Regional Technical Workshop on Application of Modelling Tools for Climate Change Impact and Vulnerability Assessment
8-9 September 2009, MRCS, Bangkok, Thailand

Vulnerability and Adaptation Assessment of capacity and experiences on climate modeling in Cambodia

For Second National Communication Under the UNFCCC

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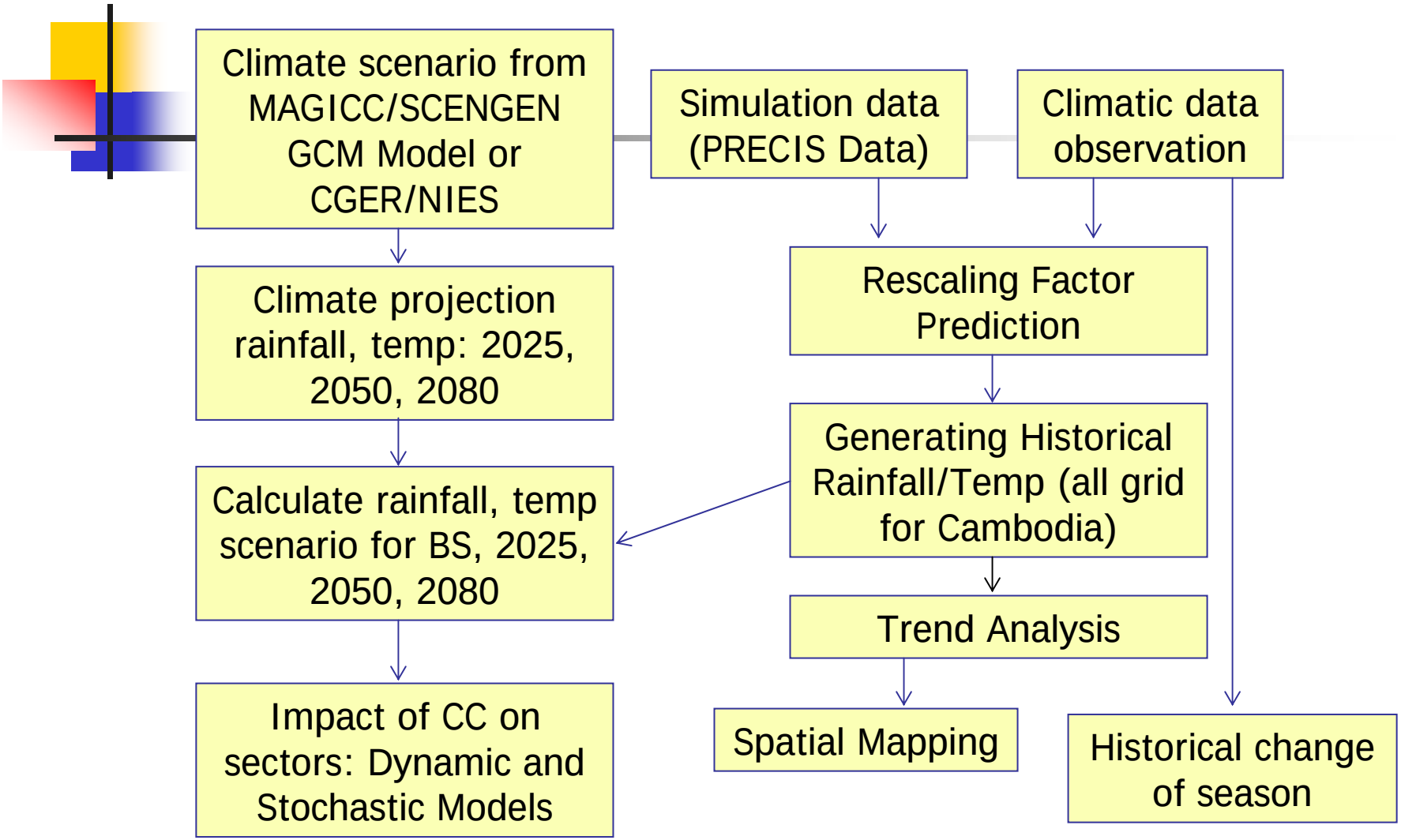
Outline of Presentation

1. Climate model development
2. Past trend analysis and future projection
3. Potential impact of climate change on sectors (dynamic and stochastic models)
4. Climate Change adaptation strategies and linkage with sectoral programs

1. Climate Modeling Development



1. Climate Modeling Development

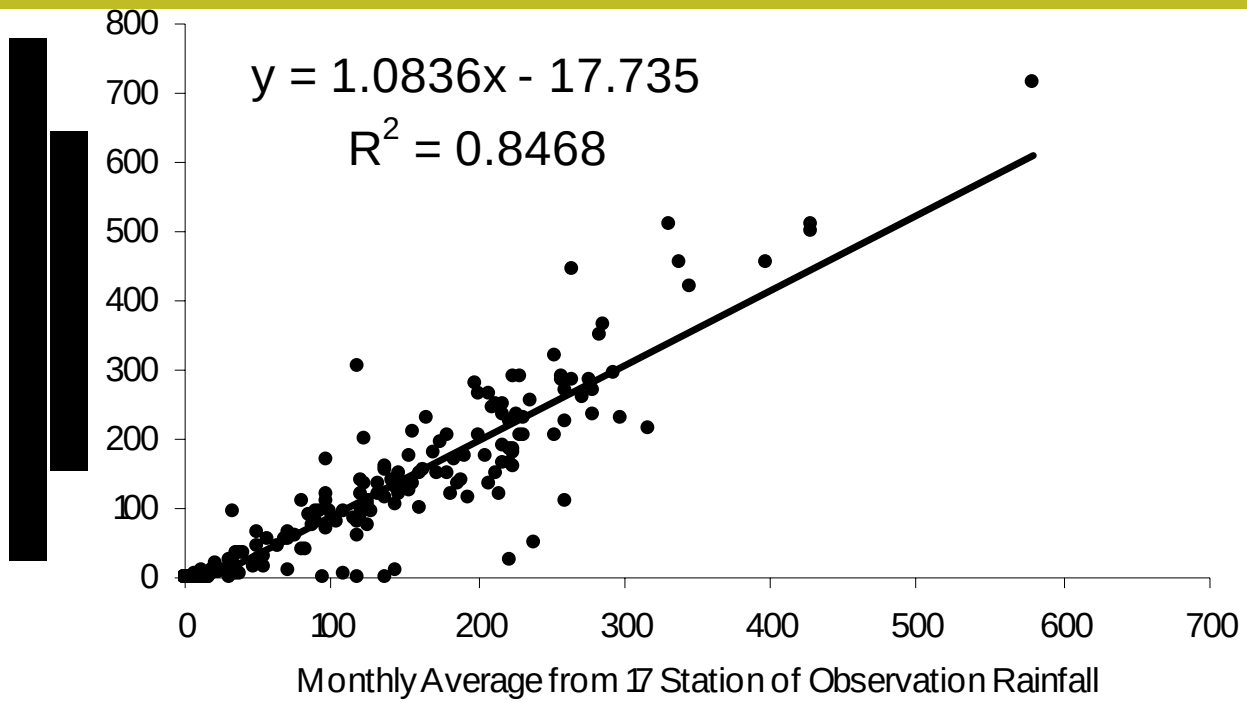
Past climate: Development of Climate Model Problems

- Limited historical climate data (2 stations with long daily data record)
- Poor data quality (many missing data)
- Poor agreement between available GCM models and observation

