



***River basin managers world-wide are facing a series of challenges critical to their future***

- **Floods and droughts will impact biodiversity, freshwater resources, agriculture and livelihoods.**
- **Increasing development of hydropower will provide much-needed energy, but alter the flow regime and sediment transport of rivers.**
- **Climate change is then superimposed on all aspects of the system, bringing changes in temperature and rainfall regimes, and reduction of snow cover.**

***Establishing a process to address these issues is not a trivial task:***


***(Transboundary) Political Boundaries***

- The information required comes from multiple sources - different instruments, disciplines, departments, countries ...
- Handling such diverse data and executing models is not straight-forward.

***Landuse/Landcover***

- Perhaps most challenging is how to not only create such information, but how to get it into the hands of users of different levels, from the specialist to the local and regional decision makers to the local farmer

***Physical "Template"***

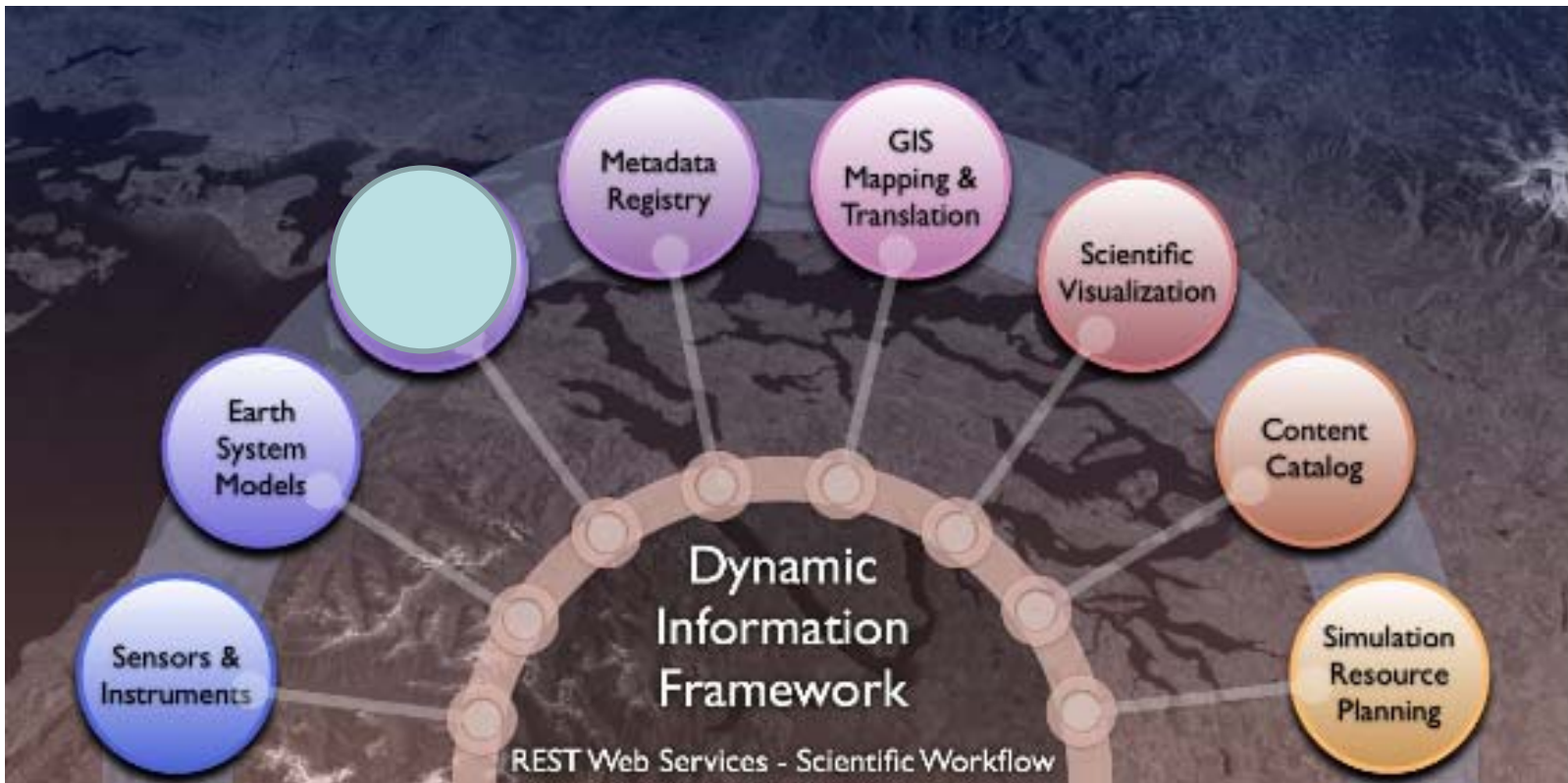


# Challenges of Data and Innovations in Modeling across Multiple Sectors in Mozambique, Mekong, and Bhutan

Jeffrey E. Richey  
River Systems Research Group  
University of Washington

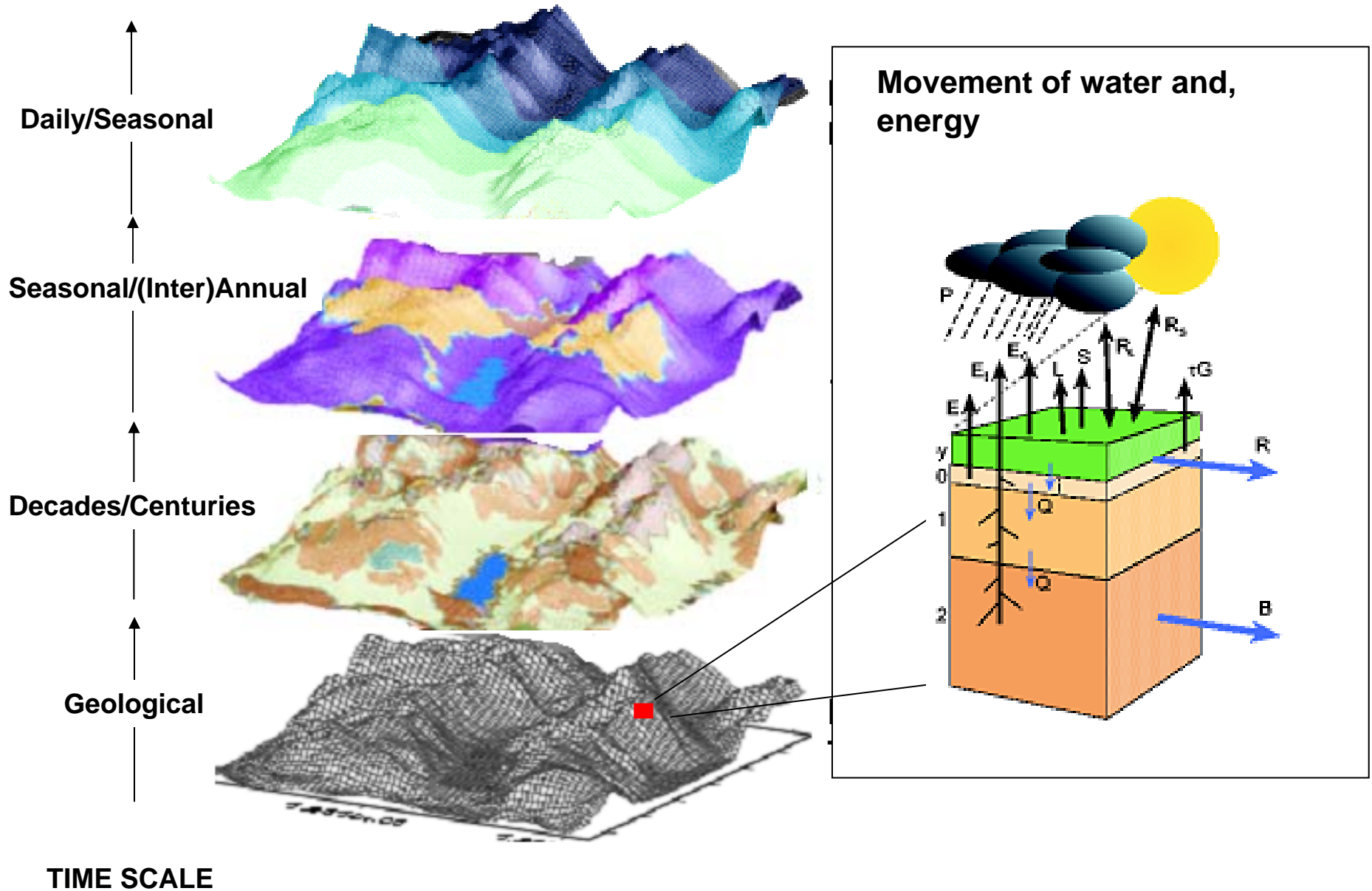
*Almaty, 3 September 2009*

## ***“Dynamic Information Framework (DIF)”***



**..... a practical engine, for organizing and processing multi-source information and decision needs - an “information laboratory and forum” - towards a readily accessible Decision Support Framework**

