



NAP GSP SOUTH-SOUTH KNOWLEDGE EXCHANGE FORUM

28 June - 1 July 2021

TOPIC 3: Climate science and vulnerability and risk assessments to guide decision-making in adaptation

Cambodia's Climate Science and Vulnerability Assessments *“Experience and Lessons Learned”*

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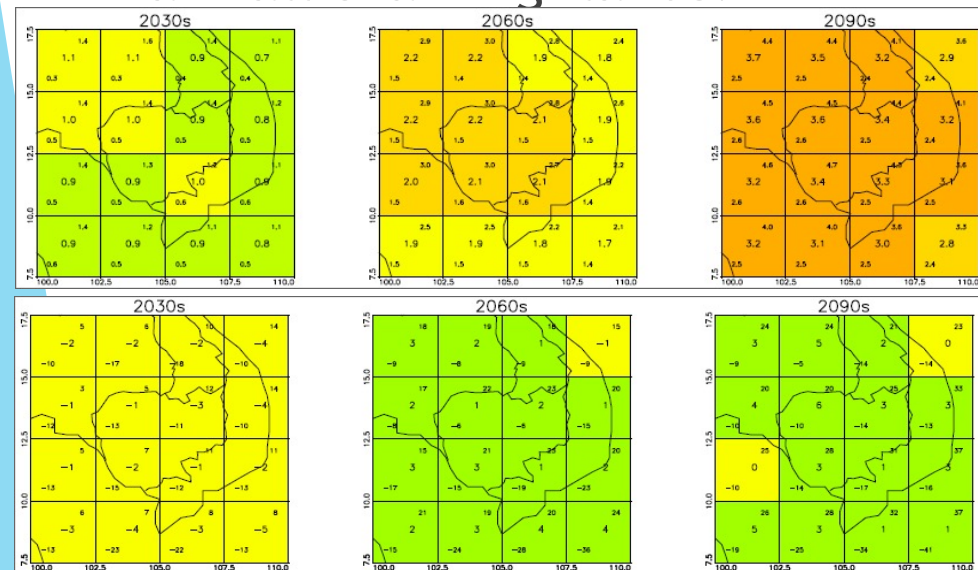
1. Introduction to Climate Model

- ▶ Regional climate model (RCM) is a sophisticated downscaling technique that represents most or all of the processes, interactions and feedbacks between the climate system components.
- ▶ Cambodia has developed climate change scenarios and its impact on sectors. The climate change scenarios was developed using MAGICC-SCENGEN (Hulme *et al.*, 2000 and MoE, 2002), a program which links emission scenarios with global and regional climate change.
- ▶ Cambodia has adopted regional climate model (PRECIS) in combination with a number of GCM models run by Climate Risk Assessment Division, Center for Global Environmental Research, National Institute for Environmental Studies (NIES) with resolution of 100x100 km (Masutomi, 2009).

2. Climate Model and Climate Change Projection in Cambodia

Projections of future climate and climate change impacts:

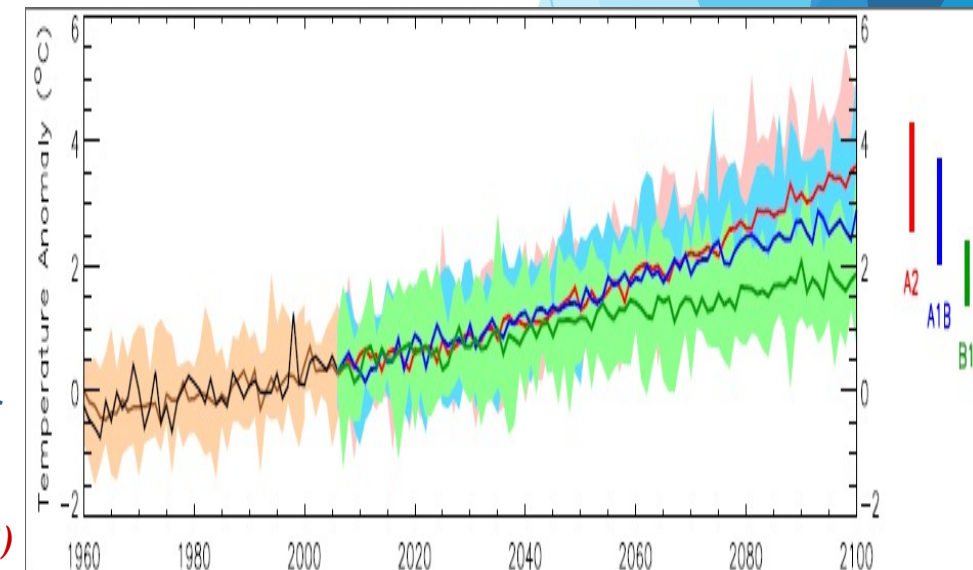
- ▶ Cambodia's Initial National Communication to the UNFCCC includes the first attempt to assess the country's future climate using two General Circulation Models (GCM) (INC, 2002). The GCM models used in this analysis (CCSR and CSIRO) were developed for use in Japan and Australia which are very different geographical regions.
- ▶ Mean annual temperatures could increase between 0.3 to 0.6 °C by 2025 and 1.6 to 2.0 °C by 2100;
- ▶ Mean annual rainfall could increase between 3% to 35% by year 2100 with the magnitude of change varying with time and location. Lowland areas would have higher increase in rainfall than highlands.



