**Lecture 1**

* Why study environmental economics in LMICs?
  + If you’re taking this class, you probably already think its important
  + I want to show you how much room there is to do work in this field, which hopefully will inspire you to pursue it in your research/thesis
  + No surprise that poor countries have highest pollution and deforestation. Means that the need for research and understanding how to clean up the environment there is much more pressing.
  + New field, room for applied theory. Things just arent the same in poor countries. Credit constraints, market failures, information frictions, etc. lead to failure of our classical models to yield insights in these places.
  + In the past, we didn’t study dev countries as much because of data access. This is not much of a problem any more because of remote sensing. Nightlights and other proxies for poverty.
  + Evidence is very important. Cannot expect people will voluntarily do things with positive externalities if there is a private cost. Regulation is necessary. We need the evidence, we need to understand the tradeoffs between externalities and livelihoods so we can know what are the right policies to pursue.
* Is environmental economics different in LMICs?
  + Sometimes…
  + Magnitudes: talking about diff levels of incomes, pollution,, etc. don’t need to fundamentally frame questions different, just have different costs and benefits
  + Topics: in poor countries, local environmental quality more important. Exposure is different. Directly exposure (drinking water direct from stream, indoor air pollution, etc.)
  + Institutions: corruption, weak institutions, information, trust. This does start leading to the study of environmental econ being different, because there are things we typically don’t consider in rich country settings.
* Course overview
  + 1. How does econ affect environment and vice versa. This is to benchmark magnitudes.
  + 2. Why is env quality bad in dev countries? Because of low WTP
  + 3. What are the costs? This goes back to question 1. Health issues
  + 4. Why is WTP low? Given that pollution so bad, why are we stuck in this bad equilibrium?
  + 5. What are the political economy issues?
* Course outline
  + Today we are just introducing the class and do a conceptual framework for formalizing our thinking about the different mechanisms through which environment and development are related. Also what are the policy parameters of interest if we want to balance env and dev?
  + Next few lectures we will benchmark magnitudes of the env-dev relationship in both directions. First, how does dev affect environment? In lecture 1, we will look at direct effect on income on environment, holding capital constant. How does directly increasing incomes affect how we use the environment? Then we look at indirect effects through expanding capital, technology, and infrastructure.
  + Then we go opposite direction and look at how environment affects development, especially human capital. First we look at health, with emphasis on adaptation and credit constraints, and other barriers specific to dev countries. Then productivity effects.
  + Then we get into our deeper study of why things are the way they are in developing countries. First we learn how to estimate WTP for env. Then we ask, is it low? Then we study WHY is it low? Market failures, information frictions, education (don’t know about benefits of clean up?)
  + Then we get into policy design. First we’ll study issues with monitoring and enforcement, how that leads to perverse incentives. Audit study. Then we will study barriers to optimal design. Why may some popular policies (i.e. subsidies for clean technology, PES) not work in dev countries? What are the specific things we need to think about for it to be successful (trust, training, etc)?
  + Lastly, we end with political economy for environment. I am still working on this.
* Why is env so low in dev countries?
  + Is VSL in kenya really 10,000 times lower?
  + Maybe this actually is optimal? In the sense that, if environment was in the agents utility function, the WTP value truly equates the marginal costs and benefits of environmental improvements. This means that maybe low environmental quality is just another dimension of poverty and its not actually “too low”.
  + OR, maybe the welfare loss from poor environmental quality is lower in dev countries, so they don’t care as much about clean up.
  + Main thing is that we don’t know, but it is likely that MWTP is distorted by market failures (missing land, capital, labor markets).
    - If you think about peoples investments in clean water on farms in India as an indicator of WTP and say, oh they don’t invest much, so MWTP is low. That’s not correct because there’s issue of common property resources, missing land markets (don’t own land), etc.
* Envirodevonomics Model
  + Representative agent with utility from consumption, environment, etc
  + Environment is individual level (i.e. quality of forests on their land)
  + Utility function captures many channels
    - EQ affects utility directly through existence value
    - EQ affects utility indirectly through health. Workers exposed to pollution may be less productive.
    - The health channel can be mitigated by self-protection (air purifier)
    - EQ affects income directly, which in turn affects utility via the budget constraint. E.g. tourism revenue from national park
    - Experienced EQ depends on initial EQ, direcly through investment in EQ, and indirectly via consumption or self-protection. Self-protection affects UTILITY, but also environment (if they buy indoor air purifier, it improves utility via better health, but also directly improves environment). These improvements in environmen then affect utility.
* Agent chooses c, e and s to maximize utility s.t. budget constraint
  + Individual MWTP is the marginate rate of substitution between income and EQ. How much income would you give up to improve EQ such that you’re on the same indifference curve? That is the MWTP.
  + The expression for MWTP is the dollars agent is WTP for a marginal increase in EQ. There are some terms that affect utility directly or indirectly. Other terms affect MWTP not through utility, but through incomes, directly and indirectly.
  + Given concave utility, when income is low, marginal utility of consumption is high, which means lower MWTP for environment. In other words, when poor, consumption is very important, so you would need a major investment in EQ to compensate for reduction in consumption.
* MWTP for self protection
  + Affects utility indirectly via improving environmental quality, scaled by dollars (invest in air purifier)
  + Affects utility indirectly via health
  + Affects income indirectly i.e. invest in pest control for crops.
  + Indirect effects on income via health (pesticides bath for health).
* First best outcome
  + Agent sets ratio of MWTP to MCs
  + This set of decisions will lead to the socially efficient outcomes (in theory, don’t need a social planner).
  + But if we have a SP, we must assume:
    - No prefs of own. If social planner puts own utility weights into the aggregation, then we get a sub-optimal outcome. (i.e. if SP takes bribes and gets direct utility from envoronmental quality)
    - No market failures.
    - Can observe true MWTP
  + Do these hold in LMICs?
    - Poltiical economy and market failures
    - Externalities are the same in HICs and LMICs, but they may be exacerbated or interact with market failures
* Course structure
  + Where can you make a contribution?
  + Most work on dh/dc, but very little work on
  + When we frame this as a first best issue, and then dissect the assumptions we need in order for this to be the first-best, which would mean that low EQ is optimal, we start to understand why EQ is low
* Why is EQ low in dev countries?
  + 1. High MUC (doesn’t depart from efficient market assumption)
  + 2. High MAC (doesn’t depart from efficient market assumption)
    - Puzzle, increasing MAC suggests that cleanin up poor countries should be cheapest. But then why don’t we? If this explanation is true, it must mean that something else is keeping costs high, not just technology costs of clean up. Could be low state capacity, bureaucratic costs, etc.
    - Doesn’t mean corruption, etc, where we would have to depart from the perfect markets assumption, just that policy implemenetation costs higher in poor countries.
  + Political economy
  + Market failures
    - Market frictions can deviate MWTP from true value. If credit markets are absent, then households may underinvest in conservation. Not because they don’t value environment, but because they don’t have financial access.
    - If you don’t have formal property rights over land, you may not make expensive investments. Not because you don’t value the land, but because of the frictions/lack of property rights
    - In Jack et al. (2024), find that WTP is distorted by lack of trust. Amount of $$ they accept to conserve land changes when pay money up front.