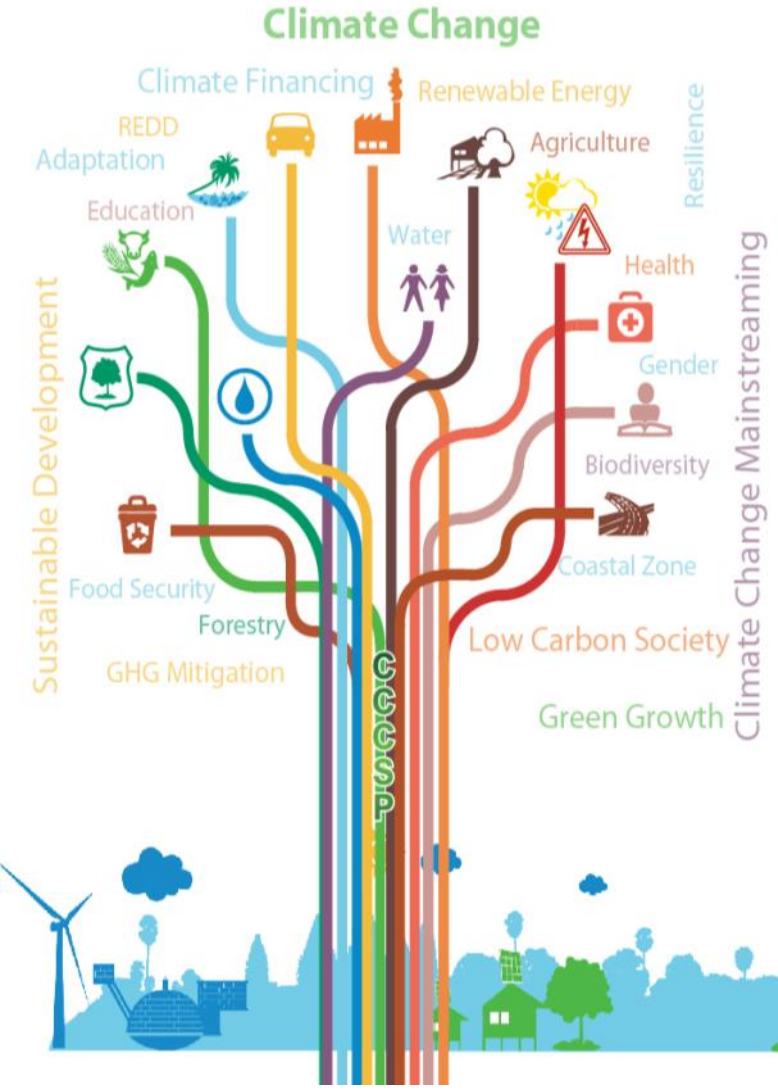
3rd National Forum on Climate Change

5 – 7 November 2013, Cambodia

"Taking Action for Sustainable Development in the Changing Climate"



Climate Change Impacts in SE Asia and the Lower Mekong Basin

Hans Guttman
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5 November 2013

CAMBODIA CLIMATE CHANGE ALLIANCE

Presentation Outline

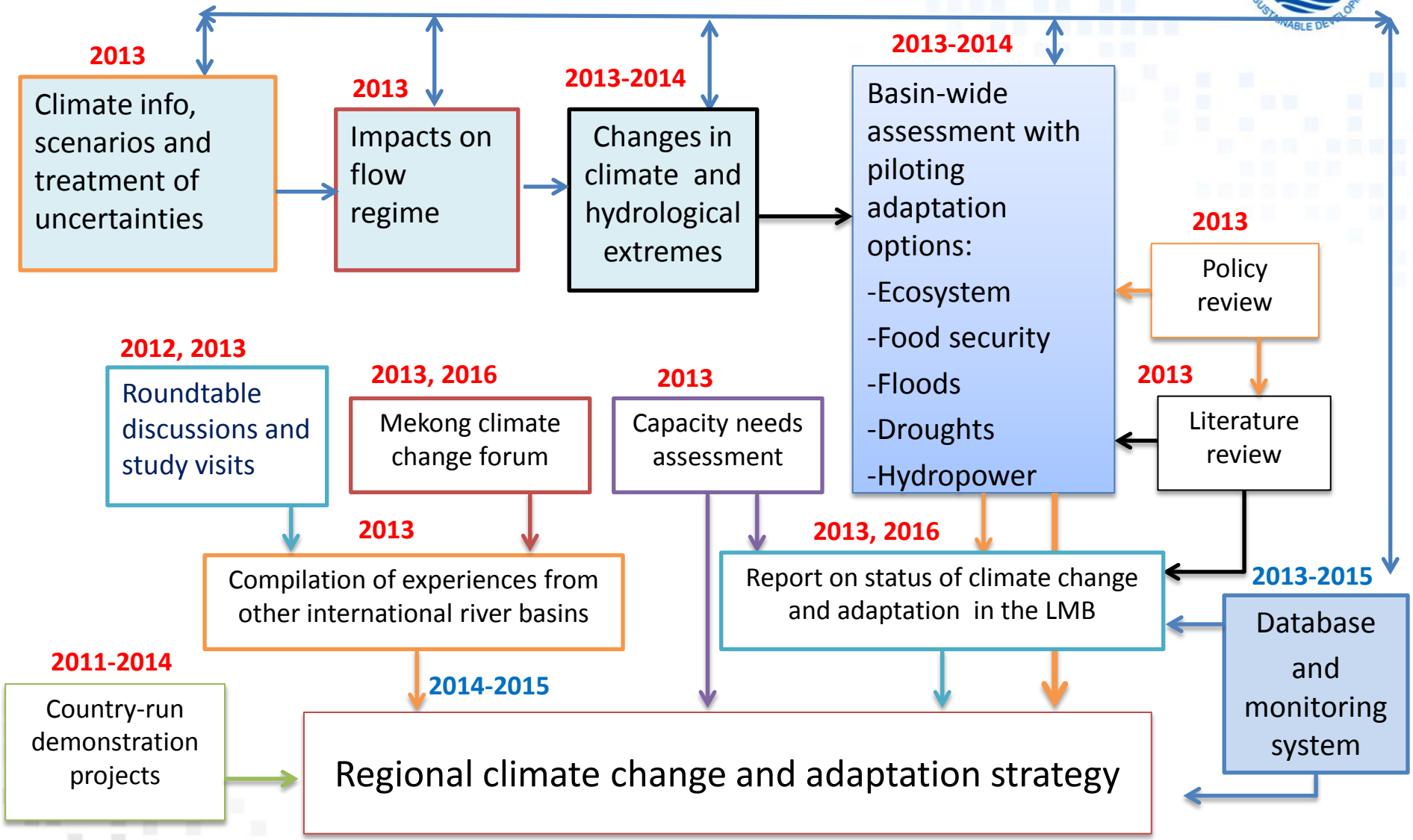
- Introduction of MRC climate change works
- Climate change in SE Asia
- Observed change of climate in the LMB
- Examples on projected future change of climate in the LMB
- Impacts of future and existing climate change on water related topics
- Conclusions

What is Climate Change and Adaptation Initiative?