Spatial patterns of projected mean annual temperature for ten-year periods

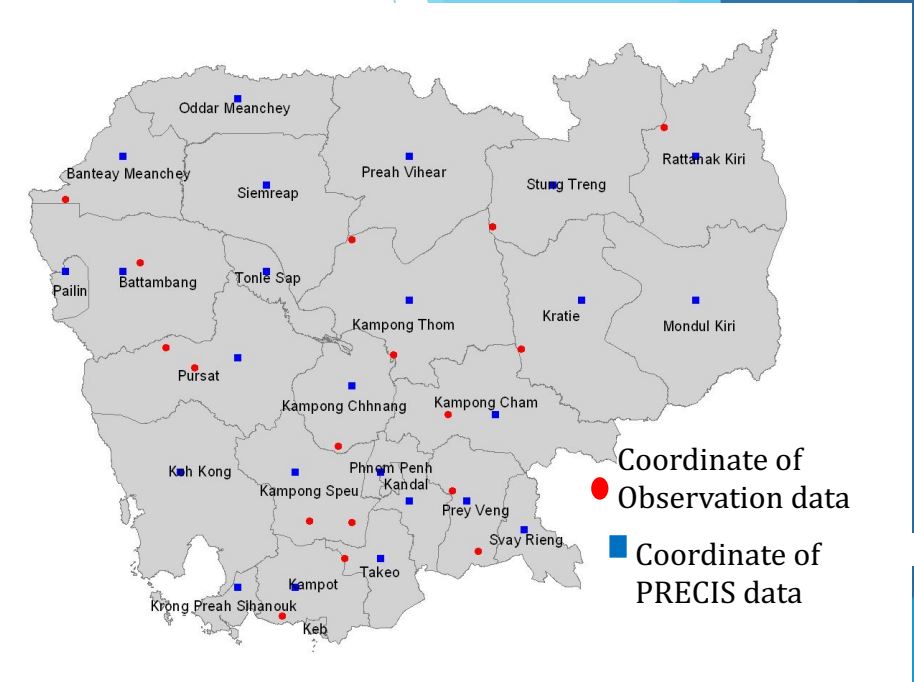
Spatial patterns of projected mean annual precipitation for ten-year periods

Source: Oxford University (2008)



2. Climate Model and Climate Change Projection in Cambodia

- ▶ Future climate projection daily data for the two IPCC SRES scenarios (A2 and B2) provided by the SEA START Regional Center were based on the ECHAM4 GCM (*European Centre Hamburg Model for Medium Range Weather Forecast*), from the Germany and downscaled to the Mekong region using the PRECIS (*Providing Regional Climates for Impacts Studies*) system.
- ▶ The PRECIS data were produced by the SEA START Regional Center for 2,225 grid cells covering the entire Mekong River Basin with resolution of $0.2^\circ\text{C} \times 0.2^\circ\text{C}$ (equivalent to about $22\text{ km} \times 22\text{ km}$) and $0.5^\circ\text{C} \times 0.5^\circ\text{C}$ ($50\text{ km} \times 50\text{ km}$).



