



# THE FRESHWATER HEALTH INDEX

DR NICK SOUTER

Iuhvkz dhu# dgdjhu#J undhu# hnrqj

CONSERVATION  
INTERNATIONAL



# DATA AND MODELS

- What data and models do you need?
- What have you got?
- Is it available?



# FRESHWATER HEALTH INDEX

- Indicators can be generated using a wide range of data

## ECOSYSTEM VITALITY

### Water Quantity

- Deviation from natural flow*
- Change in groundwater*

### Water Quality

- Suspended solids
- Total nitrogen
- Total phosphorus
- Other quality parameters of concern

### Basin Condition

- Bank modification
- Flow connectivity
- Land cover naturalness

### Biodiversity

- Species of concern
- Invasive & nuisance species

## ECOSYSTEM SERVICES

### Provisioning

- Water supply reliability
- Biomass for consumption*

### Regulation & Support

- Sediment regulation
- Water quality regulation
- Flood regulation
- Disease regulation

### Cultural

- Conservation areas
- Recreation

## GOVERNANCE & STAKEHOLDERS

### Enabling Environment

- Water resources management
- Right to resource use
- Incentives & regulations
- Financial capacity
- Technical capacity

### Stakeholder Engagement

- Information access
- Engagement in decision-making processes

### Vision & Adaptive Governance

- Strategic planning & adaptive management
- Monitoring & learning mechanisms

### Effectiveness

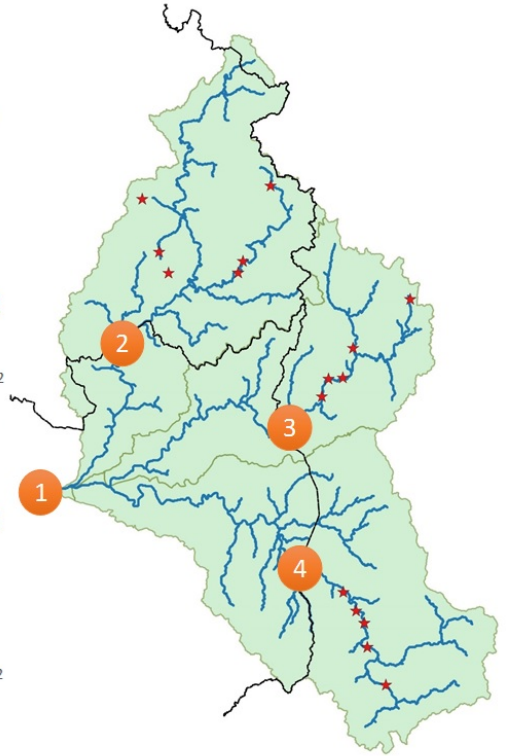
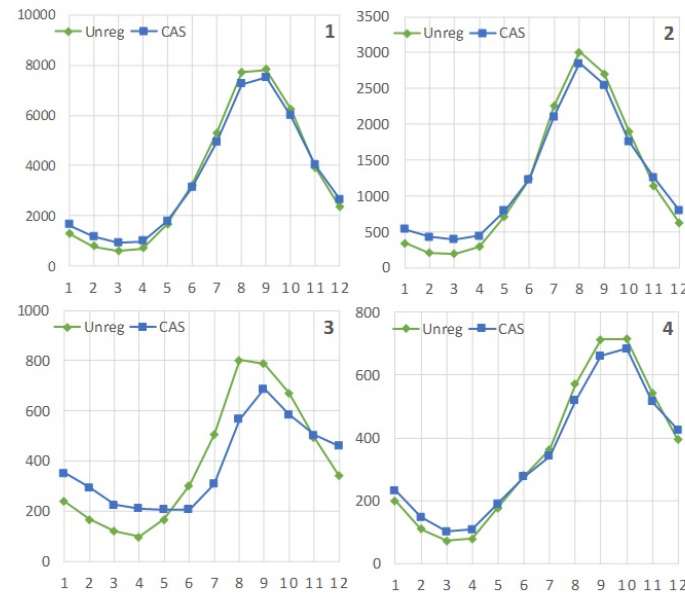
- Enforcement & compliance
- Distribution of benefits
- Water-related conflict

