EC 970: Natural Resource Economics

Harvard University Department of Economics

Fall 2023

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Office Hours: By Appointment | Class Hours: T/Th 10:30-11:45am
Stata/R Office Hours: Mini Course Site | Class Room: Harvard Hall 102

Last Updated 10/30/2023[1]

Course Description

This tutorial will explore the economics underlying the relationship between humans and the natural world, an issue of growing importance as humanity grapples with resource scarcity and its impact on the environment. The course will analyze natural resource issues through the lens of environmental economics. We will begin with one of the most defining issues of the era: the tragedy of the commons, where resources that are available to all are inevitably overused. We will discuss how incentives and institutions manage natural resources, such as fisheries, forests and minerals. We will also explore the interactions between natural resources, economic development, and politics. We will then study how to think about and measure the many values of the natural world that are not captured by markets, as a springboard to explore the trade-offs and interactions between economic activity and the natural world with a special emphasis on the role of biodiversity. By the end of the course, students will be familiar with the major methods and questions of natural resource economics.

Course Requirements

Prerequisites

A course in intermediate microeconomics and introductory statistics is a prerequisite for this class. A course in econometrics and some background in calculus is strongly recommended.

Participation (15% of Grade)

Since in-class discussion is the central component of this course, class attendance and participation are mandatory. You may occasionally ask for permission for online attendance due to extenuating circumstances.

[1] The syllabus is a living document and I reserve the right to make amendments.

Reading Assignments

Before each class you will be assigned at least one academic paper and possibly some piece of general audience media. Some days you will be assigned a brief paper responding to these readings. Regardless of whether a response paper is due, you are expected to read these totally and thoroughly, unless otherwise noted.

Writing Assignments (70% of grade)

- **Describe Yourself (∼1 Page, ungraded)** Your first assignment will be to write a one page description about your background and what elements of economics interest you most.
- **Reading Responses (1-2 pages each, 10% of grade total)** You will submit many short papers reflecting on the papers you were assigned to read for the week,due before class discussion. I will drop your lowest score.
- **Institutions Essay (4-5 pages, 10% of grade)** Your first large essay of the semester will be to describe a natural resource "institution," broadly defined. This will give you practice thinking about applying economics to the real world, and hopefully give you institutional knowledge you can use for your final research paper.
- **Data Report (∼3 Pages, 5% of grade)** A good dataset is essential to empirical economics. In this assignment I would like you to find and describe one (or more) interesting dataset(s), as well as show some basic summary statistics and interesting visualizations.
- **Valuation Essay (3-4 Pages, 5% of grade)** How to value natural resources that are not traded in markets is perhaps the most unique question in natural resource economics. In this essay you will describe your approach to valuing one such resource.
- **Referee Report (∼3 Pages, 5% of grade)** Peer review is a fundamental part of science– it is how journals and readers know that papers are up to the intellectual standards of the academic community. For this assignment you will select one of a few options of unpublished research papers to critically evaluate.
- **Final Paper (15-20 Pages, 35% of grade)** Your capstone project for this class is to write a short research paper of your own. The final research paper should roughly mimic a shorter version of a journal paper, including a review of relevant literature, a description of methodology and results, and possibly a discussion of policy implications.

  Since this is the most significant assignment this semester, it will be submitted in four parts:

  - **Prospectus (ungraded):** Approximately halfway through the course, I would like you to submit at least one brief (1-2 page) prospectus for your final paper outlining what you would like to work on. Before submitting your prospectus, I require that we meet one on one in office hours and discuss your ideas.
  - **Methods and Results (2% of grade):** To ensure you are making progress, I will request that you send me a preliminary version of your methods and results sections in advance of the first draft. This will allow me to give you feedback on the core of your paper before it is too late to make any changes.

- **First Draft (3% of grade):** To ensure your final product is of high quality, you must submit a first draft two weeks before the final draft is due. This draft should have all the major parts of the paper written, short of a conclusion or abstract. I will review this draft and give you detailed feedback with at least a week to edit it in advance of the final deadline.
- **Final Draft (30% of grade):** Your final submission should be a well polished research paper, adding a new insight into an interesting problem in natural resource economics. Your grade for the final paper will be based on this final draft.

Presentation (5% of Grade)

During the last week of class, everyone will be expected to do a short presentation on their final paper project. You will have already submitted your first draft of the paper and thus should be able to present a largely complete work. However, the presentation will be low stakes–it is simply an opportunity to share your work and get feedback from your peers.

Empirical Problem Sets (10% of Grade)

All Ec 970 students are expected to complete empirical problem sets in Stata or R as part of a discrete mini-course hosted on a separate Canvas site. This course will consist of video tutorials and four problem sets due in the first half of the semester. These problem sets will help prepare you to write an empirical paper of your own for the end of the course and to work with data more broadly. I recommend doing the problem sets in R, but there are specific office hours run by the department to provide you support for the problem sets in either language.

