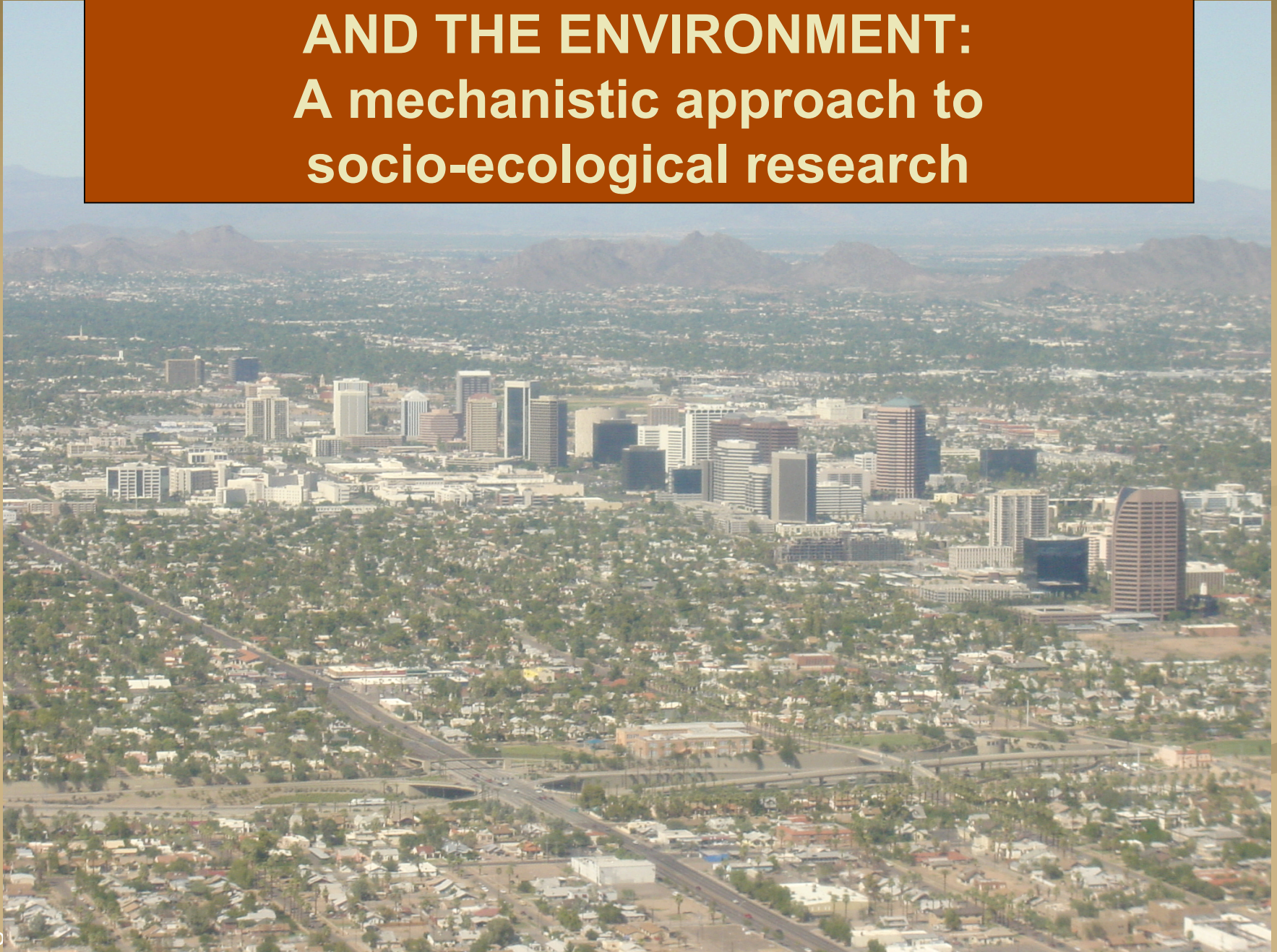


INTEGRATED SCIENCE FOR SOCIETY AND THE ENVIRONMENT: A mechanistic approach to socio-ecological research

