Climate Chang
SWAT Model

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Outline

- Introduction
- Model chain
- Climate Change Data
- Results

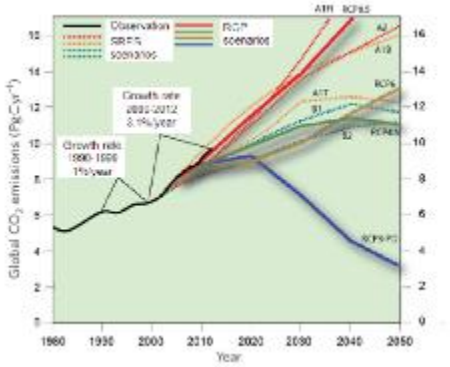
Introduction

The objective of the study is to quantify the impacts of climate change

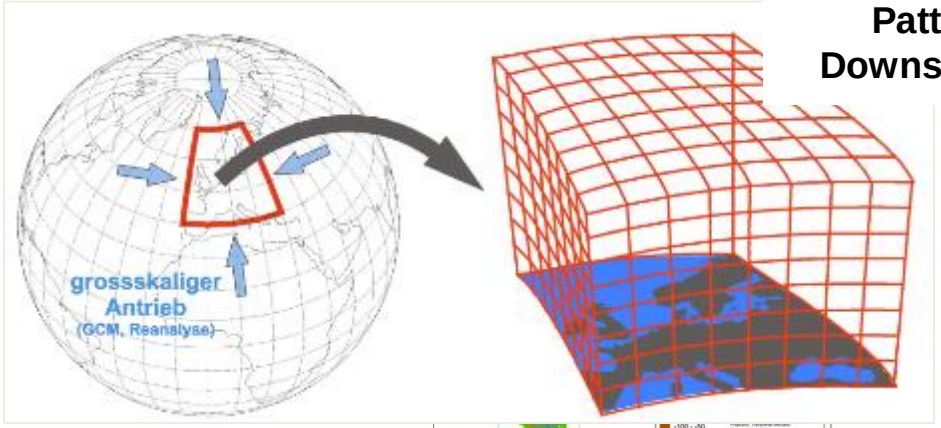
- **Water Quantity**

Model chain

Emission scenarios

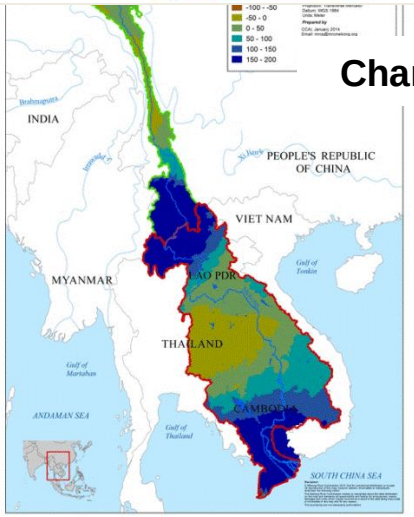


Global circulation model (GCM)

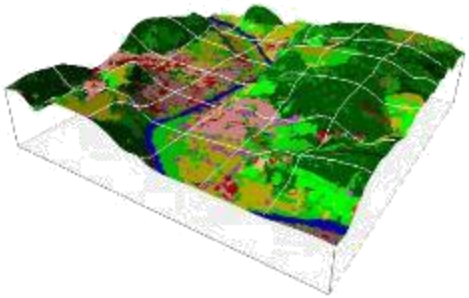


Pattern Downscaling

Change factors



Hydrological impact modeling



Climate Change Data

Variable	Frequency	Unit
Rainfall	monthly	Change of Rainfall in Percent
Maximum Temperature	monthly	Change of Temperature in Degree Celsius
Minimum Temperature	monthly	
Solar Radiation	monthly	Change of Solar Radiation in MJ/m2
Relative Humidity	monthly	Change of Relative Humidity in Fraction

Climate Change Data

Change of Rainfall	Change of Temperature
Rainfall adjustment for January (%)	Temperature adjustment for January (°C)
Rainfall adjustment for February (%)	Temperature adjustment for February (°C)
Rainfall adjustment for March (%)	Temperature adjustment for March (°C)
Rainfall adjustment for April (%)	Temperature adjustment for April (°C)
Rainfall adjustment for May (%)	Temperature adjustment for May (°C)
Rainfall adjustment for June (%)	Temperature adjustment for June (°C)
Rainfall adjustment for July	Temperature adjustment

