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

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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:

> *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

This course assumes you have completed the first-year sequence (APEC 8001-8004 and APEC 8211-8214). Previous coursework in either 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**, **[DATE and TIME]**, in **[LOCATION]**. We will rely heavily on interactive group discussions, and I expect you to come to class having engaged with that day's assigned reading(s). The more effort you put into this course, the more you will get out of it.

My office hours are **[INSERT]**, and I encourage you to sign up **[GOOGLE SHEET LINK]**. I will be happy to chat about course material, assignments, and hear about your research ideas.

I will upload course material to Canvas, including readings and assignments. All readings are also available online. You will submit assignments 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:

In-class paper presentations	10%
Problem Set	20%
Written research proposal	30%
Proposal presentation	10%
Peer review	20%
Participation	10%

4.1 In-class Presentations (10%)

At the start of the **first** lecture each week, 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 **five** 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 weekly slide submissions. If you do present, the slides and presentation will be worth 5% each. Presentations will be 10 minutes (2 minutes 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 Problem Set (20%)

There will be one problem set involving replicating 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 Canvas and in class.

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 second-year paper or any other of your papers (e.g., a paper for APEC 8703/8704). Throughout the semester, I will provide small deadlines (outline, first draft, etc.) that will lead to a final proposal to submit at the end of the course (30% of grade). I will post

more detailed instructions on Canvas. 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 Referee Report (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. 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 2-3 pages of comments and (constructive) criticism. This also means that you will receive a review of the first draft of your proposal, which 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	Intro + syllabus
1	2	Intro to Environment & Development	Theoretical framework
2	3	The effect of development on the environment	Air quality, water quality
2	4	The effect of development on the environment	Forests, biodiversity
3	5	The effect of environment on development	Model of weather and health
3	6	The effect of environment on development	Health, productivity
4	7	WTP for environmental quality	Elicitation methods
4	8	WTP for environmental quality	Market failures and WTP
5	9	Environmental Policy Design	Spillovers
5	10	Environmental Policy Design	Pollution markets
6	11	Political Economy of the Environment	Theory
6	12	Political Economy of the Environment	Evidence
7	13	Research presentations	20 mins each
7	14	Research presentations	20 mins each

6 Reading List

Module 1: Intro to Environment & Development

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

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

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

Air Quality

Geoffrey Barrows, Teevrat Garg, and Akshaya Jha (2019). "The Health Costs of Coal-Fired Power Plants in India."

Greenstone and Hanna (2014) "Environmental Regulations, Air and Water Pollution, and Infant Mortality in India" *American Economic Review*, 104(10): 3038-72.

Aragón, F. M., & Rud, J. P. (2016). Polluting industries and agricultural productivity: Evidence from mining in Ghana. *The Economic Journal*, *126*(597), 1980-2011.

Chu, Y., Holladay, J. S., Qiu, Y., Tian, X. L., & Zhou, M. (2023). Air pollution and mortality impacts of coal mining: Evidence from coalmine accidents in China. *Journal of Environmental Economics and Management*, *121*, 102846.

Noack, F., Rohner, D., Sonno, T. (2023). The Impact of Multinational Firms on the Environment. *Working Paper*.

Water Quality

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

Forests & Biodiversity

Raahil Madhok (2024). Infrastructure, Institutions, and the Conservation of Biodiversity in India. *Working paper.*

Asher, S., Garg, T., & Novosad, P. (2020). The ecological impact of transportation infrastructure. *The Economic Journal*, *130*(629), 1173-1199.

Alix-Garcia, J., McIntosh, C., Sims, K. R., & Welch, J. R. (2013). The ecological footprint of poverty alleviation: evidence from Mexico's Oportunidades program. *Review of Economics and Statistics*, *95*(2), 417-435.

Garg, T., & Shenoy, A. (2021). The Ecological Impact of Place-Based Economic Policies. *American Journal of Agricultural Economics*, *103*(4), 1239-1250.

