Kingdom of Cambodia

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TA-8179 CAM MAINSTREAMING CLIMATE RESILIENCE INTO DEVELOPMENT PLANNING – PACAKGE A (45283-001)

CLIMATE RISK SCREENING TOOL TRAINING WORKSHOP REPORT

Date of training: April, 2016
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Prepared for: Asian Development Bank
Prepared by: Climate Change Department, NCSD
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TABLE OF CONTENTS

ABBREVIATIONS

ADB	Asian Development Bank
MOE	Ministry of Environment
CDTA	Capacity Development Technical Assistance
SPCR	Strategic Program for Climate Resilience
NGO	Non-Government Organization
TA	Technical Assistance
NAPA	National Adaptation Programme of Action
CSO	Civil Society Organization
DRR	Disaster Risk Reduction
ICEM	International Centre for Environmental Management
MOWRAM	Ministry of Water Resources and Meteorology
MAFF	Ministry of Agriculture, Forestry and Fisheries
CCAFS	Climate Change, Agriculture and Food Security Program
MPWT	Ministry of Public Works and Transport
MRD	Ministry of Rural Development
UNFCCC	United Nations Framework Convention on Climate Change
GCM	General Circulation Models
NCSD	National Council for Sustainable Development
CCCA	Cambodia Climate Change Alliance
ORCHID	Opportunities and Risks from Climate Change and Disasters
DANIDA	Danish International Development Agency
VA	Vulnerability Assessment
CC	Climate Change
IISD	International Institute for Sustainable Development
IUCN	International Union for Conservation of Nature

SUMMARY

The Ministry of Environment (MOE) is the executing agency of TA 8179-CAM: Mainstreaming Climate Resilience into Development Planning. The Technical Assistance (TA) is aimed at enhanced resilience to climate change in Cambodia through strengthening institutional and technical capacity of the government to mainstream climate resilience into development planning, as well as improving coordination among various sectoral line ministries, sub-national agencies, non-government organizations (NGOs) and the private sector.

In order to identify the most appropriate climate change screening tool for each sector and the knowledge required for successful application of screening, the TA 8179 programme organised a one-day trialling workshop of the available tools in Phnom Penh on 4 April 2016, with 49 participants from key ministries of SPCR, NGOs and relevant agencies. The objectives for the workshop included:

- To present and review the climate risk screening tools applied in Cambodia and in other countries
- To discuss and trial the screening checklists in three sectors (water resources, agriculture and infrastructure)
- To develop and identify appropriate risk screening tools by sector (water resources, agriculture and infrastructure)

A number of checklist-style and web-based screening tools were reviewed, including screening checklist proposed under PPCR Phase 1, CCCA's screening checklist, ADB's preliminary climate risk management checklist for investment projects, ORCHID (Opportunities and Risks from Climate Change and Disasters) and CRiSTAL (Community-based Risk Screening Tool – Adaptation and Livelihoods). A simple risk screening tool recently developed by the TA team was then trialled by applying it to three projects in sectors of relevance to TA8179 (water resources, agriculture and infrastructure).

Feedback gathered from participants indicated that risk screening tool developed by the TA team was judged as most appropriate for the Cambodian circumstances. The tool will be revised by the TA team to make it more applicable to specific sectors (water resource, agriculture and infrastructure) and to incorporate comments and suggestions raised by the workshop participants. The tool will then be circulated among relevant ministries for further feedback and approval.

1 INTRODUCTION

1.1 PROJECT OVERVIEW

The Ministry of Environment (MOE) is the executing agency of TA 8179-CAM: Mainstreaming Climate Resilience into Development Planning. The Technical Assistance (TA) is aimed at enhanced resilience to climate change in Cambodia through strengthening institutional and technical capacity of the government to mainstream climate resilience into development planning, as well as improving coordination among various sectoral line ministries, sub-national agencies, non-government organizations (NGOs) and the private sector.

The TA has four outputs: (i) SPCR coordination, technical support and capacity to mainstream climate resilience into development planning strengthened; (ii) detailed feasibility studies for selected National Adaptation Program of Action (NAPA) projects conducted; (iii) civil society support mechanism established and capacity of NGOs and civil society organisations (CSOs) to mainstream adaptation and disaster risk reduction (DRR) into their operations strengthened; and (iv) climate change adaptation knowledge products developed and disseminated.

The International Centre for Environmental Management (ICEM) has been contracted to support MOE for Package 1 of this TA in February 2015 covering outputs i), ii) and iv). Package 1 includes a review of climate change screening tools available for sectoral agencies in Cambodia to identify the most suitable screening tools for different types of projects prepared by the target ministries for SPCR.

Risk screening tools are important in enabling a more effective response to climate change by ensuring that development investment projects most at risk are identified early in the project cycle. Some work has already been done or is planned for developing risk screening tools by the different sector agencies: MOWRAM (water resources) with its GIS and climate database; MAFF (agriculture) will be developing risk screening tools with the support of CCAFS, and has also worked throughout 2015 on mainstreaming climate change into its planning and budgeting process; MPWT (national and provincial roads and urban infrastructure) with its identification of roads at risk of flooding; and MRD (rural roads and infrastructure). No specific tools are yet in general use by any of these agencies, although MOE has applied more-general environmental and social screening tools.

In its Second National Communication to UNFCCC, the Cambodian government has committed to undertaking evaluation of present and future climate change impacts in the country, developing vulnerability maps, and assessing impacts of climate change on key sectors (agriculture, water resources, forest resources, coastal areas and health). The government has adopted a regional climate model (PRECIS) in combination with a number of General Circulation Models (GCM).

In order to identify the most appropriate climate change screening tool for each sector and the knowledge required for successful application of screening, the TA 8179 programme organised a one-day trialling workshop of the available tools in Phnom Penh on 4 April 2016 with a total of 49 participants from key ministries of SPCR, NGOs and relevant agencies.

A review of the different screening tools available covered both simple checklists and web-based tools such as Acclimatise's AWARE for Projects (for which a user fee would be required) and the climate and disaster risk screening tool developed by the World Bank (which is open-access). These tools are described in the report 'Review of climate change screening tools available for sectoral agencies in Cambodia', submitted by the TA 8179 in June 2016. This review found that none of the available screening tools were fully appropriate for use by sector agencies in Cambodia. In principle, the tools should be simple and cheap to use, and applicable at national and sub-national levels. It had been envisaged that two types of screening tools were to be trialled by each sector agency: a simple screening checklist and a web-based screening tool. However, because of time constraints, only the simple screening tool developed by the TA team for use in Cambodia was trialled by the representatives of each sector agency (MOE, MOWRAM, MAFF, MPWT and MRD).

The training workshop was presided over by HE Prof Dr Sabo Ojano, Secretary of State and Program Coordinator of SPCR, Ministry of Environment; HE Vann Monyneath, Deputy Secretary General of NCSD; and HE Pon Saroeun, Undersecretary of State and Deputy Program Coordinator of SPCR, Ministry of Environment.

1.2 WORKSHOP REPORT

The objectives for this training workshop included:

- To present and review the climate risk screening tools applied in Cambodia and in other countries
- To discuss and trial the screening checklists in three sectors (water resources, agriculture and infrastructure)
- To develop and identify appropriate risk screening tools by sector (water resources, agriculture and infrastructure)

2 SUMMARIES OF TECHNICAL PRESENTATIONS

The slide presentations are available in Appendix 3 (as a separate document).

2.1 SESSION 1: OPENING AND INTRODUCTION

As indicated above, the training workshop was presided over by HE Prof Dr Sabo Ojano, Secretary of State and Program Coordinator of SPCR, Ministry of Environment; and HE Vann Monyneath, Deputy Secretary General of NCSD; and HE Pon Saroeun, Undersecretary of State and Deputy Program Coordinator of SPCR, Ministry of Environment.

During the opening remark, HE Prof Dr Sabo Ojano encouraged participants to identify the most appropriate tools to apply in screening for climate risks when designing water resources, agriculture and infrastructure projects in Cambodia. The new tools are critical for effective climate risk assessment of investment projects, and will complement existing tools the MOE uses to screen for environmental and social impacts.

Dr. Seak Sophat provided the introduction of training, informing the participants of the objectives and the definition of climate risk related to agriculture, water resources management and infrastructure. He also stressed on the importance of applying risk screening tools in project implementation and planning.

2.2 SESSION 2: TECHNICAL PAPERS ON RISK SCREENING TOOLS

The training included key presentations discussed below.

2.2.1 Overview of climate change risk screening tools

- Climate change (CC) screening is the first step during conventional project development to identify whether or not additional climate change vulnerability assessments are required, and where adaptation measures may be built into the project. Many types of CC screening tools have been developed by various development partners including ADB and DANIDA. They include MS Excel spreadsheet/application-based tools such as CRiSTAL, and web-based tools such as Acclimatise's 'AWARE for Projects' and World Bank's climate and disaster risk screening tools. Screening tools are a common part of the EIA process. Below are examples of checklists used for risk screening:
- <u>CCCA's screening checklist</u>
  - covers many environmental and social risks, including CC
  - contains only three questions on CC because the checklist is aimed at projects which are already targeting CC resilience
  - covers mitigation and adaptation
  - 'Yes or No' questions
- <u>Screening checklists proposed under PPCR Phase 1</u>
  - 5-6 'Yes or No' questions for each sector
  - requires the project proponent to know the project and CC projections very well; doesn't assist in this regard
- <u>ADB's preliminary climate risk management checklist for investment projects</u>
  - more extensive
  - includes scoring of physical environment risk zones (very broad), sectors (agriculture and natural resources rank high, finances are low), hazards that might impact the project (floods, droughts, etc.)
  - if overall scores are high, it is recommended that the AWARE tool is applied (see below)
- <u>ORCHID (Opportunities and Risks from Climate Change and Disasters)</u>
  - developed specifically for India and Bangladesh by DFID
  - has a climate-relevant section and questions

  - three levels of risk (red, orange or yellow)
- DANIDA screening tool
  - has been used in Cambodia
  - includes suggesting adaptation measures for reducing vulnerability
- Overall similarities
  - all of these tools require a good understanding of the project on behalf of the proponent
  - problems – some tools are very general, and don't provide help in answering project-specific questions

2.2.2 Existing approaches and practices of incorporating climate risks by sector agencies: NCDD, MPWT, NOGs, etc.

DCA/CA (DanChurchAid/ChristianAid): This tool for adaptation planning can identify risk, adaptation capacity, resources and stakeholders, and overall plan with different responsibilities according to the activities. This tool has been developed both in Khmer and English version. It also provides information of vulnerable groups such as women and children. The tool has been used by NGOs for planning or new proposal preparation which require staff to collect information from community to identify actions for planning. However, collecting the information takes a long time, and the tool does not help with identifying or scoring the risk or vulnerability. It should be reviewed for improvement, including reducing the time required to complete.

MPWT: Two screening methods used:

(i) Road projects: mostly using national data on rainfall, surrounding terrain characteristics and road condition.
(ii) Water capture (dikes) and water supply projects: mostly using local knowledge from provincial authorities and communes.

MPWT team developed and gathered several models to produce vulnerability maps aimed at prioritizing roads susceptible to being damaged by flooding. A climate change model was used to estimate potential rainfall impact by 2055. Roads with high vulnerability to be damaged by floods are identified and prioritized for subsequent detailed design.

A knowledge management tool was developed, titled Flood Risk Management Interface. Its main purpose is to facilitate the planning and prioritization of road rehabilitation by providing adaption planning and design decision for the projects. It has been applied for the implementation of road and water projects.

Pros and Cons:

- **National data based screening methods (roads)**
  - **Pros**: Provides very good overall perspective of problem and many investment alternatives.
  - **Cons**: Quality of screening depends on quality / timeliness of national data (sometimes outdated); results sometimes overridden by local condition knowledge not visible at national level.
- **Local knowledge based screening methods (water projects)**
  - **Pros**: Ensures strong local support and commitment
  - **Cons**: May be subject to local politics; some solutions may be technically weak

Corrective measures:

- **National data based for screening methods (roads)**
  - maintain timely national datasets
  - always complement national analysis by good local condition analysis
- **Local knowledge based screening methods (water projects)**

- always verify locally identified needs and adaptation solutions by independent expert, preferably at national level

2.2.3 Understanding climate change projections and databases for use with risk screening tools

This presentation focused on climate change projections and databases in support of analysing the risks of development projects. The key points of the presentation are summarized below:

- There is a lot of creative activities happening in each sector in Cambodia
- Creativity and experimentation are important in identifying appropriate climate screening tools – no right or wrong approach
- The idea is to identify a cheap way to choose which projects need VAs – a tool
- Mapping out the past experiences can be useful in predicting what will happen in the future
- A set of tables showing different climate models (down to 5 km^2) was presented
- Two key questions – 1) What will happen in this location in regards to CC? 2) Will the planned project be sensitive to the expected changes?
- CC parameters for the screening stage – do not have to look at all of them, only a few relevant ones
- Increased rainfall can be a blessing (good for agriculture) or a curse (bad for roads)
- Need to look at cumulative impacts of different CC impacts (e.g. lower rain and higher temperatures can spell trouble for agriculture)
- Increase of rainfall does not automatically translate into more floods – we need to feed this info into hydrological models
- Identifying flood zone by putting on layers of all recent floods; if your project falls within the identified flood zone, it is recommended that a VA is conducted
- Also, different types of floods matter – flash floods vs. annual floods
- MOWRAM has begun developing a toolkit, and the TA team will be assisting with its preparation

2.2.4 Working with climate change screening checklists

This presentation provided guidance to each sector team and WG members to conduct a risk screening exercise by following the template prepared by the TA team. The template (provided in Appendix 3) included 1) project sensitivity, 2) project exposure scoring, and 3) climate change risk scoring. This risk screening template was easy to use and understandable by the participants for their future work. By using the project concepts derived from the scoping studies, the teams worked on analysing projects against the criteria listed in the template. The exercise provides the basic understanding and practice for the participants, allowing them apply the template to future projects to ensure that every project takes into account the climate change.

2.3 SESSION 3: INTERACTIVE DEMONSTRATION BY SECTOR

Due to time constraint, this section was cancelled. However, the intended activity was to trial the following software developed by various agencies:

- **CRiSTAL (Community based Risk Screening Tool Adaptation and Livelihoods)**
  - developed by IISD, IUCN, etc.
  - requires field visits, rather than only desk research
  - requires at least a few days to complete
  - segregates risk analysis for men and women
  - at the end, you have a summary report
- **Acclimatise – AWARE for projects**
  - gets used if the initial screening indicates the need for more detailed assessment
  - has a global database of information from which you download location-specific info

- involves project risk ratings – temperature increase, wild fire, etc.
- shortcoming – not a very transparent tool, i.e. the project proponent does not know how the information was developed

- **World Bank's Climate and Disaster Risk Screening Tools**
  - systematic and consistent
  - four steps; user-friendly
  - takes a couple of hours to complete
  - covers a range of sectors
  - at the end, you get a summary report on project risk
  - database for Cambodia is limited for droughts and floods; good for temperature and rainfall

3 SUMMARIES OF GROUP DISCUSSIONS

3.1 PRESENTATION OF THE 1ST GROUP – REHABILITATION OF KAMPONG SEIMA IRRIGATION SYSTEM

With facilitation by TA's national Adaptation Project Development Experts, Group 1 trialled the new risk screening tool prepared by the TA team. The tool was trialled by assessing the Kampong Seima Irrigation System multi-sectoral project in Battambang Municipality, Battambang province. Before assessing the project, the group was provided with background information including project location and size, project components, objectives, and environmental and socio-economic condition of the project area (including incidence of flood and drought events).

