



Landscape analysis report February 2022



PxD
PRECISION
DEVELOPMENT



Project context

Precision Development (PxD)¹ has partnered with the Coffee Board of India since August 2018 to provide the Coffee Krishi Taranga (CKT) service to coffee growers. The CKT service is modelled on PxD's flagship two-way Interactive Voice Response (IVR) service, which comprises an outgoing service that provides regular advisory to growers on their mobile phones and an inbound hotline on which farmers can call in and access free information services. As of February 2022, the CKT services reaches around 67,000 coffee growers across the states of Karnataka, Tamil Nadu, and Kerala.

The PxD team works with the Coffee Board content team to design and deliver advisory throughout the year, covering all stages in the coffee growing cycle, including land preparation, planting, fertilizer application, pest and disease management, weeding, and harvesting as well as post-harvest management. In addition to regular advisory, advisory is also updated dynamically based on real-time conditions, including weather, pest outbreaks, and more.

Goal

The objective of the landscape analysis is to inform strategy for research and program development, with a focus on three core areas:

- Sustainability;
- Market linkages;
- Gender.

Within each of these three themes, we want to understand:

- The key challenges faced by coffee producers across Southern India;
- The recommended strategies to cope with these challenges;
- The barriers to adopting these strategies.

This report was produced with the support of the Walmart Foundation.

Motivation

Like almost all farmers, particularly smallholders, across the world, coffee producers in Karnataka and Andhra Pradesh a deal with a complex and interconnected set of challenges that can have devastating impacts on their current and future livelihoods.

1. PxD's activities in India are implemented in partnership with Behaviour Change Advisory Services LLP (BCAS).



Climate change: climate change is a serious threat to coffee production globally. Researchers predict a huge contraction of land suitable for coffee growing due to rising temperatures and changing weather patterns.² Currently, coffee farmers face the threats of extreme weather, unpredictable rainfall, and rising temperatures, all of which have direct and indirect impacts on the quality and quantity of coffee produced. We seek to understand, both from experts and farmers themselves, what challenges affect them and how they can – or cannot – cope.

Markets: The majority of coffee growers in Southern India are smallholders. These farmers sell their produce in markets that are highly fragmented and exploitative. We seek to understand why this is the case and how information can improve their situation.

Gender: Women, whether household members or hired laborers, play an important role in coffee farming, though this role is not well understood. We seek to better understand the unique role women play in coffee farming and explore how our services can support them.

Research methods

This report is based on evidence from several different sources, including:

- a. **Review of existing program data:** we analyzed existing administrative and profiling data, including questions asked by farmers on our hotline³ and previous advisory messages sent on the service.
- b. **Literature review:** we reviewed existing literature on the key themes.
- c. **Farmer interviews:** we conducted several rounds of qualitative interviews focused on different themes.
- d. **Expert interviews:** we conducted interviews with identified experts within the key areas.

Overview of this report

- [Sustainability](#)
- [Market linkages](#)
- [Gender](#)
- [Planned activities with potential for impact](#)
- [Bibliography](#)

2. Bunn, Christian, et al. "A Bitter Cup: Climate Change Profile of Global Production of Arabica and Robusta Coffee." *Climatic Change*, vol. 129, no. 1-2, 13 Dec. 2014, pp. 89–101, 10.1007/s10584-014-1306-x.

3. Our service, Coffee Krishi Taranga, comprises two services: (i) an outbound service, where we send farmers push calls with current agronomic advice; and (ii) an inbound service, where farmers can call in for free and access different features, including daily price information, and record questions for experts.



SUSTAINABILITY



UNDERSTANDING LOCAL ENVIRONMENTAL CHALLENGES; INTEREST, KNOWLEDGE, AND ADOPTION OF ENVIRONMENTALLY SUSTAINABLE PRACTICES; AND THE IMPACT OF CURRENT PRACTICES AND PREFERENCES.