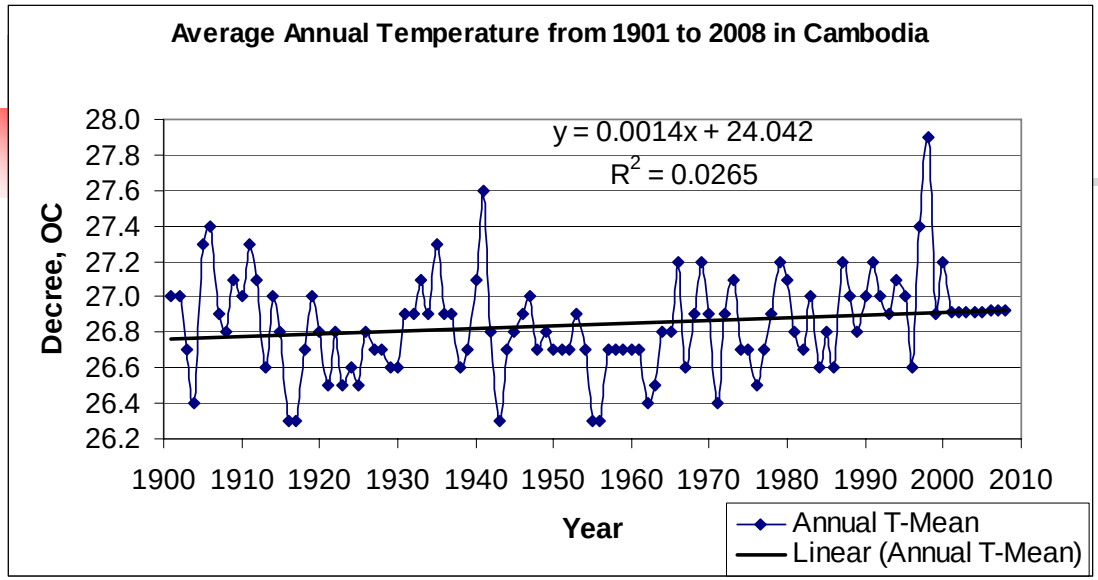
2. Past trend analysis and future projection

- Trend analysis and reconstructed climatic data with observed data and PRECIS data of ECHAM4 regional climate model
- Future climate: *(MAGICC/SCENGEN data or 14 GCMs from Center for Global Environmental Research, NIES-Japan)*

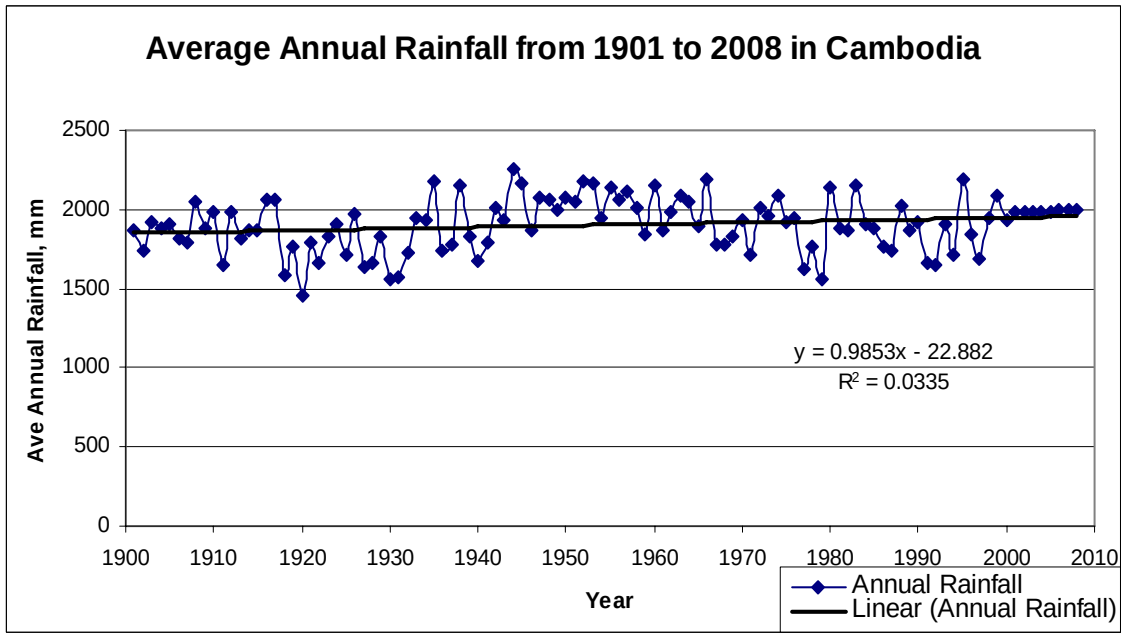
Comparison between Observation and Reconstructed Data of 17 stations



2. Past trend analysis and future projection

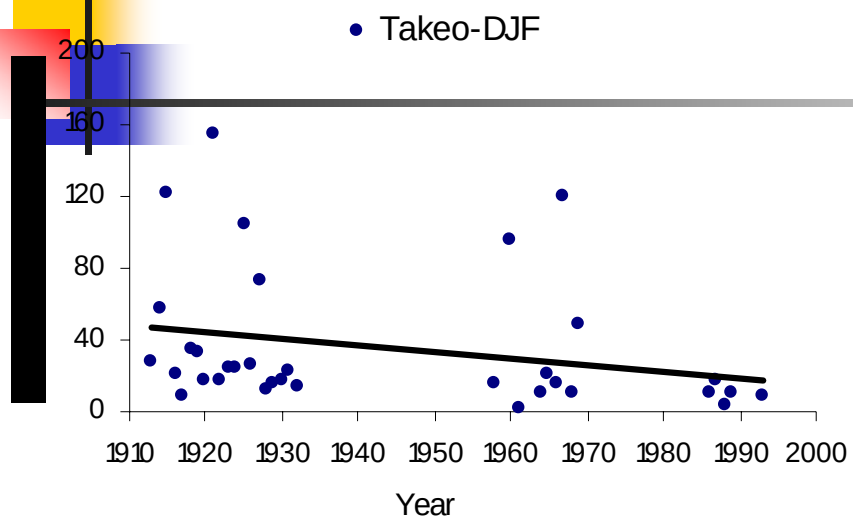


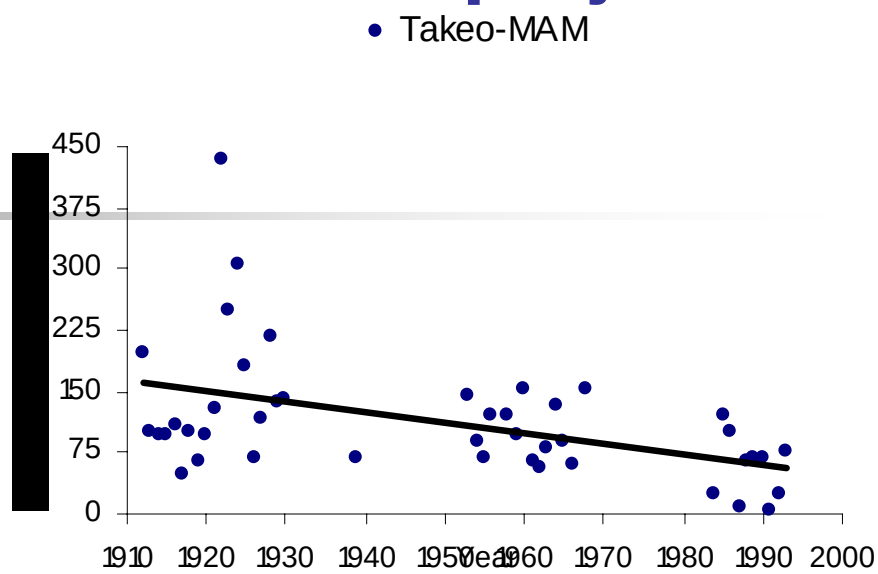
Trend Analysis Rainfall and Temperature from 1900-2008