The group assessed the project climate change exposure and climate change risk using an exposure matrix and a risk matrix; the results are provided in Tables 1 and 2 below. As a result of discussions, the group provided the following suggestions for project implementation:

- A detailed vulnerability assessment is recommended, since this project is assessed as being at medium-high risk to the climate change due to the expected change of rainfall in the wet season, flooding duration, and prolonging of drought
- The Kampong Seima irrigation Canal System should be rehabilitated to minimize the climate risk for Battambang city.

The group also provided the following recommendations regarding the screening tool:

- The project climate risk scoring should applied to conventional investment projects rather than those that focus specifically on climate change adaptation.
- Justifications should be provided for given scores.
- The exposure scores should be updated.
- High resolution imagery and downscaling climate data would be useful for such screening.

Table 1. Project Climate Change Exposure Matrix-Kampong Seima Team

Project Name		Kampong Seima Irrigation Canal System							
Sector/sub-sector		Integrated sectors (1.agricultre, 2. water resource, 3. infrastructure)							
Location - Province		8 Sangkats (communes) of Battambang city-Battambang province							
Assessors		Representative from MOE, MPU, MoWA, CDC							
Date of assessment		04 April 2016							
CC Parameter			**Change with climate change**					**Score**	**Comments**
Average daily Maximum temperature	Wet season		Low change	Medium change	High change				Based on climate change projection for Battambang, the daily temperature rainy would increase by 2.7°C (from present 30.6°C to 33.3°C) in year 2050
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C				
		score	1	2	3			2	
	Dry season		Low change	Medium change	High change				Based on climate change projection for Battambang, the daily temperature in dry season would increase by 1.9°C (from present 32.2°C to 34.1°C) by year 2050
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C				
		score	1	2	3			1	
Rainfall, % change	Wet season		Low increase	Medium increase	High increase				Based on climate change projection for Battambang, the yearly rainfall in wet season would increase by 101mm (from present 1312mm to 1413mm) in year 2050
		range	2 to 6%	6.1 to 10	10.1 to 14				
		score	1	2	3			2	
	Dry season		High decrease	Medium decrease	Little increase/ decrease	Medium increase	High increase		Based on climate change projection for Battambang, the yearly rainfall in dry season would decrease by 1mm (from present 268mm to 267mm) by year 2050
		range	-4 to -2%	-1.9 to 0	0.1 to 2	2.1 to 3	3.1 to 5		
		score	3	2	1	2	3	2	
Flooding – Flash flooding			No or little risk	Medium risk	High risk				Risk of flash flood damage to roads, based on climate change projection for Battambang.
		range	Use maps and expert knowledge						
		score	1	2	3			1	

Project Name		Kampong Seima Irrigation Canal System							
Sector/sub-sector		Integrated sectors (1.agricultre, 2. water resource, 3. infrastructure)							
Location - Province		8 Sangkats (communes) of Battambang city-Battambang province							
Assessors		Representative from MOE, MPU, MoWA, CDC							
Date of assessment		04 April 2016							
CC Parameter			**Change with climate change**					**Score**	**Comments**
Flooding – Long duration			No or little risk	Medium risk	High risk				
			Use maps and expert knowledge						Based on recent flood and climate change projection for Battambang for long duration flood hotspots in Cambodia
		score	1	2	3			3	
Drought			Decrease in number of drought months or no change	Low increase in number of drought months /yr	Medium increase in number of drought months/yr	High increase in number of drought months/yr			
			-2 to 0	0.1 to 0.5	0.51 to 1.00	1.1 to 1.5			Based on climate change projection for Battambang, drought period is expected to increase by 0.31 months (from 4.54 months to 4.85months)
		score	1	2	3	4		2	

Table 2. Project Climate Change Risk Scoring matrix for Kampong Seima irrigation

Project Name		Kampong Seima Irrigation System						
Sector/sub-sector		1) irrigation canal, 2) divert canal from flooding Battambang City, 3) Drainage and sewage canal,4) road on both side of embankment.						
Location - Province		Provincial town of Battambang and cover 8 Sangkats (communes)						
Assessors		Representative from MOE, MPU, MoWA,						
Date of assessment		04 April 2016						
CC Parameter		**Exposure Score**	**Expected sensitivity**		**Climate change risk score**	**Risk Level**		**Comments**
			H(3)	**M(2)**	**L(1)**	**Exposure x sensitivity**	**H** **M** **L**	
Maximum temperature	Wet season	2	1			2	L	Not much risk
	Dry season	1	2			2	L	High evaporate, and cause bad smell from sewage, water quality of canal is worse
Rainfall	Wet season	2	2			4	M	Rainwater would erode embankments of canal, and some parts of canals may block by garbage or over flow.
	Dry season	2	1			2	L	There will decreasing number of rain in dry season
Flooding – Flash flooding		1	3			3	L	Flush flood may destroy canal and cause over flow of canal
Flooding – long duration		3	3			9	H	Bank erosion, damage culvert, and block some parts of the canal because bringing garbage to canal
Drought		2	2			4	M	(i)The area will be quickly changed from agriculture to residential area, (ii) there will decreasing number of rain in dry season.

Climate change risk levels	Temp, rainfall, flood	Drought
	Score Range	Score Range
High Risk	9	8, 9, 12
Medium Risk	4, 6	4, 6
Low Risk	1, 2, 3	1, 2, 3
No Risk	0	0

3.2 PRESENTATION OF THE 2ND GROUP – IMPROVEMENT OF RURAL INFRASTRUCTURE TO CLIMATE RESILIENCE IN KAMPONG LEAENG DISTRICT

Group 2 included officials from MPWT, MOE and MOWRAM, and discussions were facilitated by Mr. Hak You (TA's Infrastructure & Climate Change Specialist) and Mr. Chhun Bunlong (TA's GIS Specialist).

Group 2 trialled the new risk screening tool prepared by the TA team by applying it to the Improvement of Rural Infrastructure to Climate Resilience project in Kampong Leng District. Before assessing the project, the group was provided with background information including project location and size, project components, objectives, and environmental and socio-economic condition of the project area (see Figures 1 and 2).

Figure 1. TA-8179 specialists presenting information on the Improvement of Rural Infrastructure to Climate Resilience project

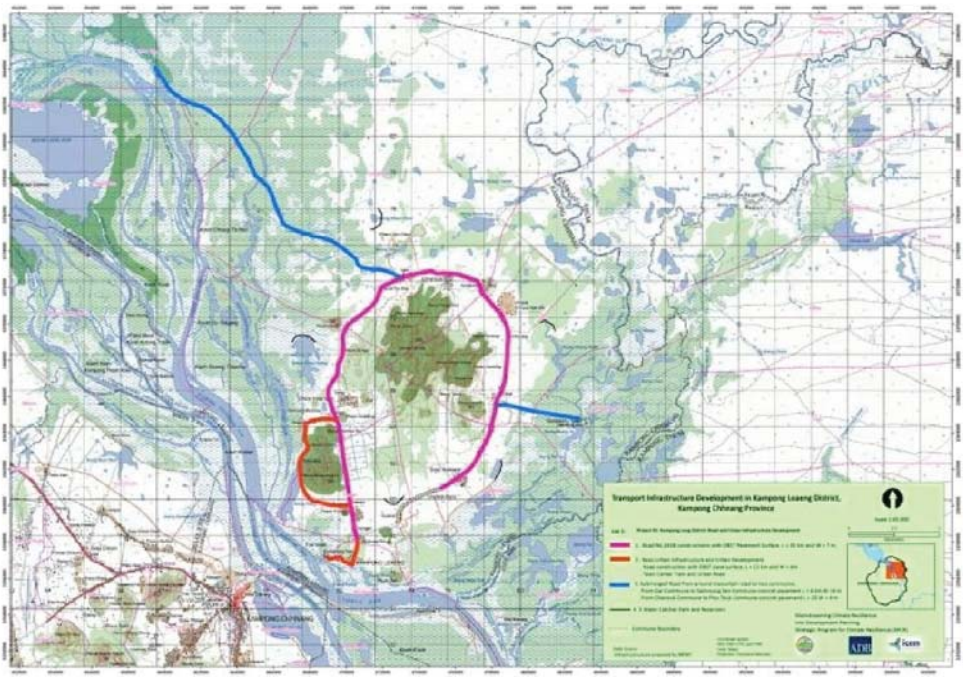

Figure 2. The map and components of the Improvement of Rural Infrastructure to Climate Resilience project

The group assessed the project climate change exposure and climate change risk using an exposure matrix and a risk matrix; the results are provided in Tables 3-5 below. As a result of discussions, the group provided the following suggestions for project implementation:

- A detailed vulnerability assessment is recommended because the project is assessed as being at high risk from long-duration floods and medium risk from flash floods, among other risks. Figures 3 and 4 show the duration of flooding, and flood damage on roads within Cambodia, respectively.
- Because the project is at risk, climate risk needs to be minimized in order to protect affected residents and farm fields.

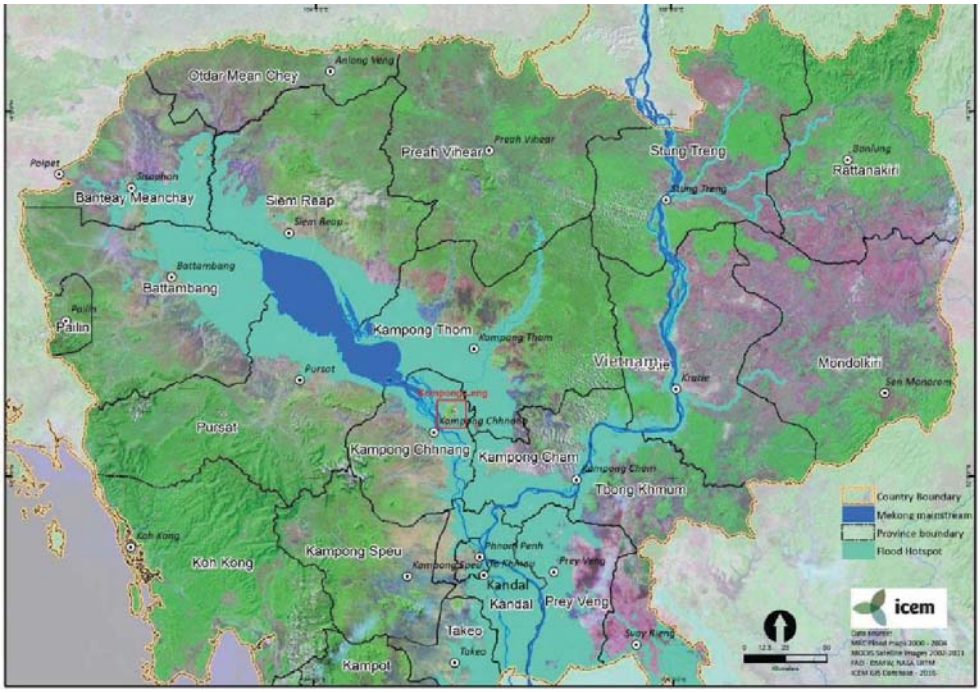

Figure 3. TA climate screening tool (Long Duration Flood Hotspots in Cambodia)

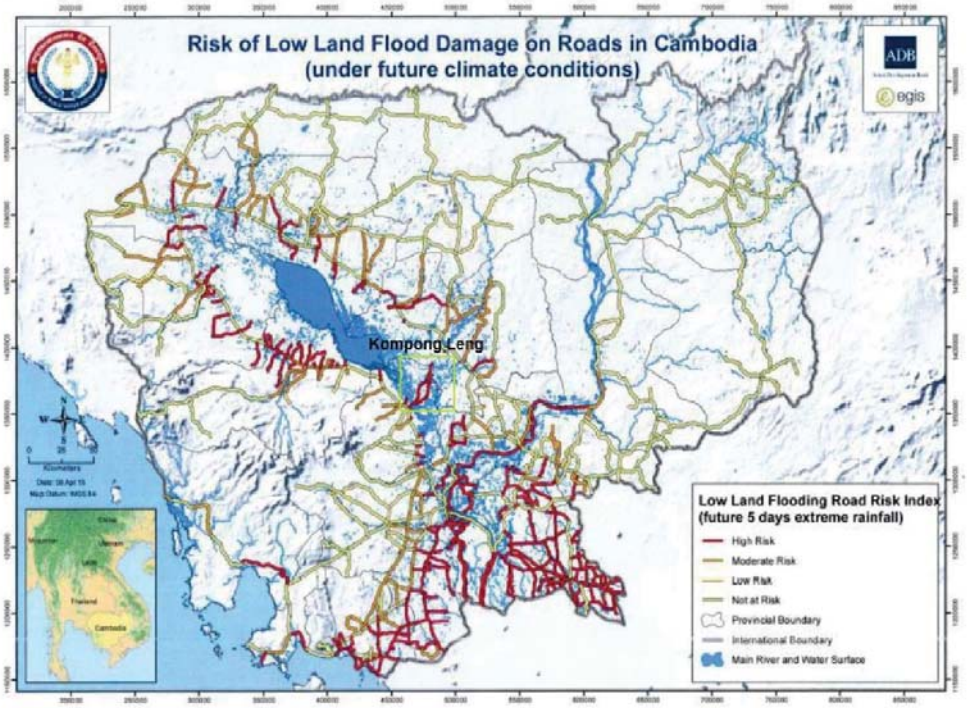

Figure 4. MPWT Tool (Risk of Lowland Flood Damage on Roads in Cambodia)

Table 3. Project Climate Change Exposure Matrix

Project Name			Improvement of Rural Infrastructure to Climate Resilience in Kampong Leng District, Kampong Chhnang Province.					
Sector/ sub-sector			MPWT/DPWT					
Location - Province			Kampong Leng District, Kampong Chhnang province					
Assessors			MPWT's AWG,MOE, MOWRAM, Local Authority					
Date of assessment			28-March to 01 April 2016					
CC Parameter			***Change with climate change (Low, Medium, High)***					***Score*** / ***Comments***
Average daily Maximum temperature	***Wet season***		***Low***	***Medium***	***High***			***2*** / ***Base on tools***
		range	***1 to 2.4***	***2.5 to 3.2***	***3.3 to 4.2***			
		score	***1***	***2***	***3***			
	Dry season		***Low***	***Medium***	***High***			***2*** / ***Base on tools***
		range	***1 to 2.4***	***2.5 to 3.2***	***3.3 to 4.2***			
		score	***1***	***2***	***3***			
Rainfall, % change	***Wet season***		***Low increase***	***Medium increase***	***High increase***			***2*** / ***Base on tools***
		range	***2 to 6%***	***6.1 to 10***	***10.1 to 14***			
		score	***1***	***2***	***3***			
	Dry season		***High decrease***	***Medium decrease***	***Little inc./ dec.***	***Medium increase***	***High increase***	***1*** / ***Base on tools***
		range	***-4 to -2%***	***-1.9 to 0***	***0.1 to 2***	***2.1 to 3***	***3.1 to 5***	
		score	***3***	***2***	***1***	***2***	***3***	
Flooding – Flash flooding			***No or little risk***	***Medium risk***	***High risk***			***2*** / ***Base on Scoping Visit***
		range	***Use maps and expert knowledge***					
		score	***1***	***2***	***3***			
Flooding – Long duration			***No or little risk***	***Medium risk***	***High risk***			***3*** / ***Base on Scoping Visit***
			Use maps and expert knowledge					
		score	***1***	***2***	***3***			
Drought			***Decrease in number of drought months or no change***	***Low increase in number of drought months /yr***	***Medium increase in number of drought months/ yr***	***High increase in number of drought months/ yr***		***2*** / ***Base on the map***
			-2 to 0	***0.1 to 0.5***	***0.51 to 1.00***	***1.1 to 1.5***		
		score	***1***	***2***	***3***	***4***		

Table 4. Project Climate Change Risk Scoring matrix

Project Name		Improvement of Rural Infrastructure to Climate Resilience in Kampong Leng District, Kampong Chhnang Province								
Sector/ sub-sector		MPWT/DPWT								
Location - Province		Kampong Leng District, Kampong Chhnang province								
Assessors		MPWT's AWG,MOE, MOWRAM, Local Authority								
Date of assessment		28-March to 01 April 2016								
CC Parameter		**Exposure Score**	**Expected sensitivity**			**Climate change risk score**	**Risk Level**			**Comments**
			H(3)	**M(2)**	**L(1)**	**Exposure X sensitivity**	**H**	**M**	**L**	
Maximum temperature	Wet season	2		2		4		M		
	Dry season	2		3		6		M		Increasing temperature in dry season dry up water content of the soil, produce dust and loss material, cracking
Rainfall	Wet season	2		3		2		M		Create pothole, Material wash out, erosion, weakening the embankment,
	Dry season	1		1		1		L		
Flooding – Flash flooding		2		3		6		M		weakening the embankment, erosion, wash out, damage
Flooding – long duration		3		3		9		H		weakening the embankment, erosion, wash out, damage, livelihood, damage infrastructures, flood the resident agricultural land disease,
Drought		2		2		4		M		Dry up water content of the soil, produce dust and loss material, cracking

Table 5. Project sensitivities to climate change

Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector - Infrastructure											
Major roads and bridges											
Rural roads											
Railways											
Schools, clinics, hospitals											
River bank protection											
River ports											
Coastal ports (consider sea level rise & storm surge)											
Urban drainage											
Structural flood protection											
Sewage treatment and sludge disposal											
Solid waste disposal											

High sensitivity	3
Medium sensitivity	2
Low sensitivity	1
No sensitivity	0

3.3 PRESENTATION OF THE 3RD GROUP – COMMERCIAL HORTICULTURE PROJECT

Group 3 consisted of representatives from MAFF (2), MoWA (1); NCDD (1), NGO (Plan International 1), ADB (1) and the TA team (1). The Group assessed the exposure and Sensitivity to climate change of the proposed Commercial Horticulture Project, using the risk screening tool developed by the TA team. The guidance on climate change threats to Cambodia's agriculture contained in the Risk Screening Tool is provided in Table 6 below.

