Environmental economics in LMICs BREAD/IGC course kick-off

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Why study the environment in LMICs?



(a) China





(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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- Magnitudes
- Topics
- Institutions and state capacity

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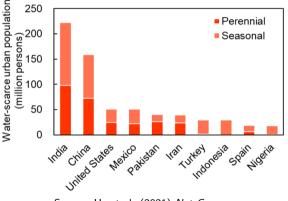
Climate adaptation and inequality: Cities and water

(with Cassandra Cole, Kyle Meng and Martine Visser)

One billion face municipal water scarity

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"



C brand prime: designs



How city will pay for Day Zero

throughout South Africa. minic Advisanse monthal grant pullition atter for Day Zero, the criteria for sites included priate time

Drilling of boreholes,

The fact of the state of the st he city in the enough space to accommodate aquifers, was also planned for

DAY ZERO GUIDELI

Moon 20.000 people will be able to collect waters of waters do water of an end of the collect above 15 Mores per persons per days form with the World Health Organisation recommendation, is an ender a provide palace and intergovernmental resources will be deployed to wrote salery. The City will have about 200 writer callectore sizes across No one will be required to provide any Vertilitation to reflect their bi

From collecting for above time date which any other one of the other the Officials will be on size to monitor outerolish above, and residential officials will be on size to monitor outerolish above, and residential officials will be on size to monitor outerolish above.

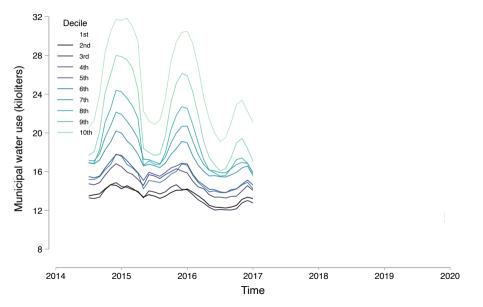
DAY ZERO 09 07 2018 THE DAY WE MAY HAVE TO QUEUE FOR WATER

military base at Fort Baro

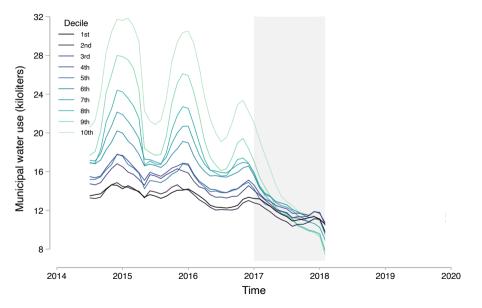
NOTE: Level Private matrixing an in effect from 1 Eabrairy which requires all to draw their data use in 20 lines ender or less. To find rul what we can do visit

THE CITY The City program on security alternative veder sources.	THE DAMS Contributed lawni of dama nuppying the city. Per many info click haws	CAPETONIANS Precordage of residents using 87 or less per day.
64%	24.0%	Under review due to new water use targets.
Cape Town Harbour (Desalination) 50%	WEEKLY TREND - 0.4% 🗸	

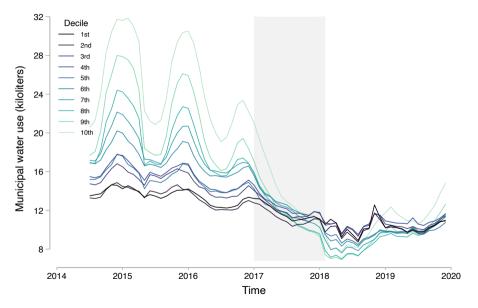
Municipal water consumption by decile



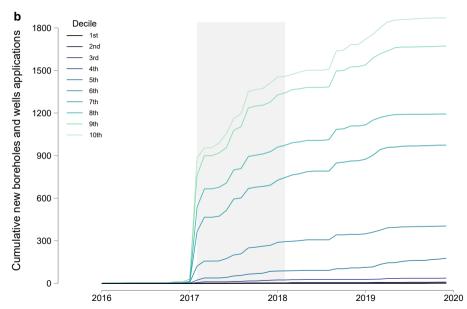
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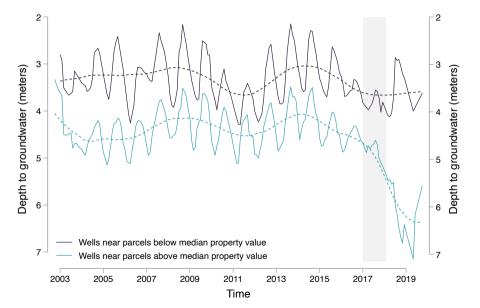
Municipal water consumption by decile



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
- \rightarrow 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

- 1. Residue burning has been illegal and punishable by fines in Punjab since 2015
- \Rightarrow 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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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 \downarrow incentive to comply + payments to people who do not comply

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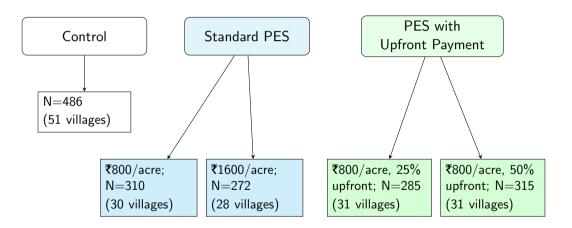
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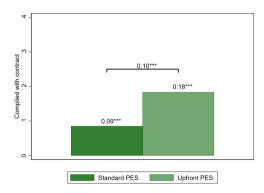
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RCT design

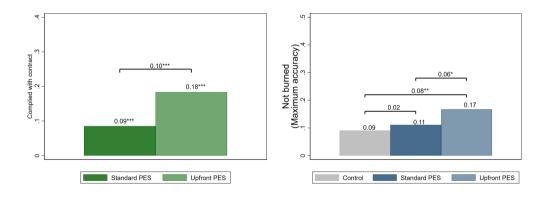


PES with upfront payment reduced burning, but standard PES did not



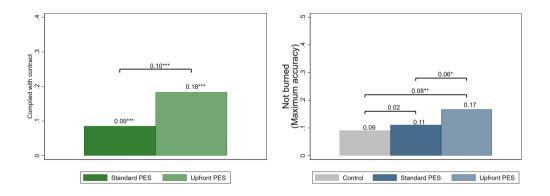
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Implications

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?