Global Scale Initiative

Progress over the Last 2 Years

Briefing to the SSC

by

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Programme implementation

Programme Implementation
The GWSP Initiatives

SPECIAL INTERESTS

Climate change

Governance

Adaptation Strategies

1. *Global Scale Initiative:*
   Ranking of threats to the GWS, States and Trajectories of Change

2. *Global Catchment Initiative:*
   Bringing the global perspective to river basin research & management

3. *Global Water Needs:* Humans and nature
   Balancing goals and needs

Simulation modelling & scenarios

Observations & Indicators

METHODS & TOOLS

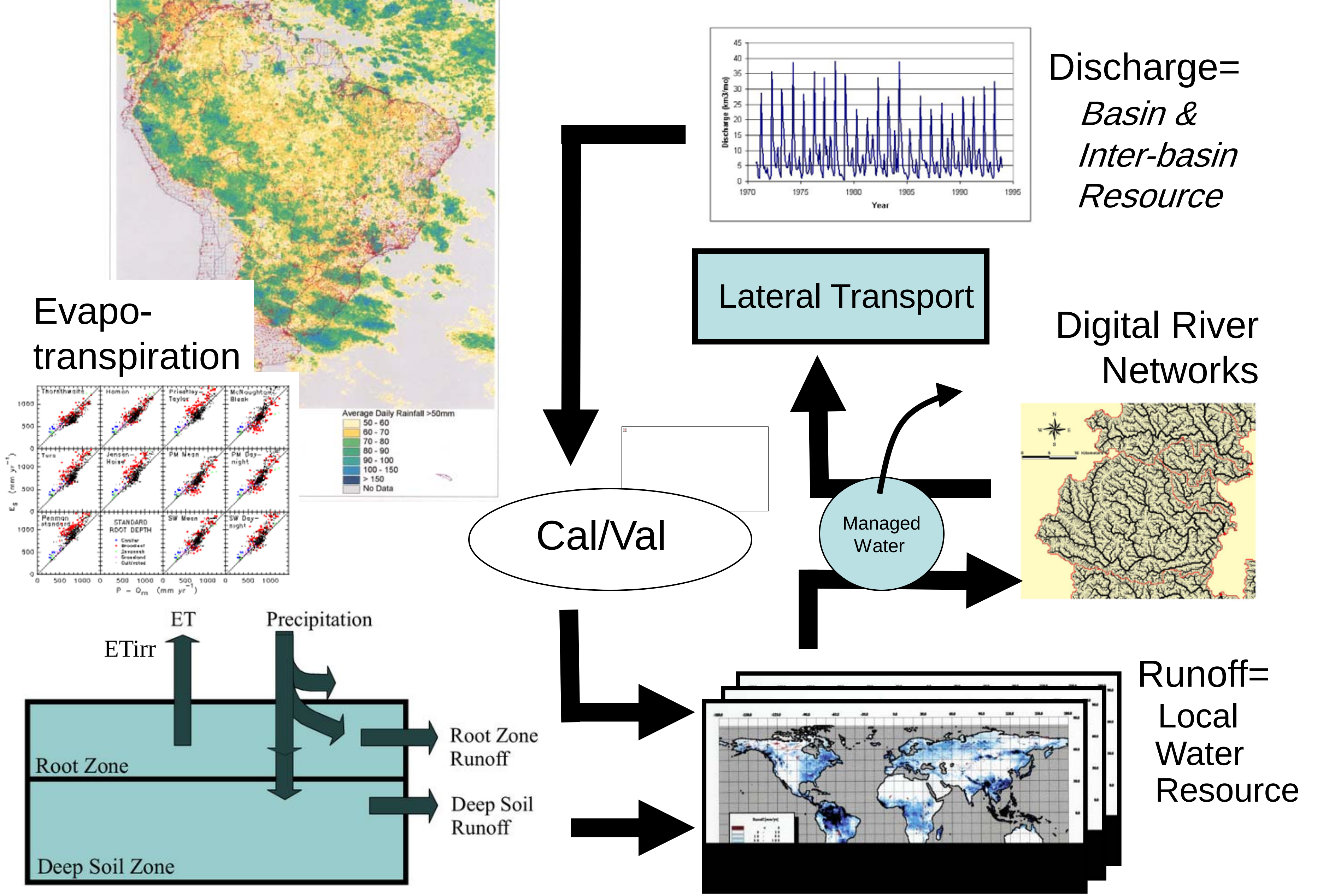
Policy Outreach & Capacity Building

Rationale for Global Scale

- Centrality of water in the Earth system and in Global Environmental Change
- Tradition of local-scale perspectives have “bound” water studies in the past
- Major uncertainties in both biogeophysical quantities and governance possibilities @ global scale….yet to be explored
- We have the capabilities and opportunity to address the issue head-on
- The “G” in GWSP