Table 6: The climate change threats to agriculture and the scoring system

Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector - Agriculture											
Improved or new cultivation systems											
Livestock breeding and infrastructure											
Aquaculture											
Value chain development (seeds, post-harvest strorage & processing) and support to marketing											
Large-scale cultivation and plantations											
Biofuel production											

High sensitivity	3
Medium sensitivity	2
Low sensitivity	1
No sensitivity	0

Based on this guidance, the Group discussed the the exposure of the project the climate change. The key variables of "exposure" to climate change include daily temperature (average, maximum), the rainfall changes (%), the flooding (the flash floods and long duration floods) and the drought. Following the discussions, scores were provided for project's exposure to these parameters; these scores are provided in Table 7.

Table 7: The exposure of Commercial Horticulture Development project to climate change – scoring by Group 3

Project Name		Commercial Horticulture Development							
Sector/sub-sector		Agriculture and Water							
Location - Province		Kampong Thom							
Assessors		Agriculture Team of TA8179							
Date of assessment		04/4/2016							
CC Parameter			**Change with climate change**					**Score**	**Comments**
Average daily Maximum temperature	Wet season		Low change	Medium change	High change				
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C				
		score	1	2	3			2	
	Dry season		Low change	Medium change	High change				
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C				
		score	1	2	3			2	
Rainfall, % change	Wet season		Low increase	Medium increase	High increase				
		range	2 to 6%	6.1 to 10	10.1 to 14				
		score	1	2	3			3	
	Dry season		High decrease	Medium decrease	Little increase/ decrease	Medium increase	High increase		
		range	-4 to -2%	-1.9 to 0	0.1 to 2	2.1 to 3	3.1 to 5		
		score	3	2	1	2	3	1	
Flooding – Flash flooding			No or little risk	Medium risk	High risk				
		range	Use maps and expert knowledge						
		score	1	2	3			1	
Flooding – Long duration			No or little risk	Medium risk	High risk				
			Use maps and expert knowledge						
		score	1	2	3			2	
Drought			Decrease in number of drought months or no change	Low increase in number of drought months /yr	Medium increase in number of drought months/yr	High increase in number of drought months/yr			
			-2 to 0	0.1 to 0.5	0.51 to 1.00	1.1 to 1.5			
		score	1	2	3	4		3	

The Group then discusses the sensitivity of the project to the climate parameters listed above, coming up with ratings of high, medium or low for each variable. These ratings were based on expert knowledge; availablity of ground-level data would improve the quality of the scoring.

By multiplying the exposure scores by the sensitivy scores, the Group came up with risk level assessments for each parameter. The overall results are provided in Table 8 below.

Table 8: Climate change risk scoring matrix for the Commercial Horticulture Project

Project Name		Commercial Horticulture Development							
Sector/sub-sector		Agriculture							
Location - Province		Kampong Thom							
Assessors		Agriculture team of TA 8179							
Date of assessment		04 April 2016							
CC Parameter		Exposure Score	Expected sensitivity			Climate change risk score	Risk Level			Comments
			H (3)	M (2)	L (1)	Exposure x sensitivity	H	M	L	
Maximum temperature	Wet season	2		2		4		M		Temperature in the wet season is not a major concern for crop and crop diversification
	Dry season	2		2		4		M		The increase in temperature in the dry season does not affect the crop productivity.
Rainfall	Wet season	3		3		9		H		We rate 3 for sensitivity of wet season to crop because heavy rain could potential damage the crop production in the wet season
	Dry season	1		2		2		L		
Flooding – Flash flooding		1		2		2		L		
Flooding – long duration		2		2		4		M		
Drought		3		3		9		H		We rate 3 for sensitivity of drought on crop production because in the dry season, there is a lack of water for cropping and thus, it lowers the yield of crop, sometime crop failure.

The Group has presented the results of its risk screening, and came up with the following conclusions and recommendation:

- The project could move ahead without a vulnerability assessment given the low risk to climate change.
- Nonetheless, climate resilient crops could be promoted based on market demands and land suitability.

- Small-scale resilient irrigation system should be promoted for horticulture commercialization, potentially through involvement of local governments.
- The risk screening tool is relevant to national level planning, but it is not applicable for local government.
- Risk screening should be a part of scoping studies.

3.4 PROPOSED DEVELOPMENT OF RISK SCREENING TOOLS BY SECTOR

Based on the risk screening exercises and plenary discussion, the participants agreed that risk screening tools are useful for designing and implementing investment programs and projects. This is because these tools provide the first-hand information on how climate risk and impacts should be minimized or mitigated. The participants agreed on the need to develop a climate change risk screening tool specific to Cambodia's context with a wide range of application for national, sub-national and civil society levels. The tool should be user-friendly and applicable to specific sectors in the country. For the following up activity, the screening should be a part of the scoping for the feasibility studies undertaken by TA8179.

4 TRAINING WORKSHOP EVALUATION

In total, 49 persons attended the workshop, including representatives of water resource, agriculture, urban infrastructure, rural infrastructure and other sectors. The list of participants is provided in Appendix 2.

Participants were asked to complete a workshop evaluation sheet at the end of the workshop. Participants reported that the workshop benefited their current work, specifically:

- The workshop helped to screen several of the adaptation projects being considered for the feasibility study, and identification components for sectors involvement in feasibility study process.
- Improved knowledge of project screening, scoping, and prioritization
- Improved practical understanding of climate resilience and adaptation
- Sharing of information through discussions with officials from each key ministry
- An opportunity to provide input to improving climate change adaptation project implementation in Cambodia
- Discussions of projects help to identify activities carried out by different ministries, cross-sector linkages and potential joint activities.
- Improved understanding of incorporating climate resilience into road infrastructure, agriculture and irrigation schemes
- Learning on classification and project criteria for selection

Participants rated the workshop performance as ‘good’ or ‘very good’. Participants were satisfied with the workshop topic, time arrangement and achievement of workshop objectives. The following suggestions for future improvement were provided:

- All participants should be motivated to contribute to discussions
- Same participants from each ministry should be invited to subsequent workshops, allowing them to deepen their knowledge of climate resilience and mainstreaming into development planning
- Introduction to the workshop is too long. It should be shorter, and more time allocated for discussion

5 CONCLUSIONS AND NEXT STEPS

Overall, the training was viewed as useful by the participants, particularly the AWG and officers at national level. Consequently, the capacity of government officials in applying climate resilience tools was improved. The workshop also succeeded in its objectives of presenting and reviewing the climate risk screening tools applied both in Cambodia and in other countries and trialing a simple screening tool suitable for use in Cambdia.

After evaluating a range of web-based and checklist-style screening tools, the simple risk screening tool developed by the TA team was judged as most appropriate. The tool will be revised by the TA team to make it more applicable to specific sectors (water resource, agriculture and infrastructure) and to incorporate comments and suggestions raised by the workshop participants. The tool will then be circulated among relevant ministries for further feedback and approval.

6 PHOTOS

Photos of various activities during the workshop on 4 April 2016

APPENDIX 1. AGENDA

TRAINING WORKSHOP ON CLIMATE CHANGE RISK SCREENING TOOLS

Phnom Penh, 4 April 2016

Cambodiana Hotel, Phnom Penh, Cambodia

Day/Session	Presentation/training activity	Presenter/facilitator
Session 1: Opening and Introduction		
7:40-8:00	Registration	PMU Staff
8:00-8:05	Welcome	MC
8:05-8.20	Opening Speech (TW/MCRDP/DOC 1)	HE Prof Dr Sabo Ojano, Secretary of State, MOE, and SPCR Program Coordinator
8:20-8:40	Introduction – What is climate risk – Managing climate risk in various sectors – Why climate risk screening is necessary – Objectives and agenda of the workshop (TW/MCRDP/DOC 2)	Dr Seak Sophat, Deputy Team Leader/ Senior Strategic Program for Climate Resilience Management Specialist
Session 2: Technical		
8:40-9:15	Overview of Climate change risk screening tools – Top-down & bottom-up (community-based) tools – Assessment of strengths and weaknesses of each tool – Analysis of applicability of tools in various countries (World, Asia & Pacific, Southeast Asia, Cambodia) & institutions – Analysis of applicability of tools in key sectors, including health – Broad lessons (good practices, gaps and needs) (TW/MCRDP/DOC 3)	Mr. Peter-John Meynell, Team Leader/ Water and Climate Change Adaptation Specialist
9:15-10:15	Existing approaches and practices of incorporating climate risks by sector agencies (TW/MCRDP/DOC 4)	CCD and Directors of SPCR projects from key ministries
10:15-10:30	***Coffee break and Group Photo***	
10:30–11:00	Understanding climate change projections and databases for use with risk screening tools – Global datasets – Cambodia-specific climate projection and databases ▪ Mekong ARCC ▪ MOWRAM climate change database and toolkit ▪ MPWT road flood risk maps – Linkages and gaps across tools – (TW/MCRDP/DOC 4)	Dr Jeremy Carew Reid, Adaptation Project Development Expert
11:00 -11:20	Working with climate change screening checklists – identifying specific project sensitivities to climate change (TW/MCRDP/DOC 5)	Mr. Peter-John Meynell, Team Leader/ Water and Climate Change Adaptation Specialist
11:20 –11:30	Work in sector groups to review project concept using checklists	Facilitated by TA sector specialists and CCD/CCCA specialists

Day/Session	Presentation/training activity	Presenter/facilitator
11:30 -12:30	Development of screening checklist for sectoral project concept	
12:30 – 13:30	***Lunch Break***	
Session 3: Interactive Demonstration by Sector		
13:30–14:15	Feedback from working groups (10 mins each)	
14:15–15:00	Working with Excel and web-based screening tools 1 – following worked example – CRiSTAL (TW/MCRDP/DOC 6)	Mr. Peter-John Meynell, Team Leader/ Water and Climate Change Adaptation Specialist
15:00-15:20	***Coffee break***	
15:20–16:00	Working with Excel and web-based screening tools 2 – following worked example – World Bank Climate risk screening tool (TW/MCRDP/DOC 7)	Mr. Peter-John Meynell, Team Leader/ Water and Climate Change Adaptation Specialist
Session 4: Proposed Development of Risk Screening Tools by Sector		
16:00-17:00	Plenary discussion on: 1) what screening tools have worked 2) strengths, challenges, & limitations of using the tools 3) how they can be used and improved for use in Cambodia 4) what are the special information and skills requirements for each sector to apply these tools 5) plans for next steps	Facilitated by TA team
17:00- 17:10	Closing workshop	HE Prof Dr Sabo Ojano, Secretar of State, MOE, and SPCR Program Coordinator

APPENDIX 2. PARTICIPANT LIST

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No.	Name	Organization/ Department	Position	Contact Detail (Telephone, E-mail)
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33	Kong Chanthon	NCDD	NCCPA	012 898 557
34	Meas Sotheavy	MAFF	Deputy Director	012 975 519
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APPENDIX 3. RISK SCREENING CHECKLIST PREPARED BY THE TA TEAM

APPENDIX 4.A PROJECT SENSITIVITY CHECKLIST

Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector - Water Resources											
Water supply infrastructure											
Irrigation infrastructure											
Improved irrigation management											
Improved water storage capacity											
Improved weather forecasting services											
Flood Protection											
Drought management											

Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector - Agriculture											
Improved or new cultivation systems											
Livestock breeding and infrastructure											
Aquaculture											
Value chain development (seeds, post-harvest storage & processing) and support to marketing											
Large-scale cultivation and plantations											
Biofuel production											

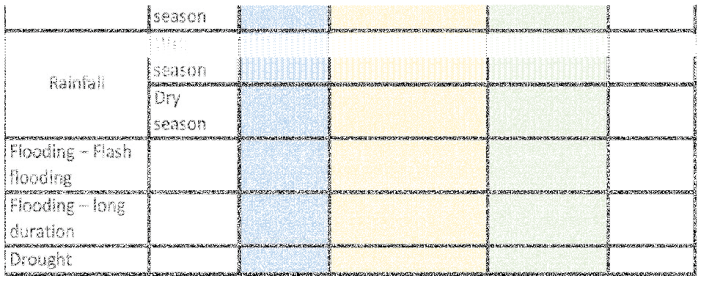
Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector - Infrastructure											
Major roads and bridges											
Rural roads											
Railways											
Schools, clinics, hospitals											
River bank protection											
River ports											
Coastal ports (consider sea level rise & storm surge)											
Urban drainage											
Structural flood protection											
Sewage treatment and sludge disposal											
Solid waste disposal											

High sensitivity	

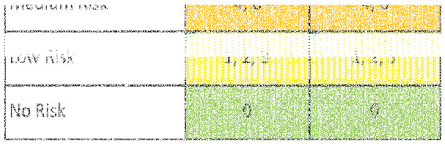
APPENDIX 4.B EXPOSURE SCORING CHECKLIST

Project Name								
Sector/Sub-sector								
Location - Province								
Assessors								
Date of assessment								
CC Parameter			Change with climate change					Score
Average daily Maximum temperature	Wet season		Low change	Medium change	High change			
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C			
		score	1	2	3			
	Dry season		Low change	Medium change	High change			
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C			
		score	1	2	3			
Rainfall, %	Wet season		Low increase	Medium increase	High increase			
		range	2 to 6%	6.1 to 10	10.1 to 14			
		score	1	2	3			
Duration		score	1	2	3			
Drought			Decrease in number of drought months or no change	Low increase in number of drought months /yr	Medium increase in number of drought months/yr	High increase in number of drought months/yr		
			-2 to 0	0.1 to 0.5	0.51 to 1.00	1.1 to 1.5		
		score	1	2	3	4		

APPENDIX 4.C CLIMATE CHANGE RISK SCORING CHECKLIST



	season				
Rainfall	season				
	Dry season				
Flooding – Flash flooding					
Flooding – long duration					
Drought					



Low Risk		
No Risk	0	0

APPENDIX 4. POWER POINT PRESENTATIONS

Strategic Program for Climate Resilience (SPCR)

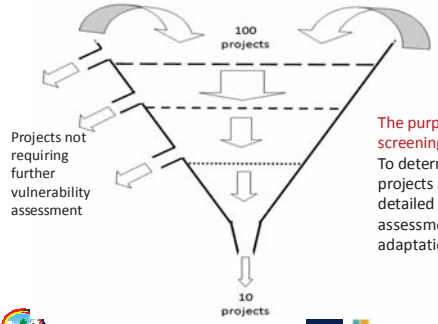
Technical Assistance 8179: Mainstreaming Climate Resilience into Development Planning (MCRDP)

(September 2013-April 2019)

Climate change information for screening of projects

Presenter's Name: Jeremy Carew-Reid
Position: Adaptation Specialist
Ministry/Institution: ICEM
Date: 4th April 2016

The screening process



The purpose of screening:
To determine which projects require detailed vulnerability assessment and adaptation measures

Main steps (screens) in applying the climate change risk screening tool

1. Ask – "what is the projected climate change for the project location?"
2. Ask – "will the planned project be sensitive to each of the changes?"

