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# Climate change screening of Danish development cooperation with Cambodia

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## **Preface**

A climate change screening of the Danish development cooperation with Cambodia was carried out from May 19 to 26, 2008 in collaboration with the Danida Representation in Phnom Penh and the Cambodia Climate Change Office (CCCO). The climate change screening was carried out in accordance with the Danish Climate and Development Action Plan (2005). Further details are included in the Danida Terms of Reference (February 4, 2008). Reference is furthermore made to the Preparation Note (April 9, 2008) and the briefing note (April 4, 2008) that informed about the climate change screening in Cambodia.<sup>1</sup>

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A debriefing report with findings and recommendations was presented at the Danida Representation in Phnom Penh on May 26, 2008 and the draft report was submitted on May 28, 2008. Comments were received from Danida Copenhagen (Technical Advisory Service) on June 20, 2008 and from the Danida Representation in Phnom Penh on June 26, 2008. The findings and recommendations are those of the team, and should not necessarily be considered as the views and policies of the Ministry of Foreign Affairs of Denmark.

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<sup>1</sup> See: <http://ccs-asia.linddal.net>

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## Abbreviations

ADB	: Asian Development Bank
ADDA	: Agricultural Development Denmark Asia
ADPC	: Asian Disaster Preparedness Centre
AMG	: Aid Management Guidelines (of Danida)
CAVAC	: Cambodia Agriculture Value Chain Programme
CBDRM	: Community Based Disaster Risk Management
CCA	: Climate Change Adaptation
CCCO	: Cambodia Climate Change Office
CCEAP	: Climate Change Enabling Activity Project
CCS	: Climate Change Screening
CCU	: Coastal Coordination Unit
CD4CDM	: Capacity Development for the Clean Development Mechanism
CDCF	: Community Development Carbon Fund
CDM	: Clean Development Mechanism
CER	: Certified Emission Reductions (of CO <sub>2</sub> e in CDM)
CFSP	: Cambodian Fuelwood Saving Project
CIPS	: Cambodia Inter-censal Population Survey
CMDG	: Cambodian Millennium Development Goals
CNM	: National Malaria Centre
CO <sub>2</sub> e	: Equivalents of CO <sub>2</sub>
COP	: Conference of the Parties (of UNFCCC)
CRC	: Cambodian Red Cross
CRCD	: Cambodian Research Centre for Development
CRED	: Centre for Research on the Epidemiology of Disasters
D&D	: Decentralization and Deconcentration
Danida	: Danish International Development Assistance
DCA	: DanChurchAid
DfID	: Department for International Development Cooperation (of UK)
DIHR	: Danish Institute for Human Rights
DIPECHO	: Disaster Preparedness European Commission's humanitarian aid department
DM	: Disaster Management
DNA	: Designated National Authority (for CDM in Kyoto Protocol)
DRC	: Danish Red Cross
DRR	: Disaster Risk Reduction
EEZ	: Economic Exclusivity Zone
ENSO	: El Niño Southern Oscillation
ERPA	: Emission Reduction Purchase Agreement
FMMP	: Flood Management and Mitigation Programme
GCM	: General Circulation Model

GDP	: Gross Domestic Product
GEF	: Global Environment Facility
GHG	: Greenhouse Gas
GTZ	: German Agency for Technical Cooperation
IETA	: International Emissions Trading Association
IFSR	: Independent Forest Sector Review
IGES	: Institute for Global Environmental Strategies
INC	: Initial National Communication
IPCC	: Intergovernmental Panel on Climate Change
IRAP	: Integrated Rural Accessibility Planning
JICA	: Japan International Cooperation Agency
LDC	: Least Developed Country
LDCF	: Least Developed Countries Fund
LULUCF	: Land Use, Land-Use Changes and Forest (UNFCCC abbreviation)
MAFF	: Ministry of Agriculture, Forestry and Fisheries (MAFF)
MDF	: Multi Donor Facility (of Danida and Dfid)
MEF	: Ministry of Economy and Finance
MFA	: Ministry of Foreign Affairs of Denmark
MIME	: Ministry of Industry, Mines and Energy
MoE	: Ministry of Environment
MoH	: Ministry of Health
MoWRAM	: Ministry of Water Resources and Meteorology
MPWT	: Ministry of Public Works and Transport
MRC	: Mekong River Commission
MRD	: Ministry of Rural Development
MW	: MegaWatt
NAPA	: National Adaptation Programme of Action
NBP	: National Biodigester Programme
NCCC	: National Climate Change Committee
NCDM	: National Committee for Disaster Management
NEDO	: New Energy and Industrial Technology Development Organisation
NGO	: Non-Government Organisation
NRM	: Natural Resource Management
NRM&L	: Natural Resource Management and Livelihoods Programme (of Danida and Dfid)
NSDP	: National Strategic Development Plan
ODA	: Official Development Assistance
PAP	: Process Action Plan
PIF	: Project Identification Form
REAP	: Renewable Electricity Action Plan
REDD	: Reduced Emissions from Deforestation and Degradation
RGC	: Royal Government of Cambodia

RUPP	: Royal University of Phnom Penh
SEDP	: Socio-Economic Development Plans
SNAP	: Strategic National Action Plan for Disaster Risk Reduction
TAS	: Technical Advisory Service (of Danida)
tCO <sub>2</sub> e	: tonnes of CO <sub>2</sub> equivalents
TDTF	: Trade Development Trust Fund
ToR	: Terms of Reference
TWG	: Technical Working Groups
UN	: United Nations
UNCCD	: United Nations Convention to Combat Desertification
UNDP	: UN Development Programme
UNEP	: UN Environment Programme
UNFCCC	: United Nations Framework Convention on Climate Change
UNICEF	: United Nations Children's Fund
UNISDR	: UN International Strategy for Disaster Reduction
URC	: UNEP Risø Centre (on Energy, Climate and Sustainable Development)
USAID	: United States Agency for International Development
USD	: United States Dollars
UXO	: Unexploded Ordnance
V&A	: Vulnerability and Adaptation
VCM	: Voluntary Carbon Markets
VCS	: Voluntary Carbon Standards
VER	: Voluntary Emission Reductions
WB	: World Bank
WFP	: World Food Programme
WHO	: World Health Organisation
WMO	: World Meteorological Organisation
WTO	: World Trade Organisation

## Executive Summary <sup>2</sup>

### 1. Danida Climate Change Screening

The Danish Climate and Development Action Programme (August 2005) requires that risks and potential impacts of climate change to Danish development cooperation are assessed (*climate screening*). Denmark has initiated a climate change screening of the Danish international development cooperation (Danida) in all development cooperation partner countries.

A climate change screening of the Danish development cooperation with Cambodia was carried out from May 19 to 26, 2008, for the Danida Representation in Phnom Penh in collaboration with the Cambodia Climate Change Office (CCCO) of the Ministry of Environment (MoE).

The climate change screening includes proposed recommendations for the Danida Representation to provide support to the efforts to address adaptation to climate change. Additional funding can be made available by Denmark to fund the implementation of proposed recommendations in addition to funds already available in the development programmes.

The recommendations and follow-up can be developed in close collaboration with development partners including CCCO and other donors in the concerned sectors. The climate change screening is integrated where relevant with the Danida action plan on Disaster Risk Reduction (DRR).

### 2. Climate change scenarios, risks and vulnerability in Cambodia

With the exception of annual floods and droughts, Cambodia is not in the frontline for severe adverse impacts from most natural hazards such as tropical storms and earthquakes. Large-scale disasters caused by natural hazards are not considered to pose a major risk. There is, however, widespread poverty and significant vulnerability to small-scale and localised impacts of natural hazard events mainly related to water flow or lack thereof, e.g. due to impacts of management of natural resources (land, forest and water) and location of infrastructure. Cambodia may thus each year experience several smaller disasters with impacts on livelihoods rather than single events causing large scale loss of lives and property.

Addressing the flood and drought regimes controlled by the monsoon rains is a key element for livelihoods in Cambodia. The consequences of climate-sensitive human health impacts (water and insect borne diseases), access (disruption of infrastructure) and food security (e.g. impacts of agricultural pests) are likely but the link to climate change is not yet widely documented or common knowledge. The ability to address current climate variability is a further indication of coping capacity vis-à-vis future climate change. Currently there may already be an *adaptation deficit*<sup>3</sup>, i.e. a lack of capacity and capability to adapt and avoid impacts of current climate variation.

Poor people in Cambodia migrate within the country seeking better opportunities including access to land. They move into the coastal regions and into upland forest areas. Some of these areas are marginal for agriculture and may be sensitive to environmental change. The vulnerability could be further enhanced as the population of Cambodia at the current population growth (2.5 % p.a.) may

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<sup>2</sup> The executive summary is an edited version of the debriefing note presented in Phnom Penh on May 26, 2008.

<sup>3</sup> The '*adaptation deficit*' refers to the gap between the adaptation that is possible without additional policy or projects and the level that is needed to avoid adverse effects of climate change (Burton, 2006). The adaptation deficit idea is a central element drawing together adaptation and development.



have doubled over the next 25-30 years. This is also the time frame where the effects of climate change may peak even under a successful regime to keep the global temperature rise below 2°C by the end of the 21<sup>st</sup> Century.

Climate change impacts are not isolated or possible to separate from other conditions for development and poverty reduction. This is evident in Cambodia and a reason climate change is not a high priority. The effects of climate change are added to the existing causes of poverty and constraints for development. As a result climate change has a potential to erode development efforts. Climate change cannot be addressed in isolation from the effects of natural resource management, right to land and resources, good governance, food security and prices, and natural climate variability.

To date, there are no documented records of climate change occurring in Cambodia as more than 30 years of weather data are required. There is an indication that although the amount of precipitation is the same annually its spatial and temporal distribution varies. The Mekong River flow has changed in the past five years, so the wet season flow is lower than in past flood years causing lesser floods while the dry season flow is higher. This may be due to upstream regulation of the water resources with new hydropower reservoirs. The implications could be beneficial for Cambodia by regulating floods and increase the dry season flow, but the consequences for the freshwater fisheries are uncertain.

### **3. Climate change policy and institutions in Cambodia**

Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in December 1995 and the Kyoto Protocol in July 2002. The Initial National Communication to the UNFCCC was submitted in October 2002 including a greenhouse gas (GHG) inventory with 1994 as the base year. The preparation of the Second National Communication was initiated in January 2007, and a draft GHG inventory with year 2000 as the base year is expected in August 2008.

The National Adaptation Programme of Action (NAPA) was approved by the Council of Ministers in October 2006 and forwarded to UNFCCC in March 2007. The NAPA process was supported by a grant of USD 200,000 from the GEF-managed Least Developed Countries Fund (LDCF) for adaptation to climate change. The NAPA includes 20 high priority adaptation projects with a combined budget for urgent and immediate action of USD 130 Million. The implementation of NAPA priority projects can be supported *i.a.* from the LDCF.

The national climate change focal point for the UNFCCC is the Ministry of Environment (MoE). The MoE is the Designated National Authority (DNA) for the Clean Development Mechanism (CDM) of the UNFCCC's Kyoto Protocol.

The Cambodia Climate Change Office (CCCO) was formally established under the MoE in 2003 together with the DNA, but the climate change office has been operating as a project office since 1999. The National Climate Change Committee (NCCC) was established in 2006 with a mandate to prepare and coordinate the implementation of policies and strategies on climate change. The CCCO functions as the secretariat for the *one-stop* climate change focal point including the DNA. There are relevant climate change mandates in several ministries, e.g. in the Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Water Resources and Meteorology (MoWRAM) including Department of Meteorology (DOM), Ministry of Economic and Finance (MEF) and Ministry of Health (MoH).

The National Committee for Disaster Management (NCDM) is the national agency responsible for providing emergency relief and developing preventive measures to reduce loss of life and property from disasters. The NCDM was established in 1995 and is an inter-ministerial body that comprise members of relevant ministries and the armed forces. The Prime Minister chairs the Committee. In practice, a Senior Minister is in charge of management with the support of the NCDM Secretariat.

The National Strategic Development Plan (NSDP) 2006-2010 constitutes a broad framework to harmonise development efforts and aid-effectiveness, and incorporates the goals and strategies of the former Socio-Economic Development Plans (SEDP) (1996-2000; 2001-2005), the National Poverty Reduction Strategy (2002) and the Cambodia Millennium Development Goals (CMDGs). The impacts of climate change as well as the need to mobilise resources for the NAPA are included in the NSDP (Sections 2.31 and 4.49).<sup>4</sup>

#### **4. Climate Change Screening of the Danida development programme<sup>5</sup>**

The Danish development cooperation with Cambodia includes:

- The Natural Resource Management and Livelihoods (NRM&L) Programme jointly with DfID (2006-2010) and New Zealand Aid.
- Human rights, democratisation and good governance (first phase in 2006-2008 and the phase 2 from 2008)
- Private sector development programme (on-going appraisal in May 2008)
- Danish NGOs currently with programmes and projects in Cambodia are Agricultural Development Denmark Asia (ADDA), DanChurchAid (DCA), Danish Institute for Human Rights (DIHR) and Danish Red Cross (DRC).

It is noted that the concern for climate change in Cambodia is currently limited due to other pressing development priorities related to natural resource management, governance and livelihoods. Ideally, these development topics will contribute to development effectiveness and ability to address environmental change including future climate change risks.

All the programmes and projects aim to reduce poverty and will thus also contribute indirectly to reducing future vulnerability to climate change. The support to local government and communities, within agriculture and food security, and the reduction of disaster risks are in particular relevant in reducing vulnerability to climate change risks and to make the development climate resilient.

Direct risks of climate change on the achievement of the development objectives of the ongoing programmes have not been identified. There may be specific risks of climate change for

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<sup>4</sup> The NSDP includes a brief reference to climate change adaptation: “*To adequately respond to the urgent needs of climate change, in particular droughts and floods, a draft National Adaptation Programme of Action to Climate Change has been prepared, containing priority actions needed to adapt to climate change in regard to agriculture, water resource management, coastal zone management and human health*” (NSDP, p.21) and “*Successful implementation of the National Programme of Action to Climate Change will depend on adequate resources*” (NSDP p.59)

<sup>5</sup> As far as assessing the NRM&L and other programmes in the context of climate change is concerned, there were few opportunities available for the team to discuss with the key partners of the Danish development cooperation. The meetings of the climate change screening took place in the week of May 19 to 23 May 2008. Both 19 and 23 May were public holidays for public institutions in Cambodia. Therefore, the climate change screening of the climate change risks and vulnerability of the Danish development cooperation with Cambodia needs to be considered a broad overview rather than a detailed examination.

investments with a longer time horizon and a potential of *maladaptation*,<sup>6</sup> for example, with rural infrastructure like a road blocking water flows or low-lying housing developments.

The Danida representation has carried out a carbon audit with the aim to reduce the carbon footprint of the representation.

The Danida representation has been requested to prepare a report on the climate and energy issues in Cambodia to the Ministry of Foreign Affairs of Denmark. The first version was prepared in January 2008 and an update was prepared in May 2008. These notes were prepared with important inputs from the CCCO. The notes have been consulted as part of the climate change screening

## 5. Emissions and mitigation of climate change

The emissions from energy use, industry and agriculture in Cambodia are equal to 12.764 Million tCO<sub>2</sub>e (tonnes CO<sub>2</sub> equivalents). The emission of CO<sub>2</sub> from energy consumption and industries is half of the emission of methane (CH<sub>4</sub>) and just one-third of nitrous oxide (N<sub>2</sub>O). The release of CH<sub>4</sub> and N<sub>2</sub>O is mainly from agriculture; such that agriculture contributes for 80 % of the total emissions (in CO<sub>2</sub>e); while the industry and fuel consumption account for about 10 % of the total emissions (in CO<sub>2</sub>e).

The net sequestration of carbon in forests land use equals an estimated 19,636 Million tCO<sub>2</sub>e in 1994. As a result the net emission of GHGs from Cambodia in 1994 was a -5,142 Million tons CO<sub>2</sub>e (first national GHG inventory). A revision of the land use, land-use change and forestry (LULUCF) GHG inventory in 2003 reduced the estimate for the net sequestration to 7,889 Million tCO<sub>2</sub>e in 1994 base year. The revised net emission from Cambodia could thus be revised to a net emission of 5,546 Million tCO<sub>2</sub>e. The revised LULUCF figures are not officially endorsed by all concerned line agencies.

Adaptation to climate change in development programmes and reduction of vulnerability to climate change risks is the main emphasis of the Danida climate change screening in particular in LDCs. But the climate change screening also briefly addresses the actual and potential climate change mitigation activities in Cambodia. Options for mitigation of greenhouse gas emission in Cambodia include:

- Support to low-emission development paths, e.g. through energy efficiency, renewable energy and technology transfer. With emission levels already low the potential for further emission reductions in Cambodia is limited. Nevertheless, setting good standards (low emissions) from the outset will contribute to sustainable development.
- Protection and enhancement of carbon sinks in forests and agriculture is a joint production of forest and land-use management. Options for Reduced Emissions from Deforestation and Degradation (REDD) are being explored in Cambodia by several international NGOs. The most advanced REDD pilot development in Cambodia is by Community Forestry International (CFI) with support from Danida/DfID/NZAid.

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<sup>6</sup> 'Maladaptation' is any changes in natural or human systems that inadvertently increase vulnerability to climatic stimuli; an adaptation that does not succeed in reducing vulnerability but increases it instead. Maladaptation can take place when the development context is not considered explicitly in designing and implementing adaptation measures (IPCC, 2001).

Financing for mitigation can be tapped through the CDM of the Kyoto Protocol and through Voluntary Emission Reductions (VER). Angkor Bio Cogen was Cambodia's first and so far only CDM activity to be registered with the CDM Executive Board in October 2006. Two additional projects were approved by the Cambodian DNA in October 2007 and May 2007, and they are at the CDM validation stage. The main obstacle to further CDM development in Cambodia resides in the relatively small size of potential projects, which tend to be household or community based, compared to the high transaction costs of CDM.

The VER is considered in Cambodia to be a smoother and more operational approach compared with CDM. The Geres Cambodia Fuelwood Saving Project has a planned offset of 160.000 tCO<sub>2</sub>e to be sold over a 10-year period at USD 23 /tCO<sub>2</sub>e. Another example is the National Biodigester Programme selling offsets from biogas at EUR 8.5 /tCO<sub>2</sub>e.

## 6. Donor harmonisation and coordination

The coordination of development cooperation among partners takes place through the Technical Working Groups (TWG). Adaptation to climate change impacts is relevant for several TWGs and does not feature in any one specific TWG. Because climate change is relevant as a thematic issue in several TWGs, it may not require one specific TWG in charge of coordination.

The TWG for Forestry & Environment has addressed the issue of REDD and finance of climate change mitigation in the forest sector. The Ministry of Environment is not actively participating in this TWG and the CCCO is not directly involved at the TWG level.

The CCCO could have a role in coordination since the CCCO has a good overview of the various climate change related activities mainly on mitigation. For the CCCO to coordinate it requires that the NGOs and donors share information with CCCO and *vice versa*.

## 7. Findings and Recommendations

### 7.1 Key findings on climate risks and vulnerability in Cambodia

- **Climate change and climate variability:** A large part of the population of Cambodia depends on agriculture and the agricultural production is subject to the annual variations of floods and droughts. There may be a present day *adaptation deficit* that has to be filled to better address future climate change. Vulnerability to climate change is high in Cambodia as a result of poverty, poor governance, food insecurity and marginalisation.
- **Awareness and capacity:** Awareness of climate change is limited and climate change adaptation is not an explicit key priority for government. But it is related to the priorities such as food security, water resource management, forest protection and agricultural development. The potential drivers such as climate change are not addressed but the potential impacts are certainly known. There may be a need for analytical studies and awareness that can translate the potential impacts of climate change into relevant policy and management responses. There is a need to create awareness about climate change and its effect on different climate parameters and possible impacts on different sectors.
- **CCCO - the one-stop climate change entry point:** The Cambodia Climate Change Office (CCCO) is relatively well functioning compared with similar focal points in other LDCs. During its operations since 1999, the CCCO in addition to national communications and the NAPA has positioned itself well among the relevant institutions and the private sector both in

relation to adaptation and mitigation. The CCCO has good relations with other line agencies. CCCO has also supported the Danida representation in preparing its reporting on climate change in Cambodia to Copenhagen. The CCCO has a potential to further develop its functions and mandate.

- **Donor coordination and harmonisation:** Addressing climate change and development is gradually emerging among NGOs and donors in Cambodia. The main attention has been on the mitigation topics (CDM, REDD and other sources of potential carbon finance), but attention to adaptation is also emerging. Climate change adaptation and reduction of vulnerability has only been limited addressed directly at the Technical Working Group (TWG) level, but indirectly through relevant sector policies, e.g. water resource management.
- **Climate data and modelling:** Cambodia in general and CCCO in particular needs quality climate data to enable the generation of climate change scenarios and projections. Some data since the 1980s available with Department of Meteorology (DOM) are only in hard copy. Digitization of data by DOM would be relevant for the Second National Communication in preparation by CCCO. The observation capacities of DOM could be further improved since accurate data would enable better projections, e.g. for climate models and early warning. Danida is already supporting enhancement of DOM's manual observation capacities through a regional project (Enhancing Community Resilience to Natural Disasters in South East Asia) implemented by Asian Disaster Preparedness Centre (ADPC). There will be continued scope for further improvements, e.g. climate data management, forecasting and automatic weather stations.
- **Climate change adaptation (CCA) and disaster risk reduction:** The National Committee on Disaster Management (NCDM) has been working for nearly a decade on reducing vulnerability to disasters through enhanced preparedness, response capabilities, and prevention activities. The National Climate Change Committee (NCCC) established in 2006 is not yet functional. NCDM and CCCO could collaborate more closely in sharing their experiences and knowledge on DRR and CCA respectively, among themselves and with the common stakeholders at large.
- **Disaster and climate change forum:** A DRR forum comprising of several NGOs and international organizations meets once every two months to share information and knowledge on community-based risk reduction. The forthcoming meeting in August 2008 has climate change adaptation as a theme. CCCO can participate more closely with this forum to learn from experiences of disaster managers that will be useful in identifying and coordinating the implementation of climate change adaptation activities.

## 7.2 Recommendations

The recommendations are prepared by the Team. The recommendations are for further decision on follow up by the Danida Representation in Phnom Penh in collaboration with CCCO and other development partners in Cambodia.

**Recommendation 1: Programmatic support to the Cambodia Climate Change Office (CCCO).** Support to CCCO will make it possible to improve the coordination of the climate change issues in Cambodia and initiate activities in addition to the on-going development of the Second National Communication with UNDP support.

