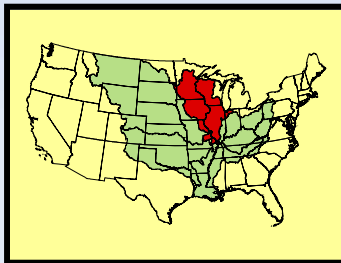


River Conservation: the Path and the Destination

Ken Lubinski

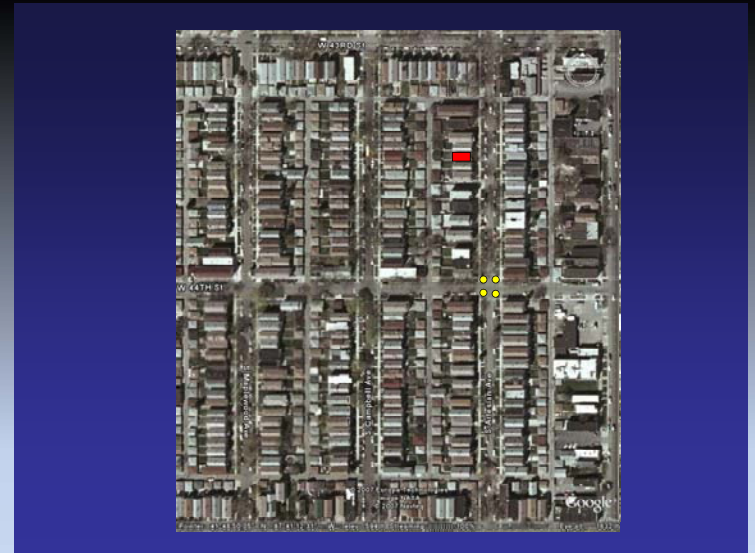
Upper Midwest Environmental Sciences Center,
La Crosse, WI



(on the Upper Mississippi River)

a little background

- How I got this way
- What I value Learning, balance
- Professional goals
 - * For river science
 - * For the Upper Mississippi River
- A Quest



Appreciation, use,
moving the needle



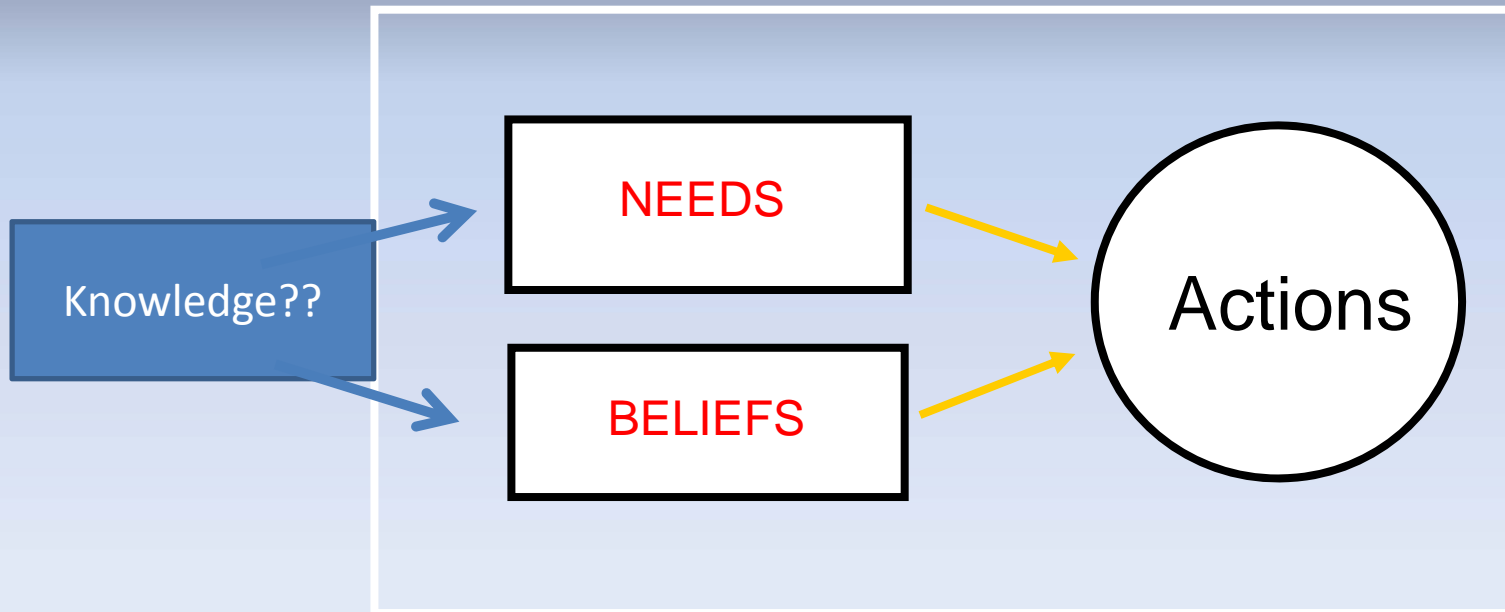
The Ideal Science/Management Relationship



- Knows what questions to ask prior to taking action.
- Knows when/how to put science into "broader context"

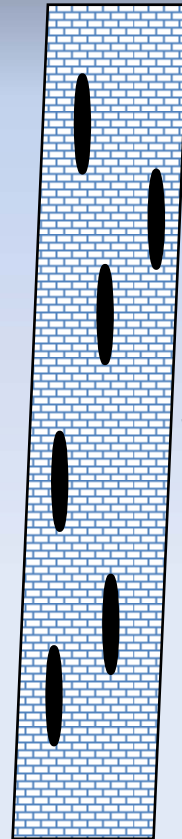
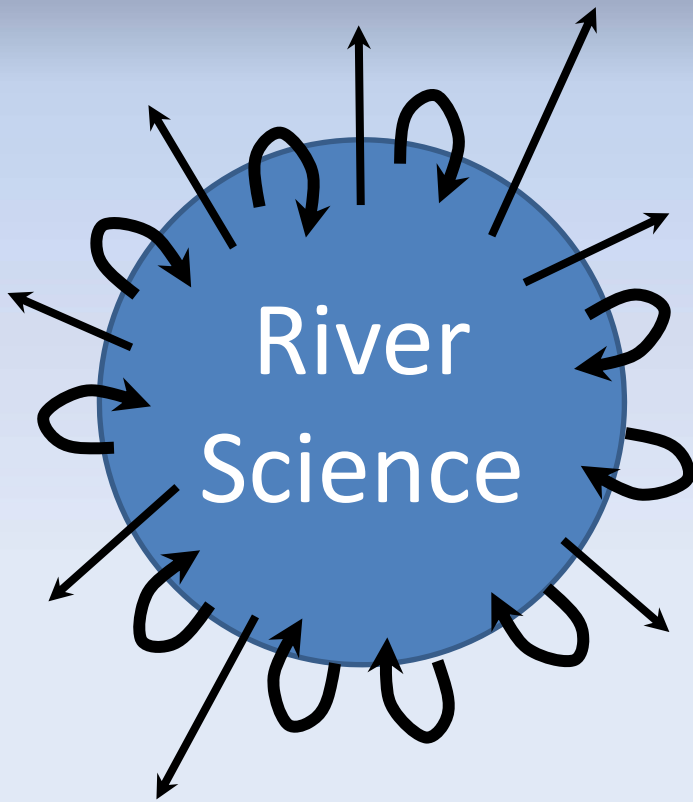
- Always has the answers
- Objective; no ego
- Always has the necessary technology