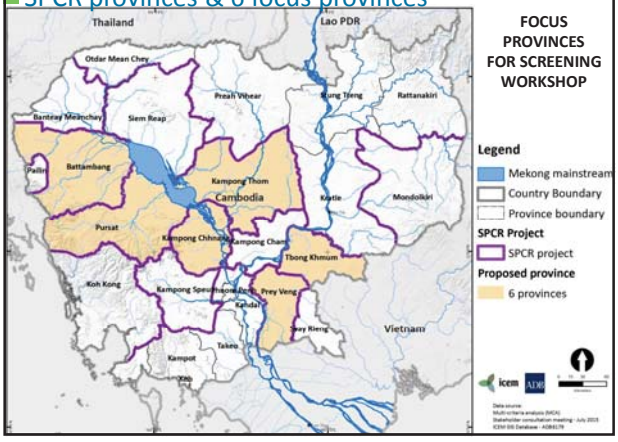
Emphasis is on the cc threat to project location

Climate change parameters for the screening stage

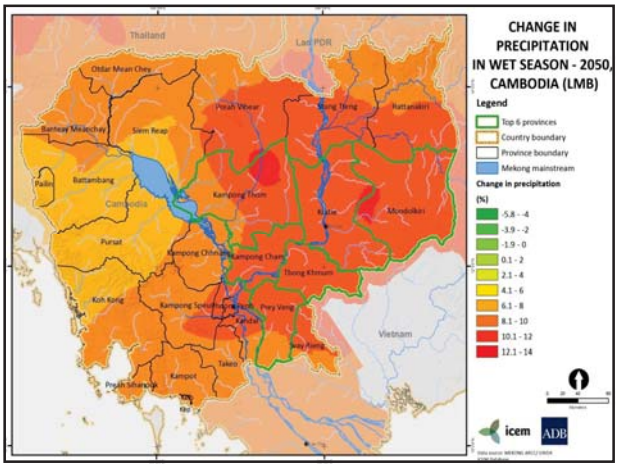
- Important parameters:
  1. Change in rainfall in the wet and dry
  2. Change in temperature in the wet and dry
  3. Change in number of drought months
  4. Change in flooding – flash floods, long duration flooding

There are many other parameters which can be considered if a detailed vulnerability assessment is required

SPCR provinces & 6 focus provinces

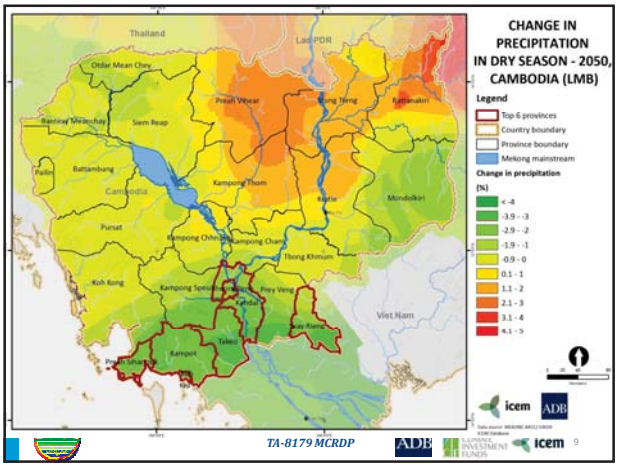


Change in rainfall



Rainfall change in the wet season - 2050

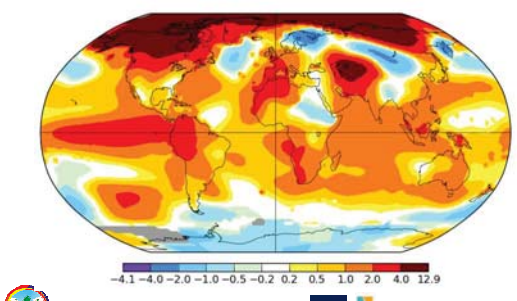
	Province	ID	Baseline	2050 rainfall	Actual change mm	% change
1.	Tbong Khmum	25	1122	1252	130	11.6
2.	Krati	11	1158	1292	134	11.6
3.	Mondolkiri	12	1455	1621	166	11.4
4.	Kampong Cham	3	1104	1225	121	10.9
5.	Kampong Thom	6	1086	1201	115	10.6
6.	Prey Veng	18	1037	1147	110	10.5
7.	Phnom Penh	15	965	1067	102	10.5
8.	Preah Vihear	17	1261	1392	131	10.4
9.	Stung Treng	22	1547	1705	158	10.3
10.	Svay Rieng	23	995	1098	103	10.3
11.	Kandal	8	981	1082	101	10.3
12.	Rattanakiri	20	1636	1800	165	10.1
13.	Takeo	24	993	1089	96	9.6
14.	Preah Sihanouk	16	1021	1119	98	9.6
15.	Kampot	7	1009	1105	96	9.5
16.	Keb	9	999	1093	94	9.4
17.	Kampong Speu	5	1066	1166	100	9.4
19.	Otdar Mean Chey	13	1058	1154	96	9.1
20.	Kampong Chhnang	4	1144	1248	104	9.1
21.	Siem Reap	21	1065	1155	91	8.5
22.	Banteay Meanchay	1	1043	1131	88	8.5
23.	Koh Kong	10	1249	1353	103	8.4
24.	Battambang	2	1312	1413	100	7.7
25.	Pursat	19	1252	1347	95	7.6
26.	Pailin	14	1875	2014	139	7.4

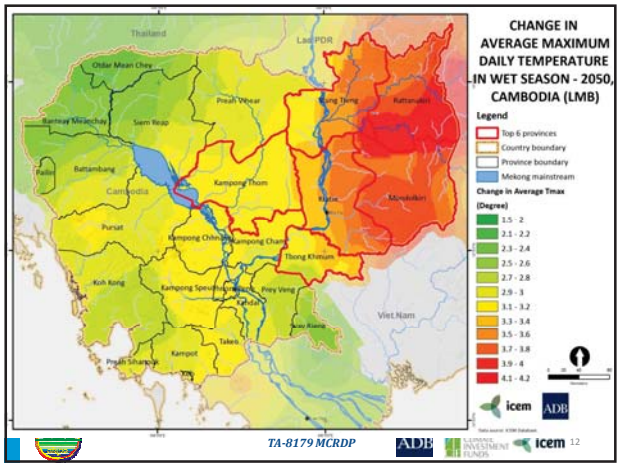


Rainfall change in the dry season - 2050

#	Province name	Prov Code	Baseline	In 2050	Actual change (mm)	% change
1	Takeo	24	254	244	-10	-3.9
2	Kampot	7	263	253	-10	-3.9
3	Keb	9	268	258	-10	-3.9
4	Preah Sihanouk	16	259	250	-10	-3.8
5	Svay Rieng	23	224	217	-7	-3.2
6	Kandal	8	209	203	-6	-3.0
7	Phnom Penh	15	190	185	-5	-2.8
8	Prey Veng	18	224	218	-6	-2.5
9	Kampong Speu	5	231	227	-4	-1.9
10	Mondolkiri	12	342	336	-6	-1.7
11	Koh Kong	10	272	269	-2	-1.0
12	Banteay Meanchay	1	203	201	-2	-0.9
13	Otdar Mean Chey	13	207	205	-2	-0.9
14	Siem Reap	21	225	224	-1	-0.5
15	Kampong Cham	3	206	205	-1	-0.5
16	Battambang	2	268	267	-1	-0.5
17	Tbong Khmum	25	204	203	-1	-0.5
18	Pursat	19	277	276	-1	-0.4
19	Pailin	14	337	335	-1	-0.3
20	Kampong Chhnang	4	232	231	-1	-0.3
21	Kratie	11	212	213	1	0.4
22	Kampong Thom	6	209	211	2	0.9
23	Rattanakiri	20	306	310	4	1.3
24	Stung Treng	22	283	287	4	1.5
25	Preah Vihear	17	208	212	4	1.8

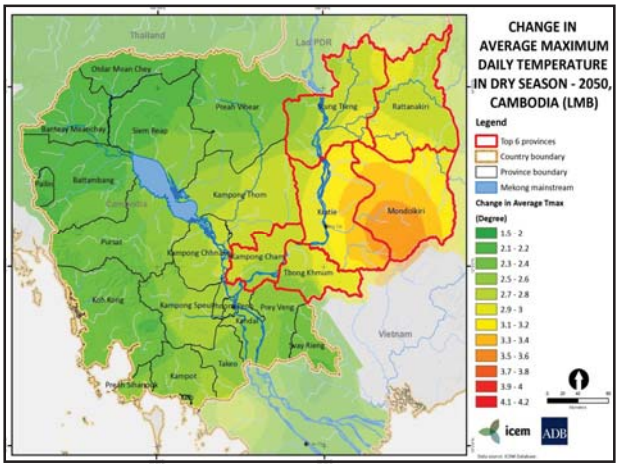
Change in temperature





Average daily maximum temperature in wet season

#	Province	Prov code	Baseline	In 2050	Change (°C)
1	Rattanakiri	20	29.3	33.3	4.0
2	Mondolkiri	12	28.6	32.5	3.9
3	Kratie	11	28.9	32.4	3.6
4	Stung Treng	22	29.5	33.0	3.5
5	Tbong Khmum	25	29.4	32.5	3.1
6	Kampong Thom	6	28.5	31.6	3.1
7	Phnom Penh	15	29.7	32.8	3.1
8	Takeo	24	30.8	33.8	3.0
9	Kampong Chhnang	4	28.3	31.3	3.0
10	Kampong Cham	3	28.5	31.5	3.0
11	Keb	9	30.3	33.3	3.0
12	Kandal	8	30.2	33.2	3.0
13	Kampong Speu	5	28.8	31.8	3.0
14	Pursat	19	28.2	31.1	3.0
15	Kampot	7	30.0	32.9	2.9
16	Preah Vihear	17	30.3	33.2	2.9
17	Preah Sihanouk	16	29.5	32.3	2.8
18	Koh Kong	10	26.6	29.4	2.8
19	Prey Veng	18	30.8	33.5	2.8
20	Battambang	2	30.6	33.3	2.7
21	Siem Reap	21	30.9	33.6	2.7
22	Pailin	14	29.9	32.4	2.5
23	Svay Rieng	23	31.7	34.1	2.4
24	Banteay Meanchay	1	32.7	34.9	2.3
25	Otdar Mean Chey	13	32.3	34.5	2.2

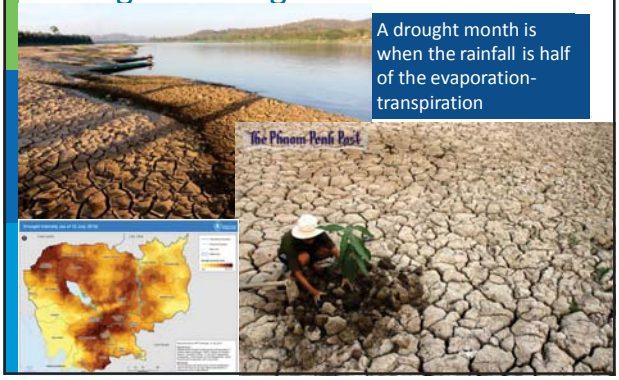


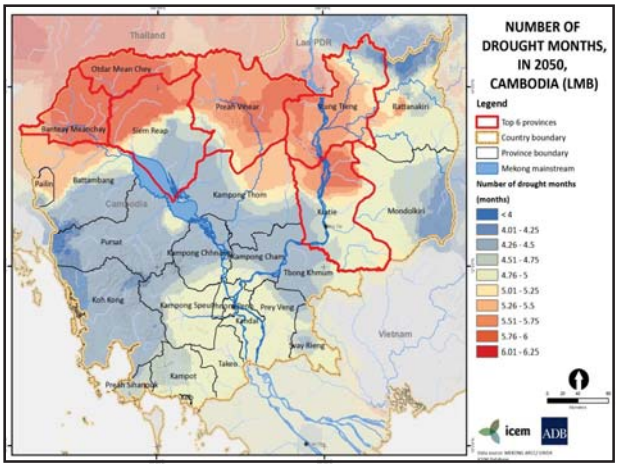
Average daily maximum temperature in dry season

	Province	ID	Baseline	Actual 2050	Increase (°C)
1.	Mondolkiri	12	30.2	33.5	3.3
2.	Kratie	11	30.6	33.7	3.1
3.	Rattanakiri	20	30.3	33.1	2.8
4.	Tbong Khmum	25	31.0	33.6	2.7
5.	Stung Treng	22	30.6	33.3	2.7
6.	Kampong Cham	3	30.3	32.9	2.6
7.	Kampong Thom	6	30.4	33.0	2.6
8.	Kampong Chhnang	4	30.1	32.6	2.5
9.	Phnom Penh	15	31.0	33.5	2.5
10.	Kandal	8	31.3	33.8	2.4
11.	Keb	9	31.2	33.6	2.4
12.	Kampong Speu	5	30.1	32.5	2.4
13.	Takeo	24	31.7	34.1	2.4
14.	Kampot	7	30.8	33.1	2.3
15.	Prey Veng	18	31.7	33.9	2.2
16.	Preah Sihanouk	16	30.2	32.4	2.2
17.	Pursat	19	30.0	32.2	2.2
18.	Preah Vihear	17	31.8	34.0	2.2
19.	Koh Kong	10	27.9	29.9	2.1
20.	Svay Rieng	23	32.4	34.4	2.1
21.	Siem Reap	21	32.4	34.5	2.0
22.	Battambang	2	32.2	34.1	1.9
23.	Otdar Mean Chey	13	33.3	35.1	1.8
24.	Banteay Meanchay	1	33.9	35.7	1.8
25.	Pailin	14	31.3	33.0	1.7