Course Logistics

Contacting Me

Please sign up for office hours if you have anything you would like to chat about! Office hours are by far the best way to discuss anything in depth. If you have a quick or time sensitive concern, please email me at adeloerabrust@g.harvard.edu and I will do my best to respond quickly. On most days I will also be happy to chat after class.

Office Hours

I encourage you to schedule office hours with me regularly throughout the semester. I will require that we meet at least twice throughout the semester: once to discuss your prospectus, and once to discuss your final paper draft. Please schedule office hours through this link.

Stata/R Office Hours

The department will provide specialized office hours run by other teaching fellows to support you through the Stata/R mini-course. More details can be found on that program's Canvas site.

Late Assignments

I will give you three “Late Days" which you can use as you see fit throughout the semester with the exception of the final paper. Beyond those three late days, you will need to ask for a formal extension, which will likely require a note from your academic dean.

Collaboration

You may find collaboration useful for the empirical problem sets and I encourage discussion of the class your peers. However, you must submit separate and unique assignments. If you plagiarize, you will fail the course. See The Harvard College Handbook for Students for details.

AI Policy

Generative AI can be a valuable tool, but should not be a crutch. You can use AI tools to assist you in coding and writing assignments, but you must note when you do so and you must ensure that the final product reflects your own work and is not just copied.

Recommended Readings

For those interested in an introductory text in natural resource economics, I personally recommend Natural Resource Economics: An Introduction by Barry C. Field. For more on econometric methods I recommend Causal Inference: The Mixtape by Scott Cunningham. For guidance on writing for economics, see the department’s Writing Economics guide.

Key Dates

- Describe Yourself Due 09/08
- Empirical Problem Set 1 Due 09/22
- Institutions Essay Due 09/29
- Empirical Problem Set 2 Due 10/06
- Data Report Due 10/13
- Empirical Problem Set 3 Due 10/20
- Prospectus Due 10/23
- Valuation Essay Due 10/30
- Empirical Problem Set 4 Due 11/03
- Referee Report Due 11/10
- Methods and Results Due 11/21
- Final Paper Draft Due 11/29
- Final Paper Due 12/13 at 5pm [NO EXTENSIONS]

Schedule

Week 01, 09/04 - 09/08: Introduction to Natural Resource Economics

- Class 1 Readings:
  - Fullerton, Don, and Robert Stavins. "How Economists See the Environment." Nature 395, no. 6701 (October 1, 1998): 433–34.
  - Stavins, Robert N. "The Problem of the Commons: Still Unsettled after 100 Years." American Economic Review 101, no. 1 (2011): 81–108.
  - Sections 0-2 of "Writing Economics"
- Class 2 Readings **+ Reading Response**:
  - Arnason, Ragnar. "Property Rights in Fisheries: How Much Can Individual Transferable Quotas Accomplish?" Review of Environmental Economics and Policy 6, no. 2 (July 1, 2012): 217–36.
  - Costello, Christopher, Steven D. Gaines, and John Lynham. "Can Catch Shares Prevent Fisheries Collapse?" Science 321, no. 5896 (September 19, 2008): 1678–81.
- **Describe Yourself Due 09/08**

Week 02, 09/11 - 09/15: The Tragedy of the Commons

- Class 1 Readings **+ Reading Response**:
  - Isaksen, Elisabeth Thuestad, and Andries Richter. "Tragedy, Property Rights, and the Commons: Investigating the Causal Relationship from Institutions to Ecosystem Collapse." Journal of the Association of Environmental and Resource Economists 6, no. 4 (July 1, 2019): 741–81.
- Class 2 Readings:
  - Ostrom, Elinor. "Institutions and the Environment." Economic Affairs 28, no. 3 (September 1, 2008): 24–31.
  - Acheson, James, and Roy Gardner. "The Evolution of the Maine Lobster V-Notch Practice: Cooperation in a Prisoner's Dilemma Game." Ecology and Society, 2011.

Week 03, 09/18 - 09/22: Natural Resource Institutions

- Class 1 Readings **+ Reading Response**:
  - Sakai, Yutaro, Hiroe Ishihara, and Mitsuhiro Ishino. "Sharing in the commons: Evaluating the pooling system in a Danish seine fishery in Japan." Marine Policy 139 (May 1, 2022): 105017.
  - Molina, Renato. "The lack of property rights can make natural disasters worse: The case of small-scale fisheries in Chile." Ecological Economics 200 (October 1, 2022): 107540.