A minimalist model of human behavior



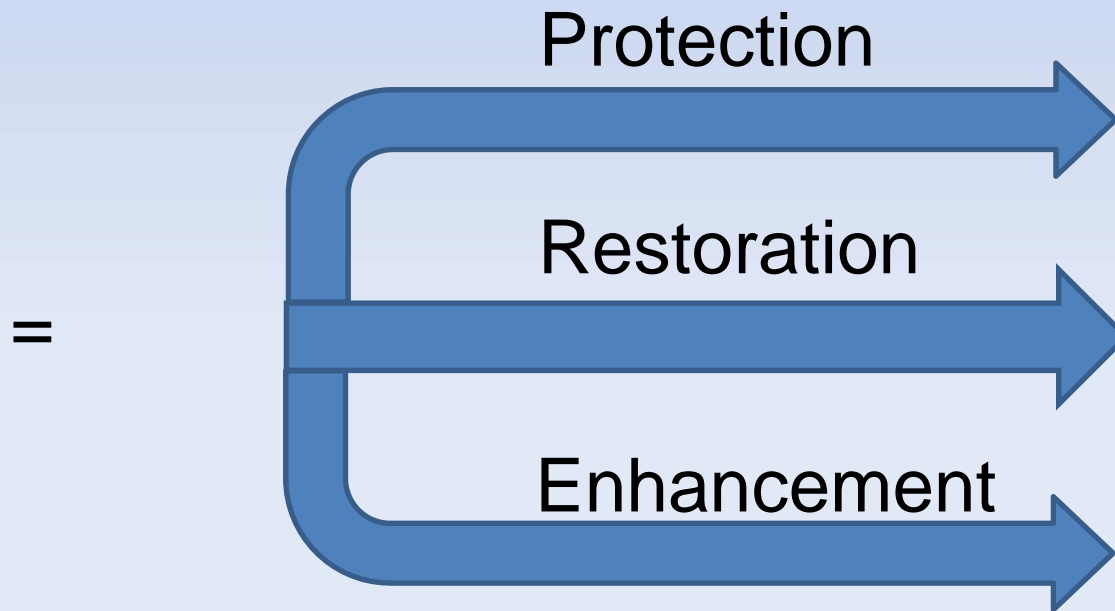
¹ Source: *Philosophy for Dummies*, T. Moore

Information Flow



River Conservation (two definitions)

= Harmony (between the humans and the land)




Outline:

Part 1: the Destination


Part 2: the Path

Part 3: relevance to ISRS

Part 1: The Destination

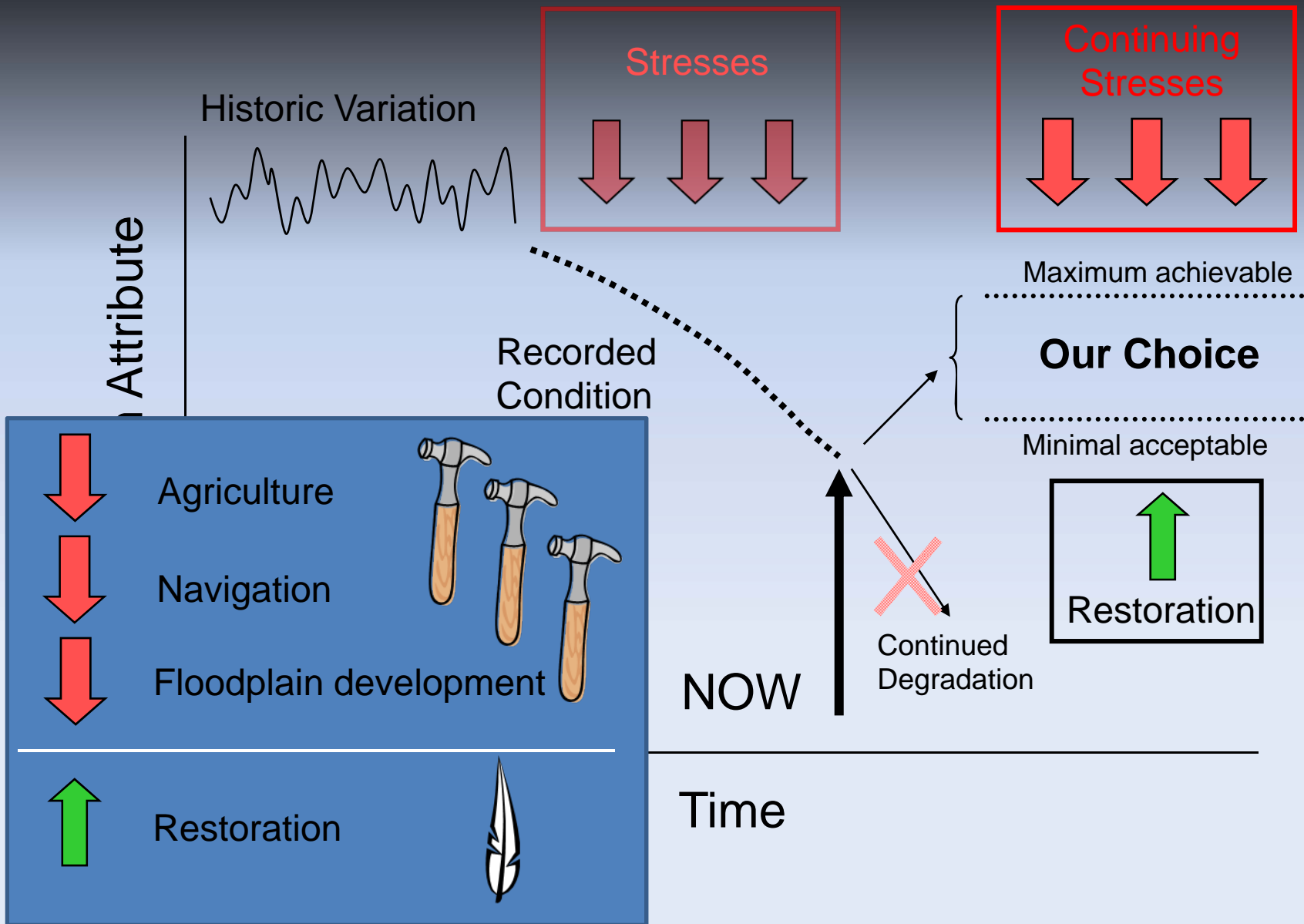


I think the channel is this way!