It is suggested that the CCCO prepare a proposal for a programmatic support from Danida to develop priority activities of the CCCO strategic plan with cooperating agencies. This may include:

- Climate change education and awareness raising, including analytical work on climate change and thematic development topics with climate change sensitivity, e.g. in agriculture, health, water resources, energy and forestry.
- Climate change technical and institutional strengthening, including support to the NCCC and the capacity of the CCCO to continue to function as the 'one-stop' point for climate change in Cambodia.
- Development of Cambodia's climate scenarios and projections for improved assessment of vulnerability and adaptation options, taking into account the Cambodia Millennium Development Goals (CMDG) including poverty reduction, health and gender.
- Development of the position of Cambodia for UNFCCC COP 15 (2009) and the post-2012 regime including coordination with other LDCs, in-country coordination and networking, and additional COP participants.
- Improved coordination with line agencies, NGOs, TWGs and the National Committee for Disaster Management on issues related to climate change.
- Complementary with other CCCO-managed activities including the on-going assistance from UNDP to prepare the Second National Communication to the UNFCCC.

The Danida representation should inform CCCO/ MoE officially about the support. The support will be for up to three years and with a proposed budget of up to DKK 2,500,000 (about USD 500,000). The support will follow the procedures of the local grant authority of Danish Embassies. A draft proposal should be forwarded by CCCO by September 2008 and an agreement should be ready by October 2008.

**Recommendation 2: A reserve for the co-financing to MoE for the coastal zone management UNEP/GEF adaptation project.** It is recommended that Danida supports the implementation of the NAPA priorities. MoE has approached the Danida representation for a co-financing of a proposed coastal zone adaptation project that is included among the NAPA priorities.

For Danida to reserve a co-financing the project, the MoE and UNEP should forward a more detailed request. This request shall outline:

- Status of other sources of funding and the proposed procedures for the financial management of the co-financing.
- Clarification on whether the Danida co-financing is for the development budget or additional adaptation costs of the proposed activities.
- Clarification of the sustainability of the past DKK 50 Million support from Danida to the environmental coastal zone in Cambodia and key outcomes that will be relevant and used in the climate change adaptation project.
- A commitment to inform the Danida representation without further delay in case the co-financing may no longer be required.

The detailed request should be forwarded by UNEP and MoE to the Danida representation not later than October 2008. The proposed support from Danida for co-financing is up to DKK 2,500,000 (about USD 500,000).

Danida has to make a commitment for the use of the available climate change funding in year 2008. An agreement has therefore to be made before December 2008. If an agreement is not feasible Danida has the option to allocate the funding to any other strategic support to address climate

change adaptation in Cambodia or elsewhere. The actual co-financing is subject to a project document of good standard approved by GEF (LDCF Council) and by Danida.

**Recommendation 3: Climate change to be included as a thematic issue in the current and next phase (from 2011) of the NRM&L programme.** It is recommended that

- Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) are addressed in the current phase of the NRM&L program through links and coordination with the Cambodian Climate Change Office (CCCO) and the National Committee on Disaster Management (NCDM). Links may be established between the NRM&L program activities and the CCCO and NCDM with a view to, for example, introducing CCA and DRR as part of the training and information activities being carried out through the components
- CCA and DRR are included in the next phase of the NRM&L programme from 2011 in accordance, e.g. with national policies and with the Danida Aid Management Guidelines. The preparation of the next phase may already be initiated from end 2009 or beginning 2010.

**Recommendation 4: Continued support to REDD as long there is scope for sustainable outcomes.** Danida/DfiD/NZAid have provided a key support to the initiated efforts to develop REDD. This is a pilot activity of local and global relevance and with continued challenges. It is recommended that support to REDD should continue as long as the REDD activities are in the pilot development phase and have prospects of achieving sustainable outcomes.

**Recommendation 5: Mainstreaming climate change in all development activities.** When appropriate, the Danida Representation should seek to include climate change risks, vulnerability and adaptation as topics in annual consultations, annual programme reviews and when identifying development cooperation. The Danida representation can make use of entry points for addressing climate change outlined in the Danish Climate and Development Action Programme (2005).

The Danida representation should facilitate and monitor the inclusion of climate change risks and reduction of vulnerability in the implementation, e.g. in compliance with building codes, environment impact assessment and use of clean technology.

The mainstreaming also applies to on-going and planned activities in the NRM&L Programme and Private Sector Programme, e.g. to reduce the vulnerability to climate change and climate variability, and to support options for a low-emission development path in the choices of technologies, marketing, innovation, and infrastructure.

# 1. Introduction to Climate Change Screening

The impacts of climate change are looming and will alter the conditions for the global economy and local livelihoods in forthcoming decades. Over the next decades, it is highly likely that countries and people will be adversely affected by climate change. In particular developing countries and the poor are vulnerable and may face larger water shortage, food insecurity and greater risks to health and life as a result of climate change (IPCC, 2007).

Development cooperation is designed with explicit or implicit assumptions about climatic conditions, including climate variability, in which it is going to be implemented. A conventional approach has been to assume that the future climate will be the same as past weather. With climate change, however, this can no longer be taken for granted, particularly in climate-sensitive sectors such as water resources and agriculture. This change will require an adaptation of existing and future practices, plans, programmes and infrastructure in many parts of the world in order to reduce the risk posed by changes in the weather regime. Adaptation to climate change may be built into programme design and implementation, but it can also be achieved unintentionally through good development practice.

The combined process of climate risk management and adaptation has been referred to as a *climate proofing* of the development cooperation (see Box 1).

## Box 1: Climate change proofing of a development programme

The climate change screening with subsequent climate proofing and reduction of disaster risks is aiming at an adaptation to the risks, exposure and vulnerability of climate change in the design and implementation of development cooperation.

*Now* = The development programme portfolio (current and planned)

- + Climate change screening (identification of climate change risks and adaptation options)
- + Reducing risks of climate change (risk management, e.g. proper selection of the site for constructing a bridge if the area is prone to high rainfall with flash floods)
- + Additional adaptation (further reduction of vulnerability, e.g. changes in selection of agricultural crops that adapt better to variations in distribution of precipitation in time and place)

*Future* = A 'climate proofed' development programme portfolio (= improved aid effectiveness)

A climate proofed development programme portfolio should in principle achieve a similar development outcome as without climate change. There will, however, be additional costs of adaptation and management of the risks.

A screening of the environmental impacts of a development programme will address the effect of the programme on the environment. In a climate change screening, this is reversed, since the concern is about the impacts of climate change on the development programmes. The climate change screening of development cooperation addresses the uncertainty of future climate change, climate variability and potential vulnerability to this change. Development cooperation may become less effective in achieving the development objectives without factoring in the climate change risk if past weather patterns are assumed to continue in the future. Thus, management and decision making



should take the uncertainty about future climate change into account in order not to lose the outcome of the investments.

The key elements of the climate change risk screening include:

- Assessing the ways in which different vulnerable groups and sectors are likely to be affected by climate change in the medium to long term.
- Carrying out climate change risk assessment of the on-going and planned development cooperation portfolio, programmes and projects in the short term.
- Identifying opportunities for additional adaptation to reduce vulnerability to climate change within the development portfolio or with additional interventions.

The emphasis is on climate change adaptation (CCA) and the mainstreaming into development programmes with the aim to further support poverty reduction and sustainable development (*see* Box 2). It is noted that the objectives of development cooperation with reduction of poverty and sustainable development coincide with adaptation and reduced vulnerability even before factoring in climate change. Additional CCA may be required when the climate change risks are identified.

There is some overlap but also some differences in the policy response to CCA and Disaster Risk Reduction (DRR), although these agendas may not always be harmonized or institutionally coordinated (*see* Annex 5).

### ***Climate screening of Danish development cooperation in Cambodia***

Denmark has initiated a climate change screening of Danish international development assistance (Danida) in all development cooperation partner countries. The Danish Climate and Development Action Programme (August 2005) requires that potential impacts and risks of climate change to Danish development cooperation should be assessed (*climate screening*). The purpose of the Danida climate screening is to ensure that risks from climate change are addressed in the design and implementing the Danish development cooperation in Cambodia (*climate proofing*).

Denmark is currently providing support to the Royal Government of Cambodia (RGC) in the natural resources management, good governance and private sector. The purpose is to address opportunities for contributions to vulnerability reduction to climate change in Cambodia within current development cooperation or as additional interventions. The outcome of the climate change screening is to improve the effectiveness of Danish development cooperation in Cambodia and facilitate informed choices on adaptation to climate change and climate variability. The adverse consequences of climate change can be addressed by reducing exposure and vulnerability and through further adaptation.

The output of the assignment is the climate change screening report of the Danida supported sector program in Cambodia. The screening recommends potential adaptation options and ways toward climate proofing of the Danish-supported sector programmes. The report includes a process action plan for follow-up by the Danida Representation in Phnom Penh. The proposed activities to reduce the impacts of climate change may be accommodated at no additional budget within the current sector programmes or from an additional climate change budget made available by the Ministry of Foreign Affairs of Denmark (MFA).

## Box 2: Climate Change, Mitigation, Adaptation and Development

The UN Framework Convention on Climate Change has since its beginning emphasised mitigation of the emission of CO<sub>2</sub> and other greenhouse gases (GHG) to reduce future climate change. Mitigation requires international cooperation and commitment because GHGs are uniformly mixed in the atmosphere and thus global externalities, i.e. the location of the source of mitigation, is independent of the benefit from the reduction. It is recognised that although attention has grown on the impact of current climate variability, the major consequences of climate change will be felt beginning in few decades and until the end of the century. Current mitigation is therefore urgent to reduce future climate change.

The major share of the mitigation will take place in developed countries, but the flexible mechanism like Clean Development Mechanism (CDM) under the UNFCCC's Kyoto Protocol make it possible to substitute mitigation, for example in Denmark, with mitigation in a developing country. If additional mitigation can be done at a lower cost, it will be possible to identify financing for investments in developing countries that may contribute to sustainable development.

The current mitigation efforts with or without CDM finance are probably insufficient to eliminate the potential risk of future climate change. It will therefore be relevant to adapt to a certain degree of future climate change as well. Developing countries are considered to be particularly vulnerable to climate change risks due to poverty, agricultural dependence, and low investment capacity. Unlike mitigation, adaptation is not a global externality, i.e. the benefits of adaptation can mostly be captured locally. A justification for external financing of adaptation in developing countries is that the problem of climate change is caused by the lifestyles and associated emissions of GHGs in developed countries.

Adaptation to climate variability already occurs today, e.g. through strategies to prepare for droughts or floods. Some adaptation takes place by individuals and the private sector, e.g. investment in irrigation facilities to reduce vulnerability to water scarcity. The need for additional capacity for adaptation is determined by the expected climate change risks and the vulnerability of exposure to such risks.

Adaptation can reduce vulnerability to anticipated climate change risks. Long-term investments, e.g. road infrastructure should consider the future flooding potential. Current development should avoid enhancing the risks, e.g. developing residential areas in low-lying coastal areas prone to flooding or adverse effects of extreme weather events. An adaptation strategy can also increase the capacity to prepare for anticipated climate change risks by addressing the overall development picture.

Although there are records from past weather events, the assessment of the impacts of climate change will be counterfactual without a reference baseline for a situation with no climate change. It is uncertain how much adaptation is required due to the uncertainty about the future impacts of climate change. One strategy is to seek adaptation measures that are 'no regrets', i.e. which will reduce vulnerability to climate but also are relevant for development objectives even with the known current climate.

It is increasingly recognised that adaptation to climate change is also an integral part of good development practice. The Stern Review noted that the foundation of the policy response in developing countries to climate change is that "*much of what governments should do in relation to adaptation is what they should be doing anyway – that is, implementing good development practice. This is key to reducing the vulnerability of developing countries to climate change and raising their capacity to adapt*" (Stern Review 2007, p.489).

Vulnerability to climate change is determined by factors that are mainly the same as those that development, seeks to address, e.g. wealth and resource inequality, gender and race discrimination and poor governance. Reversing these underlying factors will ultimately ensure that risks posed by climate change are not overwhelming, because they will build resilience to shocks of all sorts, hence also reducing vulnerability to climate change.

### Box 3: The royal ploughing ceremony and forecasting of harvest and rains

The various scientific methods available to forecast the weather and to predict the harvest are uncertain. In Cambodia there are, however, other methods to forecast and perhaps reduce the uncertainty of the future, in particular the royal ploughing ceremony (*Pithi Chrat Preah Neangkol*). The ceremony is part of Cambodia's cultural history and has been performed since ancient times. It was reintroduced in 1993 by King Sihanouk. The ceremony is rooted in Brahman belief, and is held to ensure a good harvest. A similar ploughing ceremony is also held each year in Thailand.

The ceremony is an annual event in Phnom Penh that marks the beginning of the rainy season. The ceremony is based around a procession of three royal oxen who walk around the 'Royal Rice Fields' (outside the National Museum) three times. The second plough in the procession is traditionally controlled by the King, and the third plough sows the seeds.

After the ceremonial ploughing the three holy oxen are escorted to the centre of the field, where a group of Brahmans (holy men) offer them seven bowls containing one portion of each of the following: water, rice, soybeans, sesame, maize, grass and wine. Depending on the quantities of each that the holy cows consume the Brahmans will consult and announce a prediction of the coming years' farming season.

According to Khmer belief it is possible to predict a range of events including epidemics, floods, good harvests and excessive rainfall. It is designed to give an auspicious beginning to the new planting season. Every year, Cambodian farmers anxiously await the predictions of this ceremony, which they observe with strong faith.

One year, for example, the royal oxen chose to eat out of only three trays. Because their feast consisted of varying percentages of rice and maize while they largely ignored the trays of sesame seeds, grass, water and wine, prognostications were as follows: "*Farmers would enjoy a moderate output for their rice harvest but good yields in secondary crop production, especially maize and beans*". Because the royal oxen only sniffed on the tray of water and turned away from the wine, the prediction was made that: "*Farmers would not suffer any serious floods*".

There is no point in discussing the validity of the predictions – some would argue that there is no better forecast. The large interest demonstrates that the forecasting of harvest, rains and floods has meaning for Cambodians depending on farm produces and with livelihoods influenced by floods and rains. The royal ploughing ceremony is also an opportunity to address the impacts and vulnerability to climate change both to sensitise decision makers and to increase the awareness of the population. The royal ploughing ceremony is expected to continue for years to come.

Source: Among others - [http://www.tourismcambodia.com/highlights/events/ploughing\\_festival.asp](http://www.tourismcambodia.com/highlights/events/ploughing_festival.asp)

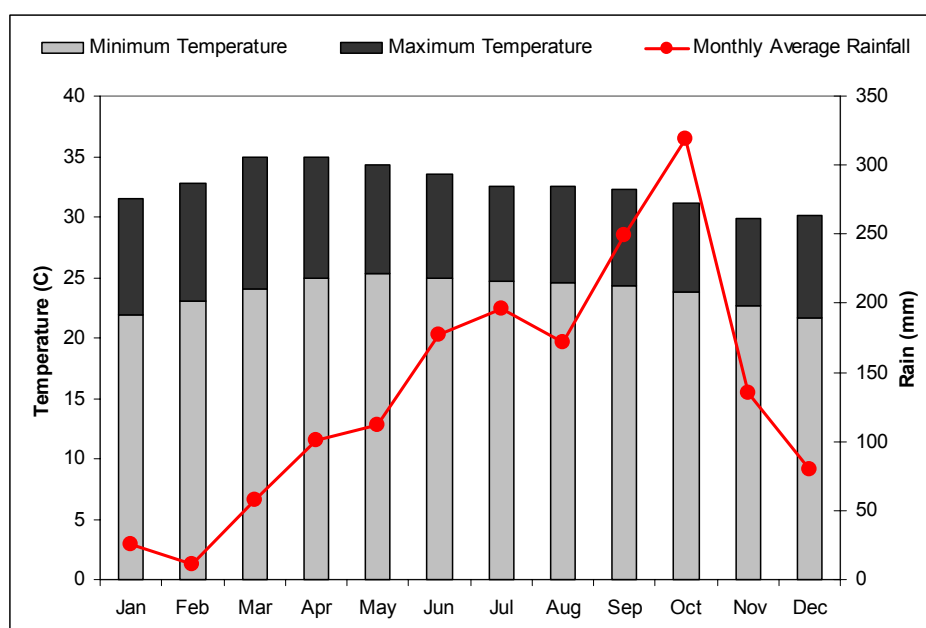
## 2. Climate Change Scenarios, Impacts, Vulnerability and Risks

### 2.1 Climate patterns and climate variability

Cambodia's geographical features are dominated by an undulating plateau in the east, flat plains along Tonle Sap Lake and the Mekong River in the centre, the Dangrek Mountains along the border with Thailand in the west, and the Cardamom Mountains and Elephant Range in the southwest.

Cambodia experiences a wet monsoon season with rains between May and October, and two rainfall peaks in June/July and September/October. Winds blowing southwest landward from the Indian Ocean bring heavy rains. In the dry season from November to May winds blow from the northeast. While cooler air dominates from November to March, hotter air prevails from April to May.

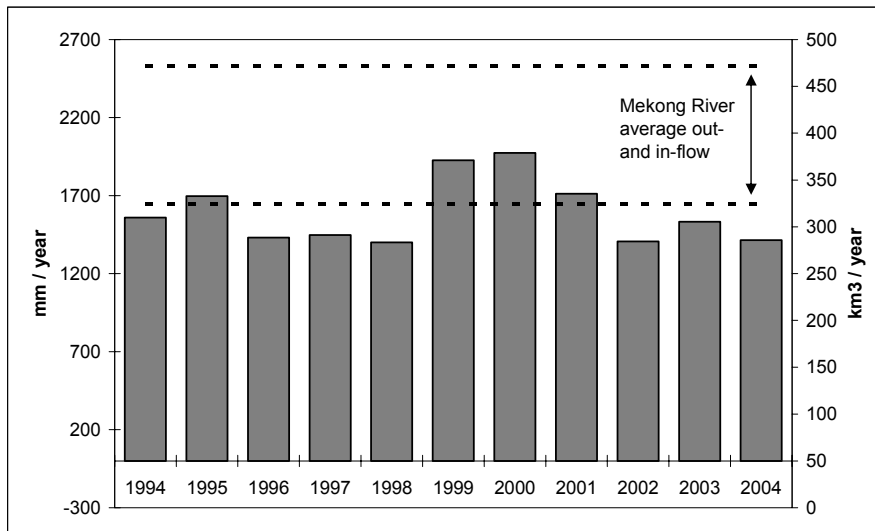
The maximum mean temperature is about 28°C and the minimum mean temperature about 22°C. March and April are the warmest months, and November and December are the coldest. Maximum temperatures exceeding 38°C are recorded annually at the height of the dry season. Minimum temperatures rarely drop below 10°C.



**Figure 1: Average monthly maximum and minimum temperatures and rainfall (1997 - 2001)**

Source: Data from [www.worldweather.org](http://www.worldweather.org)

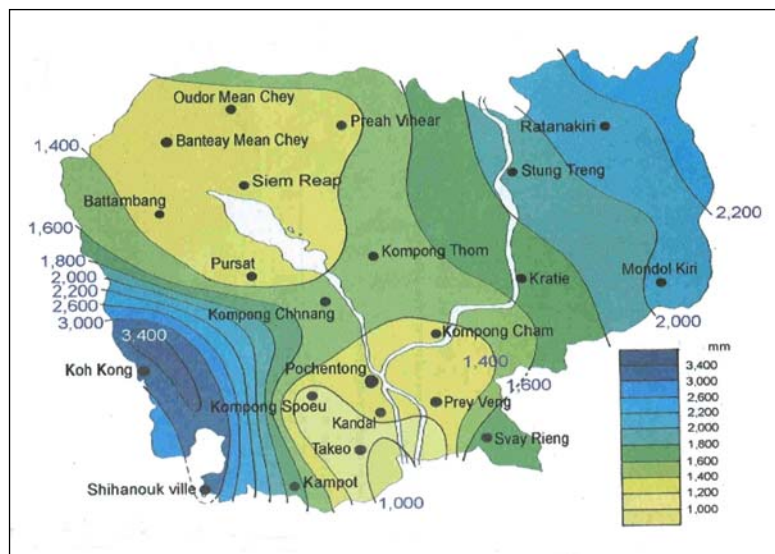
The rainy season accounts for 90% of annual precipitation. From 1994-2004, the average annual rainfall has fluctuated between 1,400 mm and 1,970 mm. There is no observable trend over such a short time period but a noticeable 'hump' for the wet years 1999, 2000 and 2001 (Figure 2). The annual external inflow of water to Cambodia from the Mekong River is of similar magnitude as the annual precipitation.



**Figure 2: Average rainfall in Cambodia and Mekong inflow and outflow (1994 – 2004)**

Source: NIS (2005) and MOWRAM (2003)

Though the average rainfall is substantial, its spatial distribution is unequal across different parts of Cambodia (Figure 3). Coastal areas receive almost 5,000 mm over a period of four to five months, while the larger central plains receive less than the national average, but are more frequently flooded by the Mekong River. The distribution in time and location are perhaps more critical factors than the average amount of water, but the absolute rainfall reveals the potential for water harvesting and irrigation to level out wet and dry seasons.



**Figure 3: Distribution of average annual rainfall (1981-2004)**

Source: MOWRAM (2005)

### Climate Variability

Inter-annual variability in Cambodia is associated among other factors with ENSO (El Niño Southern Oscillation), though studies have not revealed a consistent relationship. According to the initial national communication, the impact of El Niño on wet and dry season rainfall is negative in low land regions while the impact of La Nina is positive. In the upland and coastal regions, the impact of El Niño on wet season rainfall for some months is positive and while relatively negative on wet season rainfall. In La Nina years, most of the monthly rainfall in both wet and dry seasons increases above normal. However, this pattern is more consistent in the lowland regions than in the

coastal or upland regions where, rainfall decreased below normal in some La Nina years. This inconsistency could be due to local effects such as topographic features as well as sea breezes.

**Table 1: Inter-annual variability in Cambodia associated with ENSO**

Location	El Niño		La Nina		Rainfall stations
	Wet Season	Dry Season	Wet Season	Dry Season	
Coastal	+/0	-	-/+	+/0	Kampong Som and Kampot
Low land	-/0	-	-/+	+	Pochentong station
High land	+/0	-/0	0/+	+/0	Kratie station

*Note: + and – represents positive and negative impact, while 0 represents no impact*

The dependence on monsoon constitutes vulnerability due to the variability in the early or delayed onset of the rainy season. Similarly, the monsoon withdrawal could also start earlier or later than traditionally observed. Variation in the rainfall distribution between the two peaks may in July-August result in a short drought period affecting the wet season rice crop.

#### Box 4: Lake Tonle Sap/Mekong interaction

Cambodia has a unique hydrological system. The Mekong River and Lake Tonle Sap are connected by the Tonle Sap River which reverses its direction of flow twice a year. From July to the end of October, when the level of the Mekong is high, water flows into the Tonle Sap River, which fills Lake Tonle Sap, thereby increasing the size of the lake fourfold from 2 600 km<sup>2</sup> to about 10 500 km<sup>2</sup> at its maximum.

