

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



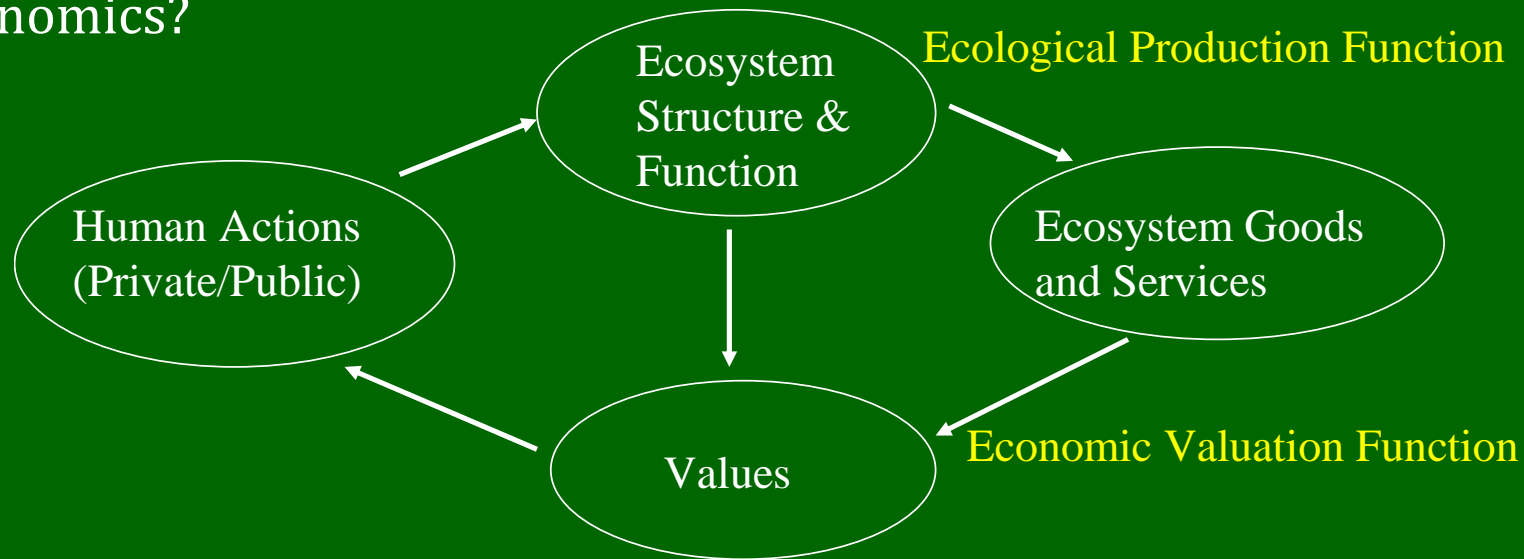
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# Linking Ecology and Economics through Ecosystem Services

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*

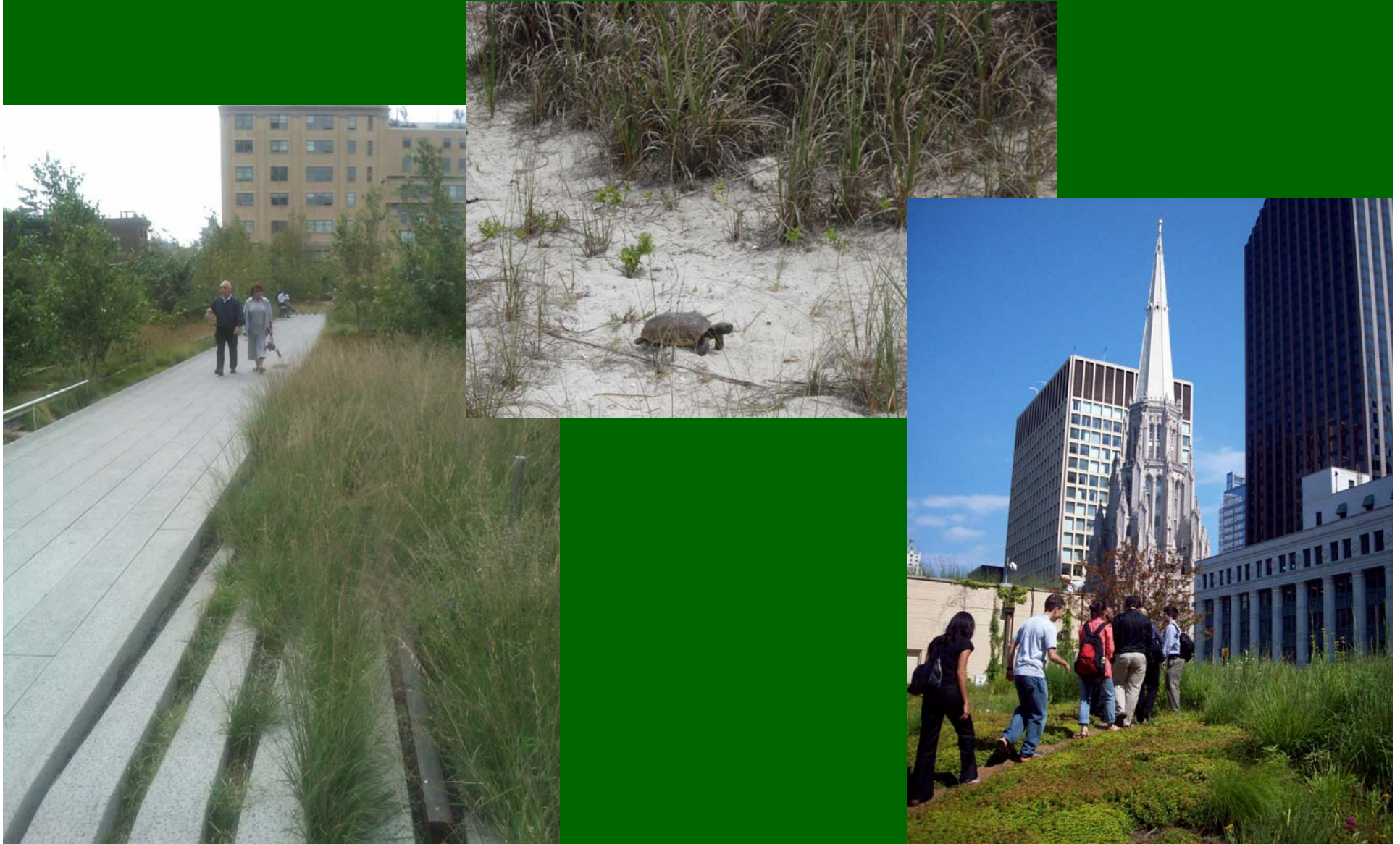
- The economic flow of resources is not a closed-loop system. It is contained within the natural system.
- Humans in the *circular flow* of the economy interact with nature through the extraction of raw materials and the disposal of waste into the environment
- But humans also use natural systems more 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?



## How is ecosystem protection an economic investment? *Ecosystem Services*

- Ecosystems provides 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**





# 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