No, the other way!

\$*%!!@@#



For parts of the Upper Mississippi, our conservation destination is like this -



But not like this -



Continuing goal-setting issues(1):

Philosophical -

Equal rights among river uses?

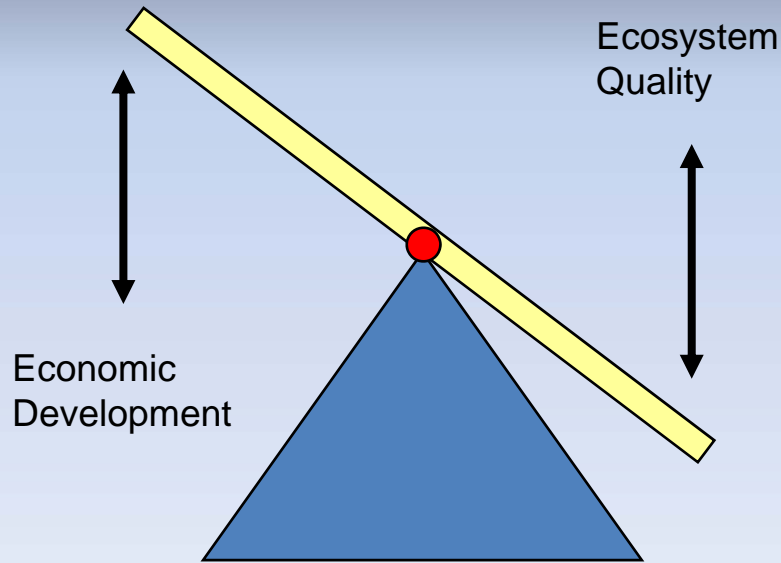
Operational -

Who is responsible?

Implementing adaptive management?

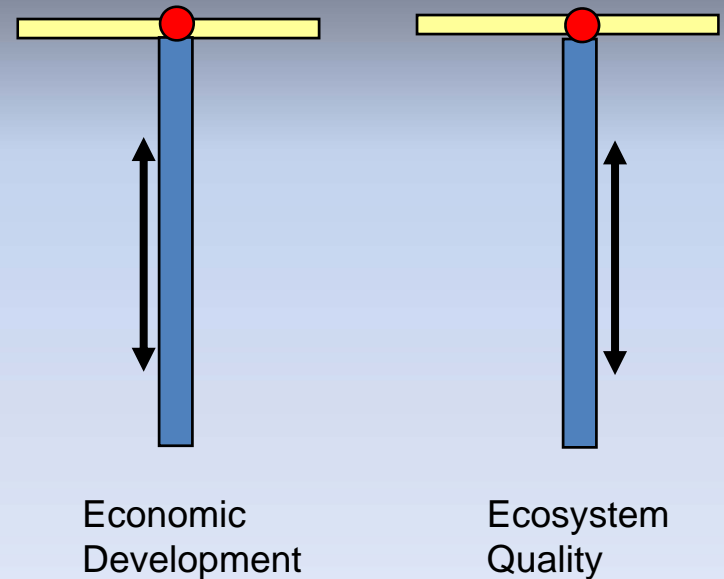
On the philosophical issue –

Two conflicting models of Economic/Ecosystem Relationships



(a)

Co-dependency



(b)

Independency

Continuing goal-setting issues (2):

Technical issues* (of special relevance to ISRS)

Which ecosystem variables matter? (ie. are “essential”)

- a. Individually
- b. Collectively

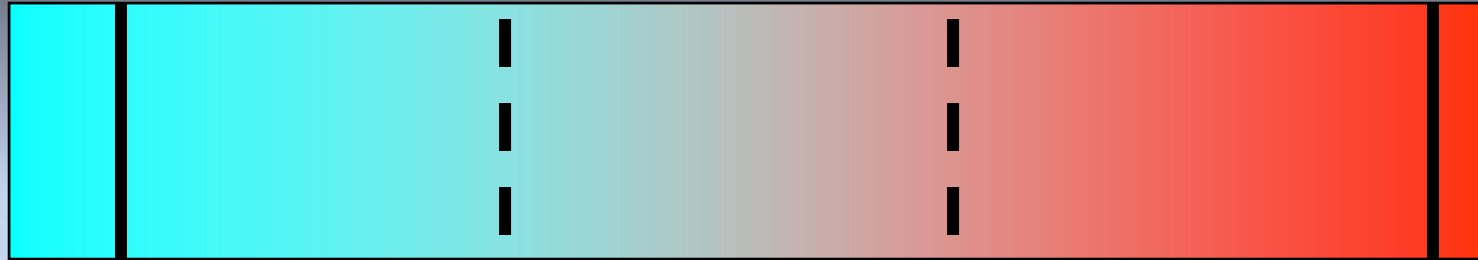
At what scale(s) should status and progress be quantified?

How much variability is enough?

Identification of “minimal needs” for all ecosystem components

On the technical issues – some progress!!

Scale of river ecosystem condition



Ecosystem
Integrity

Undisturbed,
unaltered

Ecosystem
Health

Altered by human use, but
still mostly controlled by
natural processes. Accepted
or even preferred by
the community.

Degraded

No Life

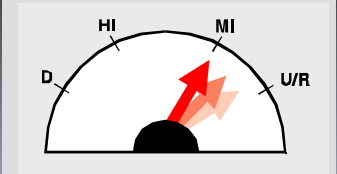
* Modified from Karr and Chu (1999)

Ecological Assessment (1998) of Three Reaches of the Upper Mississippi River

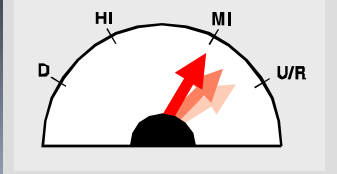
Ecosystem Criteria

1. Viable native populations and their habitats
2. Ability to recover from disturbance
3. Sustainability

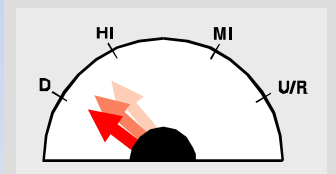
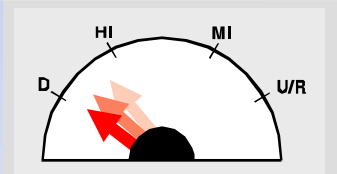
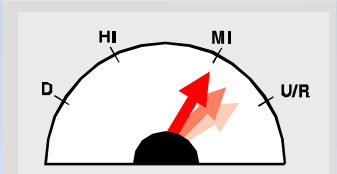
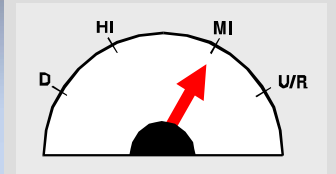
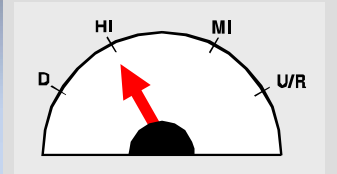
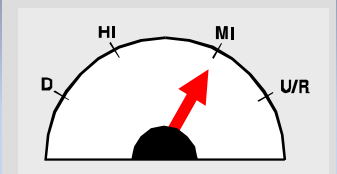
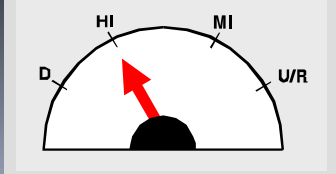
Upper Impounded Reach (Pools 1-13)



