



Quarterly Progress Report - Q4 2023





Quarterly Highlight

Scaling Leaf Color Charts in India

Food systems are responsible for one-third of global greenhouse gas (GHG) emissions, primarily through agriculture and changes in land use. Hundreds of millions of smallholder farmers worldwide do not use the right amount of nitrogen-based fertilizer, which is a leading driver of nitrous oxide emissions, a greenhouse gas 273 times more potent than carbon dioxide. According to a 2021 report by the Better Cotton Initiative, fertilizer production and application make up almost half of the GHG emissions from cotton production. In India, a majority of cotton farmers receive generic fertilizer recommendations from governmental or institutional sources, and there are substantial government fertilizer subsidies of up to 40%, contributing to significant overuse.

Leaf Color Charts (LCCs) are an effective and affordable tool to provide smallholder farmers precise nitrogen fertilizer recommendations, leveraging the science-backed Site Specific Nutrient Management approach. An LCC – a plastic, ruler-shaped strip containing several panels that range in different shades of green – is a low-cost, rule-of-thumb tool that requires minimal background knowledge which farmers can use to obtain customized and precise nitrogen fertilizer recommendations. A [study](#) with 3,000 rice farmers in Bangladesh shows that farmers selected randomly to receive LCCs reduced their nitrogen-based fertilizer use by 8% compared to those who did not, and increased their yields by 3-7%. LCCs report to have the potential to increase farmer profits by 9 to 16%. However, to date dissemination and adoption of LCCs is low.

In 2022, following the promising results from rice farmers in Bangladesh and the development of a cotton-specific LCC, PxD conducted a pilot of LCCs with 800



cotton farmers in Gujarat. In this pilot, more than half of farmers reported using the tool and shared positive feedback, and farmers who received LCCs reported applying 35% less nitrogen fertilizer than those who did not, without lowering yields. With technical assistance from researchers at International Rice Research Institute (IRRI), PxD estimated that farmers who received LCCs reduced GHG emissions by 0.3 metric tons CO₂e per hectare compared to farmers who did not receive an LCC.

With support from the Apparel Impact Institute's (Aii) Climate Solutions Portfolio, PxD is working on a two-year project with 40,000 cotton farmers to create a scaling pathway for LCCs by leveraging promising distribution channels, developing, testing and disseminating LCC training materials, encouraging sustained LCC adoption through PxD's digital agricultural advisory services, and assessing success by evaluating LCC adoption and impact. In 2024, we plan to distribute LCCs and provide customized digital agricultural advice to 10,000 cotton farmers in two eastern districts of Maharashtra, and begin a two-year evaluation of the impact of LCCs on nitrous oxide emissions and farmer net incomes, and to assess the cost effectiveness of various LCC distribution mechanisms.

In Q4, PxD established a partnership with VANAMATI, the State Research and Training Institute of the Government of Maharashtra, and Ambuja Cement Foundation to begin the project in Maharashtra, and we are working to identify other scaling partners in other states. So far, we have conducted two scoping visits in the eastern districts of Maharashtra to gain insights on the needs of the target farmers, the interest and capacity of our scaling partners, and to improve the evaluation design based on feedback from relevant stakeholders. During the second visit, PxD also led a panel discussion, hosted by VANAMATI and moderated by representatives of 150 probationary officers from Maharashtra civil services, on the challenges of smallholder agriculture and the value of collaboration between researchers and policymakers.



Programmatic Updates

India

Coffee Krishi Taranga

With the generous support of the Walmart Foundation, PxD continues to scale its Coffee Krishi Taranga (CKT) service across four states in India (Karnataka, Kerala, Tamil Nadu, and Andhra Pradesh) in partnership with the Coffee Board of India, expanding its reach to more than 120,000 coffee farmers in the last 12 months. This service provides advice on climate-smart coffee growing practices, as well as spices that are also cultivated by many coffee farmers, customized to each farmer's location. In Q4 for the first time PxD also introduced a new price alerts feature where farmers receive alerts of increases or decreases in coffee price in comparison to average prices for the month. In Q4, PxD continued to expand its reach in all four states, including users in very remote areas, using a combination of in-person enrollment and mobile enrollment by working with Coffee Board extension officers and agronomists, Krishi Vigyan Kendras (KVKs - a network of agricultural extension offices), coffee Farmer Producer Organisations (FPOs), curing houses, and the Integrated Tribal Development Agency. To increase farmer engagement, PxD pushed voice calls to users promoting the CKT service, and conducted in-person trainings with farmers on how to use the service, in collaboration with Coffee Board extension workers and agronomists. Crucially, in Q4 PxD began the process of