The storage capacity of Lake Tonle Sap is estimated at 72 km<sup>3</sup>. In early November, when the level of the Mekong decreases, the Tonle Sap River reverses its flow, and water flows from Lake Tonle Sap to the Mekong River and thence to the Mekong Delta. The seasonal rise of the Mekong floods the soils around the lake, provides breeding habitat for fishes and leaves rich silt when the waters recede, resulting in fertilisation of land and distribution of fish.

*Source: Water Profile of Cambodia, [http://www.eoearth.org/article/Water\\_profile\\_of\\_Cambodia](http://www.eoearth.org/article/Water_profile_of_Cambodia)*

## 2.2 Observed climate extremes

Cambodia has a 435 km coast line along the Gulf of Thailand of the South China Sea. There is no Pacific coastline, which spares the country from the direct impacts of typhoons. Mountainous regions and highlands to the east provide additional protection but typhoons affecting Vietnam can bring heavy rainfall to Cambodia.

Freak typhoons such as Typhoon Linda (November 1997) after causing serious impact on the southern tip of Vietnam caused significant damages on the coastal regions of Cambodia, with Kampot receiving 404 mm of rain in 24 hours. A total of 89 Cambodians lost their lives.

Cambodia has marked dry and wet seasons influenced by the monsoon weather system. Floods and droughts are the most common hazards. The direct effects are periodic losses of lives, crop failures, and destruction of property and infrastructure. An overview of recorded disasters is provided in

Table 2.

**Table 2: Cambodian natural disasters (1991-2002)**

Year of occurrence	Disaster event	No. of persons affected	Location (provinces)
1991	Flood	650,000	Kampong Cham, Prey Veng, Kampot, Kampong Speue, Takeo, Kandal
1994	Flood	29,000	Battambang, Kampong Cham, , Kampong Speue, Takeo, Phnom Penh
1995	Drought, famine	2,500,000	-
1996	Drought, famine	2,500,000	Prey Veng, Kampong Chhang, , Kampong Speue, Takeo
1997	Flood	1,300,000	Kratie, Phnom Penh, Ratanak Kiri, Stung Treng, Kampong Cham, Kandal, Prey Veng
1998	Crop failure, famine	900,000	(Non available on source)
1999	Flood	527,904	Sihanoukville, Kampot, Koh Kong
1999	Flood	106,670	Takeo, Kandal, Kampong Speu, Phnom Penh, Pursat
1999	Epidemic (Diarrhoeal/Enteric disease)	1,254	Ratanak Kiri
2000	Flood	3,448,000	Stung Treng, Kratie, Kampong Cham, Pursat, Kampong Thom, Takeo, Siem Reap
2001	Flood	1,669,182	Stung Treng, Kratie, Kampong Cham
2001	Drought	300,000	

Source: CRED & WFP (2005)

There is little data available on windstorms. The NAPA (2006) reports that 8 of 17 provinces surveyed experience strong winds in particular during the dry season (see Box 5)

#### **Box 5: Coastal dry winds - case of Prey Nup district, Sihanoukville Municipality**

Between October and early December three coastal communes, Tuek La'k, Tuek Thla and Samekki in Prey Nup district, Sihanoukville Province, experience strong dry winds (*Kachol Kodeauk* in Khmer) which cause severe damages to houses and the crops which are near harvest. Damages by strong winds have been reported in many other provinces during the same period of the year. Though there is no proper record of the strong winds, according to the communities in Tuek La'k village, these winds are experienced every year but strong winds are experienced once in every two to three years. According to local communities, strong winds were experienced during 2003 and 2006; moderate winds during 2004 and 2005. In the year 2006, strong winds flattened 9 houses and 470 houses were partially damaged (roofs blown away).

In the past, villagers were able to predict the strong winds through their indigenous knowledge two days in advance, as a loud roaring noise from Kam Chay Mountain could be heard from to the wind striking the hill sides. But these days, deforestation along the windward side of the mountain ranges has dampened the wind, leaving villagers little time to react. Due to the lack of scientific forecast information, villagers still depend on their indigenous knowledge for forecasting, such as the movement of ants for heavy rains, the flowering of *Tom Pang Bay Sor* Trees for the end of the rainy season, or forecasts from the famed royal ploughing ceremony.

A study conducted by ADPC under the Danida funded 'Enhancing Community Resilience to Natural Disasters in South East Asia Project' shows that this phenomenon is linked to the reversal of trade winds from east to west in November, which is part of a large scale phenomenon. The study also shows that it is possible to provide such information in advance so that the communities can take necessary measures to reduce damages.

## **Floods**

Rural communities have traditionally lived by regular patterns of flooding by the Mekong River and its tributaries. Annual flooding provides nutrients to soils, water for rice farming, and habitat for fish breeding. Thus, floods are considered to be an integral part of rural livelihoods, and are beneficial as long as they correspond to predictable patterns to which rural people have adapted. When floods occur earlier or later than expected, and when they last longer and have higher intensity, they spell disaster for rural communities.

Floods have differentiated effects on the Cambodian economy and people's livelihoods - medium floods are beneficial, while extreme floods such as in 1978, 1996, 2000, 2001 and 2002 boost soil fertility and fisheries but have such a widespread scope that they result in loss of lives, damages to infrastructure and crops, and human suffering. Extreme dry years such as 1988 and 1998, when no flood water reached the flood plains, lead to sudden drop in fish catch and crop production. Floods effects differ from year-to-year depending on their magnitude, timing of peaks and duration.<sup>7</sup>

The flow of the Mekong River<sup>8</sup> is influenced by upstream climate change impacts in China, Myanmar, Laos and Thailand, and downstream impacts in the Mekong delta. Annual floods in Cambodia are caused by the Mekong water from upstream catchments mainly from the left hand side tributaries of the middle reach of the Mekong in Laos.

The frequency of severe floods has increased since the 1990s. There is little data available before the 1980s, as most records were lost during the wars. The 2000 floods were the worst to hit Cambodia in seventy years, and were immediately followed by severe floods in 2001 and 2002. The official NCDM report on 16 November 2000 put the death toll at 347 lives lost (80 percent of whom were children). Of the 750,618 families (3,448,629 individuals) affected by flooding about 85,000 families (387,000 individuals) were temporarily evacuated. Furthermore, 317,975 houses were damaged, while 7,068 were destroyed. The total physical and direct damage were estimated at USD 150 million.

Floods affected 1.6 million Cambodians in 1996, 3.4 million in 2000 and 1.7 million in 2001 (CRED, NCDM & WFP, 2005). Intense and prolonged flood periods are characterised by subsequent water and food shortages. The results are increased poverty and chronic food insecurity. The 1990-2000 record suggest that flood may result in average annual loss of 100 lives and financial losses in the range of USD 100 to 170 million (see Table 3).

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<sup>7</sup> Saing Im Sok: Country Report Of Cambodia, Cambodian National Mekong Committee

<sup>8</sup> 80% of Cambodia is part of the Mekong River watershed and the remaining 20% is part of the watersheds that drains into the coastal region.



**Table 3: Direct Physical Damages of the year 2000 flood**

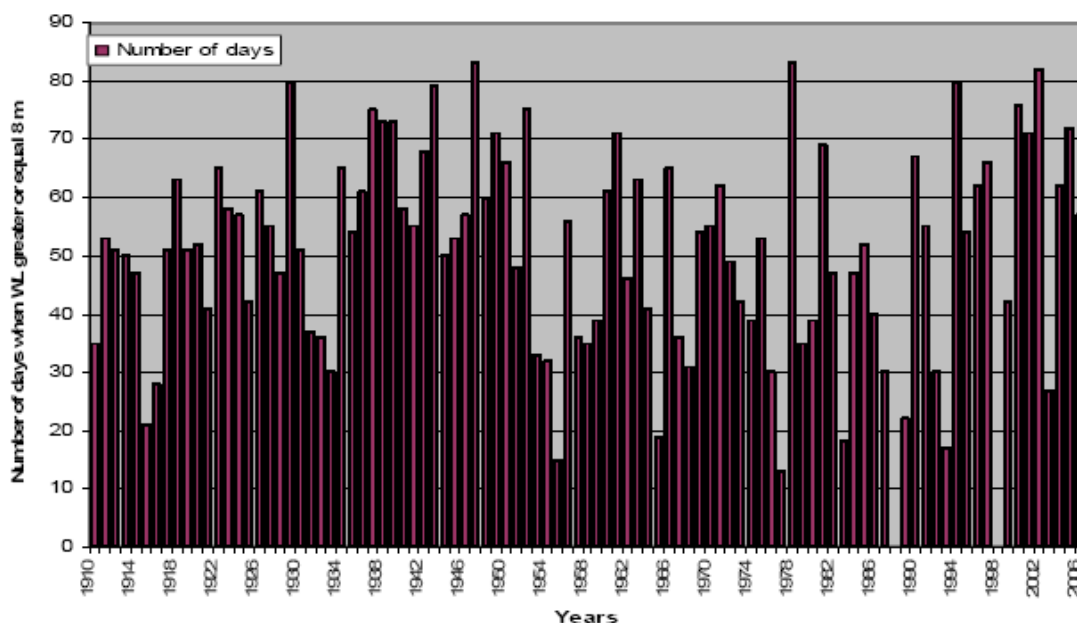
Affected	Extent	Estimated Cost
Wet season rice	616.750 hectares flooded out of which 347.107 hectares destroyed	a) Based on market value USD 87 million ( 424.000 tons of milled rice * 800 riel / kilo b) Based on NCDM report USD 57.5 million
Other crops (corn, peanuts, soybeans, vegetables, sugar, cane, sesame seeds, mung beans and cassava)	51.272 hectares flooded out of which 47.461 hectares destroyed	USD 8.519.249
Livestocks	2 309 buffaloes and cows, 1 619 pigs lost	USD 476.704
Schools	860 primary schools 128 high schools	USD 15.200.000
Hospitals	158 hospitals affected	USD 693.000
Rural Development	- Bridges and pipes in 19 places @USD 271.500 - 5 404 toilets @USD 216.160 - 11.967 wells, pipes and pumps @ USD 479.574	USD 10.876.384
Water resources	- Hydrological system affected in 123 sites covering 123.265 hectares	USD 16.714.734
Public Works and Transportation	- National, provincial and secondary roads – 1,500 km @ USD 44.933 - Bridges in 155 places – 3 024 meters @USD 1.687.825 - 1 521 km of train tracks @ USD 9 900 150	USD 44.621.385

Source: NCDM

Transport infrastructures and urban areas are vulnerable to increasing flooding and flash floods from extreme rains. People are displaced by floods and markets respond with increased prices in food and other commodities.

The majority of provinces in Cambodia are quite vulnerable to floods, but the general pattern differs between clusters of provinces (NAPA, 2006). North of Phnom Penh, upstream along the Mekong and Tonle Sap Rivers, the duration of floods is short, but flooding occurs several times a year.

The Stung Treng hydrological station is the most upstream station in Cambodia on the Mekong and has records available since 1910. Figure 4 shows time series of the number of days when water level reached or equaled the threshold of 8.0 m at Stung Treng to enter the flood plain. There is a great variation in the number of days indicating extremes of excess flooding or extreme droughts.



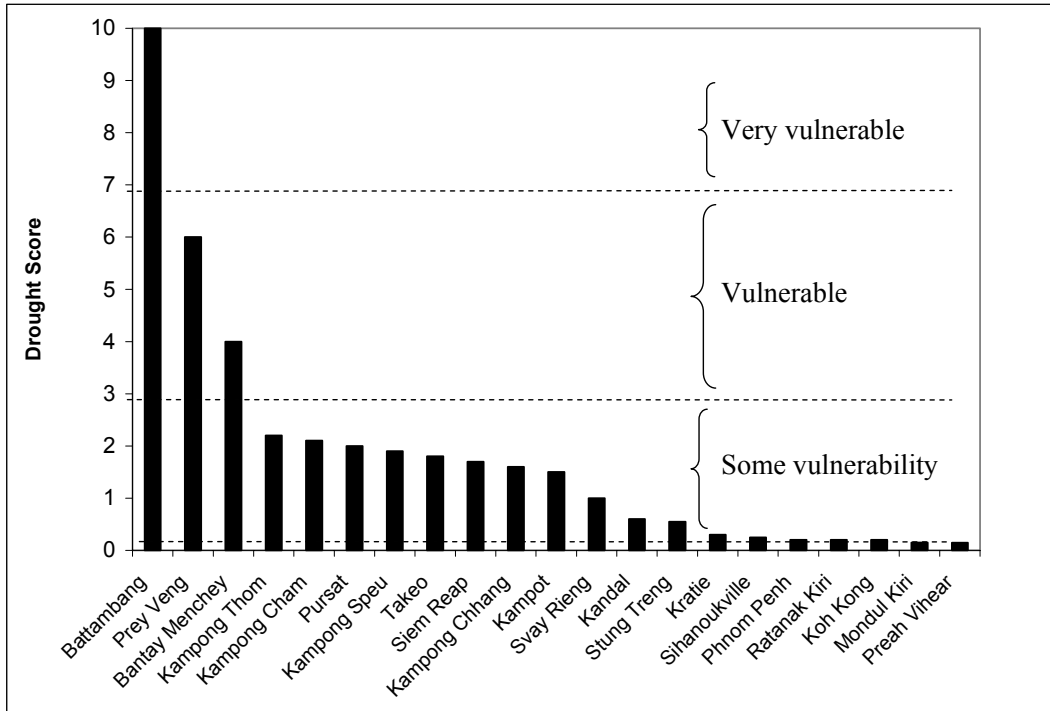
**Figure 4: The Mekong River high flow at Stung Treng, Cambodia (1910-2006)**

Number of days when water level is greater or equal to 8m (water level when water starts to flow into Cambodian flood plain). Source: Saing Im Sok: Country Report Of Cambodia, Cambodian National Mekong Committee.

### **Droughts**

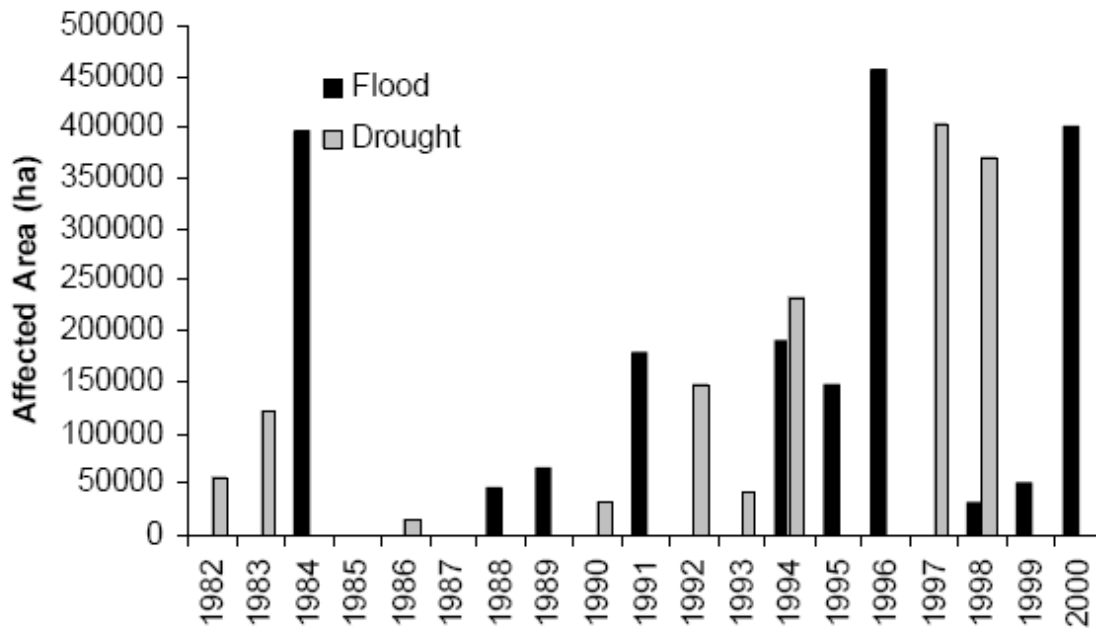
While floods affect lowland areas bordering the Mekong and its tributaries, droughts are geographically widespread and affect a large number of people (NCDM, 2002; MoP, 2005). The same provinces may be affected successively by drought and flood in the same year. Provinces vulnerable to drought are equally vulnerable to flood (NAPA, 2006). The 1995, 1996 and 1998 drought led to widespread crop failure and famine. An estimated 2.5 million people were affected each year by the droughts of 1995, 1996 and 2002.

The household survey conducted as part of the NAPA report preparation found that nationwide, some 71% of villagers had noticed an increase in the frequency of droughts in recent years, compared with 58% for floods. Water shortages are common all-year around for 81% of households, which significantly limits local capacity to cope with drought. The problem is further exacerbated by the fact that only a third of rural Cambodians have access to safe drinking water, and less than 34% of cultivated land is irrigated (CIPS 2004; WFP 2005).



**Figure 5: Relative level of vulnerability to drought by province**

*Source: NAPA (2006)*



**Figure6: Total rice area affected by flood and drought**

*(Source: MAFF, 1993- 2000)*

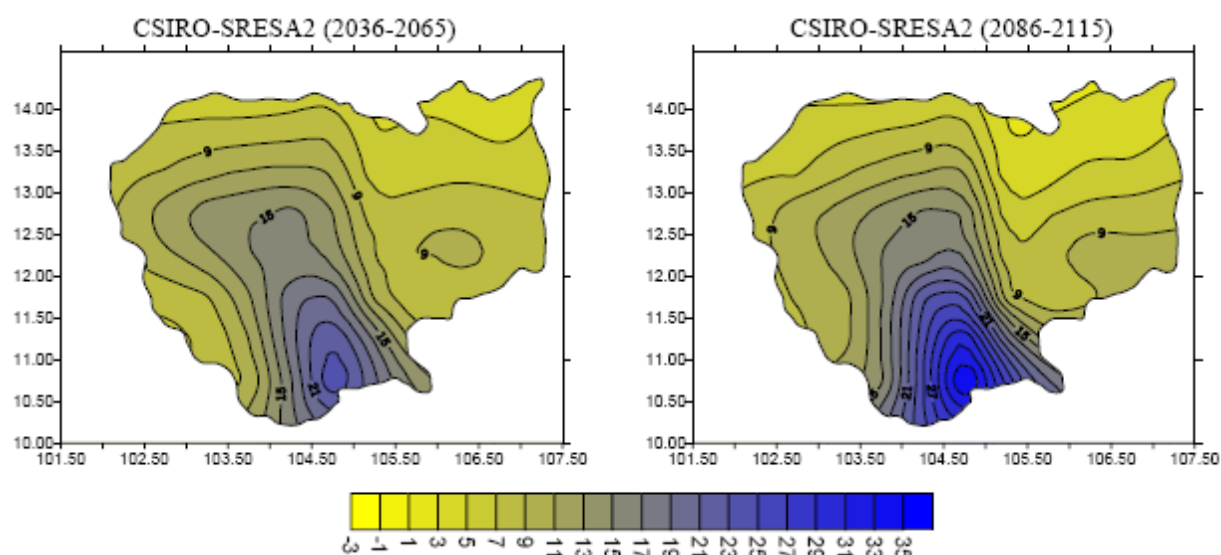
Farmers in Cambodia are already living with the consequences of climate variability resulting in floods and droughts and will be vulnerable to further variation. Rainfed rice cultivation is particularly vulnerable to variations in precipitation.

## 2.3 Climate change projections

As part of the Initial National Communication (INC, 2002) the first attempt to assess the impacts of climate change on Cambodia's climate was conducted using two General Circulation Models (GCM).<sup>9</sup> With the caveat that there was significant deviation between observed rainfall data and model output, the following projections were made:

- Mean annual temperatures in Cambodia could increase between 0.3 to 0.6°C by 2025 and 1.6 to 2.0°C by 2100;
- Mean annual rainfall in Cambodia could increase between 3% to 35% by year 2100 with the magnitude of change varying with time and location. Lowland areas would have higher increase in rainfall than highlands.
- There are no predictions on changes in climate variability between years, within seasons and on different locations. The projections are in changes in the average.

The modelling of changes in precipitation reveals that the increase will mainly be in south western Cambodia. This is where the precipitation is relatively low and below the national average. These provinces are already prone to floods and droughts so the impacts of increased rainfall will depend on whether the floods in the wet season are increased or the droughts of the dry season are reduced.



**Figure 6: Mean annual rainfall change (%) using CSIRO GCM and emission scenario SRESA2**

Source: INC (2002)

## 2.4 Potential climate change impacts

Despite uncertainties in modelling, the climate change risks are expected mainly to result in a negative outcome. There may also be cases of beneficial outcomes, e.g. with increased precipitation in semi-arid areas and new agricultural potentials with an increase in the length of growing period

<sup>9</sup> GCM models used in this analysis (CCSR and CSIRO) were not very suitable for application in Cambodia because the two models were developed for use in Japan and Australia which are very different geographical regions. The deviation of GCM models from the observed rainfall data was very significant (Ministry of Environment, 2001).

(days / year), as well as an increased crop productivity. Reduced periods of colder weather in higher altitude areas in eastern Cambodia may also be a potential beneficial impact of climate change.

The most important impacts presented in the INC's Vulnerability and Adaptation (V&A) Assessment are discussed in this section. As part of the on-going preparation of the Second National Communication, the V&A Assessment will be updated with more recent data.

**Agriculture:** The V&A assessment was conducted for paddy cultivation, as rice constitutes the main staple food in Cambodia. Yield anomalies for wet season rice are correlated with May rainfall, when farmers start planting seedlings. Water shortages during this month have significant negative effects on the early stages of vegetative growth. Under changing climate conditions, yield and production variability would increase. With the increase in the frequency and intensity of floods in lowland areas, farmers would be exposed to higher risks of production loss.

The development of varieties more resistant to longer periods of submersion under floods would assist rural communities living along the Mekong and its tributaries. To meet domestic demand for rice, it would be necessary to increase the productivity from current yields by 1 t/ha every 25 years. Adaptation options identified include: genetic improvement of high-yielding varieties, improvement of cultural practices, development of early warning system for climate extremes, development of irrigation, expansion of planting to other areas, and diversification of foods.

**Forestry:** The estimated forest cover of Cambodia is 59%, or about 10 million ha. The forest area is composed of dry/deciduous forests (60%), wet/evergreen forests (20%) and moist/evergreen forests (20%). Changes in soil water availability caused by the combined effects of changes in temperature and rainfall have significant impact on biomass production and the forest composition including reduced natural forest regeneration. With the added pressure of deforestation, some forest ecosystems may disappear.