Unpredictable weather patterns

Coffee growers in India have been strongly affected by climate change. Coffee is a sensitive crop, and heat and rainfall are widely considered to be the two most important factors for coffee growth.⁴ In qualitative interviews with farmers in the state of Karnataka in Southwest India, conducted in July 2021, 80% (N=20) of the farmers reported weather issues, such as heavy or insufficient rainfall.⁵ In interviews conducted in September 2021, 92% of farmers (N=83) said they had faced a weather-related challenge in the past year.⁶ Unpredictable weather has numerous impacts on coffee, including crop damage at sensitive times such as blooming,⁷ increased incidence of pest and disease, increased soil erosion, and more. Below, we explore a few of the key impacts of climate change on coffee.

Water management and irrigation issues

What is the challenge?

Changing rainfall patterns, which may include unseasonal rain, less rain or drought, or heavy rain, have a huge impact on coffee. Rainfall is one of the key determinants of coffee growth, and across the literature, rainfall and associated water management challenges are a key concern for coffee growers. The coffee crop requires moist soil during certain periods, including vegetative growth and fructification, and drier conditions at other times, such as fruit maturing and harvesting. Erratic rainfall poses a threat. Too much rain can damage crops and soil, delay harvest, and reduce coffee quality. Too little rain also has a severe impact, particularly for farmers without irrigation facilities, causing losses of up to 80%.⁸ In interviews, farmers consistently rated unseasonal and heavy rain as their top challenge.

In the past two to three years there has been unseasonal rain. Because of this there is a huge loss due to berry drop and black rot incidence is severe. - Interview with Virajpete Madhaya, Madikeri⁹



4. Haggar, J. and Schepp, K. (2012). Coffee and Climate Change Impacts and options for adaptation in Brazil, Guatemala, Tanzania and Vietnam. National Resources Institute Working Paper Series: Climate Change, Agriculture and Natural Resources, [online] No. 4, pp.1–50. Available at: <https://www.nri.org/publications/working-paper-series/4-coffee-and-climate-change/file> [Accessed 14 Sep. 2021].

5. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 1. 6 Jul.

6. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 5. 24 Sep.

7. Pokiya, T. (2021). Interview: Agronomist, Px.D. 16 Jun.

8. Singh, D. (2019). India is waking up and smelling the coffee when it comes to climate change. [online] Acclimatise News. Available at: <https://www.acclimatise.uk.com/2019/09/10/how-india-is-waking-up-and-smelling-the-coffee-when-it-comes-to-climate-change/> [Accessed 14 Sep. 2021].

9. The interviews reported in this Report were conducted in the indigenous language and have been translated into English.



Risk-mitigation strategies

Mulching, or the application of organic materials to the soil after fertilizer application, is one of the recommended practices in conditions of heavy rain. It can prevent soil erosion, moisture stress, and improve overall soil health. Where there is insufficient rainfall, farmers require irrigation systems and water sources. Farming Robusta coffee requires greater rainfall, and the shift to this variety has increased farmers' need for irrigation. The recommended form of irrigation is sprinkler irrigation. Harvesting rainwater can also save water.

To cope with the heavy or unseasonal rainfall, farmers in our survey reported digging ditches and removing garbage in estate fields to reduce the moisture in coffee plantations.¹⁰ To deal with low rainfall, farmers reported using irrigation facilities and water sources such as ponds. In Southern India, unseasonal or heavy rain is more of a concern than low rainfall or drought.

Due to weather conditions, harvesting and picking is delayed. Fruits are over ripened and spoiled before picking – *Interview with D.S. Sathish, Basrikatte, Chikmagalur*

Barriers

There may be several factors that prevent farmers from adopting risk management practices. These include financial constraints, for example the costs of constructing irrigation systems, or unpredictable weather itself, for example applying chemical treatments that are then washed away by unexpected rain.

There are some government schemes to help farmers deal with these challenges, for example, rainfall insurance schemes which protect farmers against crop loss due to heavy rain.¹¹ A key area for us to explore is how we can effectively target and promote existing Coffee Board schemes and recommendations that could support farmers facing these risks.

