

ILTER Workshop

Interactions among ecosystem services, ecosystem dynamics, and human outcomes and behavior

Patrick Bourgeron and the ILTER Science Agenda Committee

This workshop is the second step in the network-level attempt by the ILTER network to address the linkages between ecosystem services (ES) and human outcomes and behavior, and how they influence each other in biomes. The workshop will be conducted by analyzing site-specific feedback models and developing threshold interaction models for selected biomes across the ILTER network. The feedback model framework was developed in 2007 under the US-LTER strategic research initiative “Integrative Science for Society and the Environment” (ISSE) (Collins et al. 2007, Figure 1) and by several workshops on land use and ES.

The general objectives of the workshop are to: (1) examine the different feedback models formulated by the member networks; (2) determine whether changes are perceived in the delivery of ES; (3) ascertain whether this perception leads to changes in ES use and management in a biome in different cultural settings; and (4) identify threshold interactions between environmental and socio-economic dynamics at multiple scales, and possibly forecast the effects of these interactions on ecosystem services and ecological resilience. Breakout groups will further develop the frameworks using different biomes. The results of the workshop will indicate the next steps to achieve a synthesis within and among biomes of culture-specific socio-economic dynamics leading to increases or decreases in resilience.

The workshop will consist of three parts. First, there will be five presentations (goals of the exercise, the conceptual frameworks, and preliminary examples). Second, the attendees will be divided into a number of breakout groups that will develop further the two frameworks (feedback model and threshold interaction model) within specific biomes from different regions in the world. Third, the individual group results will be synthesized in a “general model”.

Further Reading

Carpenter, S.R., and C. Folke. 2006. Ecology for transformation. *Trends in Ecology & Evolution*, 21:309-315.

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

Kinzig, A.P., P. Ryan, M. Etienne, H. Allison, T. Elmqvist, and B.H. Walker. 2006. Resilience and regime shifts: assessing cascading effects. *Ecology and Society* 11(1): 20. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art20/>.

Guidelines for Breakout Groups

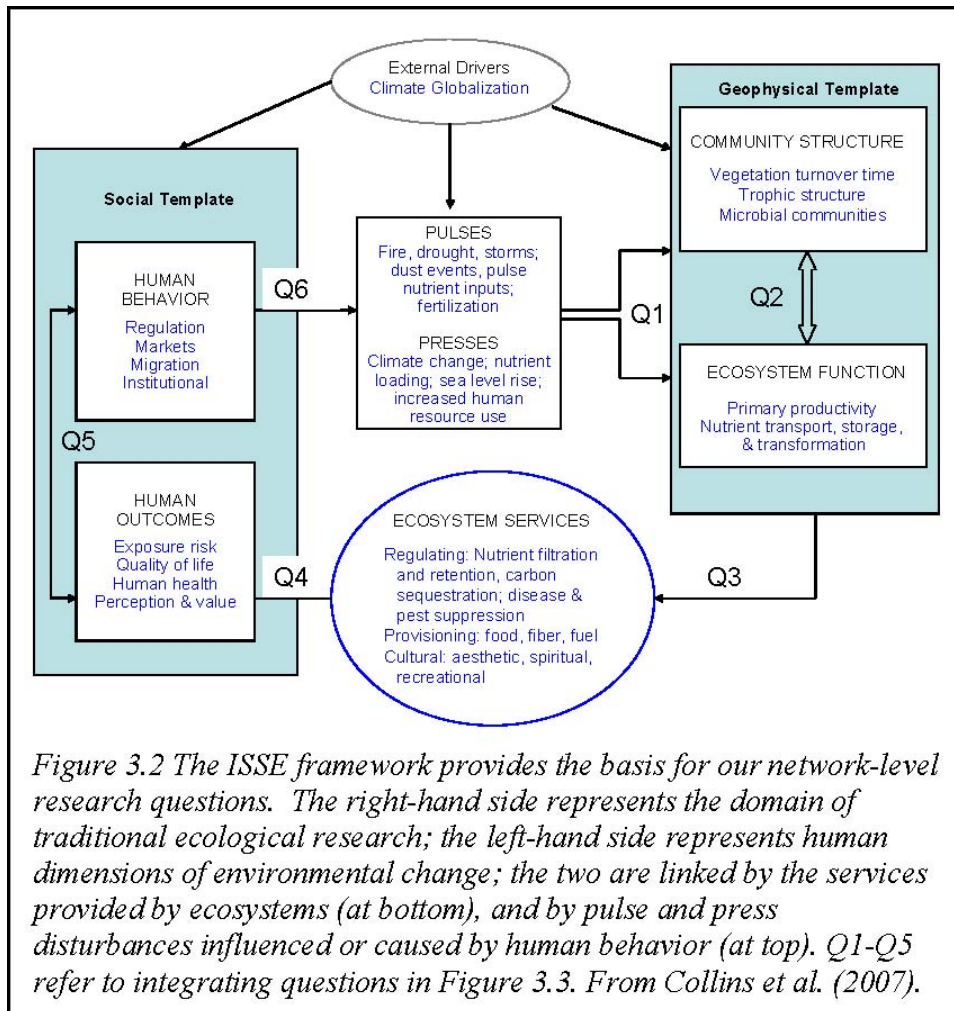
- Illustrate the general model of threshold interactions (Figure 2) using the feedback model and the identified critical ES.

