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For sustainable development



# Climate Change Scenarios for the Council Study

Presented by Climate Change Assessment Team

4<sup>th</sup> RTWG Meeting  
Office of the Secretariat in Vientiane  
9 March 2015




[www.mrcmekong.org](http://www.mrcmekong.org)

## Outline

- Progress of Climate Change Assessment
- Baseline and Future Climate – Definitions
- Defining Climate Baseline
- Defining Future Climate Scenarios
- Recommended Future Climate Scenarios
- Recommended Sea Level Rise Scenarios


## Workplan and Progress of Climate Change Assessment Team

No.	Team-Specific Tasks / Target schedule	Climate Change Assessment Milestones
1	Selection of climate change and sea level rise scenarios (June – December 2014)	Technical report on selection of future climate change and sea level rise scenarios for the LMB and for the Council Stuc 
2	Scoping of the climate change assessment (November – January 2015)	Working Paper on Scoping of Assessment of Climate Change Impacts on Selected Water Resources Development and Infrastructure and Water-related Resources in the LMB

## Workplan and Progress of Climate Change Assessment Team

No.	Team-Specific Tasks / Target schedule	Climate Change Assessment Milestones
3	Assessment of climate change impacts on hydrology, biological resources, socio economic and macroeconomic and identification of risks and opportunities caused by climate change (February – October 2015)	Baseline assessment results Scenario assessment results Impact and vulnerability maps Working Papers on Assessment of Climate Change Impacts on (1) Hydrology (2) Biological Resources (3) Socio-economics and Macro-economics (4) Risks and Opportunities for sectors (5) Selected Water Resources Development and Infrastructure in the Lower Mekong River Basin

## Progress of Climate Change Assessment Team

No.	Team-Specific Tasks	Climate Change Assessment Milestones
4	Formulation of recommendations to mitigate impacts and maximize opportunities of future climate change (November – December 2015)	Final Report of the Council Study
5	Building of database and contribution to DSF (January – March 2016)	Database of future climate change projections Datasets and information Built, calibrated and verified assessment methods and tools
6	Capacity building and knowledge transfers (March – June 2016)	Capacity building workshops (2)  Assessment teams of national experts

## Baseline and Future Climate - Definitions

- **Baseline** - represents observable, present-day conditions: 1981-2010
- **Future baseline** - projected future climate under “no change in anthropogenic emissions” or without the emission scenarios: 2030, 2060, etc.
- **Future scenarios**- projected future climate including carbon emission scenarios of 4<sup>th</sup> and 5<sup>th</sup> IPCC Assessment Report (AR4 and AR5): 2030, 2060, etc.