transitioning the CKT service to the Coffee Board of India, seamlessly transferring the core agronomy and call center functions of the service to Coffee Board staff. We plan to continue to scale this service throughout 2024 and complete the transition to the Coffee Board by the end of the year, building on the successful transitions of similar services in the states of Odisha and West Bengal.

In Q4, PxD also continued to experiment with various forms of service delivery, including outbound voice calls, an inbound voice hotline, and a WhatsApp chatbot. PxD has scaled up its new WhatsApp chatbot version of the CKT service to roughly 55,000 users in Karnataka, addressing feedback from farmer surveys that showed strong demand for video-based advice, which allows more sophisticated multimedia content than our original voice-based service. In Q4, in partnership with the Climate Forecast Applications Network (CFAN), we also continued to pilot our WhatsApp-based rainfall forecast information service with a small sample of roughly 400 coffee farmers in Karnataka during the rainy monsoon. In 2024, with support from the Asian Disaster Preparedness Center (ADPC), we plan to refine and scale this weather forecast service using both WhatsApp- and voice-based advice to farmers to ensure the service remains inclusive and accessible to all farmers, whether or not they have access to a smartphone. We also plan to apply the learnings from this weather forecast service in Karnataka to develop similar weather services for farmers cultivating additional value chains in other states in India in 2024.

Improving Adoption of Stress-Tolerant Seeds

With support from the Innovation in Government Initiative (IGI), the King Climate Action Initiative (K-CAI), and the Digital Agricultural Innovations & Services Initiative (DAISI), in Q4 PxD began work to improve farmers' access and adoption of flood- and drought-tolerant seed varieties. This work, in partnership with the West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP) will allow PxD to reach up to 75,000 smallholder rice farmers with proven flood-tolerant seed distribution interventions, with the potential to expand the initiative to increase the climate resilience of additional farmers in flood-prone areas of West Bengal and beyond. PxD is also exploring a market-shaping initiative in

Gujarat and West Bengal to improve access to drought-tolerant seed varieties, in partnership with government departments, seed retailers, private suppliers, and others. In Q4, PxD conducted field visits in Gujarat and West Bengal to identify stress-tolerant seed varieties for chickpea, rice, and jute, including conversations with agro-dealers, research institutes, universities, seed testing centers, national seed corporations, and farmers, among others.

Kenya

Asset Collateralized Loans (ACLs)

In Q4, with support from the King Climate Action Initiative (K-CAI), Private Enterprise Development in Low-Income Countries (PEDL), the Dioraphte Foundation, and the Goldsmith Foundation, we continued our project providing Asset Collateralized Loans (ACLs) to dairy farmers to finance the purchase of water tanks. These water tanks help dairy farmers increase their climate resilience, reduce vulnerability to rainfall fluctuations, reduce time spent fetching water, and increase milk yields and farmer incomes. In a recent study in Kenya, farmers who purchased tanks increased their milk production by 20-31% on average, driven by much higher milk yield during the dry season (Jack et al., 2018). Because these water tanks are long-lasting assets, these farmers can expect to earn revenue from this additional milk production for the entire lifetime of the water tanks (30 years).



In collaboration with the Development Innovation Lab (DIL) at the University of Chicago and two dairy cooperatives in Kenya's Rift Valley region (Lessos Farmers Cooperative Society and Sirikwa Dairies and General Limited), PxD is conducting a randomized controlled trial (RCT) on the impact of ACLs for water tanks on key outcomes including milk sales, milk production, cow health, household well-being, and gender outcomes (time spent by girls and women fetching water, girls school enrolment, etc). In Q4, we continued to notify additional farmers that they are in the treatment group, informing them of the ACL offer and procedures to take up the loan product, and assessing farmers' willingness-to-pay. In Q4, we received orders for 28 water tanks from participating farmers in the treatment group, bringing the total to 60 out of the 150 farmers expected to take up tanks as part of the RCT, which we expect to be reached in the first half of 2024. We continued our ongoing data collection for the RCT, including ongoing tracking of farmers' repayments of ACLs already issued, which showed over-payment relative to the repayment due dates on average.