# Express as a geospatially-explicit/process-based (set of) coupled models

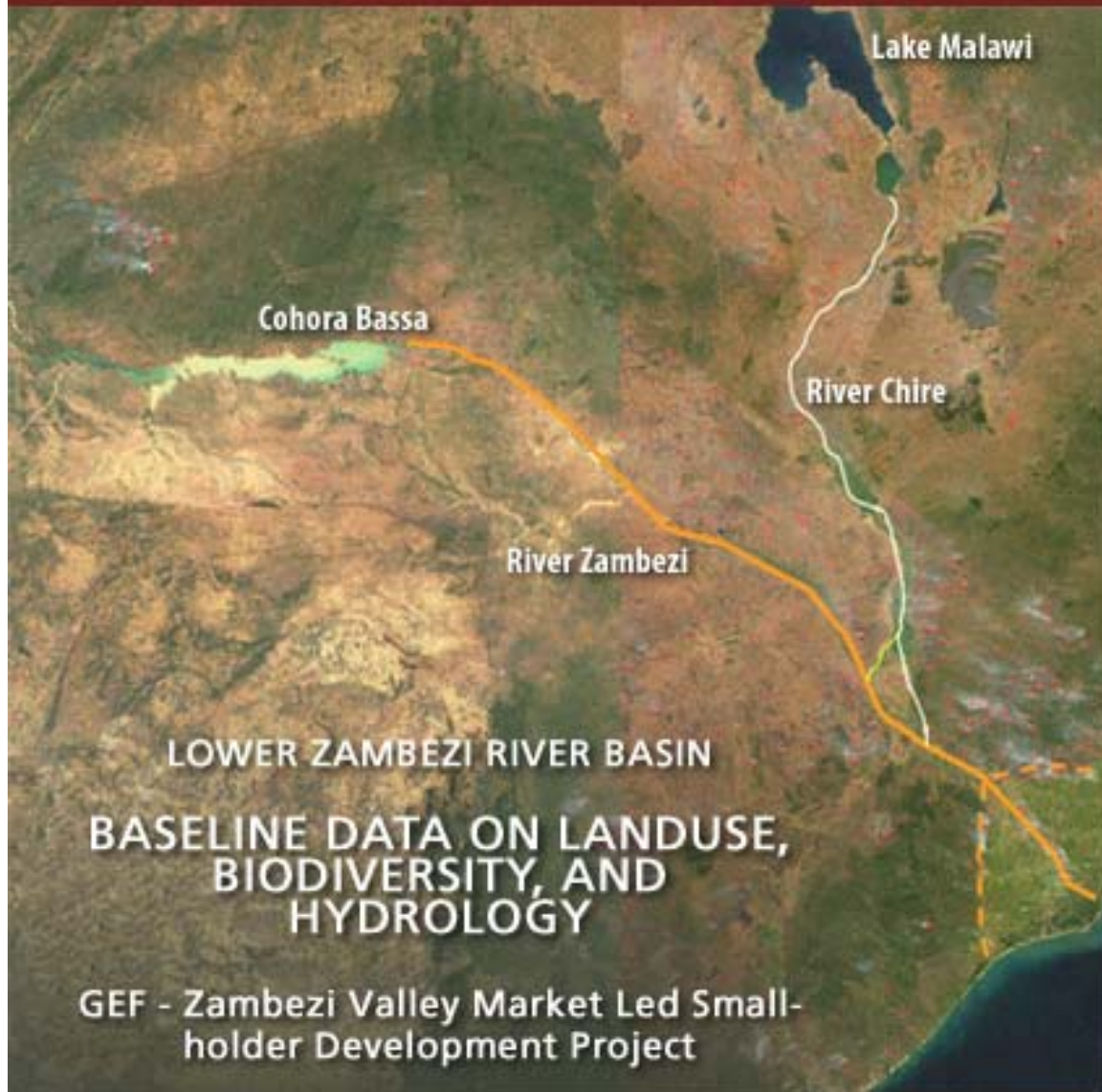




# THE ZAMBEZI DYNAMIC INFORMATION FRAMEWORK (ZAMBEZIDIF) VERSION 1



[http://www.riversystems.washington.edu/zambezi\\_dif](http://www.riversystems.washington.edu/zambezi_dif)



## Zambezi SLM Project

**SLM Project** Baseline study description

**People and Places of the SLM Districts**

- ◆ **Images**
- ◆ **Maps** from Biodiversity and survey transects

## ArcIMS Accessible Data Layers

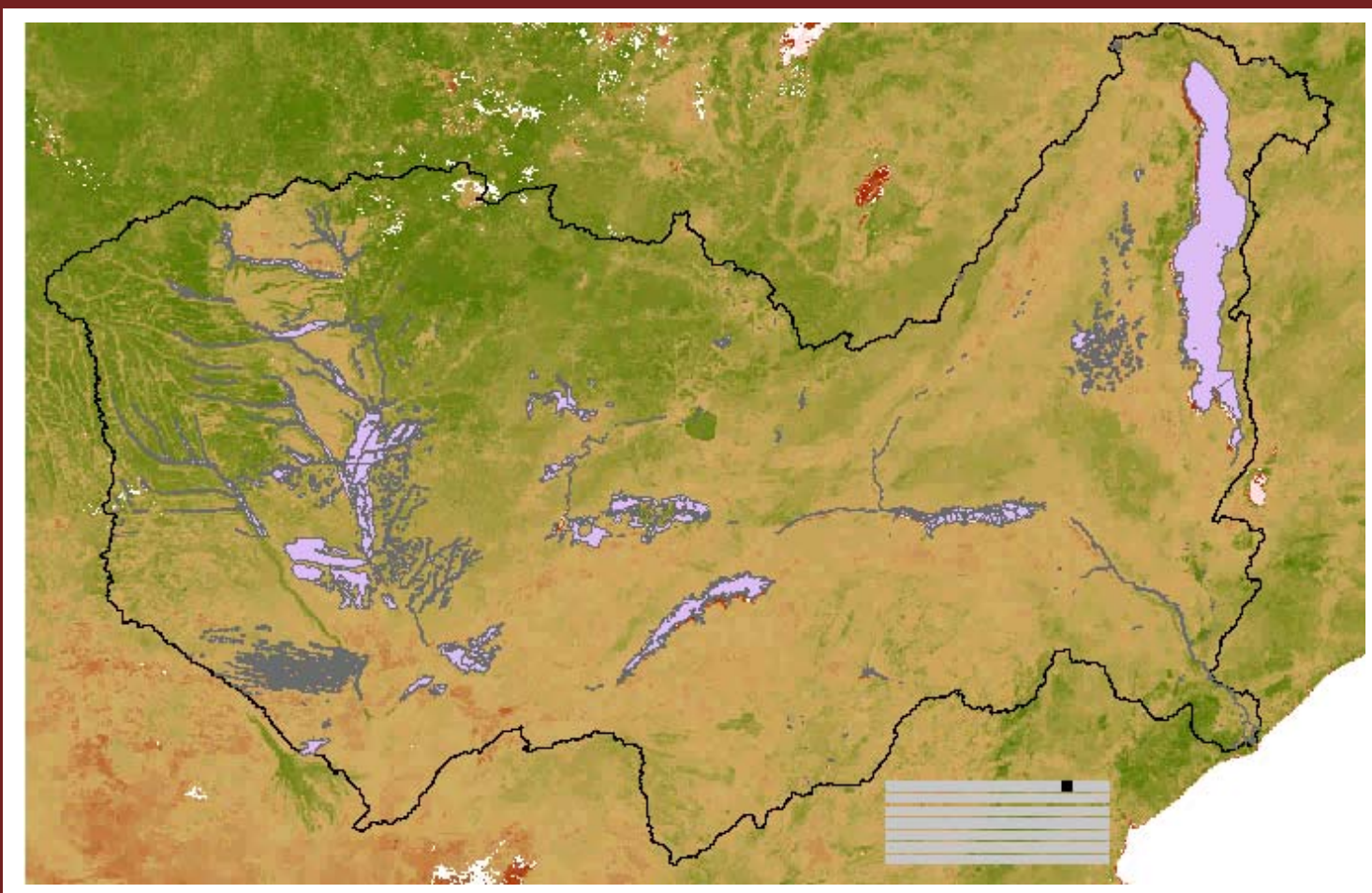
- ◆ **Zambezi Basin Boundaries**
- ◆ **Soil Properties**
- ◆ **Southern Africa Landcover**
- ◆ **Landcover and Landuse**
- ◆ **Basin %Landcover**
- ◆ **Surface Climate and Water Distributions**





