EGC Voices in Development, Season 2, Episode 2: Supporting Farmers on the Frontlines of the Climate Crisis with Kelsey Jack, Rohini Pande, Islamul Haque and Gregory Lane.

Catherine Cheney: Why do some countries advance while others fall behind? Who benefits from economic growth and who doesn't? How do inequality and climate change affect people, especially the most marginalized? What role can data play in answering questions like these and informing policies that promote economic justice? Let's find out on Voices in Development.

Hello and welcome to our podcast. I'm your host, Catherine Cheney. We're coming to you from the Economic Growth Center at Yale University, which is focused on economics and data driven insights for equitable development. Today, we're going to hear from researchers who presented at the Yale Climate, Environment and Economic Growth Conference, co-hosted by the Economic Growth Center, Tobin Center for Economic Policy, and Yale School of the environment. The vast majority of climate finance is directed toward mitigation, or reducing or preventing greenhouse gas emissions.

Just a small fraction goes to adaptation, protecting people against the consequences of climate change. This is one reason why the climate crisis is a crisis of inequality, as Rohini Pande, director of the Economic Growth Center, stated in a piece for science magazine.

Low income countries are disproportionately suffering from climate breakdowns, and that's particularly true of the poorest and most vulnerable within those countries, many of them farmers. At the Yale Climate, Environment and Economic Growth Conference, Pondemoderated a conversation featuring three researchers supporting adaptation in agriculture that included Kelsey Jack, associate professor of environmental and development economics at the University of California, Santa Barbara.

She discussed her work on rainwater harvesting techniques in rural Niger. Her work focuses on digging demi-lunes, or half moons, which are semi-circle shaped basins that farmers dig into the Earth. With a simple one day training, there was a 90% increase in adoption of this practice. Jack’s research, which you'll hear more about later in this episode, points to some of the key challenges and opportunities for technology adoption in climate adaptation.

Farmers often lack access to information, technology or capital that can help them weather the climate storm. Here's more from Pande on why that matters.

Pande: Really want to think about adaptation technologies that work. We're going to have to take very seriously these missing markets and weak institutional environments that often form frictions on adopting these technologies, or even if you can adopt them to gain full benefits from them.

Cheney: Presentations from Jack, as well as two researchers you'll meet a bit later, Islamul Haque and Gregory Lane narrowed in on what works in climate adaptation research mitigation technologies.

Pande: At the heart of it start from the fact that one unit of carbon will contribute to warming the global atmosphere, no matter where it's released, and so you can think about a lot more of designing mitigation technologies and implementing them at the national or the international level. In contrast, adaptation is very local and what works for adaptation in one place may not work for adaptation in another place simply because the environment is different.

Cheney: Development economists have a unique lens into the constraints that prevent individuals in low income environments from undertaking what might seem like sensible actions. That perspective will be critical in crafting policies that work on the ground. And as Pande says, it's one reason why development

economics, and research more broadly, should inform high level conversations on climate finance and climate action.

Pande: Any kind of negotiations have to be informed by political economy and implementation constraints. By political economy constraints, I mean when governments go back to their country, what they're going to actually be able to get through the legislature, what they're going to be able to convince citizens is valuable to them. One of the ways this is going to play out is I think in the loss and damage fund, how a low income country is going to be able to access these funds for adaptation activities versus having to spend them on mitigation.

Cheney: Particularly when it comes to adaptation, which is a critical but underfunded area, it's essential to generate more evidence on what interventions have the best return on investment. And with that, let's turn to Kelsey Jack. Her work on demi-lunes is focused in rural Niger, where 94% of the population lives on 20% of the land. Intensive agriculture practices deplete soils, and there's increasing vulnerability to climate shocks. While there aren't many options available to farmers, one low-tech practice is rainwater harvesting, making adjustments to how crops are planted and how land is managed in ways that help restore soil fertility. Demi-lunes capture available rain and any nutrient rich topsoil that would otherwise flow off the land. Here's a quick excerpt from Jack's presentation.

Kelsey Jack: This technique of constructing demi-lunes has in common a lot of the kind of features that we might think different kinds of technologies that are sort of adaptation suited technologies have in common. A lot of the costs that farmers have to undertake to adopt this technique are up front. So they have to build these demi-lunes. This is suitable for land that is very degraded, which means it has formed, kind of, a hard pan on top of the surface. So digging through that impermeable layer on top of the soil is very labor intensive.

Once they've done that, the demi-lune can persist for about three years. What agronomists say is by the end of that three year period, the soil fertility will have been restored and no further maintenance is needed. You can just continue to plant inside of this depression which now, previous to the adoption, you really wouldn't have been able to grow anything on it. Now that you've built this demi-lune, you can actually at least be growing something on the land. So costs are up front, benefits are accruing in the future, and the value of those benefits are also going to depend on weather realizations. So does it rain? How much does it rain? Is the rainfall erratic and so on.