Change in drought conditions

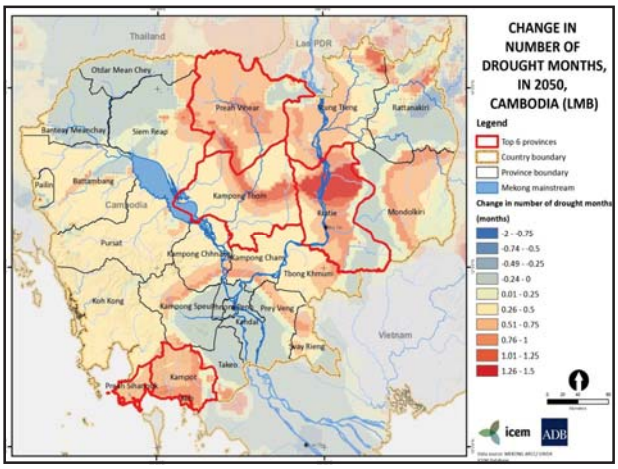
A drought month is when the rainfall is half of the evaporation-transpiration





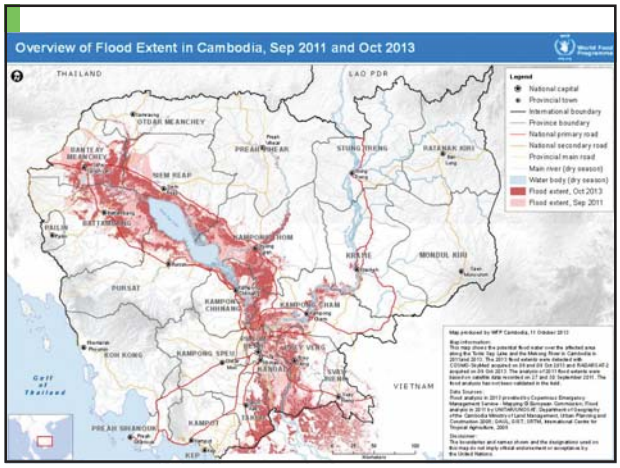
Number of Drought months

	Province	ID	Baseline	2050	Change
1.	Banteay Meanchay	1	5.88	5.91	0.03
2.	Otdar Mean Chey	13	5.85	5.90	0.05
3.	Preah Vihear	17	4.98	5.60	0.61
4.	Stung Treng	22	4.85	5.38	0.53
5.	Siem Reap	21	4.94	5.17	0.23
6.	Kratie	11	4.40	5.14	0.74
7.	Pailin	14	4.85	5.07	0.23
8.	Phnom Penh	15	5.00	5.00	0.00
9.	Kandal	8	5.00	5.00	0.00
10.	Takeo	24	4.89	5.00	0.11
11.	Keb	9	4.04	4.97	0.93
12.	Prey Veng	18	4.66	4.87	0.21
13.	Battambang	2	4.54	4.85	0.32
14.	Rattanakiri	20	4.65	4.80	0.15
15.	Kampot	7	4.16	4.79	0.63
16.	Kampong Speu	5	4.54	4.77	0.23
17.	Svay Rieng	23	4.44	4.76	0.32
18.	Kampong Thom	6	4.20	4.75	0.56
19.	Mondolkiri	12	4.34	4.72	0.38
20.	Tbong Khmum	25	4.18	4.62	0.45
21.	Preah Sihanouk	16	4.00	4.60	0.60
22.	Kampong Cham	3	4.08	4.60	0.52
23.	Kampong Chhnang	4	4.04	4.46	0.42
24.	Pursat	19	4.00	4.33	0.34
25.	Koh Kong	10	3.99	4.31	0.32

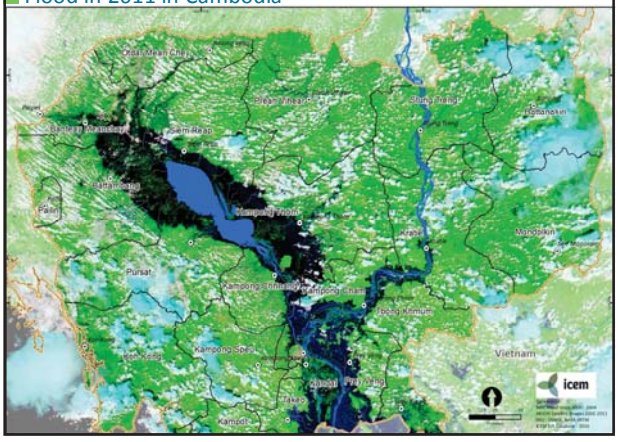


Change in drought months

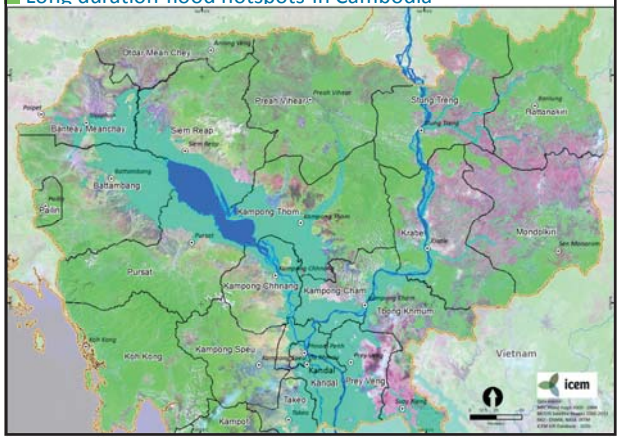
	Province	ID	Baseline	2050	Change
1.	Keb	9	4.04	4.97	0.93
2.	Kratie	11	4.40	5.14	0.74
3.	Kampot	7	4.16	4.79	0.63
4.	Preah Vihear	17	4.98	5.60	0.61
5.	Preah Sihanouk	16	4.00	4.60	0.60
6.	Kampong Thom	6	4.20	4.75	0.56
7.	Stung Treng	22	4.85	5.38	0.53
8.	Kampong Cham	3	4.08	4.60	0.52
9.	Tbong Khmum	25	4.18	4.62	0.45
10.	Kampong Chhnang	4	4.04	4.46	0.42
11.	Mondolkiri	12	4.34	4.72	0.38
12.	Pursat	19	4.00	4.33	0.34
13.	Koh Kong	10	3.99	4.31	0.32
14.	Svay Rieng	23	4.44	4.76	0.32
15.	Battambang	2	4.54	4.85	0.32
16.	Kampong Speu	5	4.54	4.77	0.23
17.	Siem Reap	21	4.94	5.17	0.23
18.	Pailin	14	4.85	5.07	0.23
19.	Prey Veng	18	4.66	4.87	0.21
20.	Rattanakiri	20	4.65	4.80	0.15
21.	Takeo	24	4.89	5.00	0.11
22.	Otdar Mean Chey	13	5.85	5.90	0.05
23.	Banteay Meanchay	1	5.88	5.91	0.03
24.	Kandal	8	5.00	5.00	0.00
25.	Phnom Penh	15	5.00	5.00	0.00

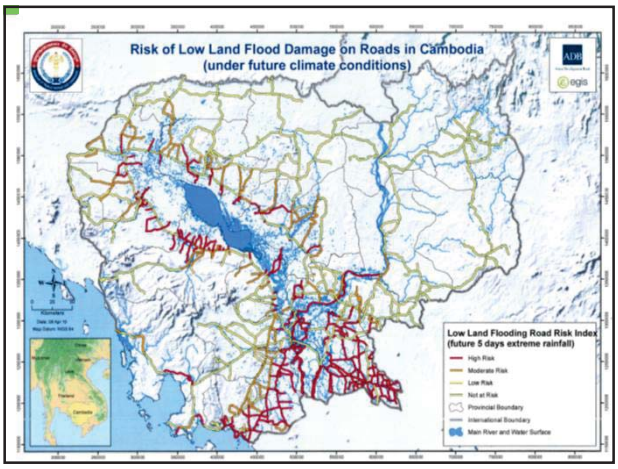


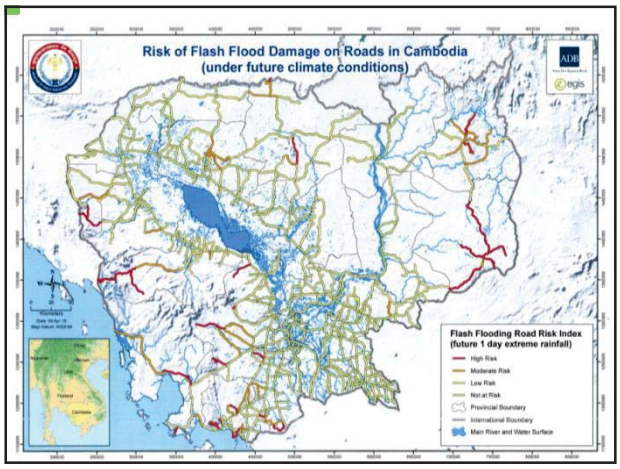
Flood in 2011 in Cambodia

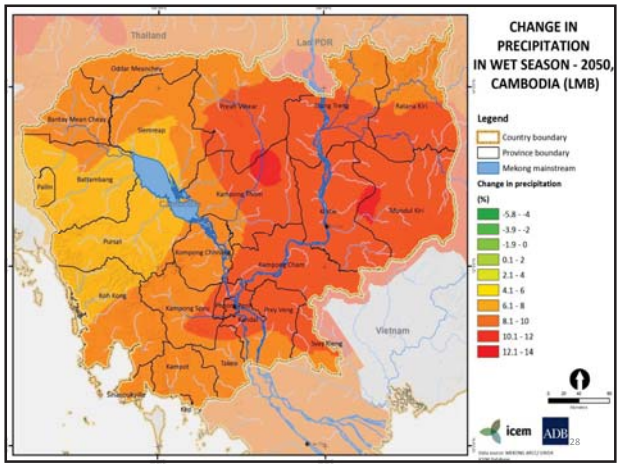


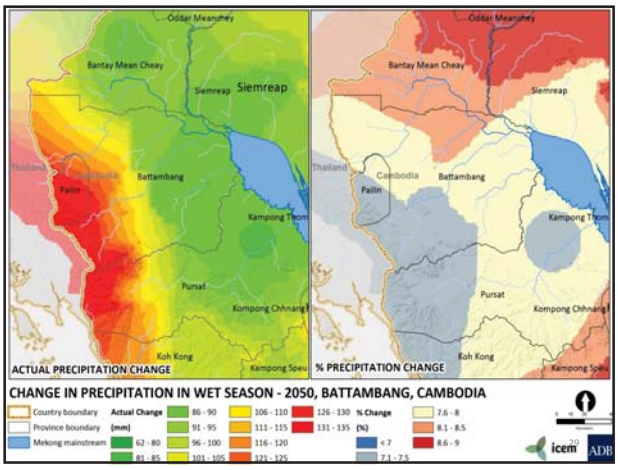
Long duration flood hotspots in Cambodia











Rainfall changes in Battambang's catchment

		West	Upper	Lower	Change
Annual Rainfall	Baseline	1554	2009	1275	
	2050	1654	2134	1356	6.2%
Rainfall in dry season	Baseline	257	312	229	
	2050	255	312	228	Slight -ve
Rainfall in wet season	Baseline	1297	1697	1046	
	2050	1399	1822	1128	7.4%

- Need to look at rainfall in the entire catchments to judge effects for the town
- Take into account current land uses and trends in condition

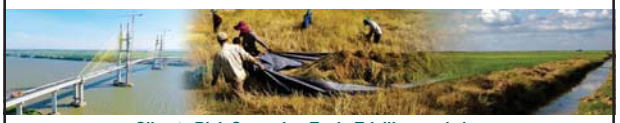
Battambang's climate change threat profile for screening (2050)

Climate change parameters	Change
1. Total rainfall in wet season:	+8.3 %
2. Total rainfall in dry season (Mar - Aug):	-2.5 %
3. Average daily maximum temperature (Annual)	+2.2 °C
4. Average maximum temperature in wet season:	+2.6 °C
5. Average maximum temperature in dry season:	+1.9 °C
6. Number of drought months	4.85
7. Change in drought months	0.32
8. Flash floods	Medium
9. Long duration floods	High

Strategic Program for Climate Resilience

Mainstreaming Climate Resilience into Development Planning (TA 8179)

(September 2013-April 2019)



Climate Risk Screening Tools Trialling workshop

Overview of climate risk screening tools

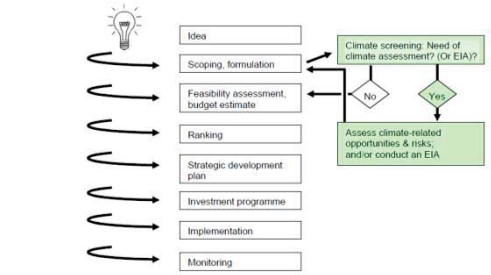
Peter-John Meynell
Team Leader
ICEM
4 April 2016

What does CC screening do

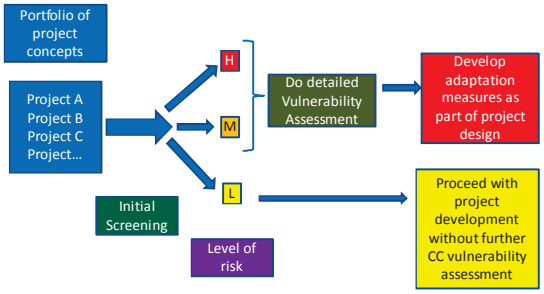
- Climate change screening is the first step during conventional project development to identify the risks from climate change
- Screening identifies whether additional climate change vulnerability assessments are required, and
- Where Adaptation measures may be built into the project.

When should CC screening be done

Figure 1: Stages of a typical cycle



Decision flow chart



Important aspects

- Project information
  - Location
  - Project type
- Climate change projections at the location
  - Provides a measure of the **exposure to different climate parameters**
- Project type
  - **Sensitivity** to the different parameters
- Provides an indication of climate change risk for the project

Types of CC Screening Tools

- Checklist/questionnaire
  - EIA type
  - ADB
    - PPCR phase 1
    - Risk screening
  - ORCHID
  - DANIDA
- Excel spreadsheet/Application based - CRiSTAL
- Web-based
  - ADB/Acclimatise AWARE for Projects
  - World Bank Climate and disaster risk screening tool

Screening tools are a common part of the EIA process

- CCCA has a screening checklist for application before proposals are considered
- The risk screening checklist will assist in answering questions of the Screening Template.
- Answers to the checklist questions help to
  1. identify potential risks,
  2. determine the overall risk categorization of the project, and
  3. determine required level of assessment and management measures.

Some CC questions of CCCA screening checklist for EIA

1. Natural Environment 1.1 Physical Resources 1.1.1 Soil	No	Yes	Comments
1. Will the project increase soil erosion?			
2. Will the project have a negative impact on the public lands?			
3. Does the project pose a risk of degrading soils?			
4. Will the project promote soil conservation?			
5. Will the project converse or degrade productive agricultural lands?			
1.1.2 Climate			
1. Will the proposed Project result in significant greenhouse gas emissions or may exacerbate climate change?			
2. Would the potential outcomes of the Project be sensitive or vulnerable to potential impacts of climate change?			
3. Is the proposed Project likely to directly or indirectly increase social and environmental vulnerability to climate change now or in the future (also known as maladaptive practices)?			

CCCA screening tool

- CCCA screening tool is good for all environmental and social risks,
- Not for climate risks alone
- It is aimed at projects already aiming for CC resilience

Screening Checklist PPCR – Phase 1

	Yes	No
Is there a need of an EIA (which will normally cover climate-related impacts as well)?		
Are there any direct climate-related benefits?		
Are there any potential climate-related opportunities (perhaps external to the direct purpose of the project)?		
Are there any climate-related risks?		
Are there any climate-related interactions with existing, parallel or planned development initiatives?		
Are there any safeguard implications?		

