



# Watershed concepts for community environmental planning

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USDA Rural GIS Consortium  
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## Purpose and Objectives

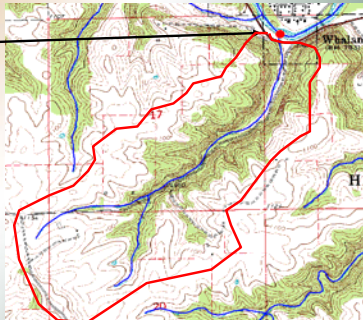
- Provide background on basic concepts in watershed, stream, and river ecology
  - Unifying theme – streams are connected to their watersheds and
  - Land use is a major impact on watersheds and stream and river ecology
- Review hydrologic cycle relative to land use impacts on
  - Flooding
  - Stream channel impacts
  - Illustrate examples of land use impacts to streams
- Introduce GIS and geospatial data of watershed management
  - Weather and Climate are drivers – Hydrologic cycle
  - Three major factors – slopes, soils, land use (land cover)
  - Illustrate examples of GIS data applied to Toby Creek




### Traditional watershed delineation had been done manually using contours on a topographic map.

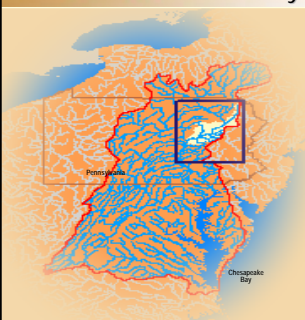
Outlet Point


A watershed boundary can be sketched by starting at the outlet point and following the height of land defining the drainage divides using the contours on a map.






