APEC 8990: Special Topics in Applied Economics:
Environmental and Development Economics

Instructor: Raahil Madhok		Office:	337D Ruttan Hall
University of Minnesota		Email:	rmadhok@umn.edu
Department of Applied Economics		Office hours:	T, Th 1:30-2:30pm

Location: Ruttan Hall 119
Course Time: Tues, Thurs 11:45am-1:25pm
Course Website: https://github.com/rmadhok/enviro-dev-grad

1 Course Overview

This is a graduate field course on the intersection of Environmental Economics and Development Economics. While often thought of as separate fields, new research in applied microeconomics is bringing them together. The course will explore key themes underpinning environment and development while offering an in-depth survey of the research frontier. At the end, students will be able to answer the following questions:

> *How does economic development affect the environment, and vice versa?*
> *Why is environmental quality so bad in developing countries?*
> *What are the costs of poor environmental quality in developing countries?*
> *Why is willingness to pay for environmental quality so low in developing countries?*
> *What are the political economy barriers to environmental protection?*

Throughout the semester, we will alternate between two perspectives: (i) the development economist focusing on relationships between growth, poverty, market failures, public good provision, and environmental externalities; and (ii) the environmental economist focusing on the unique challenges of correcting externalities in poor countries.

Given that there is no textbook on environment and development economics, I have organized the course around the central themes. Within each theme, we will dissect research papers that combine some theory with a variety of research designs, identification strategies, and estimation techniques. While the course is aimed at students planning to do research in environment/development, my goal is to help advance your training as applied microeconomists in general, by showing (i) what makes a successful research question, and (ii) what passes for credible empirics these days.

2 Prerequisites

The 1st-year sequence (APEC 8001-8004 and APEC 8211-8214) is a prerequisite. Previous coursework in applied econometrics is strongly recommended. Previous coursework in

environmental or development economics is not necessary. If you are unsure whether you are sufficiently prepared, please email me.

3 Logistics

3.1 Class Meetings, Office Hours, and Communications

We will meet **in person from 11:45am-1:25pm in Ruttan Hall 119**. We will rely heavily on interactive group discussions, and I expect you to come to class having at least skimmed that day's reading(s). The more effort you put into this course, the more you will get out of it.

My office hours are **after class (T, Th) from 1:30pm-2:30pm**. I will be happy to chat about course material, assignments, and hear about your research ideas.

All course material, including lecture slides and assignment instructions will be posted on the **class github.** Assignments will be submitted through Canvas

Please only email me at rmadhok@umn.edu with questions, concerns, or ideas. Don't be shy about following up if I forget to reply. Please *do not* email me through Canvas because Canvas-forwarded emails may not reach my primary inbox.

3.2 Regarding the COVID-19 Pandemic

You should stay at home if you experience any signs of illness or have a positive COVID-19 test result. If this occurs, please consult with your healthcare provider about an appropriate course of action. I will follow these same protocols and will let you know if the delivery of this course has to be temporarily changed as the result of my own circumstances. Absences related to illness, including COVID-19 symptoms, for yourself or your dependents, are legitimate "excused" absences

Vaccines: COVID-19 Vaccinations (or approved exemptions) are required for all students and employees. Learn about vaccine appointments on campus by visiting the FAQ on Get the Vax page.

Face coverings: Up-to-date policy information is available on the Safe Campus page. The University expects all community members to respect those who choose to wear a mask, as well as those who choose not to wear one. I fully support your individual choices around masking. Indoor masking continues to be an important tool in high-risk situations. High-quality masks (N95 or certified KN-95) will be available to students Fall 2024. Check the Safe Campus website for information on the location(s) for each campus.

Testing: Information on When, Where, and What if for testing is available on the Safe Campus webpage. Policies and guidelines may change. The University updates pandemic guidelines in response to guidance from health professionals and in relation to the prevalence of the virus and its variants in our community.

3.3 Other Campus Policies

It is our joint responsibility to understand and abide by the University of Minnesota's policies related to all courses which include topics such as: Academic Integrity, student and instructor conduct, equity and diversity, accessibility and accommodations, attendance and excused absences, and grades and appeals. You can find a full list of these policies here.