Some Key Outputs

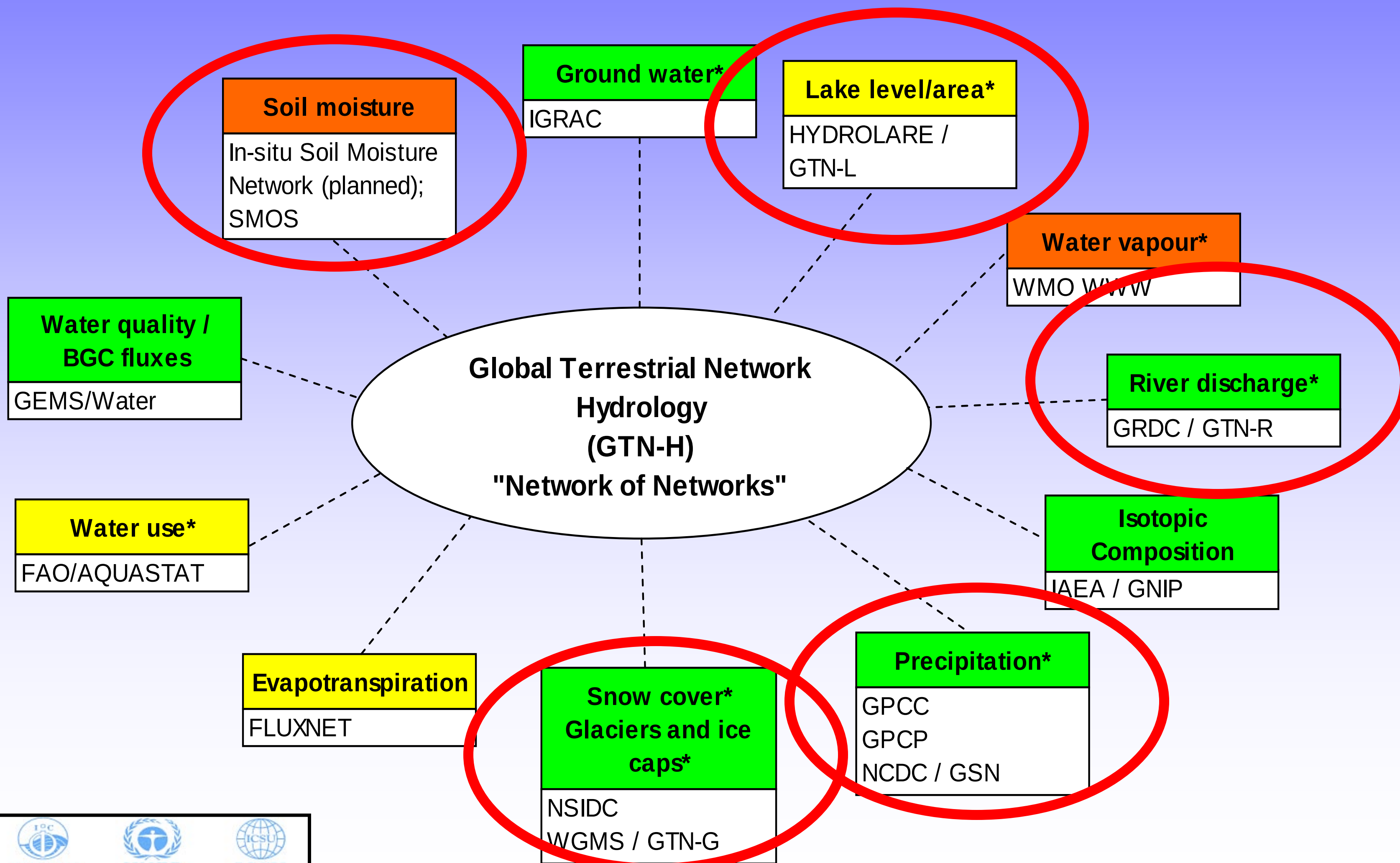
WATER RESOURCE MODULE



GTN-H Provides Rich Set of Information Streams for Many Applications

Themed Approach

e.g. Hydrologic Extremes (e.g. flood) Monitoring and Assessment



WMO GCOS UNESCO GTOS UNEP HWRP ICSU

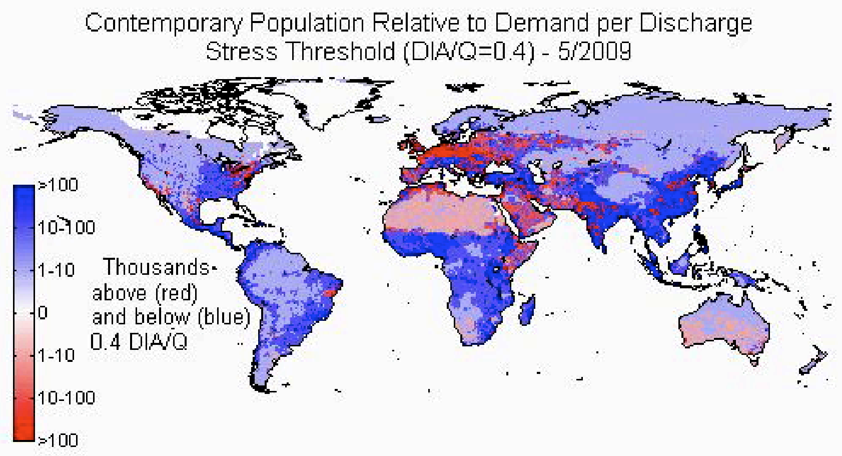