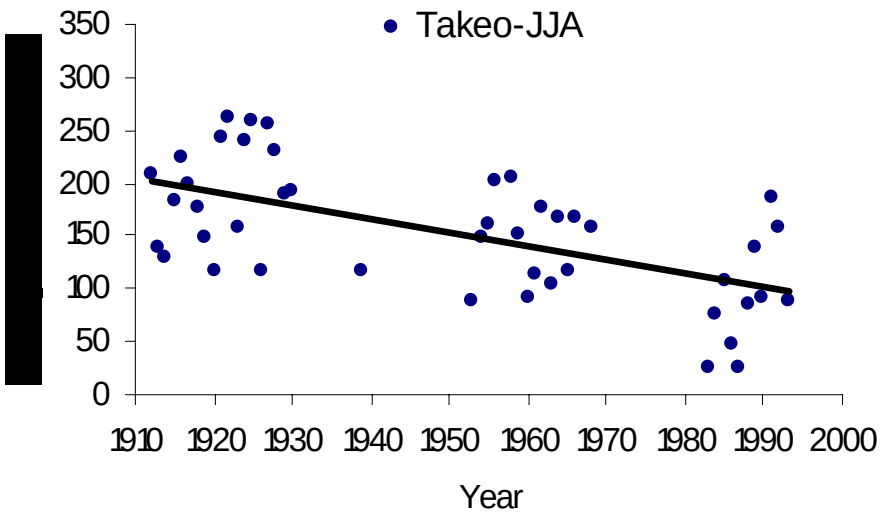


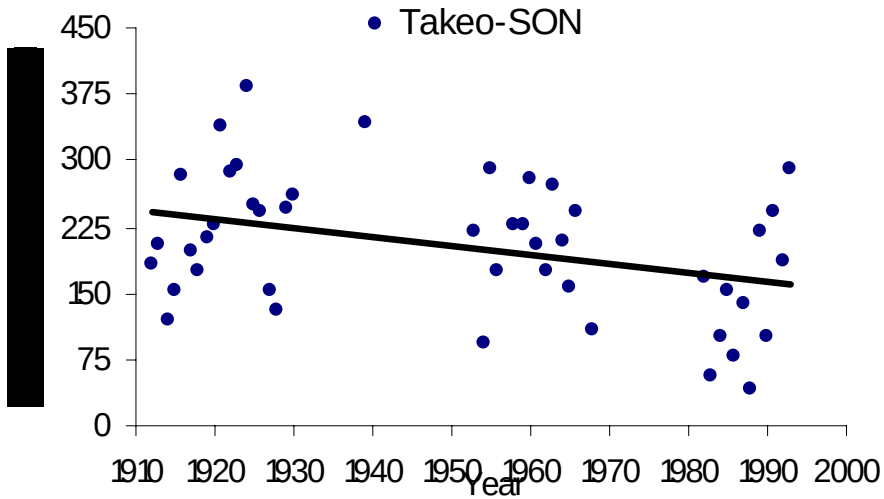
2. Past trend analysis and future projection

