Coastal Adaptation and Resilience Planning Component

Assessment of Coping Strategies in the Coastal Zone of Cambodia

Cambodia Climate Change Alliance (CCCA)

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This report is part of the Coastal Adaptation and Resilience Planning Component (CARP) as initiated by the Cambodia Climate Change Alliance (CCCA). The objective of the CARP is to increase resilience of coastal communities and ecosystems to climate change through adaptation planning, demonstrated targeted local interventions and provision of practical learning experience in adaptation planning.

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The report has been prepared byMr. Torben Krab in cooperation with national consultants and project staff. The national team consisted of Ms.SornSomoline, Mr. Chea Leng and Mr. Meas Rithy.

Abbreviations and Acronymes

ADB	Asian Development Bank
AFD	Agence Française de Développement
CARP	Coastal Adaptation and Resilience Planning Component
CCCA	Cambodia Climate Change Alliance
CCD	Climate Change Department
CDP	Commune Development Plan
IUCN	International Union of Conservation of Nature
KAP-study	Understanding Public Perception of Climate Change in Cambodia study
MFI	Microfinance
MoE	Ministry of Environment
MoWRAM	Ministry of Water Resources and Meterology
NAPA	National Adaptation Program of Actions to Climate Change
NCCC	National Climate Change Committee
RGC	Royal Government of Cambodia
SLR	Sea Level Rise

Executive Summary

This report is an assessment of current coping strategies in theCoastal Adaptation and Resilience Planning Component's (CARP) target communities in relation to flooding, drought and other extreme events. The study has been carried out in the two target communities Prey Nob District in Sihanouk Province andMondolSeima District in Koh Kong Province. The report is based on existing literature and a comprehensive data collection in the two target communities conducted by this study.

There is a general consensus in existing literature that the coastal zone in Cambodia will be subjected to further impacts of climate change than it is today. The weather hazards such as drought, floods, seawater intrusion, pest on crops and others will stay the same,however theirfrequencies and intensity are predicted to increase in the future.

Both target communities in Koh Kong and Sihanouk Provinces experience these impacts of climate change as described in existing literature. They influence villagers in the target communities in negative ways in relation to economy, occupation and health.

Both target communities have coping strategies in place, which support them in overcoming the consequences of the impacts of climate change. These coping strategies are, however, based on a low technical capacity and limited institutional support, with the result that none of the coping strategies seems to be fully working in relation to their potential.

This report's data are in line with other existing literature in identifying a gap between villagers' perception and the technical definitions of climate change.

The assessment in this report identifies the lack of an organized system of information, providing information about weather hazards to and from the villagers in the target communities, as a key problem in ensuring the effectiveness of existing coping strategies. As part of the assessment in this report, recommendations are provided regarding how such a system of information should be developed, and what type of information it should be based upon.

Introduction

The Royal Government of Cambodia has identified the coastal zone as a focal point in Cambodia's work to adapt to existing and coming impacts of climate change. Cambodia's coastal zone is threatened by impacts of climate change such as storms, surge, rise in sea levels and seawater intrusion.

This report providesan assessment of current coping strategies in theCoastal Adaptation and Resilience Planning Component's (CARP) target communities in relation to flooding, drought and extreme events. The objectives of the assessment have been formulated as objective 2.2 in the CARP. Furthermore, a brief assessment of the institutional capacity within the framework of the CARP has been conducted.

The objectives of the CARPareto build coastal zone adaptation capacity at national and provincial leveland develop coastal adaptation plans through a practical learning-by-doing capacity building exercise involving all relevant stakeholders. The adaptation plans will then be translated into practical demonstration adaptation measures to be implemented in vulnerable communities in selected agriculturaland mangrove areas.[1]In order to accomplish this, one of the first steps was to initiate the present assessment. The report will provide input to the CARP baseline onthe three following themes:

- Present perception of the population living in the coastal zone on climate change
- Information being provided to the population in the coastal zone on climate change and weather hazards.
- Existing coping strategies implemented by the population in the coastal zone, and their effects in the coastal zone

Each of these three themes will be elaborated in the next section.

Building an increased resilience to climate change through adaptation planning is dependent on integrating knowledge, information and tools into the existing livelihoods of the people residing in the coastal zone.

1 Cambodia Climate Change Alliance, "Coastal Adaptation and Resilience Planning Component", 2010, p. 34

Methodology

To a large extentthe assessment has beenbased on existing literature. However field research has also been conducted in order to present site-specific data on selected variables.

Since 2009, there have been a number of climate change studies carried out in Cambodia. This research has been used extensively in combination with the collected site-specific data.

Target communities

The study has been carried out in two pre-selected target communities. The two locations are:

- **Prey Nob District, Sihanouk Province**
- **MondolSeima District, Koh Kong Province**

As stated in the CARP, the"Prey Nob and MondolSeima districts were selected as pilot districts during consultations between the MoE, provincial and district authorities from the coast, the CCD and the national and international consultants. Their selection was based on the fact that both areas border the shoreline and largely consist of low-lying land, and consequently are highly vulnerable to SLR, storm surges, saltwater intrusion and tropical storms."

Below is a brief presentation of the target communities.

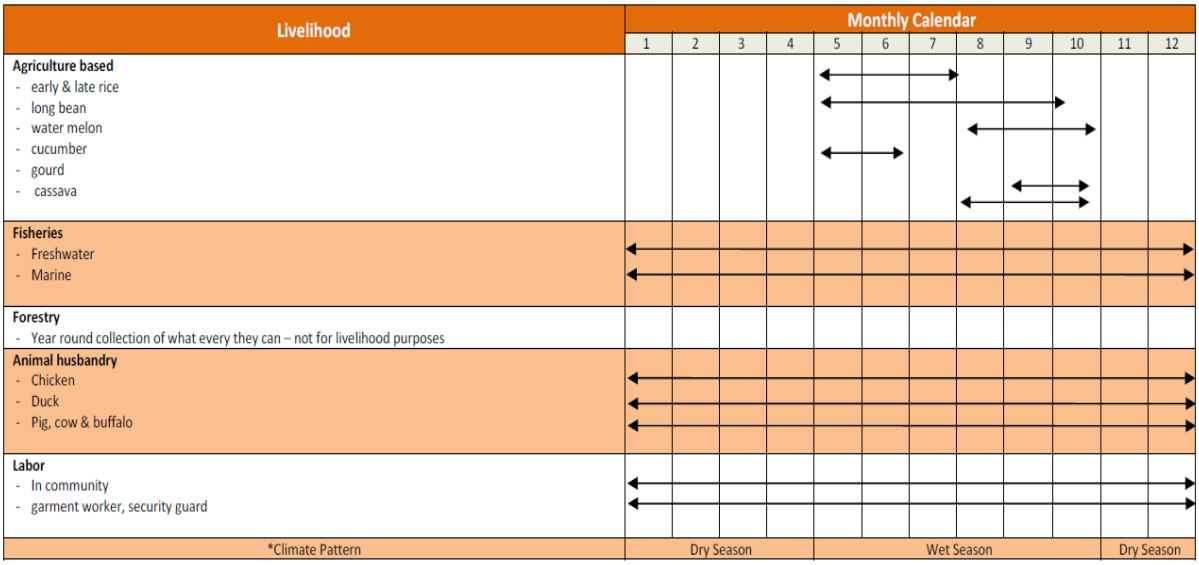
Prey Nob District, Sihanouk Province

Prey Nob district consists of 18,444 households with 93,141 people. This district is located in a particularly low-lying area with a total of 10,000 ha used for rice production, and protected by a dyke system. This dyke system was rehabilitated over a four-year period through funds from the French Development Agency, Agence Française de Développement(AFD).

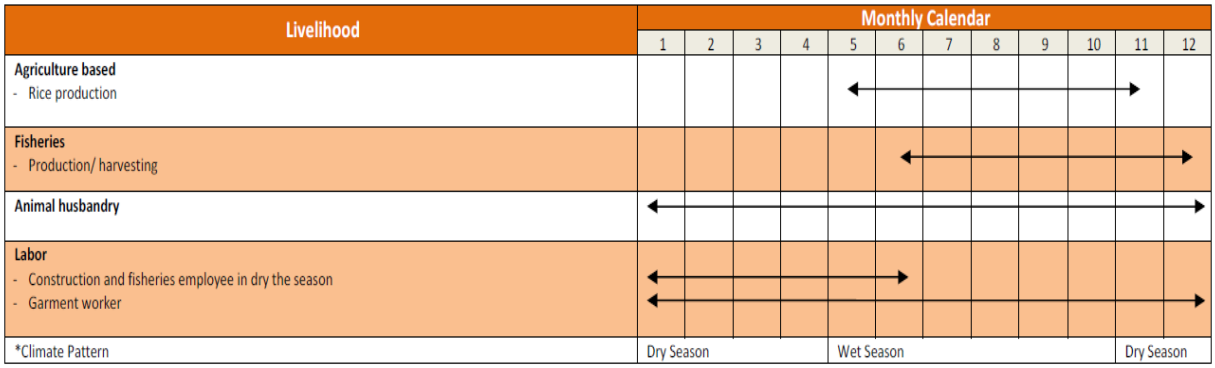
Two examples of livelihood seasonal calendars for two villages in Prey Nob[2] are presented below. From the calendars it is possible to see how the livelihoods in the two villagers base their income during the different months of a year.

2Adaptation Knowledge Platform, "Climate Change Adaptation: Finding the appropriate responses, Annex 1, Cambodia, 2011

Livelihood seasonal calendar for Ou Ta Sek village, OuOkmha Heng,, Prey Nob District, Sihanouk Province



Livelihood seasonal calendar for Boek Krang Village, Prey Nob Commune, Prey Nob District, Sihanouk Province



Mondol Seima District, Koh Kong Province

According to the most recent information regarding communities in MondolSeima the number of families is 1,883, with a total population of 9,152 residents. Almost 95% of all villagers living in PeamKrasaobrely onfishing as their main source of livelihood. Following the efforts by the government to stop mangrove destruction in the sanctuary, many of the local people changed occupations to chicken and duck raising, harvesting crabs and snails, fishing, small-scale business, hunting, small speed boat operation, repairing boat and fishing gear, thatch weaving, fish processing, and repairing houses.[3]

Below is an example of a livelihood seasonal calendar of livelihoods in MondolSeima.[4] Compared to the seasonal calendars of the two villages in Prey

3Cambodia Climate Change Alliance, "Coastal Adaptation and Recilience Planning Component", 2010, p. 23 - 24

4Adaptation Knowledge Platform, "Climate Change Adaptation: Finding the appropriate responses, Annex 2, Cambodia, 2011

Nob, the village in MondolSeima bases its income on fisheryto a larger extent, as in line with the profile of the two target communities.

Livelihood seasonal calendar for Tachat Village, TuolKokir Commune, MondolSeima District, Koh Kong Province

Livelihood	Monthly Calendar											
	1	2	3	4	5	6	7	8	9	10	11	12
RICE CROP							←					→
CROP (CHAMKAO) - Jackfruit, durian, water melon, cucumber, corn, pineapple, banana, cassava January to April – grow out for fruits, late August to December - harvest time	←			→				←				→
SMALL SCALE HAND FISHING ALONG THE CANAL AND MANGROVE - Crab, shrimp, fish with small boat (Village does not have the capacity and ability to fish in the sea) - Use small amounts of nets and traps – better catch from January to March - Note that the more salt water in the canal the better the fishing	←			- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	→
ANIMAL HUSBANDRY - Chicken, pig, duck, cow January to March the streams and canals are dry, hence there is a high rate of animal death at this time, i.e. the dry season	←	- - -	- - -	- - -	- - -	- - -	→			- - -	- - -	→
*Climate Pattern	Dry Season				Wet Season						Dry Season	
---------- doted line equals less activity												

Clarification of terms

A brief clarification of two terms is necessary. These two terms are:

- Adaptation strategy
- Coping strategy

The reason for this clarification is that “adaptation” is a common term used in the climate change debate. However, it is often mistakenly used to describe individuals’ and households’ ability to copewithclimate change, which can more correctly be defined as coping strategies.

In order to avoid any confusion, this section will discuss the two terms and how they are defined within climate change research.

Adaptation strategies

Adaptation is being used to define a system’s ability to adjust to climate change – including climate variability and extremes. By *adjustment* is meant a system’s ability not only to moderate potential damages and consequences, but also to work with potential opportunities that may arise from climate change. Primarily a system’s means of adjustment are linked to adjusting national behaviour, use of resources and technologies.[5]

Definition of a coping strategy

The term Coping strategies focuses onthe micro level or more specifically the means by which people and organizations use available resources, and strengthen their capacity, in coping with the consequences of climate change.

5Intergovernmental Panel on Climate Change, “The Fourth Assessment Report of the Intergovernmental Panel on Climate Change”, 2007.

The important notion of the definition of a coping strategy is that the strategy should not only function during extreme or adverse conditions, it should also function during normal times. Consequently, a coping strategy should be in place and function also prior to the occurrence of any weather hazards.[6]

Moreover,a sustainable coping strategy needs to be based on an informed basis of relevant data such as weather forecasts.