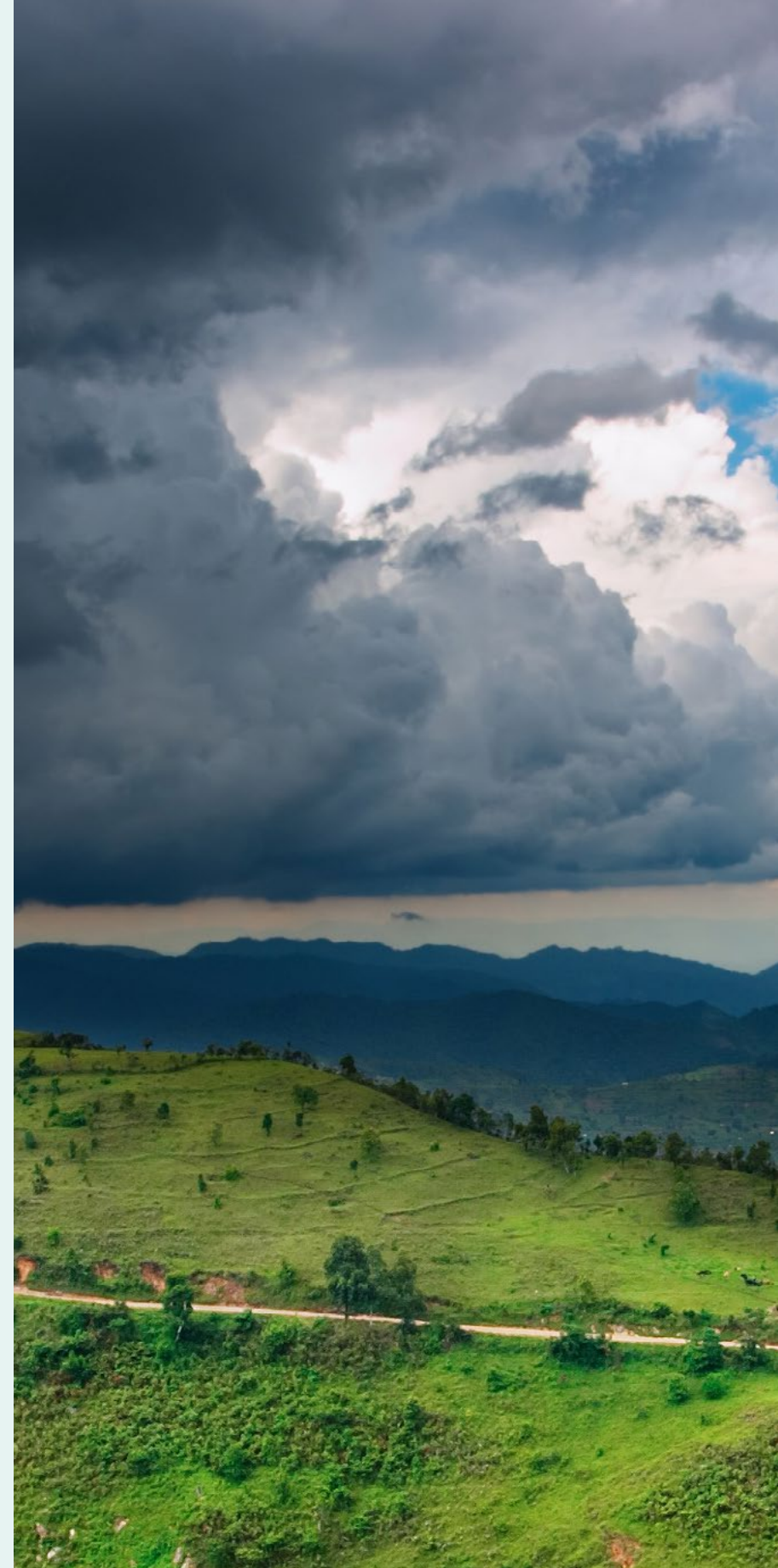
In Q4, we continued to advance our ACL scaling initiative, with a target and plan to make ACLs available to at least 10% of the 1.8 million dairy farmers in Kenya over the next 3-5 years. PxD is in the process of developing a pipeline of dairy cooperatives who are interested in offering ACLs to their members, and PxD is providing technical assistance to an initial set of dairy cooperatives and savings and credit cooperative organizations (SACCOs) to recruit farmers and administer the ACLs, so they can start offering ACLs to their members in 2024. PxD has begun to identify local financial institutions who may deploy more capital to offer ACLs to farmers, and is beginning discussions with additional impact or concessional investors who could channel additional capital to participating dairy cooperatives and SACCOs. In 2024, we plan to start piloting the commercial model of offering ACLs to farmers through the existing financial institutions we are developing partnerships with, and continue to identify ways to improve PxD's loan product offering, laying the groundwork to raise \$10-30m of low-cost capital in a revolving fund that will be channeled to credit cooperatives so they can extend ACLs to many more farmers to help improve their climate resilience.