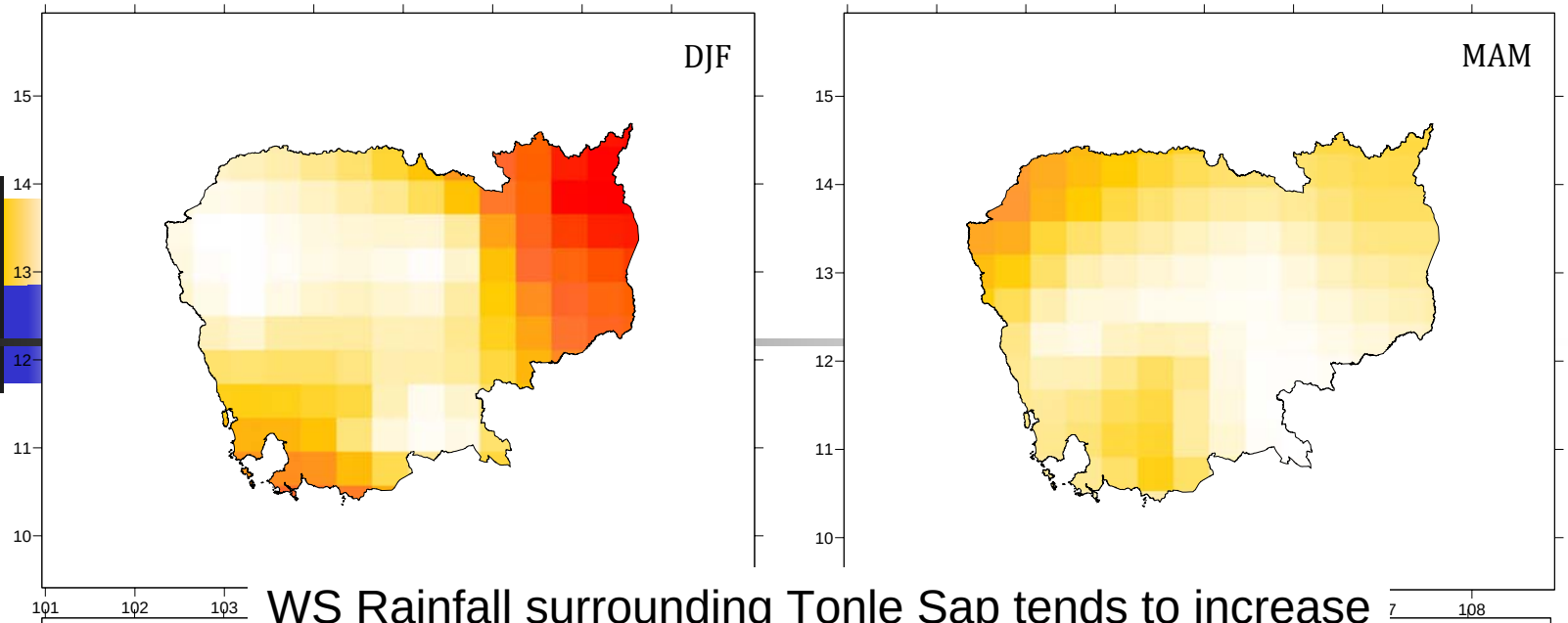
Trend Analysis



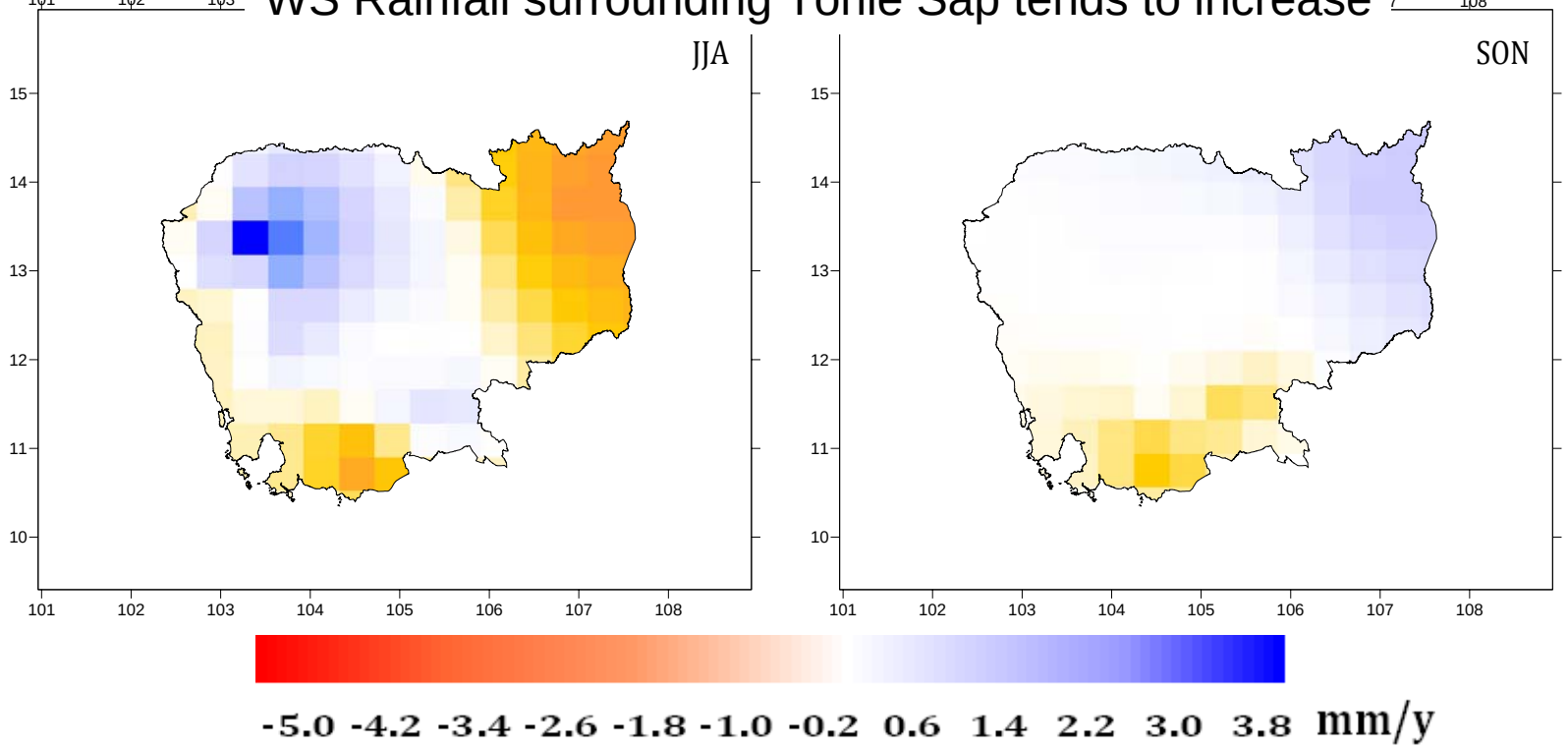








WS Rainfall surrounding Tonle Sap tends to increase



2. Past trend analysis and future projection

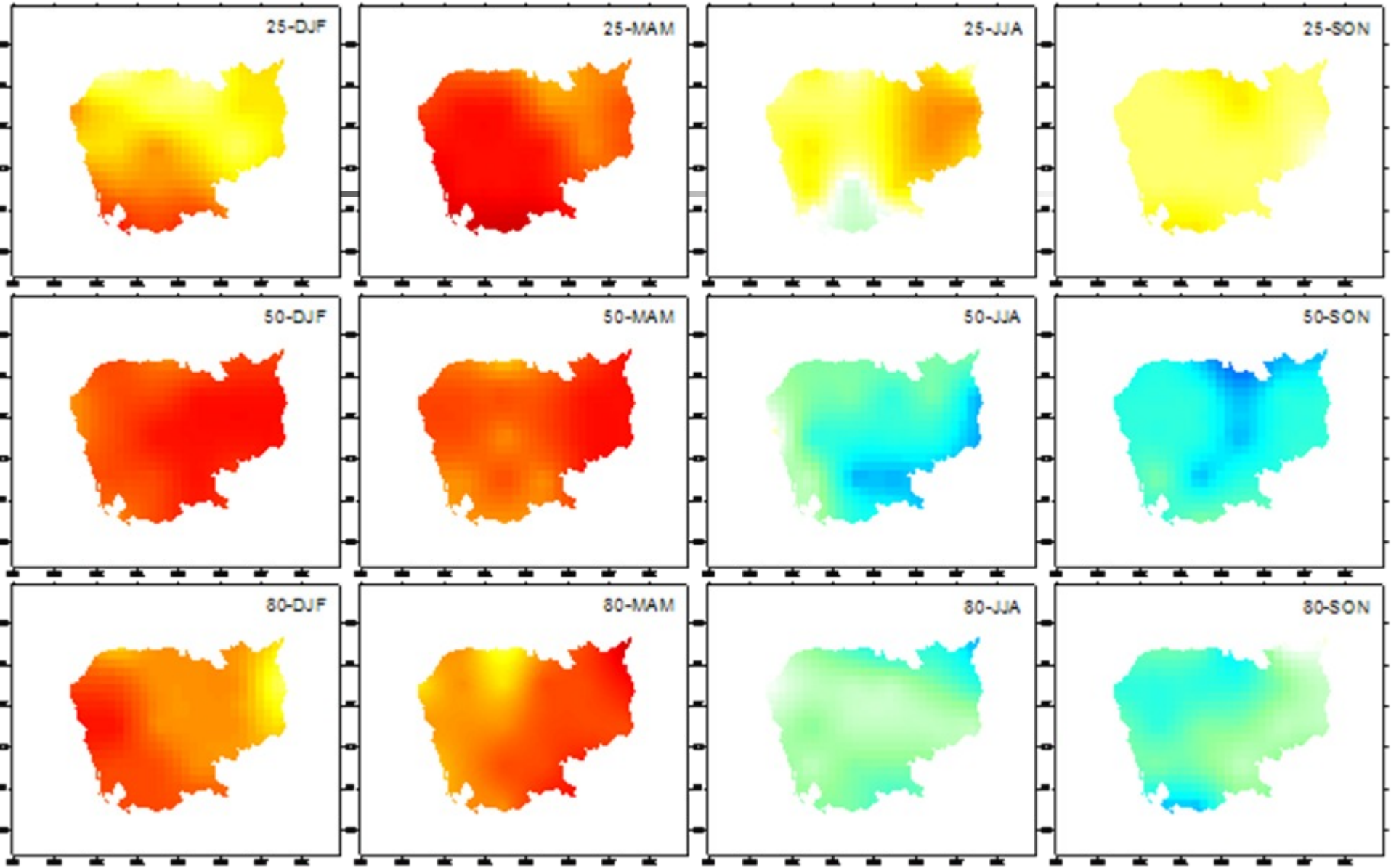
GCM Models: Resolution 1°x1°

(100 km x 100 km)

- bccr_bcm2_0
- cccma_cgcm3_1
- cnrm_cm3
- gfdl_cm2_0
- gfdl_cm2_1
- giss_model_e_r
- inmcm3_0
- ipsl_cm4
- miroc3_2_medres
- miub_echo_g
- mpi_echam5
- mri_cgcm2_3_2a
- ukmo_hadcm3
- ukmo_hadgem1

14 GCM Models were run by Climate Risk Assessment Division, Center for Global Environmental Research, National Institute for Environmental Studies, 16-2 Onogawa, Tsukuba, Ibaraki 305-8506, Japan

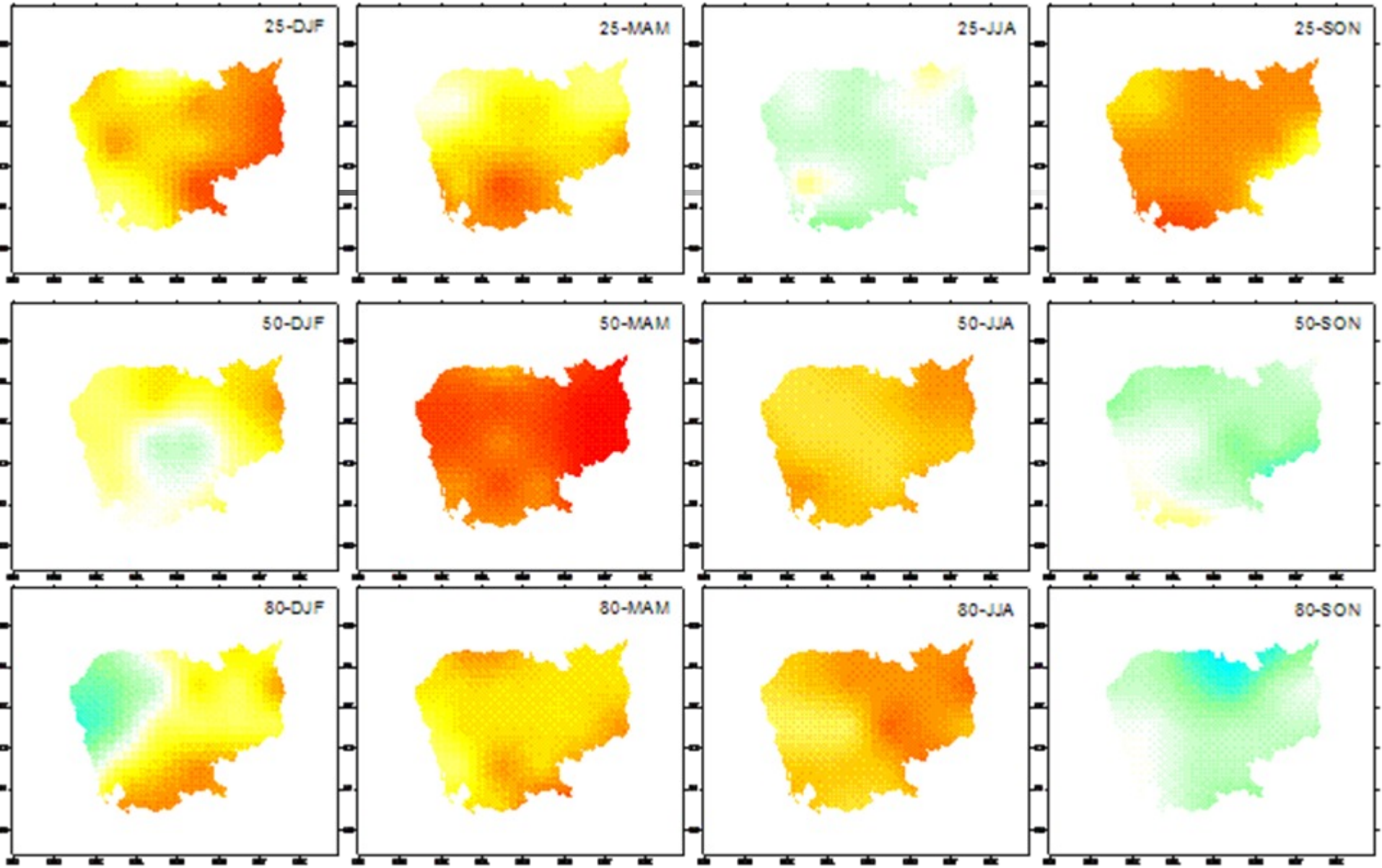
SRESA2: Trend of rainfall change based on 14 GCMs