Data collection

As mentioned previously, a significant body of research on climate change in Cambodia exists, and this data is essential to this report. However in selected target areas additional primary research was carried out in order to obtain data on selected indicators – indicators that will be elaborated on later. The data collection consists of quantitative and qualitative data. The data collection consistedof four elements:

- Questionnaire at village level
- Group Discussion at Commune Committee level
- Group Discussion at Commune Council level
- Questionnaire at Commune Council level

Questionnaire

First part of the data collection was based on a 5-page questionnaire (see annex 1). The questionnaire wascompletedthrough a face-to-face interview.

The questionnaire used was based on the following threethemes.

Perception:

Research has shown that people's perception of climate change is directly linked to their ability to distinguish between effective and ineffective climate change responses.[7] Thus as stated in the section "Clarification of terms" a sustainable coping strategy must be developed and conducted on an informed background. In order to have such an informed background it is important to ensure that peoples´ perception of climate change is in accordance with the technical definition of climate change. Otherwise there is a risk of a miscommunication between the technical elements of the CARP and the target communities. In the long-term such a miscommunication will lead to mal-adaptation.

6 UNISDR, "UNISDR Terminology on Disaster Risk Reduction", p 8, 2009

7Oxfam America, "Understanding Public Perception of Climate Change in Cambodia", p 1, 2011

Information:

First, acoping strategy must be based on an informed background. However, studies have shown that Cambodians often lack information when weather hazards occur, and consequently have limited possibilities to develop effective coping strategies.

Second, if information is intendedto create knowledge, this information has to be based on the existing perception of climate change. Thus it is important to understand the link between the perception of the target communities and the manner in which the target communities are informed about climate change.

Coping strategies

This theme is to understand if target communities have developed any coping strategies regardless of whether they are effective or not.

Considering this third theme is crucial, as this report aims to elaborate on coping strategies. Secondly, this theme will support the analysis of the concordance between villagers' perception of climate change and the technical definition, by providing data on the villagers´ perception of what constitutes a coping strategy.

The term "*Coping strategies*" has been extended in its definition compared to the more theoretical definition as presented in the section "*Clarification of terms*". In the data collection it is the respondent's perception of what constitutes a coping strategy. The respondent's perception may not be in concordance with the theoretical definition of the term. This will be analysed later in the report.

Group discussions and questionnaire

The second part of the data collection consisted of two types of group discussions. The purpose of this partwas to enterinto a more reflected discussion on the specific weather hazards that have occurred in the target communities.

Both group discussions werecarried out through a facilitated process; one consisting of community committee members and the other for the commune councils in the target communities.

For the community committee group discussion a matrix has been developed. This matrix summarizes the outcomes of the group discussion. All the matrices conducted can be found in Annex 2.

For the commune council a group discussion based on a questionnaire was conducted. Furthermore, each member of the commune council answered a questionnairegiving a score to the asked questions. Both of these documents can be found in Annex 1.

Limitation

There are a number of limitations to this report mainly in relation to the data collection.

Climate change is a concept based on very technical definitions, and due to this technical terminology there can be an issue of understanding when going into remote areas and collect data. Thus a simplification of terminology was necessary in order to carry out the research in the field. However, this creates a validity issue in analysing the data in relation to the more technical climate change data.

“Perception of climate change” is an important concept in this report. It is a concept used andanalysed in other literature as well. However, there is no definition of what constitutes a well-founded perception of climate change and what technically is just an awareness of weather patterns. Or to put it in another way, how much awareness of weather patterns constitutes a well-founded perception of climate change? This question is not something to which the existing literature gives a well-defined answer. Because of this lack of a well-defined answer it has an impact on the validity of conducting a comparative study on public perception of climate change.

When conducting field research during daytime in the coastal zone, the research has a natural bias based on gender. Men are often at sea or in the field working during daytimeand thus not available for interviews. This means that there is noequal gender split in the respondents used in the data collection. . There are methods to overcome this bias, but it is not within this report’s scope to apply such methods. A general method for overcoming this bias is to compensate chosen respondents ensuring they will stay in their households, while the data is collected, instead of going to sea or in the fields. Furthermore it requires a certain time frame to organize. As a short-term consultancy it was not within the budget or time frame to apply this method. This bias does have certain impacts on the data collected. As the respondents of the questionnaire are villagers who stay and work around the households, this is also the perspective that in general is being represented in the data collected. However this is to some extent made up by the group discussion of the community committee. The members of the community committees are mostly men working outside the households. However for this report it was organized so that the members of the community committees were attending the before mentioned group discussion.

The data collected for this report is quite extensive and has been used to create a fairly extensive database. It has not been within the scope of this study to analyse every detail of the data.Ratherthe focus has been on carrying out the detailed assessment using data retrieved from the database.

The coastal zone

Cambodia's coastal zone consists of four provinces: Kampot, Koh Kong, Sihanouk and Kep. The total area covered by these provinces is an estimated17,237 km^2. The coastal shoreline is 435 km and runs along the Gulf of Thailand. Along the coastline there is one deep seaport located in Sihanoukville, whichis considered to be one of the economic centres in Cambodia.[8]

The coastal zone's climate is defined as tropic monsoon with an annual rainfall between 2000 and 4000 mm. This amount of rainfall is higher than in other areas of Cambodia.[9]

The coastal zone has access to substantial sources of freshwaterfrom river streams, rivers and lakes that run in the area. Despite thesesources of freshwater, the lack of freshwater is a problem in the area.

During the rainy season the rivers, streams and lake flood due to the amount of rain, and in the process destroy crops in low lying areas. In the dry season, the downstream river water is getting mixed with salty seawater, making the water unsuitable for irrigation purposes.[10]

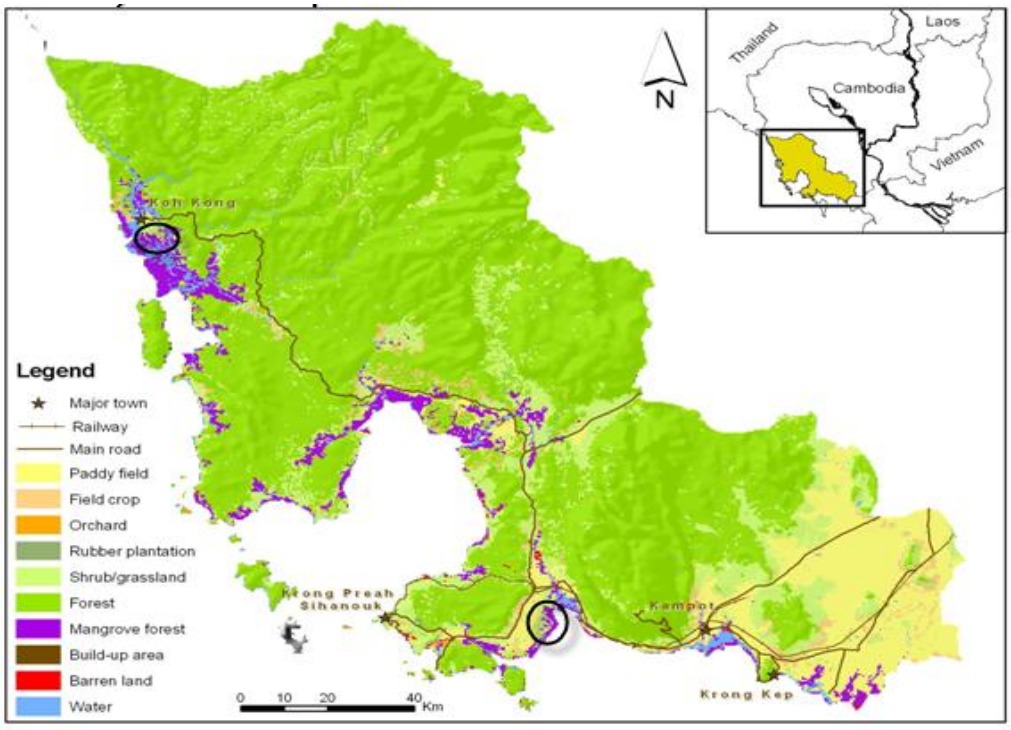


Figure 1: Land Uses in the Coastal Zone.

83/2-2012, http://www.wepa-db.net/policies/state/cambodia/seaarea.htm

9IBID

10Cambodia Climate Change Alliance, "Coastal Adaptation and Recilience Planning Component", 2010, p. 16

The coastal zone has several types of natural resources e.g.forests, mangroves and seagrass beds.

Forests and mangroves

The vast majority of the area in the coastal zone is covered by forest. The highest forest cover occurs in the Koh Kong province (83% or 1,002,721 ha), followed by the Sihanouk Province (54% or 81,539 ha) and then Kampot province (48% or 224,730 ha). The lowest forest cover is found in the Kep province (21% or 3,733 ha). From 1993 to 2005 the area in the coastal zone covered by forests has declined from 84% to 71% - mainly due to agricultural production.[11]

In 2005, 55,419 ha along the coastline werecovered with mangrove forests. The mangrove forests with theirecosystems are essential for the coastal zone for two reasons. Firstly, the mangrove forests have a vital role in the survival of a numerous fish species and other marine organisms. Secondly, the mangrove forests act as the frontline against tropical storms, storm surges and rises in the sea level, thereby reducing coastal erosion and inundation by creating a buffer zone in protecting the coastal zone. Despite its above-mentioned vital role for the coastal zone, some studies estimate that between 1993 and 2005 a decline of 25% of the mangrove forests has taken place. This decline is mainly due to the illegaluse of mangroves for firewood and for charcoal production. Other causesincludeclearing of forests for land reclamation, and the establishment of saltpans and intensive shrimp aquacultureare also playing a critical role in the decline of mangrove forests.[12]

Seagrass

Cambodia's coastal zone has large areas of seagrass. At the coastline 8 different species of seagrass can be found. The seagrass functions as habitat for juvenile fish, hereby serving as the nursing ground for many different species of fish includingcrustaceans and invertebrates.

The seagrass is under pressure from degradation of water quality due to logging, sand mining and costal reclamation activities. Furthermore destructive fishing practices also have a negative impact on the extent of seagrass along the coastline.[13]

11Cambodia Climate Change Alliance, "Coastal Adaptation and Recilience Planning Component", 2010, p. 14

12 IBID, 2010, p. 15

13IBID, 2010, p. 15 - 16

Climate Change in Cambodia

In order to assess coping strategies to climate change in the coastal communities, it is essential firstto understand what these communities have to copewith.

Cambodia is not a country that is highly exposed when it comes to climate changecompared to other countries in the region such as Vietnam and the Philippines. However, Cambodia is rankedas one of the most vulnerable countries to climate change in the world (9th rank World Risk Index 2011 Vulnerability ranking catastrophes and natural disasters, 6th rank Maplecroft Climate Change Vulnerability Index 2012).[14] Cambodia's vulnerability is based on a low level of infrastructure, a very low level of capacity in adapting to climate change effects, and on the fact that a largepart of the population work as farmers in remote areas.

Cambodia with its monsoon climate is heavily dependent on the rainy season from May to November and the seasonal flooding of the Mekong River and Tonle Sap Lake. Both these factors have become increasingly unreliable in its coming and in its intensity.[15]

The mean annual temperatures in Cambodia are projected to increase by 0.7-2.7^{0}Cby the 2060s.[16]

The Coastal zone

One of the most vulnerable areas in Cambodia in terms of climate change is the coastal zone. Among other things the coastal zone is subject to a rise in sea levels. Studies indicate that if the coastal zone experiences a rise in sea level by 1 m, 0.4% of the total area of the Koh Kong Province will be permanently under water,[17] with climate projections stating that Cambodia can experience a sea level rise of 0.18 to 0.56 m by the 2090s.[18]This threat should be understood in relation to another key environmental problem in the coastal zone. The coastal zone has experienced a decline in the area covered with mangrove forests due to deforestation and a more general decline in its biodiversity of the coastal zone – a decline in biodiversity that can lead to a natural decline in the mangrove forest. All this combined with an increase in the frequency and intensity of storms and storm surges has led to more coastal inundation.[19] This coastal inundation has dramatic effects for the communities along the coastal line. One consequence is the salinization of the surface and the groundwater, which has a severe impact

142/2-2012, http://www.businessinsider.com/climate-change-vulnerability-2011-10

1525/2-2012, http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile

1625/2-2012, http://sdwebx.worldbank.org/climateportalb/home.cfm?page=country_profile

17Cambodia National Mekong Committee, "The state of climate change management in Cambodia", 2010, p. 7

1817/2-2012, http://www.thegef.org/gef/sites/thegef.org/files/documents/document/2-7-11%20-%20Webposting.pdf

192/2012,http://www.sida.se/Global/Countries%20and%20regions/Asia%20incl.%20Middle%20East/Cambodia/Environmental%20Policy%20Brief%20Cambodia.pdf

on the fertility of the areas used for farming, and on ecosystems based on freshwater.

Furthermore, most agriculture in the coastal zone is concentrated inlow-lying coastal areas; hence the food security in the region could be threatened. Furthermore, the infrastructure in the coastal zone is under pressure from impacts of climate change, which can lead to an increased vulnerability over time and loss in income from tourism.[20]

Other threats from climate change in the coastal zone are:[21]

- An increase in rainfall of 2 to 6% by 2050, which will lead to more flooding.
- More heavy rainfall during a short period of time.
- An increase in mean annual temperatures of 0.7 to 2.7 degrees by 2060 and 1.4 to 4.3 degrees by the 2090s, which will lead to more droughts.

