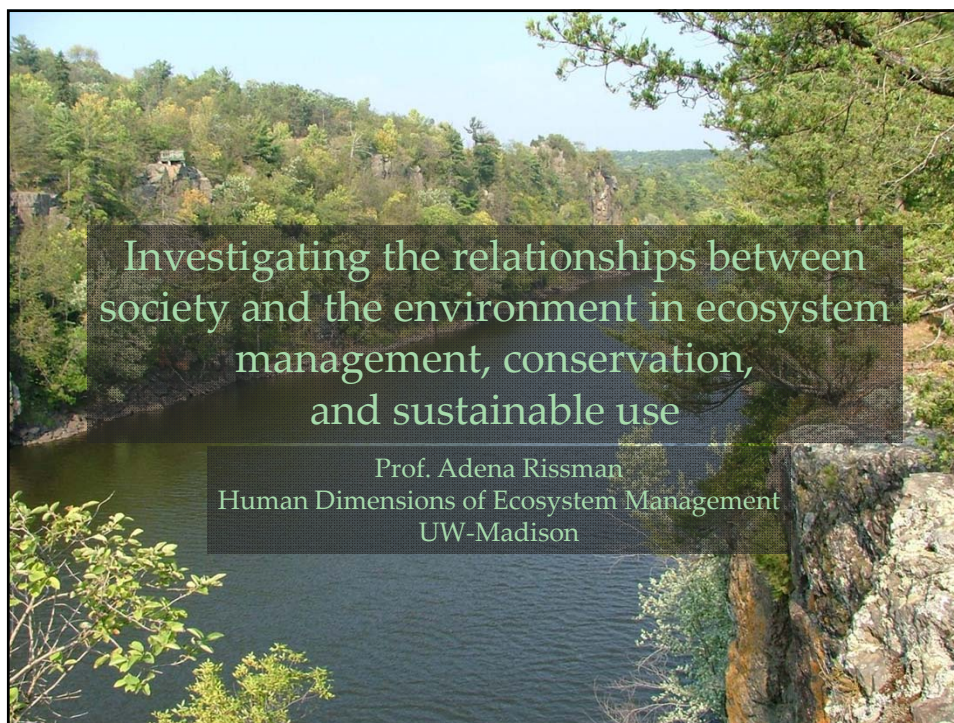


## Climate Change, Shifting Land Use, and Urbanization: Challenges for Water Quality and Quantity

NSF Water, Sustainability and Climate Program  
\$5M, Oct 2010 – Sept 2015

P.I.s:

Chris Kucharik, Agronomy and SAGE, Lead PI  
Steve Carpenter, Limnology  
Corinna Gries, Limnology  
Steve Loheide, Civil & Environmental Engineering  
Adena Rissman, Forest & Wildlife Ecology  
Monica Turner, Zoology



## Plan for Today

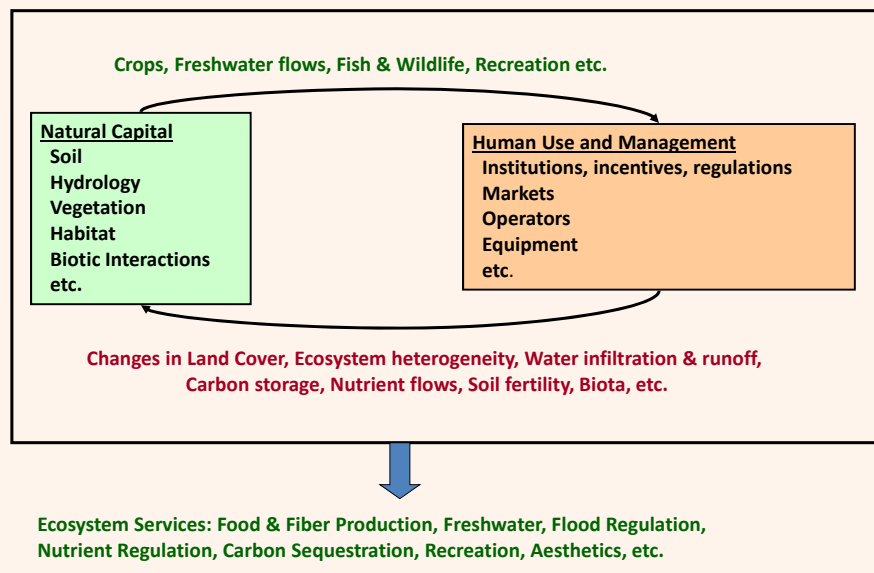
- 1) Introduction to the NSF Water, Sustainability, and Climate Program and Scenario Planning
- 2) Conceptual Modeling
- 3) Discussion

