

Environmental economics in LMICs

BREAD/IGC course kick-off

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Why study the environment in LMICs?



(a) China



(b) India



(c) Brazil



(d) Nigeria

Why study the environment in LMICs?

- ▶ Important! Enviro affects dev (e.g., Arceo-Gomez et al. 2014); Dev affects enviro (e.g., Jayachandran 2022)
- ▶ (relatively) Understudied topics so room for contributions
- ▶ Need evidence to inform policy with big implications for livelihoods

Is environmental economics applied to LMICs any different?

- ▶ Sometimes.
- ▶ Magnitudes
- ▶ Topics
- ▶ Institutions and state capacity

Two examples from my research to highlight similarities, differences and opportunities

1. Climate adaptation and inequality
2. Policy design suited to the context

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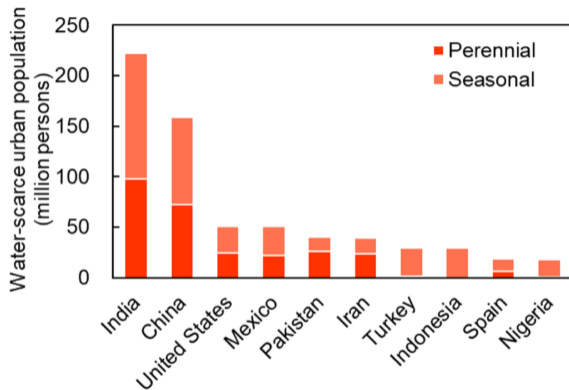
Climate adaptation and inequality: Cities and water

(with Cassandra Cole, Kyle Meng and Martine Visser)

One billion face municipal water scarcity

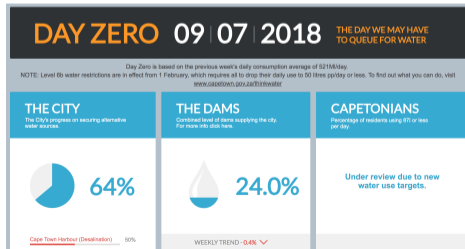
Projected to grow as...

- ▶ Urbanization and population growth increase demand
- ▶ Climate change lowers supply, increases variability