### Upper Susquehanna-Lackawanna Watershed's Relationship to the Chesapeake Bay Ecosystem



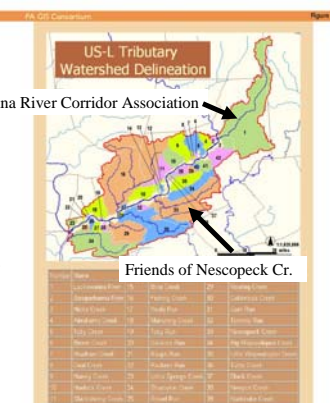


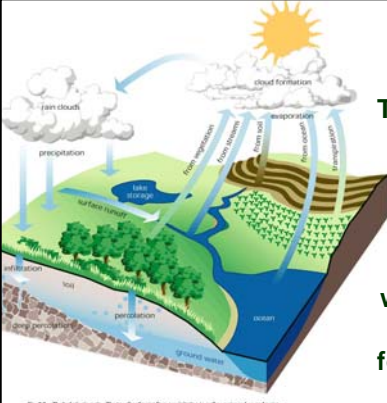


### Local watershed groups usually focus on smaller watersheds at the community level

Lackawanna River Corridor Association

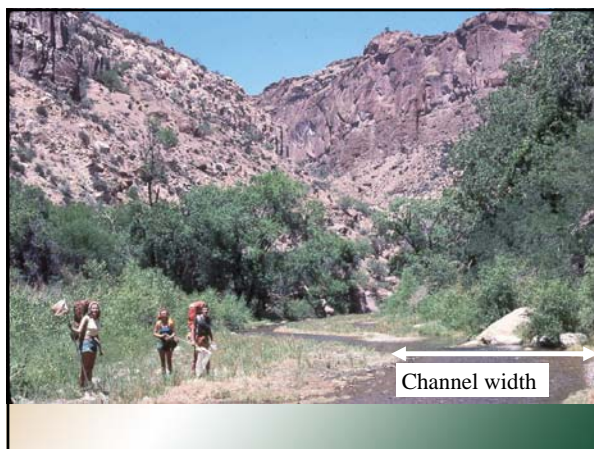
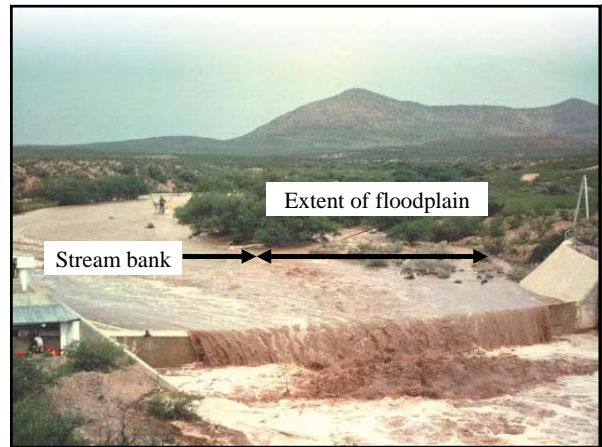
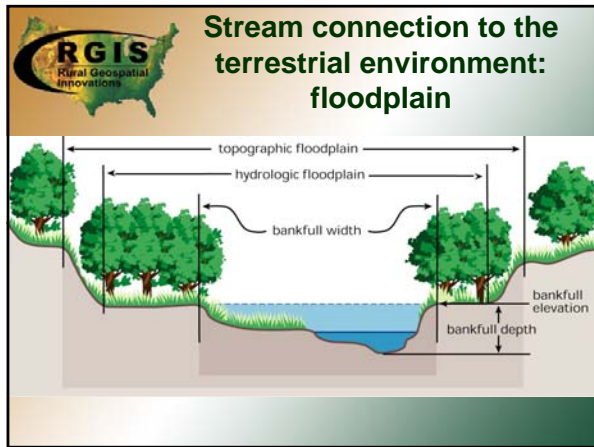
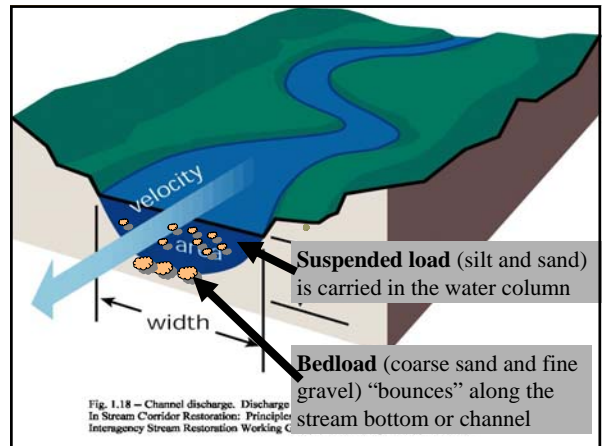
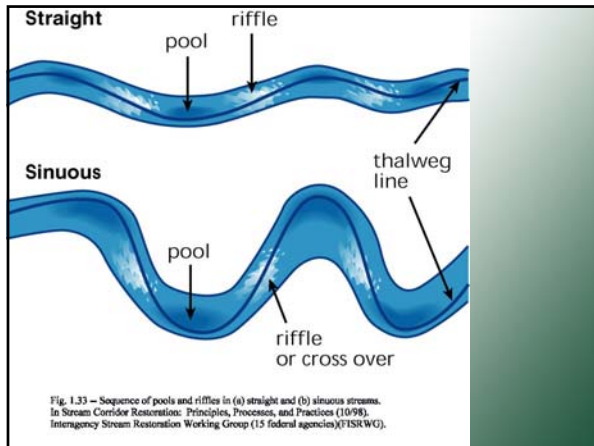
Friends of Nescopeck Cr.