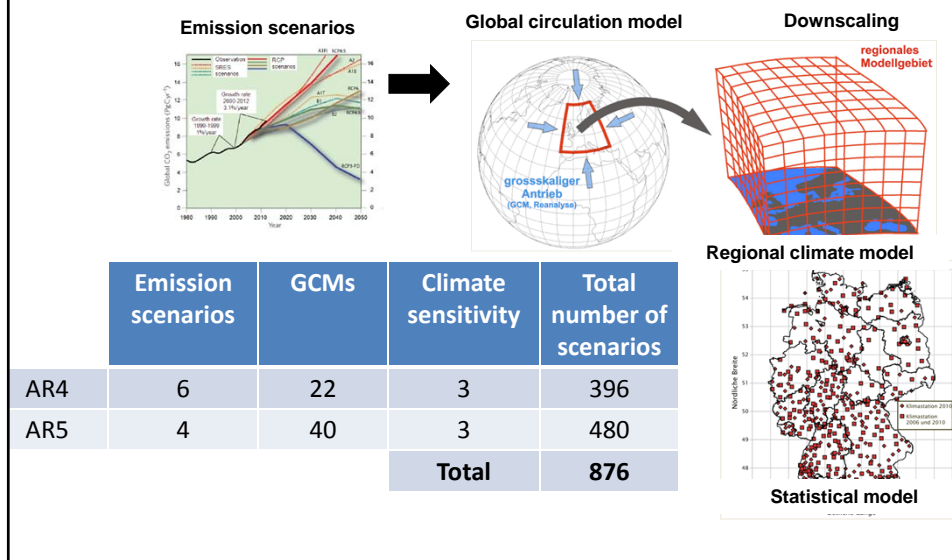
## Defining Current Climate Baseline

Step	Progress	Further work
Inventory of historical climate data available in/for the LMB	✓ Done, report available	
Collection of historical climate data	✓ Almost done	
Trend and change analysis, extreme analysis, climate indices analysis	On-going	<ul style="list-style-type: none"> <li>• Future baseline(s);</li> <li>• Seasonal forecasting</li> </ul>
Description of current climate baseline	On-going (Atlas)	

## Defining Future Climate Baseline(s)

Step	Progress	Further work
Trend and change analysis, extreme analysis, climate indices analysis	On-going	<ul style="list-style-type: none"> <li>• Seasonal forecasting</li> </ul>
Stochastic modeling to project future climate “under no change in emission” or without the emission scenarios	Not yet start	
Description of future climate baseline(s)	Not yet start	

## Defining Future Climate Scenarios



## Defining Future Climate Scenarios (contd.)

- **Consideration in selection of scenarios:**
  - Needs of transboundary adaptation planning of different water related sectors of the MRC
  - Up-to-date scientific information
  - International practice and lessons learned
    - Capture the range of projected changes,
    - No dominant downscaling approaches
    - “Questionable value”, etc.
  - Time and resources availability
  - Comparability to previous works of MRC and Member Countries
  - Knowledge transfer to national level

## Defining Future Climate Scenarios (contd.)

Step	Progress	Further work
Review of climate change scenarios and downscaling approaches	✓ Done, report available	
Collection of climate change projections dataset	✓ Done, dataset and tool available	<ul style="list-style-type: none"> <li>• Evaluation of performance of selected GCMs</li> <li>• Evaluation of downscaling approaches</li> <li>• Detailed downscaling (if necessary)</li> </ul>
Recommendation of GCMs, emission scenarios, climate sensitivity	✓ Being consulted with MCs	
Selection of a number of climate change scenarios with agreement from MCs	✓ Being consulted with MCs	

## Recommended climate change scenarios

- **Nine basin-wide climate change scenarios** have been defined for basin-wide assessment of climate change impacts in the LMB to cover the range of climate change projections available for the LMB.
- They represent
  - three magnitudes of climate change due to low, medium and high scenarios of carbon emission in the future and
  - three seasonal patterns of climate change including increase of precipitation in both dry and wet seasons (wetter overall), decrease of precipitation in both dry and wet seasons (drier overall) and increase of precipitation in wet season but decrease in dry season (increase of seasonality)

## Recommended climate change scenarios

- **Low climate change scenarios** are associated with low future GHG emission scenarios

Scenario 1: Drier overall-low represents a slight decrease of basin-average precipitation in both wet and dry seasons in the future. The scenario is formulated using RCP2.6, GISS-E2-R-CC GCM and low climate sensitivity.

Scenario 2: Wetter overall-low represents a slight increase of basin-average precipitation in both wet and dry seasons in the future. The scenario is formulated using RCP2.6, GFDL-CM3 GCM and low climate sensitivity.

Scenario 3: Increase seasonality-low represents a slight increase in basin-average precipitation in the wet season and a slight decrease in dry season in the future. The scenario is formulated using RCP2.6, IPSL-CM5A-MR GCM and low climate sensitivity.

## Recommended climate change scenarios

- **Medium climate change scenarios** are associated with medium future GHG emission scenarios:

Scenario 4: Drier overall-medium represents a medium decrease of basin-average precipitation in in both wet and dry seasons in the future. The scenario is formulated using RCP6.0, GISS-E2-R-CC GCM and medium climate sensitivity.

