

***Very often, meaningful action requires memory  
– scenarios provide us with memory of the  
future .....Models provide us with the scenarios***





Baseflow Maximum Velocity

***Uncertainties to be Addressed in the  
Hydrological Assessment of  
Development Scenarios***

**Jeffrey E. Richey  
University of Washington**

***Chiang Rai 15 October 2010***



## ***Broad View of “Uncertainties” in Assessments....***

***“Uncertainty” in representing the landscape and hydrologic cycle in simulation models, in a “non-stationary” world.***

***“Uncertainty” that all sources and uses are accounted for, and sectors cross-referenced.***

***“Uncertainty” in information acquisition and management.***

***“Uncertainty” in transparency and documentation***

***“Uncertainty” in the perspective of end-users/decision-makers –***

- What do they actually want to know? What are the big questions?***
- How does the “product” reach them?***





# Virtual Mekong Basin *IKMP under development*

Khmer | Lao | Thai | Vietnamese |

HOME

RESEARCH

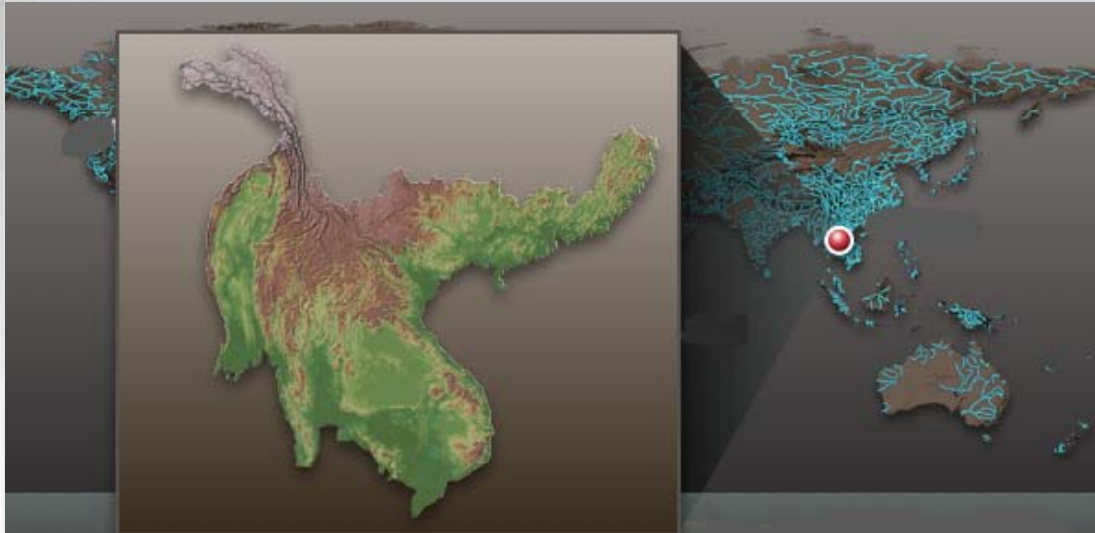
BASINS

PUBLICATIONS

RESOURCES

OUTREACH

## TOP STORY



## MISSION

*To provide an integrating, cross-sector platform - Science to Sustainability of the Mekong Basin*