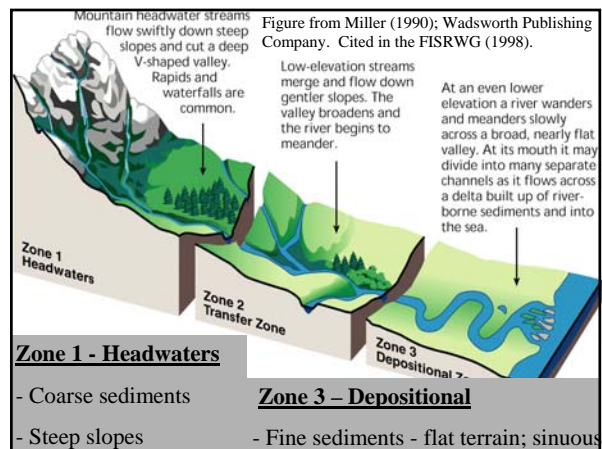
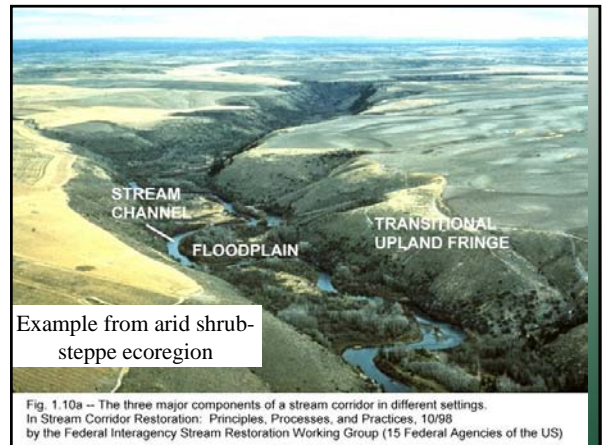
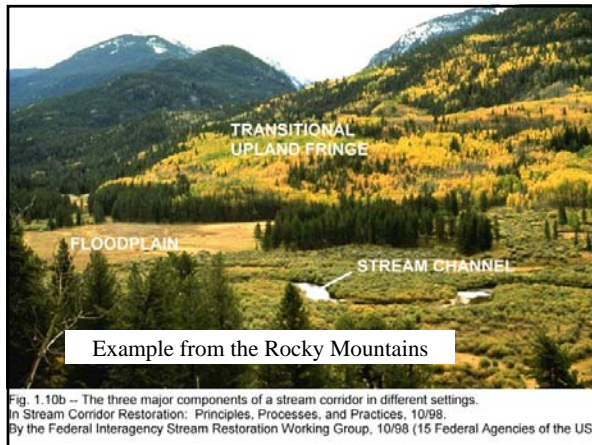
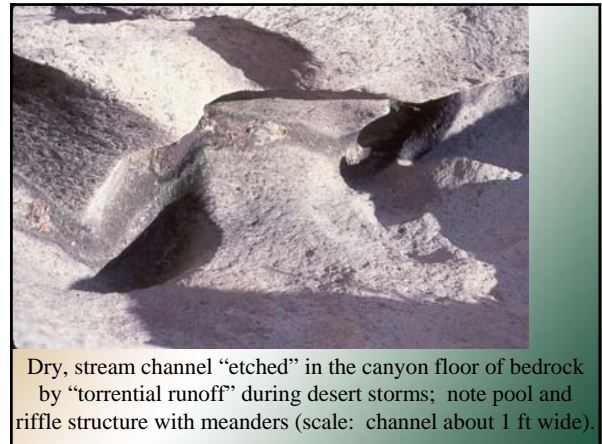
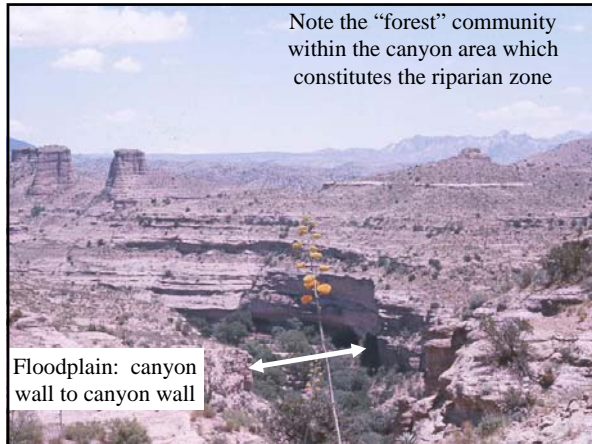