Scenario 5: Wetter overall-medium represents a medium increase of basin-average precipitation in both wet and dry seasons in the future. The scenario is formulated using RCP6.0, GFDL-CM3 GCM and medium climate sensitivity

Scenario 6: Increase seasonality-medium represents a medium increase of basin-average precipitation in wet season and a medium decrease in in dry season. The scenario is formulated using RCP6.0, IPSL-CM5A-MR GCM and medium climate sensitivity.

## Recommended climate change scenarios

- **High climate change scenarios** are associated with high future GHG emission scenarios:

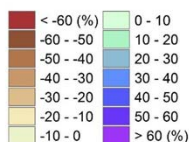
Scenario 7: Drier overall-high represents a large decrease of basin-average precipitation in both wet and dry seasons in the future. The scenario is formulated using RCP8.5, GISS-E2-R-CC GCM and high climate sensitivity.

Scenario 8: Wetter overall-high represents a large increase of basin-average precipitation in both wet and dry seasons in the future. The scenario is formulated using RCP8.5, GFDL-CM3 GCM and high climate sensitivity.

Scenario 9: Increase seasonality-high represents a large increase of basin-average precipitation in wet season and a large decrease in dry season. The scenario is formulated using RCP8.5, IPSL-CM5A-MR GCM and high climate sensitivity.

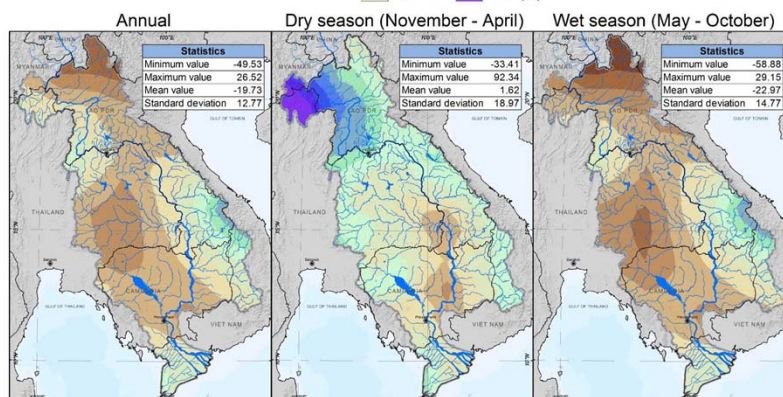
## Spatial changes of GISS-E2-R-CC model

GISS-E2-R-CC RCP8.5  
Precipitation change (%)  
in 2081–2100 with respect to 1986–2005  
Medium climate sensitivity



**Coordinate system**  
System: WGS 1984 UTM Zone 48N  
Projection: Transverse Mercator  
Datum: WGS 1984  
Units: Meter

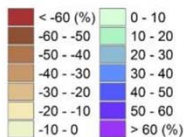
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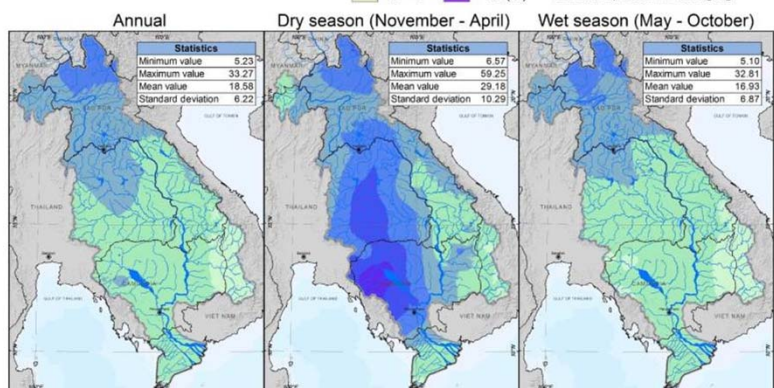
## Spatial changes of GFDL-CM3 model