Institutional framework

In order to be able to adapt to the impacts of climate change, a certain institutional capacity is required. This capacity includes not only coping strategies enacted by villagers in the target areas, but also adaptation strategies that are integrated at all levels in the Cambodian society.

T*he National Climate Change Committee* (NCCC), which was established in April 2006 as an inter-ministerial mechanism,has as mandate to prepare, coordinate and monitor the implementation of policies, strategies, legal instruments, plans and programme of Cambodia in relation to climate change. The Cambodian Prime Minister H.E. Hun Senacts as the honorary chairman of NCCC; a fact thattestifies to the political leverage that the NCCC has. The NCCC is composed of Secretaries from 19 Ministries, and Under-Secretaries from State and government agencies.[22]

Beside the NCCC, the following 3 ministrieshavethe main responsibilities related to climate change, natural resources and coastal ecosystem management and development:

- **Ministry of Environment** (MoE) was established in 1993 and is responsible for environmental protection and natural resources management in the country. MoE is also responsible for Climate Change, and the Climate Change Department in MoE functions as the secretariat for the NCCC. In relation to the coastal zone the MoE has a mandate to coordinate coastal environmental management and development

2017/2-2012, http://weadapt.org/knowledge-base/vulnerability/Cambodia

2117/2-2012, IBID

22Royal Cambodian Government, "Sub-decree on The Establishment of The National Climate Change Committee", 2006

activities in the coastal zone according to a decision letter signed by the Prime Minister.

- **Ministry of Agriculture, Forestry and Fisheries** (MAFF) has the mandate for the management of all activities related to fisheries, including artisanal fisheries, mangroves, seagrass and industrial fisheries. In practice, the ministry has the responsibility for day-to-day management of most of the coastal resources, without the general co-ordinating mandate for overall environmental management.
- **Ministry of Water Resources and Meteorology** (MoWRAM) has the responsibility for managing all activities related to water and meteorology development and natural disasters. MoWRAM has signed a Memorandum of Understanding (MoU) regarding the sharing of responsibility for thePrey Nob polder management with the Sihanouk provincial authority and the farmer water users' community of Prey Nob polders.

Other government agencies involved with climate change are:

- **Ministry of Land Management, Urban Planning and Construction** (MLMUPC) has responsibility for formulation of development plans and land use plans on the national and local levels.
- **The National Committee for Disaster Management** (NCDM) was established in 1995 and is an inter-ministerial body chaired by the Prime Minister. NCDM plays a key role in disaster management, working both on disaster risk reduction/prevention and response preparedness.
- **Ministry of Industry, Mines and Energy** (MIME) is responsible for planning industrial water uses and hydropower, water supply provision to provincial towns and administration of single-purpose schemes involving hydro-power.
- **Ministry of Public Works and Transportation** (MPWT) is responsible for construction of roads, infrastructure e.g. bridges and ports.
- **Ministry of Rural Development** (MRD) is responsible for small-scale water supply to households (drilling well, digging well, and pond), primary health care, small-scale infrastructure (road, bridge, culvert, etc.)

Policy framework

The National Adaptation Programme for Action to Climate Change (NAPA) acts as the political framework for NCCC. TheNAPA was developed following a process of gathering information about climate change impacts in Cambodia in order to prioritize adaptation needs in the country, and to create synergies to other environmental and development programmes.[23]

The Cambodia NAPA identified the following objectives:[24]

- To understand the characteristics of climate hazards in Cambodia
- To understand coping mechanisms to climate hazards and climate change at the grassroots level

23 Royal Cambodian Government, "National Adaptation Programme of Actions taken to Climate Change", 2006, p. i

24IBID, 2006, p. 1-2

- To understand existing programmes and institutional arrangements for addressing climate hazards and climate change.
- To identify and prioritize adaptation activities to climate hazards and climate change

Beside the NAPA a national strategic action plan for climate change is under preparation by the MoE.[25]

Furthermore the Provincial Environmental Management Plan covering 2011-2015 is being finalized, but has not yetbeen approved. However, it is expected that this plan will have climate change as an integrated theme, and serve as an important policyframework for climate change adaptation strategies.

Cambodia's Perception of Climate Change

A number of studies regarding the topic of "perception of climate change" have already been carried out in Cambodia. The most comprehensive one is the study *Understanding Public Perception of Climate Change in Cambodia* (KAP-study) by Oxfam America. The data from this study and others are also used in the present report.

From one of the first perception studies on climate change in Cambodia the Danish NGO DanChurchAid foundthat in order to study this topic,a change in terminology had to be introduced. Instead of the technical term "climate change" the term "a change in weather patterns" was applied whengathering data on this topic.

As mentioned in the Methodology section,when implementing climate change projects it is essential to understand people's perception of climate change. However, this perception should not only include that of climate change events, but also perception in relation to the terminology used when discussing climate change.

Based on the aforementioned studies, there is a consensus on the topic of public perception of climate change in Cambodia. In general, Cambodians have a poor understanding of the scientific basis for climate change; however,studies have also shown that the vast majority of Cambodiansrecognize the term "climate change".[26]

Due to this poor understanding of the scientific basis for climate change, studies used the term "changes in weather patterns"instead, when studying public perception of climate change in Cambodia. This however raises the question what is meant by the term "changes in weather patterns"? Instead of a clear defined theoretical term it is more a term based on the individual perception of

25 UN-HABITAT, "Vulnerability Assesment", 2011, p 2

26Oxfam America, "Understanding Public Perception of Climate Change in Cambodia", p 19, 2011

the term by the respondents and the researcher, which creates the same validity issue of analyzing perception as discussed in the section “Limitation”.

The vast majority of Cambodians have an understanding that a change in the weather patterns has occurred in Cambodia. As consequences of these changes Cambodians experience an increase in extreme weather events, with droughts, high temperaturesand very heavy rains as the three main weather hazards.[27]

A substantial proportion of therespondents living in coastal fishing communities have experienced coastal erosion and higher tides and waves in recent years.Cambodians feel that these changes in weather patterns havehad a negative impact on their ability to improve their daily lives.[28]

Furthermore, it is in relation to these local impacts of climate change they perceive the term, rather than in relation to the global causes.[29] When asked in the KAP study about the causes of climate change, only around 15%of those who answered that they were familiar with the term mentioned industrialization as a cause, in contrast to deforestation, which 57% saw as a cause.[30] Based on this and other answers in the KAP-study, the study concluded that the respondents tend to define the term in relation to local weather events and local changes in natural resources rather that national and international impacts and causes.

Information on climate change.

As defined previously, an adequate and sustainable coping strategy regarding climate change needs to be based on sound information. However, the information on climate change reachingthe public is generallylimited. Furthermore, in the information provided to the public there tends to be a gap between the public´s perception of climate change terminology and the more technical defined terminology used by climate change experts and government officials.[31]

For the same reason a substantial amount of literature on climate change in Cambodia also focuses on this issue. Again a broad consensus exists in the literature as in the KAP[32]. There is a serious lack of formal information from Cambodian authorities regarding weather hazards and also in a broader sense on climate change. Existing research has shown that, of those respondents who experienced extreme weather, 36% did not receive any information about the

27Oxfam America, ”Understanding Public Perception of Climate Change in Cambodia”, p. 12, 2011

28IBID, p. 29, 2011

29 IBID p 20, 2011

30 IBID, p. 20, 2011

31IBID, p. 2, 2011

32IBID, p. 15, 2011

weather event, and only 25% of those who did received the information prior to the event occurring.[33]

Most information given to respondents in affected areas is being provided through informal channels (mouth-to-mouth) and radio and television. The national KAP-study showed that only 3% of the respondents indicated that they got information on climate change from the authorities (including commune council and village chief). On the other hand 50%indicatedthat they have received information on climate change from neighbours, 58% from radio and 62% from television[34].

Coping strategies in Koh Kong and Sihanoukville

The Adaptation Knowledge Platform has conducted a study similar to the present in 2010in the two target communities (Prey Nob and MondolSeima). Due to the similarities in the scope of research, a summary of the research from The Adaptation Knowledge Platform has been given below.

The report *Climate Change Adaptation: Finding the appropriate responses*from the Adaptation Knowledge Platform is based on 6 participatory tools of research, all of which have been applied in each of the two communities.

It is recommended to review the report from the Adaptation Knowledge Platform. The report can be downloaded at the following link:http://www.climateadapt.asia/resources/publication/view/60

Special emphasis should be given toAnnexes 1 & 2.

Koh Kong - PeamKrasaob&TuolKokir Communes

The communities in PeamKrasaob and Tuol Kokir have experienced environmental changes overtime that is in accordancewith the literature.Some of these changes are:

- Increase in coastal storms
- Drought due to less rain in the rainy season
- Seawater intrusion
- Decrease in marine life
- Well water/ground water no longer drinkable

Among other things, these changes have resultedinhigher expenses for drinking water for the villagers and consequently less money available for expanding livelihoods.

33Oxfam America, "Understanding Public Perception of Climate Change in Cambodia", p 13, 2011

34 IBID p 21, 2011

Livelihoods have moved to marine collection from farming, increasing the pressure on the natural resources. The pressure on marine life has also resulted in increased expenses for fishing gear, e.g. in PeamKrasoabvillage whereresidents have increased their fishing nets by a factor of two, and their traps for crabs by a factor of 5.

Besides discussing the environmental changes over time, the report also looks into the communities' perception of changes in the ecosystem, what the causes are and which coping strategies are in place.This perception of changes is discussed below.

PeamKrasaob Commune

For PeamKrasaob the villagers' perception of the changes to the eco-systems is that they have experienced a decline in marine life. The villagers mention as a cause that the law prohibiting fishing by "outsiders" is not being enforced, causing an unsustainable pressure on the marine life. Furthermore,sand dredging is also mentioned as a cause of changes to the eco-systems.

The villagers feelthat an improvement has occurred in the enforcement of protecting the mangrove forests.

Because the village of PeamKrasoab was relocated from an island to the main land, the villagers now have the possibility of backyard farming which enables them to grow fruits and vegetables. However, the absence of freshwater limits the productivity of this backyard farming.

A very positive change for the villagers is the expansion of eco-tourism. Due to an increased awareness of the possibilities in tourism, the villagers have organized themselves in a way so that tourism is now an alternative source of income for the villagers, whereas before the villagers had to migrate in order to find alternative sources of income.

In Peam Krasoap the villagers have a number of coping strategies in case of different weather hazards. In PeamKrasoab village they have started to build lower houses, which causesless damage when storms occur. For the same reason trees have been planted to protect the houses, and they furthermore have a cooling effect during the increasingnumbers of very warm days. Additionally, dikes have been built to protect the village against floods; however, the dikes are not high enough to protect against the more severe floods.

TuolKokir Commune

TheTuolKokir commune is located further inland than PeamKrasaob, and the villagers in Tachat Village experience a severe decline in their access to fresh water, due to the drying out of fresh water sources on a yearly basis.

This decline has a number of consequences. According to the villagers, the marine life in the fresh water sources has dramatically decreased, due to the fact that fresh water-marine water cycles are no longer regular. The water cycle has shortened the fresh water period as a result of more frequent droughts. The villagers perceive the decrease in fresh water as a consequence of deforestation in the area near the lake and fresh water streams.

For Tachat Village the mangrove forest has been subjected to mass deforestation due to forest concessions being provided to companies. The villagers have, however, themselves also taken part in deforestation of the mangrove forests, as part of their production of charcoal. Furthermore, the villagers use the slash and burn technique in order to create land for agriculture.

In order to cope with more frequent weather hazards Tachat Village has with financial support through microfinance loans built artificial ponds in order to secure water for crops and animals during droughts. In case of soil erosion during the wet season the villagers, due to training in agriculture technology, have started to use chemical fertilizers and pesticides in order to boost crop production. Furthermore, the villagers have also started to fish in order to make up for shortfall in food.

Sihanoukville – Prey Nob&OuOknha Heng Communes

As in Koh Kong the communes of Prey Nob and OuOknha Heng have experienced a number of environmental changes overtime, some of which are:

- Extended wet season
- Intensified storms during the wet season
- Livestock health problems due to intensified heat
- Ecosystem contribute less to food security
- Decrease in soil fertility

As a consequence of these impacts, farmers have been forced to increase the use of pesticides, herbicides and chemical fertilizers. Another change is that farmers have been forced to change to other natural resources for extraction.

The pressure on marine fish continues at an unsustainable rate.

The lake has also come under increased pressure from a growing number of householdstrying to substitutetheir losses by fishing in the lake. Villagers also indicate that anadded consequence is that there is now less solidarity in the commune due to increased competition for resources.

None of the villagers have participated in any development activities in the area.

Prey Nob Commune

The village BoekKrang in Prey Nob Commune hasa number of different coping strategies in place. In case of flooding, which happens 2 to 3 times per year, the villagers open gates in the dikes in order to lower the level of the flooding. This, however, has a negative impact on the water volume for agriculture.

The villagers are aware of the health risks involved with a flooding. Thus, after a flooding has occurred, the villager make sure to clean the surroundings immediately after the flooding.

None of the above-mentioned strategies are seen by the villagers as sustainable coping strategies, and they still encounter a loss when flooding occurs.