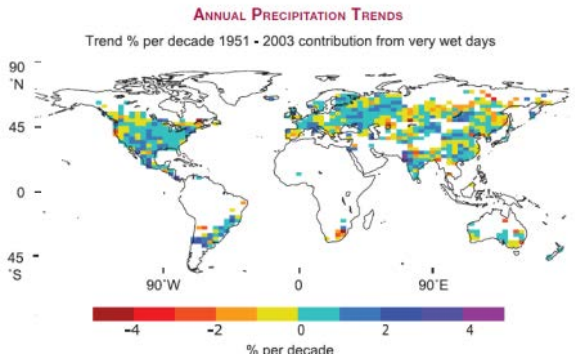
A regional collaborative initiative of the Lower Mekong Basin Countries

- Support adaptation to the **impacts** & new challenges posed by climate change

CCAI Programme of work 2011-2015



Climate change in SEA



(Source: IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change)

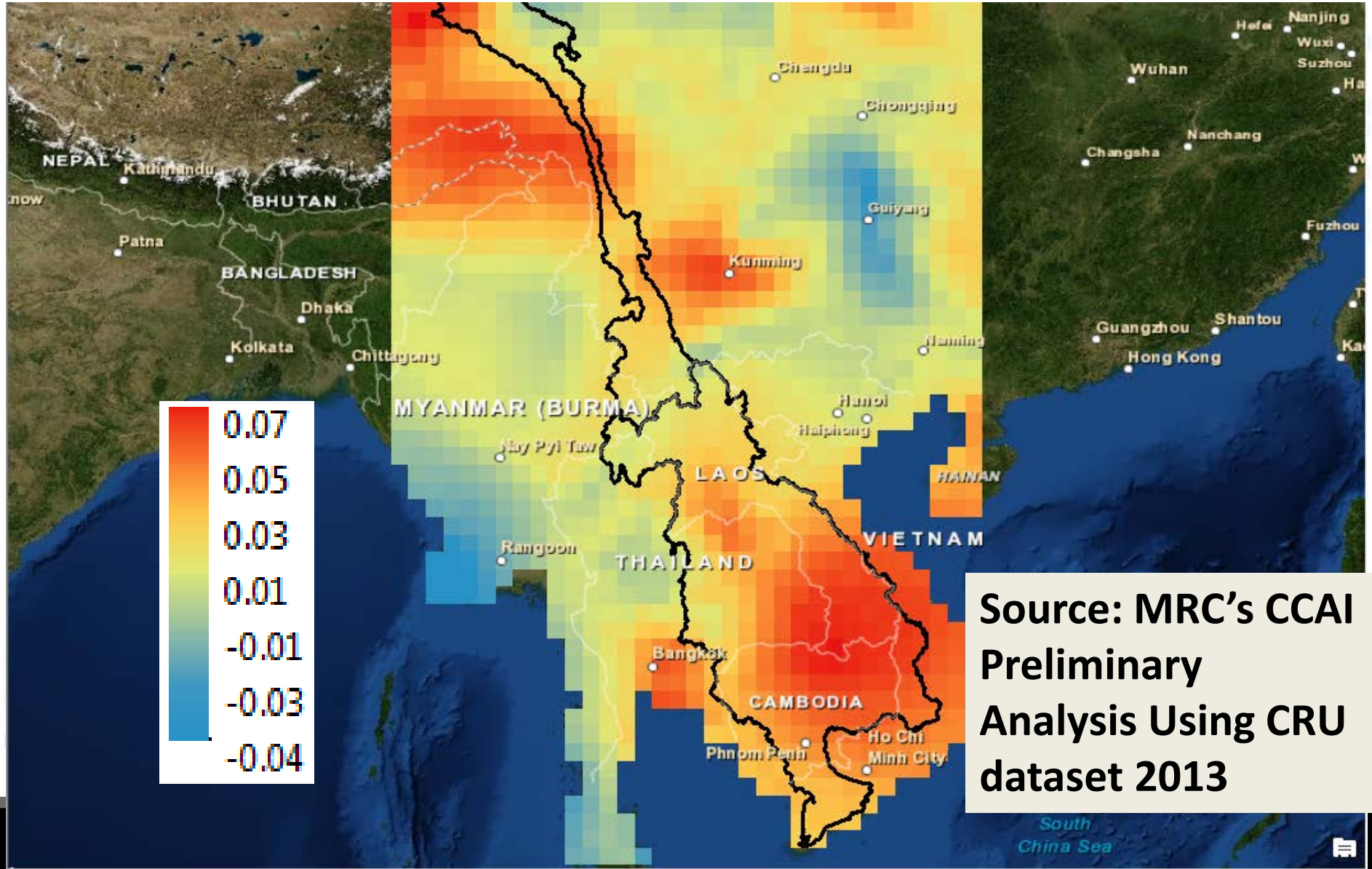
- Summer precipitation is likely to increase in most of Southeast Asia.
- Extreme rainfall and winds associated with tropical cyclones are likely to increase in Southeast Asia.

Observed change of climate in the LMB

- Increases in mean annual temperature are identified regardless of the spatial extent and the periods considered. The magnitude of increases depends, however, on the location and on the length of the data records.
- A wide range of increase rates between approx. +0.01 °C/decade and +0.18 °C/decade is reported.
- Minimum and maximum temperatures are also found to have increased. Consequently, hot days and nights have become more frequent, while the number of cold days and nights has decreased.