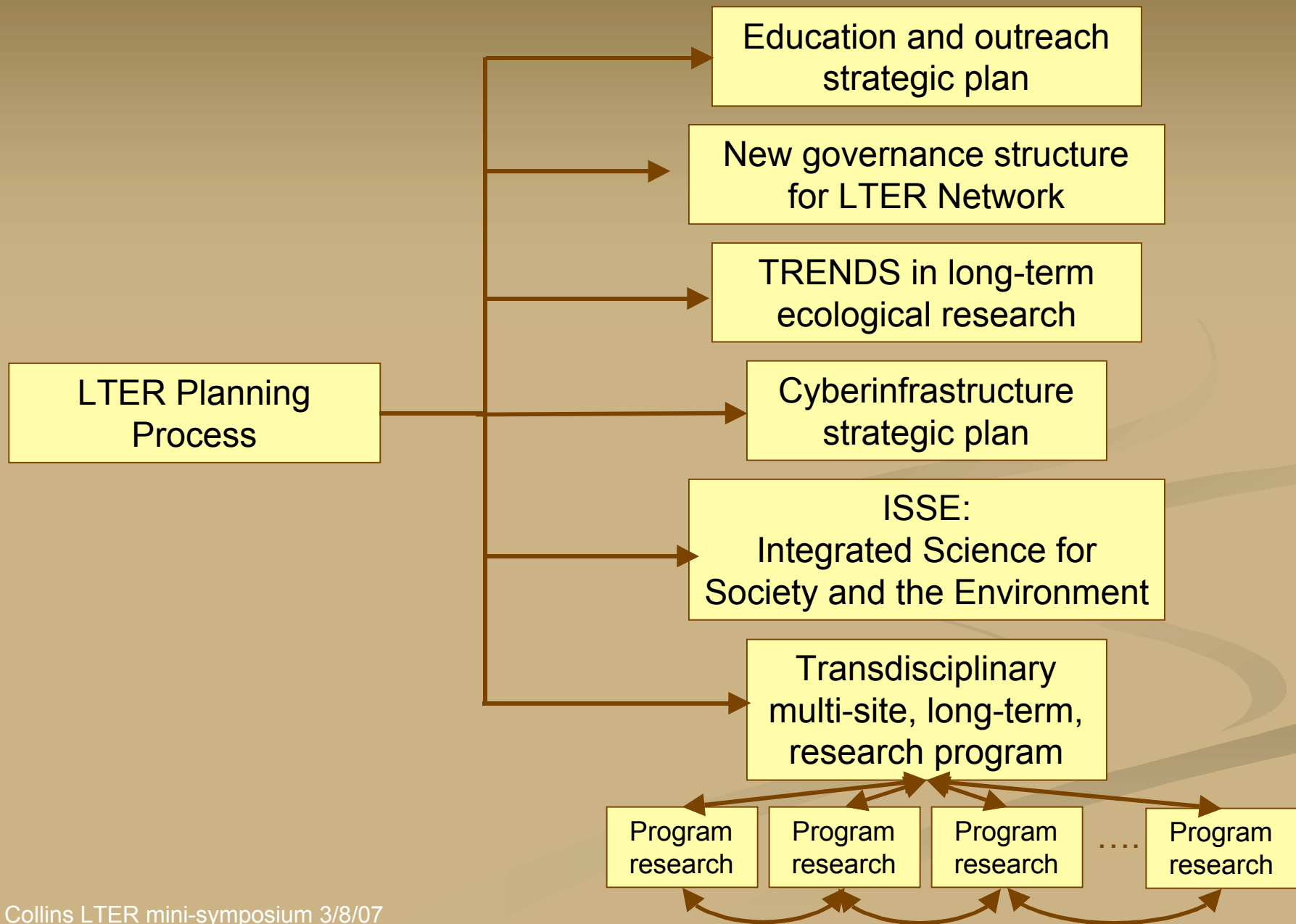


TOWARD INTEGRATION AND SYNTHESIS: GOALS OF THE LTER PLANNING PROCESS

This proposal describes an ambitious **planning activity** to develop a new LTER science agenda that when implemented will use the Network to its maximum potential and take LTER science to a higher level of research collaboration, synthesis and integration.

- **Objective 1:** establish activities that will lead to multi-site, highly collaborative, integrated research that explicitly includes synthesis components coupled with novel training opportunities in graduate and undergraduate education.
- **Objective 2:** evaluate LTER Network governance structure and further stimulate the culture of collaboration within the LTER Network.
- **Objective 3:** envision and develop education and training activities that will infuse LTER science into the K-12 science curriculum.

OUTCOMES OF THE PLANNING PROCESS



TRENDS: OUR CHANGING WORLD

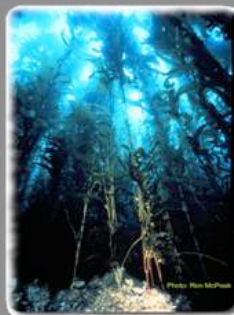


USDA United States Department Of Agriculture
Agricultural Research Service

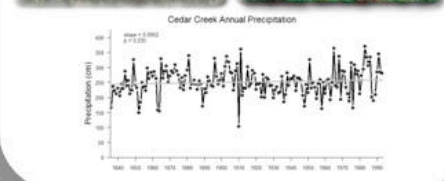
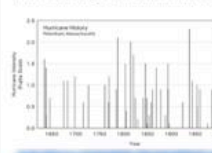
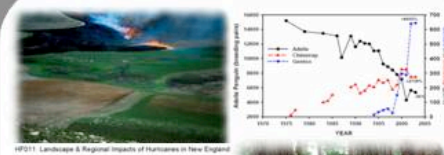


Our Changing World:

An Atlas of Long-Term Trends in Ecological Systems



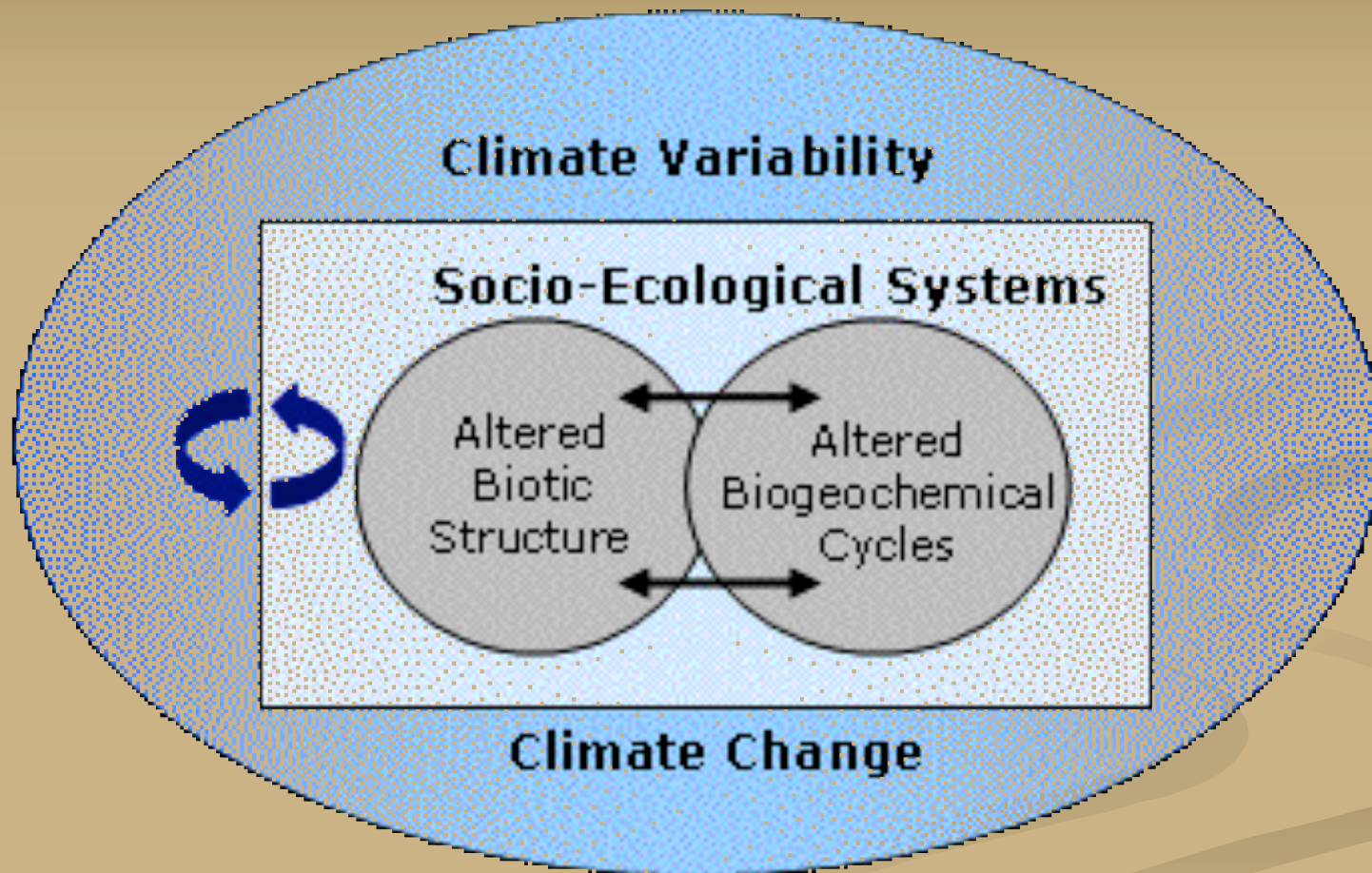
TRENDS
In long-term ecological data



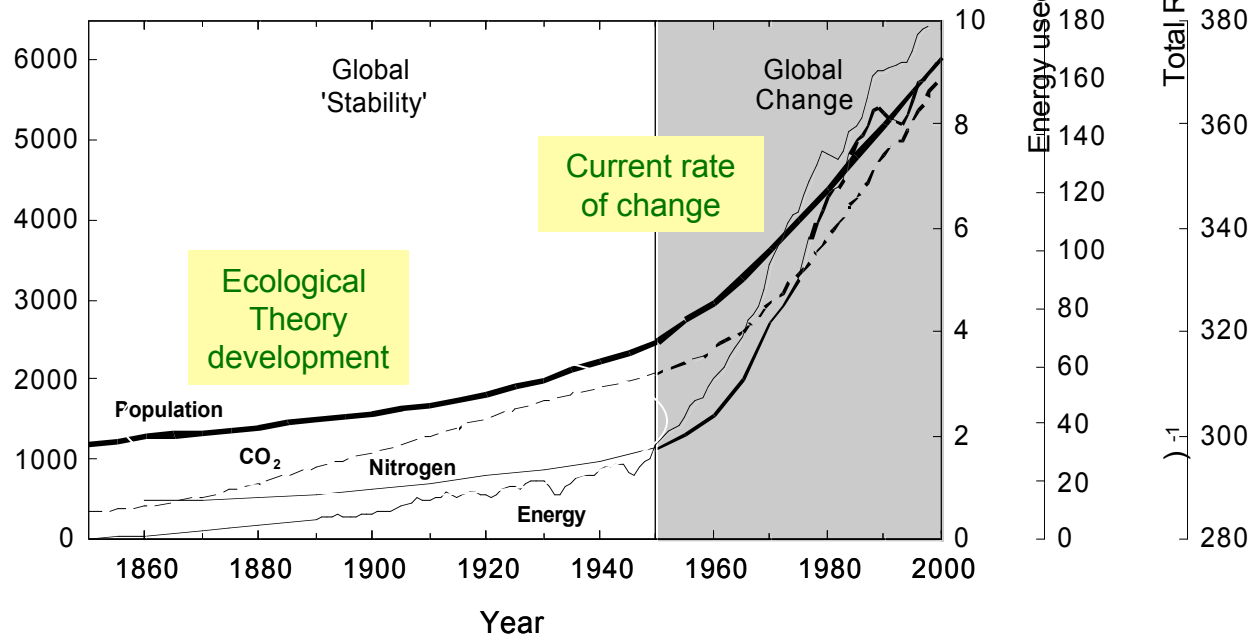
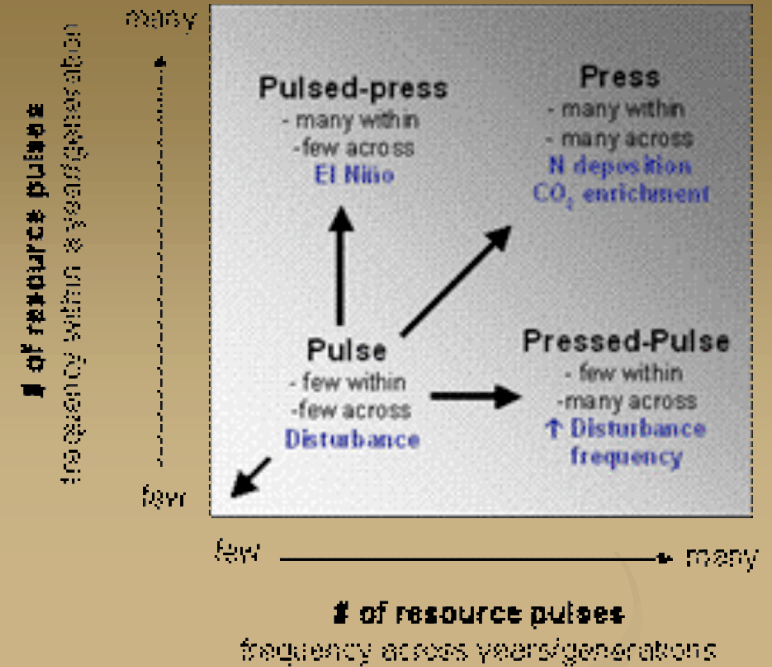
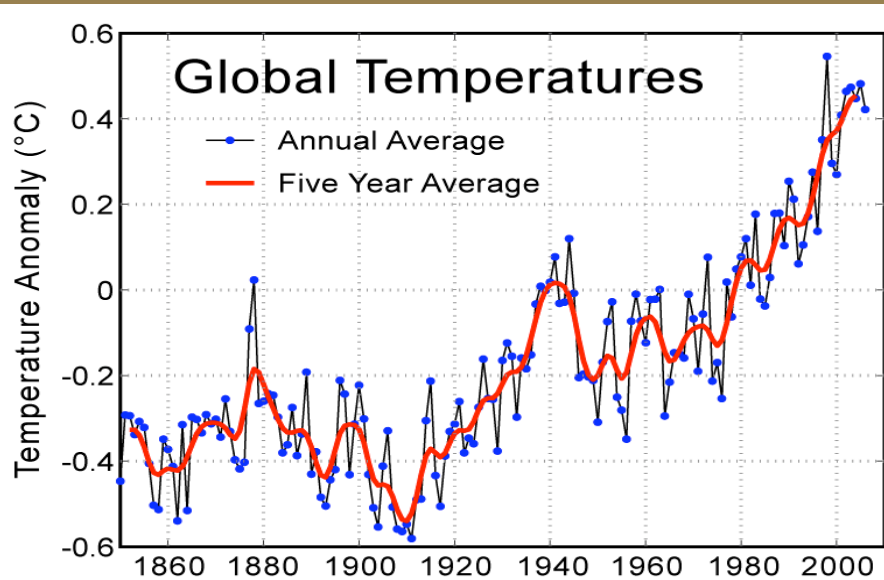
Lead Editor: Debra Peters