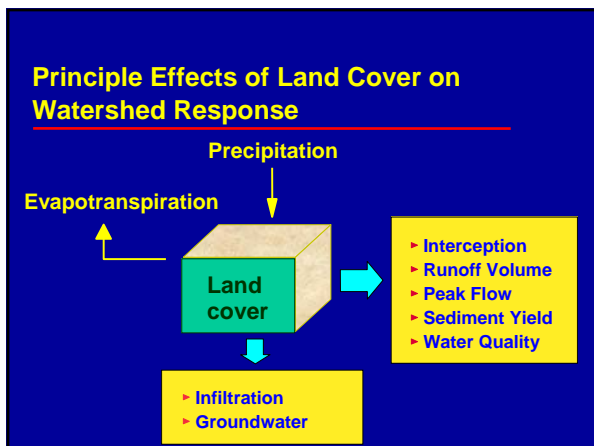
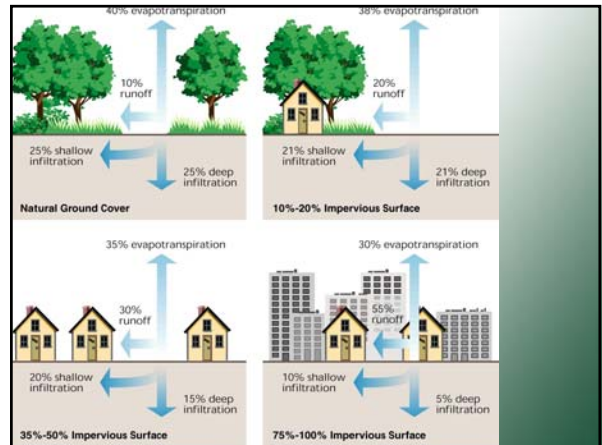
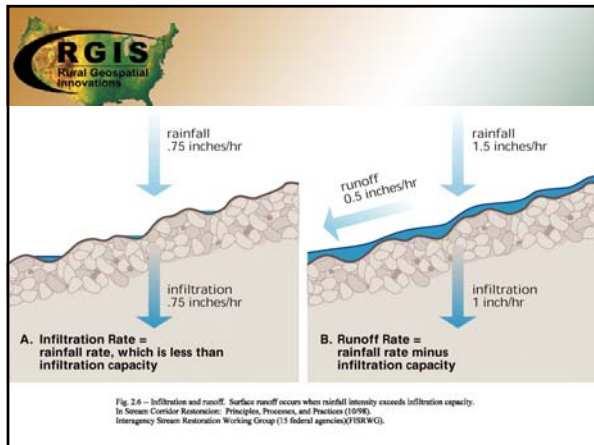
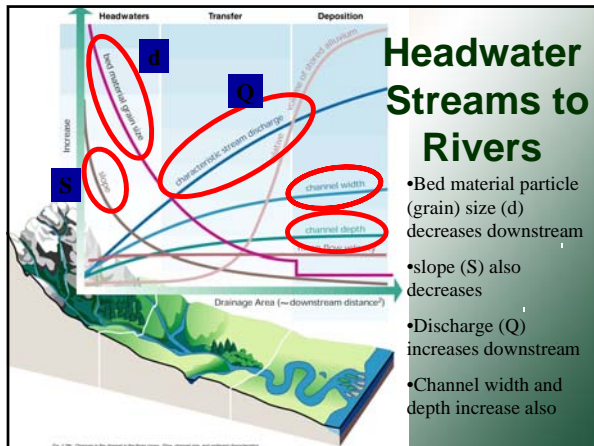


### The "Hydrologic Cycle" encompasses numerous processes that define all watersheds and form the basis for management

Fig. 1.1 The hydrologic cycle. The result of water being precipitated as surface water and ground water, its storage and health, and eventually back to the atmosphere in an ongoing cycle.  
© National Center for Geographic Information Science, Principles, Processes, and Practices (2006).  
Emergency Response, Scientific Working Group (1) Rural GIS Consortium (USDA/USGS)