All models predict rainfall will increase

All models predict rainfall will decrease

SRESB1: Trend of rainfall change based on 14 GCMs



Key message for GCM

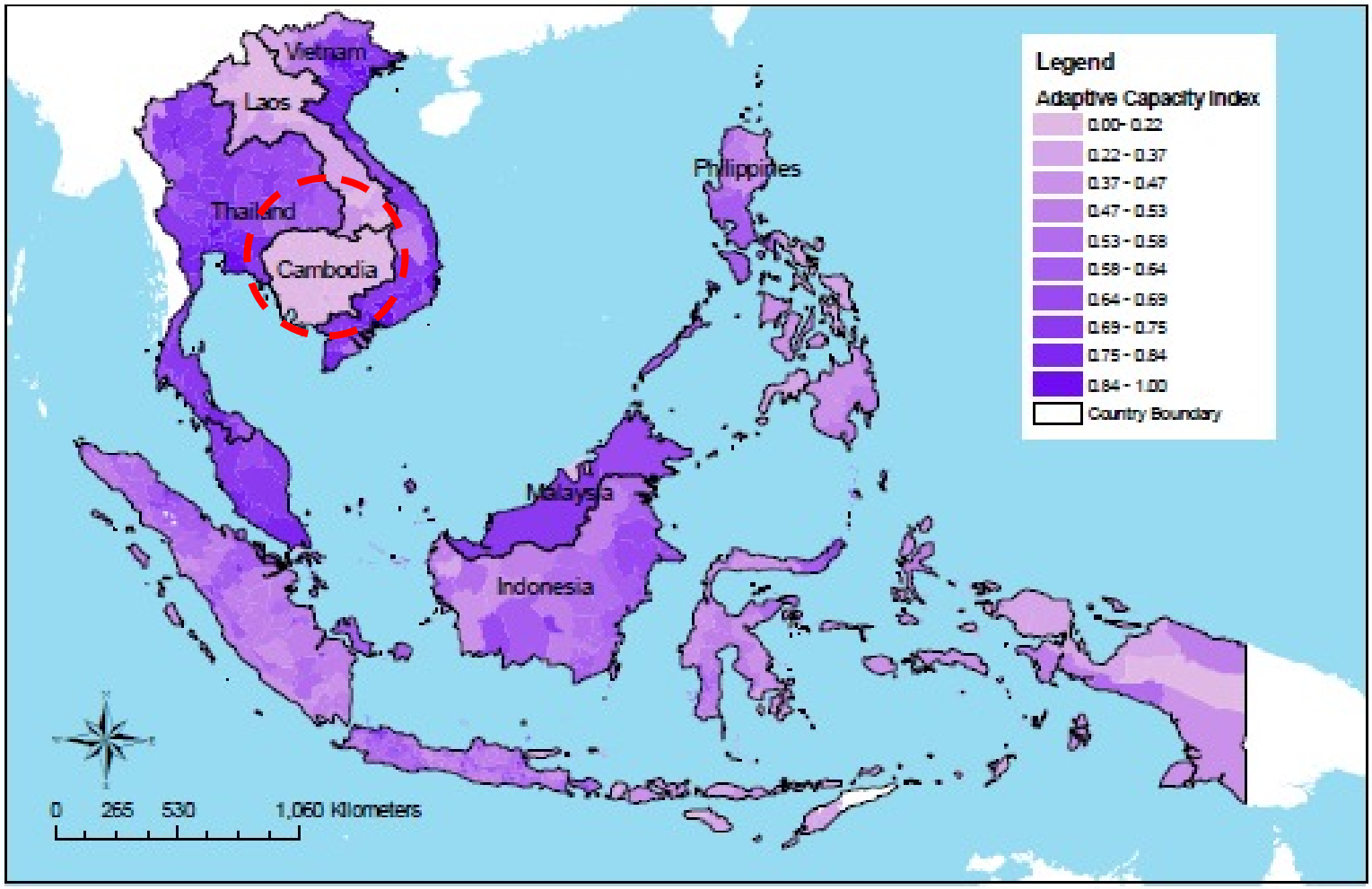
- Under high emission scenarios (SRESA2)
  - DS rainfalls DJF and MAM will decrease with high probability and WS JJA and SON rainfall may increase but with lower probability than the DS rainfall. This suggests that the onset of rainy season may delay in the future under this emission scenario.
  - WS rainfall DJF will decrease until 2025 and then increase again in 2050 and 2080
- Under low emission scenarios (SRESB1)
  - Similar with SRESA2 DS rainfall will increase but with lower probability.
  - Different with SRESA2, WS rainfall DJF will increase in 2025 and then decrease again in 2050 and 2080
- Global community achievement in reducing GHG emission will have different implication on Cambodia

3. Potential Impact of CC on Sectors

- Cambodia used dynamic impact model in V&A assessment for agriculture sector while other sectors still use stochastic-based models. Due to data limitation, many other non-Annex I also used stochastic-based model
- Return period of extreme flood will change
- Rice yield will change and harvest failure due to extreme climate may increase or decrease
- Human health may be affected
- Water balance will change (period of deficit may be longer or shorter depending on region)
- Risk of forest fire will increase

Key Vulnerabilities Assessment

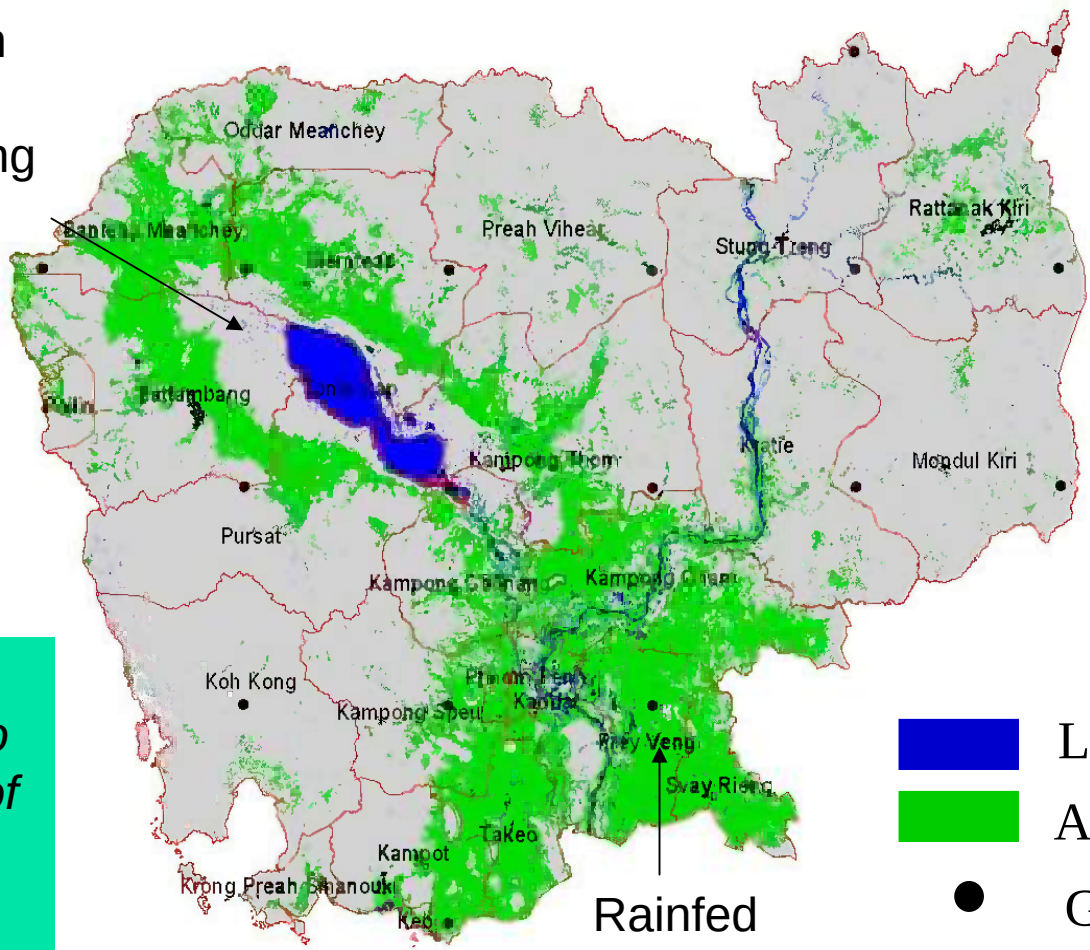
Adaptive Capacity (function of socio-economic, technology and infrastructure)