4 Course Structure

The grading breakdown for the course is:

Assignment		**Due Date**	**Grade Pct.**
In-class paper presentations		Beginning of each class	10%
Replication Assignment		Oct. 21	20%
Proposal presentation		In class: Oct. 15th and 17th	10%
Written research proposal			
	First draft	Oct. 3rd	pass/fail
	Referee report	Oct. 10th	20%
	Final Draft	Oct. 31st	30%
Participation			10%
Total			**100%**

Details and instructions for each assignment are provided on the **course website.**

4.1 In-class Presentations (10%)

At the start of the **every** lecture (except the first class), I will set aside 15 minutes for student presentations. The reading list will indicate the "presentation paper" for each week.

Every student is required to read the paper and prepare **ten** slides summarizing the motivation, research question, methods, and results. **All** students must upload their slides to Canvas by midnight the day before class. I will then **randomly** choose a student to present their slides using **random sampling with replacement.** This means that you may have to present more than once, or not at all. If you are never chosen to present, your grade will be based on your slide submissions. If you do present, the slides and presentation will be worth 5% each. Presentations will be 10 minutes (1 minute per slide). The next 5 minutes are for Q&A. These types of short presentations are common at many conferences, so this exercise will hopefully help prepare you to become top-notch conference presenters!

Presenters may role play as the paper's author (e.g., "Here is why our work is important!"), while the rest of us act as questioners (e.g., "Do we really trust the identification strategy?").

4.2 Replication Problem Set (20%)

There will be one problem set involving replicating and extending an environment/development paper (in Stata or R). The goal is to help you apply the methods we cover in class. Detailed instructions will be provided on the course website.

4.3 Research Proposal + Presentation (40%)

As PhD students, you are expected to become expert consumers and **producers** of research. To this end, you will develop a proposal for a research paper in environment/development. The proposal must be **original** i.e. you cannot use your 2nd-year paper or any other class paper (e.g., a paper for APEC 8703/8704). To keep you accountable, you will submit a first draft one month into the class. I will post detailed instructions on the course website. During the last week of classes, you will give a 20-minute presentation of your proposal (10% of grade), followed by 10 minutes of discussion.

4.4 Peer Review (20%)

Academic papers all go through peer review. Throughout the semester, we will read both published and unpublished papers. You will notice that the published papers are typically more polished – much of this can be attributed to peer review. To gain experience with this process, you will be given one of your peers' research proposals to review (20% of grade). This will be done in a double-blind format such that you will not know whose proposal you are reviewing, and they will not know who their reviewer was. We will discuss what academic peer reviews look like throughout the semester, but you should plan to prepare a brief (max. 2-pages) set of comments and (constructive) criticism. This also means that you will receive a review of the first draft of your proposal. This feedback will hopefully help you in preparing your final draft.

4.5 Participation (10%)

Many of us are still struggling to reach our pre-pandemic levels of productivity and physical/mental health. Participation points are to incentivize active engagement in the course, which I will appreciate as we navigate the post-COVID renormalization process.

5 Course Schedule

Week	Lecture	Focus	Topics
1	1	Intro to Environment & Development	Syllabus + intro
1	2	The effect of development on the environment	Income effects
2	3	The effect of development on the environment	Access to capital
2	4	The effect of environment on development	Health
3	5	The effect of environment on development	Income and Productivity
3	6	WTP for environmental quality	Revealed Preference
4	7	WTP for environmental quality	Incentive compatibility
4	8	Environmental Policy Design	Monitoring, enforcement
5	9	Environmental Policy Design	Barriers to optimal design
5	10	Political Economy of the Environment	Electoral cycles, corruption
6	11	Political Economy of the Environment	State capacity
6	12	TBD	TBD
7	13	Research presentations	20 mins each
7	14	Research presentations	20 mins each

6 Reading List

Module 1: Intro to Environment & Development
The goal of this module to introduce the field of environment and development economics and provide a conceptual framework for thinking about key concepts.