Data collection

As mentioned earlier besides the literature review this report is also based on adata collection in Koh Kong and Sihanouk Provinces. This section will present the data collected.

Koh Kong

In Koh Kong data wascollected in the district of MondolSeima. A total of 114 questionnaires were collected by interviewing respondents and then entered into a spread sheet. Four group discussions with commune committees and equally four group discussions with commune councils were conducted. The data was collected in the 6 villages of Bong Kayak,Konh Kang, PeamKrasaob (village 1 and village 2), TuolKokirand Ta Chart.

Questionnaire

Of the 114 respondents, 66 were women and 48 men.

The reason why the majority of respondents were women isthat many of the men were busy in the rice fields or at sea, while the data were collected during daytime, as elaborated on in the section “Limitation”.

67% of the respondents had their livelihoods based on fishing and only 18% based on farming. The rest were occupied indifferent areas and were shop owners, tailors, etc. These types of occupation were to be expected based on the profile of the target community, which as elaborated on earlier describes the community as mainly based on fishermen.

It should be noted that the categories “Farmer” and “Fishermen” both included small-scale backyard farming and small-scale fishing. Thus some of the respondents perceive themselves as being occupied in both categories.

7% of the respondents were women-lead households.

In the questionnaire the respondents were also asked to list their daily incomeduring wet and dry season. This was asked in order to analyze whether income can be seen as a factor in the respondent’s ability to cope to the impacts of climate change. The respondents’ income was categorized as follows.

Daily income during wet season:
12 respondents = 1000 – 5000 Riel
38 respondents = 5000 – 10.000 Riel
43 respondents = 10.000 -_____ Riel
21 respondents = No answer
Base: all respondents

Daily income during dry season:
4 respondents = 1000 – 5000 Riel
31 respondents = 5000 – 10.000 Riel
69 respondents = 10.000 -_____ Riel
10 respondents = No answer
Base: all respondents

Overall these numbers indicate that the respondents have a higher income during the dry season. Based on the data it is not valid to go into a further analysis as to why this seems to be the case. However one valid notion can be mentioned, i.e. that the dry season is also the high season for tourism in Peam Krasaob, thus generating an income opportunity for the community.

Perception

In general, the data collected as part of the theme "Perception" isin accordance with other observations on the subject. However, it needs to be taken into account that a natural difference in answers from a coastal community and an inland communityexists, due to the differences in the eco-system that surrounds them.

97% of the respondents answered to question 1 thatthey have noticed a change in the weather patterns over the last 5 years.

Of the perceived consequences of these weather changes, the answers of the respondents were divided into the following categories:

Question 2 in ”Perception of Climate Change

“If yes (question 1), what consequences has the change had?”

- Change in rainfall 84%
- Changes in temperatures 54%
- More drought 16%
- More flooding 27%
- More storms 74%
- More seawater intrusion 86%
- Pest on agriculture 24%

Base = All respondents Multiple answers possible

The answers testify to what can be expected of a coastal community in Cambodia. Comparing this data to that of the nationwide KAP-study “Understanding Public Perception of Climate Change in Cambodia” it is clear that a coastal community perceives consequences of the weather changes somewhat differentlyfrom the public nationwide. An example is the category “More drought” where only 16 % perceived that to be a consequence in Koh Kong, compared with 36% answering “More drought”” in the KAP-study.[35]Again this could be expected as natural difference between an inland and a coastal community.

The respondents were also asked if the changes in weather patterns have had any negative impact on their livelihoods. A consensus existed in the answers given.

Question 3 ”Perception of Climate Change”

“Have these consequences had an impact on your livelihood?”

- Occupation 76%
- Income 88 %
- Health 61%

Base = All repondents multiple answers possible

35Oxfam America, ”Understanding Public Perception of Climate Change in Cambodia”, p 26, 2011

These responses leave no doubt that the respondents perceive the changes in weather patterns as a negative influence on their life.

In understanding public perception of climate change in Cambodia, a conclusion has been that people perceive climate change in relation to local changes or impacts. The public does not have an understanding of climate change as a global phenomenon when it comes to causes and effects. This is also supported by the data collection in Koh Kong. In response to the question of what the respondents perceivedas the main causes for the changes in the weather patterns, the answers were given as follows:

Question 4 ”Perception of Climate Change”

“What do you think causes these change in the weatherpatterns?”

- Deforestration 50%
- National affects 46%
- International affects 37%

Base = All Multiple answers possible

Interestingly if the base of data of those who answered “Deforestation” is being sub-divided into categories of occupation, the trend is further emphasised.

Question 4 ”Perception of Climate Change”

- Deforestration
  - Farmers 100%
  - Fishermen 49%

Base = ”Farmers” & ”Fishermen”

The explanation could be that farmers relate to the changes in their local working environment – the rice fields and their surroundings.

Additionally many of the fishermen respondents mentioned sand extraction as a cause of change. Again this could be explained by the factthat the fishermen are witnessing the sand extraction along the coastline.

In general sand extraction is a concern shared by many of the respondents in Koh Kong, also to an extentwhich the data from the questionnaire does not fully reflect; due to the way the questionnaire was organized. When the questionnaire was developed it did not specifically integrate the topic of sand extraction, because this is not perceived to be a cause of climate change. Thus the topic had to be raised on the initiative of the respondents themselves, which could be argued tocreate a bias for the issues included in the questionnaire.

Information

When it comes to the term "climate change", 71% of the respondents indicated that they had heard the term before. This figure is a bit lowercompared to the figure in the KAP study where it was 84%.[36]

This figure is relatively high, since only 25% of the respondents have participated in an awareness-raising event in the communities.

The data indicates that climate change is a topic that in general is a part of the awareness of villagers in Koh Kong.

When dividing the data into "male"" and "female" the following numbers are obtained:

Question 2A "Information"

Have you participated in awareness-raising activities?

Female (yes)	Male (yes)
21	8
32%	17%

Base: All respondents

With only 17% of the male respondents having participated in an awareness-raising event compared to 32% of the women the data indicates that any awareness-raising event has to give emphasis in getting men to participate. Of coursethis is difficult asmany of the men in the communities are either at sea or in the rice-fields.However, there are ways to overcome this issue as previously discussed.

Furthermore, the two numbers of respondents for men and women should be seen as fairly low when it is taken into account that these target communities have been subject to previous climate change activities.

36Oxfam America, "Understanding Public Perception of Climate Change in Cambodia", p 19, 2011

Of the 8 respondents categorized as women-led households noneof these had participated in awareness-raising events.

A central theme for this report is to assess the sources of information on weather hazards which the respondents' use and which are available to them. Question 3 in the theme "Information"gives an indication of that.

Question 3 "Information"

"How are you informed about weather hazards in your district?"

- Radio 72%
  - Cambodian radio 65%
  - Thai radio 19%
  - Vietnamese radio 2%
- TV 40%
  - Cambodian TV 32%
  - Thai TV 12%
  - Vietnamese TV 0%
- Neighbours 33%
- Government officials 22%

Base: All respondents Multiple answers possible

From this data it is evident that the radio is the main source of information regarding weather hazards. Many of the respondents mention*Radio Cambodia* as their main source of information regarding weather hazards. A similar pattern is evident for TV, as the channel *TV Cambodia*is mentioned by many of the respondents as the channel from which they get their information.

The figure indicating information from *Government officials* is fairly low.Only 22% indicate information from this source. This category also includes village chiefs and other commune authorities. This number indicates that there are no information-sharing tools available at an institutional level. Additionally the respondents were asked from which source they would like to get their information regarding weather hazards? To this question many of the respondents answered that they would like to have more information of this kind from the commune authorities.

That a gap existsin information-sharing in relation to climate change going from the Cambodian authorities to the communities in the coastal zone is further supported by the data from question 6.

Question 6 ”Information”

“Do you know about the work of the government on climate change adaptation?”

Yes	No
22%	76%

Base: All respondents

Coping strategies

The final theme of the questionnaire is *Coping strategies*.As mentioned in the section “Methodology” it is the respondent’s perception of what constitutes a coping strategy. This perception is not necessarily in accordance with the technical definition of a coping strategy.

When asked what kind of weather hazards the respondents are able to copewith, the answers were given as a response to the ability to cope:

Question 1 ”Coping strategies”

”In case of the following weather hazards, do you have the ability to cope when they occur?”

- Droughts 6%
- Flooding 15%
- Storms 31%
- Seawater intrusion 25%
- Pest on agriculture production 8%
- None 4%

Base: All respondents Multiple answers possible

This data of course needs to be understood in relation to question2 in ”Perception of climate change”, of which weather hazards are more frequent than others.

One also needs to take into account the complexity of the weather hazard the respondents need to cope with. For a fisherman it is not toocomplex to cope with a storm. As long as you are informed about a storm is going to occur, you can stay on land. On the other hand a farmer, who experiences a seawater intrusion in his rice field, has a more complex situation to cope with.

The figures are slightly more positive compared to data collected in the KAP study.[37]

As presented earlier the respondents were asked to list their daily incomeduring wet and dry season. This question was asked in order to analyze whether income can be seen as a factor in the respondent’s ability to cope with the impacts of climate change.

When dividing the respondents into these income categories, the following data can be generated. The data has been extracted from the category “wet season”.

Question 1 ”Coping strategies”

Income category, wet season

”In the case of the following weather hazards, do you have the ability to cope when they occur?”

	1000-5000 Riel	5000 – 10.000 Riel	10.000 – _____ Riel
Droughts	8 %	11 %	5 %
Floods	33 %	29 %	40 %
Storms	48 %	55 %	67 %
Seawater intusion	58 %	45 %	67 %
Pest on agriculture production	0 %	34 %	16 %
Base: Respondents Multiple answers possible	12	38	43

37Oxfam America, ”Understanding Public Perception of Climate Change in Cambodia”, p 36, 2011

The data does not provide a clear indication of the relation between the level of household income and the ability to cope with the listed weather hazards. If one was to make a conclusion, it was that the higher income the respondents have the more they perceive themselves as having the ability to cope. This conclusion is based on the sum of the figures in each income category, which gives the following score.

Income category	1000-5000 Riel	5000-10.000 Riel	10.000 - ____Riel
Sum	147	174	195

However since the base of respondents is not large, e.g. the income category is based on 12 respondents, it is difficult to make valid conclusions.

In elaborating on these coping strategies the respondents mention some of the following coping strategies:

Question1 ”Elaboration”, ”Coping Strategies”

In case of the following weather hazards, do you have the ability to cope when they occur (if yes please elaborate)?

- Build small dikes around the household.
- Buy fresh water.
- Go to the mountain behind the village as a safe place.
- Digging a pond
- Prepare boat for evacuation
- Use chemical fertilizer to prevet pest from attacking the crops

Base: All respondents

The coping strategies are all – except the use of chemicals - strategies that do not require a high level of technical capacities, but instead the result of the means available to the villagers. These coping strategies will be discussed in more detail in the presentation of the group discussion with the community committees.

However, these coping strategies cannot preventhouseholds from experiencing an economic loss. This is indicated in the responses to question 3:

Question 3 "Coping strategies"

"When the last weather hazard occurred, did it give your household a loss?"

Yes	No
54%	23%

Base: All respondents

Group Discussions – Community Committees –MondolSeima

The above presentation of data from the questionnaire gives an overall understanding of trends in the target communities within the three themes of the questionnaire. However, the questionnaire does not offer a more detailed reflection on existing coping strategies in the communities. In order to get such reflections, a group discussion focussing on coping strategies was conducted with the Community Committees in the two communes PeamKrasaob and Tuol Kokir. As mentioned in the section Methodology the group discussions were based on a matrix which was discussed and elaborated on.

The group discussion was structured based on types of weather hazards. This section presents the main results from the matrices of the group discussions.

However, it is recommended that the reader go through the matrices in the appendix, since some of the matrices hold additional data.

PeamKrasaob Community Committee

As can be seen in the annex the matrix was organized based of different types of weather hazards, which was discussed in relation to a number of topics. The following is a summary of the main and most important findings from the group discussion of the PeamKrasaob Community Committee.

Drought:

In order to advance actions prior to droughts the community committeefocussed on the following areas:(1) To ensure water sources for the community by building basins to store drinking water for the community. (2) Prepare medicine for the community both for humans and animals, (3) to ensure preparedness in the case of forest fire.

The community committee is fully aware of the risk of sickness among animals during a drought, and has methods to ensure that if an animal gets sick, it will be burned immediately to prevent the sickness from spreading.

The community committee has a budget, which they seek funding for from district authorities to be used in the case of a drought. The budget includes buying medicine and trees for planting.

According to the community committee these actions have resulted in the planting of 160 Ha of trees, less than 50% of the animals will die during a drought, and one community well has been constructed.

Seawater intrusion/flooding

The community committee has had a 5 km saltwater protection dike built, based on community funding and contribution in kind from villagers. Furthermore the community committee is informing households to construct small hills for the animals to use in case of flooding. Boats are also being prepared for storing of the villagers´ belongings.

The community committee informs villagers about the importance of cleaning their houses during and after seawater flooding has occurred.

The community committee supports villagers financially in repairing damaged houses.