# ***PHENOLOGY OF THE ZAMBEZI BASIN: Aug '01-Aug'02***

**MODIS NDVI-16 Day: out of 2000-2006**

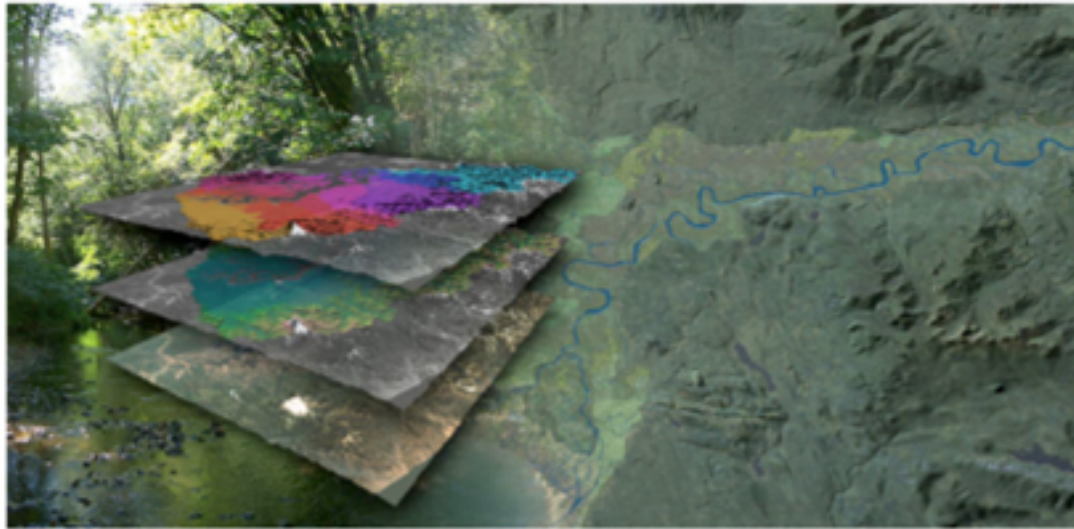






# DrukDIF Version 0

TOP STORY



## Bhutan Today and Tomorrow

[Chioq](#) [Geog](#) [Watershed](#) [Country](#) [Region](#)

MISSION

*...to provide an integrating, cross-sector platform for the resources of Bhutan*



NEWS & ANNOUNCEMENTS

QUICK LINKS



**Physical Template**  
[Topography](#)  
[Soils](#)  
[River Networks](#)



**Landcover**  
[Classes](#)  
[Seasonality](#)  
[Attributes](#)  
[Change](#)



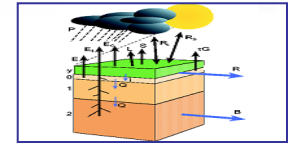
**Landuse**  
[Agriculture](#)  
[Forestry](#)  
[Infrastructure](#)  
[Ecotourism](#)



**Biodiversity**  
[Fauna](#)  
[Flora](#)  
[Ecosystem](#)



**Water Resources**  
[Climate](#)  
[Hydrology](#)  
[Flood Warning](#)  
[Hydropower](#)  
[Water Quality](#)



**Scenarios**  
[Water Distributions](#)  
[Climate Change](#)  
[Sediments](#)  
[Agric. Production](#)  
[Species Distributions](#)

A topographic map of a region, likely in South America, showing a complex network of rivers. The map is color-coded by elevation, with higher elevations in shades of green and brown, and lower elevations in shades of purple and blue. A prominent yellow dashed line traces a path across the map, likely representing a major river or a specific boundary. Red dots are scattered along this path and other river segments, indicating pour-points. The background is a grayscale topographic relief map. A semi-transparent white box with a grid pattern is overlaid on the upper portion of the map, containing the title text.

