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Getting Salmon Back in Salmon Creek: Systematizing Comparative Water Quality Analysis for Targeted Restoration

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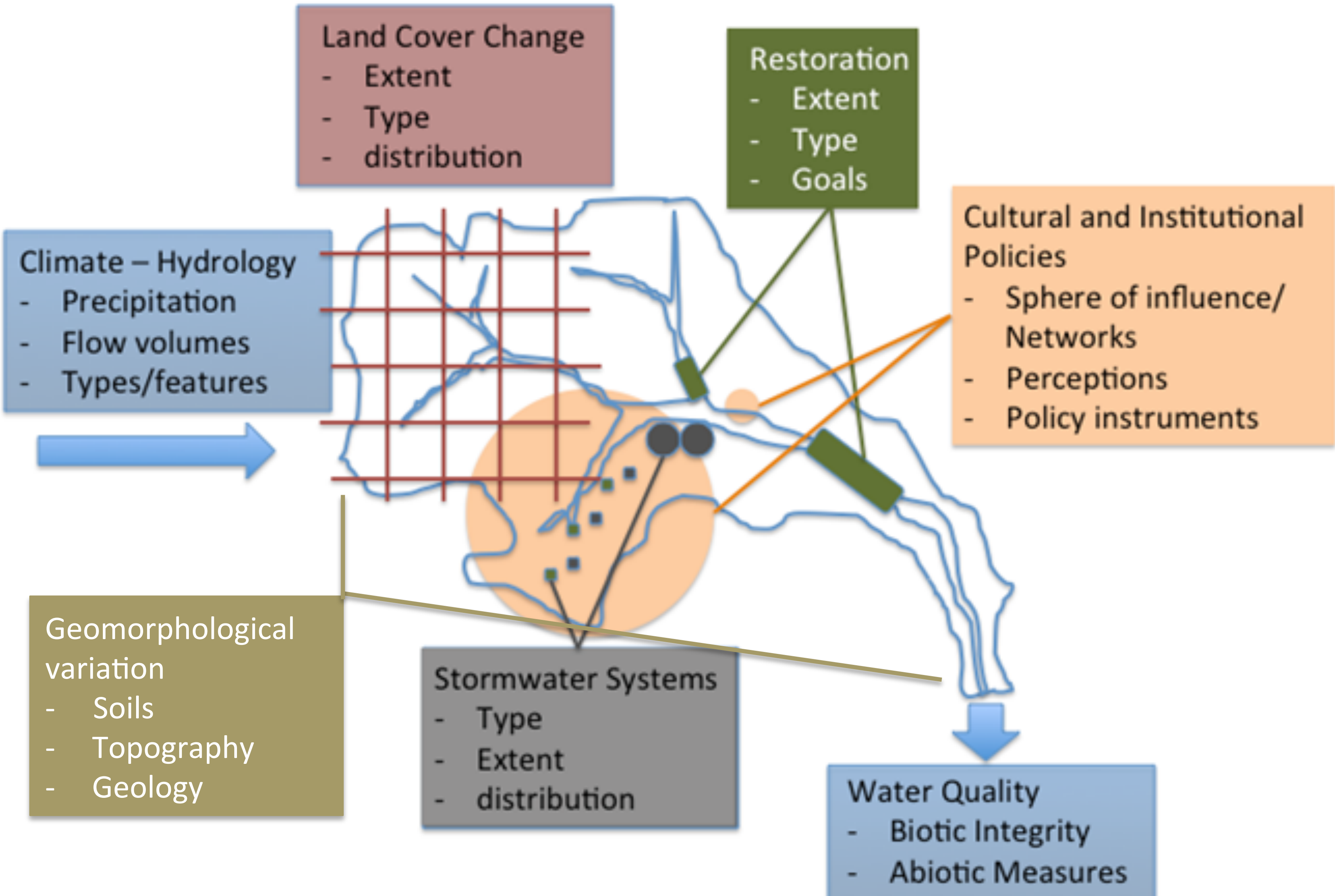
IGERT Integrative Graduate Education and Research Traineeship

WHY?