LTER CYBERINFRASTRUCTURE STRATEGIC PLAN

INTEGRATED SCIENCE FOR SOCIETY AND THE ENVIRONMENT

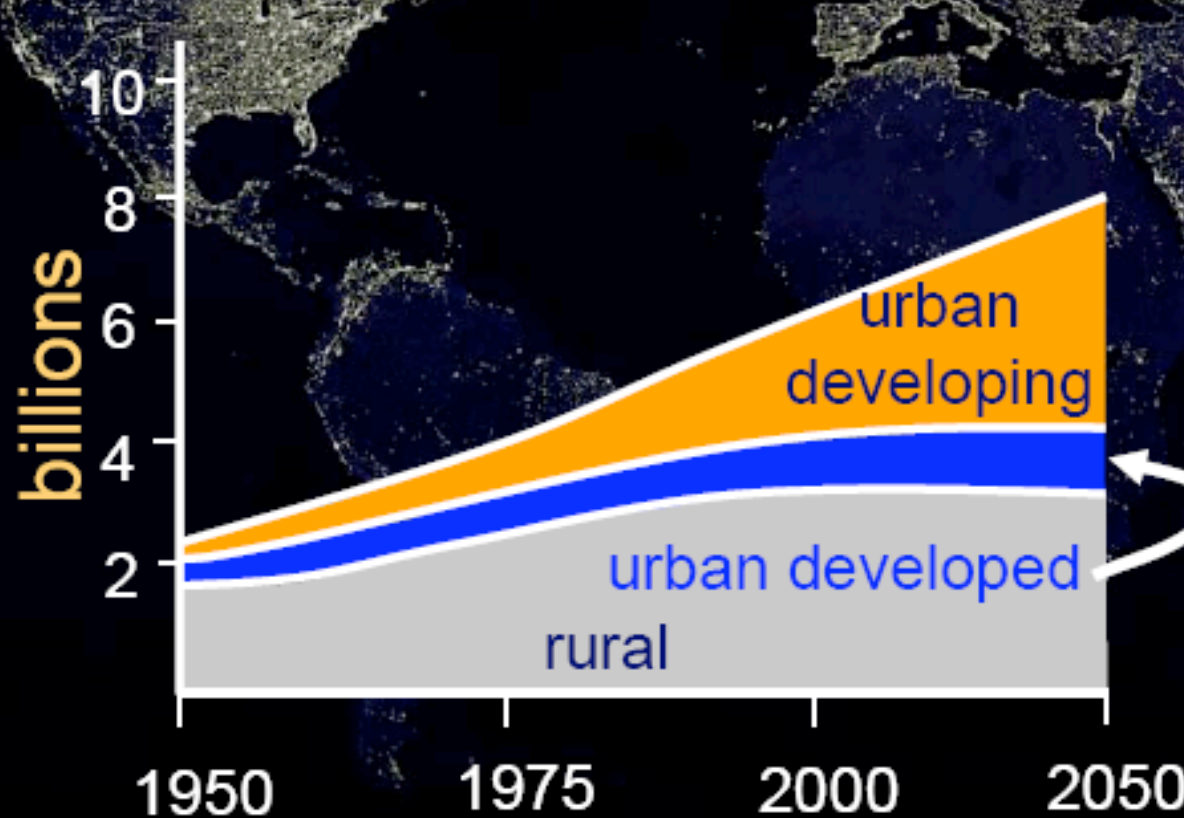


SOCIO-ECOLOGICAL PRESSES



Smith, Knapp & Collins, in review

The problem of urbanization: the future



Urban population¹:

1800 – 2%