Lecture 1

Michael Greenstone and B. Kelsey Jack. 2015. "Envirodevonomics: A Research Agenda for an Emerging Field." *Journal of Economic Literature* 53(1): 5-42
(Required; Sections 1-2)

Partha Dasgupta. 2010. "The Place of Nature in Economic Development." In Handbook of Development Economics, 5:4977–5046. Elsevier

B. Kelsey Jack. 2017. "Environmental Economics in Developing Countries: An Introduction to the Special Issue." Journal of Environmental Economics and Management 86:1–7.

Module 2: The Effect of the Economic Development on the Environment
The goal of this module is to learn how economic development affects the environment. We will cover income effects, consumption effects, and capital accumulation.

Lecture 2: Income Effects

Malerba, Daniele. "Poverty alleviation and local environmental degradation: An empirical analysis in Colombia." *World development* 127 (2020): 104776. **(for presentation)**

Gertler, Paul J., Orie Shelef, Catherine D. Wolfram, and Alan Fuchs. "The demand for energy-using assets among the world's rising middle classes." *American Economic Review* 106, no. 6 (2016): 1366-1401. **(skim)**

Alix-Garcia, Jennifer, Craig McIntosh, Katharine RE Sims, and Jarrod R. Welch. "The ecological footprint of poverty alleviation: evidence from Mexico's Oportunidades program." *Review of Economics and Statistics* 95, no. 2 (2013): 417-435. **(skim)**

Jayachandran, Seema. "How economic development influences the environment." *Annual Review of Economics* 14 (2022): 229-252**.**

Lecture 3: Technology and Infrastructure

J. Assunção, M. Lipscomb, A. M. Mobarak, D. Szerman, "Agricultural Productivity and Deforestation: Evidence from Brazil" **(for presentation)**

Abman, Ryan, Teevrat Garg, "Agricultural Productivity and Deforestation" **(skim)**

Garg, Teevrat, Maulik Jagnani, and Hemant K. Pullabhotla. "Rural roads, farm labor exits, and crop fires." *American Economic Journal: Economic Policy* 16, no. 3 (2024): 420-450. **(skim)**

Behrer, Patrick, "Man or Machine? Environmental Consequences of Wage Driven Mechanization in Indian Agriculture". *Working Paper*

Asher, Sam, Teevrat Garg, and Paul Novosad. "The ecological impact of transportation infrastructure." *The Economic Journal* 130, no. 629 (2020): 1173-1199.

Madhok, Raahil. "Infrastructure, Institutions, and the Conservation of Biodiversity in India." (2023).

Module 3: The Effect of The Environment on Economic Development

The goal of this module is to learn how the environment affects economic development. We will study health, productivity, and the role of consumption smoothing.

Lecture 4: Health

Arceo-Gomez, Hanna and Oliva (2014) "Does the Effect of Pollution on Infant Mortality Differ Between Developing and Developed Countries? Evidence from Mexico City" *Economic Journal*, 126(591): 257-280. **(for presentation)**

Burgess, Deschenes, Donaldson and Greenstone (2017) "Weather, Climate Change and Death in India" Working Paper. **(skim)**

Chen, Shuai, Paulina Oliva, and Peng Zhang. "Air pollution and mental health: evidence from China." In *AEA Papers and Proceedings*, vol. 114, pp. 423-428. 2014 Broadway, Suite 305, Nashville, TN 37203: American Economic Association, 2024. **(skim)**

Jayachandran (2009) "Air Quality and Early Life Mortality: Evidence from Indonesia's Wildfires" *Journal of Human Resources*, 44(4): 916-954

Chen, Ebenstein, Greenstone and Li (2013) "Evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River policy" *Proceedings of the National Academy of Sciences*, 110(32): 12936-12941.

Sankar, A., Goodkind, A. L., & Coggins, J. S. (2023). The air pollution tradeoff in India: Saving more lives versus reducing the inequality of exposure. *Environmental Research Letters*, *18*(9), 094045.

