The CAP LTER Ecosystem Services Assessment: An Interdisciplinary Pilot Study

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INTRODUCTION:

An interdisciplinary team of scientists is conducting a pilot study to assess the ecosystem services provided within the CAP LTER boundaries.

• Based on the Millennium Ecosystem Assessment

• GOAL: To identify the ecosystem services provided by the CAP LTER that are most critical, most threatened, and most difficult to replace through technological substitutes

• Applications: Future policy and research decisions in Phoenix; guidance for future ecosystem assessments

PROJECT ORGANIZATION:

• Three teams are working on the CAP LTER ecosystem assessment

• Each team is addressing a different aspect of the project by answering questions about specific ecosystem services outlined in the Millennium Ecosystem Assessment

• The natural science team is measuring changes in ecosystem services by patch type

6 PATCH TYPES:

1. Agriculture
2. Desert and desert remnant
3. Residential
4. Green space
5. Riparian
6. Impervious surface/ Transportation

NATURAL SCIENCE TEAM

Challenge: What are the past and projected changes in the function of each ecosystem service?

Ecosystem Service Questions:
• How has the delivery of this service in this patch type changed from (circa) 1975 to 2000 ON A PER UNIT AREA BASIS? Why has it changed on a per unit area basis? Where are these changes occurring?

• How has the delivery of this service *within the whole system* changed as a result of the changing extent of this patch type? What has been the main driving force in conversion of patch type? Where is this patch type being added (deleted)?

• What is the certainty of this assessment?

• What is/are the source(s) for assessment?

• Over what spatial scale do the *local* patches (within the CAP boundary) deliver the surface? Are they highly localized (smaller than the boundary)? Regional? Global?

• How is the delivery of this service likely to change over the next 25 years? Is this because of 'service per area' changes, or because the extent of the patch type will change? Where are the changes most likely to occur, and why?

• What is the certainty of this assessed trajectory?

• What is/are source(s) for assessing future trajectory?

Trumble, T. Downtown Phoenix.

HUMAN VALUATION TEAM

Challenge: What is the worth ascribed to each ecosystem service by the local human population, and how is that valuation changing over time?

Ecosystem Service Questions:
• What is the current value placed on this service?

• What is the certainty of the assessed value?

• Is there much heterogeneity in the value different groups place on this service? If so, which groups most highly value the service? Which least value the service?

• Do international markets provide distant substitutes for local supply of these services?

• What is the likely trajectory of this value on a 25-year time scale?

• What is the certainty of the assessed trajectory?

• What is/are source(s) for assessing future trajectory?

Phillips, J.C. Example of a regulating service (pollination).

TECHNOLOGY TEAM

Challenge: Which of the ecosystem services would it be technologically and economically feasible to replace with human-engineered substitutes?

Ecosystem Service Questions:
• What are the current *feasible* technological substitutes for this service, if any?

• What level of demand can these technologies fill?

• Are these technological substitutes widely deployed? If narrowly deployed, where are they being used?

• Do these technologies impact (+ or -) any of the other ecosystem services listed?

• What is /are source(s) for this deployment assessment?

• What are some of the future technological substitutes for this service?

• On what time scale are they likely to become technologically or economically feasible?

• How certain is this assessment of future feasibility?

• What level of demand are these technologies expected to fill?

• Are these technologies expected to impact (+ or -) any other ecosystem services?

• What sources were used in assessing future feasibility?

Brazel, A. Clean water, a provisioning service.

MILLENNIUM ECOSYSTEM ASSESSMENT

The MA defines ecosystem services as "the benefits people obtain from ecosystems, like food, water, and climate regulation." (www.millenniumassessment.org)

Ecosystem Services are listed and defined in four categories by the MA:

1. Provisioning Services (ex. food, fuel, fresh water)

2. Regulating Services (ex. air quality regulation, climate regulation, disease regulation)

3. Cultural Services (ex. cultural diversity, spiritual and religious values, aesthetic values)

4. Supporting Services (ex soil formation, primary production, nutrient cycling)

LESSONS LEARNED:

• Some baseline information is necessary for every team (such as changes in land use over time)
• Cultural services are extremely hard to quantify from an ecological, economic, or technological perspective
• Measuring changes in ecosystem services by patch type is extremely helpful for the natural science team

NEXT STEPS:

• Natural science team all-day workshop
• Ecology team follow-up meeting
• Technology team Blackboard discussion forum; next meeting TBA
• Disseminate baseline information to all teams; continue to post literature, maps on intranet; share findings between teams
• Address issues around quantifying cultural services in the CAP LTER