Prof. Adena Rissman

Elizabeth Katt-Reinders, Research Specialist

Bob Smail, PhD Candidate, Environment & Resources

**How will ecosystem services related to freshwater vary and how can they be sustained as climate, land use, cover and management, the built environment and human demands change?**



**Study System and Approach:**

**Yahara Watershed, including Madison and the 5 lakes**

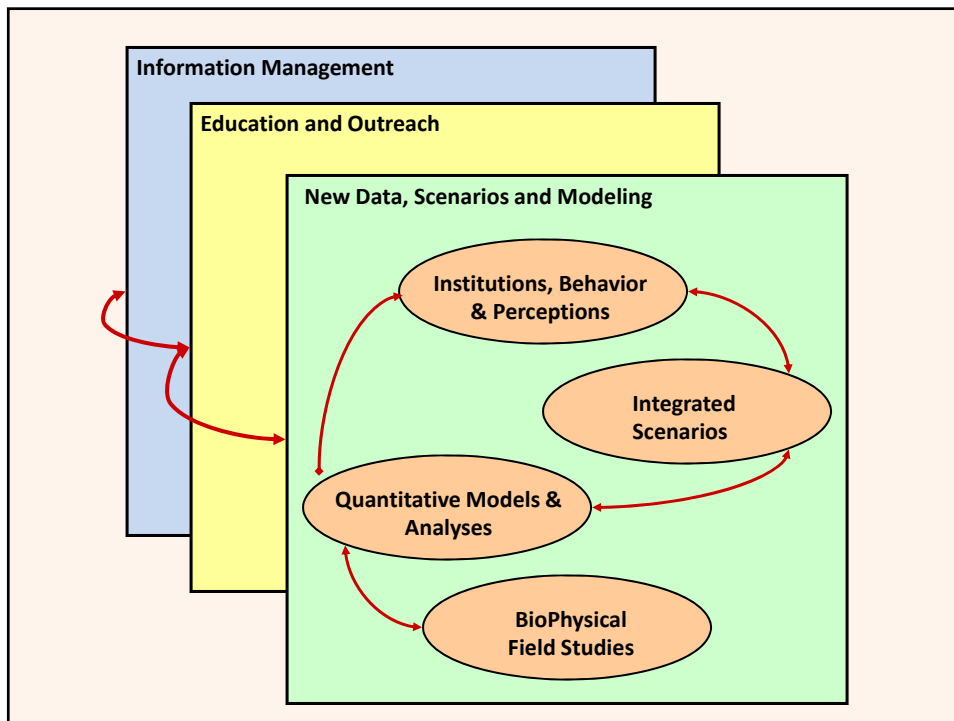
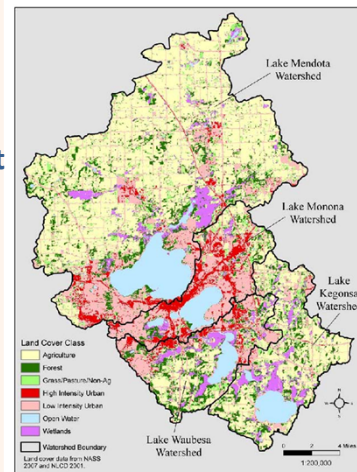
**Integrative scenarios of watershed development 2010-2060**

**Analyses of water and land use governance in the region**

**Scenarios of land cover and management practices, and climate scenarios**

**Water, C, N, P flows using Agro-IBIS and THMB based on new field data**

**Water and P flows to lakes, water quality implications**



**Outreach and Education:**

**“Water Walk” along Lake Mendota shoreline, in collaboration with Lakeshore Nature Preserve. Kiosks, podcasts.**

**K-12 in collaboration with SYLTER**

**Interactive scenarios process, including Scenarios Advisory Group, public meetings, surveys, etc.**

**Wisconsin Public Television “In Wisconsin”, ~ 5 segments focused on sustainability of the Yahara Watershed**

**New 2-semester interdisciplinary team-taught graduate seminar on Integrated Watershed Assessment, focusing on the Yahara as a practical example**