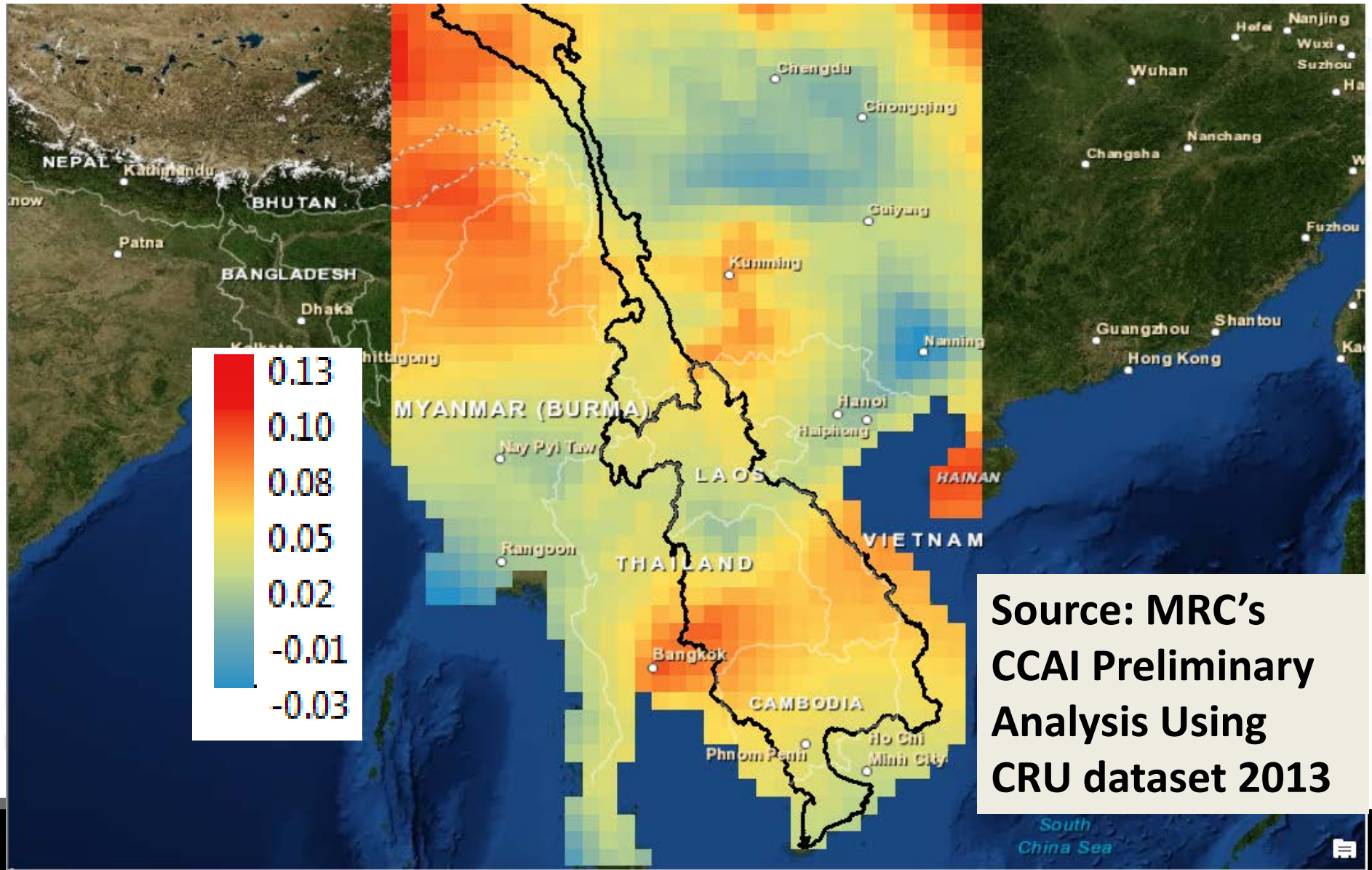
(Source: MRC CCAI Review of the Literature on Climate Change and Adaptation in the Water Environment of the Lower Mekong Basin, Draft, 2013)

Observed change of climate in the LMB: Trend in annual mean maximum temperature 1901 – 2011 (°C/10year)



Source: MRC's CCAI Preliminary Analysis Using CRU dataset 2013

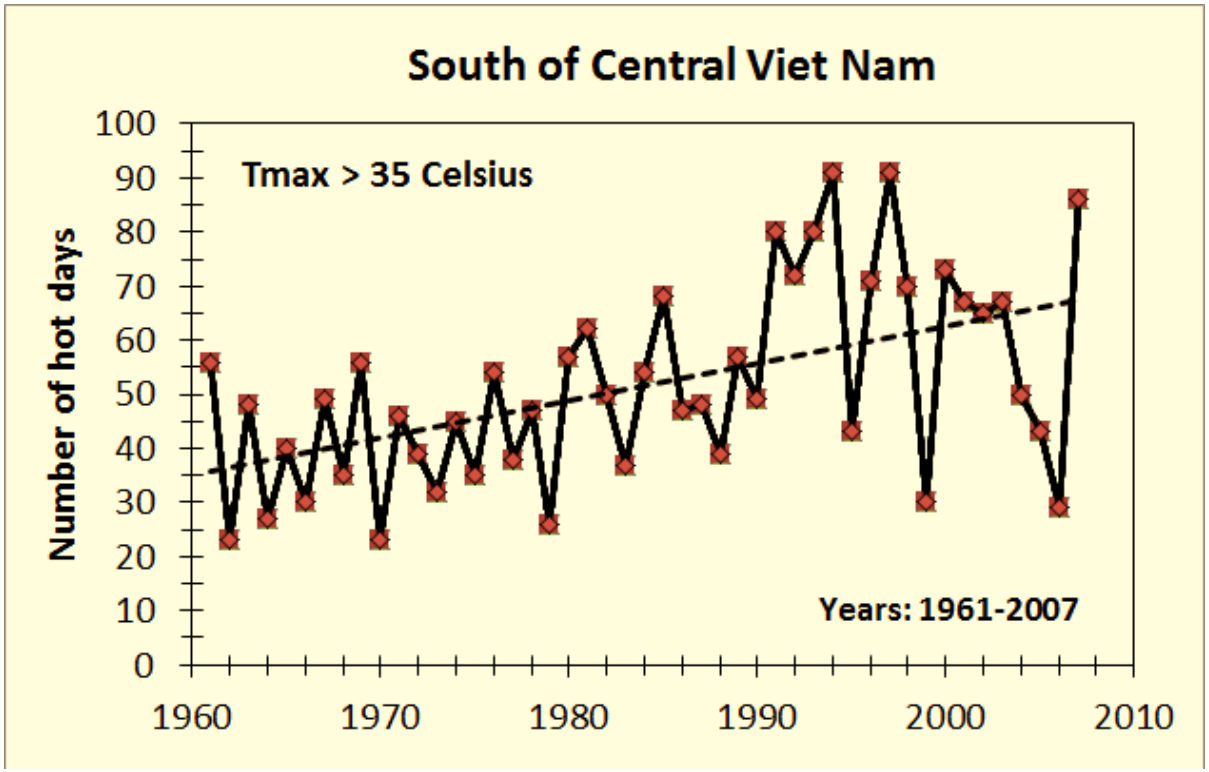
Observed change of climate in the LMB: Trend in annual mean minimum temperature 1901 – 2011 (^{o}C/10year)