GCM: Position of observation stations and PRECIS Grids

2. Climate Model and Climate Change Projection in Cambodia

GCM: Detecting Historical and Future Climate Change (14 GCMs)

- ▶ As suggested by IPCC, in climate change analysis, we should use more models to get full range of potential climate change,
- ▶ In this context, we evaluate the future climate change scenarios of Cambodia using 14 GCMs,
- ▶ This analysis was to evaluate the direction of rainfall change (either increasing or decreasing) suggested by the 14 GCMs,
- ▶ From the analysis, we produced a set of maps showing a change in seasonal rainfall in 2020, 2050 and 2080 under two emission scenarios.
- ▶ **The projections of future climate under the Second National Communication (SNC), GCMs: Resolution 1°x1°**

3. Lessons Learned and Opportunity to Enhancing the Climate Science Basis

- ▶ Lessons Learned and Opportunity to Enhancing the Climate Science Basis of GCF Funded Activities in Cambodia (03-07 February 2020) supported by WMO/GCF;
- ▶ Project proposals prepared by GCF accredited entities are founded on the best available climate science;
- ▶ The climate science basis methodology and materials are field tested in key selected countries through national workshops with regional participation are three outcomes:
 1. Climate science basis provided for a National Adaptation Plan or a GCF project in the country context;
 2. Feedback and lessons learned to inform GCF/WMO guidelines methods, data and support needed for further climate rationale preparation globally;
 3. Expanded understanding and knowledge of climate rationale requirements and preparation within the region.



WMO's role in supporting countries and proposal preparation processes to incorporate the best available science:

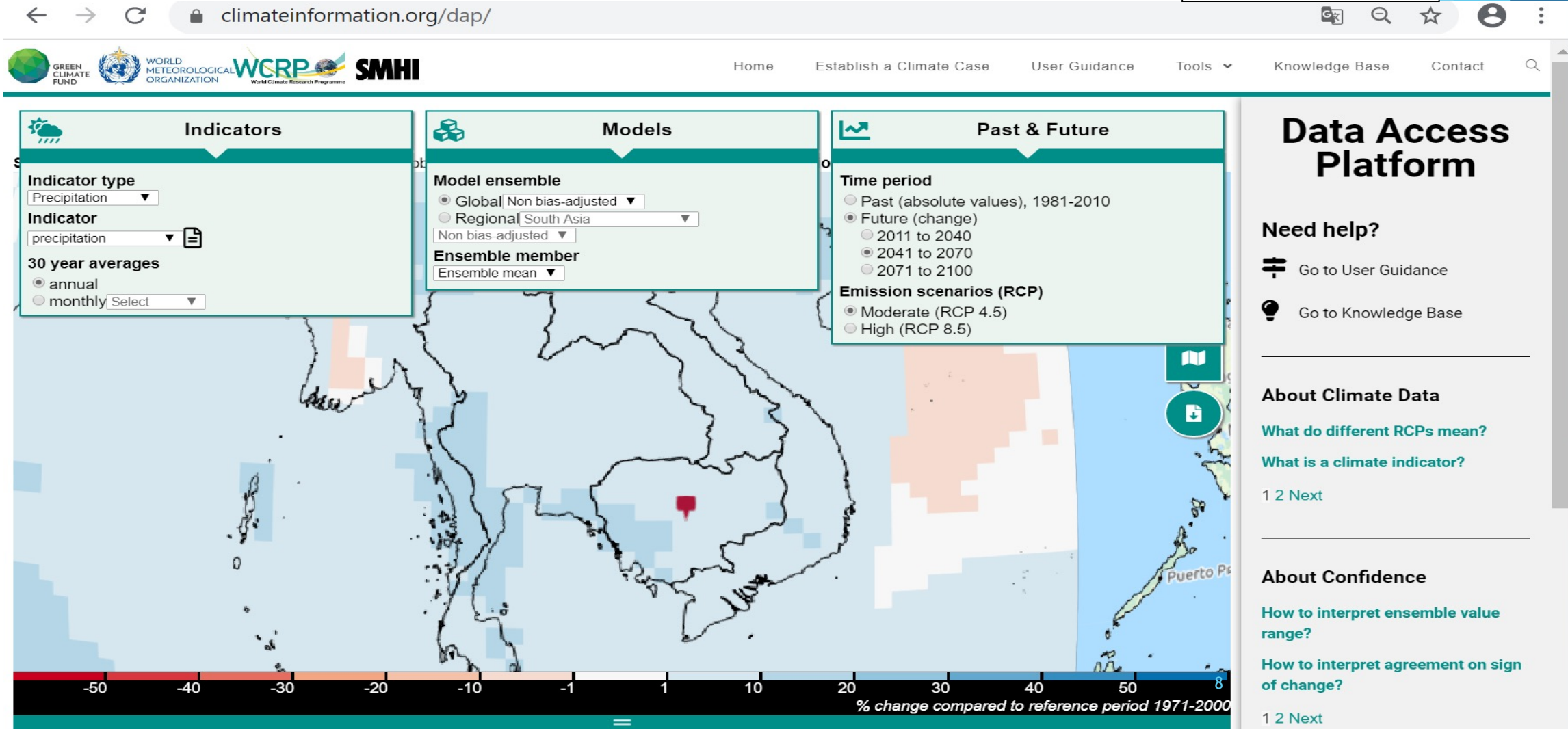
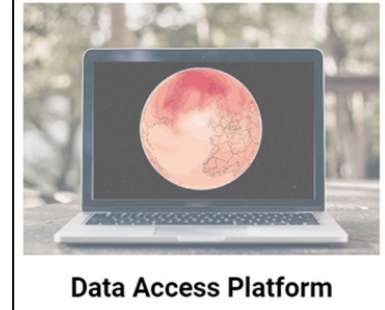
- ▶ The climate science basis for adaptation planning and decision-making;
- ▶ Climate impacts and current national adaptation and mitigation priority areas and actions: Water (flood); Agriculture (drought); Forestry; coastal and health;
- ▶ Regional Climate Modelling of GCM and uncertainty; climate downscaling (past and future climate projection based on scenarios of RCP2.6, RCP4.5, RCP6.0 and RCP8.5) etc.