- Class 2 Readings + **Reading Response**:
  - Baragwanath, Kathryn, and Ella Bayi. "Collective Property Rights Reduce Deforestation in the Brazilian Amazon." Proceedings of the National Academy of Sciences 117, no. 34 (August 25, 2020): 20495–502.
  - Jayachandran, Seema, Joost de Laat, Eric F. Lambin, Charlotte Y. Stanton, Robin Audy, and Nancy E. Thomas. "Cash for carbon: A randomized trial of payments for ecosystem services to reduce deforestation." Science 357, no. 6348 (July 21, 2017): 267–73.
- **Empirical Problem Set 1 Due 09/22**

Week 04, 09/25 - 09/29: Incentives for Conservation

- Class 1 Readings:
  - Englander, Gabriel. "Property rights and the protection of global marine resources." Nature Sustainability 2, no. 10 (October 1, 2019): 981–87.
  - PERC. "Saving African Rhinos: A Market Success Story," August 19, 2011.
  - Kremer, Michael, and Charles Morcom. "Elephants." American Economic Review 90, no. 1 (2000): *[Introduction Only]*
- Class 2 Readings **+ Reading Response**:
  - Hsiang, Solomon, and Nitin Sekar. 2016. "Does Legalization Reduce Black Market Activity? Evidence from a Global Ivory Experiment and Elephant Poaching Data." National Bureau of Economic Research Working Paper Series No. 22314.
  - Section 4 of "Writing Economics"
- **Institutions Essay Due 09/29**

Week 05, 10/02 - 10/06: Political Economy and Conservation

- Class 1 Readings + **Reading Response**:
  - Bareille, François, Julien Wolfersberger, and Matteo Zavalloni. 2023. "Institutions and Conservation: The Case of Protected Areas." Journal of Environmental Economics and Management 118 (March): 102768.
  - McDermott, Grant R., Kyle C. Meng, Gavin G. McDonald, and Christopher J. Costello. "The Blue Paradox: Preemptive Overfishing in Marine Reserves." Proceedings of the National Academy of Sciences 116, no. 12 (March 19, 2019): 5319–25.
  - Balboni, Clare, Robin Burgess, Anton Heil, Jonathan Old, and Benjamin A. Olken. "Cycles of Fire? Politics and Forest Burning in Indonesia." AEA Papers and Proceedings 111 (2021): 415–19.
- Class 2 Readings **+ Reading Response**:
  - Bruno, Ellen M., Nick Hagerty, and Arthur R. Wardle. 2022. "The Political Economy of Groundwater Management: Descriptive Evidence from California." In American Agriculture, Water Resources, and Climate Change. University of Chicago Press.
- **Empirical Problem Set 2 Due 10/06**

Week 06, 10/09 - 10/13: Natural Resources and Development

- Class 1 Readings:
  - Venables, Anthony J. "Using Natural Resources for Development: Why Has It Proven So Difficult?" Journal of Economic Perspectives 30, no. 1 (2016): 161–84.
  - Dalgaard, Carl-Johan, Anne Sofie B. Knudsen, and Pablo Selaya. "The Bounty of the Sea and Long-Run Development." Journal of Economic Growth 25, no. 3 (September 1, 2020): 259–295.
- Class 2 Readings **+ Reading Response**:
  - Allcott, Hunt, and Daniel Keniston. 2018. "Dutch Disease or Agglomeration? The Local Economic Effects of Natural Resource Booms in Modern America." The Review of Economic Studies 85 (2): 695–731.
- **Data Report Due 10/13**

Week 07, 10/16 - 10/20: Non-Market Valuation

- **Office Hours to Discuss Prospectus**
- Class 1 Readings:
  - Pelletier, Marie-Chantale, Elizabeth Heagney, and Mladen Kovač. "Valuing recreational services: A review of methods with application to New South Wales National Parks." Ecosystem Services 50 (August 1, 2021): 101315.
  - Kuwayama, Yusuke, Sheila Olmstead, and Jiameng Zheng. "A more comprehensive estimate of the value of water quality." Journal of Public Economics 207 (March 1, 2022): 104600.
- Class 2 Readings:
  - Hynes, Stephen, Wenting Chen, Kofi Vondolia, Claire Armstrong, and Eamonn O'Connor. "Valuing the ecosystem service benefits from kelp forest restoration: A choice experiment from Norway." Ecological Economics 179 (January 1, 2021): 106833.
  - Ressurreição, Adriana, James Gibbons, Tomaz Ponce Dentinho, Michel Kaiser, Ricardo S. Santos, and Gareth Edwards-Jones. 2011. "Economic Valuation of Species Loss in the Open Sea." Ecological Economics 70 (4): 729–39.
  - Section 3 of "Writing Economics"
- **Empirical Problem Set 3 Due 10/20**

Week 08, 10/23 - 10/27: Valuation Continued

- **Prospectus Due 10/23**
- Class 1 Readings:

  - Carson, Richard T. "Contingent Valuation: A Practical Alternative When Prices Aren't Available." Journal of Economic Perspectives 26, no. 4 (2012): 27–42.
  - Hausman, Jerry. "Contingent Valuation: From Dubious to Hopeless." Journal of Economic Perspectives 26, no. 4 (2012): 43–56.