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# DEVIATION FROM NATURAL FLOW REGIME

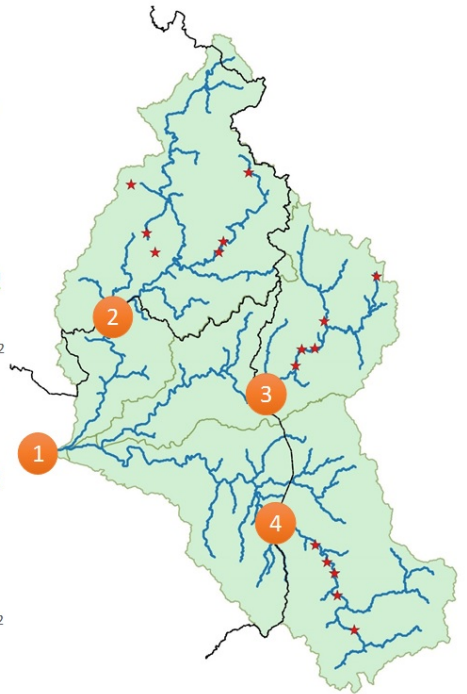
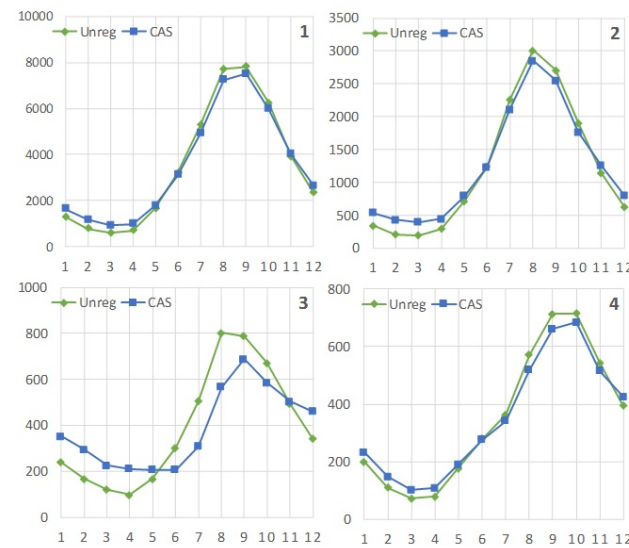
- Modelled and measured data
- Two models for the 3S
  - University of Canterbury (NZ)
  - NASA