The bank provided a 30% subsidy for a water tank. I took out a subsidy loan 30 years ago. Subsidies are available from the Coffee Board. – *Interview with P.A. Kanteesh Kumar, Madikeri*

We would also like to explore how these schemes or programs can be linked to other recommended practices. For example, in a survey of 12 farmers, only two stated that they knew what practices the Coffee Board recommends for white stem borer. This could be an opportunity for PxD to help inform farmers.

10. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 1. 6 Jul.

11. Coffee Board of India. XII Schemes - Rainfall Insurance Scheme for Coffee (RISC). Available at: https://www.indiacoffee.org/Schemes/Component6_RISC.pdf [Accessed 22 Nov. 2021].



Another area worth exploring is weather forecasts, in particular providing customized weather forecasts or real-time weather information with relevant recommendations. This includes both pre-event advisories (what farmers can do to prepare and protect against an upcoming weather event), and post-event advisories (what actions farmers should take to deal with any damage caused by weather). We asked farmers what types of weather-related challenges they faced and if weather forecasts could help. Approximately 50% (N=76) said they felt weather forecasts could be helpful, but only 16% (N=73) have access to forecasts.¹² Some farmers mentioned that forecasts helped them in the timing of fertilizer application, which often needs to be done during dry breaks in the monsoon season.

CKT's weather-related information has helped me make decisions and follow the right methods. – Interview with Mr Subramani, Kodagu



Incidence of pest and disease

What is the challenge?

The increase in average temperature and erratic rainfall exacerbates the risk posed by certain pests.¹³ The impact of climate change on these pests varies, but overall heavy rain and warmer temperatures are likely to increase the conditions in which several pests thrive. In coffee farming, common pests and diseases include white stem borer, berry borer, coffee leaf rust, and shot hole borer. These pests can cause varying levels of damage — some can be devastating, resulting in crop losses of up to 70% if not treated.¹⁴

A cross-country descriptive study of berry borer suggests that an increase of 1°C in average temperature leads to an 8.5% increase in berry borer incidence.¹⁵ Another descriptive study from East Africa also predicts increases in berry borer incidence due to increasing temperatures.¹⁶ This study also recommends shade management in sun-grown plantations to help control berry borer.

12. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 5. 24 Sep.

13. Watts, C. (2016). A Brewing Storm: The climate change risks to coffee. [online] The Climate Institute, pp.1–14. Available at: <https://www.juntospelaagua.com.br/wp-content/uploads/2016/09/Pesquisa-sobre-caf---The-Climat-Institute.pdf> [Accessed 14 Sep. 2021].

14. Machenahalli, S., Ranjini, A. P., Madhu S., Giri, Sudha M., Daivasikamani, S. and Surya Prakash Rao N. (2019). Disease of Coffee during monsoon season and their management. [online] Planter's World, May, pp.4–7. Available at: <https://krishi.icar.gov.in/jspui/bitstream/123456789/23682/1/coffee%20disease%20during%20monsoon.pdf> [Accessed 14 Sep. 2021].

15. Jaramillo, J., Chabi-Olaye, A., Kamonjo, C., Jaramillo, A., Vega, F.E., Poehling, H. M. and Borgemeister, C. (2009). Thermal Tolerance of the Coffee Berry Borer (*Hypothenemus hampei*): Predictions of Climate Change Impact on a Tropical Insect Pest. PLoS ONE, 4(8), p.e6487.

16. Jaramillo, J., Muchugu, E., Vega, F.E., Davis, A., Borgemeister, C. and Chabi-Olaye, A. (2011). Some Like It Hot: The Influence and Implications of Climate Change on Coffee Berry Borer (*Hypothenemus hampei*) and Coffee Production in East Africa. PLoS ONE, 6(9), p.e24528.



Similar studies have also pointed to an increase in areas favorable for white stem borer and other pests.¹⁷ From the farmer's perspective, pest and disease management is a recurring concern. On our hotline, over a quarter of questions are about pest and disease management. There has also been an increase in calls regarding certain pests, such as white stem borer, with farmers requesting more effective treatments. In recent interviews, nearly all farmers who reported weather-related challenges mentioned coffee/fruit drop as the main negative effect.¹⁸ This refers to the premature dropping of berries, which is often caused by diseases such as black rot or stalk rot.