Lecture 5: Productivity/Income

Aragón, Fernando M., and Juan Pablo Rud. "Polluting industries and agricultural productivity: Evidence from mining in Ghana." *The Economic Journal* 126, no. 597 (2016): 1980-2011. **(for presentation)**

Nick Hagerty and Anushman Tiwari (2022). The costs of industrial water pollution to agriculture in India. *Working Paper*. **(for presentation)**

Somanathan, Eswaran, Rohini Somanathan, Anant Sudarshan, and Meenu Tewari. "The impact of temperature on productivity and labor supply: Evidence from Indian manufacturing." *Journal of Political Economy* 129, no. 6 (2021): 1797-1827. **(skim)**

Sims, Katharine RE. "Conservation and development: Evidence from Thai protected areas." *Journal of environmental economics and management* 60, no. 2 (2010): 94-114**. (skim)**

Zhang, P., Deschenes, O., Meng, K., & Zhang, J. (2018). Temperature effects on productivity and factor reallocation: Evidence from a half million Chinese manufacturing plants. *Journal of Environmental Economics and Management*, *88*, 1-17.

Garg, Teevrat, Matthew Gibson, and Fanglin Sun. "Extreme temperatures and time use in China." *Journal of Economic Behavior & Organization* 180 (2020): 309-324.

Hanna, R., & Oliva, P. (2015). The effect of pollution on labor supply: Evidence from a natural experiment in Mexico City. *Journal of Public Economics*, *122*, 68-79.

Bharadwaj, P., Gibson, M., Zivin, J. G., & Neilson, C. (2017). Gray matters: Fetal pollution exposure and human capital formation. *Journal of the Association of Environmental and Resource Economists*, *4*(2), 505-542.

Noack, F., Riekhof, M. C., & Di Falco, S. (2019). Droughts, biodiversity, and rural incomes in the tropics. *Journal of the Association of Environmental and Resource Economists*, *6*(4), 823-852.

Module 4: Willingness to Pay for Environmental Quality

The goal of this module is to introduce you the concept of willingness to pay for environmental quality. We will learn key elicitation methods and its application for valuing air and water quality.

Lecture 6: Revealed Preference

Ito, K., & Zhang, S. (2020). Willingness to pay for clean air: Evidence from air purifier markets in China. *Journal of Political Economy*, *128*(5), 1627-1672. **(for presentation)**

Train, Kenneth E. *Discrete choice methods with simulation*. Cambridge university press, 2009. **(skim; chapters 2, 3 and 6)**

Kremer, M., Leino, J., Miguel, E., & Zwane, A. P. (2011). Spring cleaning: Rural water impacts, valuation, and property rights institutions. *The Quarterly Journal of Economics*, *126*(1), 145-205 **(skim)**

Lecture 7: Incentive Compatible WTP elicitation

Berry, J., Fischer, G., & Guiteras, R. (2020). Eliciting and utilizing willingness to pay: Evidence from field trials in Northern Ghana. *Journal of Political Economy*, *128*(4), 1436-1473. **(for presentation)**

Berkouwer, S. B., & Dean, J. T. (2022). Credit, attention, and externalities in the adoption of energy efficient technologies by low-income households. *American Economic Review*, *112*(10), 3291-3330 **(skim)**

Baylis, P., Greenstone, M., Lee, K., Sahai, H. (2024). Is the Demand for Clean Air Too Low? Experimental Evidence from Delhi. *Working Paper* **(skim)**

Ben Yishay, Fraker, Guiteras, Palloni, Shah, Shirrell and Wang (2017) "Microcredit and willingness to pay for environmental quality: Evidence from a randomized-controlled trial of finance for sanitation in rural Cambodia" *Journal of Environmental Economics and Management*, 86: 121-140. **(skim)**

Module 5: Environmental Policy Design

The goal of this module is to introduce you to the issues of environmental policy design in low-income countries. We will mainly learn how market failures lead to inefficient design.