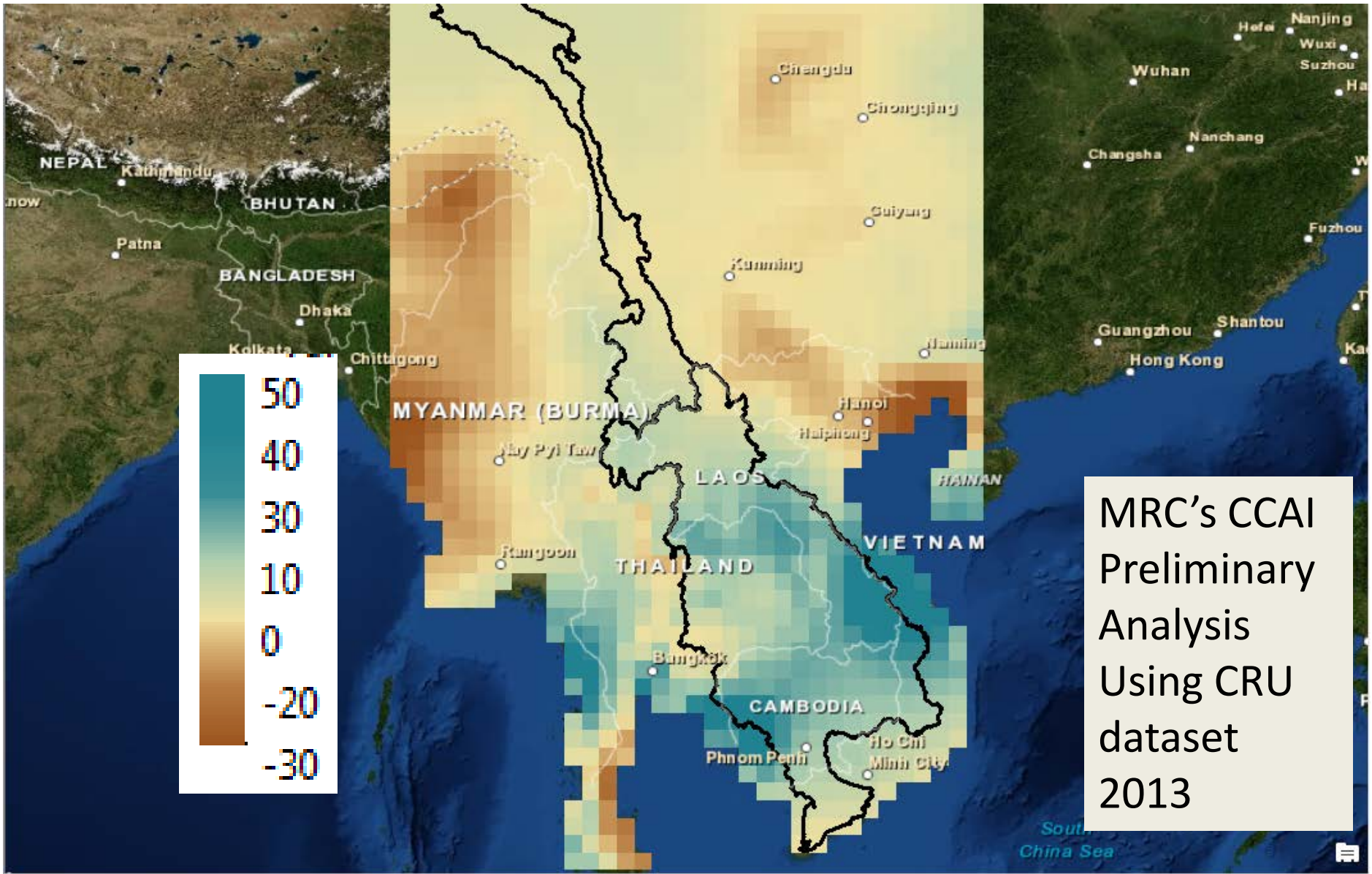
Source: MRC's CCAI Preliminary Analysis Using CRU dataset 2013

Observed change of climate in the LMB (5): Increase of extremely hot days 1961-2007