There is no crop in the estate, it is totally damaged. Early ripening of berries and dropping is observed. Coffee berries cannot be harvested and picked. Delayed harvesting results in financial losses. The yield is significantly reduced. — Interview with Mr Prakash, Chikmagalur



Solutions and strategies

With increased susceptibility to some of these pests, farmers have turned to chemical treatments. While effective in the short term when used properly, these can exacerbate the problem in the long term. Other coping strategies include intercropping (cultivating two or more crops simultaneously), and shade management, which can reduce susceptibility to certain pests and diseases.

We would like to focus on encouraging practices that are preventative or have no negative impact on farmers, regardless of the severity of the infestation. These include, for example, planting rust-tolerant seeds, which can result in higher quality coffee and yields and a reduction in coffee leaf rust, or using the safer organic Bordo copper spray, which can prevent and reduce incidence of different pests and diseases.

Barriers

In our survey of farmers who grew Arabica coffee (N=30), 73% reported using chemicals to treat pests, although we found limited awareness of how

17. Kutwayo, D., Chemura, A., Kusena, W., Chidoko, P. and Mahoya, C. (2013). The Impact of Climate Change on the Potential Distribution of Agricultural Pests: The Case of the Coffee White Stem Borer (*Monochamus leuconotus* P.) in Zimbabwe. PLoS ONE, 8(8), p.e73432.

18. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 5. 24 Sep.



and when to use them.¹⁹ The erratic weather created further complications for preventive practices. For example, Bordo should be sprayed during the dry breaks in the monsoon season, but these breaks are becoming increasingly difficult to predict. Given these challenges, we would like to explore how we can promote integrated pest management that includes the judicious use of chemicals and emphasizes organic practices where possible.

The weather imbalance leads to severe black rot and we cannot use spray at the right time. – Interview with D.S. Sathish, Basrikatte, Chikmagalur

Shifting varietal preferences

What is the challenge?

In 1950, 82% of coffee produced in India was Arabica but by 2020 this had been reduced to 30%.²⁰ We found regional variation in coffee growing methods and varieties. In Andhra Pradesh, for example, coffee farming is more traditional (organic), compared to Karnataka, and 73% of the coffee is still Arabica.²¹

At present, out of the 46,160 farmers subscribed to our service, approximately 78% grow Robusta coffee. Robusta has increasingly been preferred as it is more hardy with greater resilience to pests. This has had an impact on the ecosystem, as traditionally Arabica was shade-grown with native trees and intercropped with spices. Shade trees have long-term benefits, including improving soil fertility, reducing pest and disease incidence, preserving biodiversity, and providing firewood.

19. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 2. 16 Aug.

20. Market Research & Intelligence Unit, Coffee Board (2021). Database on Coffee. [online] Coffee Board of India, pp.1–127. Available at: https://www.indiacoffee.org/Database/DATABASE_Jan2021.pdf [Accessed 14 Sep. 2021].

21. Market Research & Intelligence Unit, Coffee Board (2021). Database on Coffee.



Coffee flowering in field, Chikmagalur district, Karnataka



For 35 years Arabica was grown, but due to higher expenses I removed 50% of the Arabica plants and switched to 50% Robusta cultivation. – Interview with D.S. Sathish, Basrikatte, Chikmagalur

The popularity of Robusta farming has led to an increase in full sun, “monoculture” plantations.²² Robusta farming is associated with an increase in deforestation, which contributes to higher temperatures and climate change.²³

Unlike Arabica, Robusta requires pre-blossom, blossom and post-blossom showers at regular intervals. Given the erratic rainfall, most Robusta farmers require sprinklers or other types of irrigation systems to meet these requirements.

In addition, the choice of Robusta has impacted farmers’ choice of trees. They increasingly prefer the exotic silver oak trees to native trees as silver oak can be harvested for timber, and there is less access to native tree seedlings. However, growing silver oak instead of native trees may also negatively affect the environment – a multi-country study

found a decrease in biodiversity and carbon capture associated with the shift from Arabica to Robusta and the preference for silver oak trees.²⁴ However, in the Indian context, further research is required to understand the relative benefits of growing native versus exotic trees on coffee and yields, incomes, and the environment.