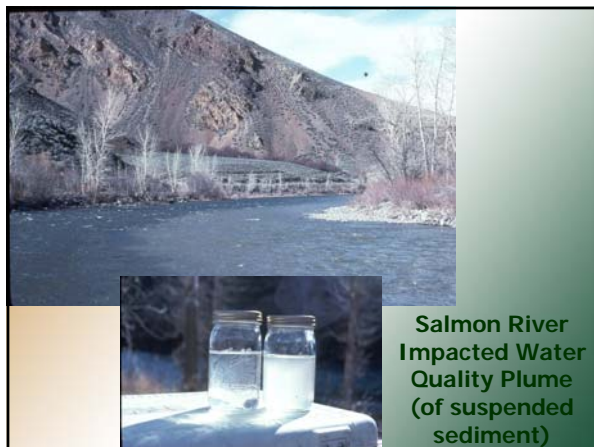
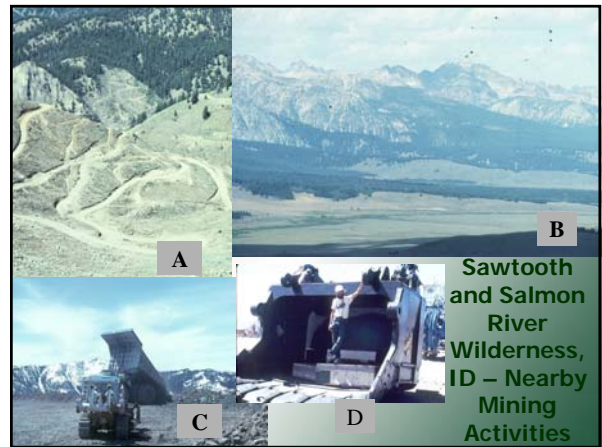
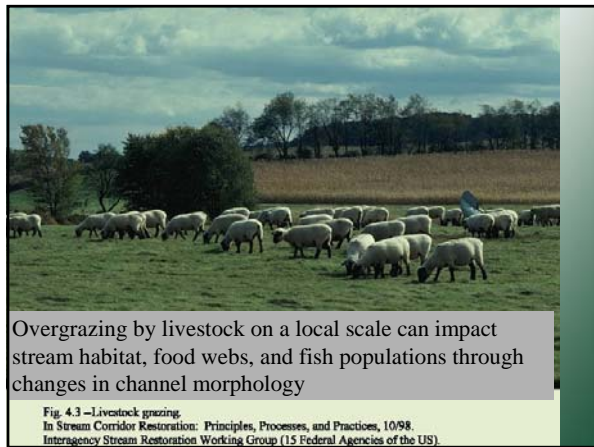






**RGIS Ecological impacts from land use and land use change**

- **Unifying watershed concept:** Streams and rivers are strongly connected to their terrestrial watersheds
- Characteristics and factors? – Practical examples illustrated**
  - Stream channel morphology ( - Salmon R., Idaho)
  - Stream water quality and turbidity ( - Salmon R., Idaho)
  - Channel erosion – flash flooding (Aravaipa Cr., Arizona)
  - Urban waste and raw sewage in urban stream channel (China)
  - Biosphere Reserve and native culture and land use (China)
  - Biosphere Reserve - glacial runoff and water quality (Rio Paine, Chile)
  - Acid Mine Drainage in Solomon's Creek (PA)