Cheney: For Voices in Development, we spoke with Jack about her research, narrowing in on what lessons it offers to other technology adoption and climate adaptation efforts.

Jack: So in this project, we were particularly interested in thinking about trying to test two things related to a technology that, in the agronomy literature and agronomy findings, looked very promising for even very low income households, farming households. And that was first, why would we look around and people not already doing this if it's as good as agronomists claim it is? And then second, measuring those impacts. So really trying to quantify what happens when somebody starts to adopt rainwater harvesting, both in terms of what does it cost them to do it? And then also what are the benefits if they do it?

And so we designed a randomized controlled trial that we rolled out in a particular region of Niger to try to test what were the barriers to adopting this technology based on interventions that we designed, that were explicitly about relaxing some of those barriers so that we could learn what was stopping people by trying to do things that would actually help them. And then important for really trying to think about the benefits of this kind of a technology, we followed for three years. We wanted to really see what were the more durable impacts after the intervention stopped, after they had a couple of years to continue to plant,

to continue to harvest and really see were these benefits that were described, actually realized when it came to real people.

As a very small aside, I think there's a really nice analogy with a lot of other types of technologies for adaptation that come out of engineering studies, where it looks like something has a lot of promise, it looks like something is going to be an amazing technology. When you get it out into the real world in the hands of real people, it turns out not to quite perform as expected. So we were concerned that this had some of those features, and so it was really important to us to be able to first do kind of a field trial that was hands off in terms of farmers could construct these techniques as they would, and then we could have enough, kind of, valid monitoring outcome data to really make sure that this wasn't just a story that some people in a research institution somewhere were telling themselves about the potential benefits.

Cheney: Jack and her colleagues approached this as a classic technology adoption problem, thinking about barriers to adoption and working to address those barriers. But technology adoption, like the farmers in rural Niger, digging demi-lune's in the earth doesn't necessarily mean that farmers will be able to adapt to climate change in the long term. That's why Jack is following this group for three years, and now she's exploring how remote sensing, including satellite imagery, can measure this adoption over the long term.

Jack: So the big kind of headline finding out of this study is that giving people access to information had a really large effect. So after a training that was basically a half day training conducted by the Ministry of Environment in Niger. So this is resources that are available in Niger, training farmers how to actually construct these techniques on their fields and really, crucially, training them how to construct these techniques without any kind of specialized equipment, without any outside capital, basically just labor and being able to pace off the dimensions of them with their feet, being able to measure the depth with their hands, basically using stuff that they really had available, that just that kind of a training led 90% of people who otherwise would not have adopted to adopt at least some of them.

Now, when it comes to how much were they adopting, they weren't covering all of their degraded land. So I should say this is a technology or a technique that is really only appropriate for very, very degraded agricultural land. So they were covering some of their land. And presumably the reason that they weren't covering all of their land is these are not easy things to build, but the amount that they were adopting was sufficient to boost agricultural income, to lower crop failure rates, to improve soil quality. And also, really importantly in this particular setting, to slow the process of land degradation.

So one of the things that is most challenging in this kind of very, very arid region is that agricultural lands very quickly get depleted, they get taken out of production, then more marginal land gets brought into production, leading farmers to kind of march down this land quality gradient and farm worse and worse land. That means that less and less able to sustain some kind of a climate shock. So those were the findings from within the study. And then I think the big question going forward is those are outcomes that we measure that don't really depend on the realization of climate shocks.

And so one big question that I think this poses, that is something researchers who are interested in these kind of randomized controlled trials or prospective studies for increasing adaptation is how exactly do we measure it? Are we stuck waiting for the shock to arrive so that we can see if it helps people when A shock actually occurs? Or is there something else we can do to sort of figure out that it looks like this is helping people adapt, even when there's no shock, even when it's just like the slow, steady increase of temperatures over time, even if there's no big deviation from the long- run means, for example.

Cheney: At the Conference, Jack also spoke to the role that development economists can and should play in informing climate adaptation, financing and policy.

Jack: I think of the role of development economists and these types of questions, as I don't think we're the best place to design some new innovation. I think in the agricultural context, you know, there are lots of people doing really important R&D on crop varieties, on agricultural practices, on all sorts of things like that. As I said, I think one of the challenges is when you get out into the real world, circumstances look really different. And I think what economists can do, hopefully, well is two things. One is really trying to rigorously test under natural conditions, how well do new technologies, but also old strategies that maybe are increasingly relevant.

