NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER



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Lesson – Economic Valuation of Natural Resources and Ecosystem Services

By James Boyd, SESYNC & Resources for the Future | March 1, 2022

Overview:

This lesson pairs with an explainer article on economic valuation, which can be found here: Explainer – Valuation of Natural Resources and Ecosystem Services: Economic Methods. *It will be helpful to read through the explainer first, before completing the lesson, as it builds foundational understanding of the topic.*

Environmental benefits and costs are often expressed in monetary terms. Economic valuation methods are used to derive monetary values. It is useful for environmental researchers to understand these methods, the data they use, their limitations, and how monetary values should be interpreted and applied.

Assumed Prior Knowledge:

Advanced undergraduates or graduate students studying environmental issues and systems with some background in statistics.

Learning Objectives:

- Understand why monetary environmental-benefit estimates are used in decision making and public discourse.
- Learn to interpret what monetary valuations represent and what they don't represent.
- Develop basic knowledge of various valuation methods and the data they use.

Key Terms and Concepts:

non-market valuation; revealed preference methods; stated preference methods; hedonic analysis; travel cost method; contingent valuation

The "Hook" (suggestions for quickly engaging students):

Have participants read one or both of these articles:

1. **Putting a Price Tag on Nature's Defenses**, by Carl Zimmer, in *The New York Times*

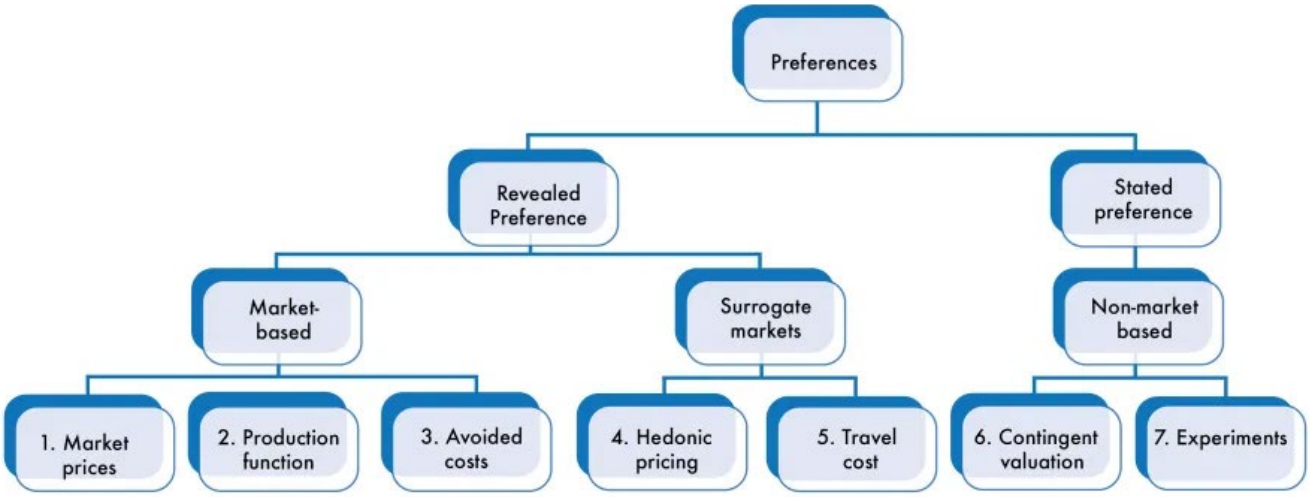
   NYT_Putting_a_Price_Tag_On_Nature's_Defenses.pdf

2. **Pandanomics: What Is Giant Panda Conservation Worth? Billions Every Year,** by GrrlScientist, in *Forbes*

   Forbes_Pandanomics.pdf

Teaching Assignments:

Instructors can use the diagram below to organize and differentiate the variety of non-market valuation methods, distinguish between revealed and stated preference methods, and provide examples and illustrative data associated with each distinct method.



The following are suggested assignments/exercises that may be used prior to or following the instructor's presentations or discussion sessions.

- How would you define the term "value," and what could be confusing about it? Give examples of how we express the value of something.
- Explore the "paradox of value" (the "diamonds and water paradox") and how it relates to monetary

environmental values. Explore the related concept of marginalism.

- What kinds of **data** are required to conduct a 1) hedonic and 2) travel cost analysis of environmental benefits?
- What kinds of **value** are not captured by a 1) hedonic and 2) travel cost estimate of environmental benefits?
- Create a set of simple stated preference choice scenarios that would allow you to rank or assign a value to an environmental good or service based on how participants in the experiment respond.

