Linking Ecology and Economy through the Ecosystem Services Approach in the Calumet Region

Sabina L. Shaikh, Ph.D.
University of Chicago
sabina@uchicago.edu
Linking Ecology and Economics through Ecosystem Services

1. Relationship of humans to nature: Linking *economics and ecology*

2. How is ecosystem protection an economic investment? *Ecosystem Services*

3. Why and how do we frame ecosystem services as *economic values*?

4. University of Chicago 2009 Calumet Quarter Case study

5. Challenges to economic valuation and *markets for ecosystem services*
Relationship of humans to nature: Linking *economics* and *ecology*

- The economic flow of resources is not a closed-loop system. It is contained within the natural system.
- Humans in the *circular flow* of the economy interact with nature through the extraction of raw materials and the disposal of waste into the environment.
- But humans also use natural systems more broadly, indirectly, and sometimes in ways that are yet to even be defined.
- So, how does economics deal with ecology? How does ecology deal with economics?

Adapted from *Valuing Ecosystem Services*, National Academy of Sciences 2005
How is ecosystem protection an economic investment? *Ecosystem Services*

- Ecosystems provide goods and services which have significant economic value (*natural capital, green infrastructure*)
- Ecosystem “Goods”: Food, Fish, Forest Products
- (Some) Ecosystem Services
  - Habitat, Biodiversity
  - Carbon Sequestration
  - Soil Management and Erosion Control
  - Flood Control
  - Groundwater Recharge and Storage
  - Water Purification
  - Waste Decomposition
  - Climate Regulation
  - Pollination Services
- Further, green spaces have significant economic potential from recreation, tourism, aesthetics
Ecosystem services can be provided in both rural and urban settings
Why do we frame ecosystem services as economic values?

- Translating ecology for humans
  - Conservation for the sake of conservation is hard to sell to a wide population.
  - What is Biodiversity? What indicators make sense to us?
- Common metric: What is the opportunity cost of land and water use?
- Identify Stakeholders: Who receives benefits? Who faces costs?
- Policy: Benefit-Cost Analysis. Absence of Values leads to omission.
- Private markets: Compare return on investments
The Economics of Ecosystem Services

• The amount of private provision of ecosystem services is where the *marginal cost* of provision just equals the *marginal benefit*

• However, this is private cost and private benefit. There are social benefits from private provision. This is an *externality*.

• Example: Energy Efficiency Vs Wind Power

• Are there benevolent providers of ecosystem services? Maybe. Can we rely on them?

• Economists believe in the power of incentives. We try to create incentives to *predictably* “internalize externalities”

• Return to Example: A carbon price makes wind power a less risky investment with private returns
How do we frame ecosystem services as economic values?

• Avoided Costs of Damage, Replacement Costs of Lost Services

• Market prices are signals of value but do not fully represent value.

• Revealed Preferences Approaches to Economic Valuation
  – Property Values, Wages, Travel Costs

• Stating Preferences and Values

• Benefit Transfer, Meta-Analysis
Calumet Region Case Study:
Friends of the Parks
Last Four Miles Plan
2009 Calumet Quarter, University of Chicago

Photo © 2009 Cameron Jay Erens
Implementation of the Last Four Miles Plan

Remediation

Redevelopment

Provision of Ecosystem Services

Lakefront Path
Parks and Open Space
Wetlands
Dune-Swale Grasslands
Beaches, Shoreline
Selected Examples of Economic Values Associated with Improved Beach and Shorelines

- **Remediation**
  - Grand Calumet River remediation increases value of homes directly adjacent to river by 27% and homes 2-3 blocks from river by 17.8% (McMillen, 2003)
  - Waukegan Harbor AOC remediation leads to increased home values of between 16-26% in Waukegan and all of Lake County. Values translate to between $7 and $12 billion (Braden, et al, 2004)

- **Beaches as Recreational Amenities**
  - Value of a day at the Beach: Lake Erie Maumee Bay Beaches = $33.52 or $8 million annually (Sohngen, et al, 1998), Lake Michigan beach in Chicago = $36.97 or close to $1 billion annually (Shaikh, 2006)
  - Beaches provide other ecosystem services: shoreline protection, flood protection, surface water runoff mitigation, erosion control, improved water quality

- **Wetlands**
  - Average and median wetland values/ha range from $100 to $2800 depending on type of wetland, location and valuation method used (Brander, et al, 2006)

- **Parks (Open Space, Green Space)**
  - **Proximity** to parks in Chicago has a positive impact on housing values: properties within 150m to 300m of the nearest park and within 300m to 450m of the nearest park have higher average sales prices of 1.7% and 1.3% respectively, when compared to properties that are more than 450m away (Tan, 2009)
Challenges to economic valuation and *markets for ecosystem services*

- Understanding the linkages between the structure and function of natural systems and human behavioral responses
- Relationships are Dynamic & Spatial
- Relationships are Complex: One Service Vs Entire Ecosystem
  - Valuing a Park for Recreation
  - Valuing a Forest for Carbon Sequestration
- Economics is inherently anthropocentric: Creating Indicators for Economic Valuation
  - Air Quality Indicators – Changes in Health, Visibility
  - Water Quality Indicators – Changes in Health, Fish Populations, Recreation
  - Ecosystems, Biodiversity?
- Integrating Ecological Models and Economic Valuation from the Ground up
- Implementation, monitoring, enforcement of markets for ecosystem services