Storms and lightning

The community committee has limited coping strategies for storms and lightning. In 2011 38 houses were destroyed, 14000 m^2 of mangrove forests were destroyed, 2 fishing boats sank and forest fire occurred inabout 30 places.

The community committee advisesvillagers to listen to radio and TV in order to keep updated. When a storm hits the community, villagers are informed to move to a safe place which has been established.

According to the community committee none of the fishermen go out fishing at the seaas a result of this information-sharing. It is estimated that 90% of households are listening to radio or TV to keep updated.

10% of the households have bought lightning protection devices.

TuolKokir Community Committee

The same exercise as with PeamKrasaob community committee was conducted with the community committee in TuolKokir.

Drought:

To prepare for drought the community committee is rehabilitating the channel system, to protect the drinking water sources. Furthermore the committee makes sure that fences are being constructed around the ponds.

Seawater intrusion/floods:

In severe cases villagers are being evacuated to a safe place which has been established. The committee ensures both prior to, during and after intrusions/floods that the seawater dike protection system is repaired, if any damages have happened.

The seawater dike constructed by the community is 600 meters long and 1 meter high.

Storms and lightning:

A priority for the community committee is to get the villagers to stay updated on storm events by watching TV and listening to theradio, and to have them ready to be evacuated to the safe places.

Furthermore, the committee has conducted awareness-raising on the importance not to cut down trees around the villages, as the trees protect the households against the storm.

In case of lightning some of the villagers have bought lightning protection gear.

Severe rainfall

The community committee defines severe rainfall as a period of 2 months of continuous rain. For the villagers it will have the effect of hampering the agricultural production by developing pest attacks on the crops.

The agriculture officer of the district is an important resource person for the community. The community committee contacts the officer as soon as they identify a pest problem. The agriculture officer then provides advice to the community on how to reduce the pest problem.

According to the community committee, the focus on pest reduction and mechanisms in place to combat pests has ensured that 70% of the expected crop production were prevented from being destroyed by pest.

Group Discussion – Commune Councils – Peam Krasaob

In addition to the group discussion at community committee level, another group discussion with the commune councils took place. This group discussion was based on 10 questions, which were discussed while notes were taken. The following is a summary of the main topics of the discussions conducted with the commune councils of PeamKrasaob and Tuol Kokir communes.

Both commune councils have an understanding of climatechange which seems to be more detailed than appears from the questionnaire. However both councils have participated in a climate change workshop in the Koh Kong province.

Additionally the councils´ understanding of climate change is developed by information from the monthly newsletter about development issues that RGC distributesto the commune councils.

Both commune councils have participated in adaptation activities carried out by IUCN and ADB. For PeamKrasaob the activities have consisted of construction of dikes, watergates and reservoirs. In TuolKokir the activities included the construction of dikes to protect against seawater, construction of reservoirs and canals to maintain the fresh water supply, enabling irrigation in the dry season for domestic uses. Furthermore the commune council in TuolKokir is actively participating in protecting the forests.

The commune councils have no coordinated information-sharing system with the national or provincial authorities regarding updated information prior to weather hazards. The information they receive is from TV and radio channels. If the commune councils receive information regarding weather hazards they try to inform the villagers.However, no established information system is in place.

None of the commune councils regarded climate change as being integrated into the present Commune Development Plans (CDP). However both councils requested such an integration in order for the CDPs to include specified climate change adaptation measures.

Questionnaire:

Additionally, a questionnaire was handed out to each member of the commune councils to plot in a score on 5 questions. The questionnaire resulted in the following scores.

Commune Council: Tuol Kokir

(1=nothing and 10= very much), __ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
1			2		2	1			

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
		2		2		3			

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
		1		3	1	1	1		

4. How well do you think the commune council supports the villages in case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
	1		2	1	1	2			

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
	2		1	2		2			

Base = 7 members from the commune council

Commune Council: Peam Krasaob

(1=nothing and 10= very much), __ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
			4		2				

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
		5		1					

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
	1	3		1	1				

4. How well do you think the commune council supports the villages in case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
	2		2	2					

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
				5		1			

Base = 6 members from the commune council

It seems from the above data and the group discussion in the communes that there is a base for developing a more technical capacity on climate change within the commune councils. Andeven though the information-sharing about weather hazards is not very well structured, the commune councils should be the link of information-sharing on weather hazards from national and district authorities to the villagers in the affected areas.

Conclusion on data from Koh Kong

In the target communities in Koh Kong the villagers experience a clear tendency to a change in the weather patterns whichwill result in more frequent weather hazards.

Both in PeamKrasaob and Tuol Kokir communes coping strategies are in place protecting villagers against the impacts of climate change. However none of these coping strategies protects the villagers against negative consequences in relation to their economy, occupation and health.

The community committee in Peam Krasaob seems to have a more detailed perception of climate change compared to the other data. This more detailed perception results in a more reflected awareness of how the community committee can support the villagers in implementing the existing coping strategies.

The community committee in TuolKokir has actively engaged with the authorities in using the available institutional capacity . The community did this by using the provincial agriculture officer, who provided advice in the community's fight against the outbreak of pests on crops, with a positive result.

In general, from the commune councils and down there is an awareness of the importance of information sharing in order to ensure successful coping

strategies. However none of the target communities have a system that supports the necessary information sharing both internally in the communities and also in relation to provincial and national authorities.

Sihanouk Province

In Sihanouk Province the data collection took place in the Prey Nob district in the six communes of TuekThla, TuekL'ak, Sameakki, TuolToteung, OuOukgha Heng and Prey Nob. In total 257 questionnaires were collected in the villages of BoengReang, ChhoLoung, Kampong Smarch Touch, Ta Orn Thom, BekKran, Bot Koki, Bot Semon, Chum PouKhmao, OuChamnar, OuTapang, Prey Nob and TuolToteung. Six group discussions with community committees were conducted and another six discussion sessions with commune councils.

Questionnaire

Of the total 257 respondents 139 were women and 117 were men. So the split between men and women is roughly the same as in Koh Kong.

In contrast to Koh Kong most of the respondents are occupied with farming. Of the 257 respondents 46% based their livelihoods only on farming, while 50% based their livelihoods on farming and other income sources such as fishing. Only 7% of the respondents based their livelihoods on fishing only.

9% of the respondents were women-lead households.

As in Koh Kong the respondents were asked to provide information regarding their daily income during the wet season and the dry season. The respondents were divided as follows:

Daily income during wet season:
69 respondents = 1000 – 5000 Riel
50 respondents = 5000 – 10.000 Riel
80 respondents = 10.000 -_____ Riel
58 respondents = No answer
Base: all respondents

Daily income during dry season:
72 respondents = 1000 – 5000 Riel
54 respondents = 5000 – 10.000 Riel
108 respondents = 10.000 -_____ Riel
23 respondents = No answer
Base: all respondents

Overall these numbers indicate that the respondents have a higher income during the dry season. However, as a considerable number of respondents did not answer, this data is not subject to further analysis.

Perception

As also concluded in the data from Koh Kong, the data collected on the theme "Perception" in Sihanoukville is in accordance with otherliterature.

Of the respondents, 99% answered that they have noticed a change in the weather patterns over the last 5 years compared to 97% in Koh Kong.

Of the perceived consequences of these weather changes, the answers of the respondents were divided into the following categories:

Question 2 in "Perception of Climate Change"

"If yes (question 1), what consequences has the change had?"

• Change in rainfall	94%
• Changes in temperatures	62%
• More drought	22%
• More flooding	39%
• More storms	91%
• More seawater intrusion	56%
• Pest on agriculture	66%
Base = 255 respondents	Multiple answers possible

The answers are a bit closerto the data from the KAP-study compared to Koh Kong.This could be explained by the fact that the respondent's occupation in general was more in line with national level.

The data from Sihanoukville is quite convincing, and does not leave much doubt that the villagers in Prey Nob district do perceive that a weather change has occurred, and has resulted in the above categorized weather hazards.

As in Koh Kong the respondents perceived the categorized weather hazards to have a negative impact on their livelihood.

Question 3 ”Perception of Climate Change”

Have these consequences had an impact on your livelihood?

- Occupation 60%
- Income 78%
- Health 51%

Base = 255 respondents multiple answers possible

As mentioned previously, public perception of the causes to climate change is perceived in relation to local changes and less to global changes. This is again supported by the data from Sihanoukville, as can be seen from the answers to the question of what the respondents thought were the main causes of the changes in the weather patterns.

Question 4 ”Perception of Climate Change”

“What do you think causes these changes in the weather patterns?”

- Deforestration 51%
- National affects 44%
- International affects 42%

Base = 255 Respondents Multiple answers

Information

When asked if the respondents had heard about the term “climate change”, the result was surprisingly low compared to the KAP-study and the data from Koh Kong. Only 55% answered “yes” while 43% answered “no”. In the KAP-study 84% answered “yes” and 71% answered ”yes” in Koh Kong.[38]

The relative low figure should be understood in relation to question 2A, where the respondents are being asked if they have participated in any awareness-raising activities regarding climate change. The data from Prey Nob is low, as can be seen from the data below.

38Oxfam America, ”Understanding Public Perception of Climate Change in Cambodia”, p 19, 2011

Question 2A "Information"

Have you participated in awareness-raising activities?

Female	Men
6	6
2%	2%

Base: All respondents

Of the 24 respondents that were categorized as women-led households, 2 answered, "yes" to have participated in an awareness-raising event.

To the question of what source, if any, the respondents get their information about weather hazards from, the data is much in line with the data from Koh Kong. However, again the data from Sihanoukville shows a surprisingly low figure. Only 2% of the respondents answer that they have received information regarding weather hazards from government officials. As in Koh Kong this number indicates that there are no information-sharing tools available at an institutional level. When answering question 4 many of the respondents request such information from the commune authorities.

Question 3 "Information"

How are you informed about weather hazards in your district?

- Radio 60%
  - Cambodian radio 58%
  - Thai radio 2%
  - Vietnamese radio 2%
- TV 25%
  - Cambodian TV 25%
  - Thai TV 0%
  - Vietnamese TV 0%
- Neighbours 27%
- Government officials 2%

Base: All respondents Multiple answers possible

Considering that only few of the respondents have been informed by government officials regarding weather hazard, or have participated in awareness-raising activities,it is not surprising that only 9% of the respondents have any knowledge about the RGC work on climate change adaptation.

Coping Strategies

Despite the fact that the respondents from Prey Nob district score low on knowledge on climate change as a concept,the respondents still have an understanding of being able to cope with some weather hazards, as shown by the data below.

Question 1 "Coping strategies"

"In case of the following weather hazards, do you have the ability to cope when they occur?"

- Droughts 5%
- Flooding 11%
- Storms 28%
- Seawater intrusion 26%
- Pest on agriculture production 30%
- None 14%

Base: All respondents Multiple answers possible

Most respondents consider that they are able to cope with storms. As described in the data from Koh Kong, storms are less complicated to adapt to than other weather hazards. However, 26% of the respondents answer that they are able to cope with seawater intrusion and this is a high percentage. This should however be understood in relation to the extensive rehabilitation of the dyke systems carried out over a four-year period by AFD in Prey Nob.

Below some of the coping strategies mentioned by the respondentsare shown.

Question 1 "Elaboration", "Coping strategies"

In case of the following weather hazards, do you have the ability to cope when they occur (if yes please elaborate)?

- Build dikes around rice fields
- Build dikes around households
- Get the rice to lie down
- Do not go out fishing
- Suggest to open the water gate
- Use chemical fertilizer to prevent pest from attacking the crops.

Base: All respondents

These examples of coping strategies are similar to those used in PeamKrasaob. The coping strategies are all – except the use of chemicals - strategies that do not require a high level of technical capacities, but instead the result of the means available to the villagers. These coping strategies will be discussed in more detail in the presentation of the group discussion with the community committees.

Question 3 "Coping strategies"

"When the last weather hazard took place, did it give your household a loss?"

Yes	No
53%	35%

Base: All respondents

As in Koh Kong - despite having some coping mechanisms in place - the majority of the respondents have experienced a loss in relation to the latest weather hazard.

Group Discussion, Community Committees – Prey Nob

Sixgroup discussions were conducted with villagers ofBoeung Rang,TuekL'ak,TuekThla, TuolToteung, OuOuknha Heng and Prey Nob. The matrices can be found in the appendix. The reader is again recommended to go through these matrices. This section will summarise the main findings.

In general, it wasfound that the six commune committees do not have the same level of awareness as the community committees in Koh Kong. Thiswas also indicated by the fact that the community committees were unable to provide reflections to a number of the columns in the matrix. Thus also fewer findings can be extracted from the group discussions.

Storms

As in Koh Kong information was given to villagers to stay updated by radio and TV, and not to go out fishing on the sea. If informed prior to a storm some of the villagers had developed a coping strategy of using wood sticks to support the rice crops from breaking during a storm, by bending down the rice.

In TuekThla the community committeeprovides help to villagers whose houses had been damaged by storms. Furthermore in TuekThla the community committee informs district authorities about the impacts of a storm.

Seawater intrusion

In case of seawater intrusion the coping strategies are similar to those of Koh Kong. Building dikes to protect against the seawater is a main strategy in the communities, but also preparing boats for evacuation of villagers and their belongings.