Cambodia along with Laos has lowest Adaptive Capacity compare to other SEA member countries (Source: Yusuf and Fransisco, 2009)

Distribution of Agriculture Land in Cambodia in 2008

Recession rice (8%), surrounding Tonle Sap

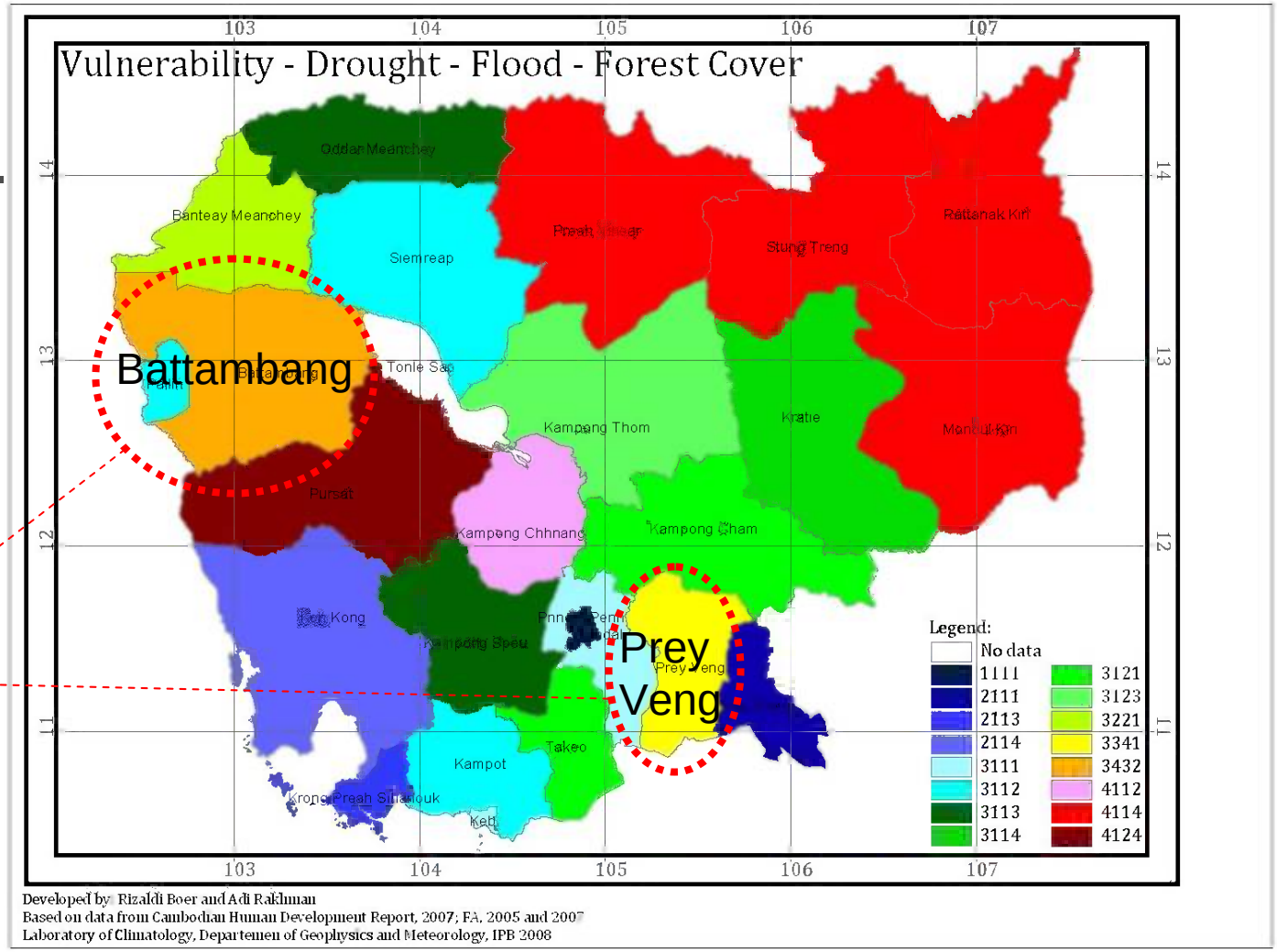


Rainfed WS rice (85%)

