NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER



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Lesson – Ecosystem Services Part 1: Defining and Valuing Nature

By Margaret A. Palmer, SESYNC | March 31, 2023

Overview:

This is the first lesson in a three-part series on the valuation of ecosystem services. It will be helpful to have first read the companion explainer article: Valuation of Natural Resources and Ecosystem Services: Economic Methods. *It is recommended to complete these lessons in order, as they build upon concepts. The other lessons in this series are available here:*

- Part 2: Linking Ecosystems & Their Processes to What People Value and to Human Actions
- Part 3: Intrinsic and Relational Values of Nature

Ecosystem services (ES) are the benefits that nature provides and that people value. For example, ES can include clean drinking water that has been purified as it infiltrates terrestrial soils and moves subsurface on its way to lakes and rivers; reduced flooding due to water storage in marshes and wetlands; the cooling effect of forests; and healthy crops that rely on pollination by insects, birds, and bats. By quantifying the social value of nature, managers can better articulate the value of conserving and restoring critical ecosystems. Economists use both market and non-market valuation methods for this assessment because many of nature's benefits can't be quantified in currencies that are traded in commercial markets. People may highly value the aesthetic and spiritual benefits they derive from

coastal landscapes or forest walks, but we can't easily monetize experiences and feelings.

This lesson explores what ES are and are not; methods used by economists to place value on them; and why the concept of ES has become popular, including its use by policymakers and natural resource managers. Lesson 2 further explores how we can connect what scientists typically measure when studying nature to intermediate measures that economists can work with to support evidence-based policies and natural resource management decisions. Lesson 3 focuses on the concept of the intrinsic value of nature and on arguments against traditional economic approaches to valuation.

Assumed Prior Knowledge:

Appropriate for undergraduate, graduate, and higher-level learners.

Learning Objectives:

- Learn how ES are defined and assigned value by economists.
- Learn why the concept of ES was developed and why it grew to be widely adopted and increasingly used by policymakers.
- Understand the different forms of valuation that are used, including the difference between market and non-market valuation and stated vs revealed preferences.



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Key Terms and Concepts:

natural capital; ecosystem service valuation; use value; non-use value; market- and non-market-based valuation; stated vs revealed preferences

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

Ask learners to take 2 min. to write down a reaction to the following statement: "Putting a price on environmental externalities (e.g., air pollution by power plants, methane produced by cattle, etc.) will reduce consumption." Query the learners on what ES are "damaged" by large cattle production systems. (**Note to Instructor:** The damaged services are clean air (damaged from greenhouse gas pollution), which is a public good; and so far, studies have shown that price increases will be passed to the consumer and yet this does not reduce consumption much, if at all. Perhaps ask them, "What might reduce consumption?")

Teaching Assignments:

Defining and Valuing Nature (One, 50-min. or 75-min. class)

1. **Prior to Class:** As preparation for the session, have learners read and take notes on the explainer "Valuation of Natural Resources and Ecosystem Services: Economic Methods" by Jim Boyd.

2. **(40–50 min.)** Divide the learners into groups of two or three. Using the provided PowerPoint, review the major concepts of ES and ask each group to take a few minutes to respond to the

questions associated with the slides, jotting their group's answers down on paper or slides. Make sure they use the question numbers with their answers. (**Note to Instructor:** Question #s are IN the slides; the question #s do not correspond to slide numbers.) There are potential answers and suggestions for the instructor in the slide notes. If you wish to provide the learners with the slides and questions but not the answers so that they can work on them in groups, use the Student PPT.

Ecosystem_Services_Pt1_Instructor_Lesson_Slides_Accessible.pptx

Ecosystem_Services_Pt1_Student_Lesson_Slides_Accessible.pptx

To give groups more time to discuss the questions, you could reduce the number of questions per group by selectively assigning some of them to different groups. The questions include:

- What is value? How can you describe the value you place on something? How would you compare something you value to something a different another person values? Would that value change if you lived in a different part of the world or had less money?
- Which of the following (see the table with many entities) are not ES?
- Can you list natural resources related to each of the six types of values (extractive use value, non-extractive use value, indirect use value, existence value, option value, bequest value)?
- Why do you think the market-based valuation method is linked to getting more or having less than you already have (i.e., rather than a fixed amount of the service)?
- What is an example of something in nature that can be monetized based on markets (i.e., has commercial value)?
- What is an example of something that could be valued based on what it would cost to get it if nature did not provide it?
- How might you go about assigning value to each of the six types of ecosystem services? (Use the same categories as in the third question above but now as they are defined.)
- How might you implement the methods of non-market valuation (revealed preference method, stated preference method) to determine the value of a natural resource or natural process?
- If you are shown the following two images (degraded vs. beautiful wetland), which one do you prefer? By how much (more)? Why?
- What factors other than the health of the wetland might apply in your preference (area, proximity to population centers, importance in buffering residential areas from storms, etc.)?
- Looking at the two photos of homes on different parcels of land, how might the two properties differ in terms of how much they are sold for? What do you think the ecosystem service is in this example?
- What are some other examples in which preferences can be revealed that cannot be easily linked to a $ number?
- Why is ES valuation useful?

3. **(10–20 min.)** Bring the groups back together and ask them to indicate how they answered each

question. Invite them to discuss if they agree with how other groups responded.

Background Information for the Instructor:

1. **Valuing Ecosystem Services a Productive Inputs**

    - While this article in part describes progress on valuing ES from the perspective of 2007, it also covers many of the valuation methods, providing examples. It describes a "production function" approach that considers valuation based on, "if production of *X* were lost." The fisheries example has a fair amount of math included, but the text is still useful for those not math savvy.

    - Barbier, E.B. (2007). Valuing Ecosystem Services as Productive Inputs. *Economic Policy,* 22(49), 179-229. http://earthtek.org/EVPP524/ProdFunc_Barbier2007EP.pdf

2. **Valuing Ecosystem Services**

    - This book has a number of useful chapters including Chapter 7, "Ecosystem Valuation: Synthesis and Future Directions," which provides general information on ecosystem services and why their valuation is useful. Chapter 4 covers "Methods of Nonmarket Valuation," including a variety of approaches.

    - National Academies of Sciences, Engineering, and Medicine. (2005). Ecosystem Valuation: Synthesis and Future Directions. In *Valuing Ecosystem Services: Toward Better Environmental Decision-Making* (pp. 239-259). The National Academies Press. https://nap.nationalacademies.org/read/11139/chapter/6#96

    - National Academies of Sciences, Engineering, and Medicine. (2005). Methods of Nonmarket Valuation. In *Valuing Ecosystem Services: Toward Better Environmental Decision-Making* (pp. 95-152). The National Academies Press. https://nap.nationalacademies.org/read/11139/chapter/9

Related SESYNC Content:

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

- Boyd, J. (2022, March 1). *Lesson – Economic Valuation of Natural Resources and Ecosystem Services*. SESYNC. https://www.sesync.org/resources/economic-valuation-natural-resources-and-ecosystem-services

- Palmer, M.A., & Scott, H. (2023, March 31). *Lesson – 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

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

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