1900 – 12%

2000 – 47%

2050 – 60%

Megacities²:

1950 – 1

2000 – 19

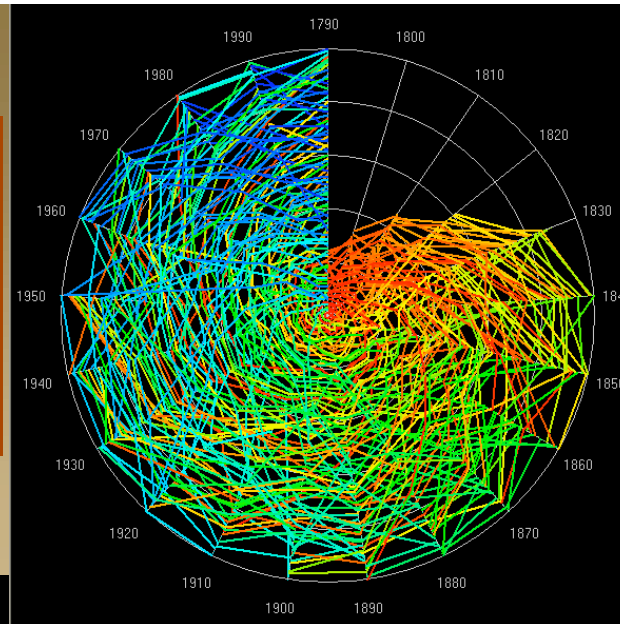
2015 – 60

Source: World Resources Institute 1996

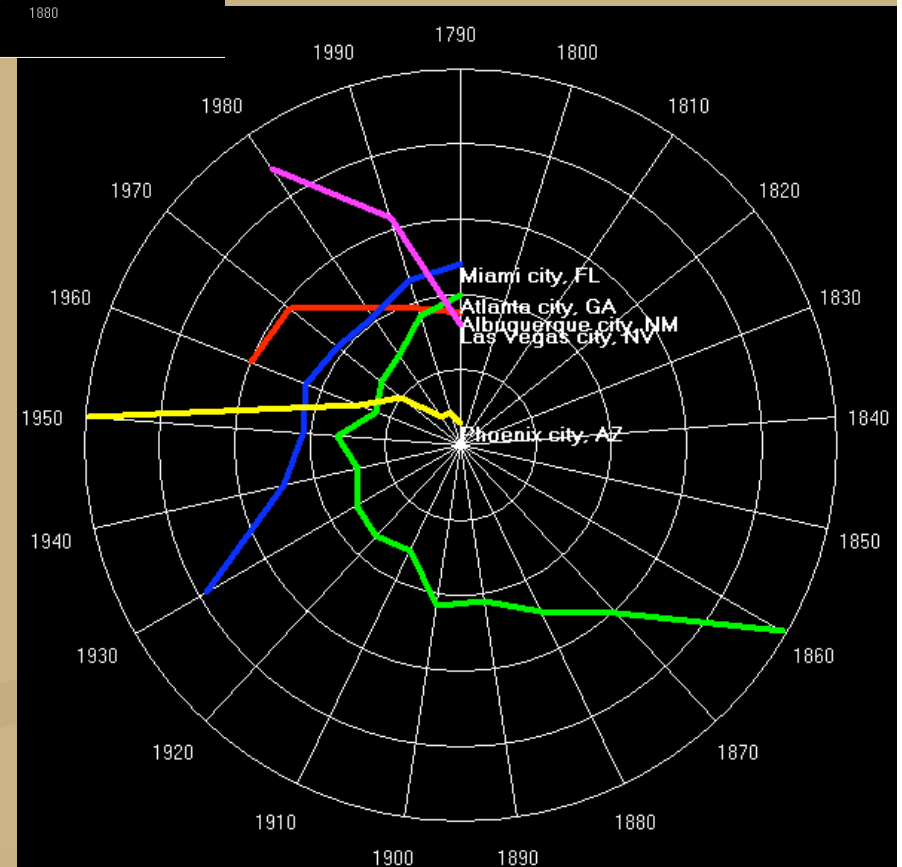
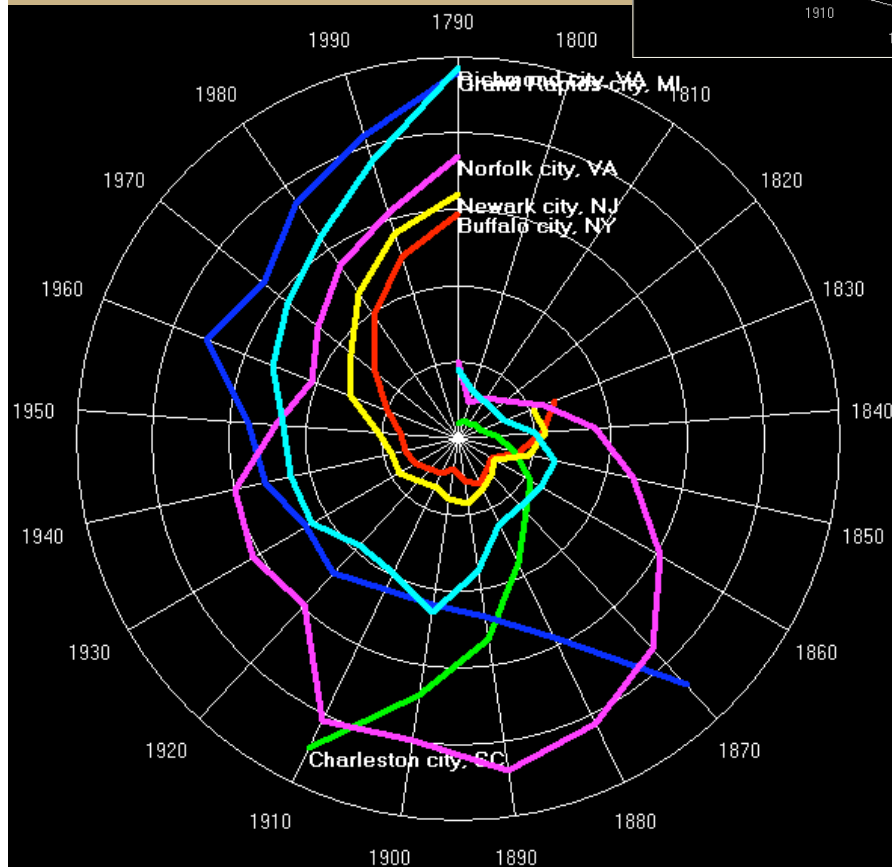
Sources: ¹ Cohen 2003 *Science*