Climate change and forest degradation in combination may result in soil erosion with increased precipitation. With projected climate conditions, Cambodia's area of wet and dry forests may decrease. Due to the longer time perspectives of natural forests the autonomous capacity to adapt to changes in environmental conditions may be low. Mixed forests with a variety of species may be better able to cope.

To reduce the impacts of climate change on Cambodia's forests, the following adaptation options may be considered: establishment of forest plantations, conservation of protected areas, and improvement of forest resource management.

**Human health:** As a tropical monsoon country, Cambodia is a breeding ground for infectious diseases. The V&A assessment of the Initial National Communication focussed on mosquito borne diseases, i.e. malaria and dengue fever.

Malaria is a major public health issue, while dengue fever has similarly become a cause of concern since the completion of the INC. On average, more than 100,000 cases of malaria are reported and treated annually. The incidence of malaria is positively correlated with wet season rainfall, low altitude, and temperature, whereas literacy rates are found to be negatively correlated.

While malaria incidence has decreased since 1999, the case fatality rate increased from 3.2% in 1998 to 4.3% in 2002. However, under changing climate conditions, the incidence of malaria might increase in Cambodia in a range of -1% to +16% (MoE, 2001). In 2007, the incidence of dengue fever increased considerably. In the first 6 months, there were 7,655 cases and 122 recorded fatalities.

Cambodia experiences a high level of malarial drug resistance, combined with inadequate access to primary health care facilities. There are more than 5,200 inhabitants per doctor, and just 7,700 medical beds for the whole country. Cambodians have the lowest life expectancy and highest child mortality and morbidity in the region. Recommended adaptation options include: diagnosis and treatment, distribution of treated mosquito nets, and health education.

#### Box 6: Climate Change, Dengue and Dr Beat

Dr Beat Richner is a Swiss paediatrician known for his acerbic violoncello performances (“Dr Beat and the Passive Genocide of Children”) and the foundation set up to run four state-of-the-art paediatric hospitals in Cambodia to provide first world and free medical care to the poor. The run-up to every wet season sees the shaggy Dr Beat clamouring for more donations of funds and blood to prepare for the annual epidemic of dengue fever.

The wet season of 2007 was marked by the worst episode of hemorrhagic fever yet on Cambodia’s records. Longer intermittent periods of rainfall and temperatures oscillating in the 25-27°C range provided favourable breeding conditions for mosquitoes. The country’s healthcare facilities were overwhelmed within days. An estimated 26,000 children were diagnosed with dengue. Under climate conditions favourable to larger mosquito populations, Dr Beat is bound to go on.

#### Coastal zone

Though not traditionally densely populated (only 7% of the total population), the 435 km coastal zone has become more socio-economically significant. Sea-level rise due to climate change would have significant negative impacts on fisheries, ports, tourism facilities, agriculture, salt farms and other coastal land uses. Mangroves and coral reefs are the coastal ecosystem most threatened by sea-level and temperature rises.

As an example, some 56% of the low-lying coastal city of Koh Kong, located in the southwest, would be submerged by a one-metre sea-level rise. Other parts of the coastline are equally vulnerable and would require further studies. The recommendations of the V&A Assessment include: development of a national strategy to respond to sea level rise; investigation of the potential impacts of sea-level rise on coastal resources, infrastructure, settlements and agriculture; and increase of public awareness.

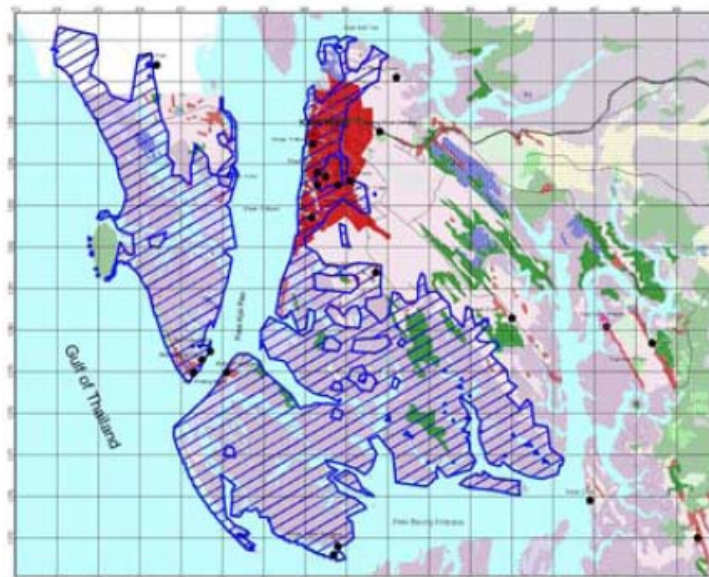


Figure 7: A one-metre sea-level rise and Koh Kong City

Source: INC (2002)

## 3. National response framework: institutions, policies and development plans

### 3.1 Cambodia and the UNFCCC

Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC) on December 18, 1995 and acceded to the Kyoto Protocol on July 2, 2002. The Initial National Communication (INC) was formally submitted to the UNFCCC on 8 October 2002. Following COP-agreed guidelines, the INC included: National circumstances related to climate change; a GHG emission inventory; GHG emission projections and mitigation options; assessment of vulnerability and adaptation to climate change; policies and other measures; activities on education, training and public participation; and recommended research.

The INC was prepared by staff of the MoE, who would later be appointed to the CCCO upon its creation. The preparation of the Second National Communication (SNC) was initiated in January 2007 and is on-going. A draft chapter on national circumstances related to climate change was completed in October 2007. A draft national GHG inventory is expected to be completed in August 2008.

Cambodia submitted its National Adaptation Programme of Action to Climate Change (NAPA) in March 2007 to the UNFCCC (*see* Box 7). Approved by the Council of Ministers in October 2006, the implementation of the NAPA is expected to contribute significantly to the Cambodia Millennium Development Goals (CMDGs) and national sustainable development objectives.

#### Box 7: National Adaptation Programme of Action to Climate Change (NAPA)

Cambodia was among the first LDCs to complete a NAPA. The aim has been to develop an achievable country-driven programme of action and priority activities addressing the needs for adapting to the adverse impacts of climate change. The climate related hazards addressed by Cambodia's NAPA are flood, drought, windstorm, high tide, saline water intrusion and malaria.

The formulation of Cambodia's NAPA relied on consultations from the grassroots level to policy-makers. A nation-wide survey of local authorities, NGOs, and more than 700 households was conducted in 17 provinces to identify coping mechanisms to climate hazards and climate change adaptation needs. The NAPA followed a participatory process involving the rural communities most likely to be affected by climate change.

The prioritisation of Cambodia's proposed activities for adaptation to climate change was validated through provincial and national consultations. Adaptation projects were prioritised according to criteria that included: improvement of livelihoods, food security, water availability, use of appropriate technology, responsiveness to immediate community needs, and sustainability.

Cambodia has made a clear choice of selecting 'no regrets' options, i.e. projects are already justified by current climate conditions and would provide social and economic benefits for local people if implemented. Under changing climate conditions, including higher frequencies of climate hazards, the selected priority activities would be even more attractive. The NAPA identified 39 projects within four sectors: agriculture and water resources, coastal zone, human health and cross-sectoral. Of these 20 projects were ranked as high priority with an estimated budget of close to USD 130 Million (*see* Annex 6). Each profile outlines the rationale, objectives, activities, outputs, location, timeframe, expected budget of the project and other relevant information for potential development partners.

## 3.2 National institutions related to climate change

### *Cambodian Climate Change Office*

Cambodia has established a government entity solely dedicated to climate change issues. On 23 June 2003, the CCCO was established as a technical body within the Department of Planning and Legal Affairs of the MoE and given the broad task of carrying out all technical activities related to the implementation of the UNFCCC and other climate change-related tasks as assigned (MOE, 2003). The key activities of CCCO related to climate change have included:

- An initial Climate Change Enabling Activity Project (CCEAP) in 1999-2002 with support from GEF/UNDP. The project prepared the Initial National Communication to the UNFCCC and included capacity development and awareness.
- A project on development of CDM capacity and projects with assistance from the Institute for Global Environmental Strategies (IGES) of Japan (from October 2003).
- The project Capacity Development for CDM (CD4CDM) (2002-2003) was implemented with the UNEP Risø Centre (URC) on Energy, Climate and Sustainable Development. CD4CDM provided support for the establishment of the DNA and the CDM project approval process.
- The preparation of the NAPA for Cambodia was initiated in August 2003 and completed as a draft in March 2005. The NAPA document was published in October 2006 and approved by UNFCCC in March 2007. The NAPA was prepared with assistance of USD 200.000 from the LCDF for adaptation to climate change with UNDP as the implementing agency.
- The CCCO is in the process of preparing the Second National Communication to UNFCCC with support from GEF/UNDP. The Second National Communication will include a section on vulnerability and adaptation.

As part of MoE, CCCO is able to coordinate its activities with the GEF focal point and the focal points of other international environmental conventions within the ministry. CCCO aims to be a one-stop shop or at least an initial contact point for not only CDM project developers, but also proponents of climate change activities in Cambodia.

Although it may be involved in the implementation of the more technical aspects of climate change projects, e.g. national GHG inventory, CCCO's role is also to facilitate and coordinate donor funded and private sector activities relevant to climate change with other government agencies. Thus, CCCO supports and organises inter-ministerial technical working groups specialised in sectors (energy and forestry), and along climate change themes (GHG inventory, mitigation, vulnerability and adaptation, and UNFCCC implementation).

### *National Climate Change Committee*

The National Climate Change Committee (NCCC), established by Ministerial Sub-decree on 24 April 2006, comprises senior policy-makers. The NCCC is an inter-ministerial mechanism with the mandate to prepare, coordinate and monitor the implementation of policies, strategies, legal instruments, plans and programmes of the RGC to address climate change. The NCCC is inter-ministerial and composed of Secretaries and Under-Secretaries of State from 19 Ministries and government agencies with mandates that are relevant to climate change adaptation or mitigation activities. The NCCC meets twice yearly or as needed.



### ***Designated National Authority for the Clean Development Mechanism***

The RGC appointed MoE as the Designated National Authority (DNA) for the Clean Development Mechanism on July 15, 2003. CCCO acts as the secretariat of the UNFCCC National Focal Point and of the Designated National Authority under the Kyoto Protocol. A selection of members of the NCCC relevant to mitigation activities forms the Board of the DNA. There is institutional overlap between the Cambodian DNA, the NCCC and the CCO, which provides the country and donor agencies institutional continuity for the implementation of climate change activities. More on CDM organisation and activities are included in section 5.

### ***Department of Meteorology, Ministry of Water Resources and Meteorology***

The Department of Meteorology (DOM) under the Ministry of Water Resources and Meteorology (MoWRAM) is the focal point for providing weather and climate information to the RGC and the public. It maintains an observation network comprising of 21 manual stations and 9 automatic stations some of which are not currently operational. With support from international agencies like Japan International Cooperation Agency (JICA) and ADPC (with Danida funding), DOM is striving to meet the climate and weather information requirements of its users.

## **3.3 Policies related to climate change**

Cambodia has yet to prepare a comprehensive national climate change policy. The priority of CCCO so far has been to mainstream climate change issues among relevant government agencies and into national development policies, as well as to attract donor interest.

Cambodia's constitution discusses environment and sustainable development issues. A number of Royal Decrees and National Laws are relevant to but do not explicitly make mention of climate change. This in particular are the Royal Decree on the Creation and Designation of Protected Areas (1993), the Law on Environmental Protection and Natural Resource Management (1996), the Forestry Law (2002), and the Electricity Law (2001).

An overview of the Royal Decrees, National Laws, Sub-Decrees, National Plans, Sectoral Plans related to climate change is included in Annex 8.

## **3.4 Climate change and development plans**

The highest national development priority is to reduce poverty towards the achievement of Cambodia Millennium Development Goals (CMDGs), which include the eight MDGs, and a ninth goal to move towards zero impact from landmines and unexploded ordnance (UXO) by 2012.

The first and second Socio-Economic Development Plans (SEDP) set out five-year development goals and strategies for the periods 1996-2000 and 2001-2005. The National Strategic Development Plan (NSDP) 2006-2010 adopted in May 2006 constitutes a broad framework to harmonise development efforts and aid-effectiveness, and incorporates the goals and strategies of the SEDPs, the National Poverty Reduction Strategy (2002) and the CMDGs. To achieve the CMDGs, total financial outlays of USD 3.5 billion are required for the period 2006-2010. The cornerstone of the NSDP remains the RGC's Rectangular Strategy for growth, employment, equity and efficiency adopted in 2004. The Rectangular Strategy has at its core good governance and public sector reform, and focuses on agriculture, infrastructure, human resources, and employment through the private sector.

The NAPA is supportive of the Rectangular Strategy, and the NSDP. The impacts of climate change as well as the need to mobilise resources for the NAPA are explicitly discussed in the NSDP (Sections 2.31 and 4.49).<sup>10</sup>

The development strategies emphasise the improvement of agricultural production through expansion of irrigation and reduced vulnerability to natural hazards through management of water resources. Other priorities, e.g. for health, are also relevant although there is no explicit link to climate change as a risk factor for climate sensitive diseases or indirect effects.

Traditional rural livelihoods are vulnerable to the adverse impacts of climate events, in particular flooding and drought. As agricultural development is central to poverty reduction efforts, the RGC intends to strengthen disaster preparedness, and meteorological and hydrological networks.

The NSDP recognizes that natural hazards and outbreak of diseases can seriously affect the performance and progress achieved. Under the new Integrated Rural Accessibility Planning (IRAP), the RCG plans to set up a mechanism that prioritizes underserved rural areas. Some of the priority actions also include promotion of disaster preparedness and risk reduction through education and provision of safety nets such as health and crop insurance for farmers.

### 3.5 Disaster risk management

The National Committee for Disaster Management (NCDM) is the national agency responsible for providing emergency relief and developing preventive measures to reduce loss of life and property from disasters. The NCDM was established in 1995 as an inter-ministerial body comprising of members from relevant ministries and the armed forces. The Prime Minister chairs the Committee, but in practice a Senior Minister is in charge of management with the support of the NCDM Secretariat. Further, committees for disaster management have been established at the province and the district level. In 2006, the RGC issued a royal decree for the establishment of Commune Committees for Disaster Management (CCDMs) to strengthen the local level institutional systems.

The first five-year Institutional Development Strategy of the NCDM (2001-2006) followed the catastrophic floods of 2000 and 2001, which affected more than five million people. The plan, developed with donor support, focused on the establishment of an effective inter-ministerial system for dealing with disaster preparedness, response and rehabilitation.

The Strategic National Action Plan (SNAP)<sup>11</sup> for 2008-2015 is being finalised with the following objectives:

1. Contribute to a common understanding, knowledge and awareness of disaster risk reduction.

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<sup>10</sup> The NSDP includes a brief reference to climate change: *“To adequately respond to the urgent needs of climate change, in particular droughts and floods, a draft National Adaptation Programme of Action to Climate Change has been prepared, containing priority actions needed to adapt to climate change in regard to agriculture, water resource management, coastal zone management and human health”* (NSDP, p.21) and *“Successful implementation of the National Programme of Action to Climate Change will depend on adequate resources”* (NSDP p.59)

<sup>11</sup> To address the implementation of the Hyogo Framework for Action in the Cambodia, the National Committee for Disaster Management (NCDM) and the Ministry of Planning (MOP) organized an inter-governmental task force to spearhead the formulation of a “Strategic National Action Plan for Disaster Risk Reduction 2008-2015” (SNAP) for the Government of Cambodia. Technical assistance was provided by the Asian Disaster Preparedness Center (ADPC) through funding support from the United Nations International Strategy for Disaster Reduction (UNISDR) and the Disaster Preparedness European Commission Humanitarian Aid Office (DIPECHO).

2. Provide a comprehensive framework to guide and monitor the implementation of disaster risk reduction initiatives in the country.
3. Create a conducive environment for the mainstreaming of disaster risk reduction into development plans, policies and projects of the RGC.
4. Enhance coordination and cooperation between disaster management stakeholders.
5. Improve the efficiency of resource allocation and utilisation in disaster reduction.
6. Orient donor support in disaster risk reduction to nationally-identified priorities.

The SNAP has identified six priority areas with 27 activities/projects that have been prioritized into four sets of attainable actions, namely (1) critical priorities, (2) first-level priorities, (3) second-level priorities, and (4) third-level priorities.

The plan document notes that both NAPA and SNAP seek to address community vulnerability to hazards, although adaptation to climate change focuses on responding to extreme weather events and slow-onset changes in climate, whereas disaster risk reduction focuses on wider issues, not just on climate-related disasters. The document also acknowledges the efforts undertaken through the NAPA and seeks to establish synergies between both the plans in implementation and monitoring the actions in future. One of the rationales underlying the new strategy is climate change, which it explicitly recognises as an emerging threat. Due to limited availability of information on possible adverse impacts of climate change at the regional and local levels it currently recommends strengthening the adaptive capacity to climate variability and extremes. However, the NCDM and the majority of donors involved in DM in Cambodia are yet to consciously integrate climate change issues into their activities, though addressing vulnerability and risk reduction.

There are a large number of international agencies and NGOs involved in disaster management in Cambodia. The DIPECHO programme (Disaster Preparedness of the European Community Humanitarian Aid Department) has focused on preparedness measures and small-scale demonstration work at the community level. Since 1998, DIPECHO has funded 11 programmes with 12 local and international partners in Cambodia. Among the lessons learned for DIPECHO's orientations in Cambodia for 2008-2012 is the use of climate change adaptation as an advocacy tool to support the promotion of Disaster Risk Reduction (Pichon & Touch, 2007). Other donors with significant activities in Cambodia include ADB, AusAid, GTZ, USAID and the World Bank.

#### **Box 8: Disaster Risk Reduction (DRR) Forum in Cambodia**

The NCDM chairs a Disaster Risk Reduction (DRR) forum attended by several NGOs and international organisations such as ADPC, Cambodian Red Cross, World Vision International, Concern, CARE, Oxfam, Action Aid, ZOA Refugee Care, Lutheran World Federation, DanChurchAid, among others, who are working on disaster risk reduction in Cambodia. The forum is hosted every two months on a rotation basis, among these organisations and seeks to promote exchange of DRR experiences, increase coordination of DRR agency activities and practitioners, raise awareness of DRR issues in the wider community and government institutions – including advocating mainstreaming DRR in the local development planning process. The major focus of the forum is on field staff – for those actively engaged in the implementation of DRR projects.

To date 11 meetings of the forum have been held and the most recent one was in May 2008 in Pursat hosted by Concern Worldwide.

## **4. Climate change screening of the Danida development portfolio**

### **4.1 The key elements of the climate change screening**

The climate change screening and risk assessment includes three key elements:

- An overall brief assessment of climate change risks and vulnerability in Cambodia as addressed briefly in Section 2. This may include both current climate variability and future climate change.
- An assessment of the direct risks of climate change and variability for the achievement of the development objective of the on-going and planned development programmes, i.e. the impacts of climate change on aid effectiveness. The response is to address climate change in the risk assessment and make appropriate changes in the programme design in order to reduce the risk of losses.
- Opportunities for additional adaptation to reduce vulnerability to climate change in Cambodia. These opportunities may be within the existing or planned development portfolio or additional climate change adaptation activities.

The two latter steps are included in the sector specific climate change screening matrix. The first step in the climate change screening is to ensure that direct risks to the Danida development portfolio in Cambodia are not overlooked. Equally important is the identification of opportunities for further reduction of vulnerability to climate change impacts.

The adaptation to climate change in the Danida development programmes can take at least three forms:

- Reduction of poverty and improved economic development may overlap with the effective adaptation responses. Achieving the objectives of development programmes will also indirectly contribute to the adaptation to climate change. Good development practice is also effective adaptation, but not all development is good, just as not all development will reduce vulnerability to climate change.
- Explicit adaptation actions may be taken in development programmes when improved knowledge or awareness about the potential climate changes can be taken into a risk assessment. This is when choices in physical planning, infrastructure and standards for building codes take future weather predictions into account.
- Additional measures can be taken that are more specific climate projects. These can be supported to improve data availability and forecasting of floods and droughts, outbreaks of pests and human diseases that are influenced by changes in the weather patterns.

### **4.2 The Danish development Portfolio in Cambodia**

Cambodia does not have the status as one of Denmark's full fledged development partner countries, and there is no Danida country strategy for Cambodia. The current collaboration with Cambodia is based on regional Danish environmental assistance to Southeast Asia that included project activities from 1997 and a bundle of projects in an NRM Programme (2000-2005).

The main elements of the current and planned Danish development cooperation with Cambodia are outlined in Table 4. The Danida activities in Cambodia also include support to Danish NGOs and various small grants activities.

**Table 4: The Danish development portfolio in Cambodia**

Programmes	On-going Sector Programmes		Comments	
	Timing	Danida Budget		
<i>Natural Resource Management and Livelihoods Programme (NRM&amp;L)</i>	2006 - 2010	DKK 220 Million (Total with DfID is Danida DKK 360 Million)	USD 44 Million (USD 72 Million for the NRM&L)	Jointly with DfID in the Multi Donor Facility (MDF). New Zealand has joined later.
<i>Human rights, democratisation and good governance</i>	2006 - 2008	DKK 25 Million	USD 5 Million	First phase is completed and the inception of the second phase is from May 2008.
<i>Private Sector Development programme</i>	2008 - 2011	DKK 40 Million	USD 8 Million	New programme. The appraisal was in May 2008.

The Danida climate change screening may include the application of a climate change screening matrix. The screening matrix can be used for programmes where relevant, i.e. if there are specific or generic risks associated with a sector programme and also where there is scope for an active engagement in reducing vulnerability and promoting adaptation.

A climate change screening matrix is considered only for the Natural Resource Management and Livelihoods Programme. It does not preclude that the other programmes may also have indirect relevance for climate change adaptation.

### 4.3 The Natural Resource Management and Livelihoods Programme

There were few opportunities available for the Team to discuss with the key partners of the Danish development cooperation.<sup>12</sup> The assessment of the NRM&L programme in the context of climate change has therefore been limited, and the climate change screening Team has not been able to address in detail what are the climate change risks and vulnerability of the Danish development cooperation with Cambodia. A climate screening matrix for the NRM&L programme has been prepared by the Team (*see Annex 2*) as a preliminary input for further detail and follow-up by the Danida representation.

The concern for climate change is currently limited due to other more urgent and immediate development issues related to firstly the implementation of the programme and secondly to challenges with natural resource management, governance and livelihoods issues. These development topics will influence the development effectiveness and ability to address environmental change including climate change risks in the future.

<sup>12</sup> The meetings of the climate change screening took place in the week of 19-23 May 2008, of which May 19 and 23 were public holidays in Cambodia.

The support to local government and communities, mainly within agriculture, water resource management and food security, and the reduction of disaster risks are in particular relevant in reducing vulnerability to climate change and to make development cooperation more climate-resilient.