## HIGHLIGHTS

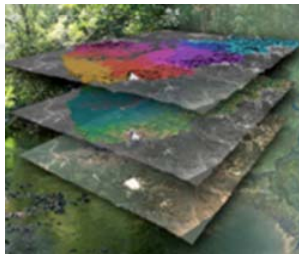
## NEWS & ANNOUNCEMENTS

## QUICK LINKS

RSS Feeds

## Mekong Yesterday, Today, and Tomorrow

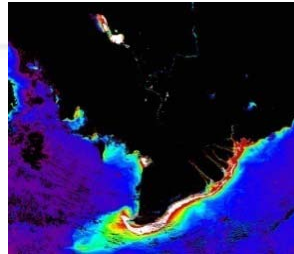
Watershed   Country   Region



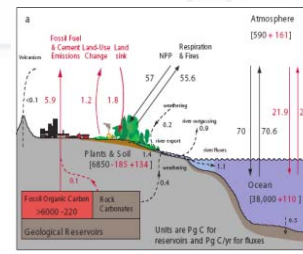
Basin Environment



Water & Water Resources



Sediment Movement

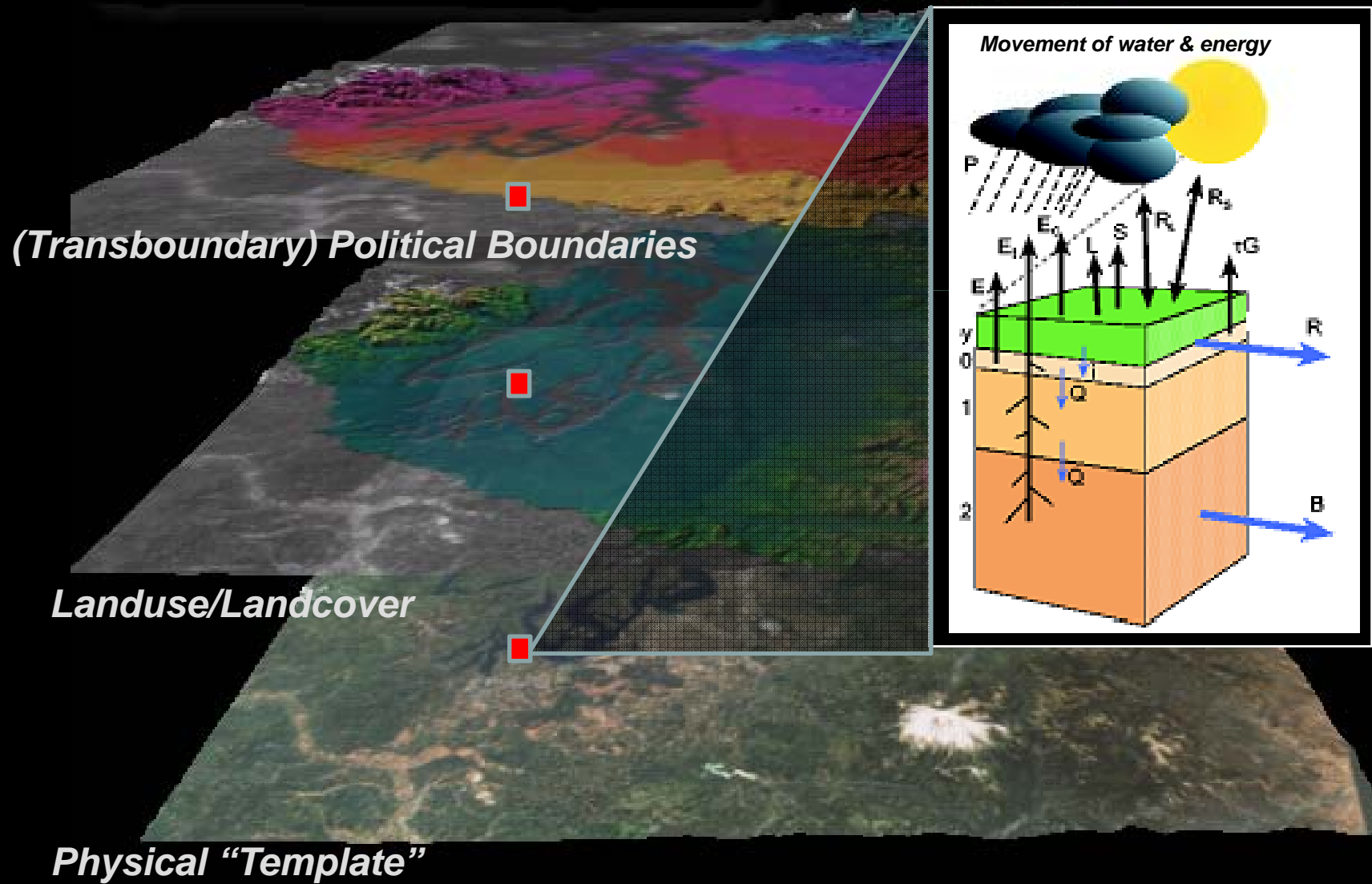


Carbon Balance



Hydropower

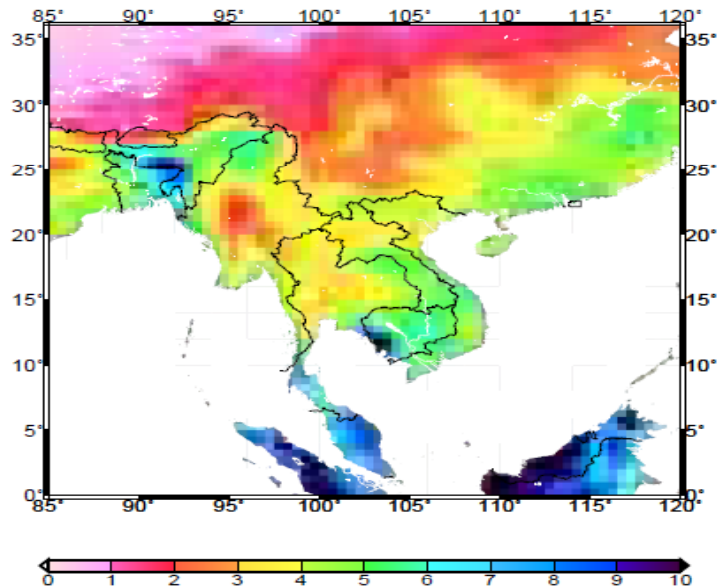
**Express as a Geospatially-Explicit/Process-Based  
(set of) Coupled Models**