And we need to think about how can people be encouraged, or even in our case, just given the information that allows them to adopt new practices. That getting that evidence is really key, because if we just kind of go blind and say, jump from the engineering or agronomy study straight to policy, we may end up really pushing things that out there in the real world are not quite as promising as they seem. Or conversely, some things that maybe didn't look quite as good ex-ante end up really helping in ways that sometimes surprise us a little bit.

And that's kind of the second thing in some ways, is I think this more comprehensive picture of what does it mean to adapt; that adaptation doesn't necessarily look like one piece of behavior change or one piece of technology adoption. It looks like a household or a community's overall resilience to climate shocks increasing. And I think one danger of having the kind of technology adoption lens is it presupposes this, sort of, one thing is going to improve things, when in fact, that one thing is going to cause many other aspects of someone's life to adjust.

Those adjustments can be reinforcing, actually making something better than we expected it to be. But they can also be undermining in the sense that if resources are going into some new technology, they're not going into something else, probably. And if that other thing that they could have gone into is more important in the long run, for example, that could be detrimental. So if you have to pull a child out of school to build demi-lunes, maybe in the short run this household has a little more agricultural income, but maybe in the next 20 years they're in a much, much worse situation.

Cheney: Gregory Lane, an assistant professor at the Harris School of Public Policy at the University of Chicago, who presented his work on weather forecasting for farmers in India, agreed: development economists have a unique role to play in climate adaptation.

Lane: What micro economists, development economists, are good at doing is testing ideas. So there's a lot of ideas that, on paper, sound really great. People are great at thinking up stories about something might solve an issue, and they're all plausible. Like, a lot of these things are plausible. But as social scientists know, there's a lot of other constraints or other reasons why plausible good sounding ideas fail when they're actually implemented. And so, development economists' toolbox, particularly around experiments, which is what most of my research takes place, is really around this idea, is you have to test something before you feel good about proposing it as a solution.

It just can't work in theory or sound very palatable. It has to actually show results. You have to see it in action. And I think just testing it seems obvious, but it's not always done, right. There's been a lot of ideas in the past to try to tackle issues like this that people don't test, and then there are issues on the ground, and that can often lead to even worse problems or backlash against these sensible ideas.

Cheney: Given how little financing goes into climate adaptation, it's critical to spend those limited dollars wisely. That's according to Islamul Haque, an associate at the Yale Research Initiative on Innovation and Scale or Rise. He presented his work with farmers in Bangladesh who are relocating farmlands due to increased salinity from rising sea waters.

Haque: So I would say my key takeaway was that there are low-hanging fruits, in terms of what we can do to increase or accelerate the rate of adaptation in developing countries. And Kelsey has shown us a very interesting scenario where a simple, traditional solution could actually make a big difference in terms of productivity, et cetera. And farmers didn't even adopt it without the intervention that she implemented.

So I guess my takeaway is basically that we should do more work on identifying these low-hanging fruits, where with very minimal investment and very simple interventions, we can actually make a very big difference in terms of resilience of the farmers income and living standard.

Cheney: Jack adds that the limited funding for adaptation is what makes these pilot scale tests for adaptation so crucial.

Jack: The amount of funding that goes into climate in general is tiny. The amount that goes into adaptation is a tiny part of a tiny total number. Therefore, I think evidence is just so crucial in this space. I think trying to figure out what to do without first having really clear evidence that something's going to work, has the potential to be a huge waste of resources. And I would argue that this whole space needs to be kind of permeated with pilot scale tests before things scale.

Of course, we need to be very careful with that. Those can end up taking longer than they need to. Those can end up missing really important things that happen when you start to scale up and so on. But I think we know a lot of that already, and we know how to be careful and look out for it. I think those risks are small compared to the risks of investing a lot of a very small budget in things that are not already really well demonstrated to work. I mean, I think there are lots of examples out there, including, for example, a lot of the energy efficiency technologies that sound wonderful because there are these, kind of, win-win great things. When you get them out into the real world, people just end up turning down the thermostat a little bit more if the energy's a little bit cheaper. And so those kinds of behavioral responses or other things that we can test those, you know, we can figure out is something actually delivering. And then the things that don't work absolutely do not spend these really scarce resources on them you know. Find the things that do work and really try to double down on those. And I think if we're only beginning to test things, that means that the playbook is just really short and we need a much, much longer playbook, because in any given place, in any given population, the things that work, one place is not the right prescription for the next place. And so we just need to know more.

Cheney: Thanks for listening to Voices in Development. If you enjoyed today's episode, please share it. Make sure to subscribe on your favorite podcast streaming platform, where you can also leave us a rating or a review. If you'd like to learn more about the Economic Growth Center, you can visit the website at e-g-c.yale.edu. There, you can also find more information on the Yale Climate, Environment, & Economic Growth Conference. And look for the next installment of Voices in Development - on EGC's website - or on Apple Podcasts, Spotify...or wherever you get your podcasts.