# DEVIATION FROM NATURAL FLOW REGIME

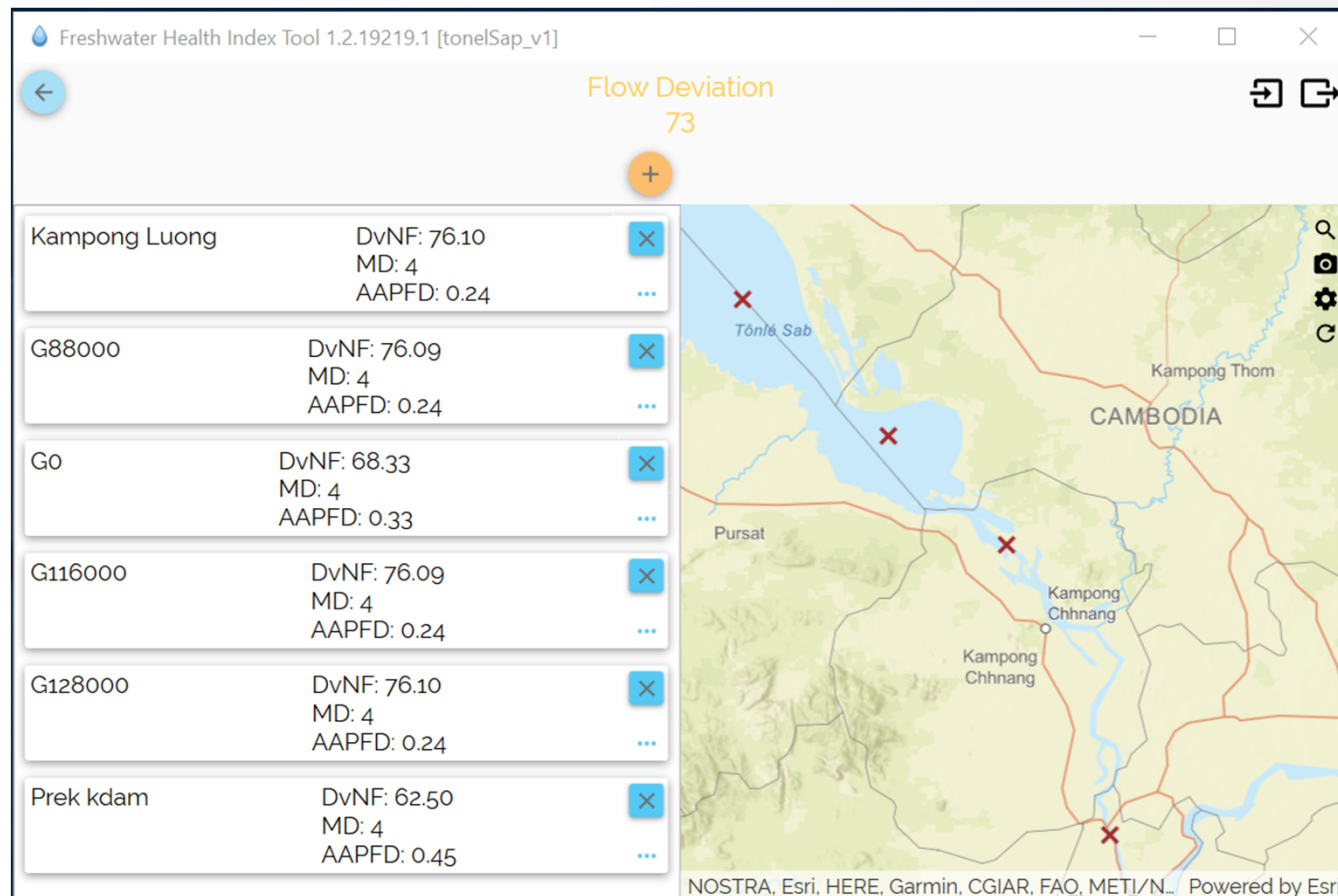
	1	2	3	4
UC model	69	70	42	54
NASA model	71	60	68	85

Erw#r#khvhv#p rgho/  
dgg#lop rgho#duh#  
Z UR QJ  
Exw#vp h#p rgho#duh#  
xvhixo