Ethiopia

Through the Digital Agricultural Advisory Services (DAAS) project funded by the Bill and Melinda Gates Foundation (BMGF) and the United Kingdom Foreign, Commonwealth and Development Office (FCDO), PxD continued to work in partnership with the Ethiopia Agricultural Transformation Institute (ATI) to provide outbound and inbound voice-based agriculture advice. In Q4, PxD continued to scale our outbound voice call service, which has now reached more than 160,000 dairy farmers in the last 12 months with information on artificial insemination, calf and cow management, and customized animal feed rationing. We have also continued to profile new farmers to enroll into our outbound service, with a focus on prioritizing female farmers. To date we have collected 217,000 profiles of dairy farmers across 46 woredas (districts), of which 15% are female farmers. We have used multiple methods to identify and enroll new farmers, including working with local agricultural extension officers - called development agents (DAs) - for in-person profiling, and leveraging the ATI's 8028 user database to conduct phone surveys to profile and enroll new users. In Q4, PxD also continued to work with the ATI to strengthen its 8028 Farmers' Hotline inbound advisory service, which has reached an additional 485,000 farmers in the last 12 months with advice on 21 crops and 5 livestock value chains. PxD also conducted capacity building workshops with 19 dairy cooperatives in collaboration with the Ethiopia Ministry of Agriculture (MoA) to train these cooperatives on milk quality and the use of digital advisory services.

In Q4, we continued to make progress toward launching our global PADDY platform in Ethiopia, completing the importation and setup of all required technical infrastructure. We are now testing the functionality of the telecom lines and expect to launch this platform in early 2024, which will allow us to achieve improved capacity and functionality for scaling push calls at farmers' preferred times of the day.

PxD continued its discussions with The Netherlands Development Association (SNV) to partner together on the second phase of the Building Rural Income through inclusive Dairy Business Growth in Ethiopia (BRIDGE+) project, which is expected to operate from 2024 to 2028.





Global Partnerships, Programs, and Events

In November 2023, PxD CEO Owen Barder joined the [Lewis and Friends podcast](#) with Lewis Perkins, President of the Apparel Impact Institute (Aii), to discuss PxD's work supported by the Aii's Climate Solutions Portfolio to scale up the distribution of [leaf color charts](#) (LCCs) in India to reduce greenhouse gas emissions and improve farmer net incomes.

In November 2023, PxD launched its carbon markets workstream aimed at **bolstering the integrity of carbon credit projects involving smallholder farmers**, potentially through the form of a new standard, buyer guidance, or other public knowledge sharing. With the generous support of the [Swiss Re Foundation](#), in Q4 project activities revolved around conducting a landscape of key carbon market stakeholders for smallholder farmer-facing projects, and establishing relationships with these stakeholders to create an Advisory Group. This Advisory Group will provide insight throughout the project process and inform the final market-shaping product. PxD is also leveraging its landscape review to identify potential research and testing partners as we develop guidance to advance the integrity of the agricultural carbon credit market.