# From Digital Elevation Models to River Networks and Pour-points: SRTM and TRMM

***SRTM: Shuttle Radar Topography Mission***  
***TRMM: Tropical Rainfall Measurement Mission***



# Virtual Mekong Basin

Khmer | Lao | Thai | Vietnamese |

HOME

RESEARCH

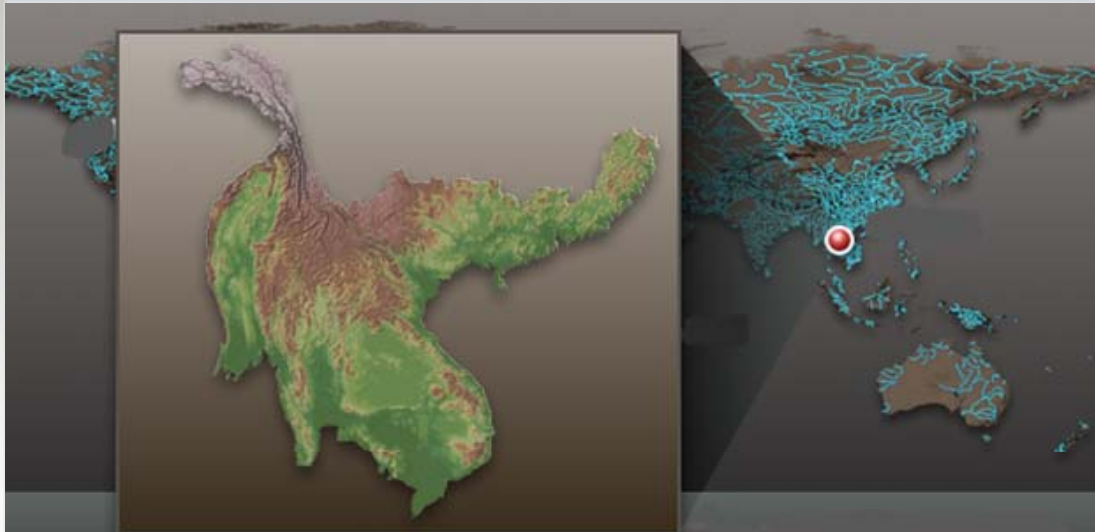
BASINS

PUBLICATIONS

RESOURCES

OUTREACH

## TOP STORY



**Mekong Yesterday, Today, and Tomorrow**  
Watershed   Country   Region

## MISSION

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



## HIGHLIGHTS

## NEWS & ANNOUNCEMENTS

## QUICK LINKS

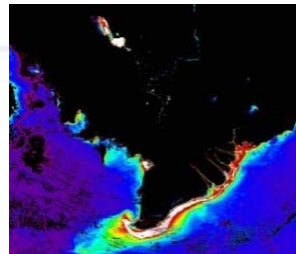