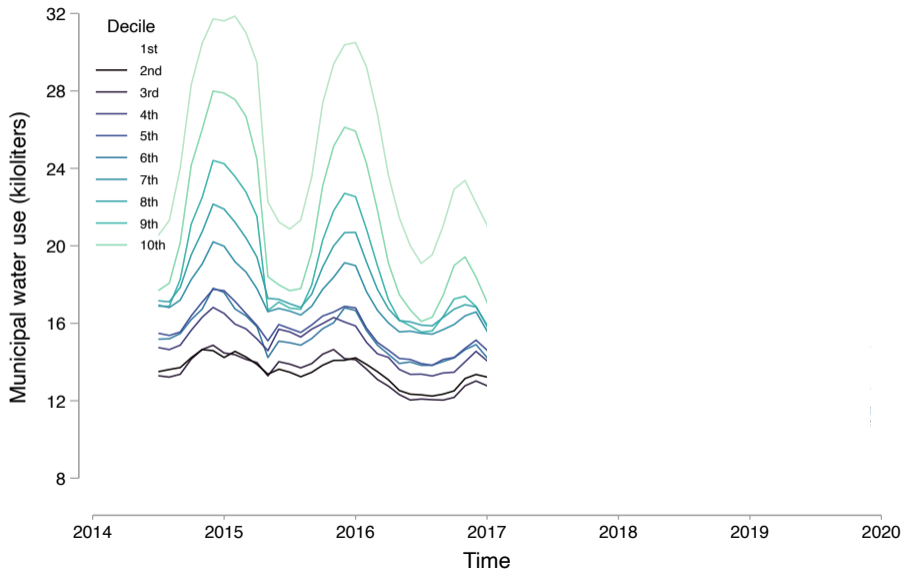


Source: He et al. (2021) *Nat Comms*

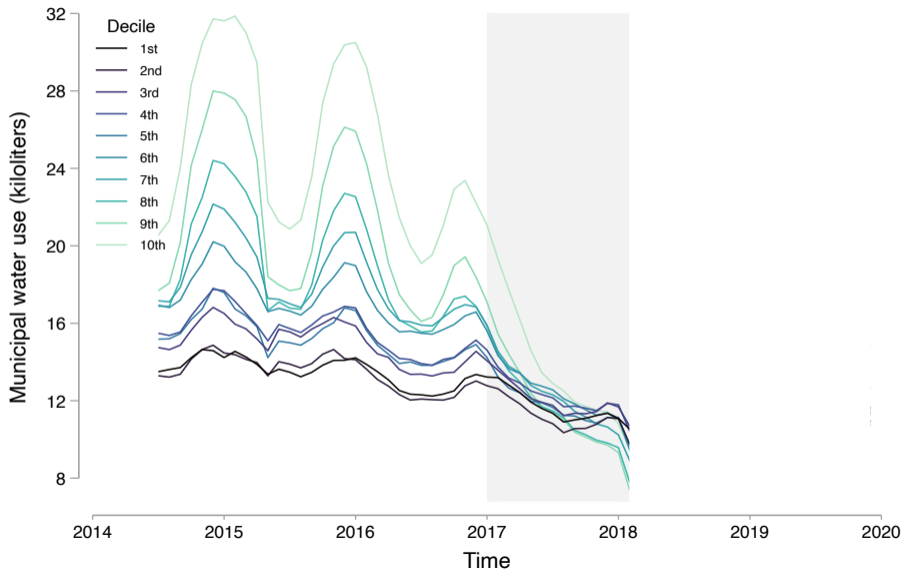
Case study: Cape Town's "Day Zero"