# Annual Precipitation Average

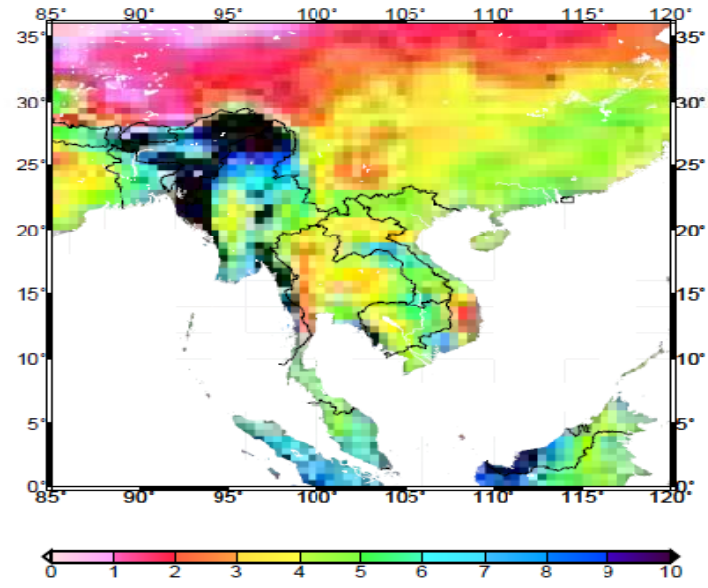
## Mean Daily Precipitation

**TRMM (1998-2008)**



**Precipitation (mm)**

**NCEP/NCAR (1948-2007)**



**Precipitation (mm)**

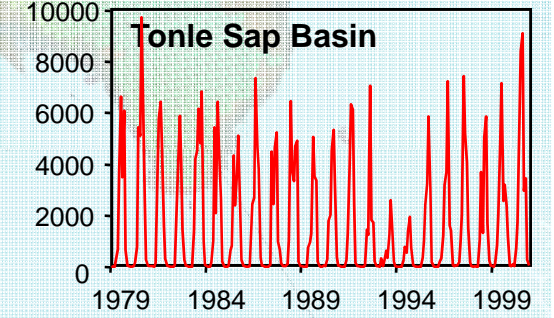
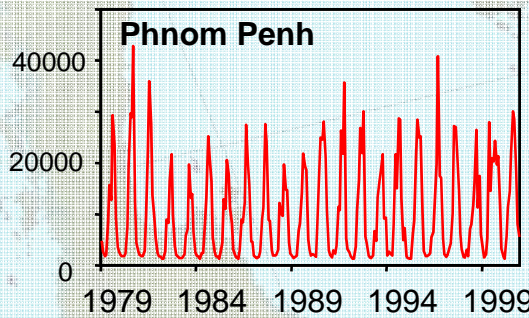
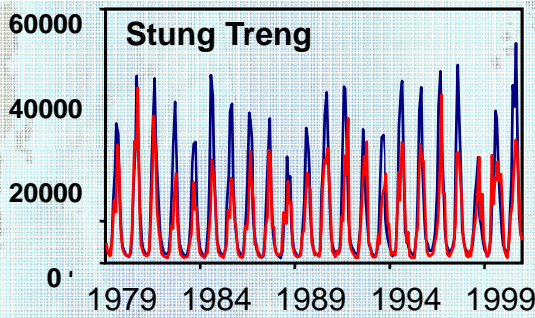
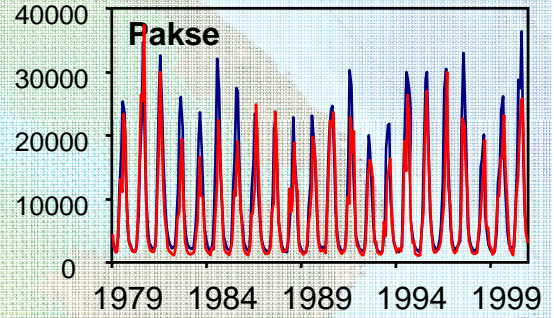
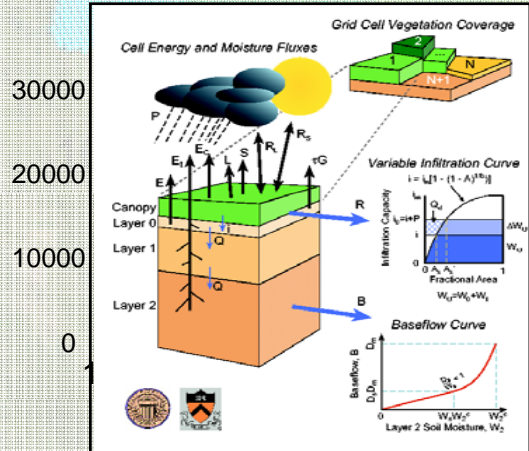
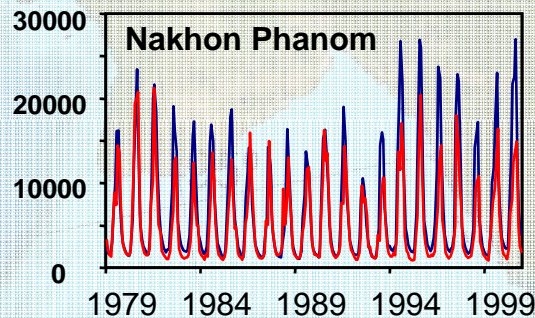
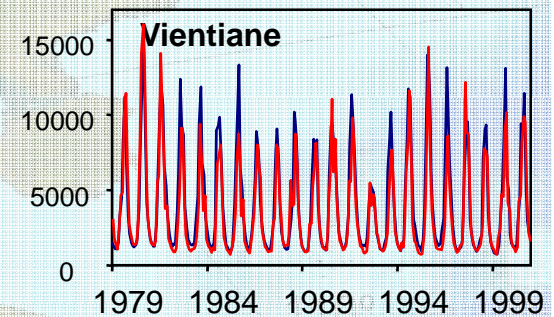
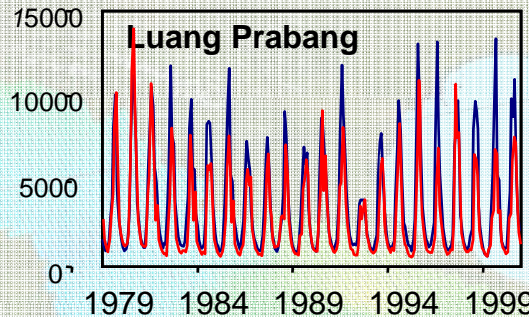
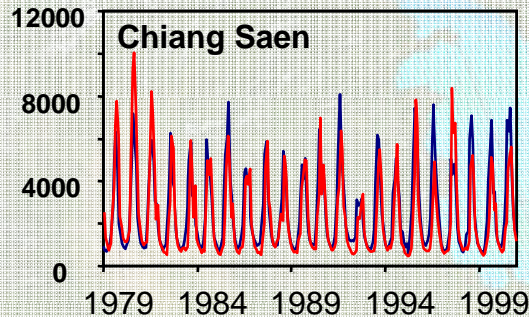