Denny, S., Englander, G., & Hunnicutt, Patrick. (2024). Outsourcing Wildlife Conservation: A Comparative Analysis of Private and Government Management of Protected Areas in Africa. *Working Paper*

Assunção, J., Lipscomb, M., Mobarak, A. M., & Szerman, D. (2022). Agricultural productivity and deforestation in Brazil. *Working Paper*.

Abman, R., Garg, T., Pan, Y., Singhal, S. (2023). Agricultural Productivity and Deforestation. *Working Paper*.

Salemi, C. (2021). Refugee camps and deforestation in Sub-Saharan Africa. *Journal of Development Economics*, *152*, 102682.

Balboni, C., Berman, A., Burgess, R., & Olken, B. A. (2023). The economics of tropical deforestation. *Annual Review of Economics*, *15*, 723-754.

Module 3: The Effect of The Environment on Economic Development

Health Impacts

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

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.

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.

Teevrat Garg, Stuart E. Hamilton, Jacob P. Hochard, Evan Plous Kresch, and John Talbot (2018). "(Not So) Gently Down the Stream: River Pollution and Health in Indonesia." *Journal of Environmental Economics and Management 92:35–53.*

Burgess, Deschenes, Donaldson and Greenstone (2017) “Weather, Climate Change and Death in India” Working Paper.

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.

Galiani, S., Gertler, P., & Schargrodsky, E. (2005). Water for life: The impact of the privatization of water services on child mortality. *Journal of political economy*, *113*(1), 83-120.

Rangel, M. A., & Vogl, T. S. (2019). Agricultural fires and health at birth. *Review of Economics and Statistics*, *101*(4), 616-630.

Productivity and Economic Development

Anushman Tiwari. (2024). Pollution, Productivity, and Place. *Working Paper*

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.

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.

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.

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.

Sheetal Sekhri. 2014. “Wells, Water, and Welfare: The Impact of Access to Groundwater on Rural Poverty and Conflict.” American Economic Journal: Applied Economics 6 (3): 76–102.

David Blakeslee, Ram Fishman, and Veena Srinivasan. 2020. “Way Down in the Hole: Adaptation to Long-Term Water Loss in Rural India.” American Economic Review 110 (1): 200– 224.

Chen, S., Oliva, P., & Zhang, P. (2022). The effect of air pollution on migration: Evidence from China. *Journal of Development Economics*, *156*, 102833.

Tatiana Zarate-Barrera. (2024). Too Polluted to Sin? Dirty Skies, Crime, and Adaptation Responses in Mexico City". *Working Paper*

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.

Garg, T., Jagnani, M., & Taraz, V. (2020). Temperature and human capital in India. *Journal of the Association of Environmental and Resource Economists*, *7*(6), 1113-1150.

Module 4: Willingness to Pay for Environmental Quality

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.

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.

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.

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.

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.

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

Module 5: Environmental Policy Design and Spillovers

Molly Lipscomb and Ahmed Mushfiq Mobarak. 2017. "Decentralization and Pollution Spillovers: Evidence from the Re-drawing of County Borders in Brazil." Review of Economic Studies 84 (1): 464–502.

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.

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

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

Assunção, J., Gandour, C., & Souza-Rodrigues, E. (2019). The forest awakens: Amazon regeneration and policy spillovers. *Working Paper*.

Litzow, E., Cecato, B., Zárate-Barrera, T., & Romero, M. (2023). Toxic Recycling: The Cost of Used Lead-Acid Battery Processing in Mexico.

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

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.

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

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.

Module 6: Political economy of the Environment

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.

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

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

Mahadevan, M. (2019). The price of power: Costs of political corruption in Indian electricity. *Conditionally Accepted, American Economic Review*

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

Oliva, P. (2015). Environmental regulations and corruption: Automobile emissions in Mexico City. *Journal of Political Economy*, *123*(3), 686-724.

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.

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

Katovich, E., & Moffette, F. (2024). Does Local Politics Drive Tropical Land-Use Change? Property-Level Evidence from the Amazon. *Working Paper*