Additional Materials:

- **The Measurement of Environmental and Resource Values: Theory and Methods**
  - Freeman, A.M., Herriges, J., & Kling, C. (2014). *The Measurement of Environmental and Resource Values: Theory and Methods* (3rd ed.). New York: RFF Press/Routledge. http://econdse.org/wp-content/uploads/2016/07/Freeman-Herriges-Kling-2014.pdf
- **Environmental Valuation and Its Economic Critics**
  - Shabman, L., & Stephenson, K. (2000). Environmental Valuation and Its Economic Critics. *Journal of Water Resources Planning and Management, 126*(6), 382–388. https://doi.org/10.1061/(ASCE)0733-9496(2000)126:6(382)
- **Why Not to Calculate the Value of the World's Ecosystem Services and Natural Capital**
  - Toman, M. (1998). Why Not to Calculate the Value of the World's Ecosystem Services and Natural Capital. *Ecological Economics 25*(1), 57–60. https://doi.org/10.1016/S0921-8009(98)00017-2

Background Information for the Instructor:

1. **Valuation of Ecosystem Services**
   - This white paper discusses the uses of monetary economic environmental valuation for decision-making, the appropriate interpretation of monetary estimates, arguments for and against monetary valuation, and alternatives to monetary approaches.
   - Boyd, J. (2011). *Valuation of Ecosystem Services* [White Paper]. Palo Alto, CA: Gordon and Betty Moore Foundation. https://www.moore.org/materials/white-papers/Ecosystem-Services-Seminar-3-Valuation.pdf
2. **A Primer on Nonmarket Valuation**
   - This book covers the main nonmarket valuation techniques in depth, but at a level appropriate for individuals who do not have a PhD in economics.
   - Champ, P.A., Boyle, K.J., & Brown, T.C.. *A Primer on Nonmarket Valuation*. Springer: Dordrecht, Netherlands. https://doi.org/10.1007/978-94-007-7104-8.
3. **Ecosystem Valuation Website**
   - This website provides non-technical explanations of ecosystem valuation concepts, methods,

and applications for non-economists.

- King, D., & Mazzotta, M. (2000). *Ecosystem Valuation* (Website). https://www.ecosystemvaluation.org

4. **Measuring Economic Values for Nature**

    - An article-length overview of valuation approaches, methodological frontiers, the role of ecologists in valuation, and disagreements within economics.

    - Bockstael, N.A., Freeman, M., Kopp, R. et al. (2000). On Measuring Economic Values for Nature. *Environmental Science and Technology, 34*(8), 1384–9. https://pubs.acs.org/doi/10.1021/es990673l.

References:

- GrrlScientist. (2018, June 29). "Pandanomics: What Is Giant Panda Conservation Worth? Billions Every Year." *Forbes*. https://www.forbes.com/sites/grrlscientist/2018/06/29/pandanomics-what-is-giant-panda-conservation-worth-billions-every-year/?sh=5bf590ea77fc.T

- Paradox of Value. (2025, April 16). In *Wikipedia*. https://en.wikipedia.org/wiki/Paradox_of_value

- Zimmer, Carl. "Putting a Price Tag on Nature's Defenses." *The New York Times*. June 5, 2014. https://www.nytimes.com/2014/06/05/science/earth/putting-a-price-tag-on-natures-defenses.html

Related SESYNC Content:

- Boyd, J. (2022, March 2). *Explainer – Valuation of Natural Resources and Ecosystem Services: Economic Methods*. SESYNC. https://www.sesync.org/resources/economic-valuation-natural-resources-and-ecosystem-services

- Palmer, M.A. (2023, March 31). *Lesson – Ecosystem Services, Part 1: Defining and Valuing Nature*. SESYNC. https://www.sesync.org/resources/ecosystem-services-part-1-defining-and-valuing-nature

- Palmer, M.A., & Scott, H. (2023, March 31). L*esson – Ecosystem Services, Part 2: Linking Ecosystems & Their Processes to What People Value and to Human Actions*. SESYNC. https://www.sesync.org/resources/ecosystem-services-part-2-linking-ecosystems-their-processes-what-people-value-and-human

- Palmer, M.A., & Scott, H. (2023, March 31). *Lesson – Ecosystem Services, Part 3: Intrinsic and Relational Values of Nature*. SESYNC. https://www.sesync.org/resources/ecosystem-services-part-3-intrinsic-and-relational-values-nature

- Scott, H. (2023, August 15). *Explainer – Classical versus Behavioral Economics: Environmental Applications*. SESYNC. https://www.sesync.org/resources/explainer-classical-versus-behavioral-economics-environmental-applications

- Scott, H. (2023, September 5). *Lesson – Behavioral Economics and Timescale Mismatches*. SESYNC. https://www.sesync.org/resources/lesson-behavioral-economics-and-timescale-mismatches

- SESYNC. (2023, September 29). *Environmental Economics Resources*. https://www.sesync.org/resources/environmental-economics-resources

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