Indicator: People under water stress

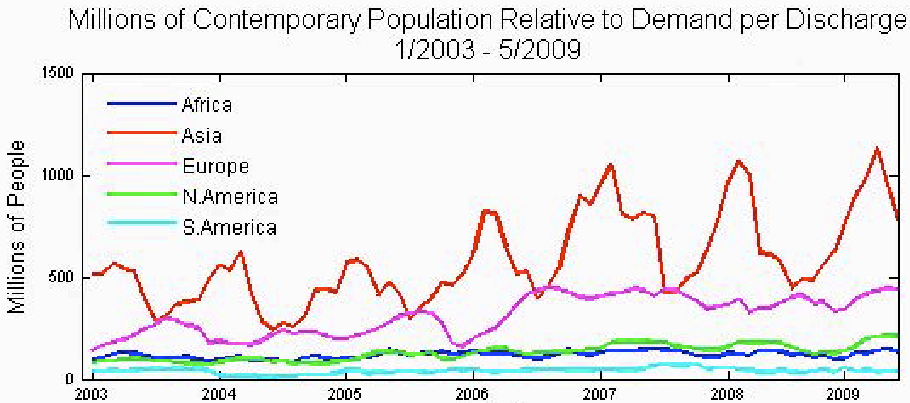
http://ceci.ccny.cuny.edu/psi/indi_dia.html

The Pilot St...n Indicators City-Mail Apple Yahoo! Google Maps YouTube Wikipedia News (239) Popular

Pilot Study on Indicators (PSI)

Welcome Overview Hydromet Data Socio-Economic Data Indicators





Water Use Index (DIA/Q):