# DEVIATION FROM NATURAL FLOW REGIME

- Wron#Vds#F rxqf#wkg|#p rghobj



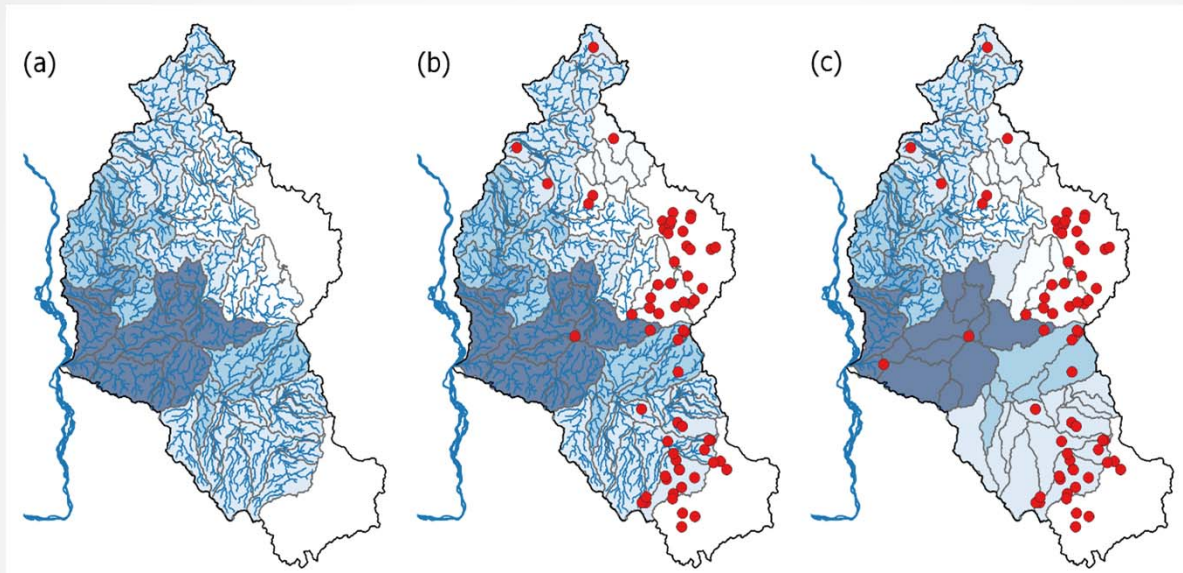
# DEVIATION FROM NATURAL FLOW REGIME

- Tonle Sap Measured Height
- Pre 1990 as natural flow
- Post 2014 as regulated flow
- Kampong Thmar: 67
- Prek Kdam: 68
- Phnom Penh Port: 63
- Overall score: 66