**Staffing:**

**6 P.I.s**

**2 Research specialists: one to coordinate biophysical data and modeling, one to coordinate scenarios**

**2 Postdocs: one for biophysical modeling, one for governance analysis**

**5 graduate students: (1) Urban heat island analysis, (2) ecohydrology, (3) lake water quality modeling, (4) adaptive governance, (5) spatial modeling**

### Timetable:

The process of hiring staff is underway

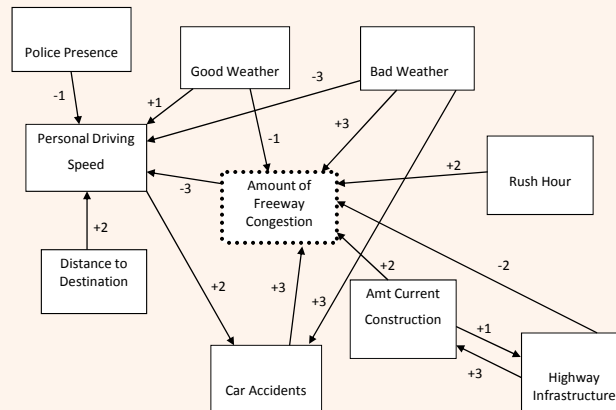
First field season 2011

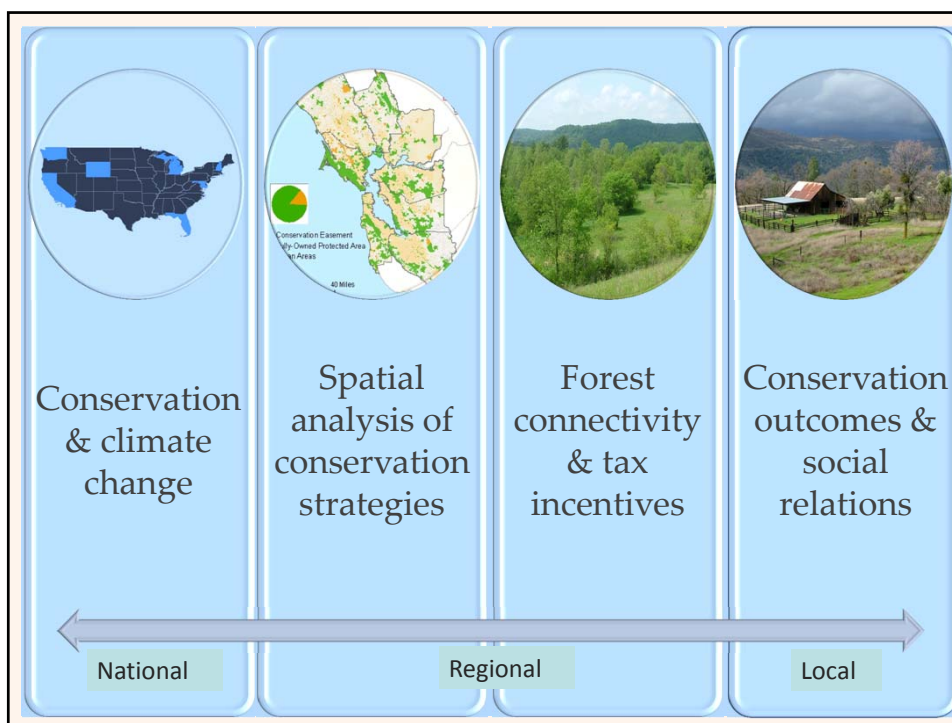
Initiation of scenario process (meetings, interviews, surveys) summer 2011

<http://wsc.limnology.wisc.edu>

### Example of a Conceptual Model

Arrows mean one item increases or decreases another  
+3 means high increase, -3 means high decrease





**How will ecosystem services related to freshwater vary and how can they be sustained as climate, land use, cover and management, the Built environment and human demands change?**

- \* How do different patterns of land use, land cover, land management, and water resource engineering practices affect the resilience and sensitivity of freshwater ecosystem services under a changing climate?**
- \* How can regional governance systems for water and land use be made more resilient and adaptive to meet diverse human needs?**
- \* In what ways are regional human-environment systems resilient and in what ways are they vulnerable to potential changes in climate and freshwaters?**