ADB Preliminary risk screening tool

Risk Screening Tool			
General Project Identification			
1. Date, Country & Project Title			
2. Lending or Financing Modality, Department & Division			
Risk Assessment Category	**Risk Values**	**Total**	**Remarks**
Pre-determined impacts and risk factors			
1. Which physical environment best describes the project area?	Using Table 3, add the score for the physical environment that best describes the project location.		
1. Categorize sectoral risk of project (See Table 4)	Add risk value from 0-3		
1. List individual hazards that may impact project (Figure 3 above)	Add risk value of 1 for each natural hazard (up to a maximum of 4). If hazards unknown, use 3 as a risk value		
1. Estimate the number of people in the project area "exposed" to risk after the project is completed	For <100 score = 0, 100-1000 score = 1, 1000-10,000 score =2, >10,000 score =3		
If the TOTAL value for the first 4 questions sums to 4 or less there is no need to complete the			

Physical Environment Risk Zones – Table 3

Physical Environment Risk Zones	Score
Arid/Semi – Arid & desert environments	1 or 2
Humid and sub-humid plains, foothills and hill country	1
River valleys/deltas and estuaries and other low-lying coastal areas	2
Small islands	3
Mountain ecosystems	3
Volcano environments	2

Table 4: Sector impacts & risk levels

Project Sectors	Examples of possible impacts	Estimated RISK LEVEL
· Agriculture & Natural Resources		Very High (3)
· Water Supply, and other municipal infrastructure and services		
· Education		
· Health and Social Protection		
· Transport & Communications		High (2)
· Energy		
· Multi-sector		
· Housing Finance & Micro-finance		Medium (1)
· Industry & Trade		
· Technical, vocational training & skills development		Negligible Risk (0)
· Finance		
· Public Sector Management		

13

ADB Preliminary screening

- Natural disasters
  - **Biological**
  - **Geophysical**, and
- **Climate**
  - Extreme temperature – heat wave
  - Drought
  - Wildfire
- **Hydrological** – Flood
  - General flood
  - Flash flood
  - Storm surge/coastal flood
- **Hydrological** – Mass movement, wet – landslide
- **Meteorological** – tropical cyclone, local storm

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14

ADB Preliminary risk screening tool

Risk Screening Tool			
General Project Identification			
1. Date, Cambodia & Flood and Drought Management in Pursat, ADB, MOWRAM			
Risk Assessment Category	**Risk Values**	**Total**	**Remarks**
Pre-determined impacts and risk factors			
• Which physical environment best describes the project area?	Using Table 3, add the score for the physical environment that best describes the project location.	1	Humid and sub-humid plains, foothills and hill country
• Categorize sectoral risk of project (See Table 4)	Add risk value from 0-3	3	Very High
• List individual hazards that may impact project (Figure 3 above)	Add risk value of 1 for each natural hazard (up to a maximum of 4). If hazards unknown, use 3 as a risk value	4	Heat wave, Drought, General flood, flash flood, Tropical cyclone
• Estimate the number of people in the project area "exposed" to risk after the project is completed	For <100 score = 0, 100-1000 score = 1, 1000-10,000 score =2, >10,000 score =3	2	1000 – 10,000
TOTAL RISK VALUES SUM TO 10 – SO ANSWER REMAINING QUESTIONS AND APPLY DETAILED VULNERABILITY ASSESSMENT			

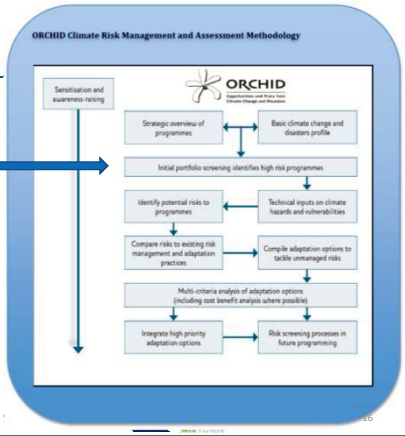
15

ORCHID

Initial Portfolio screening identifies high-risk programmes

Developed and applied in India and Bangladesh by Institute for Development Studies for DFID

Opportunities and Risks from Climate change and Disasters



16

ORCHID e.g. as used in Bangladesh

- Define the projects in the portfolio
  - Name/identifier, Budget, Duration, Activities
- **Question 1**. Is the programme sector, or regional focus vulnerable to variations in climate? Tick the hazards:
  - River floods, Flash floods, River bank erosion, Drought, Cyclone/Storm surge, Heatwaves/cold spells, Sea level rise, Groundwater salinity
  - *This question is aided by the use of national maps showing key natural hazards and vulnerability profiles*

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17

ORCHID

- **Question 2:** Are the project's objectives vulnerable to variations in climate?
- **Question 3:** Does the project already take climate hazards into consideration?
- **Question 4:** What other factors might influence the project's suitability for more detailed risk assessment?
  - E.g. partnership with other donors/agencies, project activities still in design phase
- **Question 5:** In the light of the above, please rate the priority of the intervention for follow-up risk assessment

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18

ORCHID: Priority for follow-up risk assessment

Red	Further risk assessment recommended as high priority: Significant climate sensitivity / opportunities for reducing risks
Orange	Further risk assessment medium priority: Some climate sensitivity / opportunities for reducing risks
Yellow	Further risk assessment low priority: Low climate sensitivity / opportunities for reducing risks

DANIDA – Climate change screening Steps

- Column 1 – List project components and outputs
- Column 2 & 3 – Risk assessment – assess the risks of loss of development effectiveness from CC
  - 'low' (less than 1 % (almost none) of the development investment could be at risk)
  - 'medium' (up to 10 % of the development investment could be at risk)
  - 'high' (more than 10 % of the development investment could be at risk)
- Column 4 & 5 – Options for adaptation for reducing vulnerability to CC
  - 'low' (less than 1 % of the development programme (budget and activity) is relevant for additional adaptation measures to reduce climate change vulnerability).
  - 'medium' (up to 10 % of the development programme (budget and activity) can be relevant for additional adaptation measures to reduce climate change vulnerability).
  - 'high' (more than 10 % of the development programme (budget and activity) could be relevant for additional adaptation measures to reduce climate change vulnerability).

Screening checklists – Common features

- Rapid, desk based process
- Requires information on
  - Sector, Project type
  - Location
  - Climate hazards
- Requires an understanding of sensitivity and exposure to climate change
- Some give a ranking – H, M, L
- Some see this as part of a process which includes adaptation

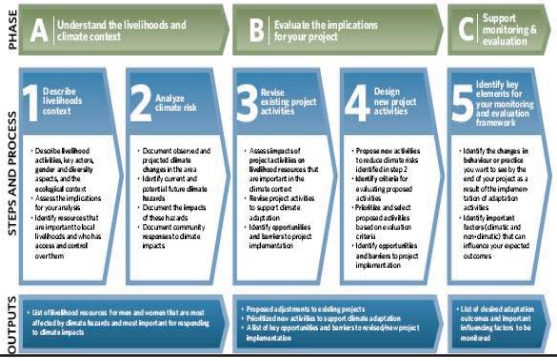
Limitations for screening checklists

- Some are very general, not very focused on Cambodia, e.g. ADB preliminary checklist
- Some are focused upon other levels of impact e.g. DANIDA on investment,
- Some focus questions on climate variation and hazards not necessarily on climate projections, e.g. ORCHID
- Most checklists do not provide any help in answering questions, e.g. PPCR Phase 1
- Some checklists are more geared towards EIA screening, not CC screening

CRiSTAL – Community-based Risk Screening Tool – Adaptation and Livelihoods

- Developed by IISD, IUCN, Helvetas and SEI
- Downloadable **App**-based tool
- Systematic - Takes the user through a series of steps prompting relevant information and analysis
- Leads into project design and adaptation
- Focus on Livelihoods, Gender disaggregated
- Requires field visits and stakeholder consultation
- Expected to take 3 – 5 days to complete
- Also have:
  - CRiSTAL – Food Security
  - CRiSTAL – Forests
  - CRiSTAL – Parks

CRiSTAL Process



CRiSTAL Pages 1

1. Project description
2. Project activities
3. Livelihoods context
4. Climate risk analysis for women and men (disaggregated)
   1. Livelihoods resources
   2. Observed and projected Climate change
   3. Current and Potential Climate hazards
   4. Climate risks in terms of direct and indirect impacts
   5. Response strategies
5. **Climate risk analysis summary report**

CRiSTAL Pages (2)

6. New project activities
7. Evaluation criteria – this allows a weighting on a 1–5 basis for a number of criteria, suggested criteria include:
   1. Helps vulnerable groups
   2. Number of beneficiaries
   3. Sustainable with climate change
   4. Political feasibility
   5. Cultural appropriateness
   6. Long-term cost effectiveness
   7. Greenhouse gas emissions
8. Evaluation of new project activities – allowing a scoring between -2 to +2
9. Opportunities and barriers
10. Monitoring and evaluation
11. Evaluation report summary

Acclimatise – AWARE for Projects

- Developed for ADB
- Web-based tool that uses global climate information to describe the exposure and sensitivity of a range of projects
- ADB uses this tool if the preliminary checklist indicates climate risks are high or medium
- Climate projections on a 50 x 50 km resolution
- Cost per project

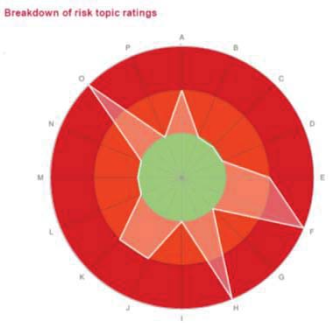
AWARE For Projects - Sections

- Project Name, Sector, Sub-sector, Description
- Location
- Project Risk Ratings – summary
  - Flood
  - Landslide
  - Sea Level Rise
  - Temperature Increase
  - Precipitation increase
  - Water availability
  - Wind speed increase
  - Precipitation decrease

Each section includes:

- **What Acclimatise data suggests**
- **What could happen in the future and what does this mean for the project**
- **Questions to consider**
- **What next**

A) Temperature increase
B) Wild fire
C) Permafrost
D) Sea ice
E) Precipitation increase
F) Flood
G) Snow loading
H) Landslide
I) Precipitation decrease
J) Water availability
K) Wind speed increase
L) Onshore Category 1 storms
M) Offshore Category 1 storms
N) Wind speed decrease
O) Sea level rise
P) Solar radiation change



Roads project in Philippines

Climate and Disaster Risk Screening Tools developed by the World Bank,

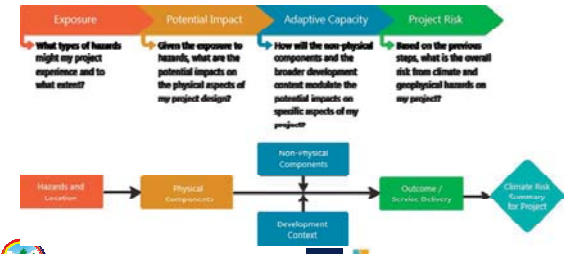
- Systematic, consistent, and transparent way of considering short- and long-term climate and disaster risks in project and national/sector planning processes.
- Screening is an initial, but essential, step to ensure these risks are assessed and managed to support mainstreaming of climate and disaster resilience into key development policies, programs, and projects.
- https://climatescreeningtools.worldbank.org
- Climate Change Knowledge Portal http://sdwebx.worldbank.org/climateportal/

Sectors covered under Project level tools:

- Agriculture
- Water
- Roads
- Coastal flood protection
- Energy
- Health
- General - The general tool covers a range of sectors:
  - non-road transportation (aviation, marine transportation, multi-modal and transit systems, rail, river transportation);
  - community development; education;
  - finance; industry; information and communication technology (ICT);
  - mining and metals;
  - natural resources (biodiversity, fisheries, and forestry);
  - social development; solid waste; urban; and other.

World Bank Screening tool model

Based upon type of project, its sensitivity and the climate risks in the location – global climate change Knowledge Portal

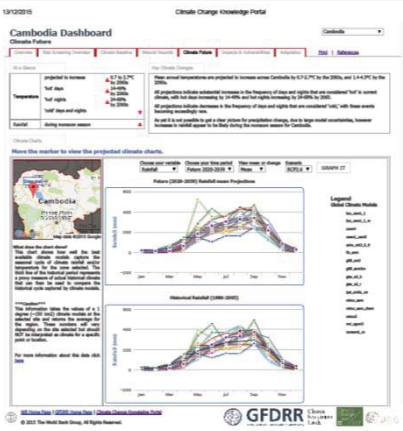


4 steps – user friendly

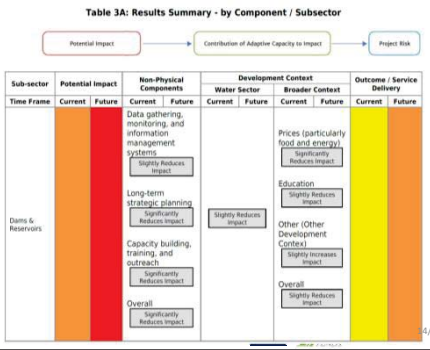
1. Evaluate the extent to which their project/location will be exposed to each hazard.
2. Combine this information with their understanding of the project's physical components to assess potential impact from each hazard.
3. Examines how relevant non-physical factors, such as institutional capacity and the larger economic and social context, influence the level of risk posed to the project.
4. Based on these considerations, rate the overall risk to the project outcome.

A report of the overall project risk profile is produced.

- Use more models
- Sophisticated processing of data (reporting in percentiles),
- Resolution of 200 X 200 km for future climate
- Some downscaling into 50 x 50 km resolution for historical
- BUT Database is limited in terms of floods and drought information



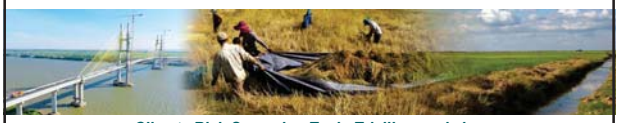
Thank you for Attention



Strategic Program for Climate Resilience

Mainstreaming Climate Resilience into Development Planning (TA 8179)

(September 2013-April 2019)

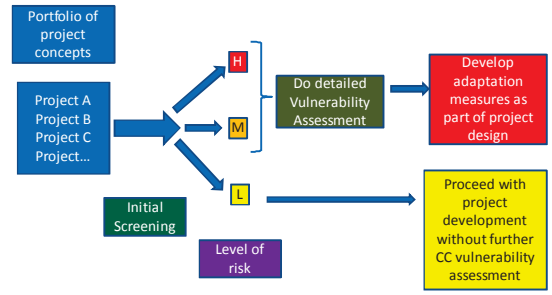


Climate Risk Screening Tools Trialling workshop

Trial of climate risk screening tools

Peter-John Meynell
Team Leader
ICEM
4 April 2016

Decision flow chart



Screening checklist trial: Sector and Cambodia focused

- Each sector will have a project concept to trial
- These will be presented to the groups first.
- Then follow 6 steps, answering questions:
  - Step 1: What are the main features of the project that may be affected by climate threats?
  - Step 2: What is the location of the project – provinces and districts?
  - Step 3: What are the main climate change threats in the project location – **Exposure**?
  - Step 4: What is the **Sensitivity** of the project to the climate change threats?
  - Step 5: What is the level of climate change risk for the project?
  - Step 6: Is further vulnerability assessment and adaptation planning required for this project.