# Initial Soil Moisture Content Layer 3

Costa-Cabral et al 2008

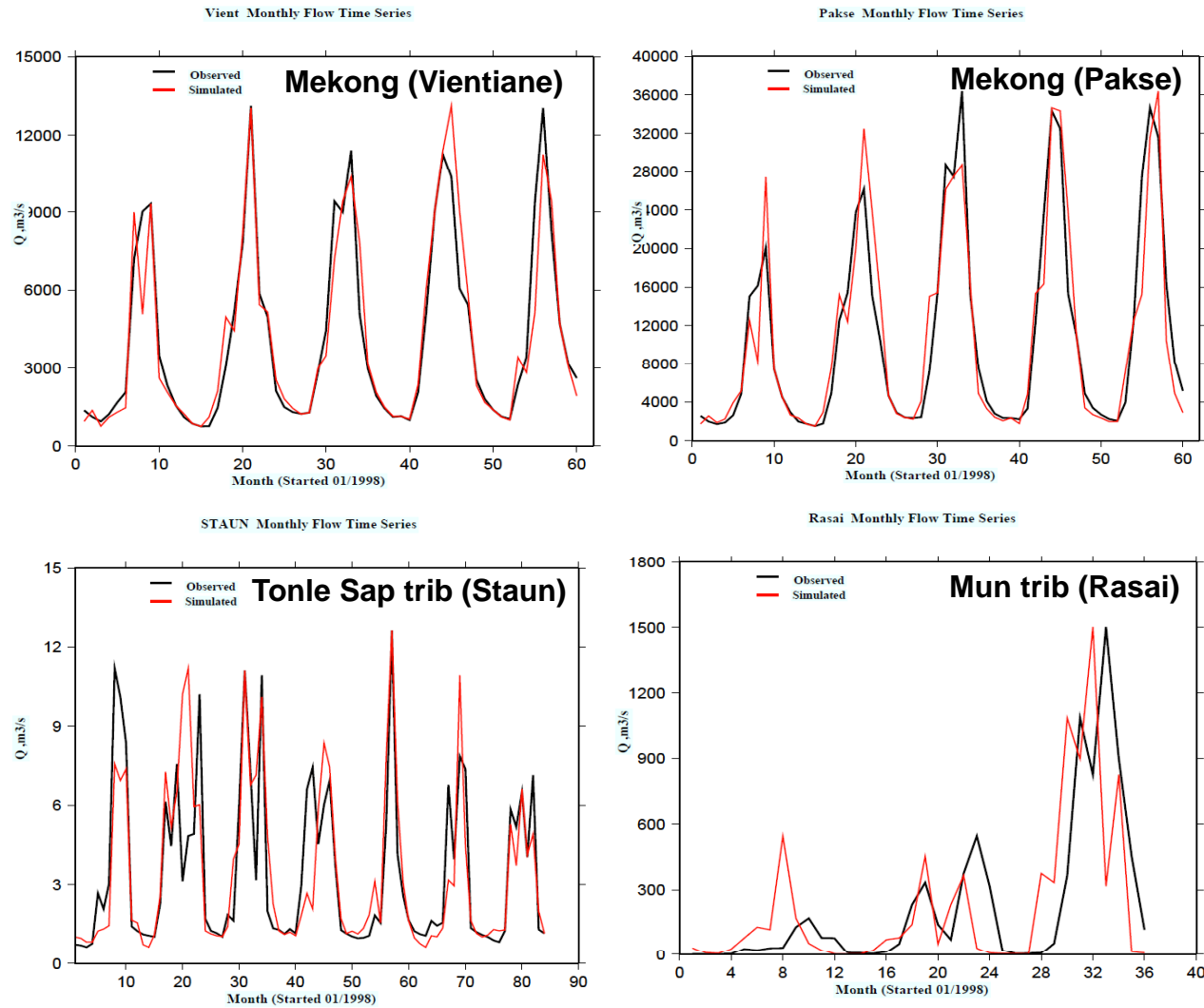
## Mekong Discharge 1979 -2000

Observed — Simulated —





# VIC, with TRMM Precipitation (1998-2002)

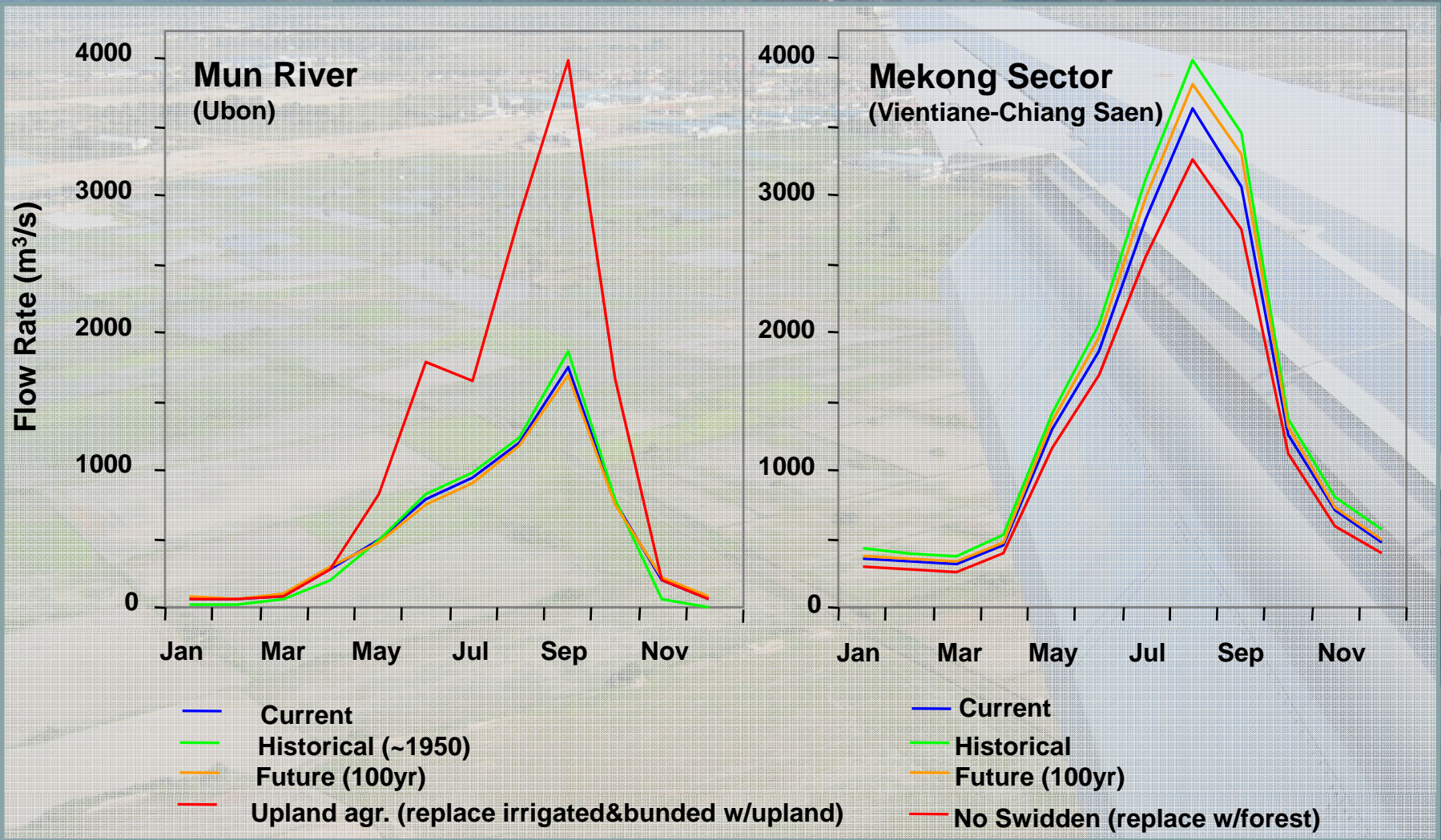