Lessons learnt:

- ▶ **ClimPACT** (*CC and its Impact*) briefing and presentations should be enhanced and need to explain a selection of the ClimPACT indices in agriculture, water and health and how they can help adaptation planning.
- ▶ Both international and national participants have noted that the Platform and ClimPACT information are not enough for adaptation planning and they should be combined with socio-economic information, if available.

<https://climateinformation.org/>

Climate-model data for Cambodia



The screenshot shows the Data Access Platform (DAP) interface. At the top, there are navigation links: Home, Establish a Climate Case, User Guidance, Tools, Knowledge Base, and Contact. The main content area is divided into three filter panels: Indicators, Models, and Past & Future. The Indicators panel shows 'Precipitation' selected. The Models panel shows 'Global Non bias-adjusted' and 'Ensemble mean' selected. The Past & Future panel shows 'Future (change)' selected, with '2041 to 2070' and 'High (RCP 8.5)' also selected. Below the filters is a map of Cambodia with a red pin indicating the location. A color scale at the bottom of the map ranges from -50 to 50, representing '% change compared to reference period 1971-2000'. The sidebar on the right contains sections for 'Need help?' (with links to User Guidance and Knowledge Base), 'About Climate Data' (with links for RCPs and indicators), and 'About Confidence' (with links for ensemble value range and sign of change).

Click in map to select a point

Research paper: Heng Chan Thoeun, 2015. Weather and Climate Extremes.

Weather and Climate Extremes 7 (2015) 61–71



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Contents lists available at [ScienceDirect](#)

Weather and Climate Extremes

journal homepage: www.elsevier.com/locate/wace



Observed and projected changes in temperature and rainfall in Cambodia



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ARTICLE INFO

Available online 7 February 2015

Keywords:

Climate modeling
General Circulation Model (GCM)
PRECIS downscaling
SRESA2 and SRESB2

ABSTRACT

Temperature and rainfall patterns in Cambodia are governed by monsoons and characterized by two major wet and dry seasons. The average annual rainfall is 1400 mm in the central low land regions and may reach 4000 mm in certain coastal zones or in highland areas. The annual average temperature is 28 °C, with an average maximum temperature of 38 °C in April and an average minimum temperature of 17 °C in January. This paper presents the climate change scenarios using MAGICC–SCENGEN program, which links emissions scenarios with global and regional climate change and has adopted the regional climate model (PRECIS) in combination with a number of GCM models with resolution of 50 × 50 km, using observation data and two historical and future climate data sets generated by RCM model downscaling under the two emission scenarios SRES A2 and SRES B2. Projections of maximum and minimum temperatures and rainfall patterns from 2008 to 2099 are described. For future studies, daily data are required perform vulnerability and adaptation assessments.