Direct risks of climate change on the achievement of the development objectives have not been observed. There may be specific risks of climate change for investments with a longer time horizon. There can also be a potential risk of *maladaptation*, for example, with rural infrastructure like a road blocking water flows or low-lying housing or other land-use development. These climate change topics should be captured in the feasibility assessments and environmental assessments.

#### **4.4 The Human Rights, Democratisation and Good Governance**

There were no immediate concerns raised about climate change risks to achievement of the programme objectives. The contribution of the programme to reduce vulnerability is indirect and incidental. But emerging conflicts over for example land and water resource rights may be triggered by environmental change including effects of climate change.

#### **4.5 The Private Sector Development Programme**

The proposed Danida supported Private Sector Development Programme has two main components:

1. Trade development: The Danish support will be through the EU and UNIDO funded Trade Development Trust Fund (TDTF) executed by the World Bank.
2. Agribusiness development: The Danish support will be through Government of Australia initiated four-year programme support to Cambodia Agriculture Value Chain Programme (CAVAC). The appraisal in May 2008 recommended abandoning or reformulating the agribusiness development component.

The design of the private sector programme includes an environmental screening note. The initial assessment also includes potential climate change risks, but this was not considered to be an important issue.<sup>13</sup> The appraisal of the private sector programme was an opportunity to address the external risk factors and possibly also climate change when relevant as a thematic issue according to the Danida Aid Management Guidelines.

The investments on agribusiness and the value chains with agriculture products are subject to influence of environmental change, e.g. potentially driven by climate change and other factors with aggregated consequences on the production potential mainly due to access to water.

The private sector programme has a potential to support the application of cleaner technology and low-carbon development paths. These options are entry points outlined in the Danish Climate and Development Action Programme (2005) for a contribution to reduced emissions and a mitigation of

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<sup>13</sup> The check list in the Danida Environmental Screening Note includes the following question: “*will projected effects from climate change influence on medium/long-term impact of interventions?*” The possible answers are ‘Yes’ or ‘No’. If the answer is ‘Yes’ the next step is the application of the climate change screening matrix and other tools in the Danish Climate and Development Action Programme (2005).

the climate change. One opportunity is for the Danida representation to emphasise the climate change risks and vulnerability reduction with the development partners in the two components.

#### 4.6 Danish NGOs in Cambodia <sup>14</sup>

The Danish NGOs currently with activities in Cambodia are Agricultural Development Denmark Asia (ADDA), DanChurchAid (DCA), Danish Institute for Human Rights (DIHR) and Danish Red Cross (DRC). Their activities include:

- Capacity development of local human rights NGOs and promotion of sustainable livelihood systems among poor and vulnerable members of society (DCA).
- Implementation of a primary health care programme to improve knowledge and practice on disease prevention and basic health care (DRC). DRC also collaborates with Cambodian Red Cross (CRC) on disaster management and mainstreaming DRR in development.
- Implementation of an agricultural project in Siem Reap Province focusing on women's economic empowerment and community development through increased agricultural production (ADDA).
- Promotion of rule of law through reform supporting activities within the formal legal sector and media campaigns (DIHR).

The NGO support includes elements of livelihood improvement, disaster risk management and reduction and food security. These are all indirect contributions to climate change adaptation and reduction of vulnerability to the effects of climate change and climate variability.

#### 4.7 Other Danish climate change issues in Cambodia

The Danida representation has been requested to prepare an update on the climate and energy issues in Cambodia to the Ministry of Foreign Affairs of Denmark. The first version was prepared in January 2008 and an update in May 2008. These notes were prepared with a valuable input from the CCCO. The notes have been consulted as part of the climate screening

The Danida representation has carried out a carbon audit with the aim to reduce the carbon footprint of the representation.

Danida through a regional project with ADPC has supported the development of capacity of the Department of Meteorology (DOM) in MoWRAM for climate forecasting and modelling.<sup>15</sup> This includes an early warning for wind storms near Sihanoukville and prevention of the potential damages to paddy fields (*see* Box 5, p.8).

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<sup>14</sup> Information from the web page of the Danida representation in Cambodia: [www.phnompenh.um.dk](http://www.phnompenh.um.dk) (accessed 18 May 2008).

<sup>15</sup> "Enhancing community resilience to natural disasters"; ADPC website: <http://www.adpc.net/v2007/Programs/EWS/PROJECTS/Enhancing.asp>

## 5. Mitigation of Climate Change and Opportunities for CDM

Mitigation of climate change consists of policies and development actions that reduce emissions of CO<sub>2</sub> and other GHGs. GHG mitigation activities carried out in Cambodia yield global benefits that cannot be captured in Cambodia alone, but Cambodia also gains a share of the benefits of mitigation activities carried out in other countries.

Options for mitigation of GHG emission in Cambodia include:

- Support to low-emission development paths, e.g. through energy efficiency, renewable energy and technology transfer.
- Protecting and enhancing carbon sinks in forests and agriculture as a co-benefit of forest and land-use management.

Funding for mitigation can be provided through the CDM or through Voluntary Emission reductions (VER).

### 5.1 National GHG inventory for Cambodia

A national GHG inventory for 1994 was prepared in June 2001. The GHG inventory is divided into a total emission with and without LULUCF. The inventory was revised in 2003 for LULUCF emissions and sequestration.

- Emissions without LULUCF: The emissions from energy use, industry and agriculture in Cambodia are equal to 12,764 Million tCO<sub>2</sub>e (tonnes CO<sub>2</sub> equivalents). The emissions of CO<sub>2</sub> from energy consumption and industries are half of the emission of methane (CH<sub>4</sub>) and just one-third of nitrous oxide (N<sub>2</sub>O). The release of CH<sub>4</sub> and N<sub>2</sub>O is mainly from agriculture, such that agriculture contributes for 80 % of the total emissions (in CO<sub>2</sub>e) while the industry and fuel consumption each account for about 10 % of the total emissions (in CO<sub>2</sub>e).
- Emissions with LULUCF: The net sequestration of carbon in forests land use equals an estimated 19,636 Million tCO<sub>2</sub>e in 1994. As a result the net emission of GHGs from Cambodia in 1994 was a -5,142 Million tons CO<sub>2</sub>e. A revision of the LULUCF inventory in 2003 reduced the estimate for the net sequestration to 7 889 Million tCO<sub>2</sub>e in 1994. The net emission from Cambodia was thus revised to 5,546 Million tCO<sub>2</sub>e. The revised inventory of GHGs is not officially endorsed by all agencies concerned.

The average emissions per capita without LULUCF is 1.13 tCO<sub>2</sub>e per capita (the population in the 1998 census was 11.3 million) of which the main part (1.0 tCO<sub>2</sub>e per capita) is from CH<sub>4</sub> and N<sub>2</sub>O emissions related to agriculture. The net uptake in forests results in a net emission of 0.49 tCO<sub>2</sub>e per capita when LULUCF is included using the revised inventory.

In most developing countries the potential for mitigating emissions of GHGs from energy consumption is relative small, because current consumption patterns and lifestyles result in low levels of emissions compared with industrialised countries. The potential to address emissions of GHGs from agriculture and sequestration of carbon in forests is relatively larger.



**Table 5: Cambodia greenhouse gas inventory (based year 1994)**

	CO2 Gg	CH4 Gg	N2O Gg	CO2-e Gg
<b>GWP</b>	1	21	310	
<b>I. Energy</b>	1272,08	24,12	0,33045	
<b>II. Industry</b>	49,85	0	0	
<b>III. Agriculture</b>	0	339,26	11,08	
<b>IV. Waste</b>	0	6,77	0,42	
<b>Total (without LULUCF)</b>	1321,93	370,15	11,8	
<b>CO2-e (without LULUCF)</b>	1321,93	7773,15	3669,49	<b>12764,57</b>
<b>V. LULUCF</b>	-19635,96	74,77	0,51	
- Change in forest biomass	-64850,23	0	0	
- Forest/land use change	45214,27	74,77	0,51	
<b>Total (with LULUCF)</b>	-18314,03	444,92	12,35	
<b>CO2-e (with LULUCF)</b>	-18314,03	9343,32	3828,85	<b>-5141,86</b>

National GHG inventory (2001)

Revised LULUCF

<b>V. LULUCF (revised)</b>	-7889,024	28,984	0,20	
- Change in forest biomass	-39451,609	0	0	
- Forest/land use change	31562,585	28,984	0,20	
<b>Total (with LULUCF)</b>	-6567,094	399,134	12,04	
<b>CO2-e (with LULUCF)</b>	-6567,094	8381,814	3731,1817	<b>5545,90</b>

Improved LULUCF inventory (2003)

Source: Initial National Communication (2001) except for revised LULUCF (revised inventory for LULUCF, 2003)

## 5.2 Energy consumption and prospects for a low-carbon development path in Cambodia

Biomass is Cambodia's main source of energy, with wood accounting for 80% of national energy consumption. According to the 1997 national census, firewood was the main source of cooking for 90% of households, followed by charcoal with 5%. Liquid Petroleum Gas (LPG) is available only in urban areas. A recent increase in energy prices including LPG has increased the demand for fuel wood and charcoal.

Cambodia's renewable energy sources consist of biomass, hydropower, wind and solar. Although these renewable resources are considered to be relatively abundant, their technical potential remains largely untapped (Williamson *et al.*, 2004). The technical potential for electricity generation from biomass has been estimated at 18,852 GWh per year, including forest products, agricultural crops and residues, municipal waste and sewerage (CRCD, 2005; De Lopez, 2003; Williamson *et al.*, 2004).

Applications of renewable energy have been limited to small-scale or demonstration projects, with total installed capacity at less than 5 MW. Cambodia's technical potential for hydropower has been estimated at 8,600 to 10,000 MW of installed capacity for the Mekong River and its tributaries, and the coastal provinces (Mekong Secretariat, 2000). Commercial hydropower plants have been in operation since 1968. The current installed capacity is of about 14 MW.

The RGC is currently proceeding with the construction of the Kamchay hydropower project, which at 125 MW of installed capacity would alone be able to supply the entire capital city. Despite Cambodia's relatively high level of *insolation*,<sup>16</sup> investment costs and low awareness have limited the use of photovoltaic and solar thermal energies. Total photovoltaic installed capacity amounted to 205 kW in 2002, with the bulk on communication towers (NEDO, 2002; MIME, 2002, Williamson, *et al.*, 2002). Cambodia's wind power resources are limited to its highlands and mountain ranges, with an estimated technical potential of 1,380 MW (World Bank, 2001). To date, only small wind turbines for household and community use have been installed

The technical potential of renewable energy sources and savings from energy efficiency activities, has been estimated to equal 47 million tons CO<sub>2</sub> per year (*see* Table 6) (Williamson, *et al.* 2004). A significant proportion of these potential sustainable energy projects may consist of small-scale activities like renewable energy projects with maximum output of 15 MW; reduction of energy consumption equivalent of less than 15 GWh or a reduction of anthropogenic emissions for projects that emit less than 15,000 tCO<sub>2</sub>e per year.

**Table 6: Cambodia's potential for renewable energy generation and savings**

Energy Source	Technical potential	Current installed projects	Theoretically remaining	Potentially annual GHG abatement
	--	(GWH / year)	--	(Gg / year)
Hydro-power	37,668	55	37,613	26,228
Biomass	18,852	-	18,852	13,146
Solar	65	1	64	44
Wind	3,665	-	3,665	2,556
Industrial energy efficiency	547	-	547	381
Residential energy efficiency	6,591	29	6,562	4,576
<b>Total</b>	<b>10,868</b>	<b>30</b>	<b>10,838</b>	<b>46,931</b>

Source: Williamson, *et al.* (2004)

Cambodia imports its entire consumption of petroleum products, which has steadily increased with economic growth to USD 691 Million in 2004. Oil and gas exploration began in the 1970s with confirmation of gas deposits. However, international companies only resumed prospecting in the 1990s after the Paris Peace Accords.

Following a series of test drills by different international consortiums, Cambodia's first significant petroleum discovery was announced in January 2005. Oil and gas reserves lie offshore within the country's Economic Exclusivity Zone (EEZ). Reserves have been estimated to date at 700 million barrels of oil and up to 5 trillion m<sup>3</sup> of gas (World Bank, 2007). These reserves are likely to be much larger, as they are only estimates based on exploration conducted to date. Cambodia is the only Southeast Asian country endowed with proven commercially exploitable both oil and gas

<sup>16</sup> Incident SOLar radiATIOn (insolation) is a measure of solar radiation energy received on a given surface area in a given time. It is commonly expressed as average energy surface radiation in watts per square meter (W/m<sup>2</sup>) or kilowatt-hours per square meter per day (kWh/(m<sup>2</sup>·day)),

resources. A concern to the donor community is the ability of RGC to channel future petroleum revenues into sustainable and equitable development.

Commercial exploitation is scheduled to start as early as 2011 for oil, yielding an estimated 10% of GDP and exceeding any other source of government revenues, including the combined annual value of international development assistance. Oil and gas are likely to have significant economic, social and environmental impacts on the country. The availability of nationally produced petroleum products will alter the country's energy balance, national GHG emissions and prospects for low carbon path development.

### **5.3 Enhancing carbon sinks in land-use and forestry**

According to Cambodia's Initial National Communication, the forestry sector was responsible for 97% of CO<sub>2</sub> emissions in 1994, compared with only 3% for the energy sector (MoE, 2001).

However, the capacity of forests to sequester carbon from the atmosphere is higher than their rates of emissions. In 1994, Cambodia's forests alone offset all combined emissions from the country's energy, industry, agriculture and waste. With increased deforestation, GHG emissions from the forestry sector tend to increase, while its capacity to sequester carbon decreases. The INC argued for further efforts to maintain Cambodia's status as a net sink and identified the following mitigation options:

- Forest protection and management;
- Sink enhancement through reforestation, community forestry, private forest plantations, and sustainable agriculture;
- Financing of the above mitigation activities through Kyoto and non-Kyoto markets.

Forests cover an estimated 10 million ha or 59% of Cambodia's land area, down from 65% in 1985/87 (MRC, 1994; MRC/GTZ, 2002; World Bank, 1999). These figures are much higher than those of neighbouring countries with the exception of Lao PDR but are not indicative of the relatively poor quality of remaining forests (MoE, 2005). Intense commercial logging characterised the 1980s and 1990s, with harvests exceeding sustainable yields by several factors.

This has resulted in biodiversity loss, and much of the country's commercial timber having already been exploited (ADB, 2000; IFSR, 2004). About a quarter of Cambodia's forests lie within a system of 23 protected areas representing 18% of land area, including national parks, wildlife sanctuaries, protected landscapes, and multiple-use areas. Protected areas constitute Cambodia's last biodiversity reservoirs, but have been under pressure from logging, forest conversion, wildlife trade, mining and tourism development.

The system of protected areas suffers from a lack of financial and technical resources, and inadequate law enforcement. The commercial exploitation of the remaining forest will have an impact on the country's ability to sequester carbon and depends on sustainable forest management. Illegal exploitation, degradation and conversion to other land uses could further increase the net emissions from Cambodia.

## 5.4 Reduced Emissions from Deforestation and Degradation (REDD)

The protection and management of forest resource is a contribution to mitigation of climate change by a reduction in the net release of GHGs. Although the issue of avoided deforestation has been discussed since 2000, UNFCCC COP 13 meeting in Bali in December 2007 brought back to the forefront of the agenda the financing of the protection of forests through carbon markets.

A REDD pilot in Oddar Meanchey implemented by Community Forestry International (CFI) financed by Danida/Dfid/NZAid and supported by the Agence Française de Développement (AFD) will help demonstrate the multiple climatic, conservation and human development benefits of a cluster of twelve Community Forestry Agreements covering 60,477 ha. Preliminary estimates indicate that the avoided deforestation could equal up to 306,000 tCO<sub>2</sub>e.

## 5.5 Carbon finance through CDM

In 2003, the RGC appointed MoE as the DNA to facilitate CDM activities under the Kyoto Protocol. A comprehensive and transparent CDM approval process has been developed, described in a flow diagram of activities and stakeholders involved, and a timeframe of 55 working days from submission to the DNA and to the final decision. A one-page application form, with all documentation requirements, is available for download from CCCO's website.

Proposed CDM projects are assessed against a Sustainable Development Compliance Checklist of 25 criteria grouped into four broad categories (Environmental Protection and Improvement, Social Enhancement of Income and Quality of Life, Technology Transfer, and Economic Benefits). CCCO coordinates the assessment with the support of inter-ministerial TWGS. The Energy Working Group is composed of technical staff from the MIME, while the Forestry Working Group comprises technical staff from the MAFF. These TWGs are responsible for assessing proposed CDM projects respectively in the energy and forestry sectors.

For its establishment, the Cambodian DNA benefited from the initial support of the Netherlands through the UNEP Risø Centre, and since then from the continued support of the Ministry of Environment of Japan through the Institute for Global Environmental Strategies (IGES). With three projects approved, the Cambodian DNA is relatively experienced, and uses clearly defined and transparent procedures. The Secretariat of the DNA is the CCCO within MoE, and has been able to rely on staff from various government agencies who have been involved in climate change projects since Cambodia's Initial National Communication to the UNFCCC.

Although several CDM projects are in the implementation or registration/validation phases (*see Fejl! Henvisningskilde ikke fundet.*), the main obstacle to further CDM development in Cambodia resides in the relatively small size of potential projects, which tend to be household or community based, and are not proportionate with the high transaction costs of CDM.

### Box 9 : Registered and planned CDM projects in Cambodia

Angkor Bio Cogen was Cambodia's first and so far only CDM activity to be registered with the CDM Executive Board in October 2006. The project consists of a 2 MW rice husk cogeneration plant which replaces diesel oil electric generators used to power rice milling operations. By burning rice husk, the project also avoids methane emissions from the decay of rice residues that would be left to decay. The expected emission reductions amount to 51.620 tCO<sub>2</sub>e annually and 294.235 tCO<sub>2</sub>e by 2012. The project is developed by the owners of the mill with the support of Japan's New Energy and Industrial Technology Development Organisation (NEDO) and Mitsubishi UFJ.

Two additional projects were approved by the Cambodian DNA in October 2007 and May 2007, and are at the CDM validation/registration phase. The first project, Methane Fired Power Generation in Samrong Thom Pig Farm, consists of a 200 kW capture and combustion facility. The expected emission reductions amount to 6 262 tCO<sub>2</sub>e annually and 31.089 tCO<sub>2</sub>e by 2012. The project is developed by the farm owners with the support of Mitsubishi UFJ. The second project, TTY Tapioca Starch Biogas, consists of a 3 MW plant for methane capture from wastewater and combustion. Expected emission reductions amount to 65,000 tCO<sub>2</sub>e annually and 260,000 tCO<sub>2</sub>e by 2012. The project is developed by the factory owners with the support of Carbon Bridge, a regional carbon broker. Project proponents have also applied for the WWF Gold Standard.

With three registered projects, Cambodia will be in the lead of the LDCs for CDM activities. As of June 2008 of the total of more than 3,400 CDM projects just 23 are in one of the 49 LDCs (9 CDM projects are registered and another 14 at the validation stage).

Despite having opportunities for establishing carbon trading through CDM, several limitations also exist for the development of CDM projects for securing carbon financing. Low awareness among policy makers and the private sector, weak institutional capacity, lack of human and technical resources, inappropriate policies and strategies are the major limitations.

## 5.6 Voluntary emission reductions

Several organisations have thus opted for non-compliance carbon markets outside of the Kyoto Protocol. This situation is common to other CDM host countries, where markets have favoured industrial projects that yield large emission reductions.

There exist options for carbon financing from Voluntary Emission Reductions (VER) outside the CDM. There are currently over a dozen existing standards, none of which has managed to dominate the voluntary markets (SEI, 2008). VERs are generated according to standards and requirements other than the Kyoto Protocol, but are also verified by an independent auditor.

Due to lower administrative costs, VERs usually trade at a discount from CERs, and are used by buyers (individuals or organisations) for offsetting their GHG emissions. Although VER schemes may follow the general guidelines of the Kyoto mechanisms, they allow more flexibility in terms of baseline and monitoring methodologies. There are currently two renewable energy projects producing VERs in Cambodia (*see* Box 10).

#### **Box 10: Voluntary Emission Reductions (VER) projects in Cambodia**

Cambodia's National Biogas Programme (NBP) is implemented by the Dutch NGO SNV in cooperation with national authorities. Its main objective is the dissemination of some 17,500 family-sized biogas digesters over the period 2006-2009. (In a similar biogas programme in Nepal the emission reductions were registered as CDM projects with contracted an Emission Reduction Purchase Agreement (ERPA) with the World Bank managed Community Development Carbon Fund (CDCF)).

In Cambodia, the NBP instead chose instead to market its emission reductions as VERs. The main reason underlying this decision was the higher complexity and transaction costs of the CDM option, estimated at USD 200,000 for two small-scale CDM projects, and uncertainties regarding the post 2012 climate regime (Lam, 2008). The VER agreement covers 10,000 digesters over a period of ten years, for expected annual emission reductions of 59,000 tCO<sub>2</sub>e.

The Cambodian Fuelwood Saving Project (CFSP), established by the French NGO GERES, commercialises an improved cook stove that consumes about 20% less charcoal than traditional stoves. The project trains manufacturers of cook stoves, provides them credit facilities, and publicises the benefits of the improved stoves among consumers. Difficulties in establishing a nationwide baseline for fuelwood consumption and stringent methodologies concerning the sustainable use of biomass fuel, have prevented the project from applying for CDM registration. Instead, the VERs from the use of improved stoves over traditional ones will follow the Voluntary Carbon Standards (VCS) of the International Emissions Trading Association (IETA). The project is expected to generate 160,000 tCO<sub>2</sub> e over the period 2003 to 2012.

## 6. Donor harmonisation and coordination of climate change activities

### 6.1 Climate Related Programmes and Projects

The priorities and emphasis of donors have been on good governance and poverty reduction, with climate change as a less immediate priority. The obvious links between development and climate change are not as obvious for stakeholders in healthcare, education or agriculture. Donors recognise that climate change is an issue relevant to development cooperation, but in practice relatively little has been done. With the lack of response from the international community, there is a risk that the RGC will likewise not attempt to mainstream climate change beyond the environment and energy sectors, and the ‘no regrets’ development activities.

There is a perception that it is easier to get support from donors for direct poverty reduction or disaster relief than it is for climate change adaptation or mitigation, unless the development links can be clearly demonstrated. There has also been some resistance to climate change mainstreaming within government agencies due to a lack of awareness of policy-makers and technical staff. It is acknowledged that climate change is a relevant topic for development in Cambodia, but few specific significant actions have been taken so far. The lack of success of Cambodia’s NAPA in attracting donor support is a case in point. Donor agencies are generally familiar with the NAPA but have yet to commit funds to its implementation.