Solutions and strategies

Before we decide to promote a seed variety or tree we need to understand the trade-offs between growing Robusta versus Arabica for South Indian farmers, and whether encouraging Arabica growth is environmentally and financially preferable for farmers. If not, can

22. Chengappa, P.G., Devika, C.M. (2016). Climate Variability Concerns for the Future of Coffee in India : An Exploratory Study. *International Journal of Environment, Agriculture and Biotechnology*, 1(4), pp.819–826.

23. Atkinson, K. (2019). Coffee and Climate Change in a Biodiversity Hotspot: The nexus of agriculture, climate adaptation and biodiversity conservation in Kerala, India. *escholarship.org*. [online] Available at: <https://escholarship.org/uc/item/63d9j05r> [Accessed 28 Sep. 2021].

24. Guillemot, J., le Maire, G., Munishamappa, M., Charbonnier, F. and Vaast, P. (2018). Native coffee agroforestry in the Western Ghats of India maintains higher carbon storage and tree diversity compared to exotic agroforestry. *Agriculture, Ecosystems & Environment*, 265, pp.461–469.



the risks associated with Arabica farming be reasonably mitigated through agronomic practices and government insurance schemes?

Robusta coffee is well suited to South Kodagu. I have been growing Robusta for 40 years. — *Interview with P.A. Kanteesh Kumar, Madikeri*

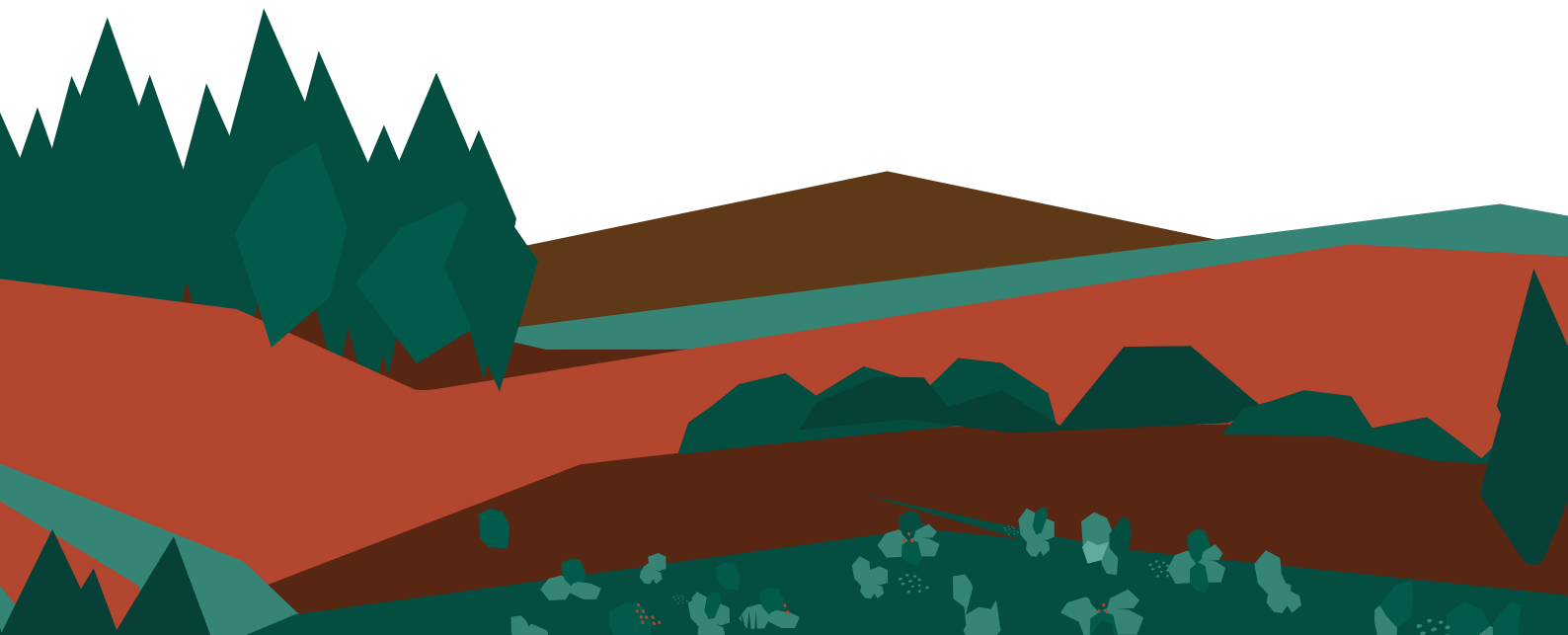
We would also like to explore the relative trade-offs of growing native and exotic trees in the South Indian context. If native trees are financially preferable for farmers, why do they choose not to plant these and how can we address their concerns? Are there existing government schemes that support growing native trees, and if so, how can we promote these?

