Commentary

The environmental effects of poverty programs and the poverty effects of environmental programs: The missing RCTs

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ABSTRACT

For decades, government agencies and nongovernmental organizations have invested in programs aimed at alleviating poverty and those aimed at protecting the environment. Whether these investments mutually reinforce each other or act in opposition has been widely debated by scholars. Studies that have tried to resolve this debate suffer from a variety of shortcomings, including the challenge of inferring causal relationships from non-experimental data. To help address some of these shortcomings, randomized controlled trials (RCTs) can play an important role. When done well, RCTs permit credible causal inferences and can be designed to directly test competing assumptions about how the world works. Yet few RCTs of poverty programs examine their effects on the environment. Worse, we know of no RCTs reporting the poverty effects of environmental interventions, which may be unsurprising given that environmental scholars rarely use RCTs. The lack of RCTs that can shed light on the relationships between actions to alleviate poverty and actions to reverse global environmental change is an obstacle to advancing the science and practice of sustainability. If scholars of poverty include environmental outcomes in their RCTs, and if environmental scholars use RCTs to study the poverty effects of environmental programs, the long-running debates about the dual challenges of alleviating poverty and protecting the environment could be resolved. Moreover, by forcing people to pay greater attention to the mechanisms and pathways that link the solutions to these two challenges, RCTs can make it more likely that environmental and poverty programs will be designed in ways that ensure progress on one challenge will also imply progress on the other.

Two of the great social challenges of the twenty-first century are to alleviate poverty and to reverse global environmental change (e.g., ecosystem and species loss, climate change, hypoxic zones; Sterner et al., 2019). Whether progress on one of these challenges implies regression on the other has long been debated by scholars and practitioners (World Commission on Environment and Development, 1987). Despite decades of debate and analysis, we still know little about the environmental impacts of actions designed to reduce poverty, or the poverty impacts of actions designed to protect the environment.

Theories from the behavioral and social sciences yield ambiguous predictions about these environmental and social impacts. Much of the empirical analyses of the relationships between poverty and the environment is done at either a macroeconomic level (e.g., environmental Kuznets curve studies) or a case study level. Such analyses, however, tend to simply describe the covariance of changes in poverty and changes in environmental conditions. They fail to identify the causes of the changes in poverty levels or environmental conditions, and more importantly from a policy design perspective they cannot credibly isolate and quantify causal pathways between interventions and outcomes. As a result, much of the discussion about the links between the goals of poverty programs and the goals environmental programs is speculative.

More recently, a small number of observational (non-experimental) studies have sought to deploy better designs and methods to quantify the causal effects of environmental programs on poverty (e.g., Oldekop, Sims, Karna, Whittingham, & Agrawal, 2019; Canavire-Bacarreza & Hanauer, 2017; Ferraro & Hanauer, 2014). An even smaller number of observational studies has sought to quantify the causal effects of poverty programs on the

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environment (e.g., Alix-Garcia, McIntosh, Sims, & Welch, 2013).[1] Observational studies are valuable, but given the challenges of using these designs to quantify causal relationships in complex socioecological systems (Ferraro, Sanchirico, & Smith, 2019), the debates about the relationship between reversing environmental change and alleviating poverty rage on. More importantly, we lack clear pathways through which progress on one challenge could also imply progress on the other.

To help identify these pathways, randomized controlled trials (RCTs), like the ones used by the 2019 winners of the Nobel Memorial Prize in Economic Sciences, should play an important role. Yet despite the explosion of randomized anti-poverty interventions over the last two decades, few evaluations have examined the environmental effects of the interventions. In fact, the number of RCTs that include environmental outcomes approaches zero if we were to exclude RCTs of interventions that explicitly target natural resource use behaviors, like improved fuelwood cookstoves that reduce indoor smoke and may indirectly reduce pressures on forests. Similarly, we could find no RCTs of environmental interventions that measure the interventions' effects on poverty.[2]

Whatever one thinks about the merits and demerits of RCTs, it is hard to imagine that roughly zero RCTs would be the optimal level in any policy domain that cares about empirical evidence. The absence of RCTs that examine the environmental effects of anti-poverty programs is perhaps unsurprising. Most anti-poverty RCTs are conducted by development scholars and practitioners who are, first and foremost, interested in the *poverty* impacts of anti-poverty programs. If there are environmental effects, they are unintended. Even if unintended environmental effects were a concern, the designers of anti-poverty programs are unlikely to spend limited resources to measure them when measuring a multi-dimensional construct like "poverty" is already challenging (not to mention the costs to statistical inference when one must adjust evaluation designs to address potential false discoveries from hypothesis tests across many outcomes).