The water Use Index is based on a scarcity threshold of > 0.4 (ratio of mean annual demand to supply, Falkenmark (1998)). The annual demand refers to the agriculture, domestic and industrial water demand on a monthly basis. The Water Balance/ Water Transport Model (WBM/ WTM) provides the monthly discharge corresponding to the period January 2003 to December 2008 used here. The input data for the WBM/WTM model includes air temperature from the National Center for Environmental Prediction (NCEP) and combined precipitation products from the GPCP /CMORPH project

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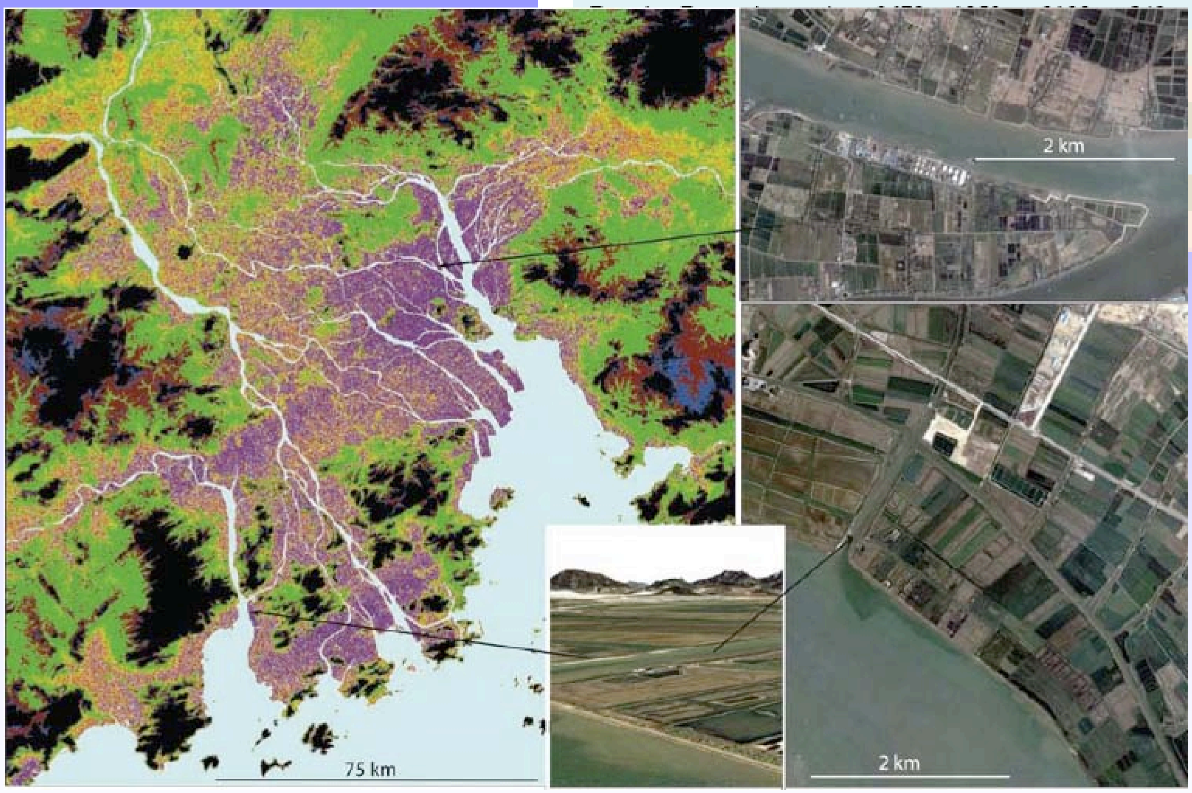
Some Chief Findings