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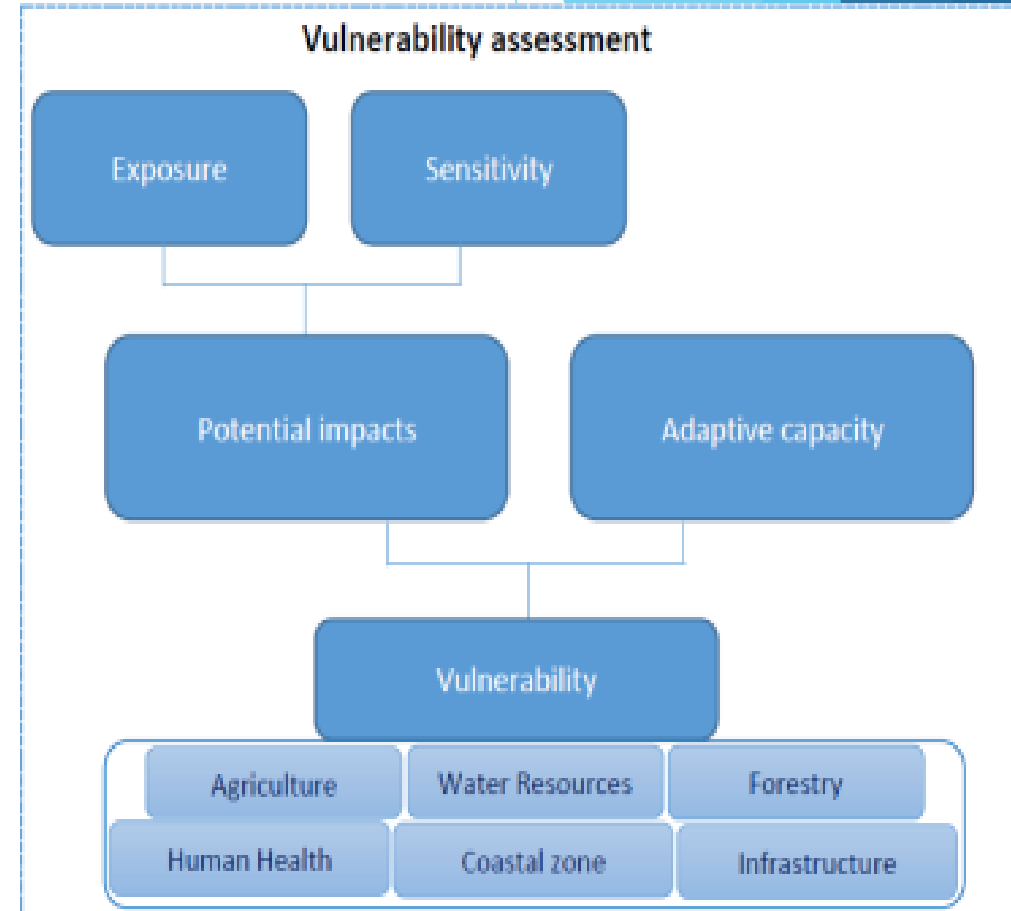
Enhancing the
Climate Science
Basis of GCF
Funded Activities in
Cambodia



Cambodia - Phnom Penh
03 - 07 February 2020
Himawari Hotel
Apartments

4. Vulnerability Assessments to CC

- The potential impacts and adaptive capacity determine vulnerability (*Current climate risks and Future climate change*)
- ▶ In Cambodia, agriculture and water resources, forestry, human health, and coastal zones sectors identified as the most vulnerable to the impacts of CC.
- ▶ In 2014 the vulnerability assessment indicated that 17.2% of Cambodia’s communes were ‘highly’ vulnerable (i.e. 279 communes) and over 31.5% (512 communes) were ‘quite’ vulnerable to multiple climate change hazards (*Source: MoE/SNC, 2015 and NAP Process, 2017*).



5. Cambodia's Experience and Opportunity to access NAP GCF Readiness Support

- NAP support project has been fully developed and will be implemented by the Department of Climate Change under the National Council for Sustainable Development, MoE;
- The overall objective is to *Strengthen institutional and scientific capacity in Cambodia to formulate and implement national, sectoral, and subnational climate change adaptation strategies and actions.*
- ❖ Three outcomes that will be implemented in two phases:
 - *Establish physical science basis and enhance research support capabilities for climate change adaptation in Cambodia;*
 - *Strengthen subnational institutional and human capacities to assess climate vulnerabilities for enhanced urban resilience; and*
 - *Implement Cambodia's NAP communication strategy, NAP process, and NAP financing framework.*
- **Lesson Learned:** past and ongoing efforts undertaken by public and/or private sectors, and other complementary GCF grants or funding proposals as Cambodia Climate Change Alliance (CCCA) and Strategic Programme for Climate Resilience (SPCR).



Thank You for Your Attention!

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