Lower Impounded Reach (Pools 14-26)

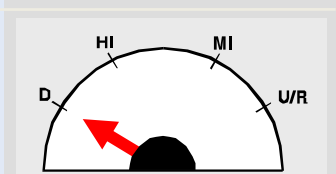
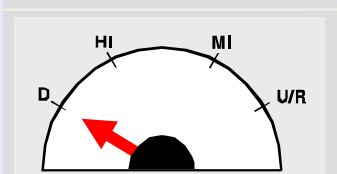
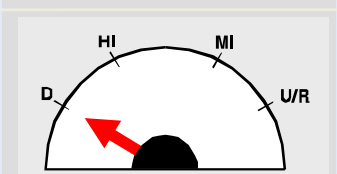
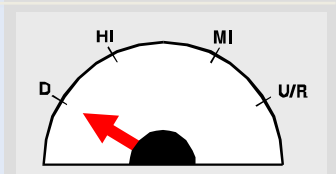
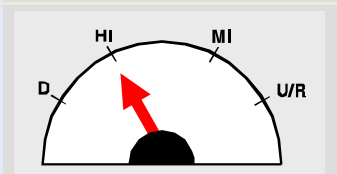
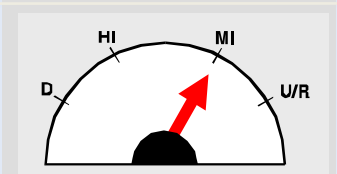
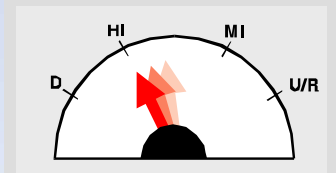
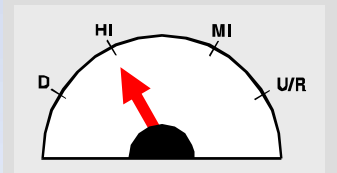
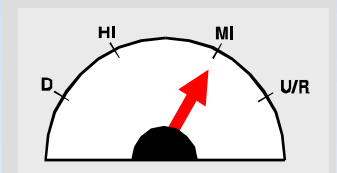


Un-Impounded Reach (St. Louis to Cairo)