RSS Feeds



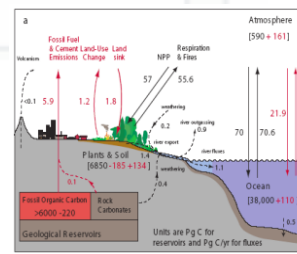
Basin Environment



Water & Water Resources



Sediment Movement



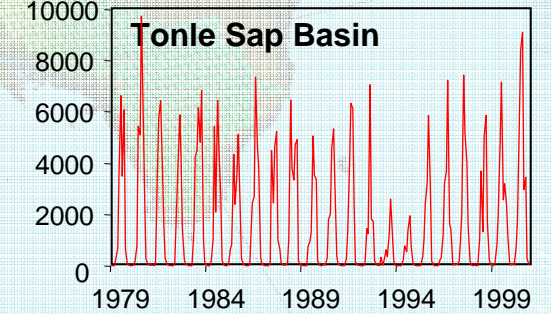
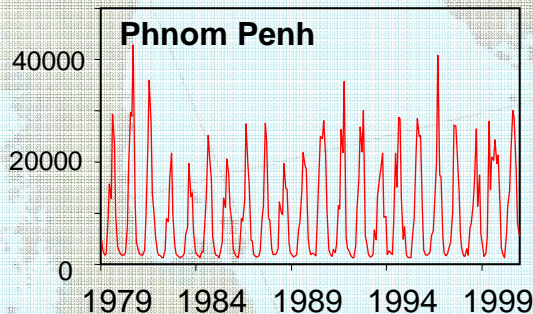
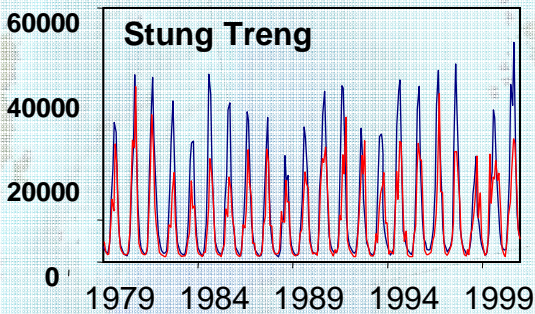
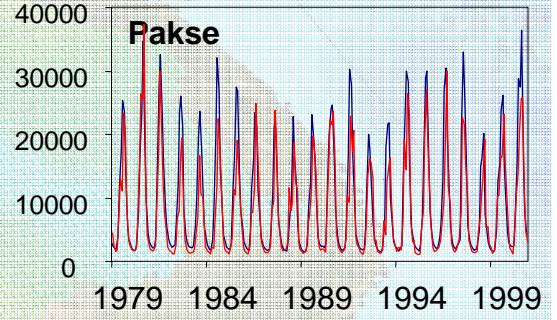
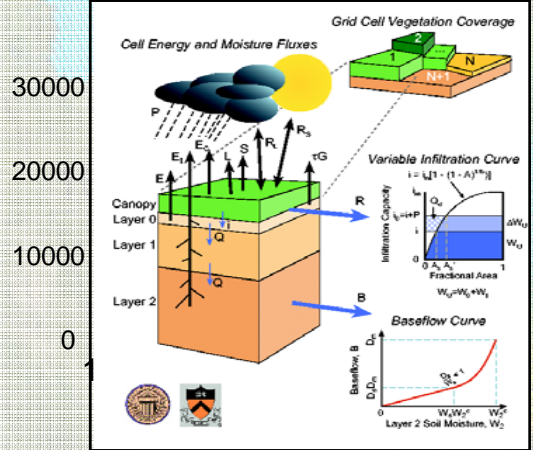
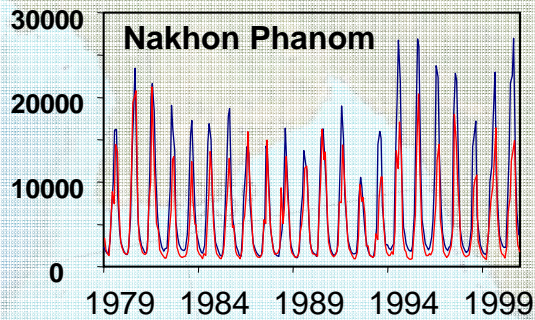
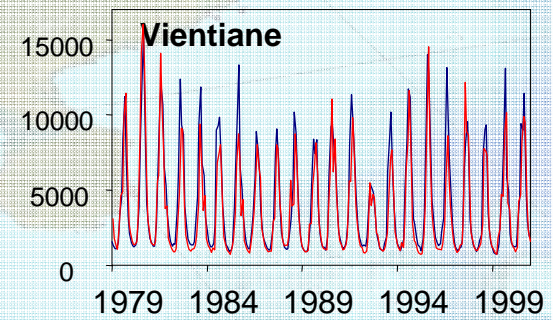
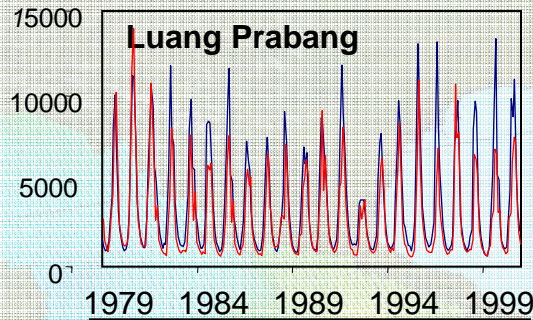
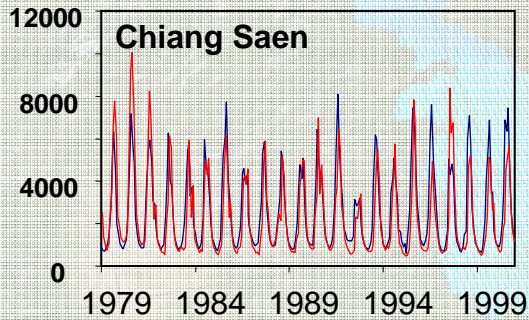
Carbon Balance