Delta	No. Maps	Est. Area km^2 <2m ASL	Recent Area km^2 Storm Surge	Recent Area km^2 River Flood	Recent Area km^2 In situ Flooding	% Sediment Reduction	Floodplain or Delta Flow Diversion	% Distributary Channel Reduction	Subsurface Water, Oil & Gas Mining	Early 20th C Aggradation Rate mm/y	21st Century Aggradation Rate mm/y	Subsidence mm/y
Amazon, Brazil	6	1960*	0; LP	0	9340	0	No	0	0	0.4	0.4	?
Amur, Russia	-	1250	0; LP	0	0	0	No	0	0	2	1	0.5-2
Brahmani, India	6	640	1100	3380	1580	50	Yes	0	Major	2	1	0
Chao Phraya, Thai.	2	1780	800	4000	1600	85	Yes	30	Major	0.2	0	50-150
Colorado, Mexico	3	700	0; MP	0	0	100	Yes	0	Major	34	0	2-4
Congo[5] DRC	-	460	0; LP	0	0	20	No	0	0	0.2	0.2	0?
						63	Yes	0	Minor	3	1	≈0
						0	No	0	0	5	5	0.5
						30	Yes	37	Major	3	2	18
						40	Yes	0	Major	7	2	≈4
						27	No	0	0	3	2	0
						80	Yes	80	Minor	8	1	1.3
						30	No	20	Minor	2	1.4	6



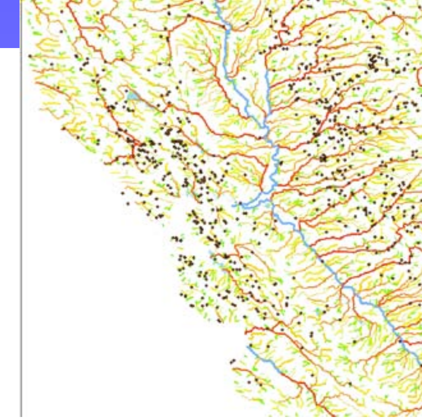
Confirms:

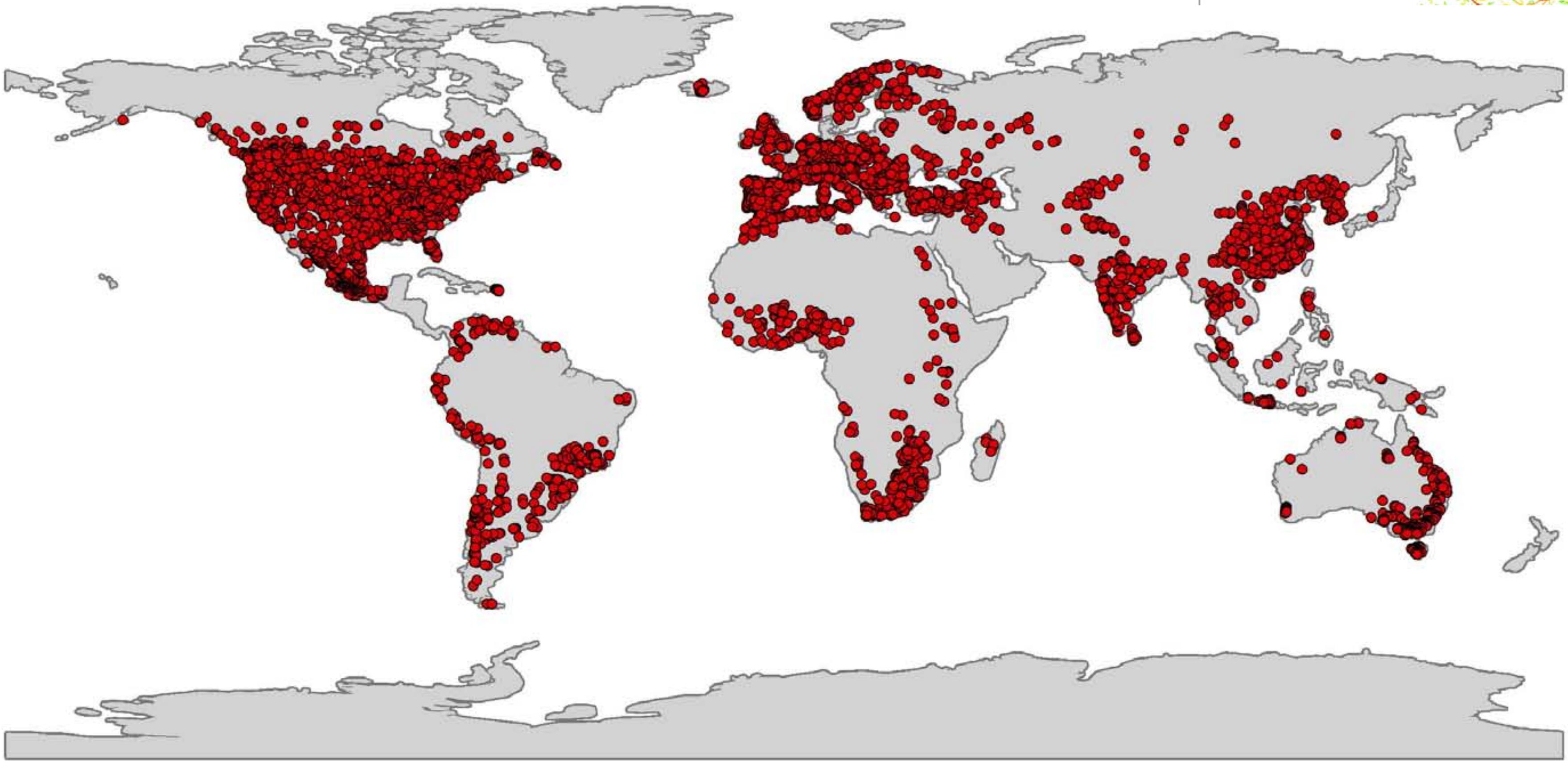
- Numerous deltas sinking
- Chief cause: landward activities, not SLR, confirming *Ericson et al. (2006)*
- 100's of millions at potential risk