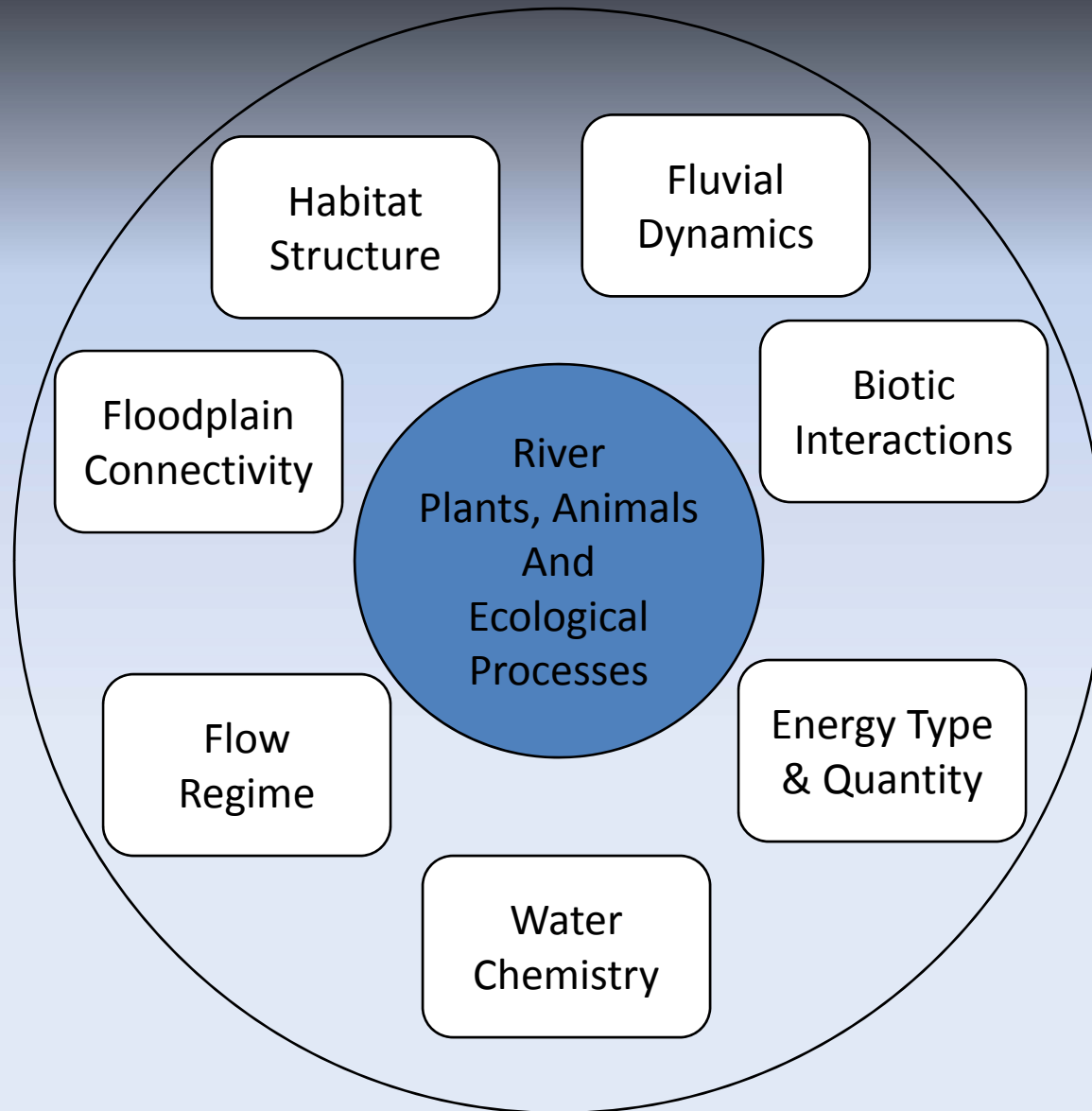
Floodplain River Criteria

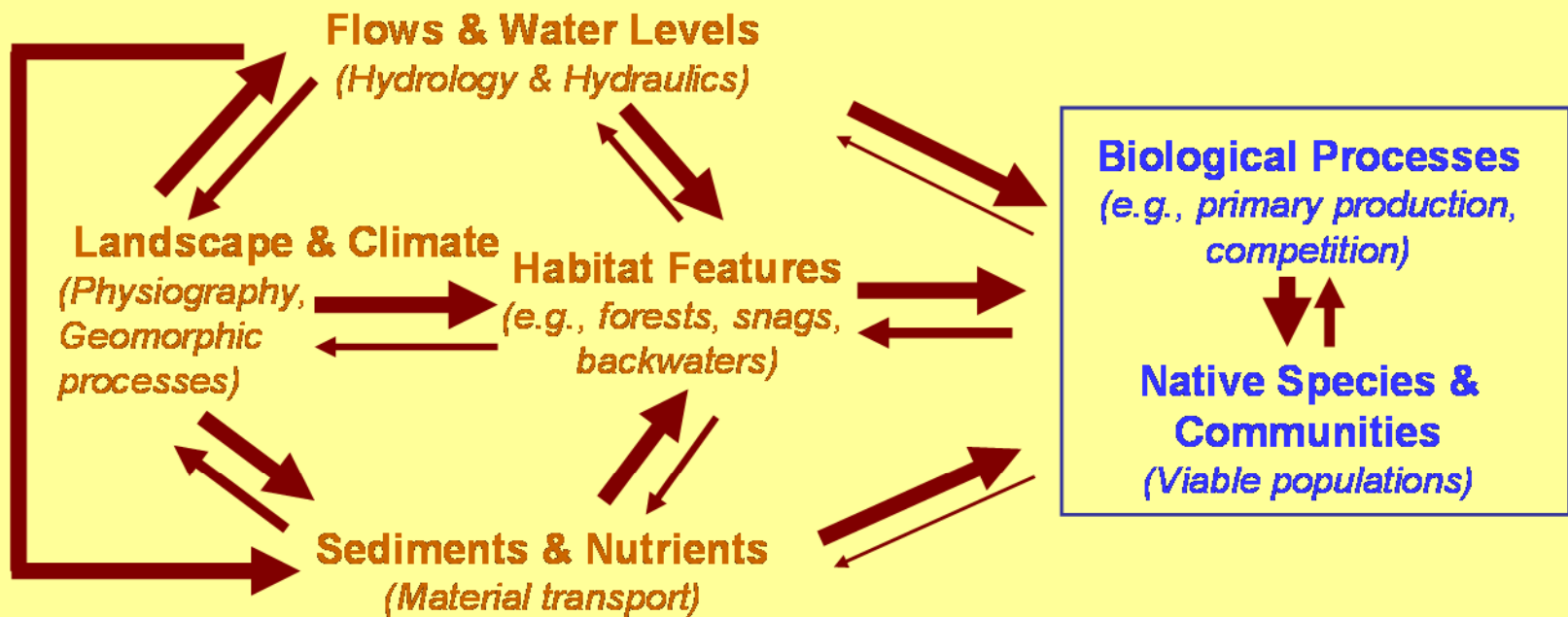
4. River provides basin services
5. Annual channel/floodplain connectivity
6. Long-term structural dynamics (such as meandering)



D = Degraded; HI = Highly Impacted; MI = Moderately Impacted; U/R = Undisturbed or Restored

We're learning how to define river "health" ...