This lack of incentives for measuring environmental outcomes should be addressed by funders. Many multilateral funders (e.g., World Bank) and large philanthropic organizations (e.g., Rockefeller Foundation) seek to both reduce poverty and mitigate environmental change. In contexts where environmental issues are salient – for example, in tropical forest areas or in areas where aquifers are overexploited or surface waters polluted –funders of anti-poverty RCTs ought to provide incentives for evaluation teams to include a relevant environmental indicator. Ideally, they ought to also provide incentives to identify the mechanisms and moderators through which the intervention has an environmental impact. Every year that passes without these kinds of RCTs is another year of missed opportunities to learn more about how societies can meet the two grand challenges of poverty alleviation and reversing environmental change.

In the context of environmental programs, we are missing more than measures of poverty outcomes – we are missing the RCTs themselves. While there has been an explosion in development-oriented RCTs in low and middle-income countries, no such explo-

sion in environmental-oriented RCTs has occurred. Environmental scholars and practitioners do not seem to see RCTs as a viable tool in their toolbox, and in the few cases where RCTs are used, the outcome measures do not include poverty (e.g., Jayachandran et al., 2017; Pynegar, Jones, Gibbons, & Asquith, 2018; Wilebore, Voors, Bulte, Coomes, & Kontoleon, 2019).[3]

The lack of RCTs in environmental programs in low and middle-income nations does not likely stem from an information deficit. Over the last decade, there have been repeated calls for such RCTs (e.g., Ferraro & Pattanayak, 2006; Ferraro, 2012), and ecologists and other natural scientists who often manage environmental programs have long histories of using experimental designs to elucidate causal pathways in natural systems (Shipley, 2016).

Instead, we believe, based on our professional experience, that the lack of RCTs in environmental programs stems from three other inter-related reasons:

(1) *Incentives from funders that reward program administrators for "success" rather than high-quality evidence about what works and under what conditions.* Those incentives ensure that an RCT offers little upside to program administrators. Worse, an RCT offers a large potential downside should the experiment convincingly and credibly show the intervention failed to move the needle in a meaningful way. Although the importance of evidence-based environmental program design is growing, our experience implies that it still takes a lot of effort to convince environmental program administrators and funders that there is an upside to null or negative results (convincing environmental journal editors is also a challenge; see Alpizar, Bernedo del Carpio, Ferraro, & Meiselman, 2019 and accompanying blog post).

(2) *An ethical and belief system among environmental scholars, practitioners and funders that does not prioritize learning through RCTs.* In medicine and public health, the ethical precept "Do no harm" and the ethical principle of "equipoise" encourage the use of RCTs in many contexts (clinical equipoise implies that the practitioner is uncertain about whether a new intervention is superior to the status quo). In contrast, the disciplines that focus on challenges like species extinction and climate change are often framed as "crisis disciplines" for which the guiding ethical precept is "do something and do it now" and for which the solutions are often framed as unequivocally beneficial. A logical implication of these ethical perspectives is that RCTs are not needed in environmental contexts. We, of course, disagree with both the perspectives and their implication.

(3) *A widespread belief that learning by doing and simple empirical designs (e.g., model fitting, before-after or with-without comparisons) are sufficient to advance our knowledge about how programs work.* As documented elsewhere (e.g., Ferraro et al., 2019), strong and often implausible assumptions are required to infer program impacts – or mechanism effects - from the types of empirical designs that are widely used by natural and social scientists in the sustainability literature. These scholars may be more likely to include RCTs in their toolbox were the weaknesses in their designs better understood.

We are hopeful that the award of this year's Nobel Memorial Prize in Economic Sciences to Abhijit Banerjee, Esther Duflo and Michael Kremer will help nudge environmental scholars and practitioners towards greater use of RCTs. And we hope our essay will

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[1] Studies have attempted to estimate the effects of more general development or governance changes on the environment (e.g., road building, decentralization of fiscal or administrative authority), but such changes are not explicitly targeted to reduce poverty. Moreover, to our knowledge, the mechanism effects on the environment from any reductions in poverty from these larger interventions have not been isolated.

[2] To identify relevant publications, we looked through results that came up in the first ten pages of Google Scholar searches on all permutations of "randomized controlled trial" with the following terms: "poverty", "forest", "water", "groundwater", "air", "biodiversity", "grassland" and "poaching" (the word "environment" yielded too many unrelated hits and was not used). We also asked colleagues who work in the environmental field and have run, or are running, RCTs.

[3] One unpublished exception is an ongoing, harmonized set of RCTs across six low and middle-income nations that includes household welfare measures. See http://egap.org/metaketa/metaketa-iii-natural-resource-governance.

nudge poverty scholars and practitioners towards more wide-spread measurement of environmental outcomes. Were these changes to occur, decision makers will have more reliable evidence about pathways to meet the twin challenges of alleviating poverty and reversing global environmental change.

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