- Millions of dollars spent annually on restoration and green infrastructure efforts
- Limited funding for monitoring
- Efficacy of restoration efforts minimally understood
  - Are we prioritizing restoration efforts appropriately?

Project Context – Simplifying Complexity



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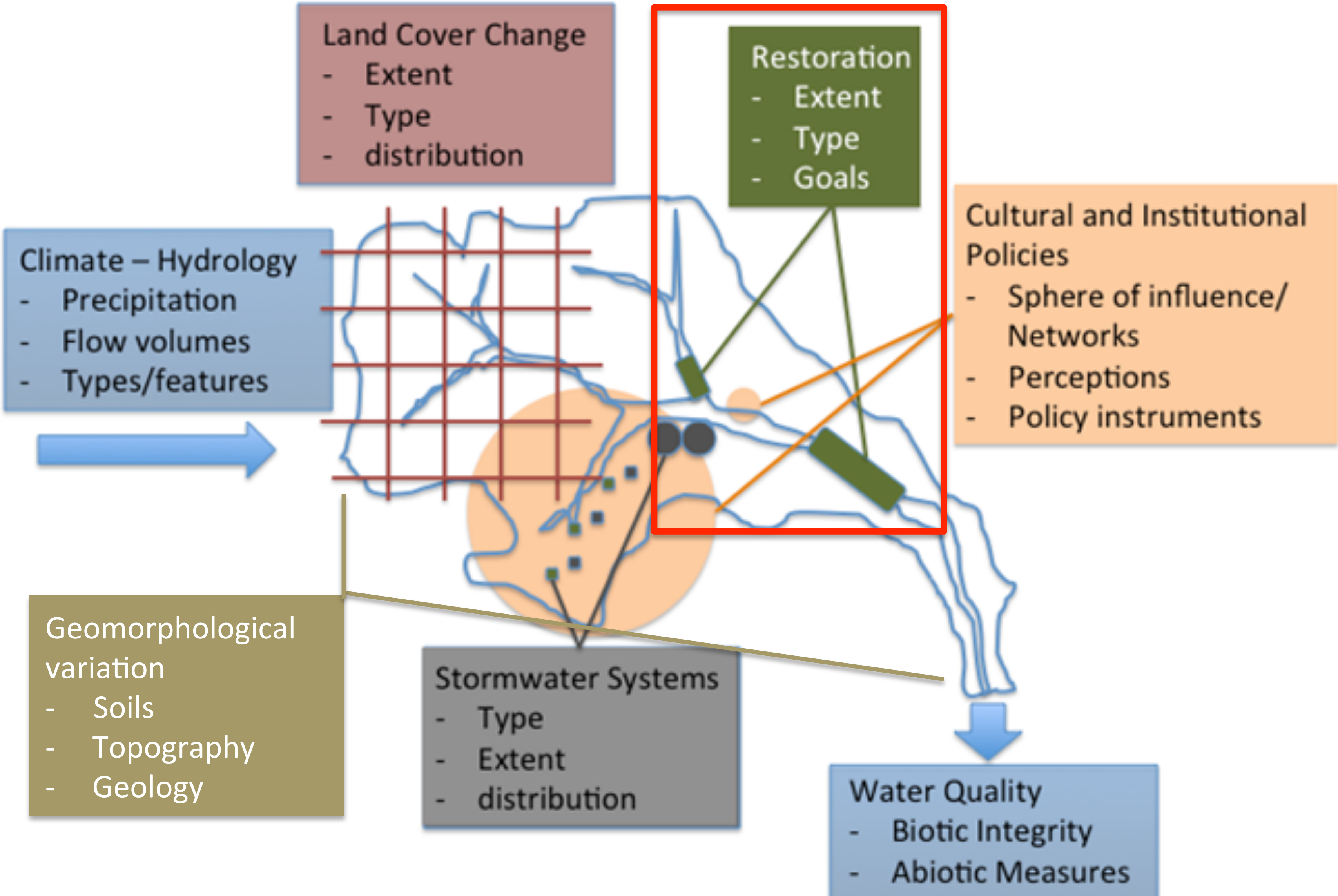