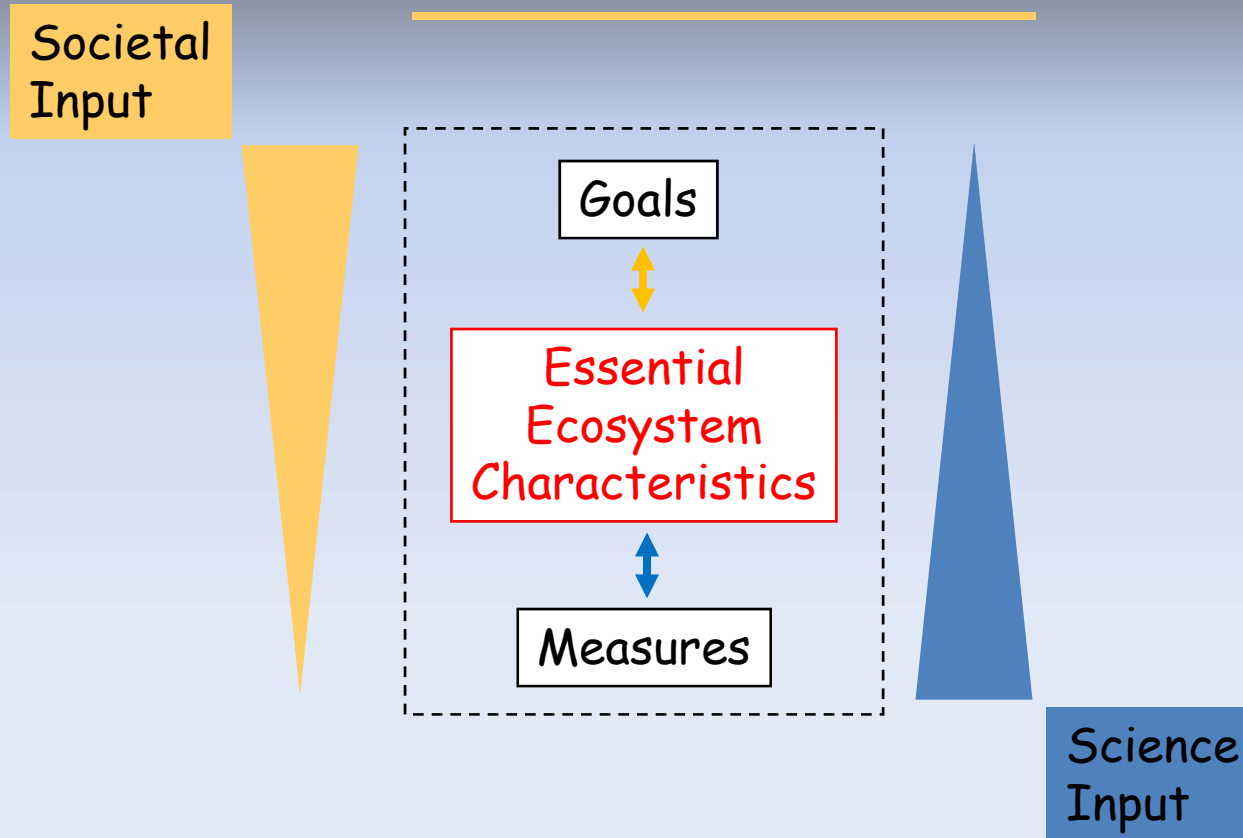




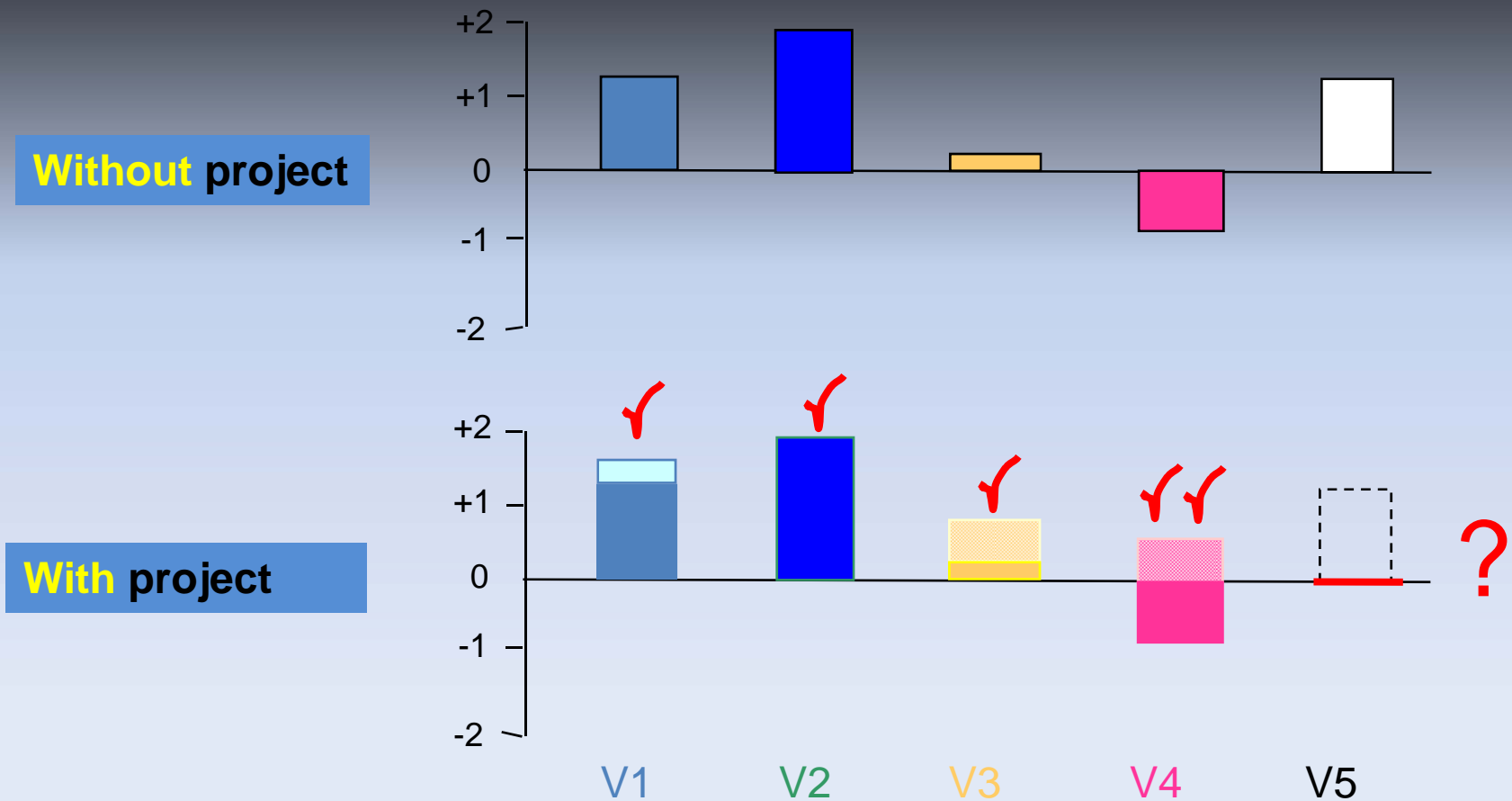
Key elements and relationships within the Upper Mississippi River System. Biological processes and species/communities (in blue) are “bottom line” restoration targets within the Navigation and Ecosystem Sustainability Program. Arrows indicate interactions among most elements are bi-directional, but relative strengths vary as shown by width. Biological processes and biota are primary end-points for evaluating success through enhancement of physical processes and habitat. Commonly used terms are in bold, along with some of their technical analogs.

Getting the Goal-setting Process Right -

AN ECOSYSTEM REPORT CARD NEEDS TO BE
SCIENTIFICALLY-CREDIBLE AND
SOCIALLY ACCEPTABLE



A hypothetical outcome of a river restoration project



To avoid unexpected outcomes -
a valuable tool = **conceptual models**

Essential Ecosystem Characteristics

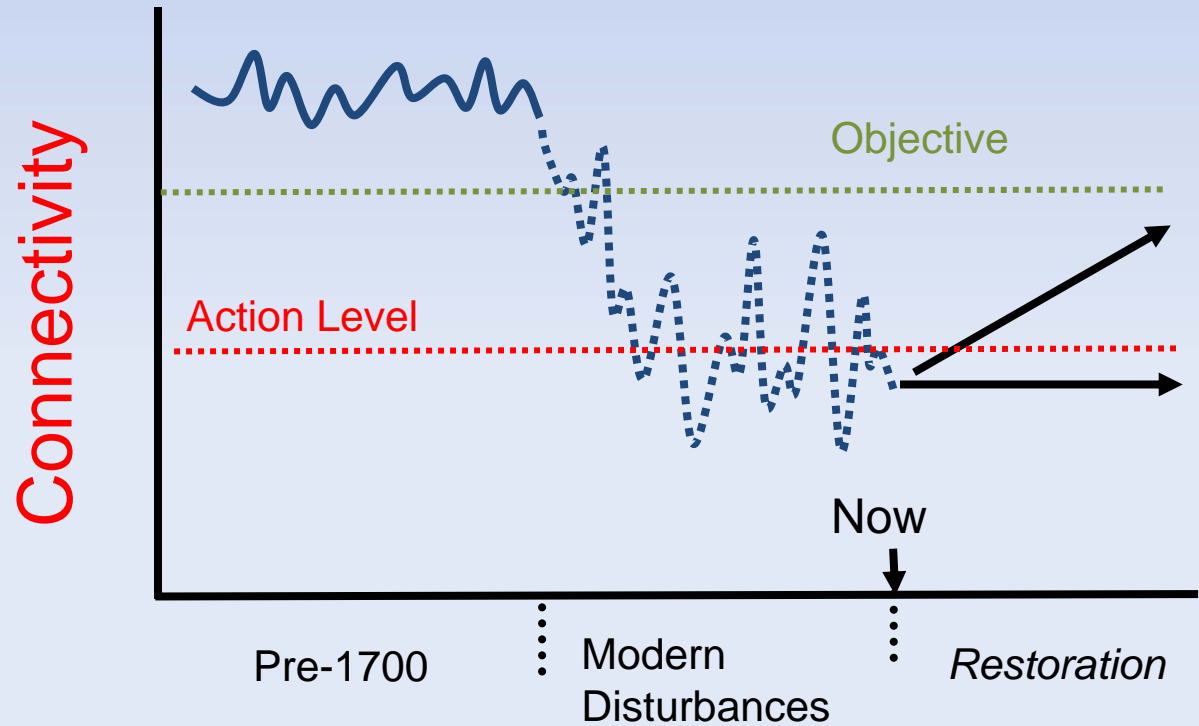
Geomorphology

Hydrology/Hydraulics

Biogeochemistry

Habitat

Biota



One last perspective the Destination:

“In changing and unpredictable systems such as the UMRS, optimization approaches for long-term static goals are problematic, and adaptive management is expected to outperform them.”