# IMPACT OF DAMS ON CONNECTIVITY AND BIOMASS



NATURAL

EXISTING

+LOWER SESAN I

Connectivity

**100**

**78**

**38**

Biomass

**100**

**94**

**26**

• Dam location  
— Connected stream  
— Disconnected stream

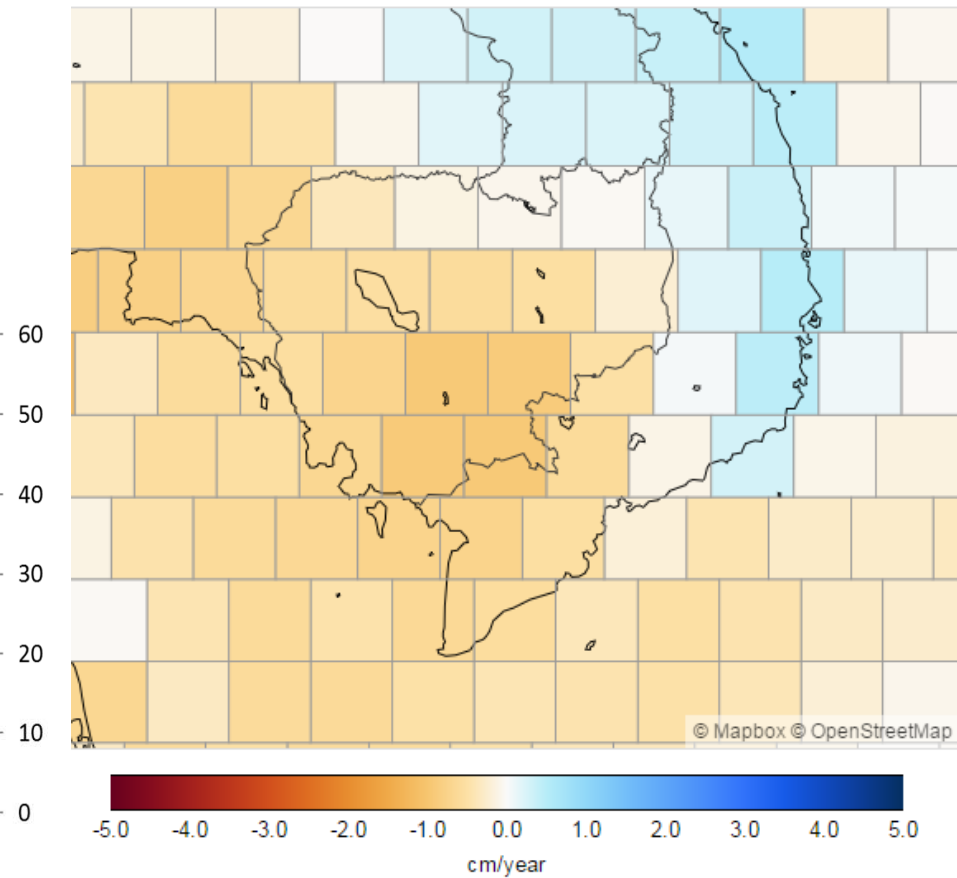
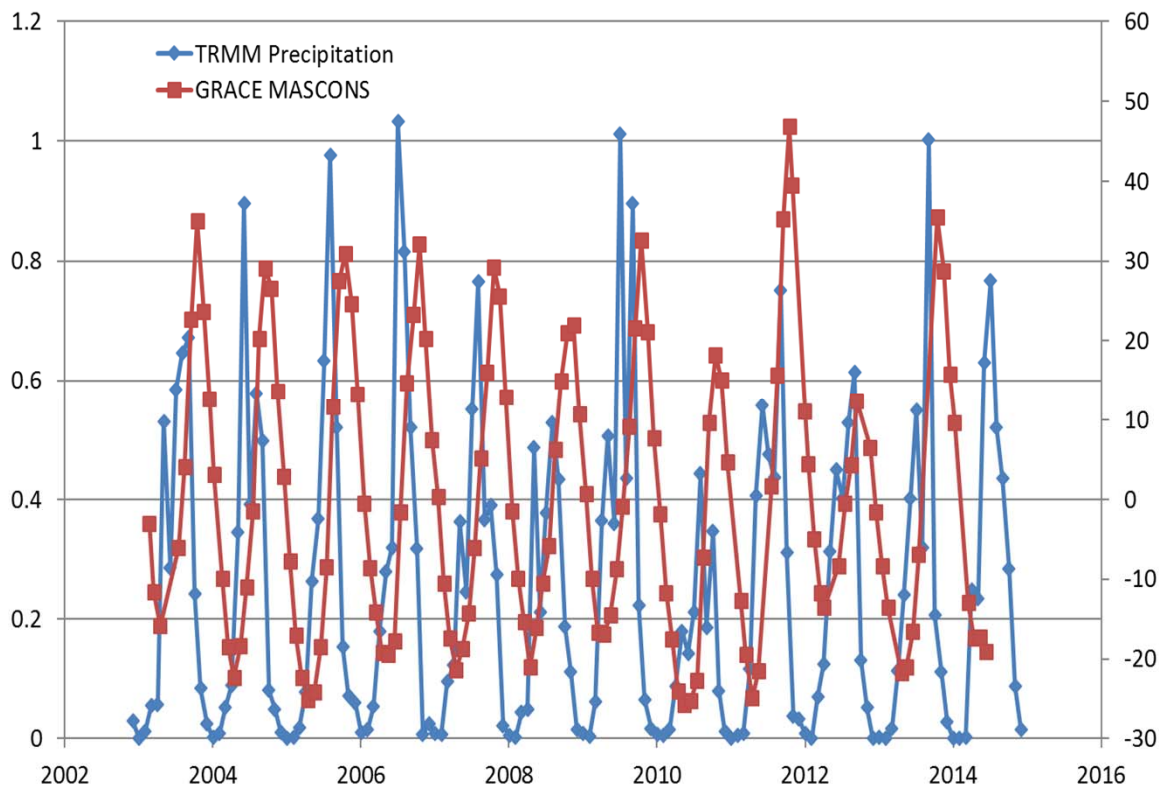




# GROUNDWATER

- 3S, bore field in Viet Nam
- But, not Cambodia or Lao PDR
- So let's use a satellite

# GRACE AND GROUNDWATER



# WHAT DATA DO I WANT ?

- Aquatic species population trends (both plants and animals)
- Groundwater depth from a bore field
- Fine scale hydrology, e.g. wetland drying regimes
- A measurement of water supply relative to demand



# THANK YOU

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

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