Step 1: Understand the Project concept

- Name
- Location – Province/District/s
- Implementing Agency
- Project Description
  - Type of project
  - Extension of existing project or completely new
  - Size and extent of project
  - Duration of implementation
  - Expected life of the project infrastructure
- Project Activities – briefly describe project components and activities
- Ecological Context for the project – terrain, watershed, vegetation cover
- **Existing climate hazards and extreme events** – floods, flash floods drought that have affected the project area in the past.
- Social context for the project – population in project area, livelihoods, direct beneficiaries

Step 2: Identify the location of the project

- Note the location of the project by province/s and district/s
- If the project covers several provinces, e.g. a road or irrigation scheme, it may be necessary to consider the components in the different provinces separately

Step 3: Locate the project on the climate risk maps, and score

- Using the range of climate risk maps and tables, identify the range of expected climate changes in the project provinces
- Using the scoring table, write the exposure score for each CC parameter on the right column of the table.
- Justify all the scores with notes

Climate risk scoring

CC Parameter			Change with climate change					Score
Average daily Maximum temperature	Wet season		Low change	Medium change	High change			
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C			
		score	1	2	3			
	Dry season		Low change	Medium change	High change			
		range	1 to 2.4 degC	2.5 to 3.2 deg C	3.3 to 4.2 deg C			
		score	1	2	3			
Rainfall, % change	Wet season		Low increase	Medium increase	High increase			
		range	2 to 6%	6.1 to 10	10.1 to 14			
		score	1	2	3			
	Dry season		High decrease	Medium decrease	Little increase/ decrease	Medium increase	High increase	
		range	-4 to -2%	-1.9 to 0	0.1 to 2	2.1 to 3	3.1 to 5	
		score	3	2	1	2	3	
Flooding – Flash flooding			No or little risk	Medium risk	High risk			
		range	Use maps and expert knowledge					
		score	1	2	3			
Flooding – Long duration			No or little risk	Medium risk	High risk			
			Use maps and expert knowledge					
		score	1	2	3			
Drought			Decrease in number of drought months or no change	Low increase in number of drought months /yr	Medium increase in number of drought months/yr	High increase in number of drought months/yr		
			-2 to 0	0.1 to 0.5	0.51 to 1.00	1.1 to 1.5		
		score	1	2	3	4		

Step 4: Sensitivity scoring

- Transfer the CC exposure score for the location to the next table
- Based upon your knowledge of the project type and its sensitivities to climate threats, use the sensitivity tables to give a sensitivity score for each climate threat
- Justify all the scores with notes

Risk Level Matrix

CC Parameter		Exposure Score	Expected sensitivity			Climate change risk score	Risk Level		
			H(3)	M(2)	L(1)	Exposure x sensitivity	H	M	L
Maximum temperature	Wet season								
	Dry season								
Rainfall	Wet season								
	Dry season								
Flooding – Flash flooding									
Flooding – long duration									
Drought									

Water resources: Project type and sensitivities

Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector – Water Resources											
Water supply infrastructure											
Irrigation infrastructure											
Improved irrigation management											
Improved water storage capacity											
Improved weather forecasting services											
Flood Protection											
Drought management											

High sensitivity	3
Medium sensitivity	2
Low sensitivity	1
No sensitivity	0

Agriculture: Project Type and sensitivity

Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector - Agriculture											
Improved or new cultivation systems											
Livestock breeding and infrastructure											
Aquaculture											
Value chain development (seeds, post-harvest storage & processing) and support to marketing											
Large-scale cultivation and plantations											
Biofuel production											

High sensitivity	3
Medium sensitivity	2
Low sensitivity	1
No sensitivity	0

Infrastructure: Project type and sensitivity

Project type	Climate change threats										
	Increased Maximum temperatures		Decreased rainfall		Increased rainfall		Increased rainfall intensity	Flooding		Drought	
	Dry Season	Wet season	Dry season	Wet season	Dry season	Wet season		Flash floods	Long duration	Dry season	Wet season
Sector - Infrastructure											
Major roads and bridges											
Rural roads											
Railways											
Schools, clinics, hospitals											
River bank protection											
River ports											
Coastal ports (consider sea level rise & storm surge)											
Urban drainage											
Structural flood protection											
Sewage treatment and sludge disposal											
Solid waste disposal											

High sensitivity	3
Medium sensitivity	2
Low sensitivity	1
No sensitivity	0

Step 5: Reaching the CC risk score

- Multiply exposure by sensitivity scores
- Use range guide to identify High, Medium or Low Climate risks for each parameter
- Justify all the scores with notes

Climate change risk levels	Temp, rainfall, flood	Drought
	Score Range	Score Range
High Risk	9	8, 9, 12
Medium Risk	4, 6	4, 6
Low Risk	1, 2, 3	1, 2, 3
No Risk	0	0

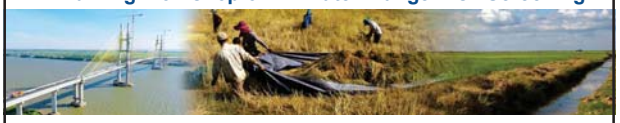
Step 6: Recommendation point

- It is recommended that:
  - For projects where the climate change risk level is **Low**, no further vulnerability assessment is required – proceed with design
  - For Projects where the climate change risk level is **Medium** or **High**, more detailed vulnerability assessment and adaptation planning is required before proceeding with design

Strategic Program for Climate Resilience

Mainstreaming Climate Resilience into Development Planning (TA 8179) *(September 2013-April 2019)*

Training Workshop on Climate Change Risk Screening



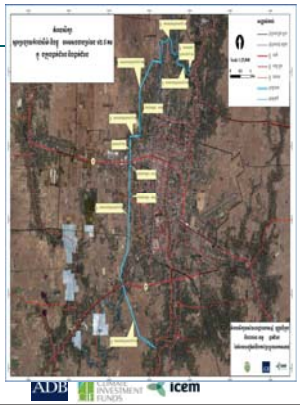
Kampong Seima Irrigation Canal System

Nom Sophearith
NAPA/NAP2-specialist
4 April 2016

TW/MCRDP/DOC .....

Project Location

- The Kampong Seima Irrigation Canal System located in Battambang city of Battambang province,
- The canal runs across seven Sangkats (communes) of Battambang city (Watkor, Ory Mal, Toul TaEk, Ou Char, Chamka Samrong, Slaket, and Kdol Donteav sangkat).



Implementing Agency

- The project was under management of
  - Battambang municipality and
  - Provincial Department of Public Work and Transportation (PDPWT)

Project Description

- Kampong Seima canal system was built in 1977 during the Khmer Rouge with 20 m wide.
- 1977-79, this canal could be able to irrigate water for only 250 ha which is mostly for irrigated land area in Watkor village, Watkor Sangkat.
- 1984-85: the canal system has been upgraded up to 10 km long ringed a part of Battambang city. It is from intake at midstream of Stung Sangke, Watkor Sangkat to downstream of Stung Sangke at Kdol Donteav Sangkat.

Objectives

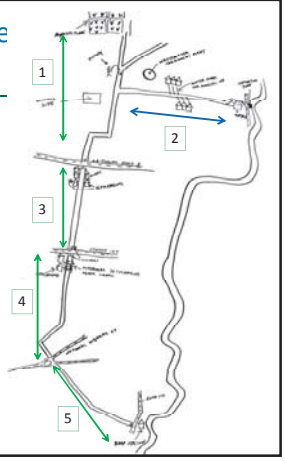
- The Kampong Seima irrigation canal system would serve as an irrigation scheme and city drainage when it helps to drain out the flood of the city (i.e., city flood protection).
- Currently, the canal still plays a role in irrigation – during the dry season, and drainage of waste water from city.
- Beside of these it is to supply the water for household consumption, transport along dyke roads, Tourism, Recreation and Fishing

Canal components

- Pumping station, intake, settlement pond and bridge/culvert at Kampong Seima
- Bridge/culvert system - eg National Road No. 57 and No. 5 and all driveways crossing the canal
- Canal banks and roads

Ecological context for the project

1. Kray Porn canal section and major agricultural production
2. Section to river (forest, agricultural area, village land)
3. Between National road No.5 and Street 127.
4. Between Street 127 to National Highway 57
5. Between National Highway 57 to pumping station (agricultural production)



Extreme events-flood and drought

- The area encountered the flood and drought.
- The drought occurs every year. But it was not so serious. Only two years, 2014 and 2015 the drought was likely to be serious that prolongs about 3 to 4 months. The rain came in late of October/ early November.
- But the flood in past
  - 1993/94: flooding destroys fruit trees, rice crops
  - 2006: flood
  - 2010: flood
  - 2011: flood from overtopping Sangker River, affects rice crops and livestock
  - 2013: floods starting from Watkor Pagoda to junction of national road No. 5, exacerbated by culvert system

Social context for the project

- The canal system runs across seven Sangkats (communes) but it covers eight Sangkats of Battambang city (including Svay Por)
- Population of 8 sangkats-20,106 families and 116,222 people. The direct beneficiaries from the project is more than 11,678 families and more than 62,183 people.
- Livelihood activities are such as agricultural production (rice and other crops), trading, worker, governmental officials, and others.

កម្មវិធីយុទ្ធសាស្ត្រសម្រាប់ភាពធន់នឹងអាកាសធាតុ

ការបញ្ជ្រាបភាពធន់នឹងអាកាសធាតុទៅក្នុងការរៀបចំផែនការអភិវឌ្ឍន៍

(TA ៨១៧៩) (ខែកញ្ញា ឆ្នាំ២០១៣ ដល់ខែមេសា ឆ្នាំ២០១៩)

សិក្ខាសាលាបណ្តុះបណ្តាល ស្តីពី

ឧបករណ៍ជ្រើសរើសហានិភ័យអាកាសធាតុ

វិស័យ ហេដ្ឋារចនាសម្ព័ន្ធ៖ ការអភិវឌ្ឍផ្លូវ និងហេដ្ឋារចនាសម្ព័ន្ធទីក្រុង ក្នុងស្រុកកំពង់លែង - ក្រសួងសាធារណការ និងដឹកជញ្ជូន (MPWT)

លោក **ហាក់ ឃុ** អ្នកឯកទេសជាតិផ្នែកហេដ្ឋារចនាសម្ព័ន្ធ និងការប្រែប្រួលអាកាសធាតុ

គម្រោង MCRDP នៃក្រសួងបរិស្ថាន

០៤ មេសា ២០១៦

TW/MCRDP/DOC ......

ទីតាំងរបស់គម្រោង និងព្រឹត្តិការណ៍អាកាសធាតុធ្ងន់ៗ

(Project Location and Climate Extreme Events)

ស្រុកកំពង់លែងគឺជាវាលទំនាបលិចទឹកនៃបឹងទន្លេសាប និងមានប្រជុំភ្នំទូកមាស និងភ្នំនាងកងរីនៅកណ្តាល។ ហើយទីប្រជុំជន និងការតាំងទីលំនៅគឺភាគច្រើនស្ថិតនៅជុំវិញតំបន់ប្រជុំភ្នំទាំងនោះ។ សណ្ឋានភាពនេះបណ្តាលឲ្យស្រុកកំពង់លែងប្រឈមនឹងព្រឹត្តិការណ៍អាកាសធាតុធំៗ២គឺ៖ ទឹកជំនន់ និងភាពរាំងស្ងួត។

- **បញ្ហាទឹកជំនន់**: (១) ជំនន់ពីទឹកបឹងទន្លេសាប និង(២)ជំនន់ភ្លាមៗពីទឹកភ្លៀងមកពីប្រជុំភ្នំទូកមាស។
- **បញ្ហារាំងស្ងួត**: ខ្វះទំនប់ស្ទាក់ទឹក ខ្វះអាងស្តុកទឹក។ ទឹកស្រែកអស់គ្មានសល់។

ស្រុកកំពង់លែង

ខេត្តកំពង់ឆ្នាំង

ទីតាំង និងសមាសភាគរបស់គម្រោង

(Project Location and Components)

- **អនុគម្រោងទី១**: ការធ្វើអោយប្រសើរឡើងផ្លូវលេខ៥០C ដែលព័ទ្ធជុំវិញប្រជុំភ្នំទូកមាស។
- **អនុគម្រោងទី២**: ទំនប់ស្ទាក់ទឹក អាងស្តុកទឹក និងប្រឡាយទឹក ក្នុងឃុំមួយចំនួន។
- **អនុគម្រោងទី៣**: ផ្លូវលិចទឹកចំនួន២ខ្សែ គឺផ្លូវទៅឃុំផ្លូវទូក និងផ្លូវទៅឃុំសំរោងសែន។
- **អនុគម្រោងទី៤**: ប្រព័ន្ធបង្ហូរទឹកស្អុយ និងកែលម្អផ្លូវក្នុងទីប្រជុំជន ក្នុងឃុំកំពង់ហៅ។

ស្រុកកំពង់លែង

ខេត្តកំពង់ឆ្នាំង

បច្ចុប្បន្នភាពរបស់គម្រោង (Project Current Situation)

- **អនុគម្រោងទី១**: ការធ្វើអោយប្រសើរឡើងផ្លូវលេខ៥០C ដែលព័ទ្ធជុំវិញប្រជុំភ្នំទូកមាស

MPWT and DPWT កំពង់ធ្វើការអភិវឌ្ឍផ្លូវនេះដោយថវិកាជាតិ។

ក្នុងមួយឆ្នាំបានប្រហែល ២គម។

បច្ចុប្បន្នភាពរបស់គម្រោង (Project Current Situation)

- **អនុគម្រោងទី២**: ទំនប់ស្ទាក់ទឹក អាងស្តុកទឹក និងប្រឡាយទឹក ក្នុងស្រុកកំពង់លែង

- **ជំនន់ភ្លាមៗ (Flash Flood)**: ទំនប់ស្ទាក់ទឹក កាត់បន្ថយទឹកជំនន់
- **ភាពរាំងស្ងួត (Draught)**: ទំនប់ស្ទាក់ទឹក និងស្តុកទឹកទុកប្រើប្រាស់នៅរដូវប្រាំង

បច្ចុប្បន្នភាពរបស់គម្រោង (Project Current Situation)

- **អនុគម្រោងទី២**: ទំនប់ស្ទាក់ទឹក អាងស្តុកទឹក និងប្រឡាយទឹក ក្នុងស្រុកកំពង់លែង

បច្ចុប្បន្នភាពរបស់គម្រោង (Project Current Situation)

- **អនុគម្រោងទី២:** ទំនប់ស្ទាក់ទឹក អាងស្តុកទឹក និងប្រឡាយទឹក ក្នុងស្រុកកំពង់លែង




- មិនអាចធ្វើស្រែវស្សាបាន - ជាវាលលិចទឹកនៃបឹងទន្លេសាប (លិច៣ម៉ែត្រ)
- អាចធ្វើស្រែប្រាំងបានត្រឹមតែម្តង - ខ្វះទឹកប្រើប្រាស់

បច្ចុប្បន្នភាពរបស់គម្រោង (Project Current Situation)

- **អនុគម្រោងទី២:** ទំនប់ស្ទាក់ទឹក អាងស្តុកទឹក និងប្រឡាយទឹក ក្នុងស្រុកកំពង់លែង



- **ប្រឡាយផ្លូវលោក** (ទីតាំងលើកោះតាឃ្លា)៖ (១៧០០ម ស្រោចស្រព ១២៥ហ.ត)
- **ប្រឡាយកោះខ្លា** (ទីតាំងលើកោះខ្លា)៖ ៤៥០០ម ស្រោចស្រព ២២០ហ.ត

បច្ចុប្បន្នភាពរបស់គម្រោង (Project Current Situation)

- **អនុគម្រោងទី៣:** ផ្លូវលិចទឹកចំនួន២ខ្សែ (ផ្លូវទៅឃុំផ្លូវទូក និងផ្លូវទៅឃុំសំឡាងសែន)

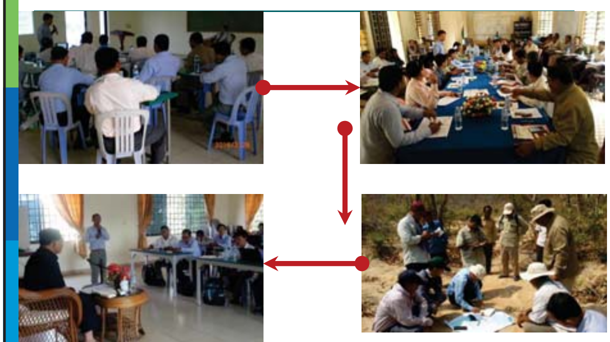
បច្ចុប្បន្នភាពរបស់គម្រោង (Project Current Situation)