Holling, C. S. 2001. Understanding the Complexity of Economic, Ecological, and Social Systems. *Ecosystems*. 4(5):390-405.

Part 2: The Path

- Packing for the trip (What to put in the tool box?)
- Getting smarter while covering the distance

Packing for the trip (What to put in the tool box?)

- Definitions*
- Lots of dirt-moving equipment
- Compass (a monitoring system)***
- \$\$\$, \$\$\$, and more \$\$\$
- Patience, tolerance

Key features of a compass (monitoring system)

- Functional over multiple spatial scales
(project, reach, river system)
- Consistent over time



The compass tells if the project is taking us in the right direction

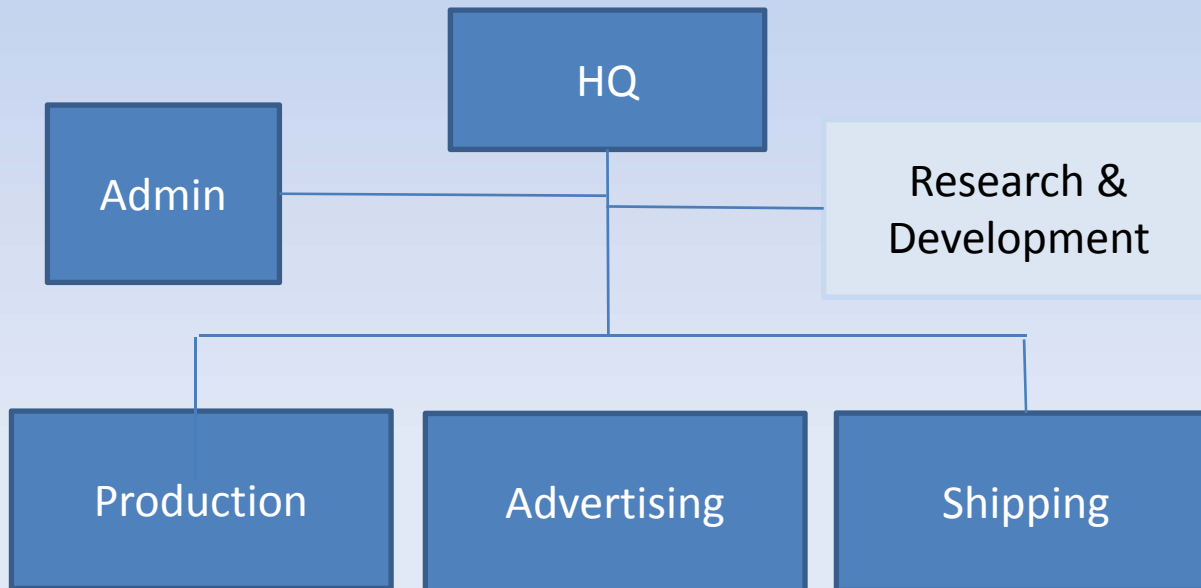


Getting smarter while covering the distance

- Adaptive management
- Institutional learning*

An aside: Partner structures make mutual learning difficult.

Common business structure focuses “learning” in the R&D section



Institutional teaching/learning needs

- Within existing agencies, organizations
- Among agencies, organizations on individual river systems
- Among river systems*
- Across generations*

Part 3: Relevance to ISRS

ISRS ??

Indian Society of Remote Sensing

International Society of Refractive Surgery

International Society for Reef Studies

Informational storage and retrieval system

International Stereotactic Radiosurgery Society

International Safety Rating System

Instructional Support and Related Services

Interactive Student Response System

...

...

(from a recent Google search)

A summary of conservation items of relevance to ISRS

We need help with -

- Technical questions: which variables matter at what scales, how much variability is enough (beyond environmental flows), minimal requirements for all species (not just targets)
- Definitions of critical terms
- Our compass (monitoring systems)
- Institutional teaching/**learning** within and **across river systems**

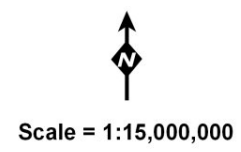
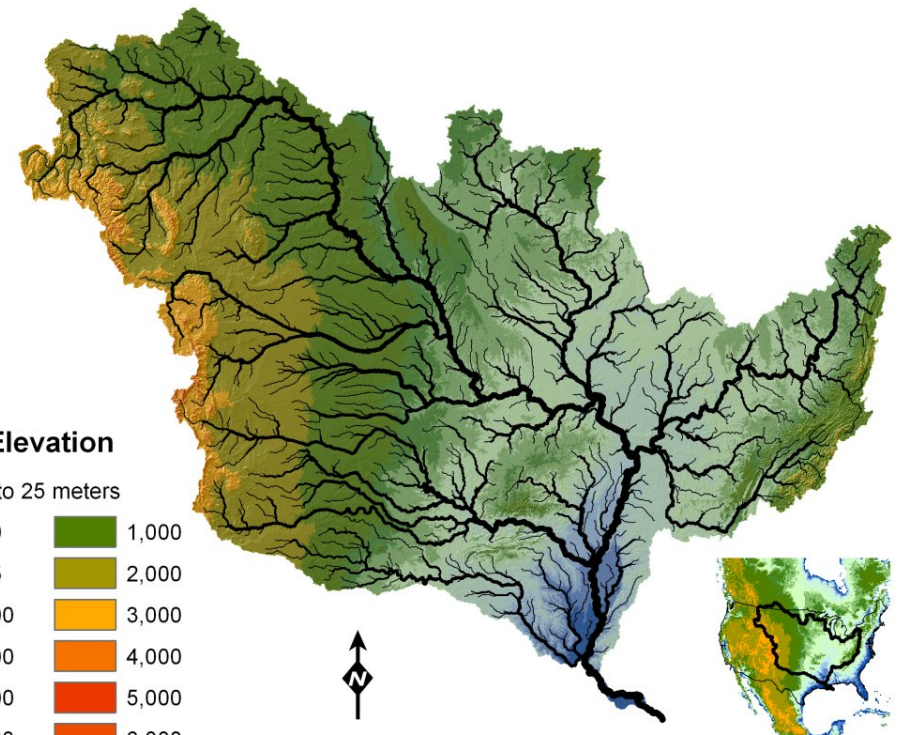
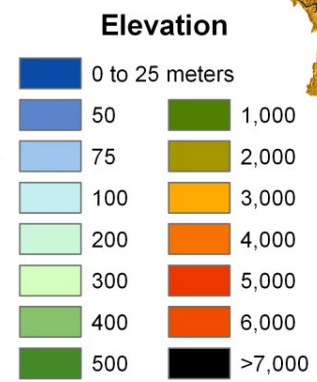
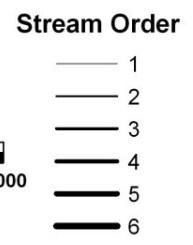
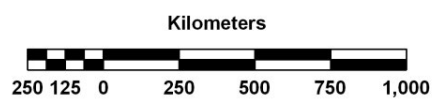
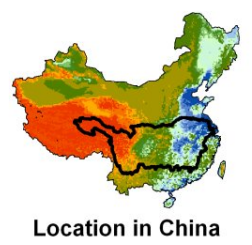
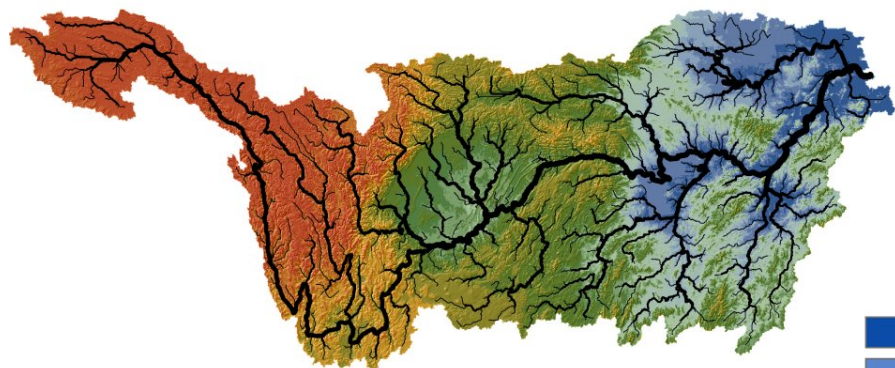
ISRS as an active agent for cross-system teaching