Syvitski et al., Nature Geosciences, in review

Global Reservoir and Dam (GRanD) Database

Currently ~ 7000 dam locations referenced to SWBD polygons and HydroSHEDS river network





~ 2600 reservoirs ≥ 100 Mio. m^3

Total storage capacity ~ 6000 km^3 (>80% of world total)

Nature: September 30 issue

- Addresses central tenet of GWSP (document; attribute; impacts)
- Great media coverage (>240 outlets)
- Next steps: scenarios

Visit: *www.riverthreat.net*

Earth System Science Partnership

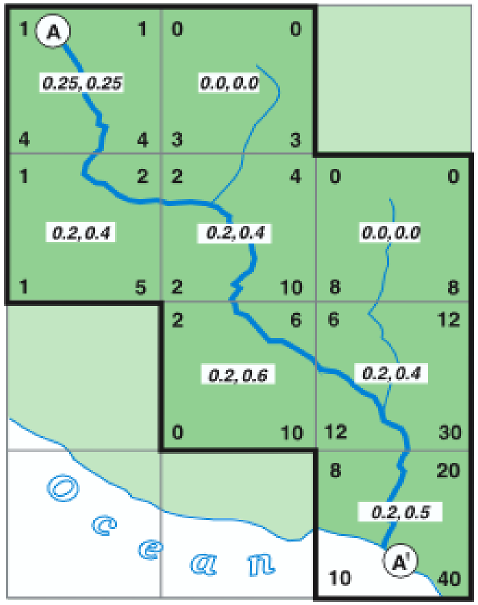
GWSP Global Water System Project

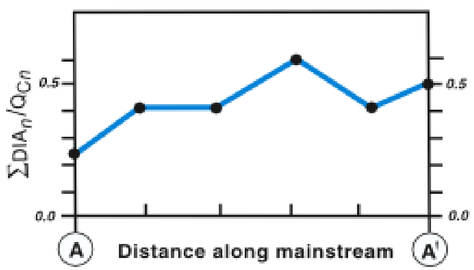
DIVERSITAS

Global RIMS

Global Rapid Indicator Mapping System for Water Cycle & Water Resource Assessment