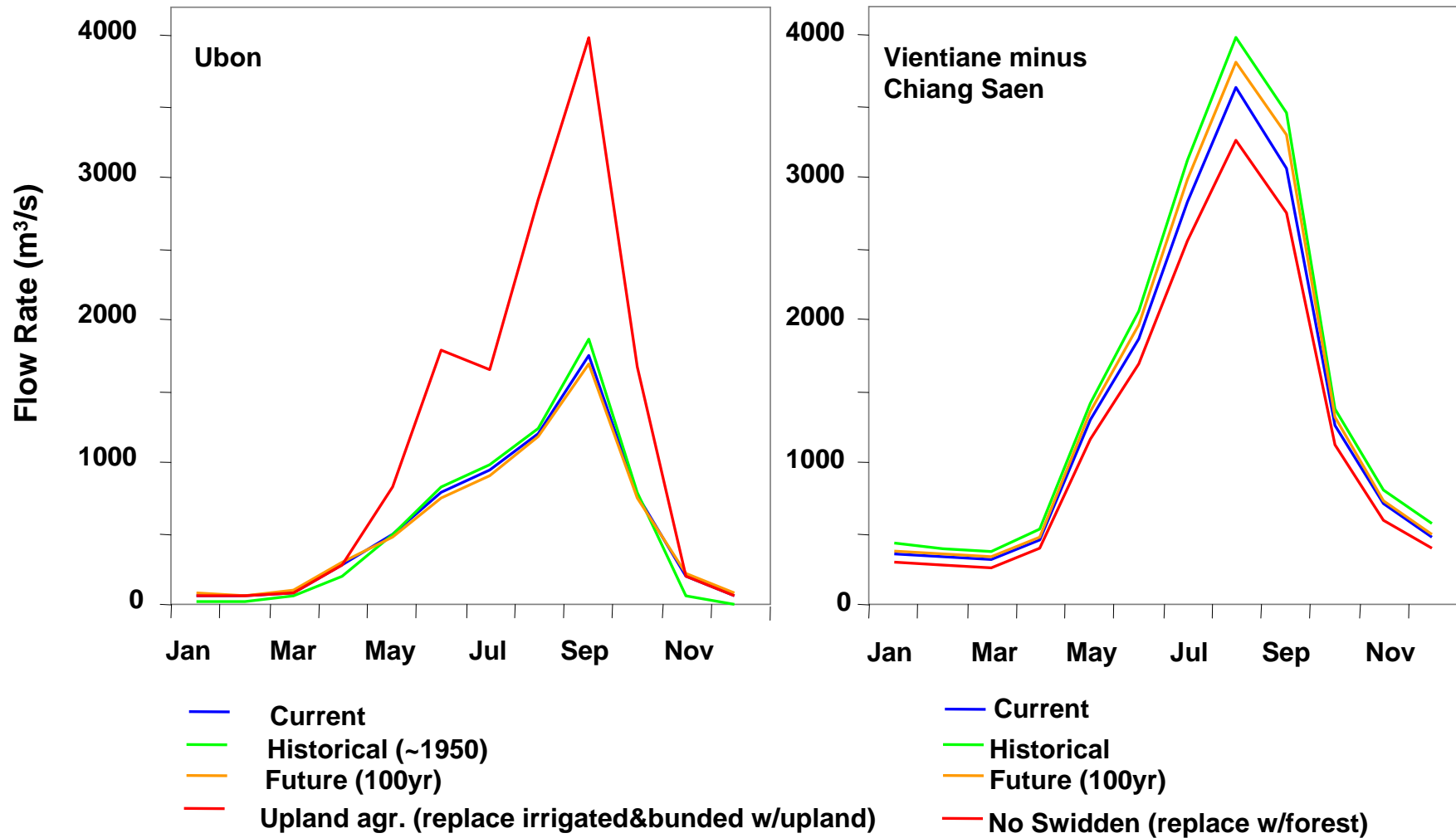
Hydropower

# Mekong Discharge 1979 -2000

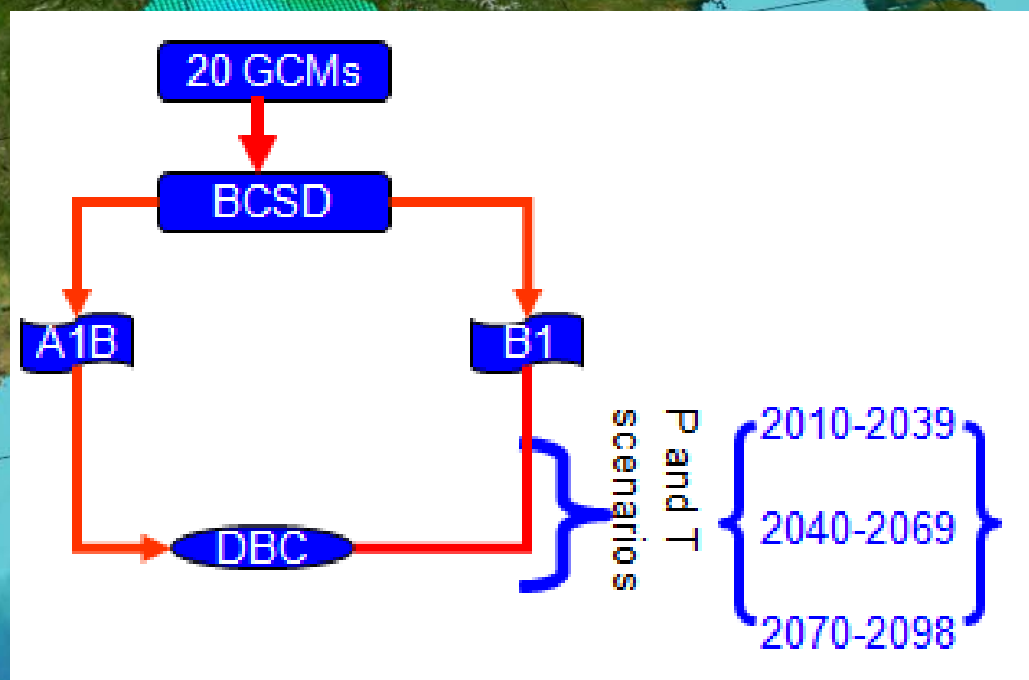
Observed  Simulated 



## Average Monthly Streamflow in 1980-2000 For Simulation Scenarios



# Mekong Discharge 2010 – 2098: *Climate Scenarios*

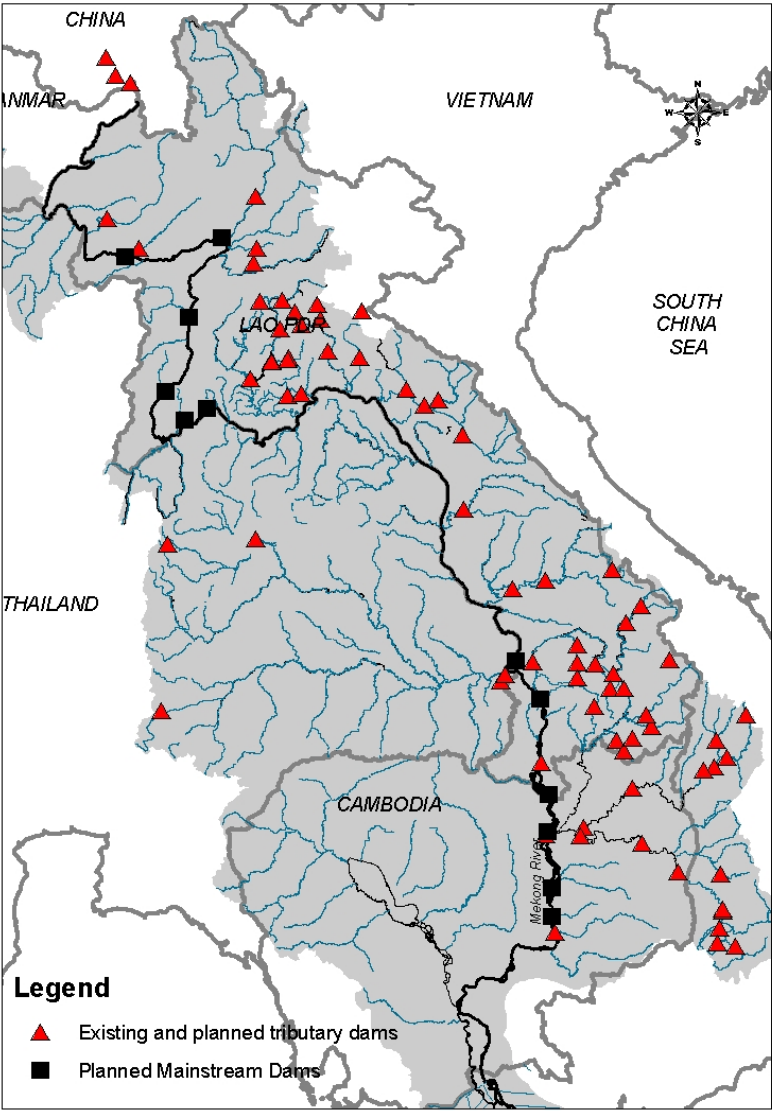


95°