Flood and Drought are two main climate hazards in Cambodia

Rice alone contribute to about 80% of total agriculture production

Climate-Vulnerability Index (CVI) for Agriculture System

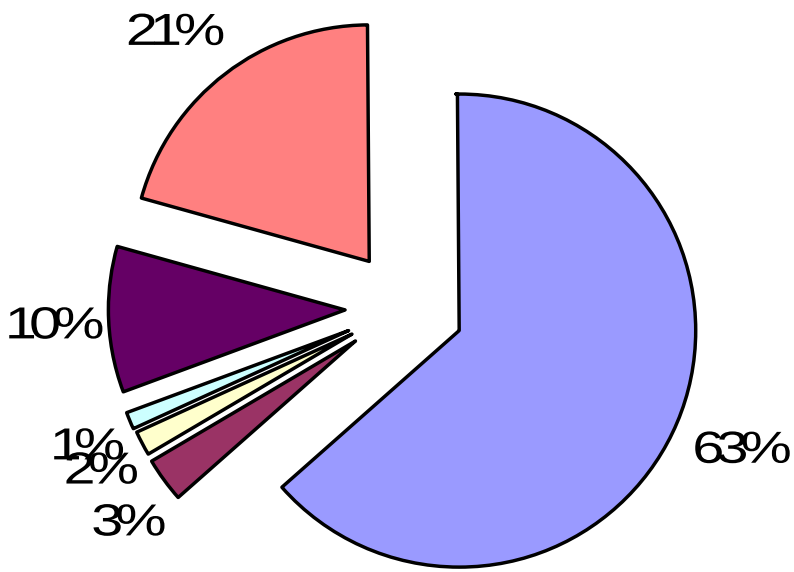


The most vulnerable province

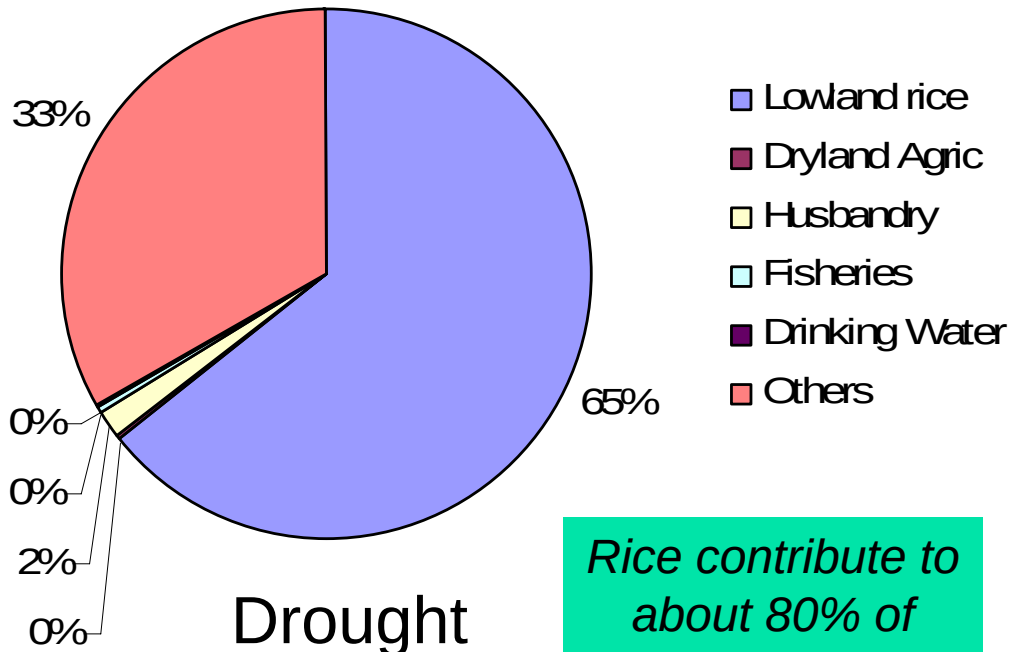
- CVI-1111 means the province has low level of vulnerability (Category 1), has low flood (Category 1) and drought (Category 1) experience and low forest cover (Category 1)

Vulnerable Sub-sector in Agriculture to Climate Hazards

Based on Survey at Prey Veng, the most vulnerable province to climate hazards, rice farming is the most vulnerable sub-sector to climate hazards



Flood

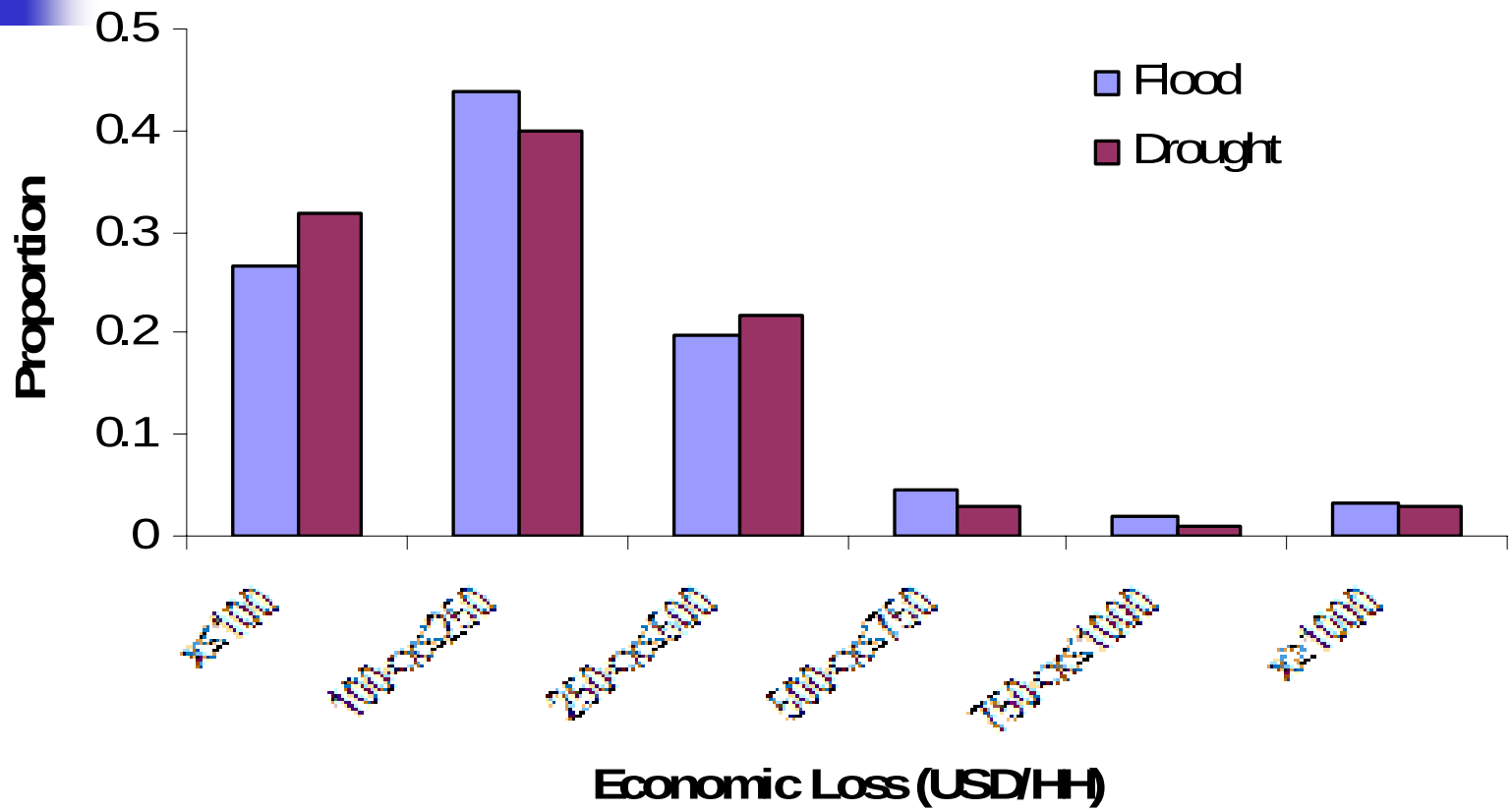


Drought

Based on interview with 417 respondents

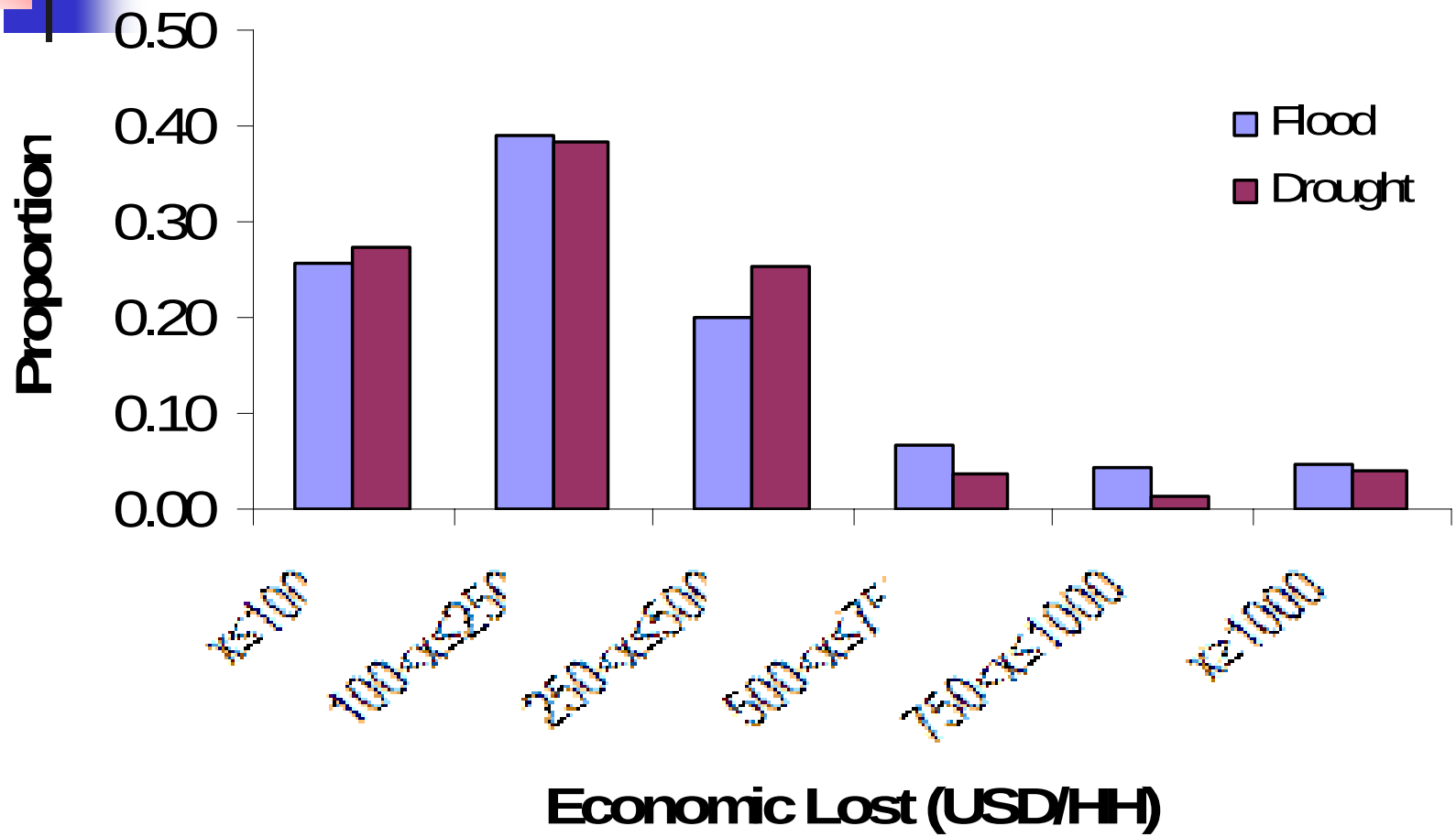
Rice contribute to about 80% of total agriculture commodities production