² IHDP Report 2005

RANK CLOCKS REVEAL THE UNEQUAL DISTRIBUTION OF URBAN GROWTH

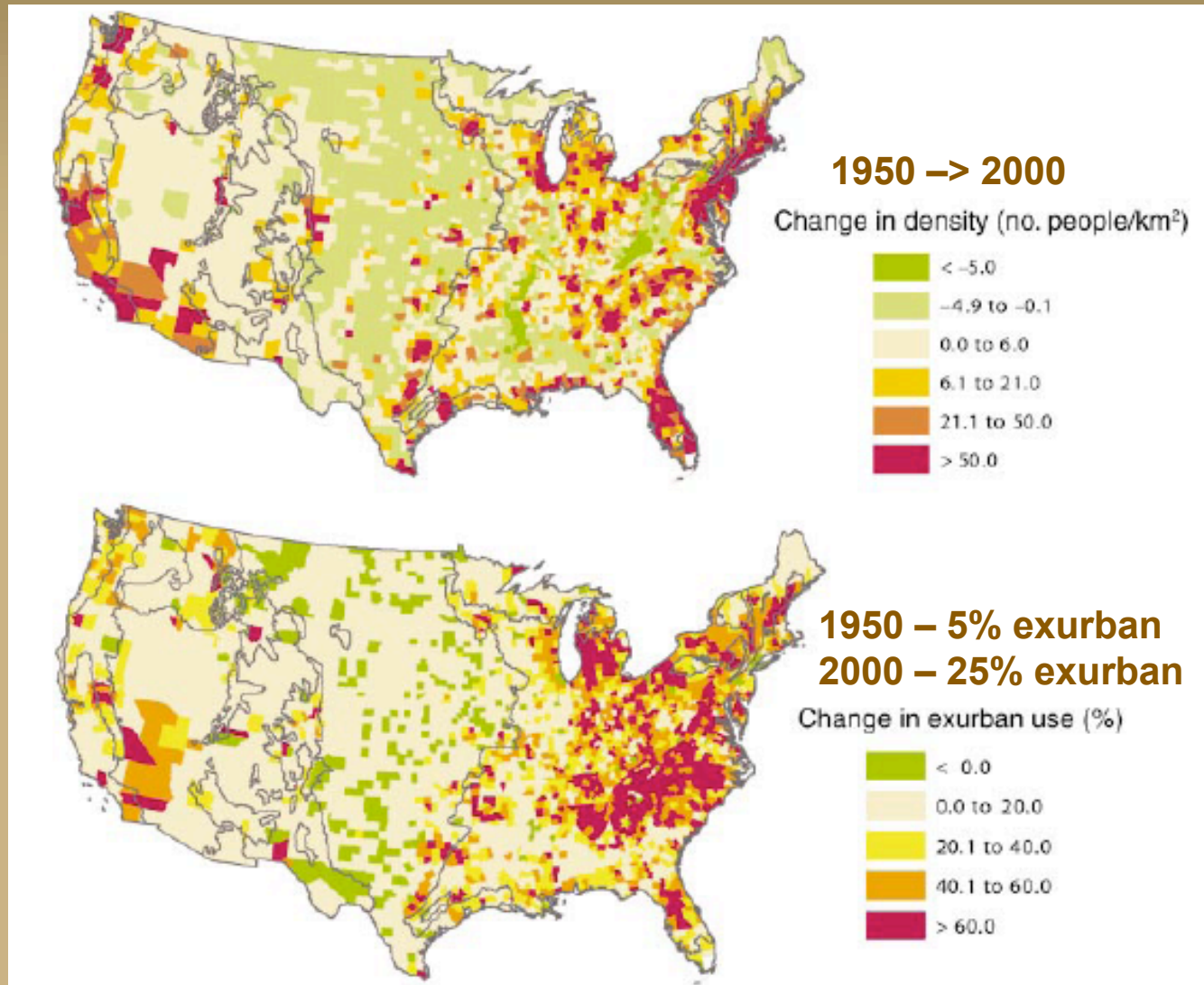


Batty 2006 Nature



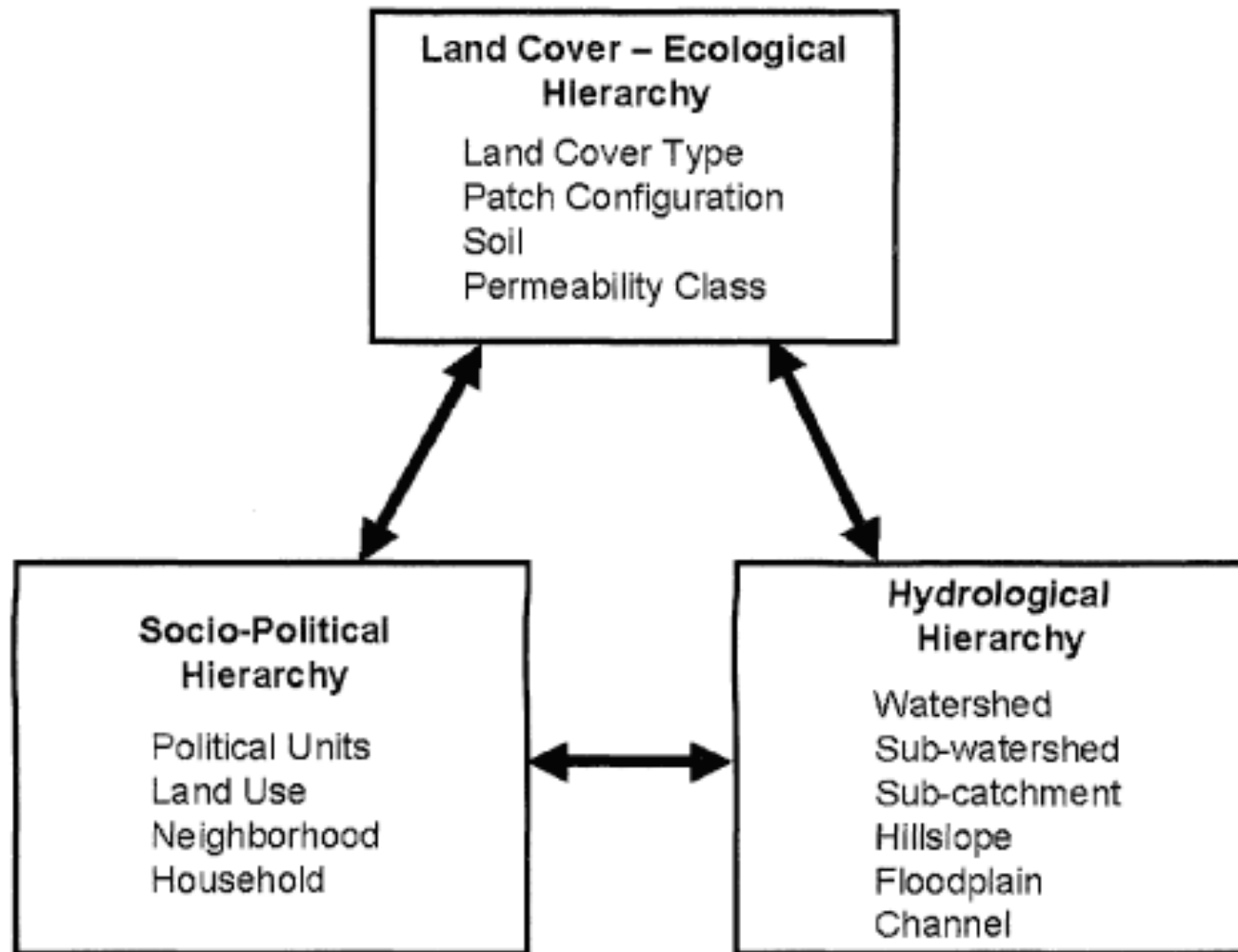
POPULATION EFFECTS VARY SPATIALLY

Requires a broad-scale comparative approach



Brown et al. 2005 Ecological Applications

SOCIO-ECOLOGICAL RESEARCH: HIERARCHICAL FRAMEWORK



Pickett et al. 2001 Annual Reviews of Ecology and Systematics

SOCIO-ECOLOGICAL RESEARCH: COMPETITIVE FRAMEWORK (us vs them)