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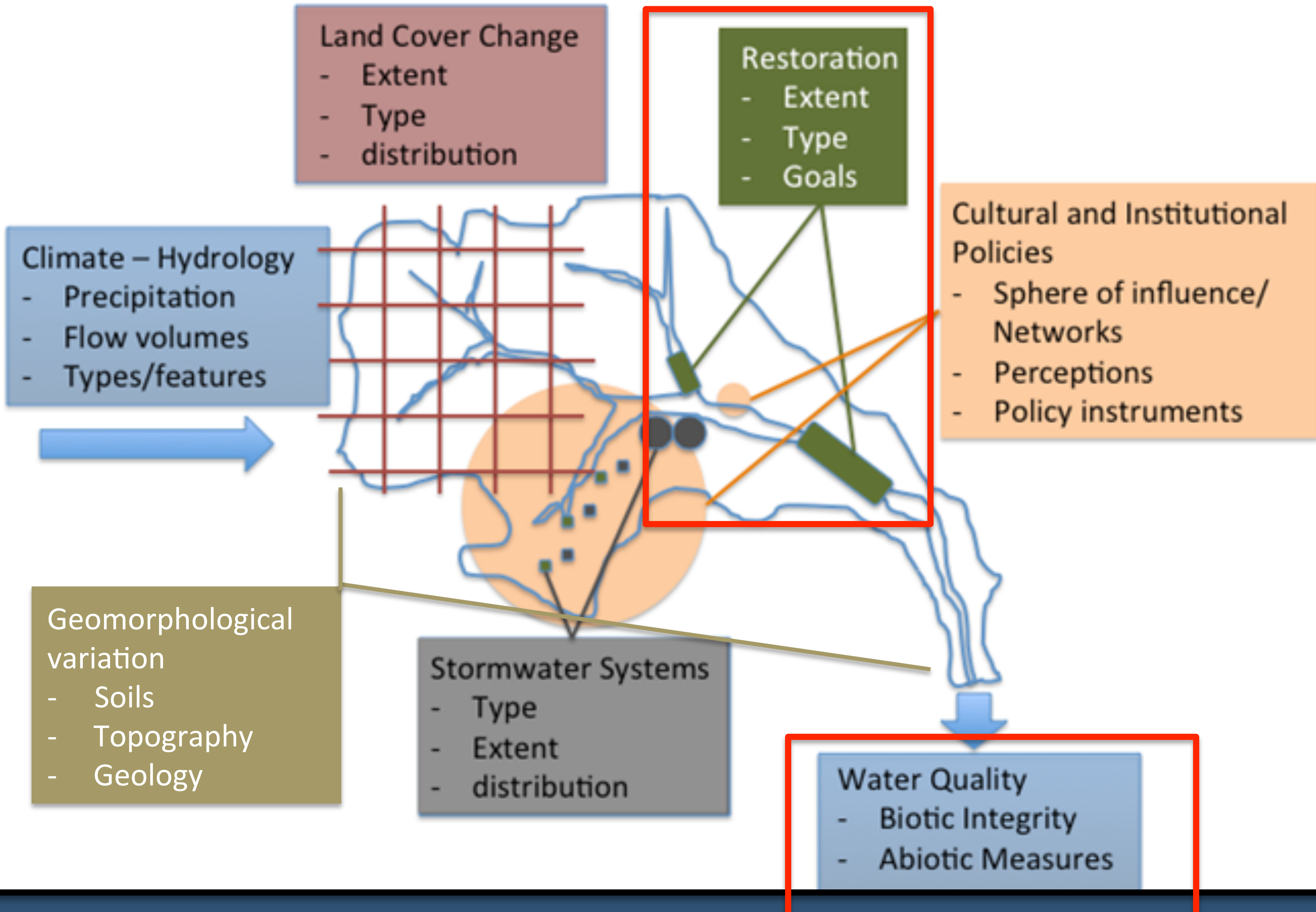