A limited number of donor supported programmes are directly addressing issues relevant to adaptation to climate change risks, vulnerability reduction and greenhouse gas mitigation (Annex 10). These programmes are not significant when compared to donor commitments of USD 689 million in 2007 to support Cambodia’s development.

### 6.2 The Least Developed Countries Fund for adaptation to climate change

The LDCF for adaptation to climate change is a fund under UNFCCC with voluntary donor contributions and managed by GEF. Donors have committed more than USD 170 Million to the fund and Denmark has contributed more than USD 16.3 Million. The LDCF has funded 47 LDCs including Cambodia with up to USD 200,000 for the preparation of the NAPA. The LDCF is now able to fund the ‘additional costs’ of the NAPA priority projects. The additional costs are those cost that a development project or program will have to incur to adapt to the changing conditions with climate change and still achieve the same development effectiveness.<sup>17</sup>

Cambodia through UNDP as the implementing agency has proposed to develop an adaptation project on: “*Building capacities to integrate water resources planning in agricultural development*”. The Project Identification Form (PIF) has been approved by GEF and the project is about to enter the LDCF GEF Project pipeline. The budget is USD 4 Million and the LDCF funding

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<sup>17</sup> Although administrated by the GEF the LDCF does not apply the *incremental costs* approach. The LDCF covers the *additional costs* of immediate adaptation to reduce future vulnerability and climate change risks (see Annex 7). The LDCF can provide co-financing according to a ‘sliding scale’, where for example projects costs between USD 0.5 and 6.0 Million are covered by up to 50% and only projects costs up to USD 300,000 are covered 100% by LDCF.

is USD 2 Million and co-financing is from other sources. About 10 % of the LDCF funding is from Danida.

Another project proposal is under preparation for potential funding from the LDCF. The project is in the coastal zone and under preparation with support from UNEP as the implementing agency and the MoE Coastal Coordination Unit (CCU). This proposal addresses priorities for the coastal zone in the NAPA and builds on the former Danida support to the coastal zone management project with more than DKK 50 Million between 1997 and 2006. The proposed budget is USD 4.55 Million with a suggested LDCF funding of USD 2 Million.

### **6.3 Donor Harmonisation and Coordination**

Coordination and collaboration among donors and harmonisation with RGC policies is required to avoid duplication of support and to create an enabling platform for addressing development issues such as climate change. The Technical Working Group on Forestry and Environment (TWG F&E), established in 2004 provides a mechanism for government-donor coordination within forestry and environment. The TWG-F&E is currently chaired by the Head of the Forestry Administration (MAFF) and coordinated among the donor partners by Danida. Meetings are called at least four times a year. The membership of the working group is limited to government and donor agencies, with the World Conservation Society (WCS) as the only nominated NGO representative. Climate change issues discussed in the TWG F&E have been restricted to carbon financing in the forestry sector. There is a total of 19 sector/thematic TWGs, none of which currently provides an adequate forum for coordinating climate change activities between donors and government.

Donors with explicit climate change adaptation or mitigation projects usually work closely with or at the very minimum to update CCCO with the status of their activities. Problems may appear when donors undertake projects without knowing their relevance to climate change, i.e., donors who have little understanding of climate change issues. CCCO's strategic plans include the promotion of dialogue and information exchange among stakeholders involved in climate change relevant programmes and projects in Cambodia. However, the lack of resources has to date limited the implementation of these activities.

### **6.4 Cooperation among Southeast Asian Countries**

Cambodia, alongside Lao PDR, Thailand and Vietnam, is a member of the Mekong River Commission (MRC). All four countries have agreed on cooperation for the sustainable development of the Mekong River Basin, including in the areas of irrigation, hydropower, navigation, flood control, fisheries, recreation and tourism. China and Myanmar are Dialogue Partners, but are not signatories of the MRC Agreement. The MRC collects and disseminates information on hydrological conditions through river monitoring and early warning. The Flood Management and Mitigation Programme (FMMP) aims to prevent, minimise or mitigate people's suffering and economic losses due to floods, while preserving the environmental benefits of floods. A network of 23 monitoring stations on the Mekong and its tributaries provide observed and forecasted hydrological data online.



## 7. Findings and Recommendations

### 7.1 Key findings on climate risks and vulnerability in Cambodia

- **Climate change and climate variability:** A large part of the population of Cambodia depends on agriculture and the agricultural production is subject to the annual variations of floods and droughts. There may be a present day *adaptation deficit* that has to be filled to better address future climate change. Vulnerability to climate change is high in Cambodia as a result of poverty, poor governance, food insecurity and marginalisation.
- **Awareness and capacity:** Awareness of climate change is limited and climate change adaptation is not an explicit key priority for government. But it is related to the priorities such as food security, water resource management, forest protection and agricultural development. The potential drivers such as climate change are not addressed but the potential impacts are certainly known. There may be a need for analytical studies and awareness that can translate the potential impacts of climate change into relevant policy and management responses. There is a need to create awareness about climate change and its effect on different climate parameters and possible impacts on different sectors.
- **CCCO - the one-stop climate change entry point:** The Cambodia Climate Change Office (CCCO) is relatively well functioning compared with similar focal points in other LDCs. During its operations since 1999, the CCCO in addition to national communications and the NAPA has positioned itself well among the relevant institutions and the private sector both in relation to adaptation and mitigation. The CCCO has good relations with other line agencies. CCCO has also supported the Danida representation in preparing its reporting on climate change in Cambodia to Copenhagen. The CCCO has a potential to further develop its functions and mandate.
- **Donor coordination and harmonisation:** Addressing climate change and development is gradually emerging among NGOs and donors in Cambodia. The main attention has been on the mitigation topics (CDM, REDD and other sources of potential carbon finance), but attention to adaptation is also emerging. Climate change adaptation and reduction of vulnerability has only been limited addressed directly at the Technical Working Group (TWG) level, but indirectly through relevant sector policies, e.g. water resource management.
- **Climate data and modelling:** Cambodia in general and CCCO in particular needs quality climate data to enable the generation of climate change scenarios and projections. Some data since the 1980s available with Department of Meteorology (DOM) are only in hard copy. Digitization of data by DOM would be relevant for the Second National Communication in preparation by CCCO. The observation capacities of DOM could be further improved since accurate data would enable better projections, e.g. for climate models and early warning. Danida is already supporting enhancement of DOM's manual observation capacities through a regional project (ECR-SEA) implemented by Asian Disaster Preparedness Centre (ADPC). There will be continued scope for further improvements, e.g. climate data management, forecasting and automatic weather stations.
- **Climate change adaptation (CCA) and disaster risk reduction:** The National Committee on Disaster Management (NCDM) has been working for nearly a decade on reducing vulnerability to disasters through enhanced preparedness, response capabilities, and prevention activities. The National Climate Change Committee (NCCC) established in 2006 is not yet functional. NCDM

and CCCO could collaborate more closely in sharing their experiences and knowledge on DRR and CCA respectively, among themselves and with the common stakeholders at large.

- **Disaster and climate change forum:** A DRR forum comprising of several NGOs and international organizations meets once every two months to share information and knowledge on community-based risk reduction. The forthcoming meeting in August 2008 has climate change adaptation as a theme. CCCO can participate more closely with this forum to learn from experiences of disaster managers that will be useful in identifying and coordinating the implementation of climate change adaptation activities.

## 7.2 Recommendations

The recommendations are prepared by the Team. The recommendations are for further decision on follow up by the Danida Representation in Phnom Penh in collaboration with CCCO and other development partners in Cambodia.

### **Recommendation 1: Programmatic support to the Cambodia Climate Change Office (CCCO).**

Support to CCCO will make it possible to improve the coordination of the climate change issues in Cambodia and initiate activities in addition to the on-going development of the Second National Communication with UNDP support. It is suggested that the CCCO prepare a proposal for a programmatic support from Danida to develop priority activities of the CCCO strategic plan with cooperating agencies. This may include:

- Climate change education and awareness raising, including analytical work on climate change and thematic development topics with climate change sensitivity, e.g. in agriculture, health, water resources, energy and forestry.
- Climate change technical and institutional strengthening, including support to the NCCC and the capacity of the CCCO to continue to function as the 'one-stop' point for climate change in Cambodia.
- Development of Cambodia's climate scenarios and projections for improved assessment of vulnerability and adaptation options, taking into account the Cambodia Millennium Development Goals (CMDG) including poverty reduction, health and gender.
- Development of the position of Cambodia for UNFCCC COP 15 (2009) and the post-2012 regime including coordination with other LDCs, in-country coordination and networking, and additional COP participants.
- Improved coordination with line agencies, NGOs, TWGs and the National Committee for Disaster Management on issues related to climate change.
- Complementary with other CCCO-managed activities including the on-going assistance from UNDP to prepare the Second National Communication to the UNFCCC.

The Danida representation should inform CCCO/ MoE officially about the support. The support will be for up to three years and with a proposed budget of up to DKK 2,500,000 (about USD 500,000). The support will follow the procedures of the local grant authority of Danish Embassies. A draft proposal should be forwarded by CCCO by September 2008 and an agreement should be ready by October 2008.

**Recommendation 2: A reserve for the co-financing to MoE for the coastal zone management UNEP/GEF adaptation project.** It is recommended that Danida supports the implementation of

the NAPA priorities. MoE has approached the Danida representation for a co-financing of a proposed coastal zone adaptation project that is included among the NAPA priorities. For Danida to reserve a co-financing the project, the MoE and UNEP should forward a more detailed request. This request shall outline:

- Status of other sources of funding and the proposed procedures for the financial management of the co-financing.
- Clarification on whether the Danida co-financing is for the development budget or additional adaptation costs of the proposed activities.
- Clarification of the sustainability of the past DKK 50 Million support from Danida to the environmental coastal zone in Cambodia and key outcomes that will be relevant and used in the climate change adaptation project.
- A commitment to inform the Danida representation without further delay in case the co-financing may no longer be required.

The detailed request should be forwarded by UNEP and MoE to the Danida representation not later than October 2008. The proposed support from Danida for co-financing is up to DKK 2,500,000 (about USD 500,000).

Danida has to make a commitment for the use of the available climate change funding in year 2008. An agreement has therefore to be made before December 2008. If an agreement is not feasible Danida has the option to allocate the funding to any other strategic support to address climate change adaptation in Cambodia or elsewhere. The actual co-financing is subject to a project document of good standard approved by GEF (LDCF Council) and by Danida.

**Recommendation 3: Climate change to be included as a thematic issue in the current and next phase (from 2011) of the NRM&L programme.** It is recommended that

- Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) are addressed in the current phase of the NRM&L program through links and coordination with the Cambodian Climate Change Office (CCCO) and the National Committee on Disaster Management (NCDM). Links may be established between the NRM&L program activities and the CCCO and NCDM with a view to, for example, introducing CCA and DRR as part of the training and information activities being carried out through the components
- CCA and DRR are included in the next phase of the NRM&L programme from 2011 in accordance, e.g. with national policies and with the Danida Aid Management Guidelines. The preparation of the next phase may already be initiated from end 2009 or beginning 2010.

**Recommendation 4: Continued support to REDD as long there is scope for sustainable outcomes.** Danida/DfiD/NZAid have provided a key support to the initiated efforts to develop REDD. This is a pilot activity of local and global relevance and with continued challenges. It is recommended that support to REDD should continue as long as the REDD activities are in the pilot development phase and have prospects of achieving sustainable outcomes.

**Recommendation 5: Mainstreaming climate change in all development activities.** When appropriate, the Danida Representation should seek to include climate change risks, vulnerability and adaptation as topics in annual consultations, annual programme reviews and when identifying development cooperation. The Danida representation can make use of entry points for addressing climate change outlined in the Danish Climate and Development Action Programme (2005).

The Danida representation could facilitate and monitor the inclusion of climate change risks and reduction of vulnerability in the implementation of the development cooperation, e.g. in compliance with building codes, environment impact assessment and use of clean technology.

The mainstreaming also applies to options in the on-going and planned activities in the NRM&L Programme and Private Sector Programme, e.g. to reduce the vulnerability to climate change and climate variability, and to support options for a low-emission development path in the choices of technologies, marketing, innovation, and infrastructure.

## Annex 1: Process Action Plan for Climate Change Proofing in Cambodia

The Process Action Plan (PAP) includes tasks from the recommendations. The timing is indicative and should be confirmed by the Danida representation. Further details of the recommendations are included in section 7.

Action	Timing / Initiated by	Comments and documentation	Funding (DKK)	
			Danida Climate Change funding 2008 / 2009	Other sources of possible funding
1. A programmatic support to the Cambodia Climate Change Office (CCCO).	Proposal: September 1, 2008 Agreement date: October 1, 2008	Communication to MoE from Danida; project proposal (LGA format) from CCCO/MoE; agreement; Outputs defined in CCCO project proposal.	Up to 2,500,000	To be coordinated with support from UNDP and other donors by CCCO.
2. A reserve for the co-financing to MoE for the coastal zone management UNEP GEF adaptation project	Detailed request: October 1, 2008 Commitment Agreement date: December 1, 2008 or before	Communication to MoE from Danida; detailed request from MoE and UNEP; commitment agreement; GEF LDCF approval; project document.	Up to 2,500,000	Other co-financing; LDCF for additional adaptation costs.
3. Climate change is included as a thematic issue in the next phase of the NRM&L (from 2011).	December 2009	Concept paper (expected early 2010)	None	Partners of the multi donor facility
4. Continue support to REDD as long there is scope for sustainable outcomes	Continuous	Follow-up in TWG Forest and Environment; TWG minutes; National Forest Programme; transfers generated.	None	Coordination with other REDD initiatives; NRM&L unallocated funds.
5. Mainstreaming climate change in all development activities.	Continuous	Terms of Reference; reporting (appraisals and review); environmental screening notes; concept papers.	None	NRM&L unallocated funds.

## Annex 2: Sector Climate Change Screening Matrix

The climate change screening matrix is the initial step in mainstreaming of climate change into development programmes. The purpose is to provide an overview of potential risks to Danida's development programme and identify opportunities for additional adaptation to climate change for a specific sector programme. The rapid appraisal carried out for the screening matrix is not an assessment of the climate change risks in the sector *per se* but rather aims to ensure that development efforts, i.e. the sector programme support or projects, are 'proofed' against losses due to climate change, climate variability and extreme weather events.

The attached rapid appraisal matrix to inform the climate change screening matrix is a draft version for possible further development by Danida. The initial version of the matrix was developed and applied to five Danida supported sector programmes in Kenya in October 2007.

The first column in the table includes all the programme components and sub-components/outputs. It would also be relevant to include programme budgets divided into sub-components, when possible. The second and third columns are the risk assessment. In the second column the risks of climate change impacts on the development cooperation are assessed. The risks are here confined to the sensitivity of the development sector programme to climate change and will include elements of climate change risks and sector sensitivity. The risk assessment is whether there will be a loss of development effectiveness due to climate change, i.e. whether the objectives are not achieved as effectively as expected. The ranking into 'low', 'medium' and 'high' are defined as follows:

- 'low' (less than 1 % (almost none) of the development investment could be at risk)
- 'medium' (up to 10 % of the development investment could be at risk)
- 'high' (more than 10 % of the development investment could be at risk)

The climate change risk assessment is used for the identification of components where an improved risk assessment and reduction could be required. Comments are included in the third column. Because the sector programme support has activities now and results within 5 to 10 years, but climate change impacts are expected after several decades, it is likely that the risk will be low in general. Irreversible investments with a long time span of several decades could be affected. Sector programmes already addressing climate variability may be less prone to future climate change risks.

The fourth and fifth columns address opportunities for additional adaptation for reducing vulnerability to climate change. In the fourth column the ranking is:

- 'low' (less than 1 % of the development programme (budget and activity) is relevant for additional adaptation measures to reduce climate change vulnerability).
- 'medium' (up to 10 % of the development programme (budget and activity) can be relevant for additional adaptation measures to reduce climate change vulnerability).
- 'high' (more than 10 % of the development programme (budget and activity) could be relevant for additional adaptation measures to reduce climate change vulnerability).

The climate change opportunity assessment is used to identify actions where development effectiveness could be improved by addressing additional adaptation options and other measures to mainstream the potential risks of climate change in the sector.

**Danida Climate Change Screening Note: Natural Resource Management and Livelihoods (NRM&L) Programme, Cambodia**

Components	Climate Risks to programme	Comments: Risk Assessment	Options for Adaptation	Comments: Options for adaptation
	Low/medium/high		Low/medium/high	
Component 1: Natural Resource Management the D&D process	Medium	The investments in infrastructure (rural roads and water supply) can be at risks of climate change and climate variability. The risks should be addressed in feasibility assessments and EIA procedures.	Medium	Reduction in vulnerability and improved ability to address climate change and climate variability (mainly natural hazards of floods and drought) at commune level.
Component 2: Civil society and pro-poor markets	Low	No significant direct risks to the implementation due to climate change or climate variability.  The achievement of the outcomes may indirectly be influenced by natural hazards depending on the local vulnerability.	Medium	Overall reduction of vulnerability to natural hazards. Awareness of climate change and coping measures of flood / drought
Component 3. NRM sectors and policy development	-	-	-	-
<ul style="list-style-type: none"> <li>▪ Sub-component 3.1: Land management</li> </ul>	Low	The technical support to land-use management is not direct at risk from future climate change.  Climate change and climate variability on top of other development risks in the land management sector (governance related)	Medium	Improved land-use management and planning can address vulnerability mapping.  Especially when future climate change may begin after 3-4 decades when the population of Cambodia may also have doubled at current growth rate.

<b>Components</b>	<b>Climate Risks to programme</b>	<b>Comments: Risk Assessment</b>	<b>Options for Adaptation</b>	<b>Comments: Options for adaptation</b>
<ul style="list-style-type: none"> <li>▪ Sub-component 3.2: Forestry and Environment sector</li> </ul>	Low	<p>The support to the Technical Working group is not direct at risk from future climate change.</p> <p>The main focus in the forest sector is on potential financing from reduced emissions from deforestation and degradation (REDD). The vulnerability of the forests due to climate change is not considered in policies, e.g. increased risks to forest fires.</p>	Medium	<p>Protection of the forest resources may be improved with additional carbon financing.</p> <p>Sustainable forest management to address the vulnerability of the forest sector to climate change (e.g. forest fires) and contribution to other sectors to reduce vulnerability (e.g. forest cover in watersheds).</p>
<ul style="list-style-type: none"> <li>▪ Sub-component 3.3: Fisheries sector</li> </ul>	Low	<p>The support to the Technical Working group is not direct at risk from future climate change.</p> <p>Overall, the changes in the water cycle due to climate change and climate variability in addition to other development activities can be a potential risks to the large freshwater fish production and protein/nutrient source for Cambodia.</p>	Medium	<p>Option to address the vulnerability to climate change of the fisheries sector. The aim should be to ensure food security and nutrient supply for the health of the population.</p>



## Annex 3: The Danish Climate and Development Action Programme

The Ministry of Foreign Affairs of Denmark (MFA) launched the “*Danish Climate and Development Action Programme – a tool kit for climate proofing Danish Development Cooperation*” in August 2005. A merger with the *Danish Disaster Risk Reduction (DDR) Action Programme* (Draft, September 2007) is planned.

The Climate and Development Action Programme includes the following main elements with specific actions on:

- Raising the policy profile of climate change in multilateral and bilateral development cooperation.
- Integrating adaptation to climate change in development cooperation programmes
- Integrating climate change mitigation in the context of development cooperation
- Developing capacity to address climate change and take appropriate actions in development cooperation programmes and national programmes

Each of these elements is addressed within the following ‘entry-points’: i) Multilateral development cooperation, ii) Bilateral development cooperation: country programme level, iii) Bilateral development cooperation: sector programme support level, and iv) the Mixed Credit Scheme (soft loans).

As part of the implementation of the Danish Climate and Development Action Programme, Climate Change reports have been prepared eight Danida programme countries (Viet Nam, Tanzania, Mozambique, Bangladesh, Bolivia, Nicaragua, Kenya and Uganda) in 2006 and 2007. Climate change screening is planned for 2008 in another nine programme countries including Nepal, Bhutan and Cambodia. The emphasis of the climate change screening has shifted from initially the national capacity to address climate change towards a more specific climate change screening of the Danish development cooperation portfolio.

The Danish Climate and Development Action Programme was prepared as part of the national implementation of the “*EU Action Plan on Climate Change in the Context of Development Cooperation*” (November, 2004). The first bi-annual progress report on the implementation of the EU Action Plan (2007) concluded: “*Denmark’s Climate and Development Action Programme has set the stage to become an exemplary showcase of the integration of climate change into development cooperation, using a comprehensive, yet ultimately practical and flexible approach. In the first years of its implementation, Denmark’s initial experience will need to be closely followed by other Members States and the Commission, as they may provide valuable experience to be shared within the EU and with its partner countries.*”<sup>18</sup>

The Danida Aid Management Guidelines (AMG) on programme management makes reference to the Climate and Development Action Programme. ‘Climate’ is included in the Danida priority themes (which also include topics like HIV/Aids, youth and private sector) and these must be considered when relevant in the programme concept note, design or appraisal stage. Risks to the programme from climate change are included as one the screening topics in the mandatory Danida Environmental Screening Note of development cooperation programmes and projects. For this purpose the Danish Climate and Development Action Programme includes a tool box for climate change screening.

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<sup>18</sup> Source: First bi-annual Progress Report on the Implementation by the EU of the Action Plan to accompany the EU Strategy on Climate Change in the Context of Development Cooperation (2007)

## Annex 4: The overlapping agendas of Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA)

The overlapping agendas of disaster risk reduction (DRR) and climate change adaptation (CCA) is currently receiving much attention from different sectors, including NGOs and practitioners, UN and donor agencies, and academics. Dialogue between the DRR and CCA communities focuses on creating stronger linkages, putting greater effort on learning more from each other, and collaborating conceptually and practically. In part, this common interest has come from a simultaneous recognition that risk reduction requires a far more holistic approach than has been previously been applied. Neither DRR nor CCA is about disasters or climate change only, but rather about all of the social, physical and economic factors that influence the magnitude of and are affected by the threat. The table below elaborates on some of the linkages.