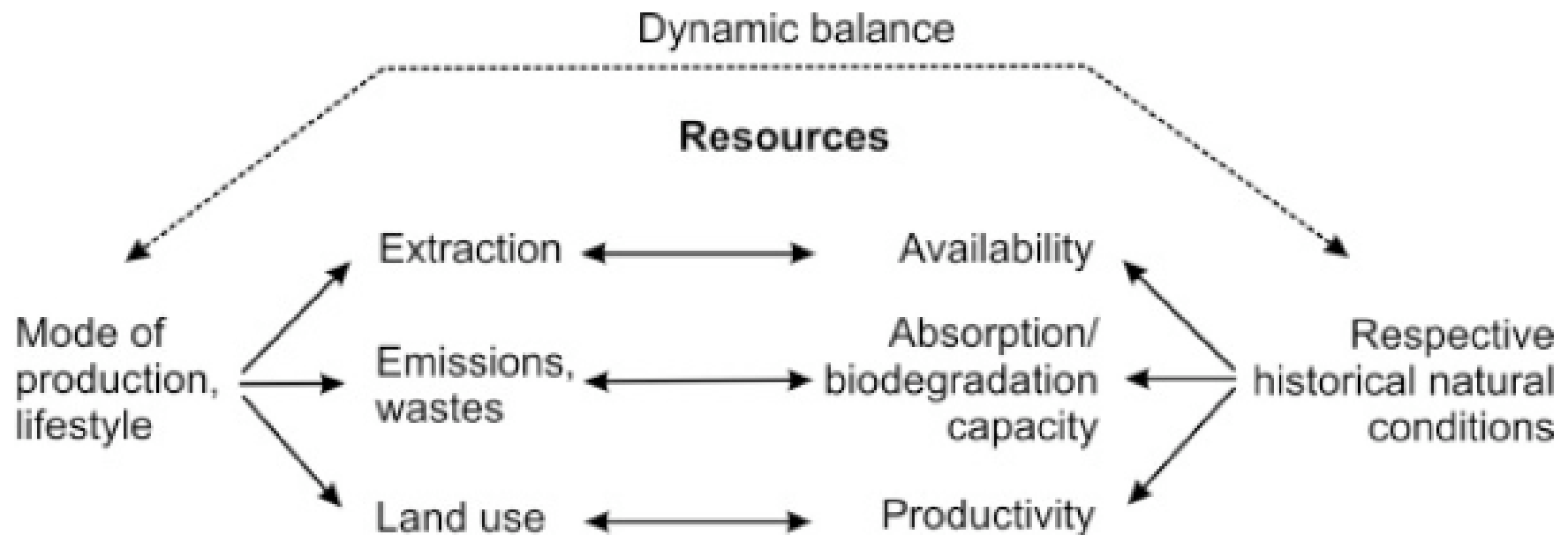
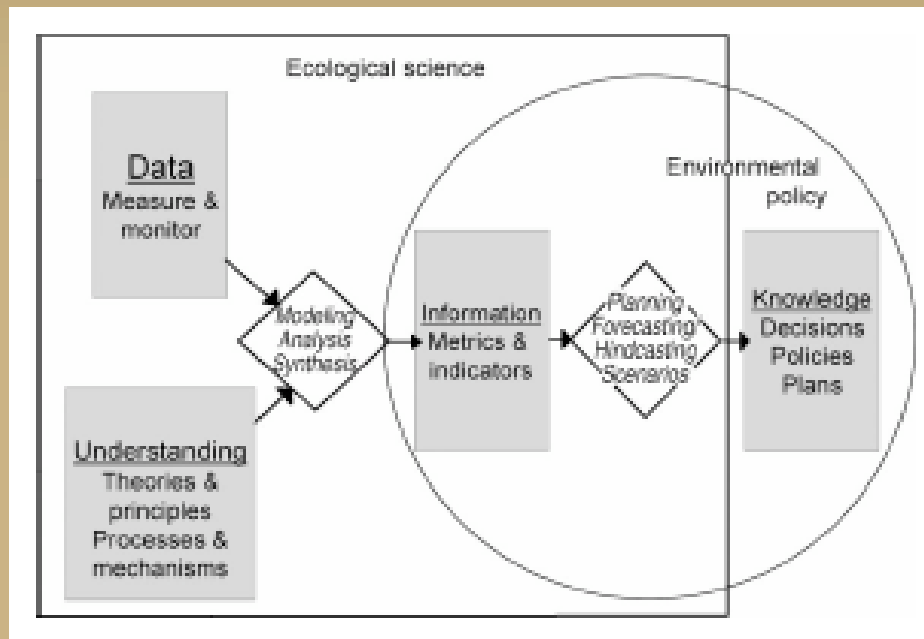
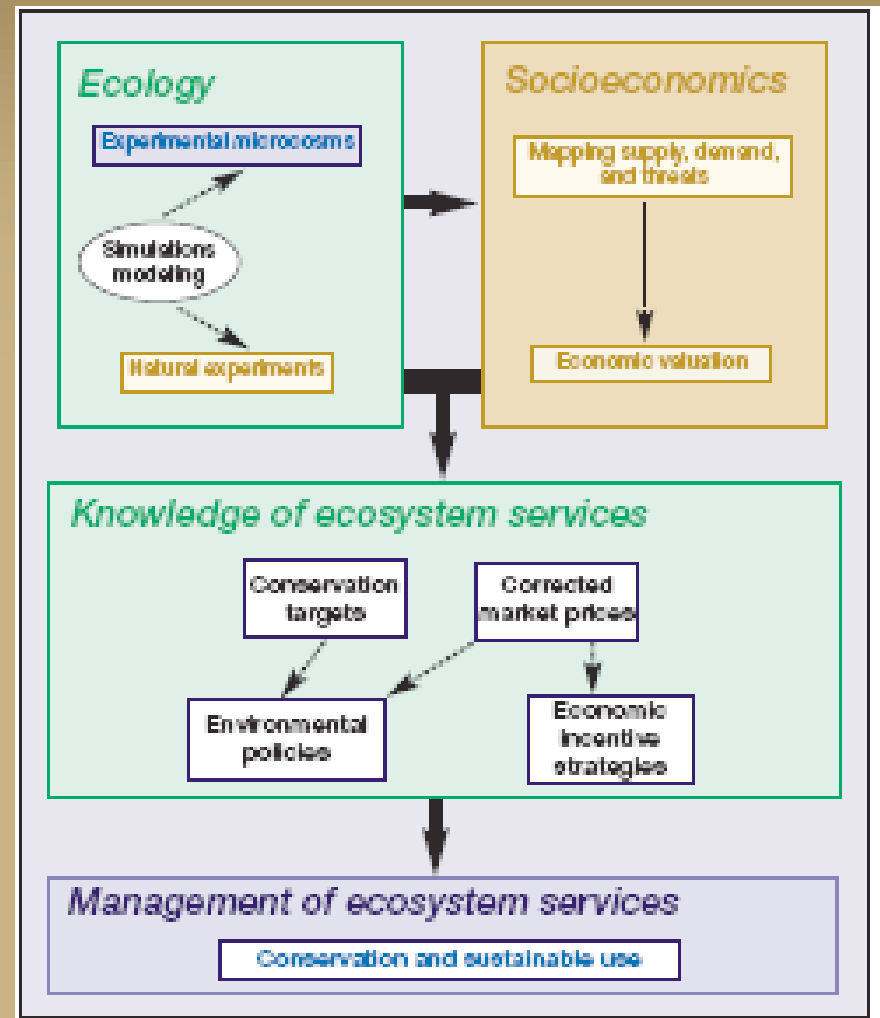


Figure 1. Sustainability as the dynamic balance between mode of subsistence / lifestyle and the respective historical natural conditions.

SOCIO-ECOLOGICAL RESEARCH: LINEAR MODELS (lack feedbacks)