**GFDL-CM3 RCP8.5**  
**Precipitation change (%)**  
 in 2081–2100 with respect to 1986–2005  
 Medium climate sensitivity



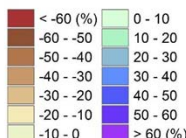
**Coordinate system**  
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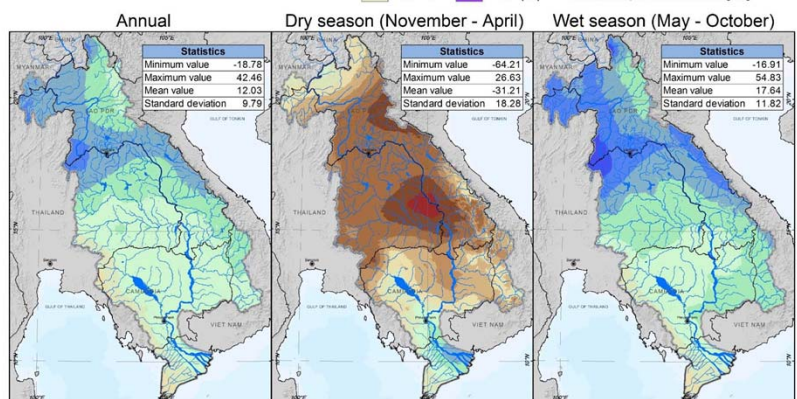
## Spatial changes of IPSL-CM5A-MR model

**IPSL-CM5A-MR RCP8.5**  
**Precipitation change (%)**  
 in 2081–2100 with respect to 1986–2005  
 Medium climate sensitivity

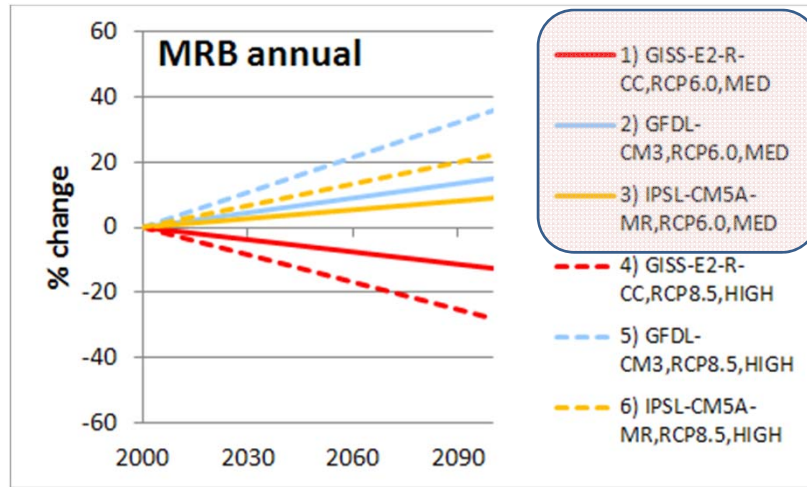


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**Projected change to annual precipitation relative to baseline period (1986-2005) in the whole Mekong River Basin (MRB) under medium and high climate change scenarios**



## Recommended sea level rise scenarios

Sea level rise scenarios	2030	2060	2090
	(2021-2040)	(2031-2070)	(2081-2100)
	meter	meter	meter
Low (RCP 2.6)	0.13	0.30	0.46
Medium (RCP 6.0)	0.15	0.33	0.57
High (RCP 8.5)	0.16	0.40	0.75

Results are also consistent with the official Vietnam sea level rise projections (MONRE, 2011), which are: 0.10 – 0.15 metres by 2030, 0.25 – 0.40 metres by 2060 and 0.45 – 0.85 metres by 2090 (with the range due to different emission scenarios). Moreover, the results are close to the sea level rise projections of 0.17 metres by 2030 and 0.30 metres by 2060 under B2 scenarios that were previously used in assessment of basin-wide development scenarios (MRC, 2011)