Economic Lost from Rice Crops due Flood and Drought Hazard



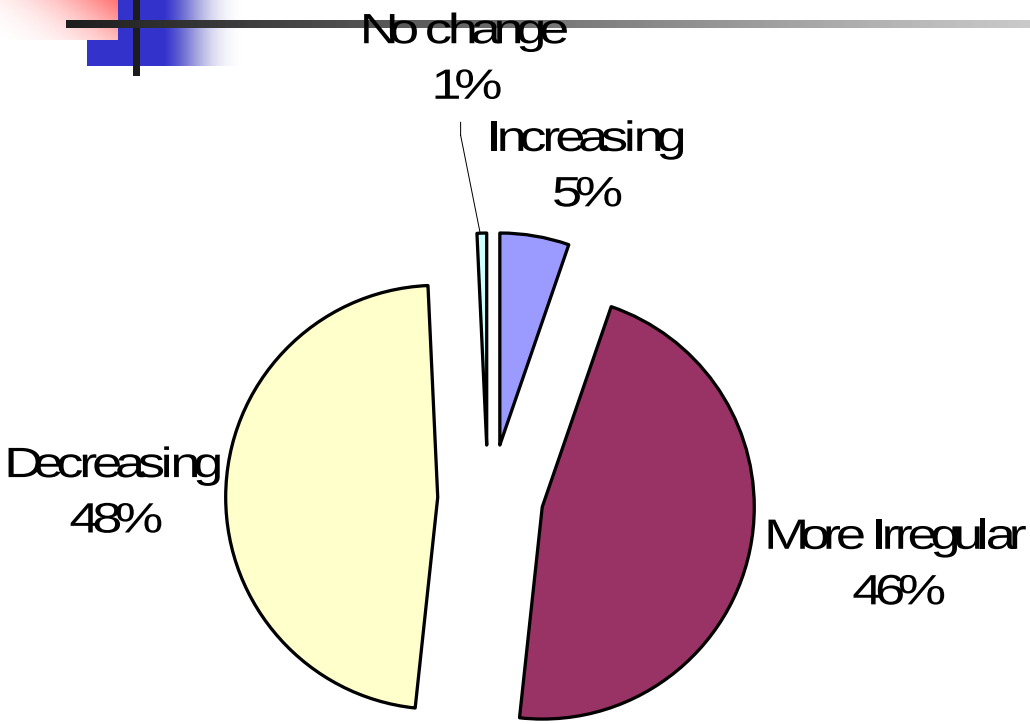
Based on Survey at Prey Veng Province in 2009

Economic Lost from all sectors due Flood and Drought Hazard

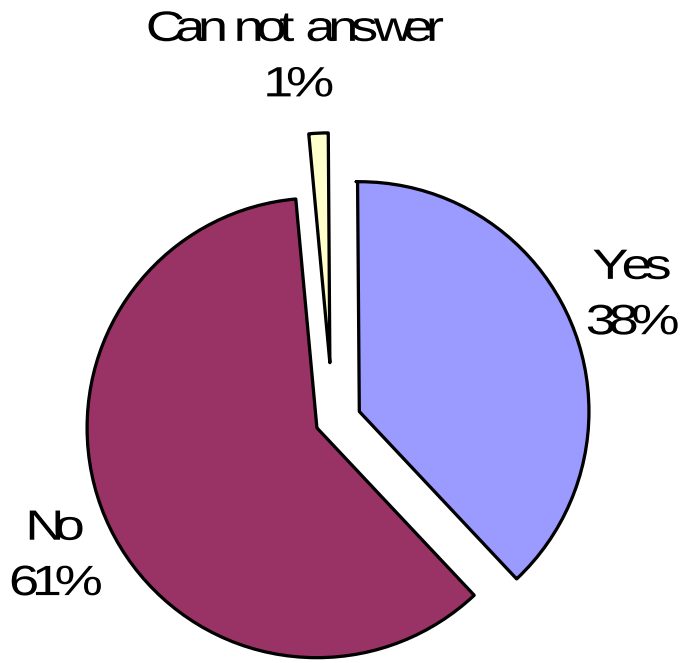


Based on Survey at Prey Veng Province in 2009

Farmers perception on change in drought and flood severity?



Flood frequency and intensity



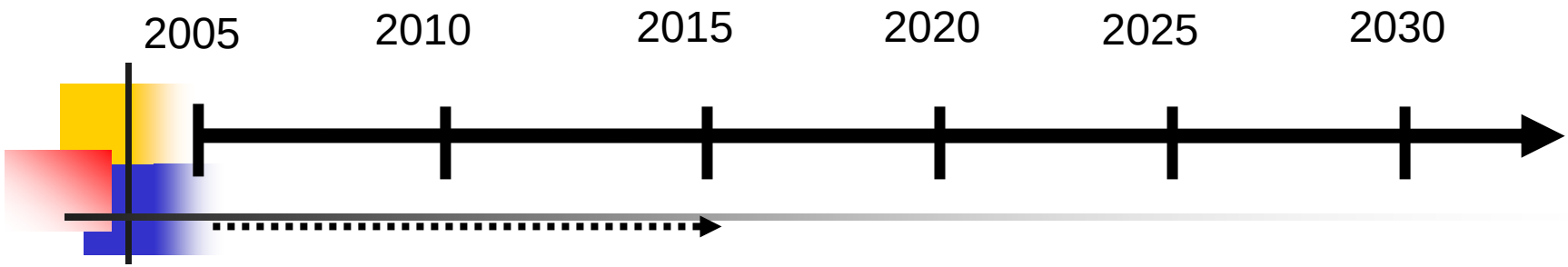
Drought severity increase?

Based on Survey at Prey Veng Province

4. CC Adaptation Strategies and linkage with Sectoral Programs

- CC Adaptation Strategies and linkage with Sectoral Programs
  - Prioritized CC adaptation program
  - Integration of climate change adaptation into development program (sectoral and national and regional)
- Designing horizon plan of adaptation using the result of impact studies and evaluating cost-benefit of implementing adaptation measures

Example: Horizon Plan for Adaptation



- Measures: Adjust the cropping pattern following the climate forecast
- Improve crop management
- Improved irrigation facility and irrigation efficiency
- Provide more opportunity for alternative economic activities
- Set up policy to ban conversion of rice field to other uses in Java, stand by funding, insurance system
- Expand the rice growing areas to less vulnerable areas, new varieties
- Maintain and increase forest cover in the upstream
- Diversify food consumption
- Develop new irrigation facility in vulnerable rice production centre areas whenever possible to allow for increasing planting index and productivity
- Inter basin transfer

Next Steps

- Engage policy makers to evaluate current programs for addressing climate risks based on V&A assessments and design pilot projects (e.g. NAPA) and research activities that can be used to adjust, expand or modify current plans and programs to adapt to climate variability and change.

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www.camclimate.org.kh