Examples	Probability	Impact	DRR	CCA
<b>Large scale humanitarian disasters</b> caused by refugees from war, epidemics and natural events like tsunamis, and earthquakes. These may have been triggered or exacerbated by impacts of climate change on natural resources, e.g. conflicts over access to water resources and access. Disaster management options include mainly response and relief. DRR focus on reducing the vulnerability, e.g. early warning systems and contingency plans for disaster preparedness	Low	High	●	
<b>Disasters caused by extreme weather events</b> (e.g. droughts, storms, floods, and large landslides). These events are part of natural climate variability, but their frequency and magnitude could be exacerbated by climate change. Disaster management options include preparedness and response to disasters, e.g. through early warning systems. The DRR and CCA aim at reducing the impacts extreme weather events by addressing the vulnerability through development planning, e.g. to reduce the risks of flooding and landslides or through appropriate water resources management and drought-resistant agricultural practices for drought. Disaster prone areas are targeted by DRR.	Low to Medium	Medium to High	●	●
<b>The incremental impacts of climate change and climate variability</b> on agriculture, health and infrastructure that are gradual may not be identified as disasters, but may be part of CCA. The response is to increased uncertainty related to climate variability as well as to opportunities to reduce vulnerability in development planning, e.g. though changes in cropping patterns in agriculture. The accumulated risks may increase vulnerability to hazards and thereby increase disaster impacts.	High	Low	○	●

- : Addressed in policies and institutions related to DRR / CCA
- : Not directly addressed in DRR mandate but with indirect influence on the agenda

## Annex 5: Linking climate change risk, vulnerability and adaptation

DRIVERS	PRESSURE	STATE	RESPONSE
Climate Change Hazards	Climate Change Risk Exposure	Vulnerability to Climate Change	Adaptation
<b>Increase in mean temperature</b>			
<ul style="list-style-type: none"> <li>▪ Increased evaporation</li> </ul>	<ul style="list-style-type: none"> <li>▪ A reduced length of growth period (LGP)</li> <li>▪ Reduced water availability and water stress on crops and ecosystems</li> <li>▪ Transformation of ecosystems towards more water resistant species</li> </ul>	<ul style="list-style-type: none"> <li>▪ Expansion of arid and semi-arid lands borders subject to local changes and variability</li> </ul>	<ul style="list-style-type: none"> <li>▪ Efficient water use and conservation</li> </ul>
<ul style="list-style-type: none"> <li>▪ Seasonal droughts</li> </ul>	<ul style="list-style-type: none"> <li>▪ Loss of agricultural production</li> <li>▪ Forest fires</li> </ul>	<ul style="list-style-type: none"> <li>▪ Impacts on income and livelihoods</li> <li>▪ Loss of biodiversity and forest ecosystem</li> </ul>	<ul style="list-style-type: none"> <li>▪ Community based management practices and early warning.</li> <li>▪ Changes in crops and varieties</li> <li>▪ Water harvesting and storage</li> <li>▪ Irrigation capacity</li> <li>▪ Promotion of genetically adaptive species and varieties</li> <li>▪ Improved forecasting of droughts</li> </ul>
<ul style="list-style-type: none"> <li>▪ Occurrence of disease vectors due to expanded range (combination of increased temperature and changes in precipitation)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Expanded range of vectors for Malaria and dengue fever.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Population in areas not previously under strong influence of malaria and dengue.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Malaria prevention (nets and profylaksis)</li> <li>▪ Control of vectors</li> <li>▪ Awareness to people with little prior experience with malaria</li> <li>▪ Sanitation</li> </ul>
<ul style="list-style-type: none"> <li>▪ Occurrences of agricultural pests (combination of increased temperature and changes in precipitation)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Loss of agricultural production in particular in marginal areas.</li> <li>▪ Land degradation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Farmers with inadequate access to extension and response mechanisms.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Early warning systems linked with integrated pest management.</li> <li>▪ Changes in crops and varieties</li> <li>▪ Soil conservation</li> </ul>
<ul style="list-style-type: none"> <li>▪ Warmer and more frequent</li> </ul>	<ul style="list-style-type: none"> <li>▪ Increased energy demand for</li> </ul>	<ul style="list-style-type: none"> <li>▪ Electricity shortages</li> </ul>	<ul style="list-style-type: none"> <li>▪ Energy efficiency, renewable</li> </ul>

DRIVERS	PRESSURE	STATE	RESPONSE
Climate Change Hazards	Climate Change Risk Exposure	Vulnerability to Climate Change	Adaptation
days	<ul style="list-style-type: none"> <li>cooling</li> <li>Declining air qualities in cities</li> </ul>	<ul style="list-style-type: none"> <li>Urban pollution</li> </ul>	<ul style="list-style-type: none"> <li>energy</li> <li>Public transportation</li> <li>Pollution control</li> </ul>
<b>Reduced precipitation and variability (average precipitation will increase but uncertainty about variability)</b>			
<ul style="list-style-type: none"> <li>Drought (prolonged periods, seasonal and localised)</li> </ul>	<ul style="list-style-type: none"> <li>Reduction or loss of agricultural and horticulture crop production</li> <li>Loss/change of browsing for livestock</li> <li>Increased livestock deaths</li> </ul>	<ul style="list-style-type: none"> <li>Reduced food security</li> <li>Loss of potential export markets</li> </ul>	<ul style="list-style-type: none"> <li>Early warning systems to provide information on different time scales</li> <li>Efficiency in water use (best economic use of a scarce resource); efficient drip irrigation assuming access to water resources</li> <li>Water harvesting and conservation in small dams and larger reservoirs.</li> <li>Changes in farming systems to more drought tolerant crops.</li> <li>Changes to livestock species more adapted to water shortages</li> </ul>
	<ul style="list-style-type: none"> <li>Consequences for supply of hydro-power</li> </ul>	<ul style="list-style-type: none"> <li>Hydro-power production (small in Cambodia but imports of electricity from the region)</li> </ul>	<ul style="list-style-type: none"> <li>Micro-hydro power plans must be climate proofed to ensure that water supply will be adequate.</li> </ul>
	<ul style="list-style-type: none"> <li>Changing livelihood potentials</li> <li>Increased pressure on scarce resources, e.g. charcoal production</li> </ul>	<ul style="list-style-type: none"> <li>Farmers with limited knowledge and access to adaptation measures</li> <li>Decrease in forest areas</li> </ul>	<ul style="list-style-type: none"> <li>Access to sustainable alternative income and credit/saving mechanisms.</li> <li>Management rules and tools for scarce natural resources</li> </ul>
	<ul style="list-style-type: none"> <li>Health impacts</li> </ul>	<ul style="list-style-type: none"> <li>Reduced access to clean water results in health risks.</li> </ul>	<ul style="list-style-type: none"> <li>Awareness of water diseases and prevention</li> </ul>

DRIVERS	PRESSURE	STATE	RESPONSE
Climate Change Hazards	Climate Change Risk Exposure	Vulnerability to Climate Change	Adaptation
			<ul style="list-style-type: none"> <li>Access to primary health services</li> </ul>
	<ul style="list-style-type: none"> <li>Changes in bird and wildlife habitats and impacts on ecosystems, e.g. loss of wetlands</li> </ul>	<ul style="list-style-type: none"> <li>Vulnerable ecosystems</li> <li>National parks and tourism facilities</li> </ul>	<ul style="list-style-type: none"> <li>Land management, e.g. protection and restoration of upstream forests</li> </ul>
	<ul style="list-style-type: none"> <li>Water scarcity in cities (reduced access to safe water)</li> </ul>	<ul style="list-style-type: none"> <li>Reduces access to water for public utility services</li> </ul>	<ul style="list-style-type: none"> <li>Improved water efficiency in urban water supply, e.g. reducing system leaks</li> </ul>
	<ul style="list-style-type: none"> <li>Drying of wetlands and other aquatic habitats</li> </ul>	<ul style="list-style-type: none"> <li>Loss of biodiversity and ecosystem assets and services.</li> <li>Loss of fish production</li> <li>Impact on food security (proteins and nutrients from fish) and livelihoods</li> </ul>	<ul style="list-style-type: none"> <li>Conservation of up-stream forests and watersheds</li> <li>Water harvesting and conservation in small dams and larger reservoirs for human consumption and aquaculture</li> </ul>
<b>Increase in precipitation:</b>			
<ul style="list-style-type: none"> <li>Increased flooding along Mekong River</li> <li>Flash floods from short but torrential rain</li> </ul>	<ul style="list-style-type: none"> <li>Damage to agricultural crops and soil erosion.</li> <li>Uncertainty of livelihoods and accumulated risks</li> </ul>	<ul style="list-style-type: none"> <li>Farmers with inadequate soil protection against flash floods</li> <li>Siltation of water ways, e.g. reduced navigation and filling up hydropower dams.</li> <li>Impacts of siltation on water ways and fish production</li> </ul>	<ul style="list-style-type: none"> <li>Early warning systems</li> <li>Adaptation of farming systems to risk of top soil erosion, e.g. contour farming and gully management</li> <li>Reforestation and forest rehabilitation to protect top soils and retain surface water</li> </ul>
	<ul style="list-style-type: none"> <li>Reduced accessibility due to damage on infra-structure or inaccessibility</li> </ul>	<ul style="list-style-type: none"> <li>Entire economy is vulnerable.</li> <li>People on flood prone areas (flooding is not new to Cambodia, so the adaptation capacity is relative high but also determined by social factors)</li> </ul>	<ul style="list-style-type: none"> <li>Physical planning, e.g. based on expected rather than historical climate data</li> <li>Building codes and effective land use planning taking into account expected future extreme weather events</li> </ul>
	<ul style="list-style-type: none"> <li>Water borne diseases from polluted sources, e.g. flooding of wells and dams used for</li> </ul>	<ul style="list-style-type: none"> <li>Vulnerable people with low access to safe water and preventive health care</li> </ul>	<ul style="list-style-type: none"> <li>Protection of safe water sources</li> <li>Awareness on water resource management and sanitation</li> </ul>

<b>DRIVERS</b>	<b>PRESSURE</b>	<b>STATE</b>	<b>RESPONSE</b>
<b>Climate Change Hazards</b>	<b>Climate Change Risk Exposure</b>	<b>Vulnerability to Climate Change</b>	<b>Adaptation</b>
	drinking water		
	<ul style="list-style-type: none"> <li>▪ Flooding in cities due to inadequate infra-structure</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lower-lying residential areas and roads</li> </ul>	<ul style="list-style-type: none"> <li>▪ Standards and maintenance of urban infrastructure, e.g. storm drains.</li> <li>▪ Urban planning and regulation</li> </ul>
<b>Increased climate variability and unpredictability</b>			
<ul style="list-style-type: none"> <li>▪ Climate variations intensity in frequency and magnitudes (rainfall fluctuation and seasonal variations)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Extreme weather events</li> <li>▪ Uncertainty in weather conditions and water availability</li> </ul>	<ul style="list-style-type: none"> <li>▪ Farmers and rural dwellers with little prior experience in large climate variation and extreme weather events</li> <li>▪ Accumulated consequences of higher frequencies of extreme weather events.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Risk reduction from: early warning systems (up to 3-6 months), income diversification, access to credit, savings and insurance schemes</li> </ul>
<b>Sea level rise</b>			
<ul style="list-style-type: none"> <li>▪ Increased in sea level in the coastal zone</li> </ul>	<ul style="list-style-type: none"> <li>▪ Flooding of low lying coastal areas</li> </ul>	<ul style="list-style-type: none"> <li>▪ People living in low lying coastal areas</li> <li>▪ Fields in low lying coastal areas</li> <li>▪ Urban areas including impacts in infra-structures and services, e.g. water supply</li> </ul>	<ul style="list-style-type: none"> <li>▪ Dikes and seawalls</li> <li>▪ Mangrove forest protection and rehabilitation</li> <li>▪ Physical planning and regulation</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Increased vulnerability from development in the coastal zone ('maladaptation')</li> </ul>	<ul style="list-style-type: none"> <li>▪ New developments including residential, industry, infra-structure and tourism facilities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Physical planning and regulation</li> </ul>
<b>Regional consequences on Mekong river</b>			
<ul style="list-style-type: none"> <li>▪ Upstream effects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Influence on the water inflow on the Mekong due to climate change impacts in China, Myanmar, Laos, Thailand and Vietnam</li> <li>▪ Increased water harvesting upstream</li> </ul>	<ul style="list-style-type: none"> <li>▪ Added effect on floods or droughts in Cambodia</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regional cooperation and planning (MRC)</li> </ul>

<b>DRIVERS</b>	<b>PRESSURE</b>	<b>STATE</b>	<b>RESPONSE</b>
<b>Climate Change Hazards</b>	<b>Climate Change Risk Exposure</b>	<b>Vulnerability to Climate Change</b>	<b>Adaptation</b>
	<ul style="list-style-type: none"> <li>▪ Release from hydropower dams upstream including from Vietnam</li> </ul>	<ul style="list-style-type: none"> <li>▪ Short term human induced flooding in localised areas</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regional cooperation and early warning (MRC)</li> </ul>
<ul style="list-style-type: none"> <li>▪ Down stream effects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Back logging due to flooding and sea level rise in the Mekong River</li> <li>▪ Regional migration from the Mekong delta to Cambodia</li> </ul>	<ul style="list-style-type: none"> <li>▪ Added effect on floods in Cambodia</li> </ul>	<ul style="list-style-type: none"> <li>▪ Regional cooperation and planning (MRC)</li> <li>▪ Adaptation in Viet Nam</li> </ul>

## Annex 6: Overview of the 20 NAPA high priority projects in Cambodia

No	Title	Objectives	Location	Time frame	Estimated Budget, US\$	Agencies involved		Status
						Lead	Cooperating	
<b>Non-Health Sectors</b>								
1a	Rehabilitation of a Multiple-Use Reservoir in Takeo Province	- To improve water storage capacity for multiple uses including irrigation, water supply for urban areas, recreational uses and enhanced aquatic biodiversity.	Takeo	3 years	4,000,000	MOWRAM	MoE, MAFF, MIME and MRD	This is a new initiative.
1b	Rehabilitation of Multiple-Use Dams in Takeo and Kampong Speu Provinces	- To improve water management for multiple uses including irrigation, water supply rural communities, recreational uses and aquatic biodiversity enhancement.	Takeo, Kampong, Speu	2 years	2,500,000	MOWRAM	MoE, MAFF, MRD and local authorities	Minor repairs have been conducted since the 1980s by local authorities. MOWRAM plans to undertake a detailed study of this project.
1c	Community and Household Water Supply in Coastal Provinces	- To provide safer water for rural communities in coastal areas; and - To reduce the incidence of water-related diseases.	Kampot Kep and Koh Kong	1 year	1,000,000	MRD	Commune councils, NGOs	Wells and ponds have been constructed in Kampot and Kep by FAO, Food for Hunger, UNICEF and the WFP. Some NGOs have also distributed water filters.
2a	Development and Rehabilitation of Flood Protection Dikes	- To protect settlements and agricultural fields from flood.	Battambang, Kampong Cham, Kandal, Kratie, Pursat, Sihanoukville and Svay Rieng	3 years	5,000,000	MOWRAM	MPWT, local authorities and NGOs	MOWRAM has developed flood protection structures in a number of provinces.
2b	Rehabilitation of Upper Mekong and Provincial Waterways: - To reduce risks caused by Mekong floods -	- To improve rural livelihoods by supplying sufficient water for irrigation and domestic uses; and - To improve provincial	Provinces along upper Mekong, Koh Kong, Prey Veng, Pursat and Svay Rieng	3 years	30,000,000	MOWRAM	MPWT and local authorities	Provincial waterways rehabilitation has been carried out by MOWRAM with support from ADB, JICA and WB in



No	Title	Objectives	Location	Time frame	Estimated Budget, US\$	Agencies involved		Status
						Lead	Cooperating	
	To improve fishery resources	water transportation.						Banteay Meanchey, Battambang and Kampong Speu.
2c	Rehabilitation of Multiple-Use Canals in Banteay Meas District, Kampong Province	- To enhance water storage capacity for general use in the village during the dry season.	Kampong	1 year	1,500,000	MOWRAM	NGOs and local authorities	In Kampong, the construction of wells and ponds has been undertaken with the assistance of FAO, Food for Hunger, UNICEF and WFP.
3a	Vegetation Planting for Flood and Windstorm Protection	- To reduce flood and windstorm damage to property and crops.	Kampong Thom, Kampong Kratie, Sihanoukville, Takeo, Prey Veng, Battambang and Banteay Meanchey	3 years	4,000,000	MAFF	MoE and local authorities	In the 1980s, MAFF started promoting the plantation of Acacia and Eucalyptus throughout the country including in coastal areas. Need to promote indigenous species.
3b	Strengthening of Community Disaster Preparedness and Response Capacity	- To ensure preparedness for and effective response to climate hazards at the community level; and - To reduce climate hazard risks for local communities.	Banteay Meanchey, Kampong Cham, Kampong Speu, Kampong Kandal, Prey Veng, Svay Rieng and Takeo	5 years	5,000,000	NCDM	MoH, local authorities and NGOs	NCDM has prepared a strategic plan mentioning community disaster preparedness. Oxfam has worked on a comprehensive disaster management programme in Takeo Province including preparedness, mitigation and risk reduction.
3c	Water Gates and Water Culverts Construction	- To regulate flood water around the newly rehabilitated road network; and - To minimise road and crop damage caused by flood.	Banteay Meanchey, Kampong Cham, Kampong Kandal, Kratie, Prey Veng, Siem Reap, Svay Rieng and Takeo	2 years	10,000,000	MPWT and MOWRAM	Local authorities	The construction of water gates and culverts has been undertaken by some NGOs and NCDM in selected provinces.
3d	Safer Water Supply	- To provide safe water in	Battambang,	3 years	5,000,000	MRD	MoH, local	The construction of

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No	Title	Objectives	Location	Time frame	Estimated Budget, US\$	Agencies involved		Status
						Lead	Cooperating	
	for Rural Communities	sufficient quantities for rural communities; and - To reduce the risk of contracting water-related diseases.	Kampong Cham, Kampong Speu, Kampong Thom, Kandal, Kratie, Prey Veng, Ratanak Kiri and Takeo				authorities and NGOs	wells and ponds in selected areas has been carried by CONCERN, CRCDD, FAO, UNICEF, WFP, etc. In some places, locally made water filters have been provided by some NGOs.
3e	Development and Improvement of Small-Scale Aquaculture Ponds	- To ensure food security in the areas where wild fish stocks are insufficient to meet demand; and - To increase the income of people living in these areas.	Kampong Cham Kampong Speu Kandal, Kratie, Sihanoukville and Svay Rieng	3 years	4,000,000	MAFF	Local authorities and NGOs	Limited implementation of smallscale aquaculture. MAFF has provided extension service and training to farmers about fishpond cultures, as well as rice/fish culture in Kandal, Prey Veng, Svay Rieng and Takeo.
3f	Promotion of Household Integrated Farming	- To increase agricultural productivity; and - To improve farmers' incomes, food security and livelihoods in the areas affected by flood and drought.	Banteay Meanchey, Battambang, Kampong Speu, Prey Veng, Svay Rieng and Takeo	3 years	2,500,000	MAFF	Local authorities and NGOs	MAFF with support from ADB has implemented similar projects in selected areas of Banteay Meanchey, Battambang, Pursat and Siem Reap. Some NGOs has implemented similar project in Prey Veng and Svay Rieng.
3g	Rehabilitation of Coastal Protection Infrastructure	- To increase agricultural production in coastal areas.	Kampot, Kep, Koh Kong and Sihanoukville	2 years	2,000,000	MOWRAM	MOWRAM's Provincial Departments and concerned NGOs in Collaboration with local authorities	Damaged coastal protection structures have been identified and initial limited repairs conducted. GRET has repaired the Prey Nob polder in Sihanoukville and

No	Title	Objectives	Location	Time frame	Estimated Budget, US\$	Agencies involved		Status
						Lead	Cooperating	
								operates it with local communities.
4a	Development and Improvement of Community Irrigation Systems	<ul style="list-style-type: none"> <li>- To provide sufficient water for rice farming;</li> <li>- To reduce the risk of crop failures from water shortage; and</li> <li>- To enhance food security and -assist in eliminating poverty among rural people.</li> </ul>	Banteay Meanchey, Battambang, Kampong Cham, Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot, Kandal, Kratie, Prey Veng, Pursat, Ratanak Kiri, Siem Reap, Svay, Rieng and Takeo	3 years	45,000,000	MOWRAM	MOWRAM's and MAFF's Provincial Departments, local authorities	A number of governmental and non-governmental organisations and other donors such as ADB, APS (Italian Government), the Japanese Government, etc., have built medium-scale irrigation schemes in several provinces, including Battambang, Kampong Cham, Kampong Speu, Kampong Thom, Prey Veng, and Svay Rieng.
4b	Community Mangrove Restoration and Sustainable Use of Natural Resources	<ul style="list-style-type: none"> <li>- To stabilise shoreline;</li> <li>- To reduce sea water intrusion;</li> <li>- To reduce coastal erosion; and</li> <li>- To protect coastal areas from storm.</li> </ul>	Kampot, Kep and Koh Kong	3 years	1,000,000	MoE	NGOs, local authorities and SEILA	There are at least three modules of similar community based natural resource management established and/or functioning in coastal areas with support from IDRC/MoE and DANIDA.
4c	Community Based Agricultural Soil Conservation in Srae Ambel District, Koh Kong Province	<ul style="list-style-type: none"> <li>- To reduce soil erosion from agricultural land in the coastal watershed; and</li> <li>- To increase food security.</li> </ul>	Koh Kong	3 years	2,000,000	MAFF	MAFF's Provincial Department, local authorities and NGOs	AFSC has worked with local communities in Srae Ambel in the following areas: sustainable agriculture, and community forestry and fisheries.
<b>Health</b>								
1a	Production of Biopesticides	- To reduce malaria incidence by introducing	CNM and CPE	5 years	3,000,000	CNM	CPE University of	Limited biopesticide research has been

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No	Title	Objectives	Location	Time frame	Estimated Budget, US\$	Agencies involved		Status
						Lead	Cooperating	
		biopesticides					Health Sciences, RUPP and NGOs	conducted in Cambodia.
1b	Development of Healthcare Centres and Posts	- To assist the Ministry of Health in developing healthcare centres and posts in high risk malaria regions and in areas highly vulnerable to climate change.	Selected villages in highrisk malaria regions	3 years	750,000	MoH	CNM and local authorities	Budget constraints have limited MoH construction of healthcare centres and posts.
1c	Provision of Safe Water in High Risk Malaria Regions	- To reduce risk of mosquito bites while collecting water from rivers and streams; and - To provide communal water sources.	Selected villages in highrisk malaria regions and in areas highly vulnerable to climate change	3 years	100,000	MRD	NGOs and international organisations	MRD in collaboration with NGOs and international organisations has constructed wells in a number of provinces.
2	Malaria Education and Mosquito Habitat Clearance Campaigns	- To raise public awareness of malaria prevention and treatment; - To promote behavioural changes towards malaria prevention and treatment; and - To reduce the extent of mosquito habitats.	Kampong, Thom, Koh, Kong, Mondul, Kiri, Preah, Vihear, Pursat, Ratanak Kiri, and Siem Reap	3 months from Febr. to April every year	500,000 per year	CNM	MoH Provincial Departments, Local authorities and concerned NGOs	This project complements existing malaria education by CNM, HU and PFD under the global fund.

