

Introduction to Indicator Development

- Review Definitions
- How Indicators fit into an Instream Flow Study
- Examples: Goal, Objectives, Indicators, and Conceptual Model
- Indicators for the Middle & Lower Brazos
- Questions?

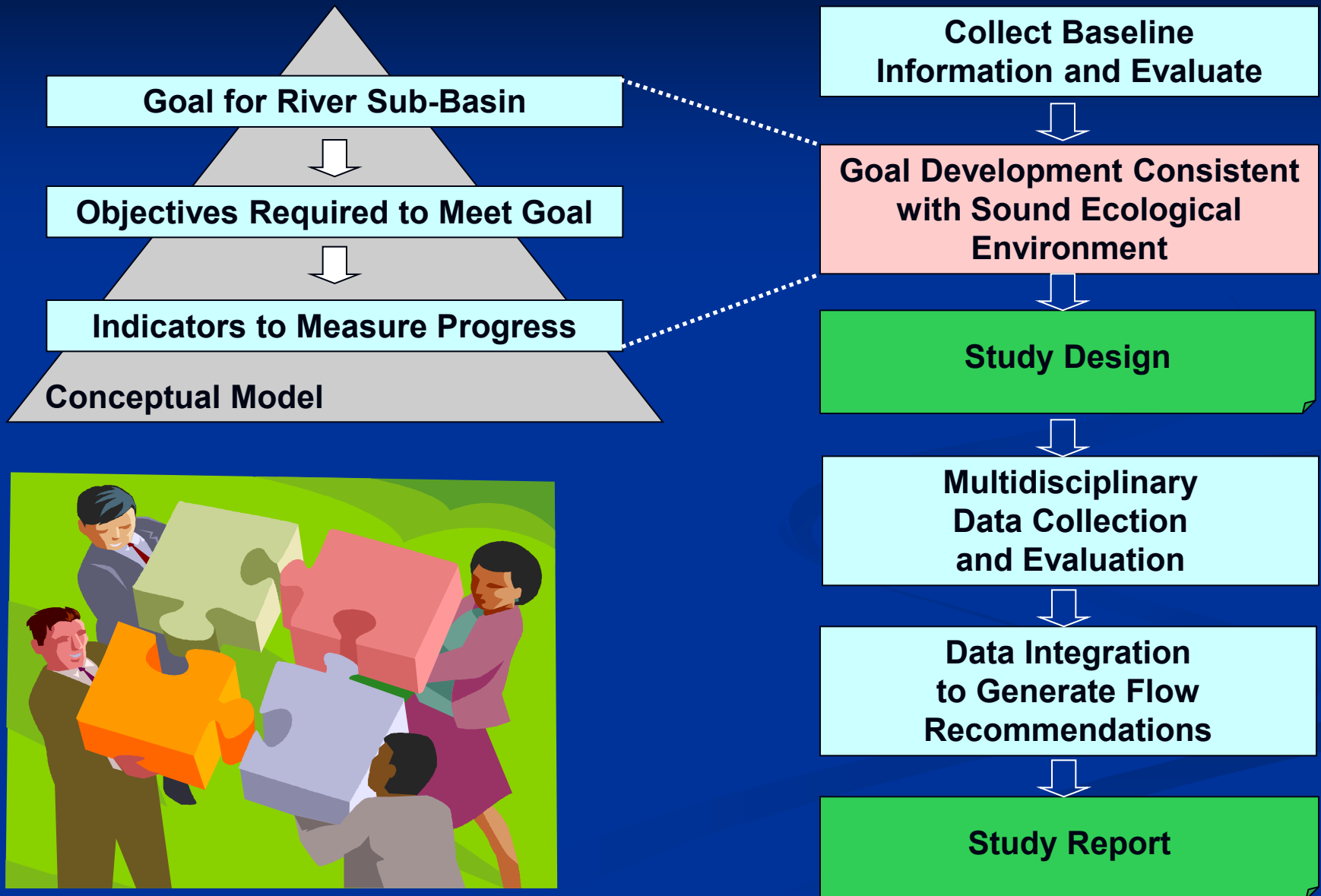


Definitions:

- **Goal:** a vision of a healthy environment for the river system that reflects local values
- **Objectives:** specific means to accomplish goal
- **Indicators:** measures that show progress in meeting objectives
- **Conceptual model:**
a representation of how a system is thought to function



How Indicators Fit in the Process



Example: Murray-Darling Basin

- **Goal:** "a healthy, working river – one that assures us of continued prosperity, clean water and a flourishing environment."