CALCULATION OF KEY WATER INDICATORS





DIA_n = domestic, industrial, agricultural water use ($km^3\ yr^{-1}$) in cell n

$\sum DIA_n$ = DIA in cell n plus all upstream cells ($km^3\ yr^{-1}$) $= \sum_{i=1}^{n} DIA_i$

R_n = locally-generated runoff (mm/yr)

A_n = area of cell n (km^2)

$QL_n = 10^6 * R_n * A_n$ = locally generated discharge ($km^3\ yr^{-1}$)

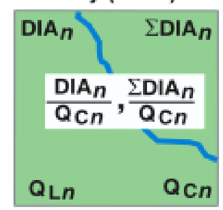
$QC_n = \sum_{i=1}^{n} QL_i$ = river corridor discharge ($km^3\ yr^{-1}$)

DIA_n/QC_n = local relative water use (unitless)

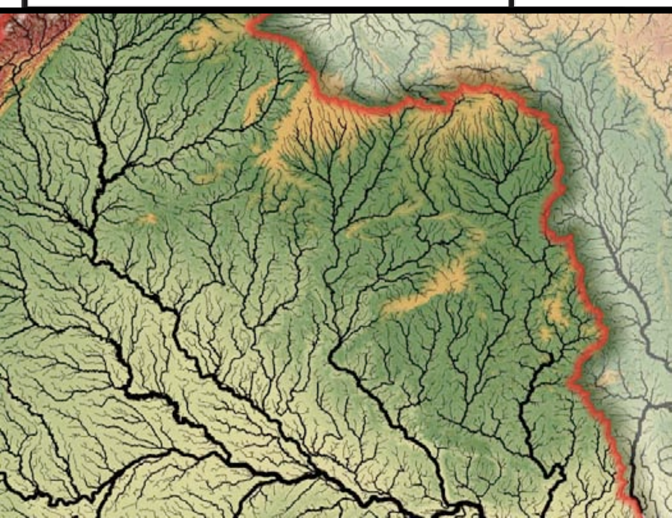
$\sum DIA_n/QC_n$ = water reuse index (unitless)

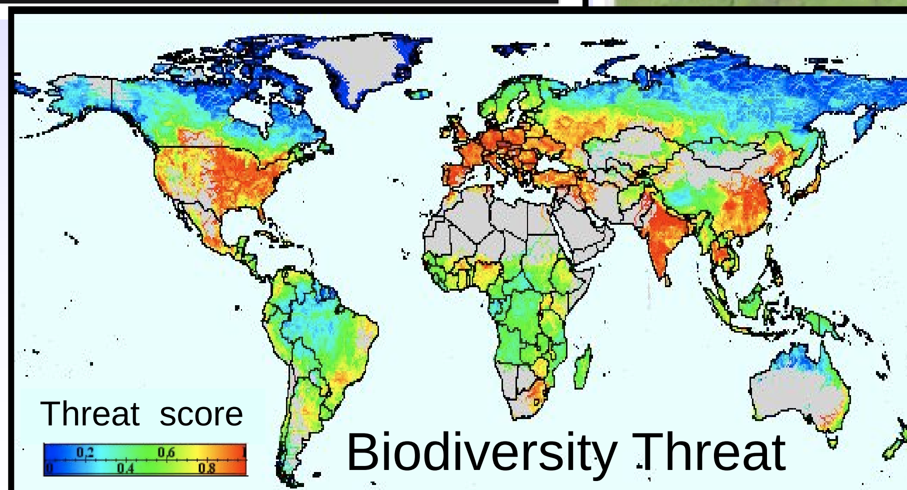
n = position of cell in river network
= total number of upstream cells plus cell in question

Key (cell n)