Sonessa "this morning"



# Landuse Scenarios

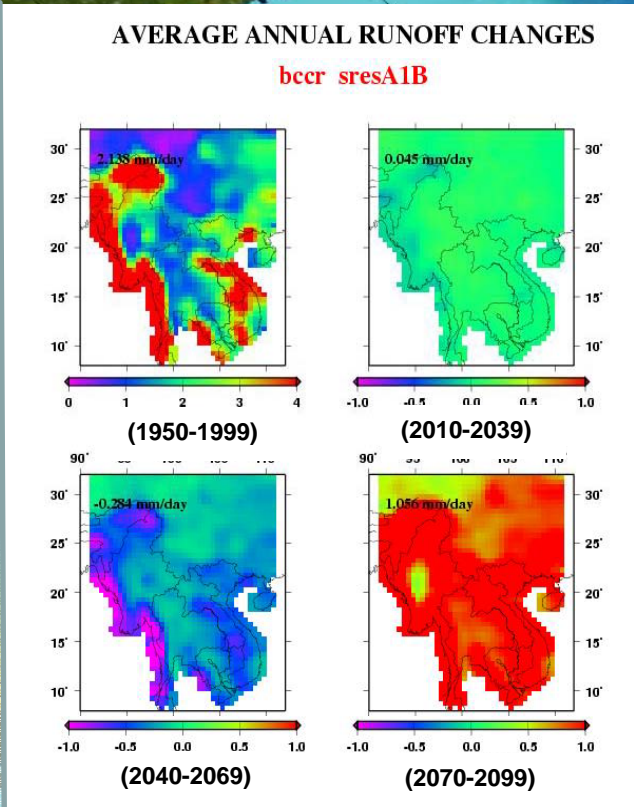
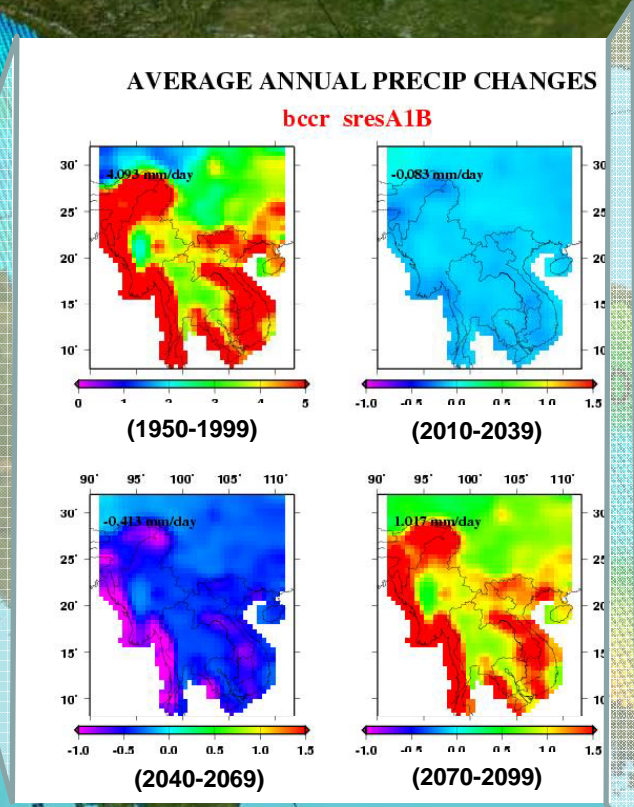
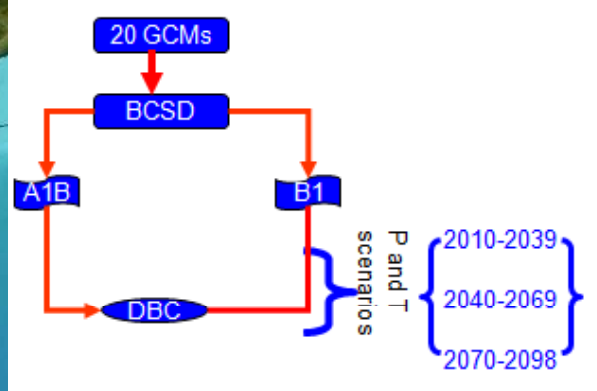
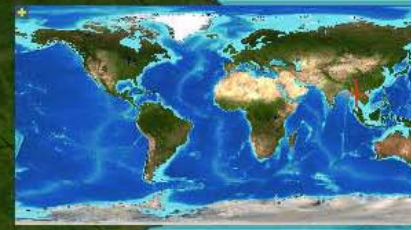
## Average Monthly Streamflow, 1980-2000