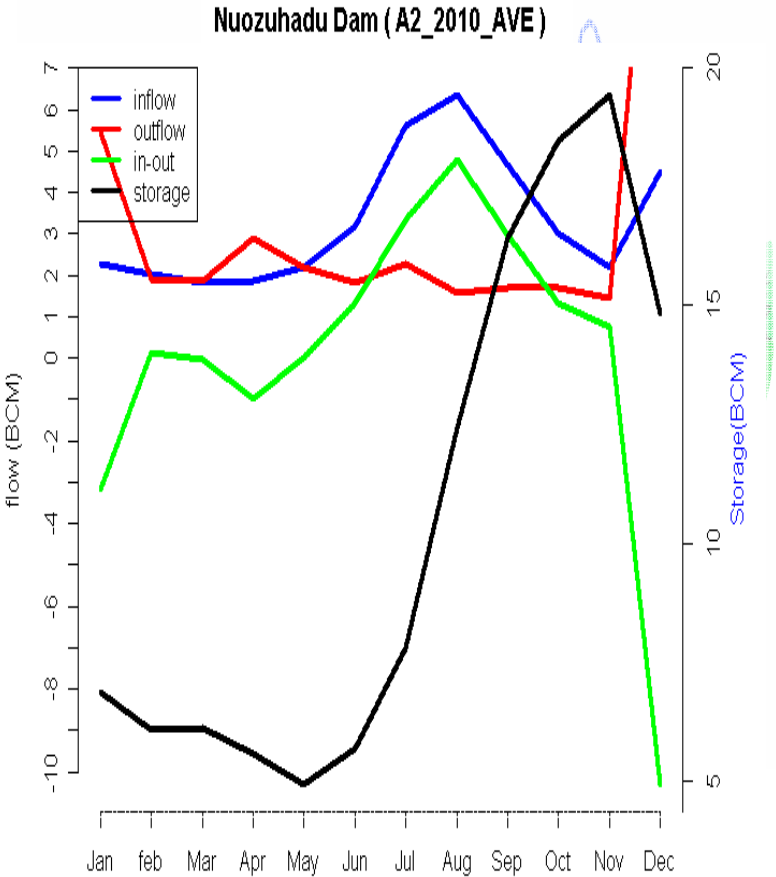
110°



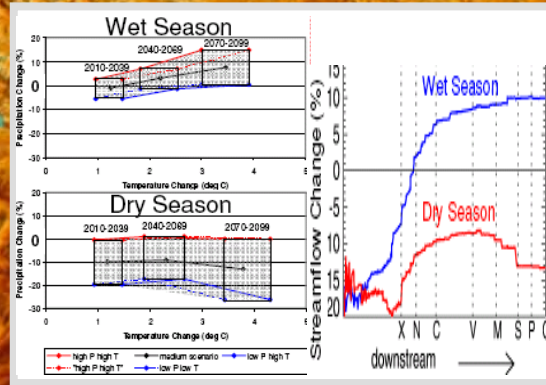
# Mekong Mainstem & Tributary Dams: Hydropower



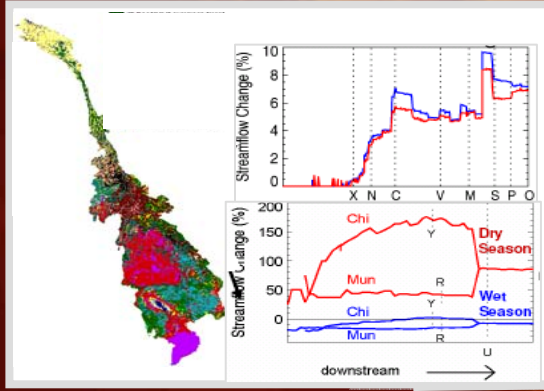
Example of future runs (A2 2010 2030)



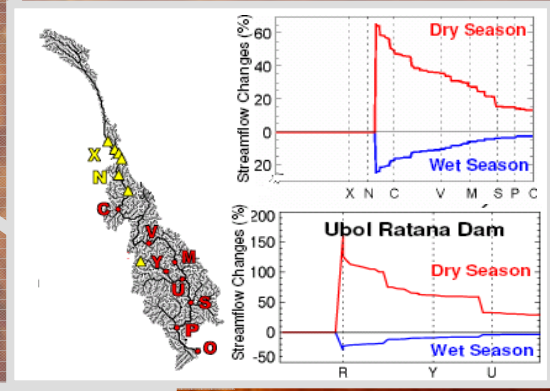
# CLIMATE CHANGE



**Synergy:  
Cumulative  
Impacts &  
Outcomes**



**LAND USE**



**DAMS**