Climate Change Data

Change of Solar Radiation	*Change of Relative Humidity*
Radiation adjustment for January (MJ/m2)	Humidity adjustment for January (fraction)
Radiation adjustment for February (MJ/m2)	Humidity adjustment for February (fraction)
Radiation adjustment for March (MJ/m2)	Humidity adjustment for March (fraction)
Radiation adjustment for April (MJ/m2)	Humidity adjustment for April (fraction)
Radiation adjustment for May (MJ/m2)	Humidity adjustment for May (fraction)
Radiation adjustment for June (MJ/m2)	Humidity adjustment for June (fraction)

Climate Change Data

Scenarios

- GFDL-CM3 (wetter overall)
- GISS-E2-R-CC (drier overall)
- IPSL-CM5A-MR (wetter wet seasons and drier dry seasons)

SN	Emission	Year
GFDL	RCP2.6	2030
GISS	RCP4.5	2060
IPSL	RCP6.0	2090
	RCP8.5	

Precipitation change(%)

PCP :GFDL – Wetter Case in 2090 (RCP 8.5)

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

< -60 (%)	0 - 10
-60 - -50	10 - 20
-50 - -40	20 - 30
-40 - -30	30 - 40
-30 - -20	40 - 50
-20 - -10	50 - 60
-10 - 0	> 60 (%)

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

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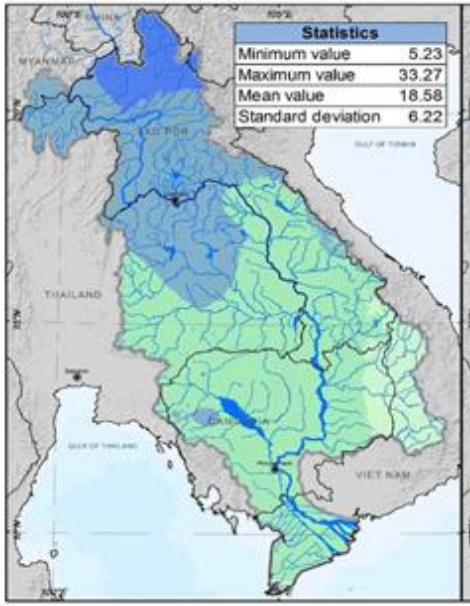
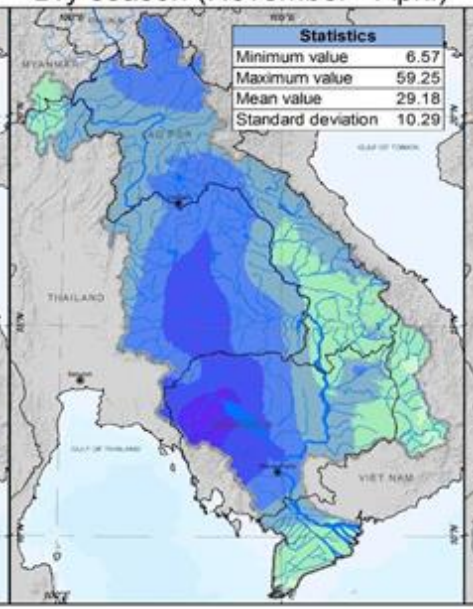
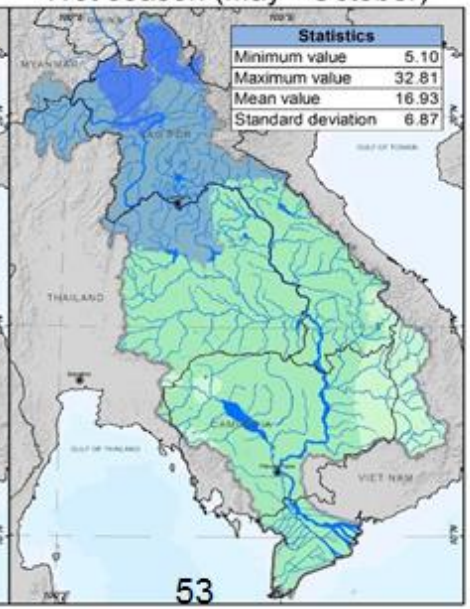
Annual