Non-point contaminants – abiotic indicators ↔ Physical modifications – habitat structure

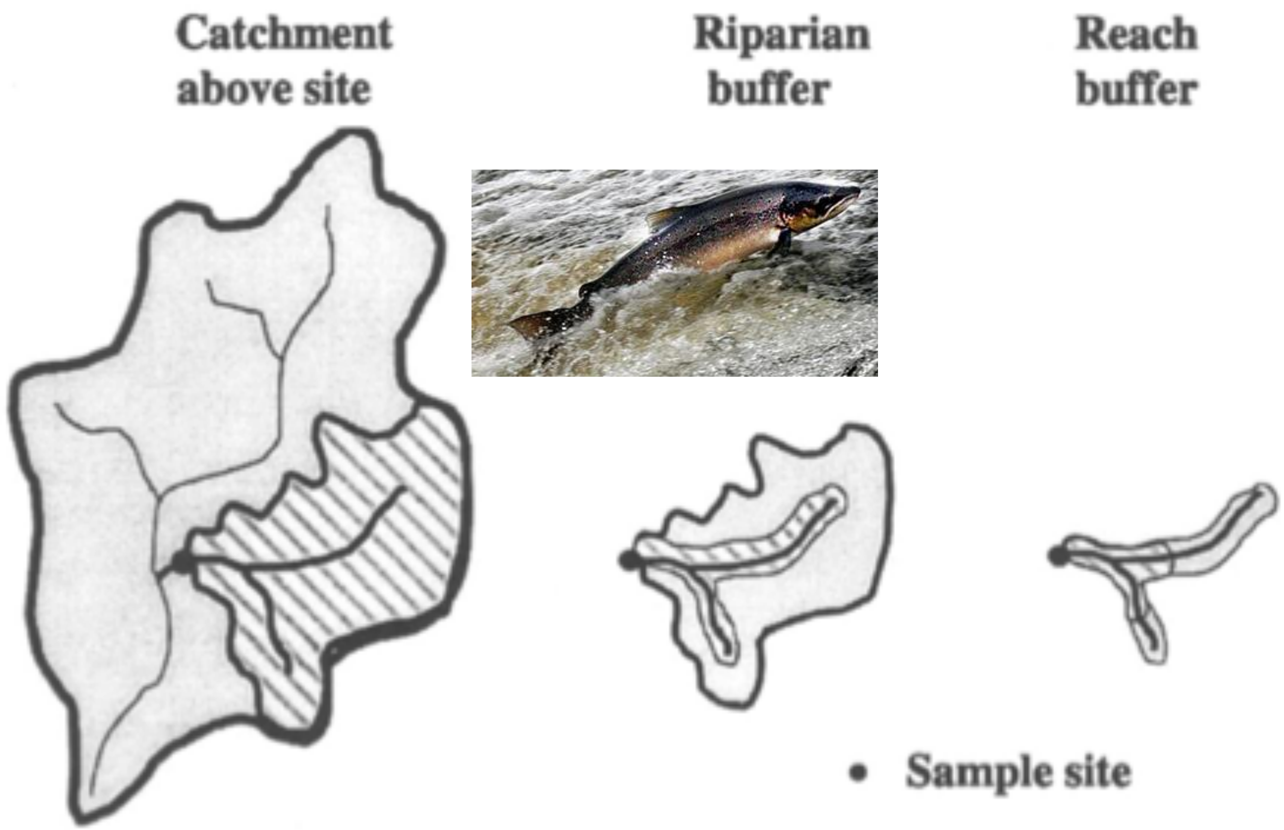


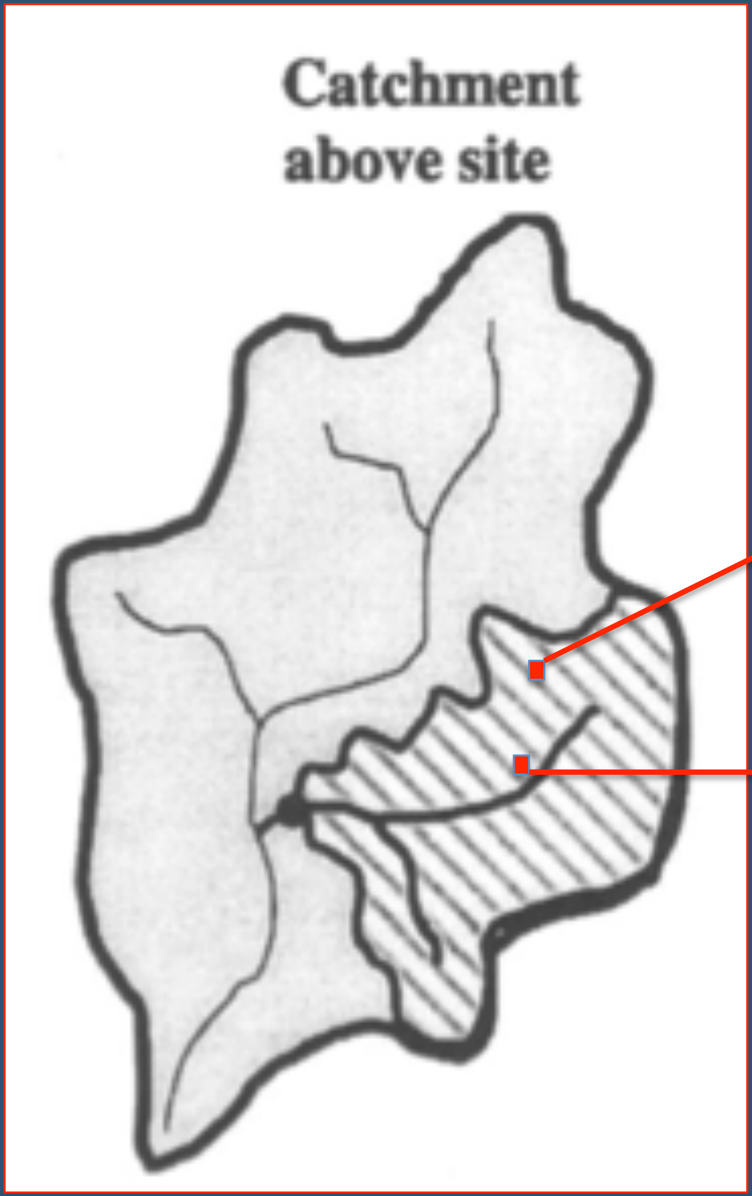
Figure 3 Three spatial scales widely used in relating landscape variables to some physical or biological measure of stream condition. The catchment typically is a subcatchment of a larger basin. Buffer widths of 100–200 m (each bank) are common. Modified from Morely & Karr (2002).

Modified from Allan, D. 2004. Landscapes and Riverscapes: The influence of land use on stream ecosystems. *Annual Review of Ecology, Evol and Systematics* 35. (picture from salmonaid.org)

What is the value of existing data?

- How best to patch together existing data sets?
  - Just using Metro as a case study we have 4 distinct data sets to combine of 12 abiotic variables and a number of biotic indeces
  - Problems with aggregate indeces
- How can we systematically examine trends in existing data sets?
  - Consequence of spatial and temporal scales?
- What explanatory variables can we use?
  - Land Use, Policy, Etc
  - ***Novel distance weighted metrics***

Inverse Distance Weighting



Blend known physical interactions with
A statistical metric

A cell (of any attribute) farther away has less weight than one closer to the stream channel

A first order approximation for understanding the impacts of *patterns* of land use on *process* of water quality degradation

Includes slope as proxy for flow rate
And distance as proxy for signal degradation effects

Outcomes

- A solid comparative framework to analyze
  - Trends in abiotic and biotic indicators of water quality
  - Statistical relationships to explanatory variables of
    - Distance weighted land use
    - Land management policy
    - Restoration types and extents
- Leading to:
  - Data gap identification
  - Prediction of restoration impacts