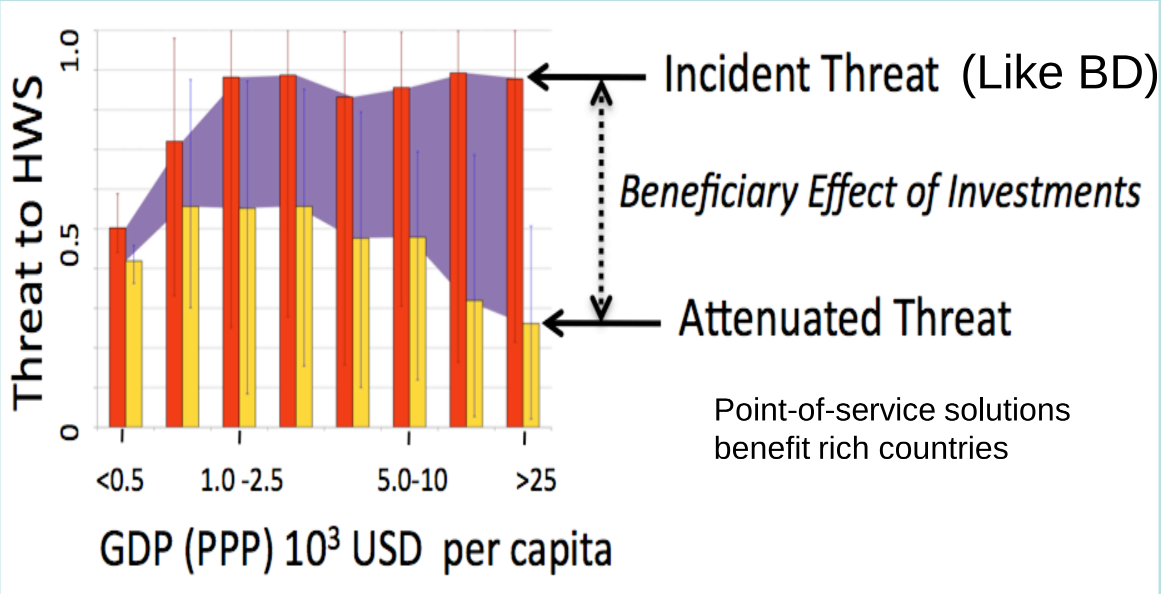
- *DEFINE WATERSHED STATE BASED ON LOCAL AND RECURSIVE INDICES*
- *GOOGLE AND OPEN MAP SERVERS*
- *MAP SYSTEM STATES OVER MULTI-SPACE & TIME SCALES*





GWSP Global Water System Project

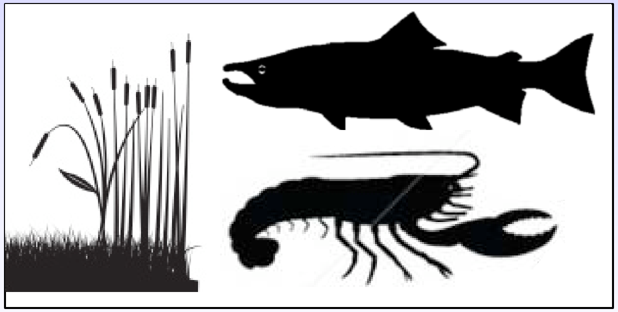
DIVERSITAS



Large $$ & Energy Costs

- Treat symptoms rather than causes
- Strand poor & BD under high levels of threat
- Water management impacts (like from dams) impair BD and Ecosystem Services

Infrastructure investments are huge: $0.75Trillion/yr for OECD & BRIC alone by 2015



Why so different?

Next Steps

- Continue WWAP liaison / support activities—"State Product" (Pilot Study on Indicators), National Water Accounts (UN Statistical Division)
- Continue GTN-H coordination w/ WMO
- Continue IGBP-LOICZ effort on deltas, focusing on sources of risk from freshwater management
- Continue GWSP-DIVERSITAS Threat Mapping, engage IPBES
- Workshops on all of these
- "Bundled" products for Atlas

GSI: Next Steps

A Focus on Partnerships

- GAIM for integrated modeling
  - US NSF: EASM, WSC, Coupled Human-Natural Systems
- ESSP Carbon Project for (a) E use to pump H2O; (b) water – climate; (c) water – carbon – energy links
- GTN-H / WWAP
- Use of the Atlas/RIMS (www.riverthreat.net) to bring partnerships together
- Private sector?