WHY?

Teaching/learning within individual river systems **doesn't seem to be happening fast enough** to offset growing threats.

But, learning (beyond superficial comparisons) requires **comprehensive, scientific expertise**.

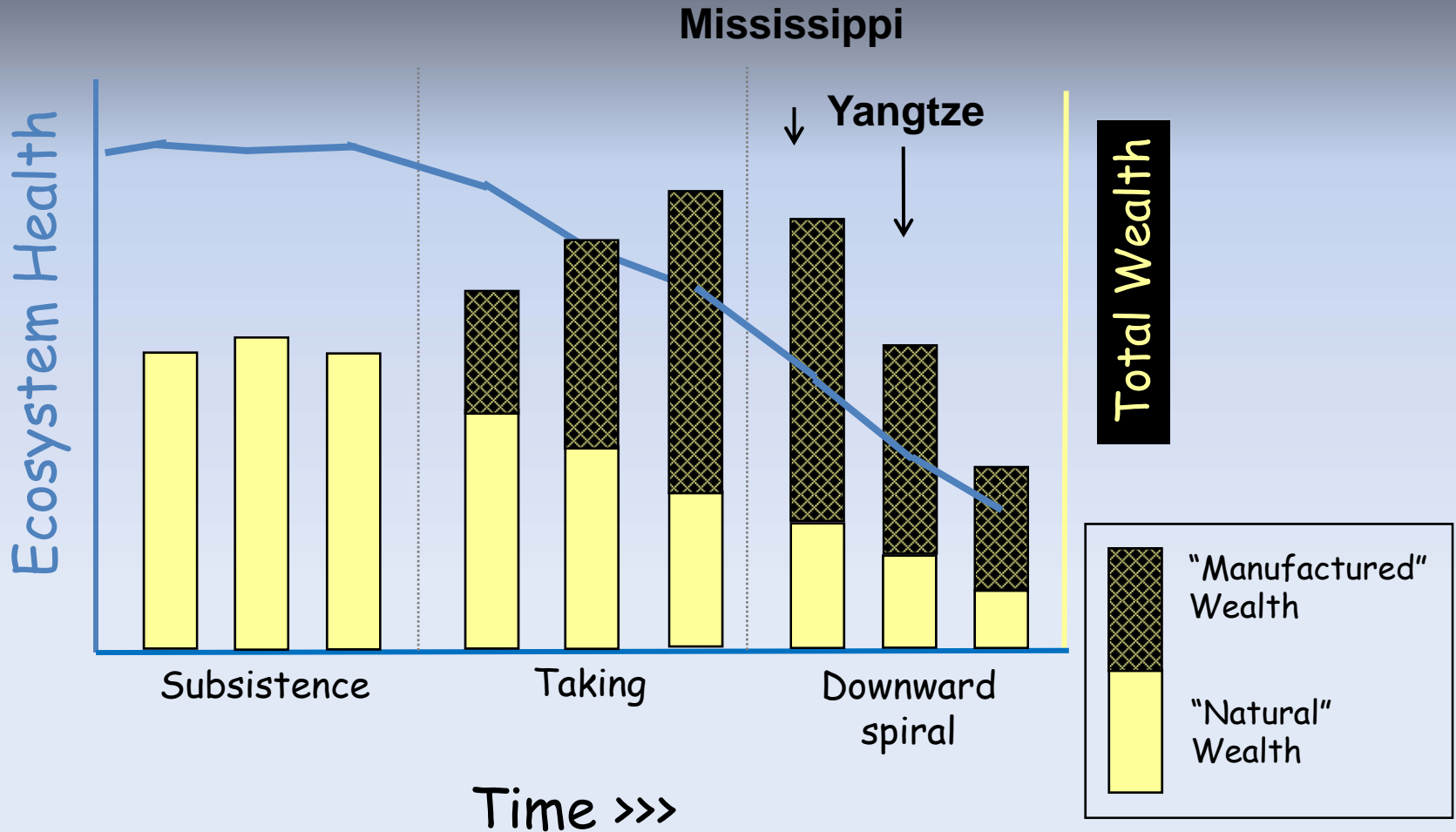
And, the strength of a “**common scientific voice**” is more likely to influence decisions than many individual voices. (Example: The Millenium Assessment)



	<u>YANGTZE</u>	<u>MISSISSIPPI</u>
Basin area (km ²)	1,808,500	3,202,000
Length (km)	5,980	3,703
Ave. discharge (m ³ /s)	34,000	17,545
Ann. sediment load (tons/yr)		
pre-dam	499,000,000	349,000,000
post-dam	349,000,000	210,000,000

Study multiple rivers to predict future, whole system responses

Three phases of human use of natural resources



River Conservation: the Path and the Destination

Thanks, again. Enjoy the trip!