- **អនុគម្រោងទី៤:** ប្រព័ន្ធបង្ហូរទឹកស្អុយ និងកែរលម្អផ្លូវក្នុងទីប្រជុំជន ក្នុងឃុំកំពង់ហៅ

គោលបំណងរបស់គម្រោង (Objectives)

- **ផ្លូវ៥០C:** ការពារទឹកជំនន់ពីទឹកបឹងទន្លេសាប និងការធ្វើអោយប្រសើរឡើងផ្លូវចរាចរណ៍។
- **ទំនប់ស្ទាក់ទឹក:** ស្ទាក់ទឹកការពារទឹកជំនន់ពីភ្នំ និងស្តុកទឹកសម្រាប់ប្រើប្រាស់នារដូវប្រាំង។
- **អាងស្តុកទឹក និងប្រឡាយទឹក:** ស្តុកទឹកពេលមានជំនន់ សម្រាប់ស្រោចស្រប់នៅរដូវប្រាំង។ អាចធ្វើស្រែប្រាំងបាន២ដង។
- **ផ្លូវលិចទឹកចំនួន២ខ្សែ:** អាចប្រើប្រាស់បាន៩ខែ។
- **ប្រព័ន្ធលូទឹកស្អុយ និងផ្លូវក្នុងទីប្រជុំជន:** រំដោះទឹកស្អុយចេញ និងសម្រួលចរាចរណ៍ក្នុងទីប្រជុំជន។

សកម្មភាពរបស់គម្រោង (Project Activities)



អ្នកទទួលផលពីគម្រោង (Project Beneficiaries)

- **ផ្លូវ៥០C**: ទូទាំងស្រុកកំពង់លែង។ ការធ្វើដំណើរឆ្លងកាត់ទៅមក កំពង់ឆ្នាំង កំពង់ធំ កំពង់ស្ពឺ សៀមរាប ។ល។
- **ទំនប់ស្ទាក់ទឹក**: ទូទាំងស្រុកកំពង់លែង។
- **អាងស្តុកទឹក និងប្រឡាយទឹក**: ទូទាំងស្រុកកំពង់លែង។
- **ផ្លូវលិចទឹកចំនួន២ខ្សែ**: ឃុំពាក់ព័ន្ធមួយចំនួន។
- **ប្រព័ន្ធលូទឹកស្អុយ និងផ្លូវក្នុងទីប្រជុំជន**: ឃុំកំពង់ហៅ។

ប្រជាពលរដ្ឋក្នុងស្រុកកំពង់លែង (ចំនួន៩ឃុំ) សរុប៥៤៨៩៧នាក់។

អ្នកទទួលផលពីគម្រោង (Project Beneficiaries)

អ្នកចូលរួមក្នុងគម្រោង (Project Partnership)

- MPWT and Kampong Chhnang DPWT
- MRD?, MOWRAM?, MAFF?, MOE?
- Kampong Chhnang DRD?, PDWRAM?, MAFF?, DOE?
- **អាជ្ញាធរខេត្តកំពង់ឆ្នាំង**
- **អាជ្ញាធរស្រុកកំពង់លែង**
- **អាជ្ញាធរឃុំ ភូមិ**
- **ដៃគូអភិវឌ្ឍនានា** (ADB, CIF, GCF…)
- ។ល។

ថវិកាគម្រោង (Project Budget)

- **ផ្លូវ៥០C**: ការងារចាក់ដីតួផ្លូវ ការងារការពារជើងទេរ ការងារក្រាលកៅស៊ូ និងសំណង់សិល្បការមួយចំនួន។
- **ទំនប់ស្ទាក់ទឹក**: កែលម្អទំនប់ (អំពីដី ឬអំពីបេតុង)។
- **អាងស្តុកទឹក និងប្រឡាយទឹក**: កែលម្អទំនប់ ស្តារបឹង ស្តារប្រឡាយ។
- **ផ្លូវលិចទឹកចំនួន២ខ្សែ**:ការងារចាក់ដីតួផ្លូវ ការពារជើងទេរ ការងារចាក់បេតុង និងសំណង់សិល្បការមួយចំនួន។
- **ប្រព័ន្ធលូទឹកស្អុយ និងផ្លូវក្នុងទីប្រជុំជន**: ដាក់លូទឹកស្អុយ និងកែលម្អផ្លូវដោយចាក់បេតុងក្នុងទីប្រជុំជន។

សូមអរគុណ


ADB
សិក្ខាសាលាស្តីពីឧបករណ៍ជ្រើសរើសហានិភ័យអាកាសធាតុ
ឧបករណ៍សម្រាប់រៀបចំផែនការបន្សាំ ដោយមានការចូលរួម
លោក ណុប ចំរើន
ប្រធានក្រុម DCA/CA
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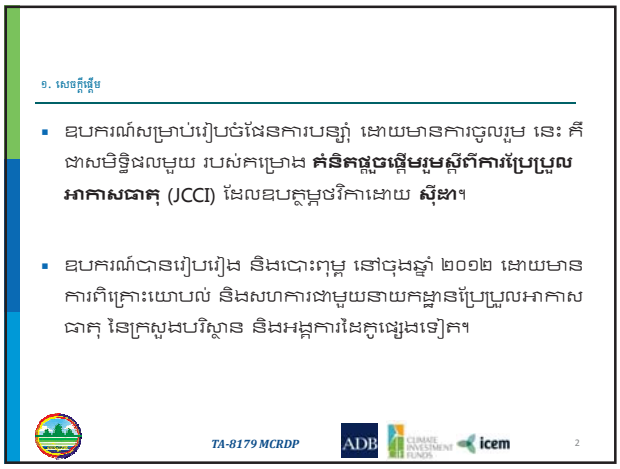
9. សេចក្តីផ្តើម
ឧបករណ៍សម្រាប់រៀបចំផែនការបន្សាំ ដោយមានការចូលរួម នេះ គឺជាសមិទ្ធិផលមួយ របស់គម្រោង **កំនិតផ្តួចផ្តើមរួមស្តីពីការប្រែប្រួលអាកាសធាតុ** (JCCI) ដែលឧបត្ថម្ភថវិកាដោយ **ស៊ីដា**។
ឧបករណ៍បានរៀបរៀង និងបោះពុម្ព នៅចុងឆ្នាំ ២០១២ ដោយមានការពិគ្រោះយោបល់ និងសហការជាមួយនាយកដ្ឋានប្រែប្រួលអាកាសធាតុ នៃក្រសួងបរិស្ថាន និងអង្គការដៃគូផ្សេងទៀត។
TA-8179 MCRDP
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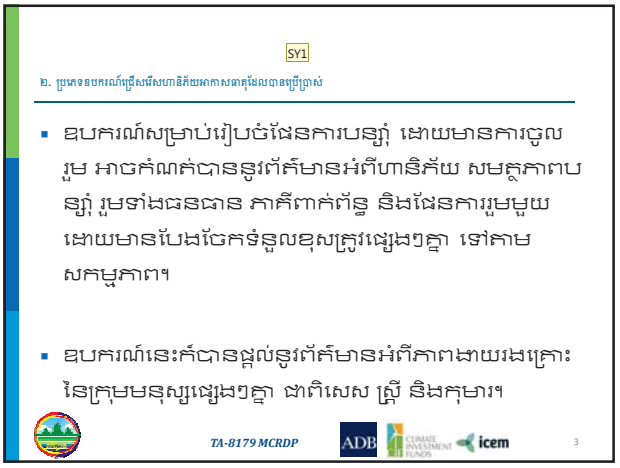
SY1
២. ប្រភេទឧបករណ៍ជ្រើសរើសហានិភ័យអាកាសធាតុដែលបានប្រើប្រាស់
ឧបករណ៍សម្រាប់រៀបចំផែនការបន្សាំ ដោយមានការចូលរួម អាចកំណត់បាននូវព័ត៌មានអំពីហានិភ័យ សមត្ថភាពបន្សាំ រួមទាំងធនធាន ភាគីពាក់ព័ន្ធ និងផែនការរួមមួយ ដោយមានបែងចែកទំនួលខុសត្រូវផ្សេងៗគ្នា ទៅតាមសកម្មភាព។
ឧបករណ៍នេះក៏បានផ្តល់នូវព័ត៌មានអំពីភាពងាយរងគ្រោះនៃក្រុមមនុស្សផ្សេងៗគ្នា ជាពិសេស ស្ត្រី និងកុមារ។
TA-8179 MCRDP
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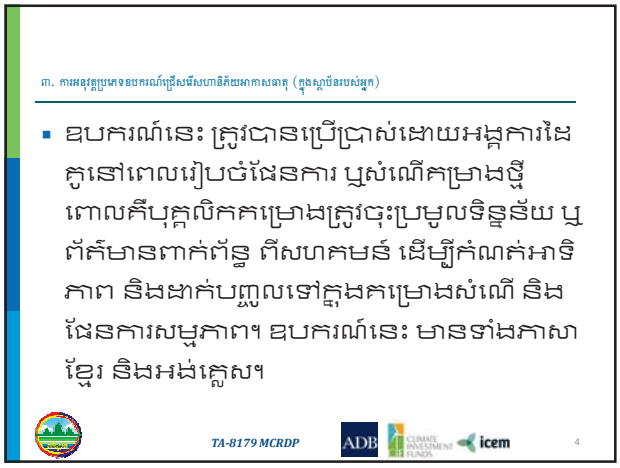
៣. ការអនុវត្តប្រភេទឧបករណ៍ជ្រើសរើសហានិភ័យអាកាសធាតុ (ក្នុងស្ថាប័នរបស់អ្នក)
ឧបករណ៍នេះ ត្រូវបានប្រើប្រាស់ដោយអង្គការដៃគូនៅពេលរៀបចំផែនការ ឬសំណើគម្រោងថ្មី ពេលគឺបុគ្គលិកគម្រោងត្រូវចុះប្រមូលទិន្នន័យ ឬព័ត៌មានពាក់ព័ន្ធ ពីសហគមន៍ ដើម្បីកំណត់អាទិភាព និងដាក់បញ្ចូលទៅក្នុងគម្រោងសំណើ និងផែនការសម្ភភាព។ ឧបករណ៍នេះ មានទាំងភាសាខ្មែរ និងអង់គ្លេស។
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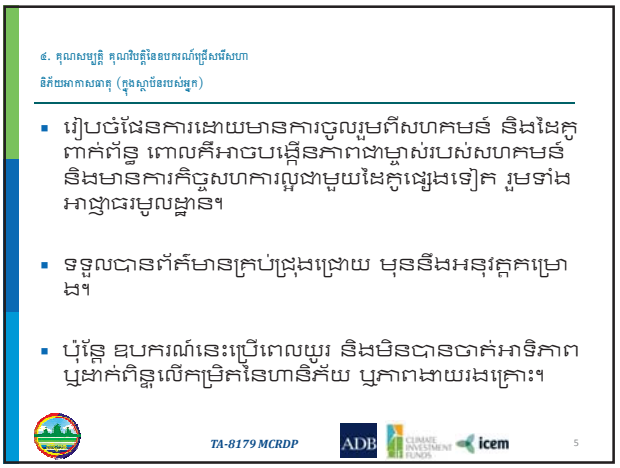
៤. គុណសម្បត្តិ គុណវិបត្តិនៃឧបករណ៍ជ្រើសរើសហានិភ័យអាកាសធាតុ (ក្នុងស្ថាប័នរបស់អ្នក)
រៀបចំផែនការដោយមានការចូលរួមពីសហគមន៍ និងដៃគូពាក់ព័ន្ធ ពេលគឺអាចបង្កើនភាពជាម្ចាស់របស់សហគមន៍ និងមានការកិច្ចសហការល្អជាមួយដៃគូផ្សេងទៀត រួមទាំងអាជ្ញាធរមូលដ្ឋាន។
ទទួលបានព័ត៌មានត្រប់ជ្រុងជ្រោយ មុននឹងអនុវត្តគម្រោង។
ប៉ុន្តែ ឧបករណ៍នេះប្រើពេលយូរ និងមិនបានចាត់អាទិភាព ឬដាក់ពិន្ទុលើកម្រិតនៃហានិភ័យ ឬភាពងាយរងគ្រោះ។
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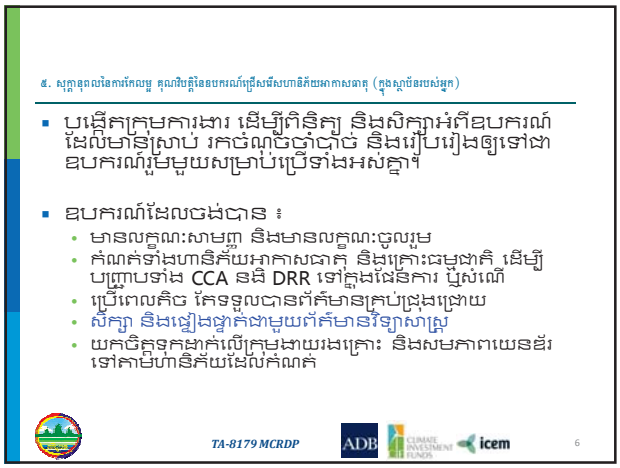
៥. សក្តានុពលនៃការអភិលម្ហ គុណវិបត្តិនៃឧបករណ៍ជ្រើសរើសហានិភ័យអាកាសធាតុ (ក្នុងស្ថាប័នរបស់អ្នក)
បង្កើតក្រុមការងារ ដើម្បីពិនិត្យ និងសិក្សាអំពីឧបករណ៍ដែលមានស្រាប់ រកចំណុចថ្មីបាច់ និងរៀបរៀងឲ្យទៅជាឧបករណ៍រួមមួយសម្រាប់ប្រើទាំងអស់គ្នា។
ឧបករណ៍ដែលចង់បាន ៖
មានលក្ខណៈសាមញ្ញ និងមានលក្ខណៈចូលរួម
កំណត់ទាំងហានិភ័យអាកាសធាតុ និងគ្រោះធម្មជាតិ ដើម្បីបញ្ចូលទាំង CCA និង DRR ទៅក្នុងផែនការ ឬសំណើ
ប្រើពេលតិច តែទទួលបានព័ត៌មានត្រប់ជ្រុងជ្រោយ
សិក្សា និងផ្តៀងផ្ទាត់ជាមួយព័ត៌មានវិទ្យាសាស្ត្រ
យកចិត្តទុកដាក់លើក្រុមងាយរងគ្រោះ និងសមភាពយេនឌ័រ ទៅតាមហានិភ័យដែលកំណត់
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គុណវិបត្តិនៃឧបករណ៍

ឧបករណ៍ដែលចង់បាន ៖

- បង្កលក្ខណៈសហការគ្រប់ដៃគូពាក់ព័ន្ធ
- អាចជួយសហគមន៍បានគ្រប់ជ្រុងជ្រោយ (Holistic approach)
- ទាមទាឲ្យមានការចូលរួមពីសហគមន៍ និងអ្នកពាក់ព័ន្ធ
- អ្នកប្រើប្រាស់ត្រូវយល់ពីទស្សនាទានគ្រោះមហន្តរាយ ឬការប្រែប្រួលអាកាសធាតុ និងមានជំនាញសម្របសម្រួលខ្ពស់
- ត្រូវការសម្ភារសម្រាប់សម្របសម្រួលក្នុងការប្រមូលព័ត៌មាន

សូមអរគុណ!