- Near doubling of days with max temperature > 35 degrees

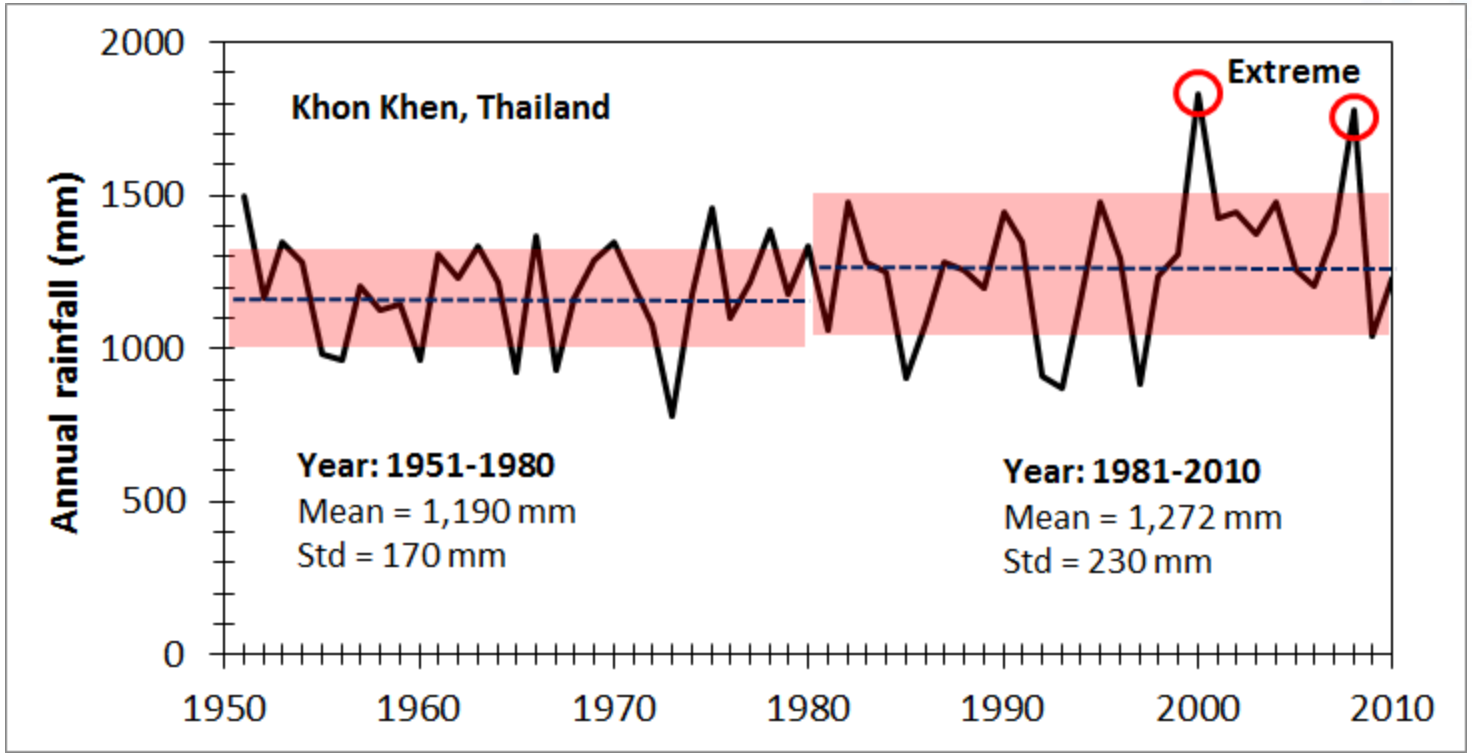


Observed change of climate in LMB:
Trend in annual rainfall total 1901 – 2011 (mm/10year)



MRC's CCAI Preliminary Analysis Using CRU dataset 2013

Observed change of climate in the LMB: Increase in variability of rainfall 1951-2010

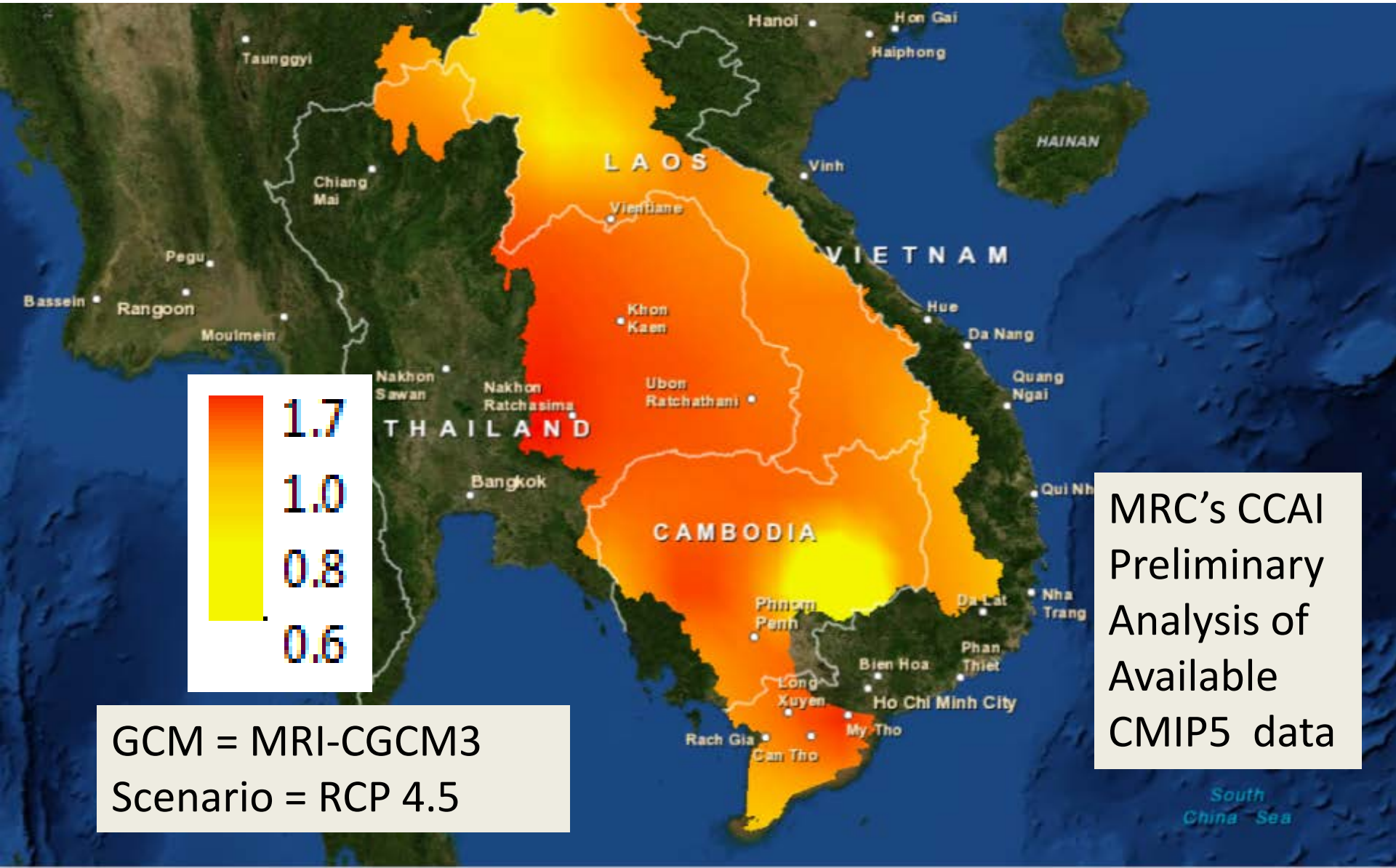


Projected future change of climate in the LMB

- Information on future climate change is usually derived from climate projections which are based on model chains consisting of a combination of emission scenarios, global and regional circulation models or another downscaling procedure.
- Temperature is reported to continue to increase depending among others on the considered spatial extent, the emission scenario, the length of reference and future period and the climate models used.