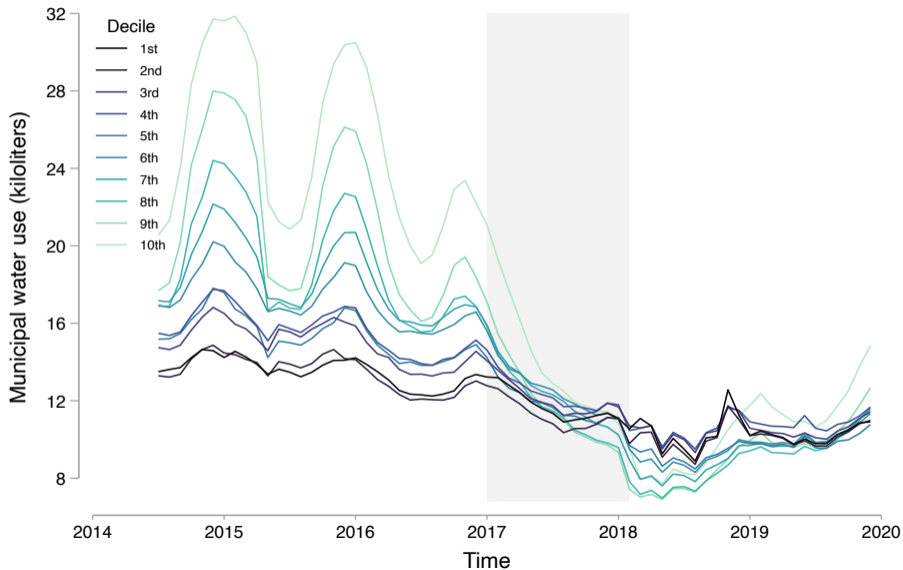
Municipal water consumption by decile



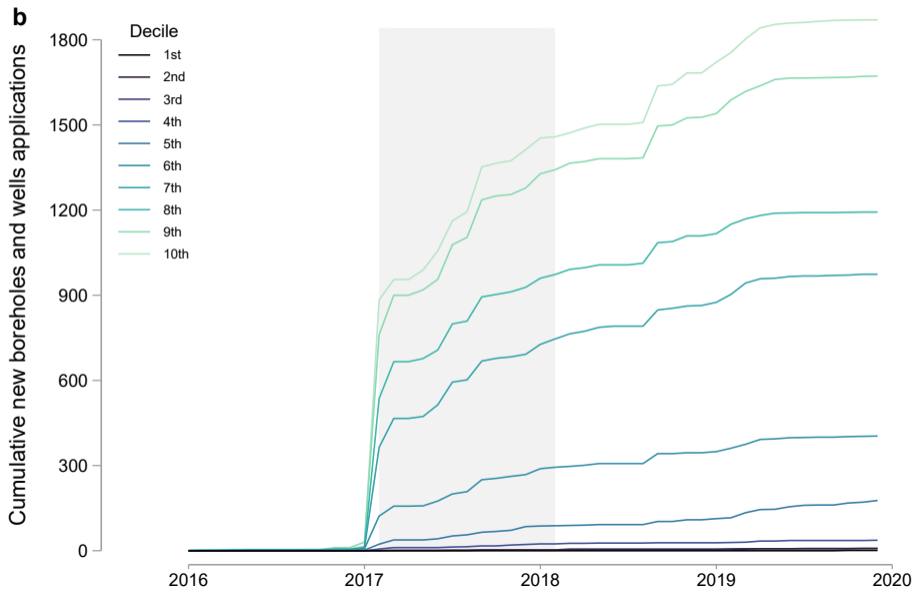
Municipal water consumption by decile



Municipal water consumption by decile



Borehole and well applications



Groundwater depth near high and low property value areas



Implications: Climate change and inequality

For many climate shocks, public utilities mediate household or individual adaptation

- ▶ If supply (of water or energy) is fixed in the short run, price increases are likely to manage demand during droughts or heatwaves
- ▶ When households have substitutes (wells, rooftop solar), they will adopt
- ▶ Adoption likely to favor the rich

→ Fiscal externality on non-adopters who now have to cover the utility's remaining costs, regressive in many cases

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Policy design with context in mind: Crop residue burning in India

(with Seema Jayachandran, Namrata Kala and Rohini Pande)



Burning in Punjab...



...affects air quality in Delhi

Textbook externality problem:

- ▶ Burning is the cheapest way for farmer to clear the field
- ▶ Costs are borne by others

Reducing stubble burning

1. Residue burning has been illegal and punishable by fines in Punjab since 2015

⇒ However, limited enforcement

2. In 2017, Govt of India allocated funds to subsidize *in situ* equipment purchase

⇒ However, subsidy program has not made non-burning cheap and attractive enough

We evaluate an alternative approach: Payments for ecosystem services (PES)

Conducted randomized trial in 171 villages in Bathinda and Faridkot districts in Punjab

▶ ~10 farmers per village, N=1664

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How best to design PES contract?

Standard PES contract offers payment after verification that you have complied, i.e., undertaken the specified pro-environment behavior

Mistrust + lack of financial liquidity might reduce compliance

Goal: Use a PES contract design that can address these problems

Treatment arms vary the proportion of payment made upfront (unconditionally)

- ▶ Upfront: ↑ trust in payment and liquidity to rent equipment
- ▶ *But* also ↓ incentive to comply + payments to people who do not comply

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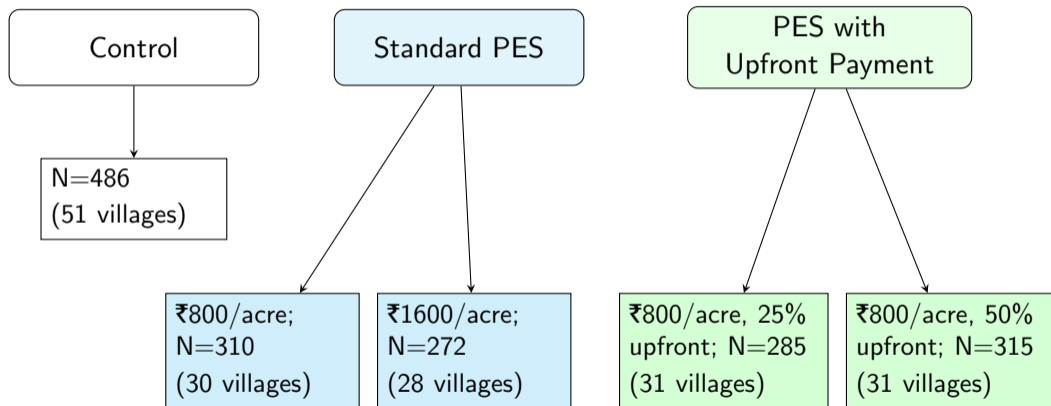
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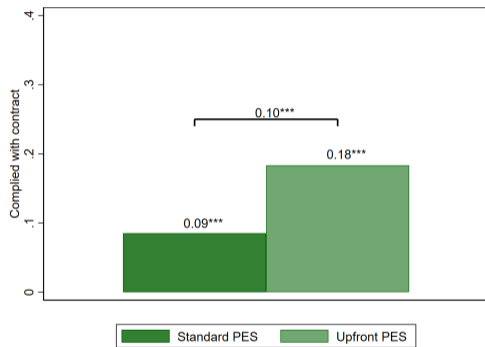
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RCT design