- Class 2 Readings **+ Reading Response**:
  - DePillis, Lydia. 2023. "White House Aims to Reflect the Environment in Economic Data." The New York Times, January 20, 2023, sec. Business.
  - Brandon, Carter, Katrina Brandon, Alison Fairbrass, and Rachel Neugarten. "Integrating Natural Capital into National Accounts: Three Decades of Promise and Challenge." Review of Environmental Economics and Policy 15, no. 1 (January 1, 2021): 134–53.

Week 09, 10/30 - 11/03: Other Topics in Valuation

- **Valuation Essay Due 10/30**
- Class 1 Readings:
  - Teh, Louise S. L., Lydia C. L. Teh, U. Rashid Sumaila, and William Cheung. "Time Discounting and the Overexploitation of Coral Reefs." Environmental and Resource Economics 61, no. 1 (May 1, 2015): 91–114.
  - Franklin, Sergio L., and Robert S. Pindyck. "Tropical Forests, Tipping Points, and the Social Cost of Deforestation." Ecological Economics 153 (November 1, 2018): 161–71.
- Class 2 Readings: **+ Reading Response**:
  - Garcia, Marissa. "To Survive Climate Change, Coffee Must Embrace New and Resilient Beans." Washington Post, June 9, 2022.
  - Frank, Eyal, and Anant Sudarshan. 2023. "The Social Costs of Keystone Species Collapse: Evidence from the Decline of Vultures in India." Working Paper.
- **Empirical Problem Set 4 Due 11/03**

Week 10, 11/06 - 11/10: Biodiversity

- Class 1 Readings **+ Reading Response**:
  - Heal, Geoffrey. "The Economic Case for Protecting Biodiversity." National Bureau of Economic Research Working Paper Series No. 27963 (2020).
  - Frank, Eyal G., and Wolfram Schlenker. 2016. "Balancing Economic and Ecological Goals." Science 353 (6300): 651–52.
  - Kremen, Claire. 2018. "The Value of Pollinator Species Diversity." Science 359 (6377): 741–42.
  - Adams, W. M. 2014. "The Value of Valuing Nature." Science 346 (6209): 549–51.
- Class 2 Readings:

  - Metrick, Andrew, and Martin L. Weitzman. "Conflicts and Choices in Biodiversity Preservation." Journal of Economic Perspectives 12, no. 3 (1998): 21–34.
  - Moore, Frances C., Arianna Stokes, Marc N. Conte, and Xiaoli Dong. "Noah's Ark in a Warming World: Climate Change, Biodiversity Loss, and Public Adaptation Costs in the United States." JAERE 9, no. 5 (September 1, 2022): 981–1015.

- **Referee Report Due 11/10**

Week 11, 11/13 - 11/17: Conservation and The Economy

- Class 1 Readings **+ Reading Response**:
  - Garg, Teevrat, and Ajay Shenoy. "The Ecological Impact of Place-Based Economic Policies." American Journal of Agricultural Economics 103, no. 4 (August 1, 2021): 1239–50.
  - Ferraro, Paul J., and Rhita Simorangkir. "Conditional Cash Transfers to Alleviate Poverty Also Reduced Deforestation in Indonesia." Science Advances 6, no. 24 (June 12, 2020).
- Class 2 Readings **+ Reading Response**:
  - Liang, Yuanning, Ivan J Rudik, and Eric Zou. "Economic Production and Biodiversity in the United States." NBER Working Paper Series No. 29357 (2021).

Week 12, 11/20 - 11/24: Conservation Tradeoffs

- Class 1 Readings **+ Reading Response**:
  - Jayachandran, Seema. "The Inherent Trade-Off Between the Environmental and Anti-Poverty Goals of Payments for Ecosystem Services." NBER Working Paper Series No. 29954 (2022).
  - Section 5 of "Writing Economics"
- **Methods and Results Due 11/21**
- Thanksgiving Break 11/22-11/26

Week 13, 11/27 - 12/01: Presentations

- Class 1 Presenters: Adrian, Payton, Mia, Matt
- Class 2 Presenters: Shirleen, Logan, Alejandro, Gunnhildur
- **Final Paper Draft Due 11/29**

Week 14, 12/04 - 12/08: Presentations

- Class 1 Presenters: Strat, Marwan, Xavier, Angela

Week 15, 12/11 - 12/15:

- **Final Paper Due 12/13**