- Is there a generality in the interactions between thresholds within biomes?
- Under what conditions do management and conservation policies backfire as multiple thresholds are breached?
- Is the role of socio-cultural thresholds universal for ES management?
- To what extent do dynamics outside of the regional system induce regime shifts within a given region and therefore constrain ES management?

Synthesis and Recommendations

- How universal are the general models for management of ES sustainability and resilience?
- How useful are they for ES?
- What is the added value of systematizing the approach for ES?
- What strategy should the ILTER follow in using the approach to inform policy?

Figure 1. Framework and questions.



- Q1:** How do long-term press disturbances and short-term pulse disturbances *interact* to alter ecosystem structure and function?
- Q2:** How can biotic structure be both a *cause and consequence* of ecological fluxes of energy & matter?
- Q3:** How do altered ecosystem dynamics affect ecosystem services?
- Q4:** How do changes in vital ecosystem services alter human outcomes?
- Q5:** How do perceptions and outcomes affect human behavior?
- Q6:** Which human actions influence the frequency, magnitude, or form of press and pulse disturbance regimes across ecosystems, and what determines these human actions?

Figure 2. Generalized model of threshold interactions showing all possible combinations of domains and scales and possible interactions between regime shifts at various domain-scale combinations.

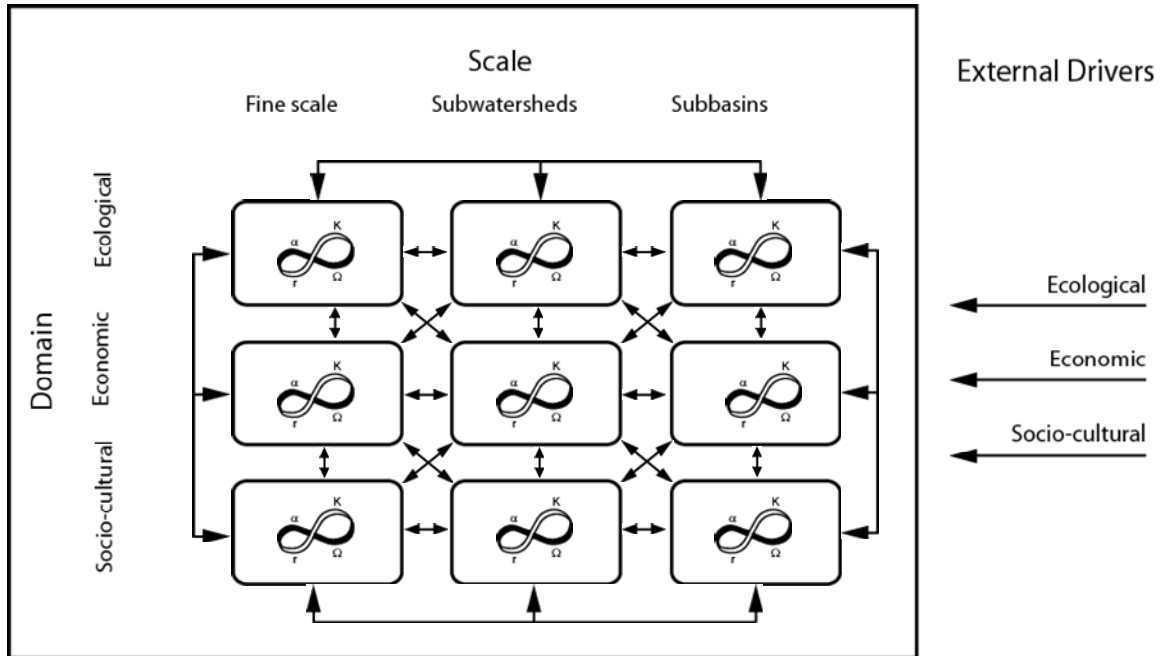


Figure 3. Interactions among regime shifts in the Colorado Front Range.

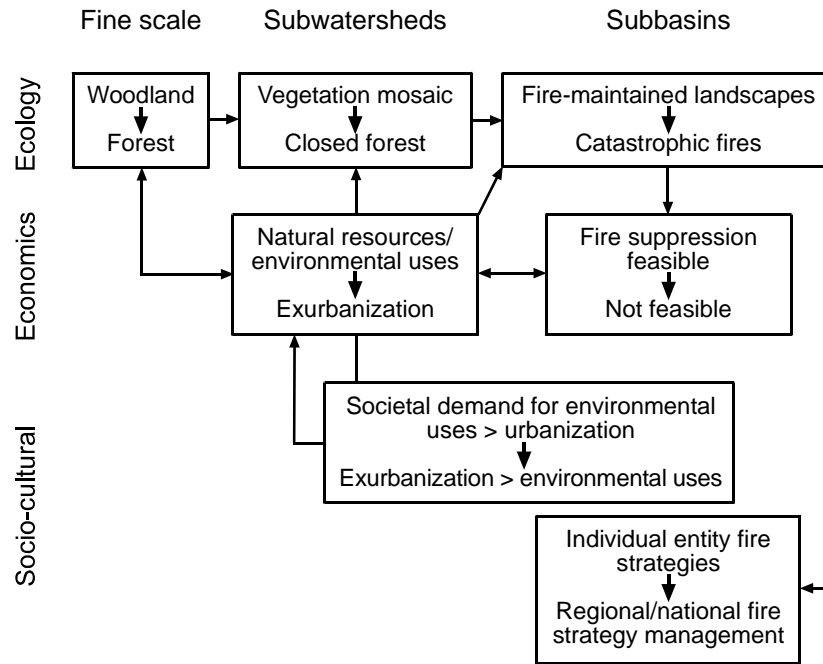
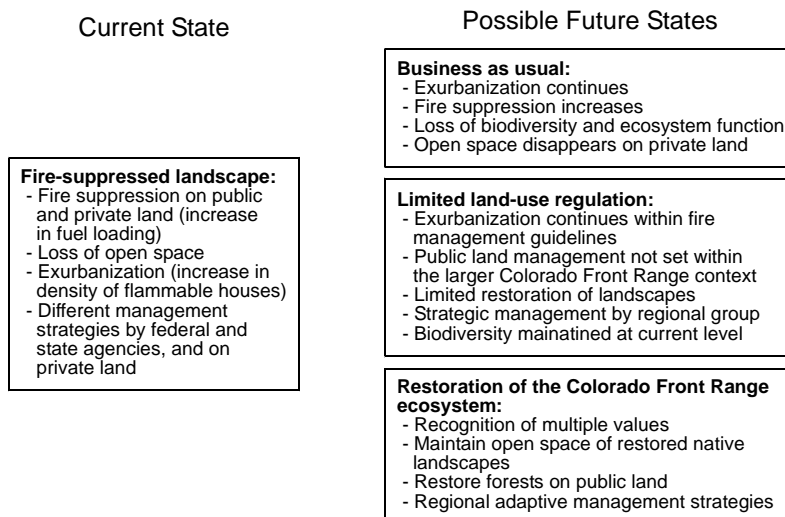


Figure 4. Current and future states.



Domain

Socio-cultural

Economic

Ecological

Fine scale

Subwatersheds

Subbasins

Scale