## Annex 7: GEF/UNEP and MoE proposed coastal zone climate change adaptation project

A draft project identification form (PIF) has been prepared by UNEP, UNEP Collaborating Centre on Water and Environment (located in Denmark), and the Ministry of Environment for the project: *"Vulnerability assessment and adaptation measures for climate change in the coastal zone of Cambodia considering livelihoods improvement, ecosystems and biodiversity"*. MoE has made a request to Danida for support to the co-financing of the project.

The Danida representation in an email (April 10 and April 18, 2008) has noted that the climate change screening is *"expected to review and make recommendations with regard to the MoE request for Danida to support the UNEP-GEF ... climate change adaptation programme in the coastal area"*.

The PIF is submitted to the GEF managed Least Developed Countries Fund (LDCF) for adaptation. Denmark has contributed USD 16 Million to the LDCF and approximately 10 % of the total donor commitment. LDCF has funded the preparation of NAPAs in 47 Least Developed Countries (LDCs) including Cambodia. LDCF now can support the implementation of the NAPA priority projects. One project has been funded (in Bhutan) and Cambodia with UNDP has prepared a PIF for a priority project dealing with capacity development in agriculture and water management.

The proposed project will contribute to lesser potential damages of climate change to coastal zone development and livelihoods in the coastal zone. Three components are proposed:

1. Strengthening national policy, regulations and institutional capacity for climate change adaptation measures, integrating ecosystems, biodiversity and livelihood.
2. Vulnerability assessment for coastal area, identification of areas for adaptation measures, and land use plan.
3. Rehabilitation of Coastal infrastructure and water resources protection measures.
4. Community mangrove restoration and sustainable use of natural resources.

The project relates to several of the priority projects of the NAPA (projects 1c, 3g, 4b and 4c that are listed among the NAPA priority project (*see* Annex 6) with a combined NAPA budget of USD 6.0 Million).

The LDCF project for the coastal zone has a budget of USD 4.550 Million. The co-financing part of USD 2.550 Million includes an expected share of USD 1.5 Million from bilateral donors and the rest from various sources. The co-financing can be from ongoing programmes.

The grant from the LDCF of USD 2.0 Million covers the additional costs of climate change adaptation. These are costs that are additional to an ongoing or planned development activity. The co-financing in all or part includes the development budget, i.e. the development activities not directly related to climate change adaptation.

The assessment of the additional costs is difficult to assess, and GEF therefore has introduced a sliding scale. For a project of this size up to 50% of the project costs may be additional costs for potential LDCF funding. In the following box, the definition of additional costs of adaptation to climate change are defined.

**From the GEF council meeting, June 2006 (GEF/C.28/18):**

19. LDCF support to adaptation projects will be based on identifying and meeting additional costs. Activities that would be implemented in the absence of climate change constitute a project *baseline*, and the costs of achieving this development scenario are referred to as baseline costs or baseline financing. The altered plan of action required to achieve the national sustainable development goals, to build adaptive capacity, and to increase resilience to the anticipated climate change comprises an *adaptation scenario*. The costs of this adaptation scenario constitute the total project costs and will normally exceed the costs of the baseline scenario. The additional costs associated with meeting these extra adaptation needs imposed on the country by the effects of climate change will be supported by the LDCF. The costs of the baseline activities are expected to be met through normal development expenditures, such as government budgets, bilateral aid, contributions from the private sector, NGO resources, and loans from international financial institutions, including IDA. **Baseline financing will normally serve as co-financing for the additional costs of financing adaptation projects provided through the LDCF [emphasis added]**

20. For example, a city in a vulnerable country may be planning to build a new water supply system. Under the baseline conditions prevailing without climate change, the cost of these activities would include the cost of construction, operation, maintenance, and training for the communities concerned. These baseline costs would be met through the water agency's development budget. However, in the face of expected increased drought and flooding expected due to climate change, the water supply system might have to be redesigned to include (additional) specific measures to conserve more water; to improve drought/flood planning and preparedness; to strengthen storage facilities; and to provide more flexible access to alternative sources of fresh water. The total costs of the new, re-designed, project are considered the costs of the adaptation scenario. The difference between the costs of the adaptation scenario and the baseline scenario are the additional costs of building the water supply system in the face of global warming. It is these additional costs which would be supported by the LDCF.

Danida has previously been a major donor for support to environmental management in the coastal zone in Cambodia with three phases from 1997 to 2007 and a grant of DKK 50 Million. This included *i.a.* the establishment of the four coastal zone resource centres in the coastal zone.<sup>19</sup>

The project proposal is not yet developed and it has therefore not been possible to review the project proposal in detail. It is recommended as an outcome of the climate change screening to reserve a contribution to the co-financing of the adaptation project.

A more detailed outline from MoE and UNEP for requesting the co-financing could include:

- Status of other sources of funding and the proposed procedures for the financial management of the co-financing.
- Clarify whether the Danida co-financing is for the development budget or additional adaptation costs of the proposed activities.
- A clarification of the sustainability of the past DKK 50.0 Million Danida support to the environmental coastal zone in Cambodia and key outcomes that will be relevant and used in the climate change adaptation project.
- A requirement to inform the Danida representation without further delay in case the co-financing may no longer be required.

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<sup>19</sup> MoE in November 2006 approached the Danida representation and other donors to support to coastal zone projects: (i) Strengthening of the Environmental Management Framework in the Coastal Zone of Cambodia, and support to the Government's D&D efforts (USD 4.379 Million), and (ii) Establishment of Management System for Marine and Coastal Protected Areas in Cambodia and Improvement of Livelihoods for Coastal Communities (USD 6.755 Million). The Danida representation decided then not to support this request.

## Annex 8: Policies and Regulations Relevant for Climate Change

Policy Document	Type	Key Points	Relation to Climate Change
Constitution, 1999	Constitution	Requires the State to protect the environment and natural resources and establish management plan of land, water, air, wind, geology, ecological system, mines, energy, petrol and gas, rocks and sand, gems, forests and forestry products, wildlife, fish and aquatic resources.	No reference to climate change.
Law on Environmental Protection and Natural Resource Management, 1996	National law	Objectives include pollution control, environmental impact assessment of proposed projects, sustainable management of natural resources.	No reference to climate change.
Land Law, 2001	National law	Determines and guarantees ownership regime for immovable properties.	No reference to climate change.
Fisheries Law, 2001	National law	Establishes framework for sustainable management of fisheries.	No reference to climate change.
Forestry Law, 2001	National law	Establishes framework for sustainable management of forests.	No reference to climate change.
Electricity Law, 2001	National law	Establishes framework for electric power supply and services.	No reference to climate change.
Sub-decree on the Control of Air Pollution and Noise Disturbance, 1999	Sub-decree	Protects environment quality and public health from air pollutants and noise disturbance.	No reference to climate change.
Sub-decree on Environmental Impact Assessment Process, 1999	Sub-decree	Requires environmental impact assessments to be conducted for proposed projects, and to be reviewed by MOE.	No reference to climate change.
National Adaptation Programme of Action to Climate Change, 2006	National plan	Based on nationwide consultations from grassroots to policymakers, including survey of 700 households in 17 provinces. Addresses flood, drought, windstorm, high tide, salt water intrusion and malaria.	Prioritises 39 project profiles for adaptation to climate change.
National Strategic Development Plan 2006-2010	National plan	Framework to harmonise development efforts and aid-effectiveness. Founded on	Stresses the need to respond to climate change, in particular droughts and floods.

<b>Policy Document</b>	<b>Type</b>	<b>Key Points</b>	<b>Relation to Climate Change</b>
		rectangular strategy for growth, employment, equity and efficiency.	Reference to NAPA.
Renewable Electricity Action Plan, 2001	National plan	Envisions a ten-year programme of activities: 5MW of electrical supply from renewables; 100,000 households served; 10,000 solar home systems.	Contributes to efforts to address climate change, but focuses on poverty reduction. Explores funding opportunities through CDM.
Energy Masterplan, 2002	National plan	Energy masterplan to the year 2015.	No reference to climate change.
Strategic National Action Plan for Disaster Risk Reduction 2008-2015	National Plan	Addresses the implementation of the Hyogo Framework in Cambodia.	Recognises that both NAPA and SNAP aim to address community vulnerability to hazards. Seeks to establish synergies with NAPA.



## Annex 9: Institutions Relevant for Climate Change

Institution	Type	Relevant objective	Remarks
Ministry of Environment	Government Ministry	Mandate over environmental issues, including conservation/protected areas, environmental quality/environmental impact assessment, and rational use and management of natural resources.	Focal Point for Climate Change and Biodiversity Conventions, and GEF.
Cambodian Climate Change Office	Ministry Office	Carries out all technical activities related to the implementation of the Climate Convention. Facilitates and coordinates donor funded and private sector activities relevant to climate change with other government agencies. Supports and organises inter-ministerial technical working groups specialised in sectors (energy and forestry), and along climate change themes (GHG inventory, mitigation, vulnerability and adaptation).	Part of Ministry of Environment. Department of Planning and Legal Affairs. Secretariat of the DNA for CDM, and of the UNFCCC focal point.
National Committee on Climate Change	Inter-ministerial Committee	Prepares, coordinates and monitors implementation of policies, strategies, legal instruments, plans and programmes to address climate change.	Composed of Secretaries and Under-Secretaries of State from 19 Ministries and government agencies. Meets at least twice yearly.
Ministry of Agriculture, Forestry and Fisheries (MAFF)	Government Ministry	Mandate over agriculture, including forestry and fisheries.	Focal point of the United Nations Convention to Combat Desertification (UNCCD).
Forest Administration	Government Department	Responsibilities include forest and wildlife inventory; protection and management of forest resource, and wildlife conservation.	Formerly known as Department of Forestry and Wildlife. Part of MAFF.

<b>Institution</b>	<b>Type</b>	<b>Relevant objective</b>	<b>Remarks</b>
Cambodian Agricultural Research and Development Institute	Government Research Institute	Research body for sustainable agriculture and economic development, with primary aim of food security through increased rice production.	
National Committee on Disaster Management	Inter-ministerial Committee	Provides emergency relief and develops preventive measures to reduce loss of life and property from natural and human induced disasters.	Composed of members of relevant ministries and the Armed Forces.
Ministry of Industry, Mines and Energy	Government Ministry	Develops and manages energy policy, strategy and planning, including renewable energy.	
Ministry of Water Resources and Meteorology	Government Ministry	Responsibilities include development and implementation of water resource strategy, determination of water potential, collection and management of meteorological data.	WMO focal point.
Ministry of Public Works and Transport	Government Ministry	Manages execution of national policy on public works, including roads, bridges, ports, railways, waterways and buildings.	
Ministry of Health and National Malaria Centre	Government Ministry	Mandate over public health. Ultimate objective to eliminate vector borne diseases.	
Council for the Development of Cambodia	Government Agency	One-stop service for rehabilitation, development, and investment activities. Facilitates and coordinates government-donor relations.	

## Annex 10: Donor funded projects relevant for Climate Change

Organization	Types	Name of the project	Funding	Remarks
Ministry of Environment	Govt	Second National Communication to UNFCCC (SNC)	GEF/UNDP	Ongoing. Initiated in 2007.
		IGES Clean Development Mechanism Programme	Japan/IGES	Ongoing. Initiated in 2003.
		National Adaptation Programme of Action to Climate Change (NAPA)	LDCF/UNDP	Completed in 2006.
		Capacity Development for the Clean Development Mechanism (CD4CDM)	Netherlands/UNEP Risoe	Completed in 2005.
		Initial National Communication to UNFCCC (INC)	GEF/UNDP	Completed in 2002.
Ministry of Industry Mines and Energy	Govt	Rural Electrification Fund (REF)	World Bank/GEF	Ongoing. Initiated in 2004.
		Renewable Electricity Action Plan (REAP)	World Bank	Completed in 2001.
		Energy Masterplan for the Kingdom of Cambodia	Japan/NEDO	Completed in 2002.
Ministry of Water Resources and Meteorology	Govt	Enhancing Community Resilience to Natural Disasters	ADPC	Ongoing. Initiated in 2006.
		Technical Service Center for Irrigation System Project	JICA	Ongoing. Initiated in 2001.
National Committee on Disaster Management	Govt	Partnership for Disaster Reduction – Southeast Asia	ADPC/EC	Ongoing. Initiated in 2007.

<b>Organization</b>	<b>Types</b>	<b>Name of the project</b>	<b>Funding</b>	<b>Remarks</b>
		Support to Implementation of Flood Preparedness Programs at Provincial, District and Commune Levels	ADPC/MRC/EC	Ongoing. Initiated in 2007.
		Strategic National Action Plan for Disaster Risk Reduction 2008-2015	ADPC/UNISDR/EC	Ongoing. Initiated in 2007.

## Annex 11: GEF small grants projects on climate change in Cambodia

**Community Energy Cooperative (CEC) Expansion and Small Business Livelihood Development Project, (KHM/06/02);** Grant Amount: USD 42,035; Grantee: Anlong Tamey Community Energy Cooperative; Dates: 1/2006 - 6/2007.

*The project aims to electrify a rural village using 100% renewable energy sources. The source of biomass will be locally farmed trees. No wood from natural forests will be harvested. Establishing community energy reserves/tree farms will reduce pressure from the use of fuel wood from natural forests. Leuceana is a fast growing, tropical legume (nitrogen fixing) which will improve soil fertility. Leuceana thrives on less fertile non-irrigated land and will not displace paddy areas.*

**Solar Bicycle Improvement Research (KHM/06/08);** Grant Amount: USD 3,798; Grantee: Local Capacity Builder; Dates: 10/2006 - 3/2007.

*The main objective is to build two new models of solar bicycles and introduce them to the public to increase awareness of environmental issues.*

**Mainstreaming Climate Change Issues in Sustainable Development (KHM/OP3/2/07/18);** Grant Amount: USD 50,000; Grantee: Save the Earth Cambodia, Dates: 7/2007 - 9/2009.

*The project aims to build capacity of the GEF SGP project partners in project management (planning, implementation and participatory M&E) and organizational management. The project will provide a sharing and learning platform for GEF SGP grantees, community representatives and donors.*

**Environmental Education through Pagodas, CAMBODIA (KHM/UNDP/07/20);** Grantee: The Association of Buddhists for the Environment; Dates: 9/2007 - 12/2007.

*The project will provide water supply and sanitation facilities to about 613 families in Kandal, Trapek and Chrolong village, (Da, Chronok and Tragnel commune of Kompong Leng district). It will also improve sanitation facilities for local people, train communities to take responsibility for the facilities, and conduct health and hygiene awareness outreach.*

**Community Energy (CEC) Smallholders Irrigation and Agriculture Income Development for Anlong Thmey (KHM/UNDP/07/40);** Grantee: Anlong Thmey Community Energy Cooperative; Dates: 9/2007 - 10/2008.

*The first goal is to utilize currently underutilized daytime electricity generation capacity. The electric motor driven pumps will add to the kWh demand and improve the financial viability of the CEC renewable energy electricity system. The second objective is to increase income for farmers and family members. The introduction of drip irrigation technology will allow the production of market oriented vegetables and increase the number of crops that can be grown and harvested.*

**Improving Environment and Livelihood Through Conservation and Sustainable Use of Natural Resources (KHM/SGP/OP4/CORE/07/42 );** Grant Amount: \$ 37,995; Grantee: Development & Appropriate Technology; Dates: 1/2008 - 12/2009.

*The project aims to i) technical support to households on growing jatropha and oil production from jatropha seeds, ii) participatory management of sugar palm trees, iii) improved cookstoves for palm sugar production, planting of fast growing tree species and community forestry and iv) strengthening of fair trade enterprises.*

**Clean Environment and Poverty Reduction with the Promotion of Bio-Digester Technology in Rural Communities (KHM/SGP/OP4/RAF/08/50);** Grant Amount: \$ 46,565; Grantee: Peace and Development Institute; Dates: 5/2008 - 10/2009.

*The project aims to install 200 biogas digesters with 100 toilet-connections and 150 compost huts in the 50 village based savings groups of the target areas, together with the recruitment and training of 14 masons and 3 technician supervisors.*

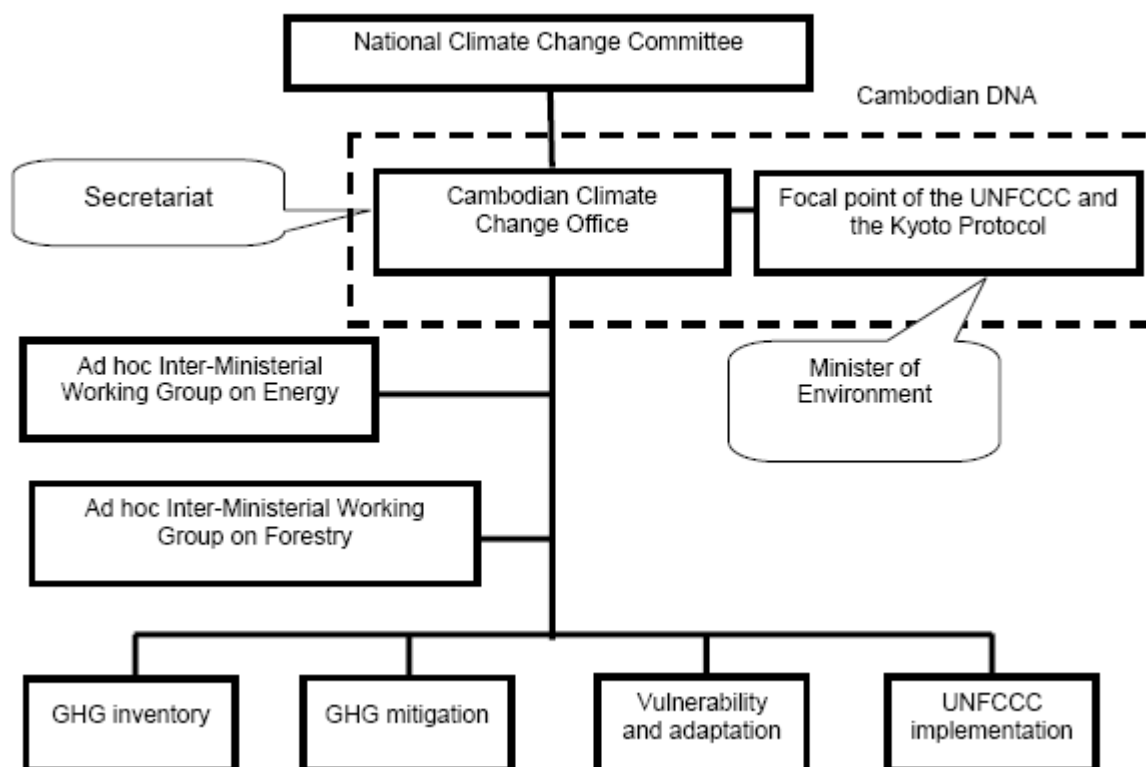
**Wind Water Pump Development and Dissemination (KHM/SGP/OP4/RAF/08/51)**, Grant Amount: \$ 10,749; Grantee: Cambodian Development Institute; Dates: 5/2008 - 4/2009.

*The main objective is to improve and refine two models of wind pumps and manufacture six wind pumps from the prototype models for dissemination through training.*

**Restoration and Management of the Reservoir and Sustainable Community Based Eco-village Development (KHM/SGP/OP4/RAF/08/49)**; Grant Amount: USD 44,009; Grantee: Coastal Community Fisheries Khan Stung Hav, Sihanoukville; Dates: 5/2008 - 12/2009.

*The project components are: i) Restoration and management of the reservoir; ii) sustainable community based eco-village development.*

## Annex 12: CDM and DNA Institutional Structure



## Annex 13: List of References

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## Annex 14: List of Persons Met

### Cambodia Climate Change Office (CCCCO), Ministry of Environment

1. Thy Sum : Head of Climate Change Office, Department of Planning and Legal Affairs
2. Chea Chan Thou : Deputy Director, Department of Planning and Legal Affairs
3. Tin Pon Lok : Project Coordinator (CCCCO – UNDP project)

### Ministry of Environment (MoE)

4. Long Rithirak : Deputy Director General
5. Vann Monyneath : National Project Coordinator, Coastal Coordination Unit

### Ministry of Health (MoH)

6. Khoun Engmony : Deputy Director, Health Prevention

### Ministry of Industry, Mines and Energy (MIME)

7. Toch Sovanna : Director, Department of Energy Technique

### Department of Meteorology, Ministry of Water Resources and Meteorology (MoWRAM)

8. Long Saravuth : Director, Department of Meteorology

### Forestry Administration (FA)

9. Ma Sok Tha : Chief of Reforestation Office

### National Committee for Disaster Management

10. Peou Samy : Secretary General
11. Khun Sokha : Director, Emergency Response and Rehabilitation Department

### Danida Representation

12. Tom B. Hansen : Head of Representation, Danida
13. D.Andrew Wardell : Counsellor, Danida Representation
14. Michael Engquist : Senior Programme Officer

### DFID

15. Chris Price : Livelihoods Advisor

### Sida

16. Eric Illes : First Secretary, Embassy of Sweden

### Agence Française de Développement (AFD)

17. Hervé Conan : Chargé de Mission
18. Jean-Michel Mignot : Environnemental & Social Expert, Département Technique Opérationnelle (Paris, France)

### United Nations Development Programme (UNDP)

19. Lay Khim : Assistant Resident Representative, Environment and Energy

Cluster Team Leader

**Asian Development Bank (ADB)**

20. Paul Van Im : Programs Officer, Agriculture, Environment and Natural Resources

**Mekong River Commission, Regional Flood Management and Mitigation Centre (RFMMC)**

21. Truong Hong Tien : FMM Programme Coordinator

22. Hatda Pich An : Operations Manager

23. Perapol Begkhuntod : Programme Officer, Meteorologist

24. Bob Pengel : Technical Adviser

**WorldFish Centre, Greater Mekong Region**

25. Blake D. Ratner : Regional Director

26. Eric Baran : Research Scientist

27. Mam Kosal : Research Analyst (institutions and governance)

28. Yumiko Kura : Regional Programme Coordinator

29. Mrigesh Kshatriya : Research Fellow

**Cambodian Red Cross**

30. Uy Sam Ath : Director, Disaster Management Department

31. Andrew Oliver-Smith : Disaster Preparedness Delegate, Danish Red Cross

**Wildlife Conservation Society**

32. Tom Evans : Technical Advisor, Cambodia Programme

**Wildlife Alliance**

33. Adam T. Starr : Grant & Report Coordinator

**Geres (Groupe Energies Renouvelables Environnement et Solidarités)**

34. S. Yohanes Iwan Baskoro : Country Director

35. Arnaud Guidal : Forester

**National Biodigester Programme (SNV)**

36. Jan Lam : Senior Advisor Biogas

37. Lam Saoleng : Programme Coordinator

**Community Forestry International**

38. Amanda Bradley : Country Director

**Oxfam America**

39. Sumie Arima : Regional Policy Officer, East Asia Regional Office

40. Abdul Latif Khan : Humanitarian Response Program Officer