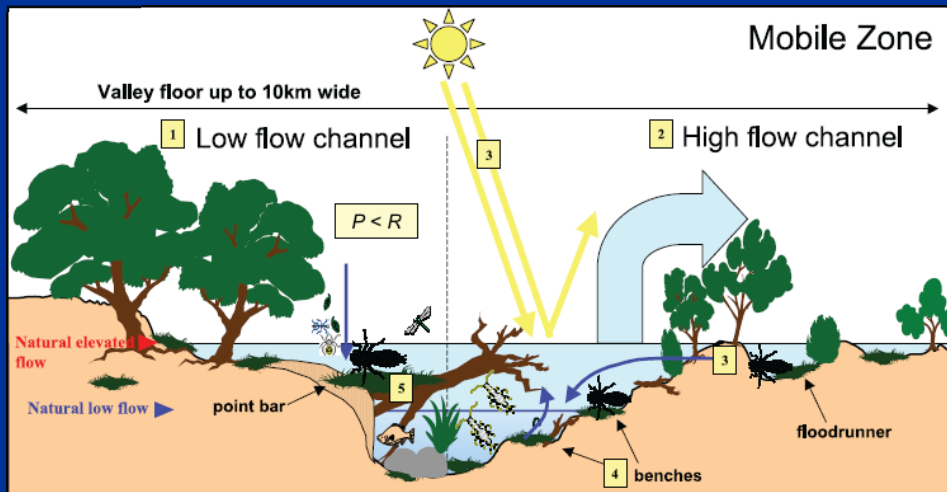
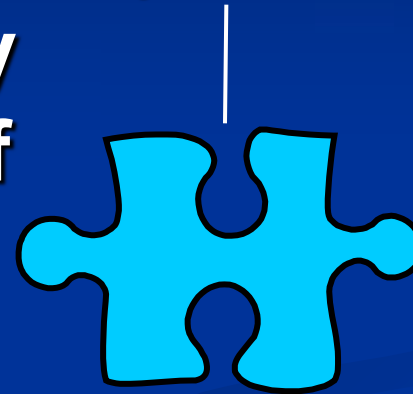


Goal: a healthy, working river

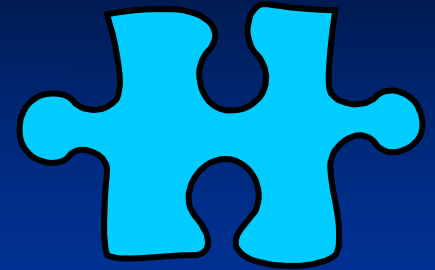
■ Objectives:

1. Reinststate ecologically significant elements of the flow regime

Hydrology &
Hydraulics



Reinstate ecologically significant elements of the flow regime



■ Indicators:

High Flow: Number of 1 in 10 year floods

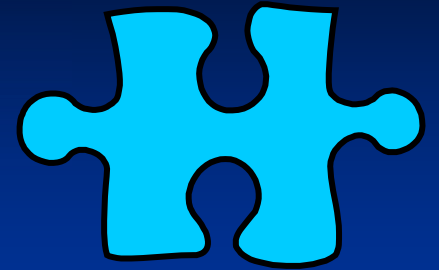
Low/zero flow: Number of low flow events

Variability: Seasonal amplitude

Seasonality: Seasonal period index

Flow volume: Median annual flow volume
Mean annual flow volume

Reinstate ecologically significant elements of the flow regime



■ Indicators:

High Flow:

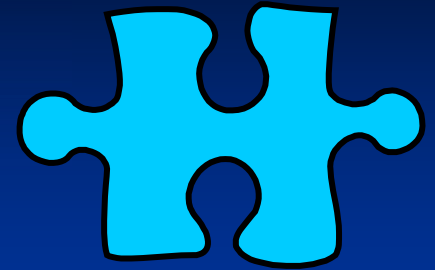
Number of 1 in 10 year floods

Reinstate ecologically significant elements of the flow regime

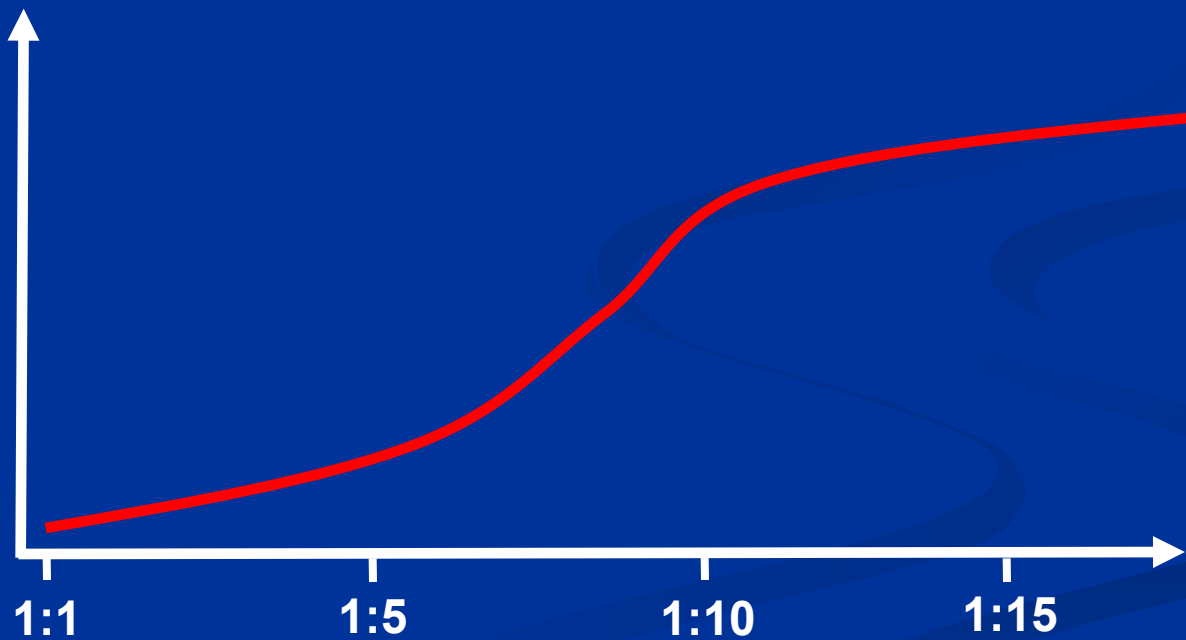
■ Indicators:

High Flow:

Number of 1 in ~~10~~ year floods



Indicator



Flood Magnitude

Middle & Lower Brazos

- **Statewide Goal:** “A resilient, functioning ecosystem characterized by intact, natural processes and a balanced, integrated, and adaptive community of organisms comparable to that of the natural habitat of the region.”
- **Specific Goal:** “A Middle and Lower Brazos River that provides for sustainable environmental, economic, and social uses.”

Middle & Lower Brazos

■ **Statewide Objectives:**

“Evaluate intact natural processes:

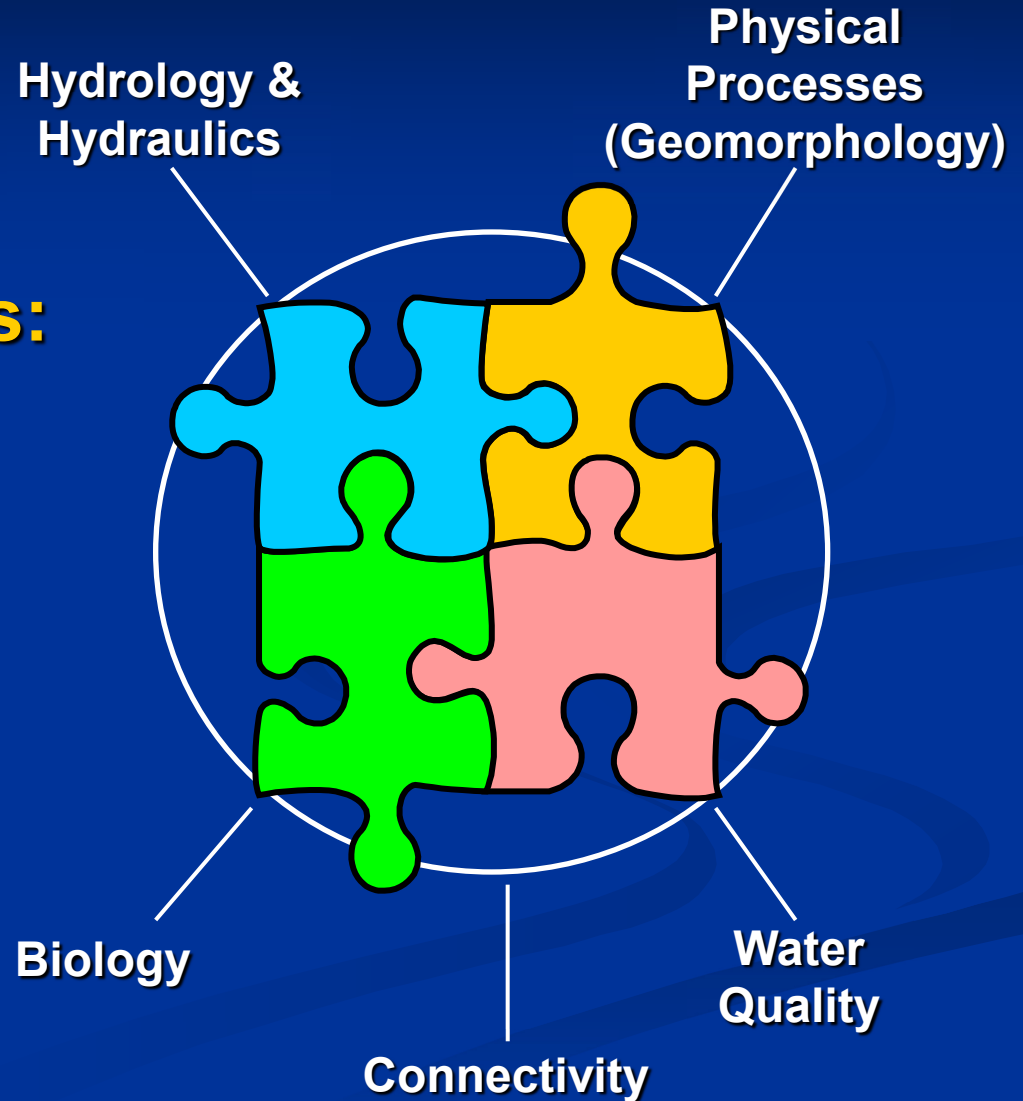
- **Characterize system hydrology and hydraulics**
- **Examine status of geomorphic processes within the system**
- **Characterize system water quality**
- **Define connectivity issues within the system**

Evaluate biological communities

- **Examine the integrity of the biological community**
- **Examine biodiversity within the system**
- **Define the influence and relationship of other riverine components relative to biology of system.”**