Group Discussion, Commune Councils

Group discussions with commune councils were conducted as in Koh Kong and with the same 10 questions. In SihanoukProvince thesix commune councils of TuekThla, TuekL'ak,Sameakki, TuolToteung, OuOuknha Heng and Prey Nob took part in this exercise.

The six commune councils'understanding were more in line with the results from the questionnaire than in Koh Kong. The members of the councils perceived climate change in relation to local impacts, as in contrast to the councils in Koh Kong,which also had an understanding of climate change in a global context.

Sameakkicommune, as the only one of the six communes, has integrated climate change in the CDP, and has established a committee for disaster preparedness and rescue. This committee has identified a safe place for villagers to escape to during weather hazards like e.g. storms.

The three communes of TuekThla, TuekL'ak and Sameakkihave been involved in climate change activities organized by MoE and the provincial authorities. The activities relate to awareness-raising guidance of crop selection and planting of mangrove trees.

The two communes of TuekThla and TuekL'ak have received information from MoWRAM and provincial authorities prior to a weather hazard.

As in Koh Kong, each member of the commune councils was asked to fill in a questionnairein addition to the 10 questions. The scoring results of these questionnaires are as follows:

Commune: Tuek Thla
(1=nothing and 10= very much), __ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
					3	1			

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
			3	1					

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
				3	1				

4. How well do you think the commune council supports the villages in the case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
		1	3						

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
							3	1	

Base: Four members of the commune council

Commune: Sameakki
(1=nothing and 10= very much), __ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
			3	5					

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
				1		1	1		

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
	1	1	1						

4. How well do you think the commune council supports the villages in the case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
				1	2				

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
	2		1						

Base: Three members of the commune council

Commune: Tuek L'ak
(1=nothing and 10= very much), __ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
			2	1		2			

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
	1		1	1	2				

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
		1	2		1	1			

4. How well do you think the commune council supports the villages in the case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
		1	2	1	1				

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
			1	3		1			

Base: Five members of the commune council

Commune: TuolToteung
(1=nothing and 10= very much), __ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
				2		1	1		

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
					2	1	1		

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
				2	2				

4. How well do you think the commune council supports the villages in the case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
			3	1					

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
							4		

Base: Four members of the commune council

Commune: OuOuknha Heng
(1=nothing and 10= very much), _ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
							1		3

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
1	1	1				1			

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
1				2					1

4. How well do you think the commune council supports the villages in the case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
1		1			1	1			

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
				1	1	1	1		

Base: Four members of the commune council

Commune:Prey Nob
(1=nothing and 10= very much), _ = number of answers

1. How much do you know about the term climate change?

1	2	3	4	5	6	7	8	9	10
						3	1		

2. How well is your commune ready to deal with weather hazards?

1	2	3	4	5	6	7	8	9	10
		1				3			

3. How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

1	2	3	4	5	6	7	8	9	10
			1		2			1	

4. How well do you think the commune council supports the villages in the case of a weather hazard?

1	2	3	4	5	6	7	8	9	10
			1		2	1			

5. How well is the coordination with other sectors (e.g. NGO and private sector) in relation to weather hazards?

1	2	3	4	5	6	7	8	9	10
2		2							

Base: Four members of the commune council

The scoring provided by the members of the commune councils to the answer seems a bit high compared to the data from the questionnaires. This can be explained by the fact that the scoring is based on the commune council members' own perception, without the need for any further reflection about the questions, compared to the group discussion, which was a facilitated discussion, where the members needed to go into a more reflected discussion. Thus the scoring needs to be analysed in relation to the findings of the above presented group discussions by the commune councils. As analyzed the level of reflection in the commune councils in Sihanoukville is more in line with the data from the questionnaires, which is a fairly limited level. Hence the level of the scoring based on the perception of the members in the commune councils in Sihanouk Province is perceived by the report to be a bit too high.

Conclusion on data in Sihanouk Province

As in Koh Kong the target communities in Sihanouk experience a change in the weather patterns. This change has a negative impact in relation to the respondents' economy, health and occupation. Despite these negative impacts of the weather changes, the villagers in Prey Nob do have coping strategies in place similar to those in PeamKrasaob and Tuol Kokir commune.

Compared to Koh Kong the target communities in Sihanouk are supported by a stronger adaptation mechanism with the extensive water gate system built by ADF. However this water gate system needs to be further developed, in order for it to serve as a well functioning adaptation mechanism.

In Sihanouk the data reflected a lower awareness of the term climate change, both compared to the data from Koh Kong, and also in relation to the nation-wide KAP-study. This lower awareness is also supported by the group discussion with the commune councils, from which this report concludes that a lower awareness exists in the councils compared to the ones in PeamKrasaob.

As in PeamKrasaob the level of information sharing is low, and based on the group discussion with the commune councils it seems that the level is also lower than in PeamKrasaob. This lower level of information sharing is in relation to the internal communication in the commune during a weather hazard. In Prey Nobno system of information from the authorities related to weather hazardsexists. However in Prey Nob the commune councils have received ad hoc information from the authorities regarding weather hazards, without this being part of a system.

Assessement

The final section of this report is the assessment of the level of coping strategies in the target communities. The assessment follows the same three themes as the data collection:

- Coping strategies
- Perception
- Information

As part of the assessment recommendations are also presented.

The reader of this report is recommended to read the two reports below on coping strategies in the coastal zone as well. These two reports provide relevant analyses and recommendations based on similar research questions as this report. Furthermore the two reports are conducted in the same areas as this report.

The two reports are:

- The policy note by Regional Climate Change Adaptation Platform http://www.climateadapt.asia/resources/publication/view/62
- The "Interim Report on Vulnerability to Climate Change in Sihanoukville Municipality", 2012 by UN-HABITAT.

This report's assessment is based on the data presented throughout; however,a special emphasis will be given to the site-specific data collected by this report.

The assessment is conducted on an overall perspective of the level of coping strategies in the two target communities. It discusses the general level of coping strategies in the two target communities in Sihanoukville and Koh Kong with examples of coping strategies being provided.

Coping strategies

In general no coping strategies existin the target communities that provide full protection against the negative impacts of weather hazards occurring in the coastal zone.

With the predictions of an increased intensity of the weather hazards occurring in the future, these negative impacts can likewise be predicted to further worsen. Therefore the level of coping strategies has to be raised to meet future challenges.

To achieve this it is important for the target communities not only to develop coping strategies based on a short-term perspective but also to develop strategies based on a long-term perspective.

Another issue in relation to have no long-term perspective on coping strategies is that due to their short-term perspective some of the coping strategies put further pressure on the ecosystem, thus worsening the situation in the long run. An example is when villagers change their occupation from farmers to fishermen as a result of change of weather patterns, thus putting further pressure on this resource, as has been experienced in Prey Nob. Thus emphasis should be put on relevant awareness-raising activities to stress the interconnection between coping strategies to climate change and other development issues.

Despite not having coping strategies, which fully protect against weather hazards, both target communities do have coping strategies in place, which might reduce the negative impacts of climate change. Below are the main strategies assessed.

The identification of a safe place seems to be an effective strategy against storms and other severe weather hazards. This strategy ensures the immediate safety of the villagers.Naturally the optimal strategy would be for villagers to be able to secure their houses in a way so they can stay in them during storms and other weather hazards. The safe place coping strategy should be developed both in relation to the physical surroundings of the safe place, and the coordination of transporting villagers to the safe place, and also the information system informing villagers to prepare to evacuate to the safety placemust be in place.

Building and maintaining dike systems are another important coping strategy for the target communities. Despite the fact that these dike systems are not able to fully prevent flooding and seawater intrusion, they are still regarded as an important coping strategy by the villagers in the target communities. Again this coping strategy has room for improvement at multiple levels. The technical level of these dike systems seems to be primitive. There seems to be no development by the communities of the quality of the dikes, instead the communities try to repair them to the same technical level as prior to their damage, when they are continuously being destroyed by weather hazards. Thus this coping strategy should be improved at a technical level. Such an improvement is closely linked to the available financial resources, hence funds need to be established for this improvement to happen. Furthermore the technical capacity of developing these dike systems needs to be established at an institutional level, in order to ensure that the systems are developed based on the right expertise.

A problem for farmers is that their rice crops break during storms. Some farmers have developed the fairly primitive coping strategy of using wooden sticks to support the rice from breaking, by using the sticks to bend down the rice during a storm. Despite its primitive nature this coping strategy seems to be an effective one which is used generally by the farmers in the target communities.

If this coping strategy is further technically developed and implemented in a more structured way, this strategy could serve as an effective coping strategy for farmers.

The use of chemicals as a coping strategy against pest on crops due to much rain seems to be quite effective, e.g. in TuolKokir where the commune committee estimated the use of chemicals to save 70 % of the rice crops attacked by pest from being destroyed. The effectiveness of the coping strategy is based on two factors, 1) knowledge on how to use the chemicals in the most effective way, 2) the availability of the chemicals to the farmers. Both these factors are specific in ensuring that they are accomplished. Thus this coping strategy could and should be supported by an institutional capacity, which to some extent is already taking place as the data from Koh Kong has presented.

These coping strategies can be found in both target communities. However there is a difference as to how these strategies are integrated, and to which extent they are based on joint efforts in the communities. It seems that the community in PeamKrasaob is better organized than the others.

The matrix from the group discussion with community committees in Koh Kong provides an understanding of a community which work together in strengthening the general level of coping strategies for the community. Furthermore it has been analysed that the knowledge of climate change seems to be at a higher level in PeamKrasaob compared to the other target communities.

This level of knowledge is seen as an essential factor in raising the communities' level of coping strategies.

Sameakki commune is the only communewho has integrated climate change in the CDP and has established a committee for disaster preparedness and rescue. This step by Sameakki is positive in relation to be better organized as a commune in relation to coping strategies. However, besides locating a safe place, which has also been done in the other communes, this committee seems to be limited in its output. However, such an organizational step and how it could become more effective should be further analysed on, and it is discussed below.

Based on the water gate system that has been rehabilitated, Prey Nob is supported by stronger adaptation capacities compared to MondolSeima. Of course it should be taken into an account that the water gate system does not fully prevent water flowing over the dikes. However, it is still an adaptation capacity that supports the villagers in Prey Nob, even though the water gate system needs to be further developed in order to be able to serve as an adaptation capacity in relation to future impacts of climate change. Interestingly many of the respondents in Prey Nob referred to the water gate system as a coping strategy, when instead it should be regarded as an adaptation mechanism. Whether to define the water gate system as a coping strategy or an adaptation mechanism is in itself not very interesting. However it raises an important notion. In developing adaptation mechanisms it is essential to ensure that this is done as a support mechanism to existing coping strategies, or as a catalyst of developing new coping strategies. The risk is to develop an adaptation mechanism, which makes the target communities think that it will solve all the problems related to weather hazards. This can lead to target communities

becoming passive in relation to further developing their own coping strategies. This is not the case in Prey Nob, such a conclusion would not be valid to make based on this report's data collection, but it is,however, a notion to be made. Another notion that needs to be made in relation to the development of adaptation mechanisms is that when developing adaptation mechanism it is important to ensure that these mechanisms are not putting a pressure on the villagers resources, which are used for their own coping strategies, due to required maintenance of the adaptation mechanism by the villagers.

Another issue is that an institutional capacity to support the communities in integrating and developing their coping strategies is not in place. Most of the capacities that are in place are mostly based on the development of the infrastructure like the water gate system in Prey Nob. However more capacity on technical knowledge needs to be established. Such as provincial resource persons, who are able to support the communities in case of more complex impacts of weather hazards like pest on crops, change of crops, sickness among villagers and sickness among animals. As for instance in TuolKokir commune, where the communes' use of a provincial agriculture officer has had a positive effect in the communes' struggle against pest on crops.

The earlier mentioned level of organization at the commune councils and community committee level is by the author seen as an essential factor in raising the level of existing coping strategies in the coastal zone. One example is the development and maintenance of the dike systems in the target communities. It is important that it is well defined whose responsibility it is to develop and to maintain the different dike systems and water gate systems. When this has been done, the next step is to ensure that the knowledge and resources are available to the stakeholders. At the moment the responsibility of maintaining the dike system is placed in the community committees, but this report's data shows that the community committees does not have the capacity to repair the system in a way that ensures against being flooded continuously. Thus the question whether the community committees based on their current level of capacity is the right organizational level to have the responsibility of maintaining the dike systems must be raised.

Thus it is recommended that the CARP gives emphasis to raising the organizational level of these two stakeholders. The following three steps are recommended for the CARP to take as method for raising the organizational level at the commune and community level.

1. The first step would be to define what role these two stakeholders should have in securing the coastal zone against climate change.
2. The second step should look into how the two stakeholders should be organized internally and in relation to other stakeholders, e.g. should a climate change resource person be appointed in the two stakeholders' organization?
3. Third and finally how, based on step 1 and 2, should a capacity building process be organized and implemented?

Information

The key problem in both target communities is that there is no system in place for sharing relevant information between relevant stakeholders. As defined in this report a coping strategy needs to be based on an informed background both prior to, during and after a weather hazard occurs.

The data from the questionnaire provides a clear understanding from which sources the respondents receive their information regarding weather hazards. , Radio and television are by far the two main. Additionally, the respondents receive information from the neighbours and local authorities, but this source is limited. Only very few of the respondents have received information about weather hazards from the national authorities.