(Source: MRC CCAI Review of the Literature on Climate Change and Adaptation in the Water Environment of the Lower Mekong Basin, Draft, 2013)

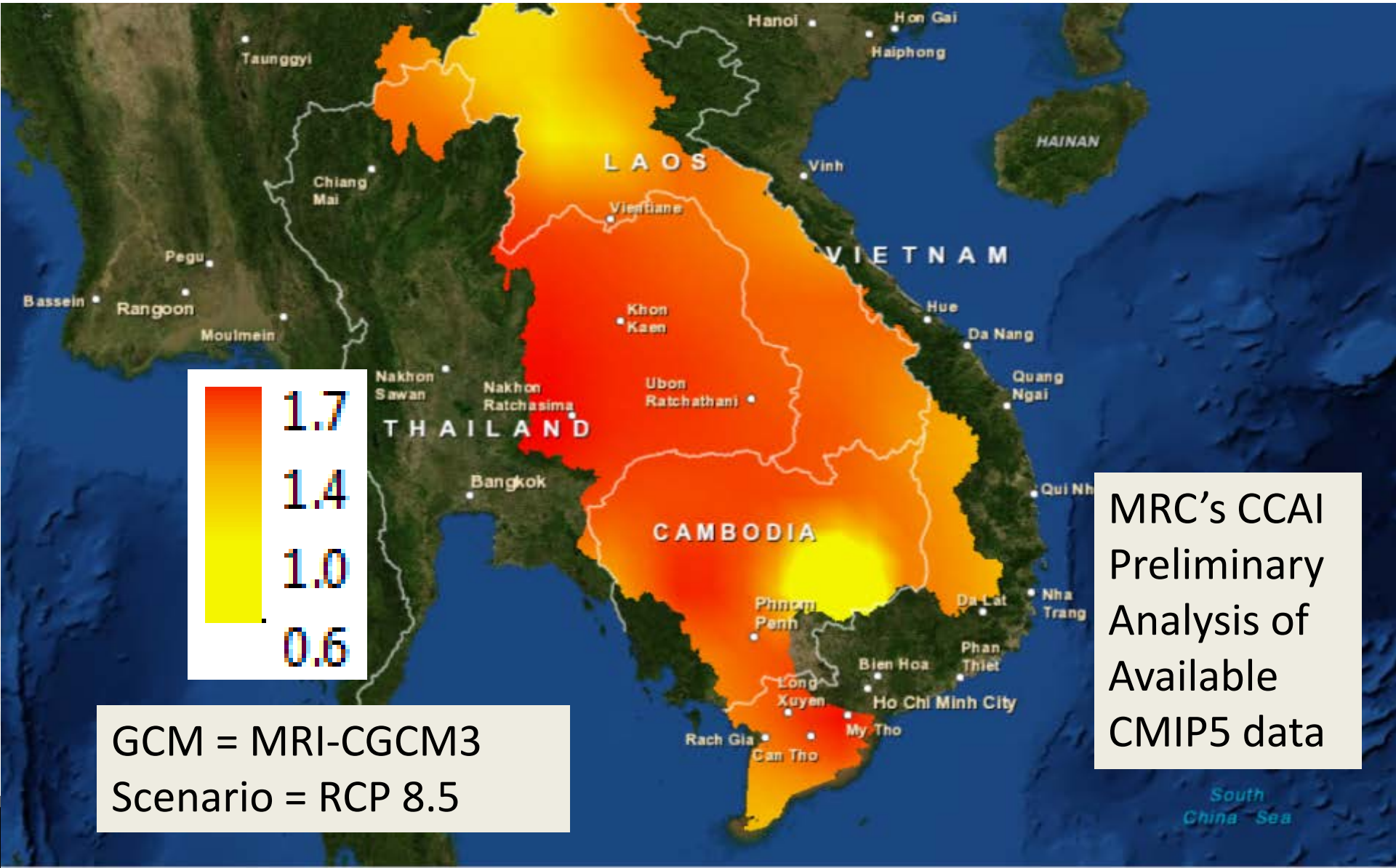
Examples of projected future change of climate in LMB (1): Low-scenarios annual mean max temperature change in 2050 (^{o}C)



GCM = MRI-CGCM3
Scenario = RCP 4.5

MRC's CCAI Preliminary Analysis of Available CMIP5 data

Examples of projected future change of climate in LMB: High-scenarios annual mean max temperature change in 2050 (^{o}C)