# Climate Scenarios

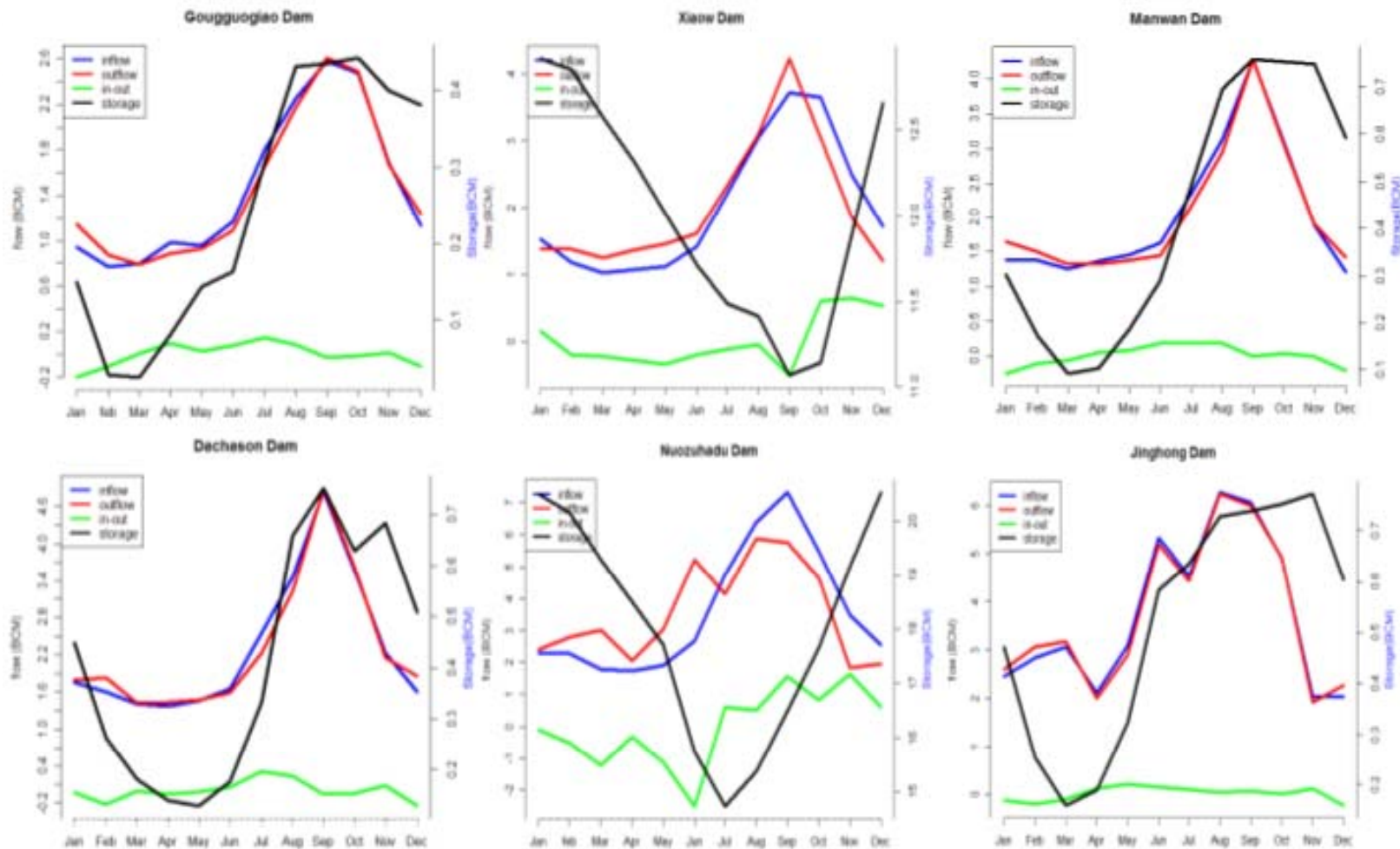
## Mekong Discharge 2010 – 2098:





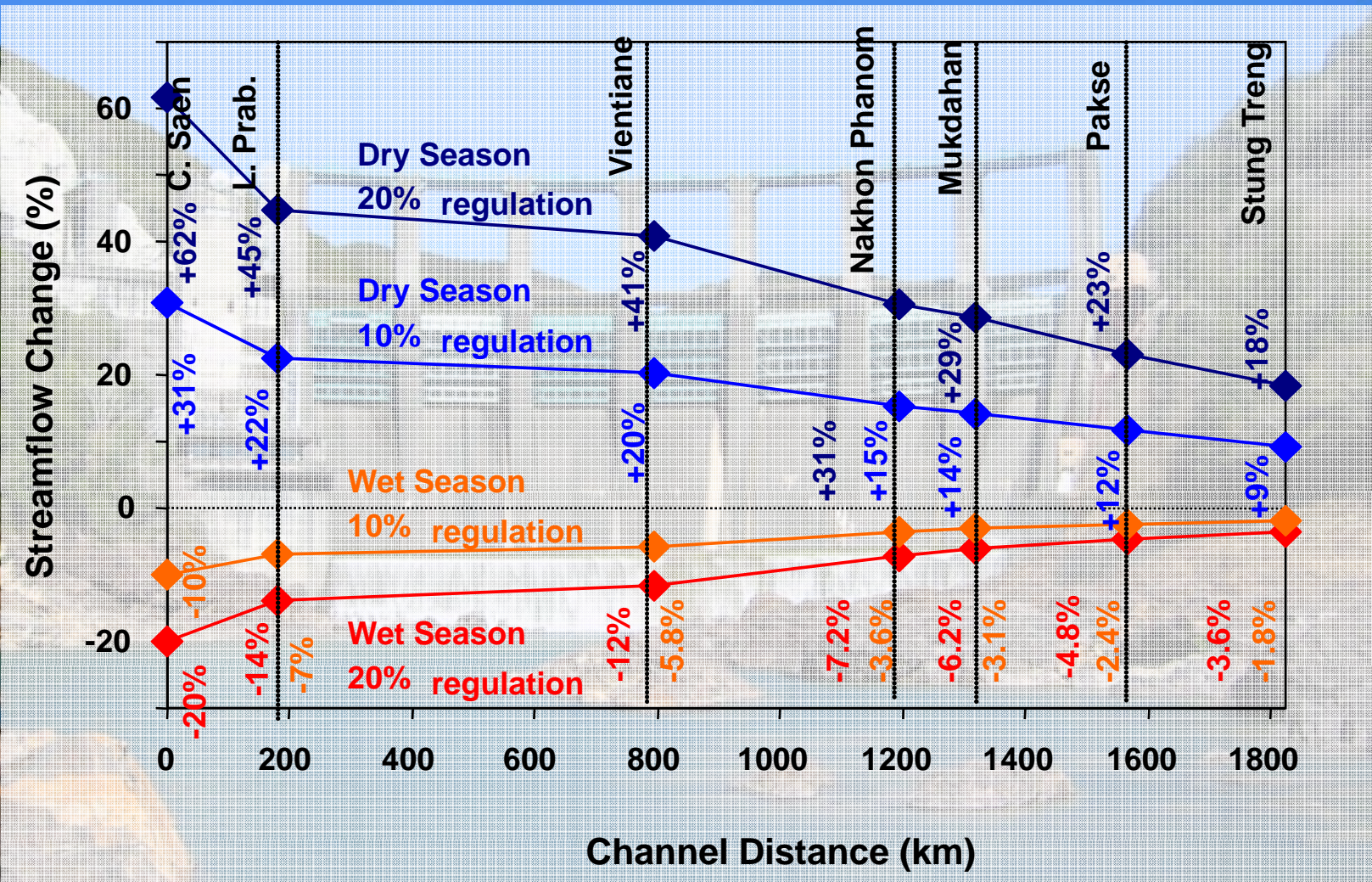
# Hydropower Scenarios

Simulated and optimized, release, storage and inflow at 6 Chinese dams  
(Base climate scenario).