Dry season (November - April)



Wet season (May - October)



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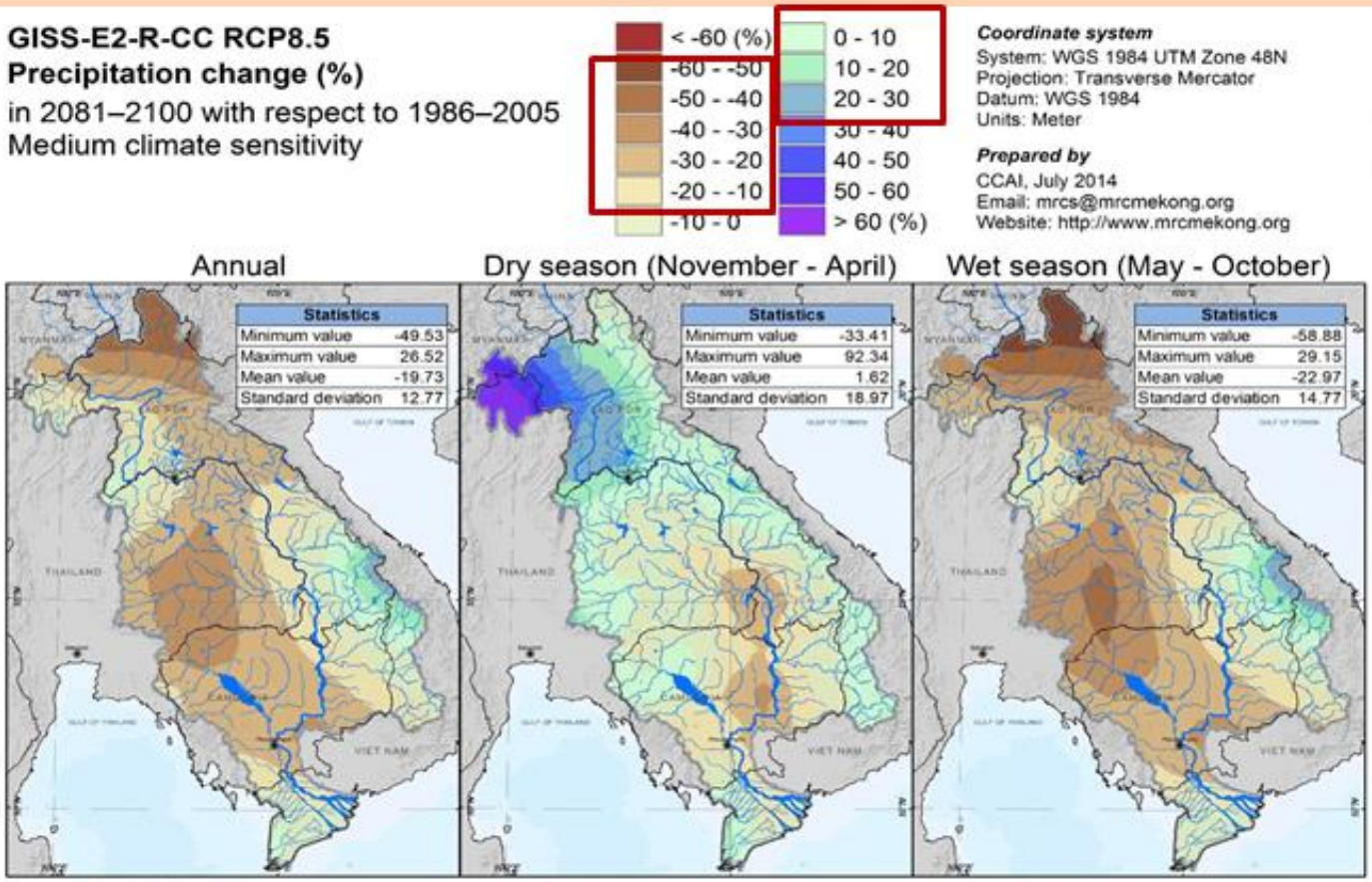
Precipitation change(%)

PCP :GISS – Drier Case in 2090 (RCP 8.5)



Precipitation change(%)

PCP :IPSL – Drier & Wetter Case in 2090 (RCP 8.5)