GCM = MRI-CGCM3
Scenario = RCP 8.5

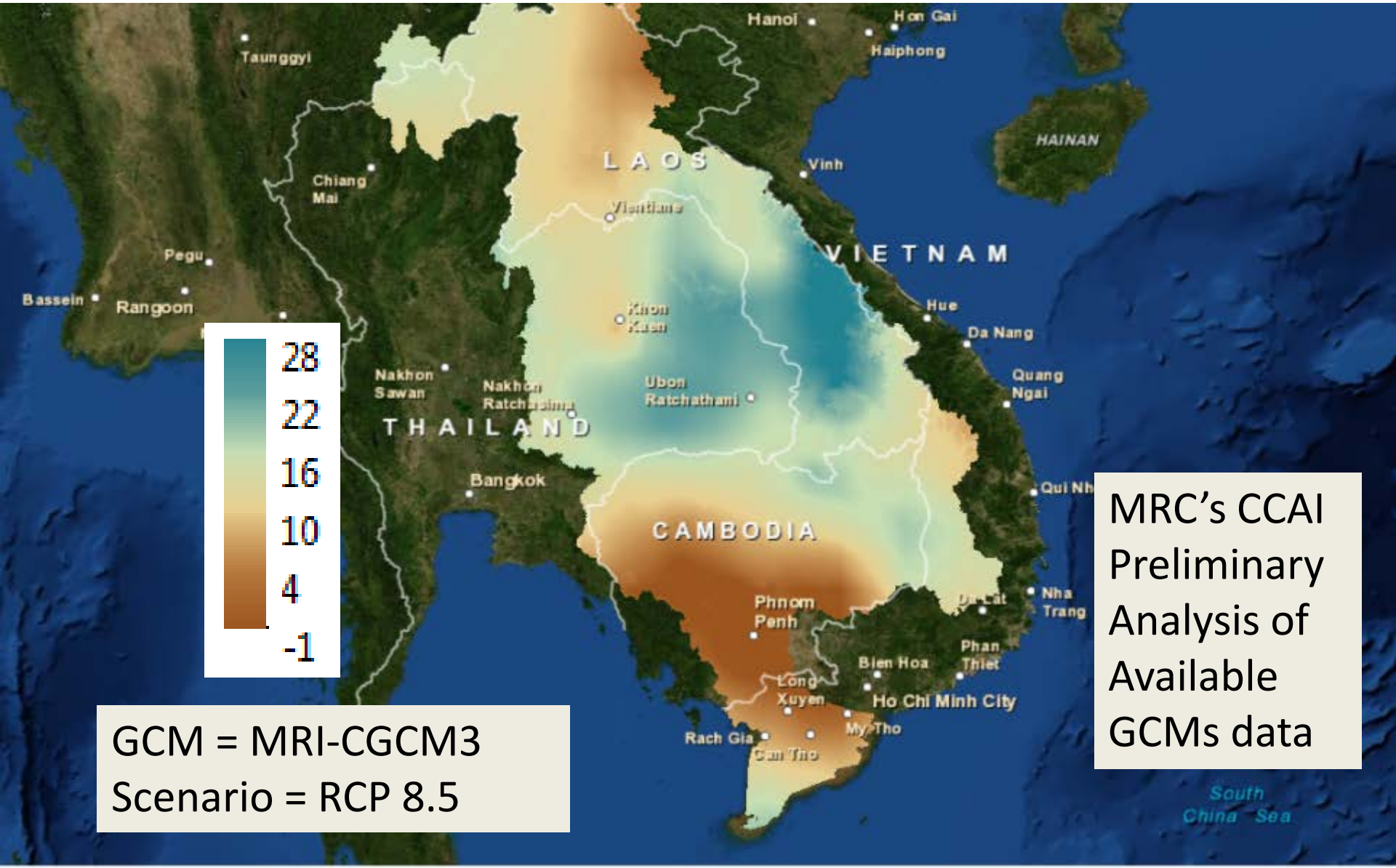
MRC's CCAI Preliminary Analysis of Available CMIP5 data

One Impact of extremely hot days – Workers MUST rest above 26°

- Maximum working temperature is 26 °C, for physical labour and beyond that level the proportion of rest time recommended increases by approximately **20%** per °C.

Ref Loss of worker productivity due to projected climate change Tord Kjellstrom, B Lemke 2009 IOP Conf. Ser.: Earth Environ. Sci. 6 522003

Examples of projected future change of climate in LMB: High-scenarios annual rainfall total change in 2050 (%)