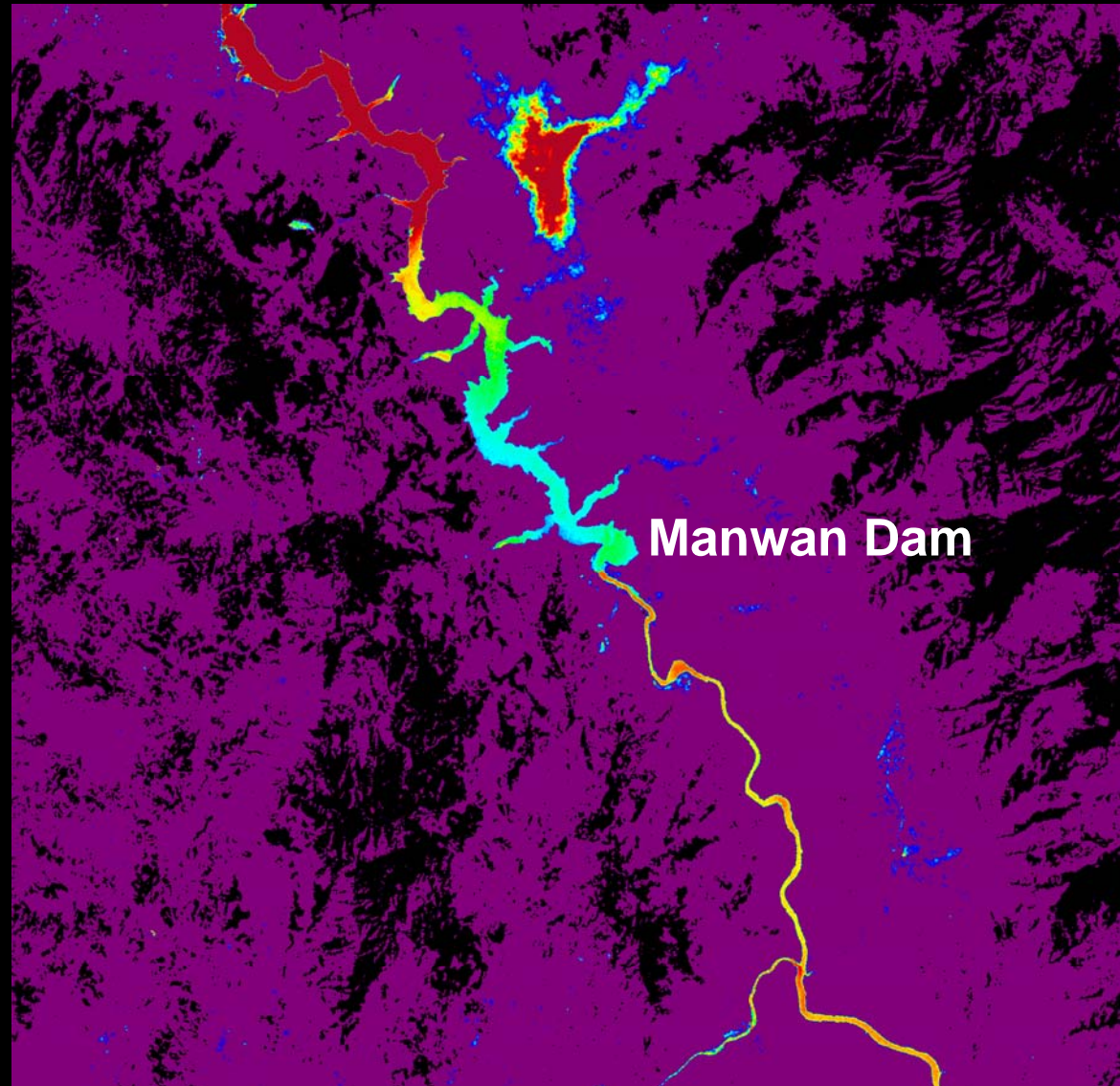


# Effect of Dam Cascade on Seasonal Streamflow





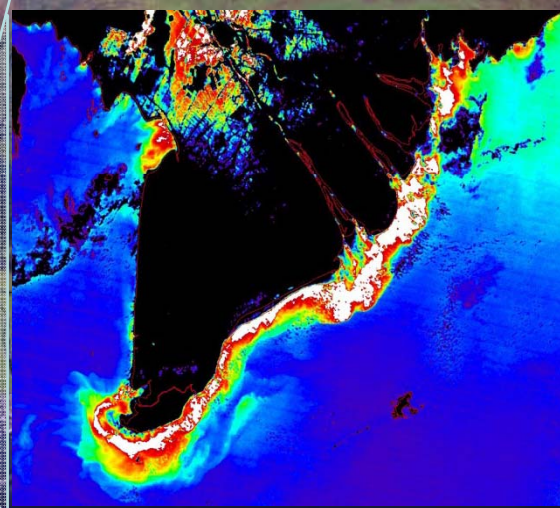
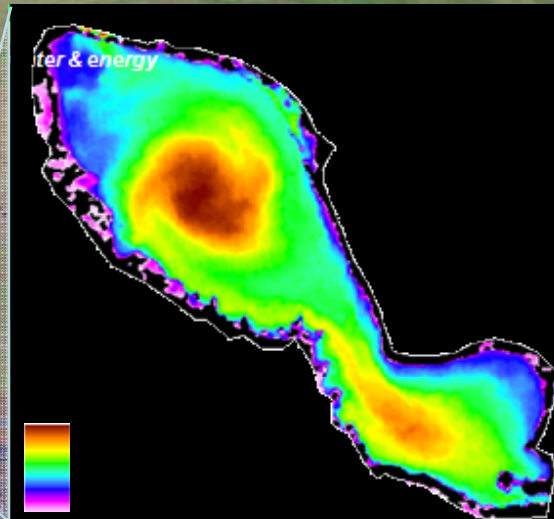
***Turbidity (upper Mekong)***  
**ASTER March 14, 2009**





# *Turbidity (Lower Mekong)*

MODIS, Nov 2006

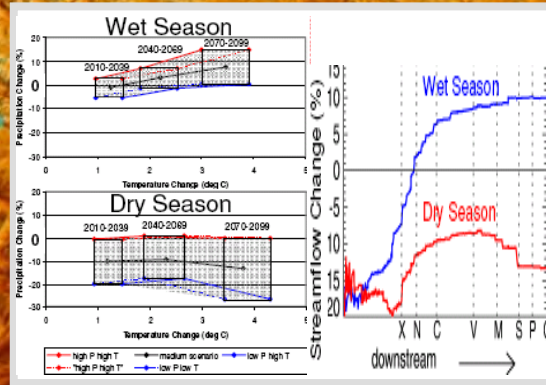


*Kirschke et al in prep.*

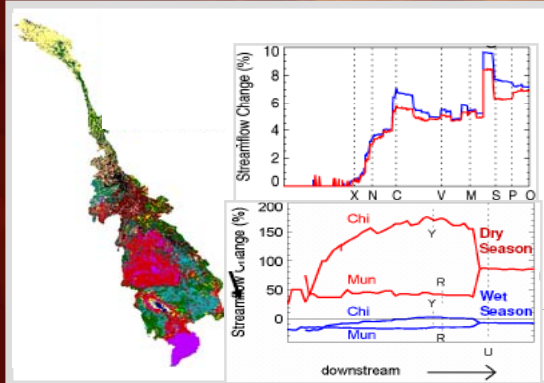
PL OnEarth WMS Global Mosaic, a high resolution global image mosaic of the earth, produced from more than 8200 individual Landsat7 scenes.



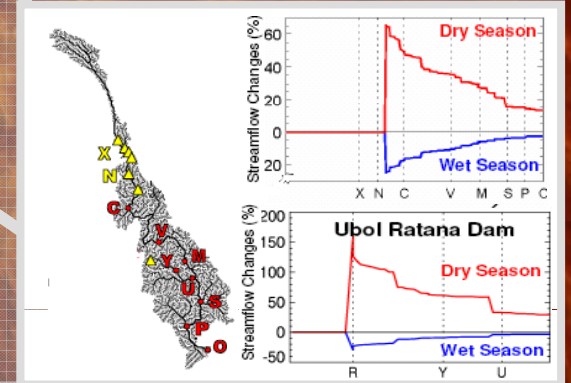
# CLIMATE CHANGE



**Synergy:  
Cumulative  
Uncertainty in  
Impacts &  
Outcomes**



## LAND USE



## DAMS