On November 9, 2023 PxD convened our Advisory Group of stakeholders on **Enhanced Rock Weathering (ERW)**, a promising climate mitigation technology with the potential to capture huge quantities of carbon dioxide from the atmosphere while helping farmers improve soil fertility and increase their incomes. With the generous support of the Wellspring Philanthropic Fund, PxD hosted a virtual workshop to share our problem hypothesis for ERW catalyzation in the Global South with the Advisory Group, which consisted of prominent carbon credit buyers such as Frontier, policy initiatives such as Cascade Climate, private ERW companies such as Mati, as well as scientific experts such as the Climate Drawdown Initiative. PxD also published a [blog post](#) (highlighted below) with input and feedback from Advisory Group members, outlining our problem hypothesis, and incorporating PxD's first-of-its-kind cost-benefit analysis of ERW deployment between Global South and Global North geographies, drawing on academic literature reviews and consultations with ERW firms and other stakeholders.

On November 14-15, 2024, PxD's CEO Owen Barder and Ethiopia Country Director Freyhiwot Nadew attended a **partners convening in Addis Ababa, Ethiopia** hosted by the Bill and Melinda

Gates Foundation (BMGF) to bring together the many partners of BMGF who are working in the agriculture and livestock sectors in Ethiopia, to share lessons and identify opportunities for collaboration.

On November 16, 2024, PxD hosted a webinar called "**Bridging the Gap: Centering Climate Change Innovations around the Realities of Global South Smallholder Farmers.**" At this webinar, PxD's team including Owen Barder, CEO, Tomoko Harigaya, Chief Economist and Director of Research, and Yifan Powers, Senior Research Manager (Climate) shared learnings on the importance of centering climate initiatives, including both climate mitigation and adaptation, on the incentives and realities of smallholder farmers in the Global South and maximizing the benefits of evidence-based solutions for people and the planet. The slidedeck and recording of the webinar can be found [here](#).

In December 2023, Jonathan Lehe, PxD's Chief Strategy Officer, attended the 28th session of the **UN Climate Change Conference of Parties (COP 28)** in Dubai, United Arab Emirates. It was a highly productive conference, with more than \$80 billion in funding committed by governments, multilaterals, foundations, and private companies to fight climate change. The agreement coming out of COP, agreed to by all ~190 participating nations, for the first time included critical commitments to "transition away from fossil fuels." Also for the first time, in 2023 COP included a day dedicated to "Food, Agriculture and Water", where delegates explored the important role that agriculture plays in combating climate change. Smallholder farmers in low and middle income countries are among those least responsible for causing climate change, and yet are the most vulnerable to its effects. More than 130 countries pledged to include food and agriculture in their climate plans, and sustainable and regenerative agriculture plays a huge role in those plans. Going forward, PxD is increasingly focused on exploring ways to help the 10 million smallholder farmers that we work with in Africa and Asia mitigate and adapt to climate change.



Organizational Updates

We are pleased to welcome the following new hire to our team:

Abraham Salomon, Senior Program Manager, ACLs, Kenya
Alok Jena, Operations Associate, India

We are pleased to announce that the following colleague has been promoted:

Winnie Njuguna has been promoted to Operations Manager

We are also delighted to announce that Jinu Koola has joined the PxD Board, bringing her huge experience and expertise to PxD. Jinu is currently an Investment Director at ICP Infrastructure, a Norwegian investment firm specializing in energy transition infrastructure in Europe. Before joining ICP, Jinu was a Senior Economist and Head of ESG Analytics at Norges Bank Investment Management (NBIM), which manages Norway's USD 1.4 trillion sovereign wealth fund. Jinu was previously with the U.S. Treasury where she served as the U.S. Financial Attaché to India. She has a broad range of policy and research experience from working with the World Bank, the Gates Foundation, and Innovations for Poverty Action.