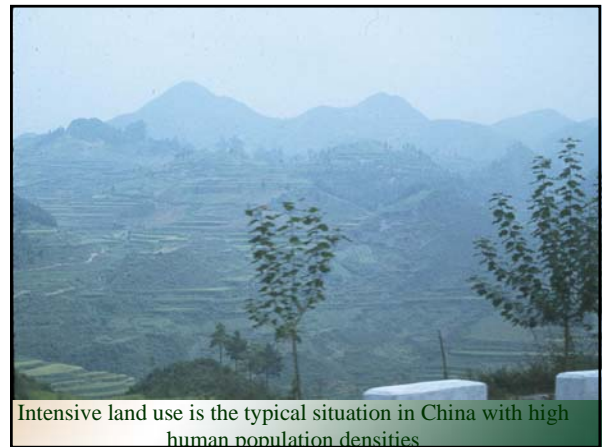


**RGIS**  
Rural Geospatial  
Innovations

Best Management Practices  
(BMP): Sediment Retention Basins

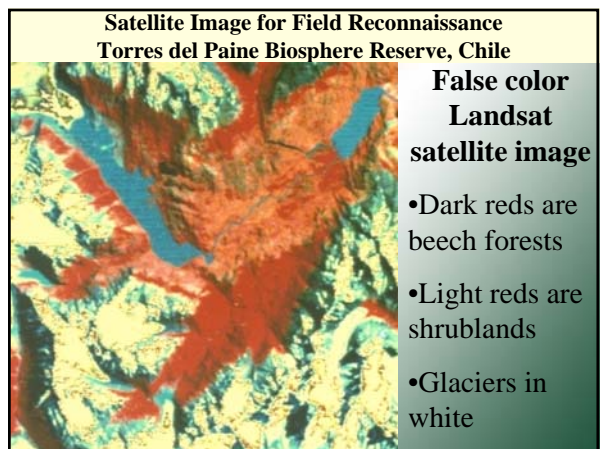
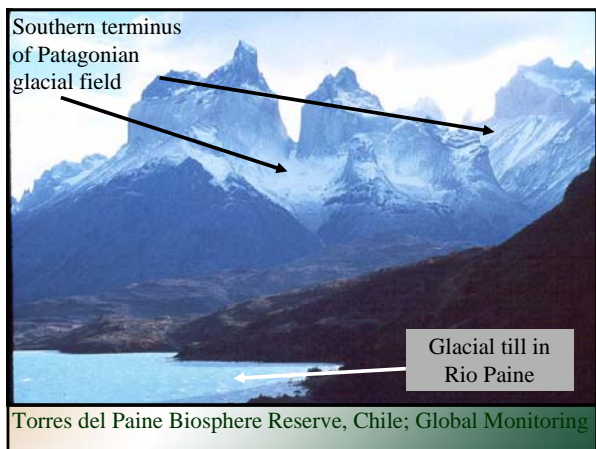
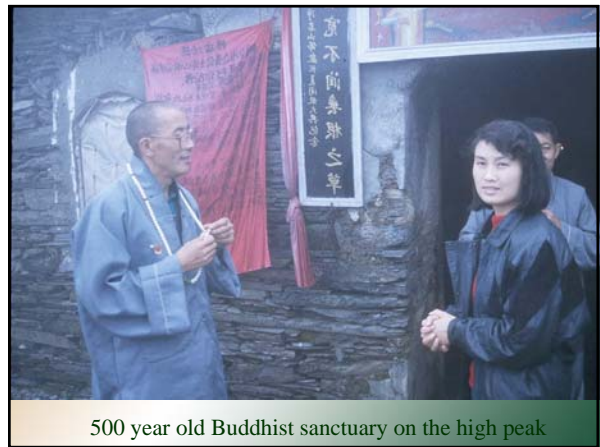
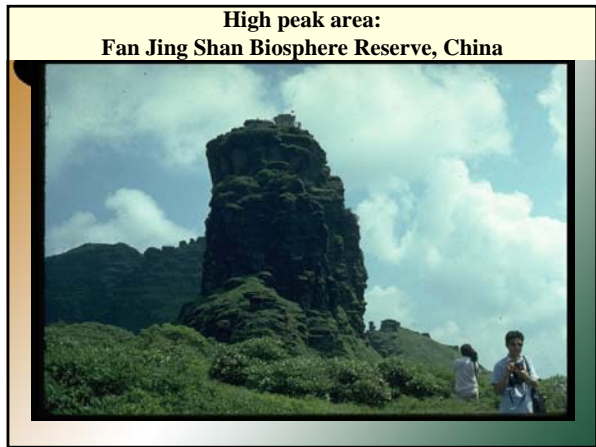
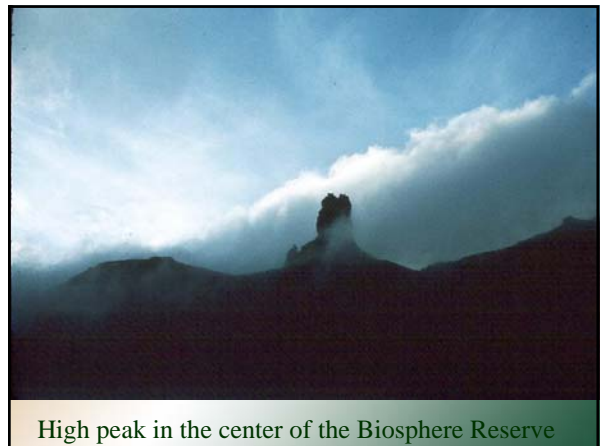
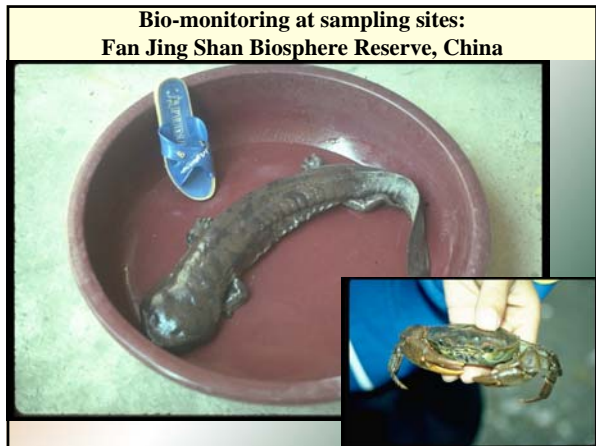