Furthermore the respondents commented that in future they would like to receive more information from the local authorities.

For the commune councils the sources of information are much the same as for the villagers. None of the commune councils have a coordinated system of information with the national or provincial authorities. However the two commune councils of TuekThla and TuekL'ak have previouslyreceived information from MoWRAM and provincial authorities prior to a weather hazard. Furthermore, in TuekThla the community committee has informed district authorities about the impacts of a storm. It is, however, unclear from the data of this report how the authorities used this information, but no coordinated system of information is in place.If the commune councils receive information regarding weather hazards they try to inform the villagers, but again, no established system of information is in place.

This leads to another discussion, namely what type of information and how much information is needed to constitute an "informed background" in relation to the three time categories (prior to, during and after)? The data collection of this report does not give a full answer to this question. However some notions can be made.

In general a system of information should ensure that relevant information is not only passed to the villagers but also from the villagers. Beneath is an assessment of what type of information in relation to the three time categories a system should facilitate.

Prior to a weather hazard a system of information should ensure that whatever information/predictions available about the weather hazard are shared with the communities that are going to be affected. As part of the ongoing work progress with developing more qualified weather forecasts and weather hazard prediction, the two media radio and TV should be given a key role in informing the target communities prior to a weather hazard. In case of extreme weather hazards this information is recommended to come directly from the relevant authorities. This could be done in a number of ways. One way would be for the

authorities to have a contact person within the commune councils, which they could contact by phone, and inform on a predicted weather hazard. This contact person would be responsibility to share this information to the community committees, which then could initiate relevant actions.

During a weather hazard it is important within a community that a system is in place, which ensures that relevant villagers are informed e.g. in case of the need for an evacuation to a sheltered area.

After a weather hazard has occurred it is important that relevant information is passed from the villagers to the authorities. Such information would most likely be related to the impacts of a weather hazard. This information can be used by the authorities to makean assessment of damage and economic loss due to the weather hazard. Furthermore this data could support the development of a database on the issue. Such a database could serve as baseline for a number of indicators in relation to weather hazards, e.g. frequency, impact, and level of success by adaptation capacity and certain coping strategies. These data could serve as essential inputs for future research.

To create an information system is by the author regarded as essential in ensuring improvement of existing and the development of new coping strategies. Thus it is recommended that an analysis based on a participatory process of relevant stakeholders is conducted in order to analyse how an information system is best developed and integrated.

It is further recommended that such a system of information would be formulated and included into the CDP.

Perception

As stated in the methodology the respondent's perception may not be in concordance with the theoretical definitions of climate change. This seems to be the case in the data collected. There is a clear tendency in the data collected that respondents perceive climate change and its impacts in relation to the local environment, and does not have the understanding of climate change in a global context. In relation to assessing the existing coping strategies in the target community, this perception of climate change as local phenomena is not assessed to have an influence on the existing coping strategies, which it could have had because some coping strategies in its implementation should be perceived in a cross-border perspective, e.g. water resource management.

However there are some risks related to a community to base its perception of climate change on local events. One of these risks is that climate change becomes the source of all problems in the local environment. If a tendency to such an understanding prevailed, which is not seen as unrealistic, it would create a difficulty not only for climate change projects but also for other development projects implemented in the target communities. This difficulty must be overcome by ensuring that beneficiaries have clear focus on the objectives of a

development project to be implemented, and not perceive the development project in a context it is not meant to. An example is the issue of sand extraction, which by many of the respondents in Koh Kong were mentioned as a cause of climate change impacts. Sand extraction should not be perceived as a cause of climate change impacts. However since in Koh Kong it is perceived assuch, it creates an issue for the CARP in its implementation, because the respondents have a different perception ofthe causes of climate change than the one CARP is based upon, thus a miscommunication based on this different understanding can happen – the CARP and the target community in Koh Kong are so to speak not on the same page of understanding.

Thus it is important for the CARP to ensure a good communication and rising awareness of the target communities about the objectives of the CARP. This would include avoiding miscommunication between the stakeholders based on the above mentioned issue of perception. Such a miscommunication can have an impact on the outputs of the CARP. This awareness requires the right level of complexity. It would be a further miscommunication if the objectives of the CARP were communicated in all its detail and complexity to the target communities. Thus it is important that the technical stakeholders of the CARP analyse this issue, and come up with a communication plan to overcome this issue.

It is recommended for the CARP to have an objective of raising the general level of awareness regarding the existing coping strategies in the target communities. To do this it is recommended that awareness materialsbe developed based on two formats, (1) a coping strategy catalogue listing developed coping strategies in the target communities, (2) developing posters illustrating coping strategies. This material should be divided into the time categories of prior to, during and after.

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Annex 1: Questionaire

Questionnaire

Name:

Age:

Sex: ☐male ☐female

Civil status: ☐Single ☐Married ☐Widower

Occupation:

Village:

District:

Daily income in average: Wet season Dry Season

Date of interview:

Perception of Climate Change

1. Have you noticed a change in the weather patterns over the last 5 years?

☐Yes ☐No

2. If yes, what consequence(s) has the change had?

☐Change in rainfall

☐Change in temperatures

☐More droughts

☐More flooding

☐More storms, cyclones

☐More seawater intrusion

☐Pest on agriculture production

3. Has/havethis/these consequence(s) had an impact on your livelihood?

☐None

☐Occupation

☐Income

☐Health

Elaboration……
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4. What do you think causes this/these change(s) in the weather patterns?

☐Deforestation

☐National affects (e.g. increased pollution)

☐International affects (e.g. increased pollution)

☐Yourself

☐Don't know

☐Other affects (please elaborate)……
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5. What kind of risks do you think these changes in weather patterns pose for the future?

Elaboration……
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Information

1. Have you heard about the term ”climate change”

Yes No

If yes, please elaborate……
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2. Has awareness-raising on climate change been an issue in your community ?

☐Yes

☐No

Have you participated in the awareness-raising?

☐Yes

☐No

3. How are you informed about the weather hazards in your district?

☐Radio broadcast

If yes, which Cambodian, Thai or Vietnamese radio

☐TV

If yes, which Cambodian, Thai or Vietnamese radio

☐Neighbours

☐Government officials

4. From where would you like to receive information about any weather hazards that would occur in the future?

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5. Are you informed about any weather adaptation projects in your district?

☐Yes ☐No

If yes, do you know who is the provider of these projects?

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If yes, have you been contacted by the providers?

Yes No

6. Do you know about the work that the government officials have been doing on a climate change coping strategy?

☐Yes

☐No

If yes, please elaborate?……
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Coping strategies

1. In case of the following weather hazards, will you have the ability to cope when they occur (if yes please elaborate) ?

☐Droughts

☐Flooding

☐Storms

☐Seawater intrusion

☐Pest on agriculture production

☐None

Elaboration……
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2. Are there any capacities that support your means of coping?

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3. In case of the last weather hazard experienced by you, did it give your household a loss?

Yes No

If yes, what kind of loss (e.g. agriculture, income, animals)?

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4. What kind of capacities could be established that would support your means of coping (please elaborate)

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5. Considering a change in weather patterns, has this led to alternatives in the way you conduct your livelyhood?

Yes No

If yes, please elaborate……
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Questionnaire for Commune Council

Please put a circle to your answer

1.

How much do you know about the term climate change?

(1 = nothing and 10 = very much)

1 2 3 4 5 6 7 8 9 10

2.

How well is your commune ready to deal with weather hazards?

(1 = not at all and 10 = very much)

1 2 3 4 5 6 7 8 9 10

3.

How satisfied are you with the information that the commune council receives on weather hazards from other national authorities?

(1 = not satisfied and 10 = very satisfied)

1 2 3 4 5 6 7 8 9 10

4.

How well do you think the commune council supports the villages in case of a weather hazard?

(1 = not well and 10 = very well)

1 2 3 4 5 6 7 8 9 10

5.

How well is the coordination with other sectors (e.g. NGOs and private sectors) in relation to weather hazards?

(1 = not well and 10 = very well)

1 2 3 4 5 6 7 8 9 10

Annex 2: Matrix for Group Discussion

Matrix for Group Discussion

Community: PeamKrasaob **District: MondolSeima**

Date of interview: 26 January 2012

Weather Hazards (events)	Frequencies of the event	Vulnerabilities (impacts)	Action taken to reduce the impact			Capacities that supported the action			Result of the action
			Before	During	After	Before	During	After	
Drought	- Rain falls between April and May - No rainfall for half a month to a month (3-4 times per rainy season) (between July and September)	- Animal Sickness - People Sickness - Damage to households plants	- Consultation with agriculture officers for the method to protect animals from being sick - Find water sources - Built a basin to store drinking water for community - Prepare medicine - Preparedness on the prevention of forest fire - Planted more trees to reduce the heat	- Discuss with veterinary officers to find a solution on preventing animal from getting sick - Find other water sources - Keep children indoors	- Buried or burnt animals that died by diseases, in order to prevent the contagious diseases from spreading - Rehabilitated water sources - Planted trees	- Informed people to be prepared - Prepare budget (Community fund and district fund) - Find other sources of fund, and apply for funding for planting trees	- Means for transporting of drinking water from the town (buckets, carriage, water pumping machine...) - Village veterinary spraying medicine to prevent animals from being infected	- Promote methods of coping (by educational methods) - Use commune and community funds	- Prevent 50% of animals from death by diseases - Planted 160 Ha of trees - Rehabilitated one community well

Seawater intrusion	- 4 to 5 times in a 3 months period (from November to January)	- Damage to roads - Damage to vegetables, plants and animals - Flooded houses (flooded for half a day)	- Prepare budget to build a salt water protection dike - Consult with community members to contribute in kind (labour support for building the dike) - Inform households to prepare high hill or shelves for animal or poultry - Informed households to prepare boats to keep belongings - Prepare the houses.	- Open water gate - Informed people to be careful - Informed people to evacuate to the safety place -Prepare valuable things on boat	- Repaired the salt water protection dike if destroyed by seawater intrusion - Informed people to clean the house to keep sanitation and hygiene at acceptable level.	- Prepared budget to build salt water protection dike (raised the budget in commune development plan) - Promote people to participate in kind to build the new seawater protection dike (discussion, meeting, education.) - Prepared fund to build (other NGOs...)	- Control the condition of seawater protection dike - Release saving funds for victim -Use the community contribution fund	- Support fund for repairing houses - Awareness raising on preparedness for the next events	- 100% do go out fishing - Built a salt water protection dike about 4-5km long and 0.5m high - 100% of community members contribute in kind in building the salt water protection dike (support in labour) - 70% have boats and make shelves to keep animals or poultry from the flood)
Storm and Lightning	- 3 times a year	- Destroyed 38 houses (2011) - Destroyed mangroves forests (20m x 700m) - Forest fire (20m x 20m) about 30 places - Sank 2 fishing boats	- Informed the people to be careful (warn from house to house) - Informed people to listen to the weather forecast on radio and TV - Informed people to protect from lightning by not turning on the TV, do not go under trees when raining) - Planted tree(s) (mangrove forests) for storm protection	- Informed people not to go out fishing - Informed people not to go under trees	- Inform people to prepare for the next events - Repaired houses - Replanted trees	- Prepare budget for planting trees - Reforestation Project budget (Commune budget and IUCN) -Prepares safety area for evacuation (humans and animals)	- Evacuated people to the save area	- Support funds to repair houses (provincial red cross and commune fund) - Support fund to plant trees	- 90% of total household participated in preparedness (listen to radio on weather forecast, prepared boat to evacuate) - 10% of total household bought lightning protecting device - Participated in planting trees (160 Ha) - 100% of household stopped fishing during the storm

Matrix for Group Discussion

Community: BoengReang **District: Prey Nob**

Date of Interview: 03 February 2012

Weather Hazards (events)	Frequencies of the event	Vulnerabilities (impacts)	Action taken to reduce the impact			Capacities that supported the action			Result of the action
			Before	During	After	Before	During	After	
Storm	- 5 times in 2011	- Damaged households - Fruitless rice - Damaged 1 boat - Affected fishing	- Informed fishermen to listen to the weather forecast - Informed people to use wood stick to bend down the rice in order to prevent it from being destroyed by the wind - promote seed choosing by forestry officers - Informed people to maintain natural forest to prevent storms - Prepared budget for growing 10000 trees in 2012	- No fishing activity - Used wood stick to bend down the ricein order to prevent the rice from being destroyed by the wind.	- Informed people to build stronger new houses - Informed people to use wood sticks to protect rice crops before the storm occursagain - Choose rice species that can stand against the storms - Trained people to maintain natural forests	- Support the rice seeds that can withstand wind (the Provincial Department of forestry fisheries and agriculture) - Protected mangrove forests - FIX organisation support funds to grow mangrove forest	- Prepare boats for individual evacuation - Listen to radio forecast	-Provide rice seeds - Informed the people to be prepared for the next events	- Received 1000kg of rice seeds - Plant tree at community forest (4125Ha) - Protected mangrove forest (321Ha) - Plant 1000 mangrove trees
Dry wind	- Occur during the whole month of October								
Seawater Intrusion	- 10 times a year from October to February	- Damaged rice fields - Damaged the road - Flooded the village - Damaged crops - Affected domestic animals, poultries	- Prepare 6000$ to build a salt water protection dike (20km) - Prepared budget to repair, build salt water protection dike to protect rice fields - Prepared boats to store materials when the sea water rises	N/A	N/A	N/A	N/A	N/A	-Saved 500Ha, 70% rice