Middle & Lower Brazos

- **Specific Objectives:**



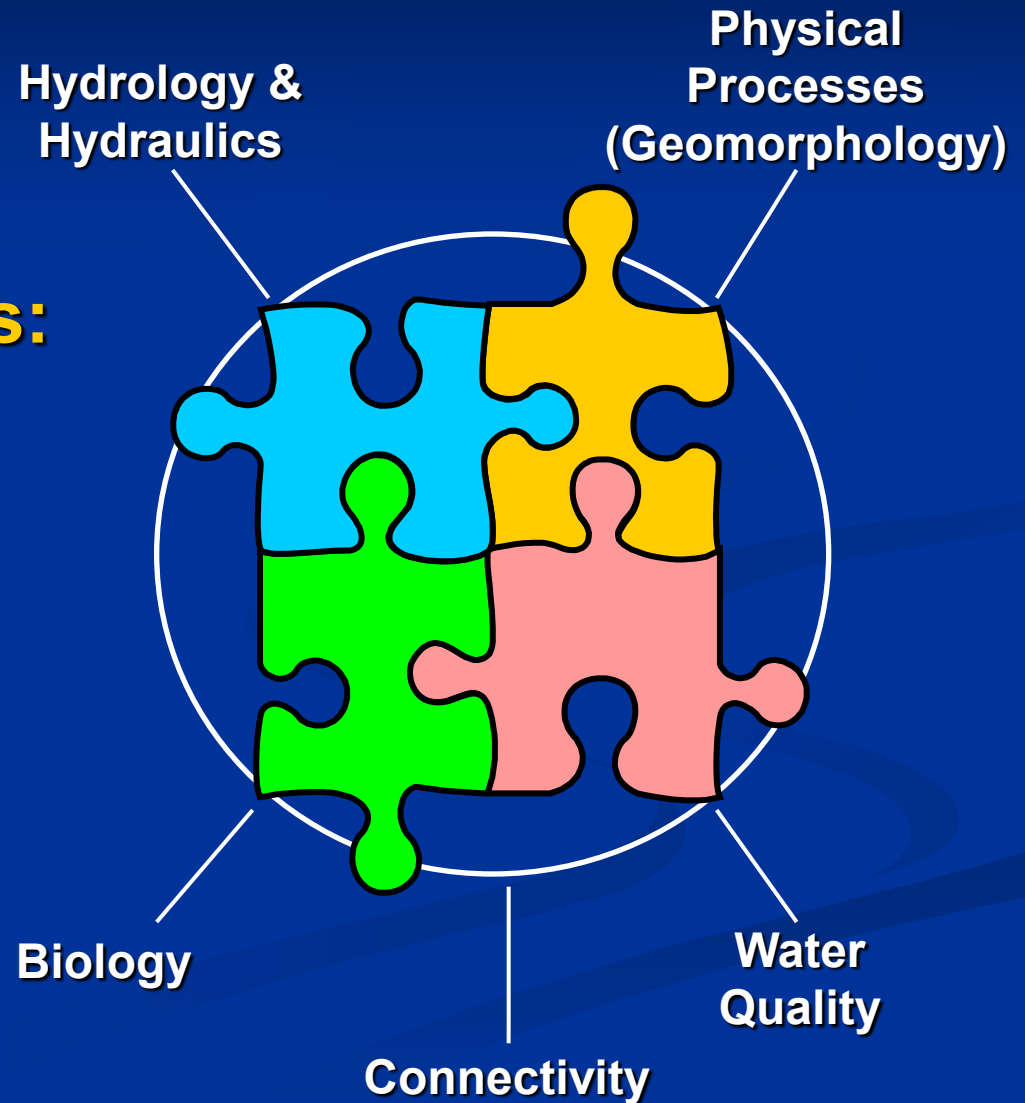
Middle & Lower Brazos

- **Goal:** ... provides for sustainable environmental, economic, and social uses.
- **Objectives:** Preserve/protect and restore/improve key habitat features ... in ... riparian zones.
- **Indicators:** measures collected in riparian areas
 - How often they receive flow from the river
 - Soil moisture throughout the year
 - Amount of sediment and nutrients from river

Middle & Lower Brazos

- **Specific Objectives:**

Other ?



Middle & Lower Brazos

Statewide Goal:

- “a Sound Ecological Environment”

Specific Objectives: Other

- Evaluate relationships between flow regimes and economic and social uses, including recreational use
- Consider how water planning studies and instream flow studies will impact and interact
- Identify issues with instream flows that impact bays and estuaries

Questions?