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

< -60 (%)	0 - 10
-60 - -50	10 - 20
-50 - -40	20 - 30
-40 - -30	30 - 40
-30 - -20	40 - 50
-20 - -10	50 - 60
-10 - 0	> 60 (%)

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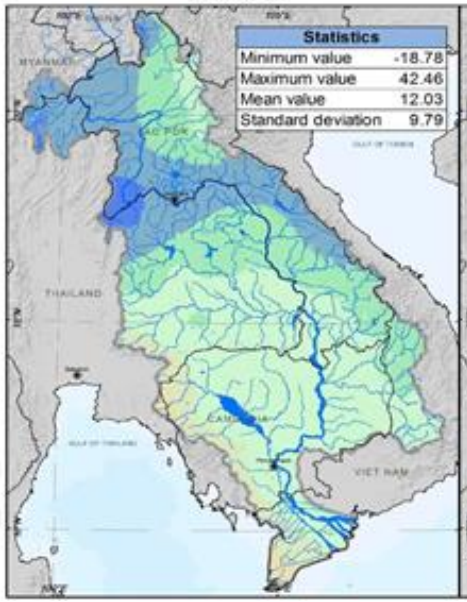
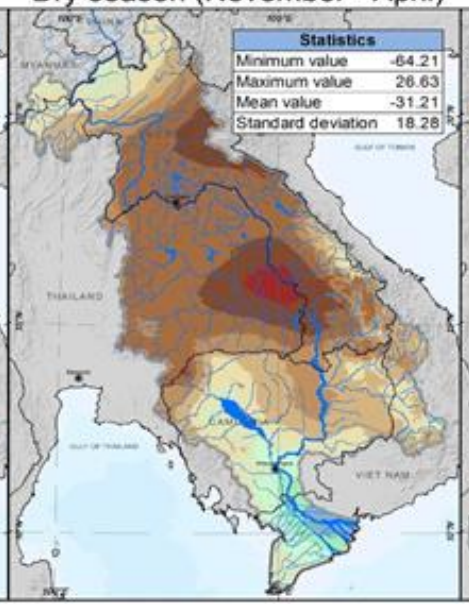
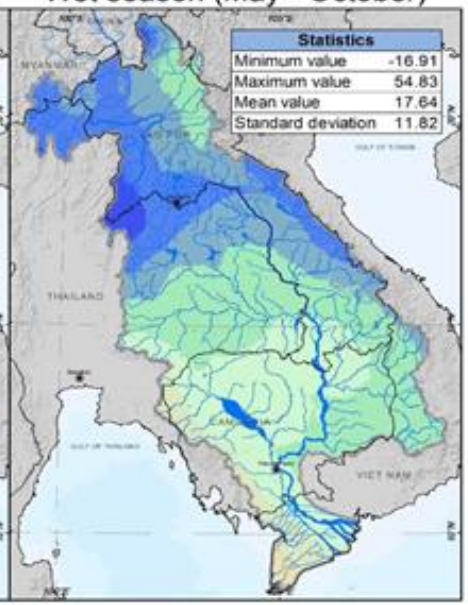
Annual