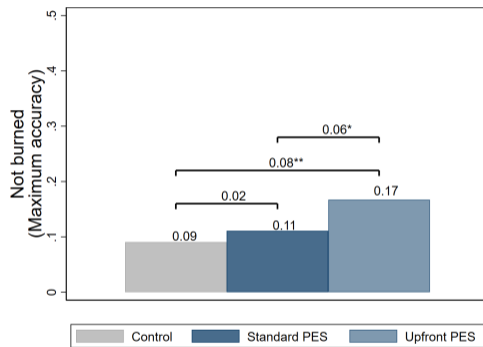
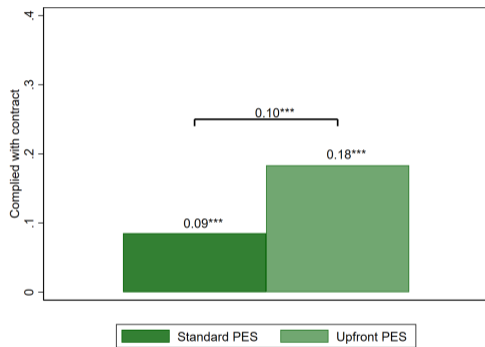


PES with upfront payment reduced burning, but standard PES did not



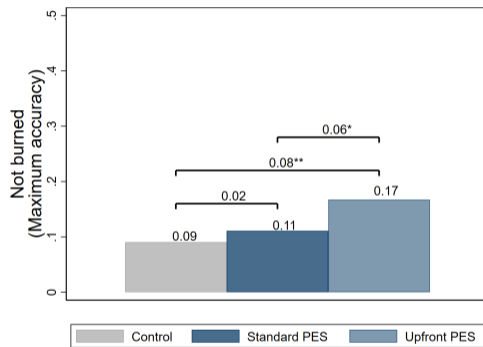
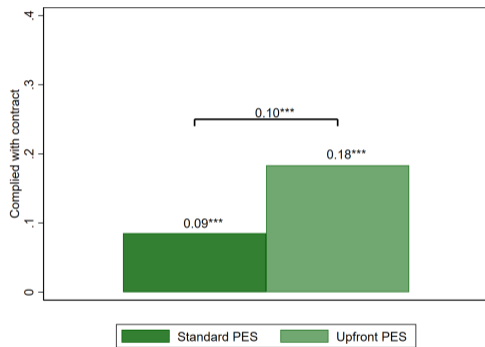
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Implications

Policies need to accommodate market frictions (credit constraints) or effects of state capacity (low trust) to be effective

- ▶ Numerous examples of failed policies due to poor design or poor implementation
- ▶ Not limited to LMICs, of course
- ▶ Market frictions and low state capacity more pervasive so need for policy adaptation is clear

What else to look forward to in this course

9 more weeks of lectures delivered by leading economists

1. Economics of conservation (Seema Jayachandran and Ben Olken)
2. Climate adaptation (Esther Duflo)
3. Renewables (Mar Reguant and John Van Reenan)
4. International climate action (Bard Harstad)
5. Climate migration (Gharad Bryan and Melanie Morten)
6. Regulation and pollution (Rohini Pande and Nick Ryan)
7. Inequality of environmental damages (Tamma Carleton and Reed Walker)
8. Economic impact of climate change (Michael Greenstone)
9. Sea level rise (Clare Balboni and Allan Hsiao)

Questions about today's content?