GCM = MRI-CGCM3
Scenario = RCP 8.5

MRC's CCAI Preliminary Analysis of Available GCMs data

Impacts of climate change

Climate change

Impacts on hydrology

- Rainfall
- Water balance

Impacts on hydrodynamics & morphology

- Flow
- Sediment

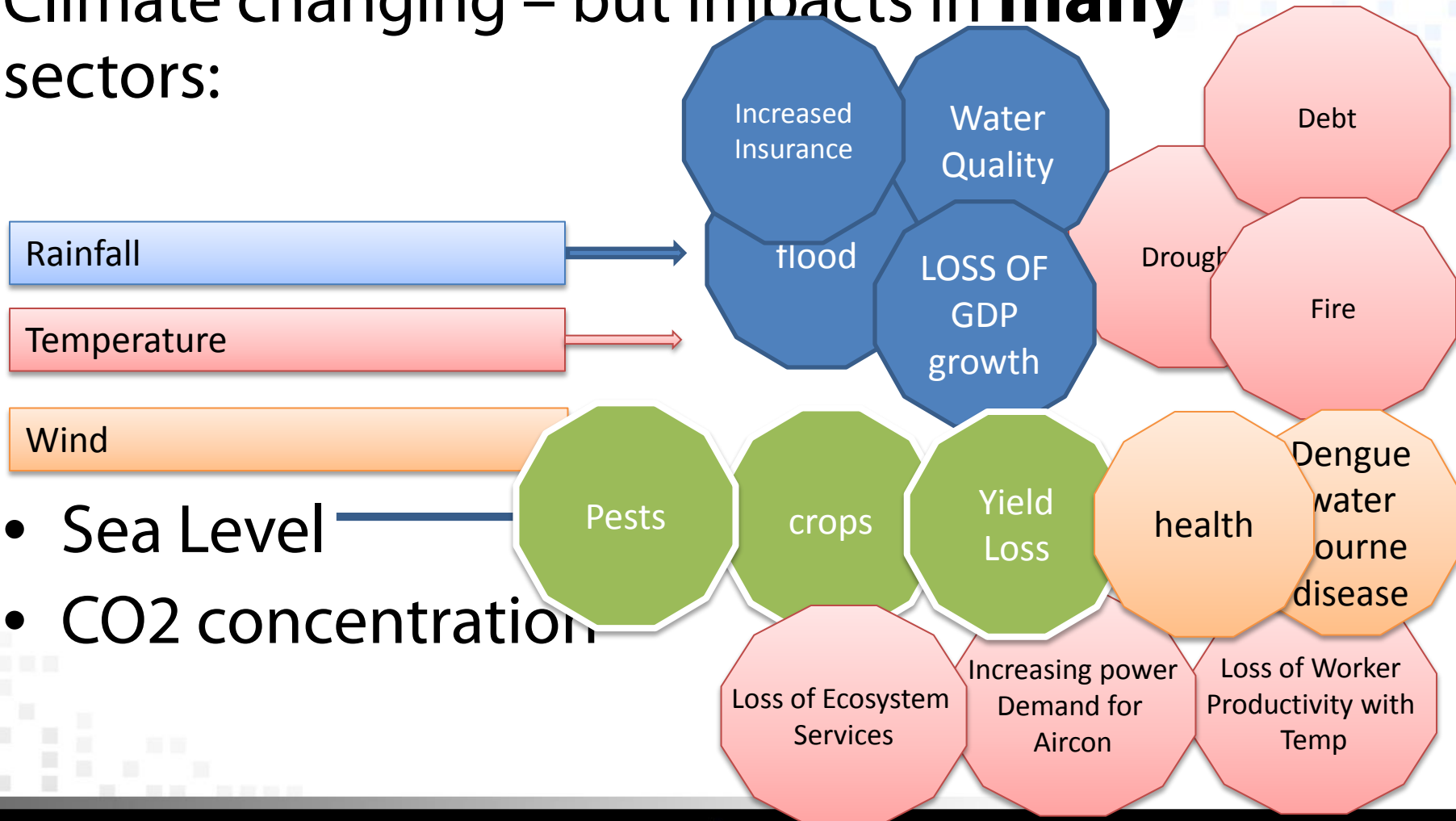
Impacts on ecosystems

Impacts on hydropower yields and operation

Impacts on agriculture, fisheries …

Climate Change Impacts

Climate changing – but impacts in **many** sectors:



- Sea Level
- CO2 concentration

Impacts of future and existing climate change on water related topics (1)

- There are many sectors which will be affected by changing climatic conditions and related modifications of the hydrological conditions.
- The results for change in river flow are as heterogeneous as the results for precipitation.
- As the expected changes in discharge are very heterogeneous, it is difficult to assess the likely impact of climate change on hydropower in the LMB. Also statements of future sediment transport and geomorphologic changes are insecure.

(Source: MRC CCAI Review of the Literature on Climate Change and Adaptation in the Water Environment of the Lower Mekong Basin, Draft, 2013)

Impacts of future and existing climate change on water related topics (2)

- Estimation of impacts on agriculture and fisheries throughout the basin deserves more comprehensive assessment.
- The effects of rising sea level and increased salinity could negatively affect agriculture in the downstream areas.
- The effects on biodiversity and ecosystems can also be influenced by indirect effects which are difficult to foresee.
- Climate change can influence human health. Higher temperatures may especially affect cardiovascular and vector-borne diseases.

(Source: MRC CCAI Review of the Literature on Climate Change and Adaptation in the Water Environment of the Lower Mekong Basin, Draft, 2013)

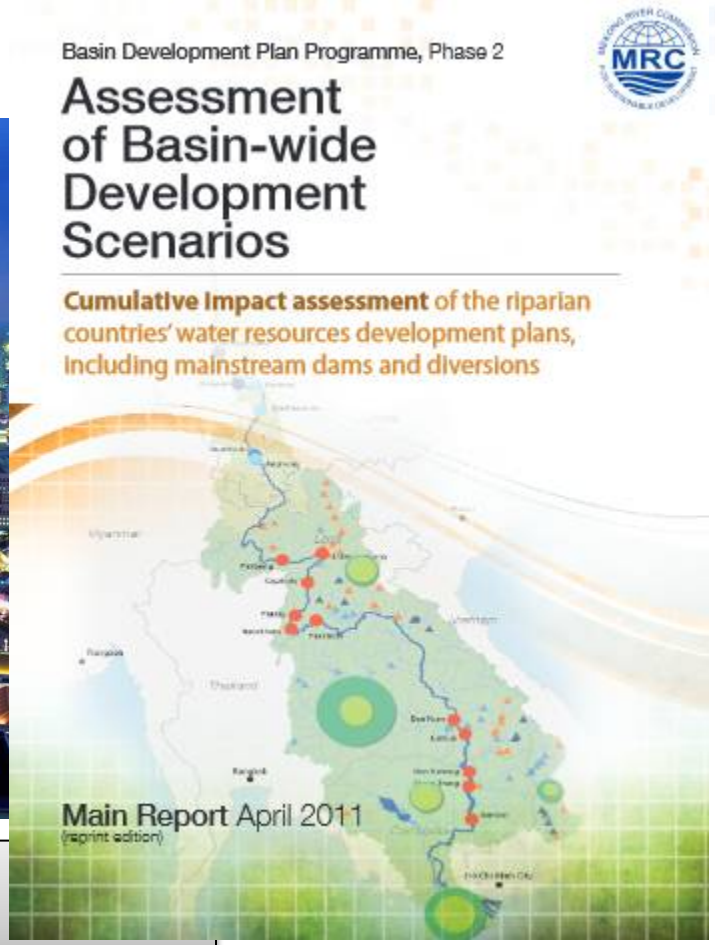
Impacts of future and existing climate change on water related topics (3)

- Infrastructure may suffer from direct effects of climate change (e.g. extreme rainfall, high temperatures) and indirect effects (e.g. landslides and prolonged flooding).
- Regarding socio-economic conditions, climate change may most likely impact the gross domestic product (GDP) negatively according to results of Integrated Assessment Models.

(Source: MRC CCAI Review of the Literature on Climate Change and Adaptation in the Water Environment of the Lower Mekong Basin, Draft, 2013)

Climate Change Impacts must be considered in conjunction with other expected changes

Phnom Penh in 2050?



Best Available Estimates of Climate Change Impacts (2080-2100)

Impact on River and Flood Flows:

12-21% in 2080

Based on AR4, New AR5 results in preparation

Crop Yields

--0.8-+2.5 t/ha

Simulations for Prey Veng New AR5 results now in preparation High Uncertainty

Economy

5.7 % to 6.7% of GDP

High Proportion of non market losses, a proportion may be offset through adaptation

Sources: MRCS, CNMC,ADB

Conclusions

- MRC CCAI is working together with Member Countries (involving the National Climate Change Focal Agencies) to conduct participatory and scientifically sound analyses and assessment to improve the understandings on climate change impacts and suitable adaptation actions. This helps contribute to the enhancement of the adaptive capacity of the Member countries and the region as a whole.
- To account for uncertainties and overcome the challenges and limitations that exist with understanding future climate change impacts, MRC CCAI is examining the recommendation to move away from scenario first (or top-down) approaches to climate change adaptation.

Thank You !

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CAMBODIA CLIMATE CHANGE ALLIANCE

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