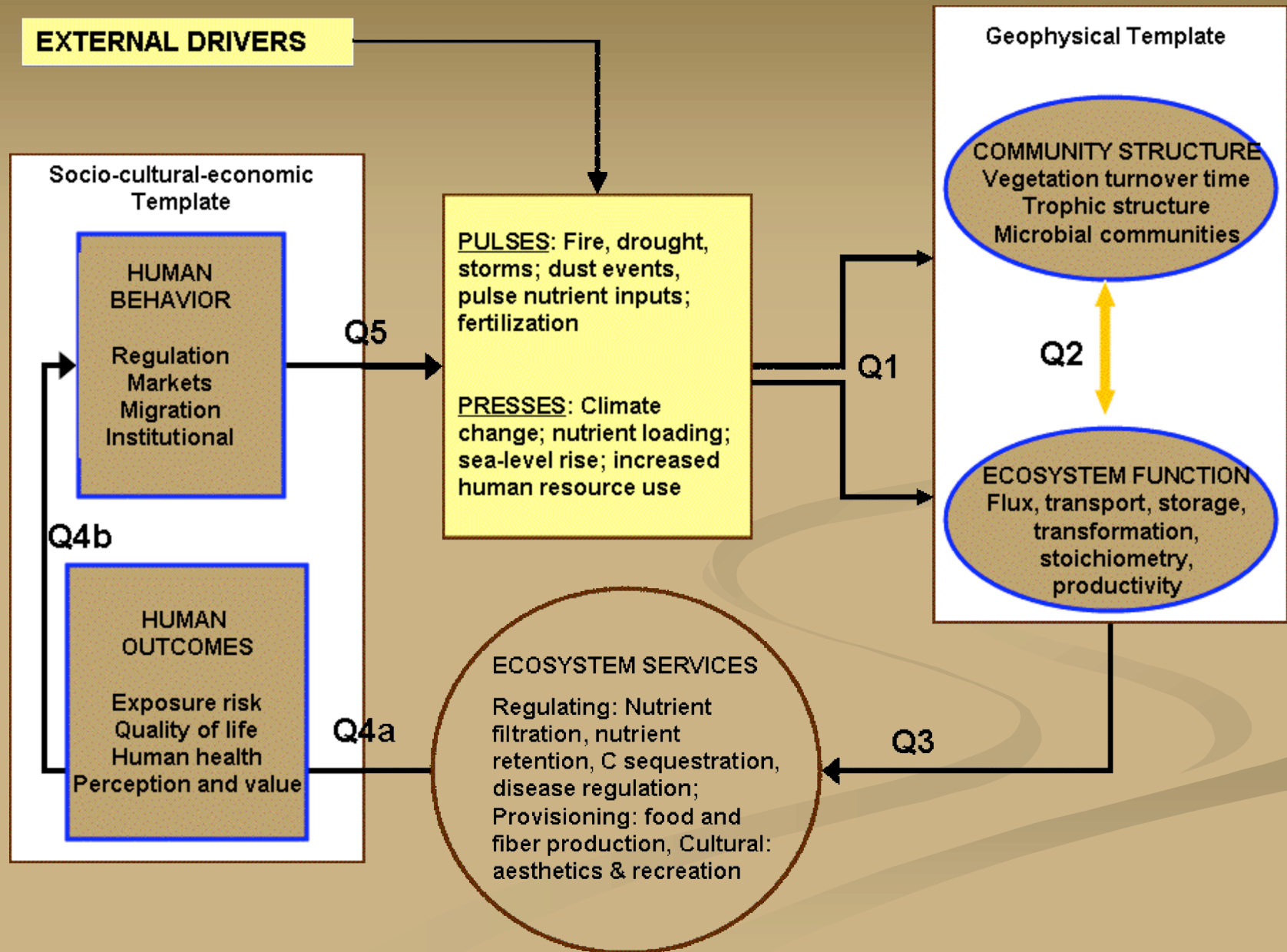


Theobald et al. 2005 Ecological Applications



Kremen & Ostfeld 2005
Frontiers in Ecology and Environment

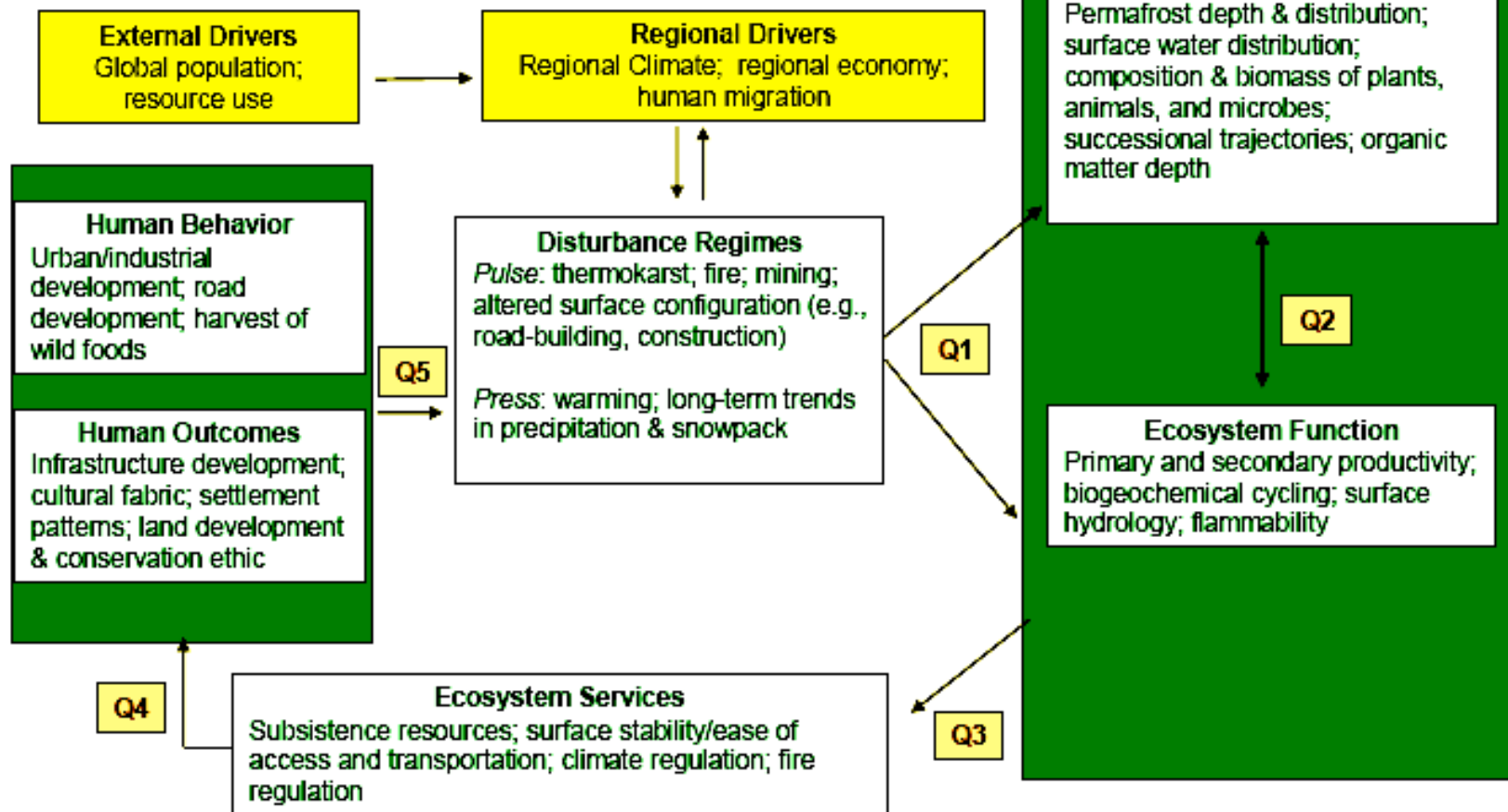
ITERATIVE CONCEPTUAL FRAMEWORK



FRAMEWORK QUESTIONS

- **Q1:** How do long-term press and pulse drivers **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 **feed back** to alter human behavior?
- **Q5:** Which human actions influence the frequency, magnitude, or form of press and pulse disturbance regimes across ecosystems, and how do these change across ecosystem types?

Bonanza Creek Permafrost Impacts



- Q1. How do long-term trends in climate interact with disturbance to the land surface to affect the structure & function of the boreal forest in interior Alaska?
- Q2. How are feedbacks between community structure and ecosystem function affected by changes in permafrost?
- Q3. How do ecological changes associated with warming permafrost affect subsistence resource use, the ease of accessing landscapes, and flammability/fire regulation?
- Q4. How will the human population respond to landscape changes associated with warming permafrost?
- Q5. How will human actions/decisions affect the dynamics of permafrost thaw in interior Alaska?

FRAMEWORK QUESTIONS: Site based examples from current LTER research

0900-0930	Steward Pickett	Social-ecological Change in Urban Ecosystems
0930-1000	Terry Chapin	Social-ecological change in Boreal Forest of Alaska
1000-1015	Break	
1015-1045	Steve Polasky	Bioeconomics of Biofuels: Grassland Restoration and Renewable Energy
1045-1115	Dan Reed	Social-ecological Change in Coastal Marine Regions
1115-1145	David Foster	Centuries of Social-Ecological Change in the Deciduous Forest of Eastern North America
1145-1200	Deb Peters	Synthesis: Understanding Social-Ecological Systems Through a Network of Sites

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surface

Interior Alaska?

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Latest Timeline and Project Plan