Lecture 8: Monitoring and Enforcement

Vieira, J. P., Dahis, R., & Assunção, J. (2023). *The Role of Sanctions and Spillovers in Forest Conservation* (No. 2023-16). *Working Paper*. **(for presentation)**

Duflo, E., Greenstone, M., Pande, R., & Ryan, N. (2013). Truth-telling by third-party auditors and the response of polluting firms: Experimental evidence from India. *The Quarterly Journal of Economics*, *128*(4), 1499-1545. **(skim)**

Englander, G. (2023). Information and spillovers from targeting policy in peru's anchoveta fishery. *American Economic Journal: Economic Policy*, *15*(4), 390-427. **(skim)**

Greenstone, M., Pande, R., Sudarshan, A., & Ryan, N. (2023). Can Pollution Markets Work in Developing Countries? Experimental Evidence from India. Working Paper.

Alves, G., Burton, W. H., & Fleitas, S. (2023). Difference-in-Differences in Equilibrium: Evidence from Placed-Based Policies. *Working paper*

Lecture 9: Barriers to Optimal Policy Design

Aker, J. C., & Jack, B. K. (2023). Harvesting the rain: The adoption of environmental technologies in the Sahel. *Review of Economics and Statistics*, 1-52. **(for presentation)**

Jack, B.K., S. Jayachandran, N. Kala and R. Pande (2023) "Money (Not) to Burn: Payments for Ecosystem Services to Reduce Crop Residue Burning". *American Economic Review: Insights*, Conditionally accepted. **(skim)**

Ben-Yishay, Ariel, and A. Mushfiq Mobarak. "Social learning and incentives for experimentation and communication." *The Review of Economic Studies* 86, no. 3 (2019): 976-1009. **(skim)**

He, G., Wang, S., & Zhang, B. (2020). Watering down environmental regulation in China. *The Quarterly Journal of Economics*, *135*(4), 2135-2185

Module 6: Political Economy of the Environment

The goal of this module is to introduce you to the political economy of the environment. We will study how state capacity, institutions, and politics plays a role in balancing environment and development.

Lecture 10: Political economy of the environment

Mahadevan, M., & Shenoy, A. (2023). The political consequences of resource scarcity: Targeted spending in a water-stressed democracy. *Journal of Public Economics*, *220*, 104842. **(for presentation)**

Burgess, R., Hansen, M., Olken, B. A., Potapov, P., & Sieber, S. (2012). The political economy of deforestation in the tropics. *The Quarterly journal of economics*, *127*(4), 1707-1754. **(skim)**

Bragança, A., & Dahis, R. (2022). Cutting special interests by the roots: Evidence from the Brazilian Amazon. *Journal of Public Economics*, *215*, 104753. **(skim)**

GULZAR, S., LAL, A., & PASQUALE, B. (2023). Representation and Forest Conservation: Evidence from India's Scheduled Areas. *American Political Science Review*, 1–20.

Balboni, Clare, Robin Burgess, Anton Heil, Jonathan Old, and Benjamin A. Olken. "Cycles of fire? Politics and forest burning in Indonesia." In *AEA Papers and Proceedings*, vol. 111, pp. 415-419. 2014 Broadway, Suite 305, Nashville, TN 37203: American Economic Association, 2021.

Lecture 11: State Capacity

Saavedra, Santiago. "Technology and State Capacity: Experimental Evidence from Illegal Mining in Colombia." *Available at SSRN 3933128* (2023).

Lipscomb, M., & Mobarak, A. M. (2016). Decentralization and pollution spillovers: evidence from the re-drawing of county borders in Brazil. *The Review of Economic Studies*, *84*(1), 464-502.

Buntaine, Mark T., Michael Greenstone, Guojun He, Mengdi Liu, Shaoda Wang, and Bing Zhang. "Does the squeaky wheel get more grease? The direct and indirect effects of citizen participation on environmental governance in China." *American Economic Review* 114, no. 3 (2024): 815-850.

Wang, Shaoda, and Zenan Wang. "The environmental and economic consequences of internalizing border spillovers." *University of Chicago: Chicago, IL, USA* (2020).