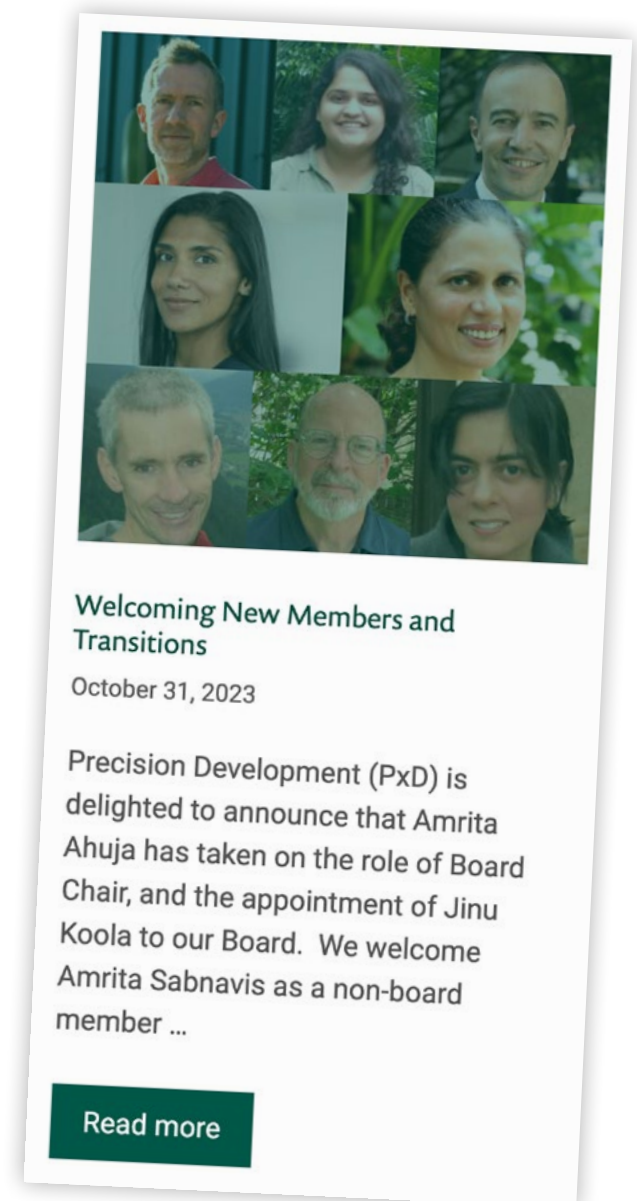
We also welcome Amrita Sabnavis as a non-board member of our Finance and Audit Committee, who will be working closely with Shawn Cole (Board Treasurer) to advise and make recommendations to the Board on matters concerning the financial operations of the organization and the effectiveness of systems of control or management. Amrita has a wealth of experience, with nearly 30 years spanning advertising, retail banking, wealth management, private equity, and entrepreneurship. She currently works as a strategy consultant for Mann Deshi Foundation & Mann Deshi Bank.

We are grateful for the support from [Dasra](#) and the [Women on Board](#) program team, run in partnership between ISDM, Dasra, and Governance Counts, which helped us in the recruitment of Amrita and are leading the way to ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life.



PxD Blog Posts and Publications in Q4

- In October we published a blog post welcoming new members and announcing transitions to PxD's Board and staff.
- In December we published a blog post highlighting PxD's market-shaping work to create a Global South inclusive marketplace for Carbon Dioxide Removal (CDR), through the lens of Enhanced Rock Weathering (ERW), a promising climate mitigation technology with the potential to capture huge quantities of carbon dioxide from the atmosphere while helping farmers improve soil fertility and increase their incomes.



User reach Q4:

Platforms built or improved by PxD reached a total of **10,052,109** users in the last **12** months, including **2,588,395** users of PxD's active programs and **7,463,714** graduated users¹, with an average cost per farmer per year of **~\$1.29** since PxD's inception (including graduated users).



Unaudited actual expenses for last 12 months: **\$4,446,429**

Funding updates

We are very grateful for the following commitments received in Q3:

- A \$994,455 grant from the Bill and Melinda Gates Foundation (BMGF) to provide unrestricted support and conduct an organizational assessment of PxD's forward-looking strategy and plans for long-term financial sustainability.
- A \$98,442 grant from the Asian Disaster Preparedness Center's (ADPC) Innovations for Climate Adaptation and Resilience (iCARE) Innovations Fund to support our work developing and scaling weather forecasts for coffee farmers in Karnataka, India.
- A \$150,000 grant from the Mulago Foundation to provide unrestricted support.
- A \$1,482,425 grant from the Bill and Melinda Gates Foundation (BMGF) to establish a Project Management Unit (PMU) embedded within the federal Ministry of Agriculture and Farmers' Welfare (MoAFW), Government of India, to support digital agricultural transformation.

1. We define graduated user reach as "the number of unique farmers receiving services developed, enhanced, or improved by PxD and managed by partners without our direct involvement in the last 12 months." We do not directly interact with graduated users but they continue to benefit from our work.



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