To Plant, or Not to Plant?
Regulation of Invasive Plants in the Mid-Atlantic States


This work was supported by the National Socio-Environmental Synthesis Center (SESYNC) under funding received from the National Science Foundation DBI-1052875

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To Plant or Not to Plant?
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PART 2:
Mapping Social-Ecological Systems
Social-Ecological Systems

Solving complex problems

• Complex systems can be difficult to understand
• Elements
• Relationships
• Boundaries
• Visualization
• Conceptual models
Social-Ecological Systems

Solving complex problems

• What are the impacts?
• Are there benefits?
• Who cares? Why do they care?
• What can be done?
• What should be done?
• Who should do it?
• Where will the money come from?
• Do solutions have drawbacks?
Social-Ecological Systems

Representing complex relationships

Sketch a diagram that illustrates your relationship(s) to the environment.

Social-Ecological Systems
Representing complex relationships

Example:
Integrated Social-Ecological System Model Template

http://dx.doi.org/10.1016/j.jenvman.2010.08.022


A diagram is worth a thousand words.
Integrated Social-Ecological System

- Land use
- Land cover
- Production
- Consumption
- Disposal

Interactions

External

- Political & Economic Conditions
- Bio-geo-physical Conditions

Social Patterns & Processes
- Demography
- Technology
- Economy
- Institutions
- Culture
- Information

Ecological Patterns & Processes
- Primary productivity
- Biodiversity
- Populations
- Nutrients
- Organic matter
- Disturbance

Systems have boundaries

External


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External Bio-geo-physical Conditions

Interactions
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Human Components

Ecological Components

Elements of systems interact


Integrated Social-Ecological System

Human Components
- Interactions
  - Land use
  - Land cover
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  - Disposal

Ecological Components
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External Political & Economic Conditions
- Social Patterns & Processes
  - Demography
  - Technology
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  - Information

External Bio-geo-physical Conditions
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Strength and direction of interactions is variable


Integrated Social-Ecological System

Land use
Land cover
Production
Consumption
Disposal

Interactions

External Political & Economic Conditions

External Bio-geo-physical Conditions

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Human Components

Ecological Components

Interactions can be positive or negative


Mapping a Social-Ecological Problem System

We can use system mapping to understand complex social-ecological problems, where people may have multiple, conflicting, logic-based viewpoints.

- Natural resource management
- Environmental justice
- Genetically modified organisms
- Invasive species
Mapping a Social-Ecological System

We can use system maps to describe many kinds of systems that have social and ecological elements... like a student having pizza for lunch near campus.
Boundaries

Where is the system? Who is involved?

What is inside the system?
What is outside?

- University students
- Pizzerias near campus
- Food-producing region
- Exporting regions
- Transport networks
Stakeholders

Who is affected? Who gains or is harmed?

People with an interest or concern ("stake") in an issue
• Interests
• Concerns
• Values
• Different perspectives
• Common ground

Hungry students
Farmers
Pizzerias
Trucking company

Ecological Elements
How are biological and physical elements of the environment involved?

- Wheat plants
- Tomato plants
- Basil plants
- Olive trees
- Cows
- Energy inputs
- Pollinators
- Pesticides
- Agricultural runoff
- Fertilizers
- Soil
- Climate
Social Elements

How do institutions, power, and other social patterns and processes affect the system?

- Health and safety regulations
- Price of pizza
- Friends’ recommendations
- Cost of wheat flour
- Restaurant reviews
- Number of pizzerias
- Equity of service
- Grandma’s recipe
- Cultural expectations

Pizza System Map: **Interactions**

Arrows can be used to show **direction** and **effects** of interactions (increase, benefit/decrease, negative/neutral, both).

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Mapping a Social-Ecological Problem System: Regulation of Invasive Plant Species

Oriental bittersweet (*Celastrus orbiculatus*)
Native to Asia
Invasive in eastern North America

Mapping a Social-Ecological Problem System

Activity: Using information from the article about kudzu, create a system map of the problem of kudzu’s expanding range in the United States.

1. **List system elements** on small pieces of paper
2. Arrange elements
   - Cluster similar elements
   - Leave room for lots of interactions
3. Show interactions between elements with arrows
   - Arrow direction = direction of influence
   - + or - = positive (increase, benefit) or negative (decrease, harm)
This model can be helpful for identifying system elements.

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Mapping a Social-Ecological Problem System

Problem System Elements

• Boundaries
  • Where is the problem? Who is affected?

• Stakeholders
  • Who is affected? Who gains or is harmed?

• Ecological elements of the problem
  • Effects of the problem on the biological and physical environment (+/-)
  • Effects of biological and physical environment on the problem (+/-)

• Social elements of the problem
  • How do institutions, power, and other social patterns and processes affect the problem?

• Interactions
  • Show interactions using arrows between elements in your system map.
  • Indicate whether interactions are positive (increase, benefit) or negative (decrease, harm) using (+/-).
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