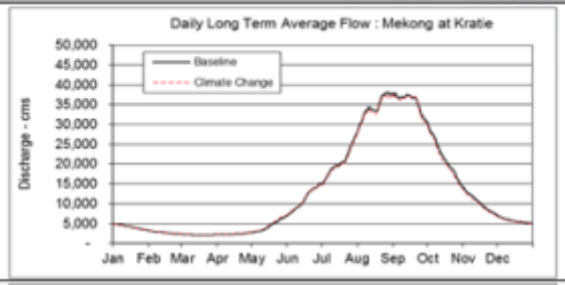
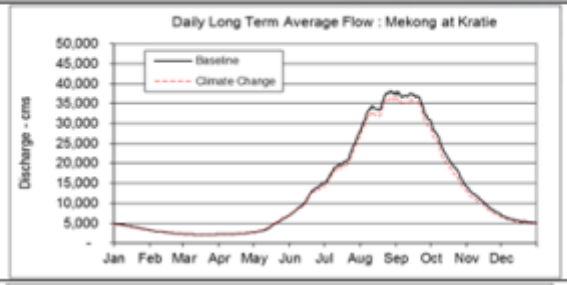
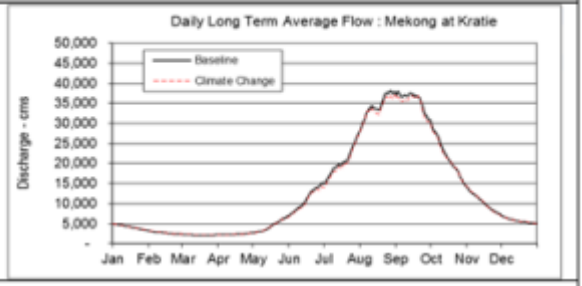
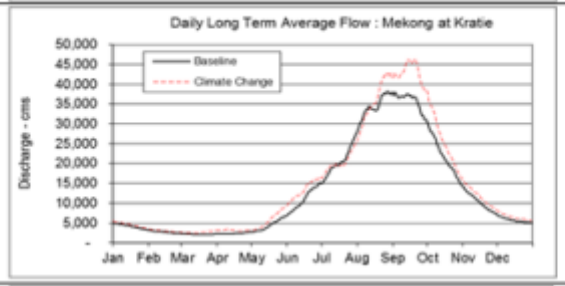
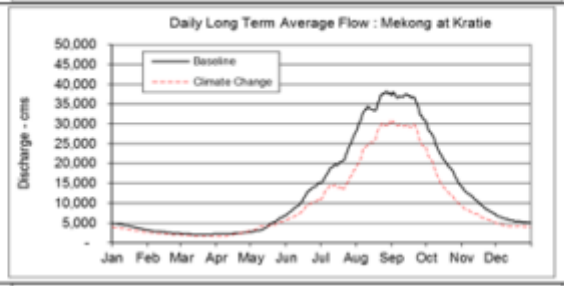
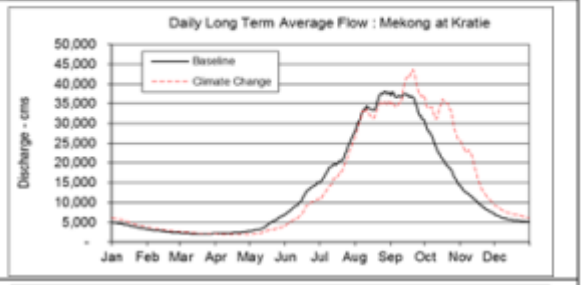
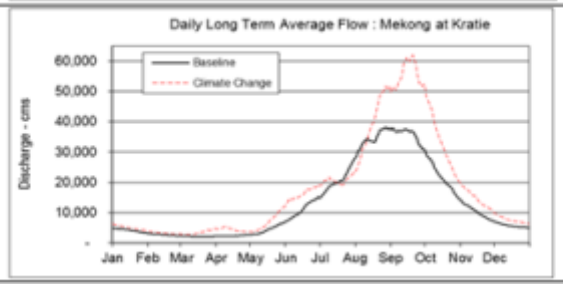
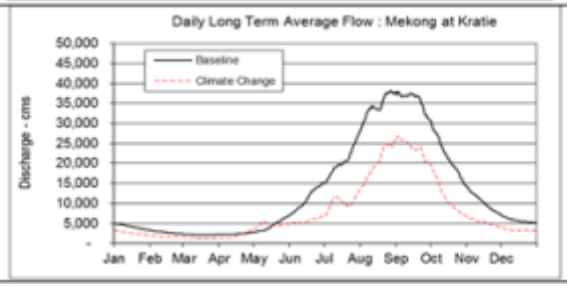
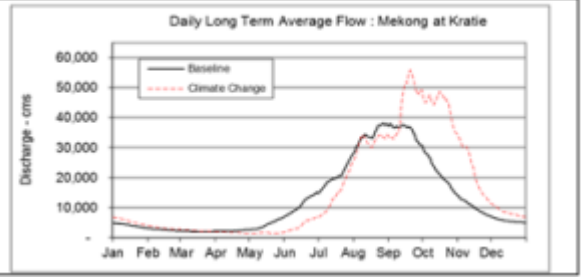
Dry season (November - April)



Wet season (May - October)



Water flow (Baseline & Climate Change)

	GFDL	GISS	IPSL
RCP2.6 _ 2090			
RCP6.0 _ 2090			
RCP8.5 _ 2090			

Exercise

- input climate data
- compare flow out

Contract
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