Flood and rainfall	- 5-6 times a year from July to August	- Damaged small roads - Damaged rice seedlings - Flooded houses - Affected fishing	- Prepared budget for repairing roads (commune development plan)	- Observe the roads during the flood	- Repaired the road (funds from people in the province) - Reported the damages to the district level	N/A	N/A	N/A	
Pests on agriculture product	- From August to November	- Damaged rice products	- Informed the district agriculture officer to support	- Used pesticides as informed by agriculture officer	- Training on the methods of pest prevention	N/A	N/A	N/A	

Matrix for Group Discussion

Community: TuekThla **District: Prey Nob**

Date of discussion: 2nd February 2012

Weather Hazards (events)	Frequencies of the event	Vulnerabilities (impacts)	Action taken to reduce the impact			Capacities that supported the action			Result of the action
			Before	During	After	Before	During	After	
Storm and Dry wind	- Twice a year - Dry wind 2 months in a year	- Affect fishing - Fishing boats sink - Damaged houses - People died - Destroyed rice and other plants - Damaged mangrove forests	- Replant mangrove forests - Conducted meeting with community on preparedness - Informed people not to go out fishing if the big winds occur - Listen to weather forecast - Use wood stick to bend down the rice in other to prevent it from being destroyed by the wind	- Observe the conditions - Informed people to evacuate to the safety area - Informed people to be aware of the event	- Compensate the families that lost their relatives - Contribute in kind to repair houses that were damaged - Reported the damages to district officer - Inform people to be careful and listen to weather forecast - Go fishing in groups so it's easier to save each other (Group fishing)	- Prepare funds for planting mangrove tree - Fund supported by Japanese organisation (CIVADECRE) - Prepare budget to purchase guarding boats to help the fishermen in case of storm - Raise the budget (Commune budget)	- Observed the conditions - Evacuate people to the safety area	- Provided community fund to those who lost relatives - Community contributed (in kind) to repair the damages -Reported about the damages and sent information to District Level - Planting trees	- Planted 3000-5000 trees - Supported in repairing 8 houses - Provide fund to help casualty families (80,000 riels/ each family) - Provided 2000 riels for every family in the community.
Seawater Intrusion	- Three times a year	- Damaged rice and other plants - Damaged animals - Damaged rice field - Damage household equipment (motors, bicycles)	- Prepare salt water protection dike for individual paddy fields - Prepared boat for evacuation human, animals, poultry, equipment	- Make salt water protection dike to protect the rice fields - Evacuate people, animals, poultry, equipment to a high place	N/A	N/A	N/A	N/A	N/A
Land level rise	- The water is going shallower every year, the deepest sea level is 1m (land rises 50m from the beach)	- Affected fishing territory and fishing activities - Less fish and crabs	N/A	N/A	N/A	N/A	N/A	N/A	N/A

More rainfall	- 10 times per dry season	- Damaged rice making it fruitless - Affected the timing of planting and cultivating rice	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Matrix for Group Discussion

Community: TuekL'ak District: Prey Nob

Date of interview: 02 February 2012

Weather Hazards (events)	Frequencies of the event	Vulnerabilities (impacts)	Action taken to reduce the impact			Capacities that supported the action			Result of the action
			Before	During	After	Before	During	After	
Seawater Intrusion	-Big difference in the last 5-6 years -Sea intrudes in September, October, November, and December (4 months per year)	- Affect drinking water and animals' food -Affected rice fields and plants	- Inform people not to cut down trees - Grow mangrove forests -Conduct consultation meeting at district level to find solutions	- Reported to the commune about the disasters - Informed people to be careful with their domestic animals, poultry	- Build a higher salt water protection dike around the rice fields (individual) - Reported to commune authority about the impacts	- Inform people about the change in weather (storm, floods etc) - Hold a community meeting to find a way to prepare for less impacts - Hold a meeting with local authorities about the change in weather	- Find a safety area for people and animals, poultry	- Provided information for people to be able to find good seeds - Cooperate well with authorities and organizations	- Have informed 80% of people about storms - Moved 200 cows and buffaloes to a safe place - Contact with the Ministry of Forestry, Fisheries and Agriculture and received 20 tons of rice seed.
Storm	- 3 to 4 times a year	- Fruitless rice and rice production drops by storm							
Change in weather pattern (dry and wet)	- In the last 5-6 years experienced a large change in the amount of rainfall and droughts	- Damaged rice production and pest on agriculture product							
Lack of drinking water	- Lack of drinking water from November to June every year	- Affect people's health							

Matrix for Group Discussion

Community: TuolKokir District: Peam Krasaob

Date of interview: 27 January 2012

Weather Hazards (events)	**Frequencies of the event**	**Vulnerabilities (impacts)**	**Action taken to reduce the impact**			**Capacities that supported the action**			**Result of the action**
			Before	**During**	**After**	**Before**	**During**	**After**	
Seawater Intrusion	Once in a season (2 days in December)	- Damage 2 Ha of rice in Ta Jark and 5 Ha in TuolKokir - Damage plants in the village	-Prepare safety area -Built salt water protection dike (Ta Jark) - Repair salt water protection dike (TuolKokir)	- Evacuate to the safety area. - Check the condition of the saltwater protection dike.	- Repair the salt water protection dike and water gate	- Prepare budget for construction and repairing salt water protection dike (Commune development plan)	- Budget support - The salt water dike - Fund support for evacuation activities (human, animal, things)	- Repairing salt water protection dike damaged by sea water intrusion - Fund support for the victim (repairing houses)	- Built a 700m salt water dike (repair + newly built) in TuolKokir (connecting from upper TuolKokir to lower TuolKokir) - Repaired 600m with 1m high salt water protection dike (connecting lower TuolKokir to upper TuolKokir)
Storm + Lightning	Twice a year	- Damaged soil - Damaged houses - Damaged some houses' roof	- Stop cutting tree (stop deforestation) - Promote planting trees (reforestation)	- Advise people to be careful of the storm and lightning (listening weather forecast through radio) - Advice people on how evacuate to safety area.	- Repair the houses - Plant more trees to protect against storm - Awareness-raising on preparedness when the next event comes, such as listening to weather forecasts, installinglightning protection	N/A	N/A	N/A	- Protect the forest surrounding the community
Drought	Twice in 5 years (2-3 months each time)	- Lack of drinking water - Damage fruit trees -Damage rice and animals	- Protect drinking water sources - Build fences around ponds -Rehabilitate canals, keep water in household	N/A	N/A	N/A	N/A	N/A	N/A

Too much rainfall	2 months continuously	- Damage rice - Increase pest on crops	- Prepare pesticide -Contacted agriculture officers to consult on solutions to protect the crops - Build new canals, repair old canal and water gate	- Use pesticide - Contact agriculture officer as soon as possible to get help on time - Open water gate to save the rice from flood	- Inform people about the change in weather so they can understand and find solutions for the next weather hazards - Repair canals and water gate	- Consult with agriculture officer to find the solution to save the agriculture product from pest - Prepare budget for repairing canals and water gate	- Provide pesticide - Open water gate to save the rice from flood	- Prepare budget for the next weather hazard (commune development plan)	- Saved 70% of rice product from being pest destroyed - Repaired some rice seedlings after the rainfall finished - Built 1660m canal - Repaired old canal

Matrix for Group Discussion

Commune: Prey Nob **District: Prey Nob**

Date of interview: 22 June 2012

Weather Hazards (events)	Frequencies of the event	Vulnerabilities (impacts)	Action taken to reduce the impact			Capacities that supported the action			Result of the action
			Before	During	After	Before	During	After	
Drought	-Drought three times in October, November, and December.	-Impact to rice yield because of limited water irrigation paddy.	-Selecting rice seeding (Short term rice).	-Guide children to stay in cold places -Keep livestock (ducks, chicken) in cageling	N/A	-Villagers		N/A	
Temperature Increase	-Starting from March to April	-Children frequently sick -Cause livestock such as ducks, pigs and chicken to die.	-Planting tree;	-Guide children to stay in cold places. -Keep livestock (ducks, chicken) in cageling	N/A	-Villagers		N/A	-Planting mangrove 3000 trees -Planting 500 other trees at school and pagoda
Change in rainfall	-More rainfall in December, January, and February	-Damaged the ripen rice (more water in paddy and sank ripen rice).	-Prepare machine to pump water from paddy.		N/A	- PoDWRAM -Polder community	N/A	N/A	- PoDWRAM has 10 pumping machines -Polder community has 4 pumping machines. -Testing cultivate Short Tem Rice.
Flooding ទឹកជំនន់	-Frequently flooding in August	-Damage rice because of level of seawater and level of raining water are the same level, so FWUC unable to release flooding water to the sea.	-Rehabilitate canal, other waterway for release water to the sea; -Clearing grasses in canal or water for ensure able to release water when there is a heavy rain or flooding	-Open the Watergate to release flooding water to the sea. -Pumping raining water from paddy in case of heavy rain.	N/A	- PoDWRAM -Polder community -Local authority	- PoDWRAM pumped water -Polder community lend pumping machine to farmers.	N/A	- PoDWRAM has 10 pumping machines -Polder community has 4 pumping machines.
Seawater intrusion	-The seawater level rose to 742 cm which was almost equal todike level(756), so a	- Damaged rice; -Damaged mangrove forest; -Damaged dike.	-Close all Watergates ; -Prepare sand bags to prevent seawater	-Trucks transport soil to fill on the low level of dike. -Fill soil in the sand bags and	-Close the Watergate to keep water in paddy; -Rehabilitate polder in case of damaged.	-Locate budget for rehabilitate dike, canal.		-Propose budget to rehabilitate dike from MoWRAM in case	-Community locate budget 500 USD each year to rehabilitate dike, canals and Watergates

	seawater intrusion to paddy happened.		instruction or flooding to paddy.	put on the dike to prevent seawater flooding or instruction to paddy. -Participate in prevention activities.				ofserious dikedamage.	

Matrix for Group Discussion

Commune: OuOukghaheng **District: Prey Nob**

Date of interview: 22 June 2012

Weather Hazards (events)	Frequencies of the event	Vulnerabilities (impacts)	Action taken to reduce the impact			Capacities that supported the action			Result of the action
			Before	During	After	Before	During	After	
Drought	One time a year	-Impact to rice -Impact to other crops such as corn, watermelon, string been.	-Close Watergate	-Monitoring reservoir	-N/A	-Community's budget	-Community's budget	-N/A	-Close Watergate and prevented 100,000 ha (80%).
Flooding	-3 to 4 times a year	-Impact to rice -Impact to livestock, Impact to rural road.	-Rehabilitate canal to release water to the sea	-Open Watergates -Community cooperate with polder's community	-Close Watergates; -Close reservoir to keep water	-Receive 4000 USD/year from Natural resources organization and PoDWRAM .	-N/A	-Community polder's budget	-Able to prevent paddy 3000 to 4000 ha
Seawater intrusion	-2 to 3 times per year	-Impact to rice -Impact to fresh water	-Prepare sand bags; -Close Watergates.	-Prevent illegal fishing (Using nets which barrier or reduce speed of water flow. -Control low level of dike.	-Control dike and rehabilitate which damage.	-Polder community -PoDWRAM; -AFD	-Polder community -PoDWRAM; -AFD	-Polder community -PoDWRAM; -AFD	-Protect seawater intrusion about 2km
Storm	2 to 3 times per year	-Impact o household -Impact to rice -Impact to other crops	N/A	N/A	-Informed to commune authority	-N/A	-N/A	-Red cross -Charity from district, province and NGO	-Can support in short periods.

Matrix for Group Discussion

Commune: TuolToteung **District: Prey Nob**

Date of interview: 22 June 2012

Weather Hazards (events)	**Frequencies of the event**	**Vulnerabilities (impacts)**	**Action taken to reduce the impact**			**Capacities that supported the action**			**Result of the action**
			Before impact	**During impact**	**After impact**	**Before impact**	**During impact**	**After impact**	
Drought and Temperature increase	-From year to year especially in June	-Impacts to human health and livestock -Impacts to other crops	-Planting mangrove trees and other fruit trees	- Keep livestock in cageling -Guide children to not go out if not necessary	N/A	-Provide budget to nursery and planting trees	N/A	N/A	-Planting 2000 mangrove trees
Storm	Every two years	-Impact to household -Cause boats sank	-N/A	-N/A	-N/A	-N/A	-N/A	-N/A	-N/A
Flooding	Every year	-Impact to rice -Impact to crops	-Clearing grass along the canal -Listen to weather broadcast	-Open Watergates - Informed fishermen	-Rehabilitate dike and rural road -Close Watergates	-Community budgets to clearing grasses	-N/A	-N/A	-N/A
Seawater intrusion	-Every year from October to February	-Damaged dike -Impact to rice	-Prepare trucks for transport soil -Prepare sand bags	-Close Watergates	-N/A	-PoDWRAM -Polder's community	-N/A	-N/A	-Rehabilitated dike 20 km in polder 2 and 3. -Rehabilitated dikes 69 km.
Increasing pest	-Every year	-Impact to rice and other crops -Impact to human health							