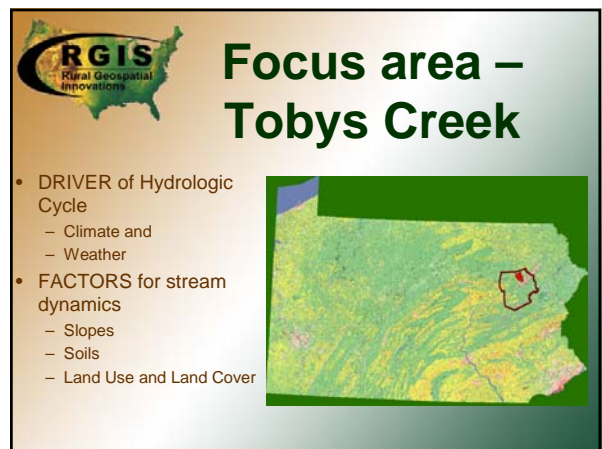
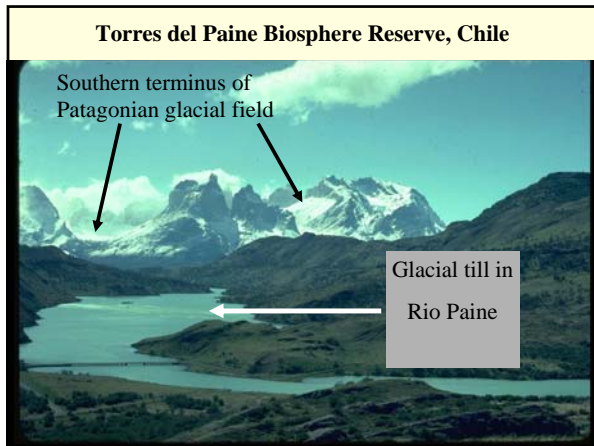
Industrial City:  
Airshed and urban  
stream



Fanjingshan Biosphere Reserve: native agriculture

GPS for locating (inset) sampling sites:  
Fan Jing Shan Biosphere Reserve, China







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