Barriers

We will need to consider the above questions before we can identify the barriers. However, generally farmers prefer Robusta because it is a hardier and more resilient variety. The preference for exotic trees is because of the easy availability of these seeds and that they can be harvested for timber.

If barriers to specific strategies are financial (e.g. higher potential of financial loss or periods of low returns), we may consider leveraging donor-based financing to offset these risks and promote sustainable practices.

Forty years ago my father grew Arabica but later changed to Robusta. — *Interview with Mr Prakash, Chikmagalur*





Soil quality

What is the challenge?

Climate change and associated changes in weather patterns have negative impacts on soil health. Lack of rainfall can lead to low soil moisture and soil nutrition issues, while heavy rainfall can cause soil erosion and increase soil acidity. Similarly, warmer temperatures lead to higher soil temperature which slows the rate of evaporation and organic material breakdown, which in turn leads to poor soil structure and increased risk of erosion.²⁵

There has been a lot of research into practices that address soil health. A descriptive study from Uganda evaluated coffee yield gaps and explored contributing factors, citing soil fertility and nutrition as a key factor.²⁶

Solutions and strategies

Many commonly recommended practices from the Coffee Board and research organizations in India focus on improving soil nutrition and health, for example, mulching, intercropping, shade management and more. There are several additional recommended practices to

25. Kimemia, J.K. (2016). Climate change and its mitigation in sustainable coffee production. [Presentation] Available at: <https://www.kalro.org/sites/default/files/2016-Coffee-Climate-change-and-its-mitigation-in-sustainable-coffee-KIMEMIA.pdf> [Accessed 28 Sep. 2021].

26. Wang, N., Jassogne, L., van Asten, P.J.A., Mukasa, D., Wanyama, I., Kagezi, G. and Giller, K.E. (2015). Evaluating coffee yield gaps and important biotic, abiotic, and management factors limiting coffee production in Uganda. *European Journal of Agronomy*, 63, pp.1–11.

Women labourers conducting weeding on coffee fields, Chikmagalur district, Karnataka





improve soil health, including composting, lime application, urea application, and growing green manure crops. Regular uptake of these practices is recommended to ensure healthy and fertile soil for good quality coffee and yields. An experimental study from Rwanda found a positive impact of certain organic mulches on soil nutrition and productivity.²⁷

We need to look at how we can effectively communicate information about Coffee Board schemes and programs to farmers and how these can be combined with relevant recommendations. More generally, we want to identify high-impact and low-risk practices that promote soil health and nutrition, such as mulching and composting, and understand the barriers to adopting these and how we can promote these more effectively.

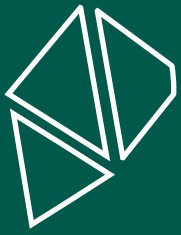
The Coffee Board should talk to the Government of India about providing electric dryers for growers due to the weather imbalance and because (small-scale) growers are not able to buy dryers. – Interview with D.S. Sathish, Basrikatte, Chikmagalur



Barriers

Similar to other challenges, barriers here will depend on the type of practice. However, we might expect that barriers such as financial constraints in accessing inputs, knowledge of how and when to apply inputs and unpredictable weather would be relevant in adopting the recommended practices for soil health.

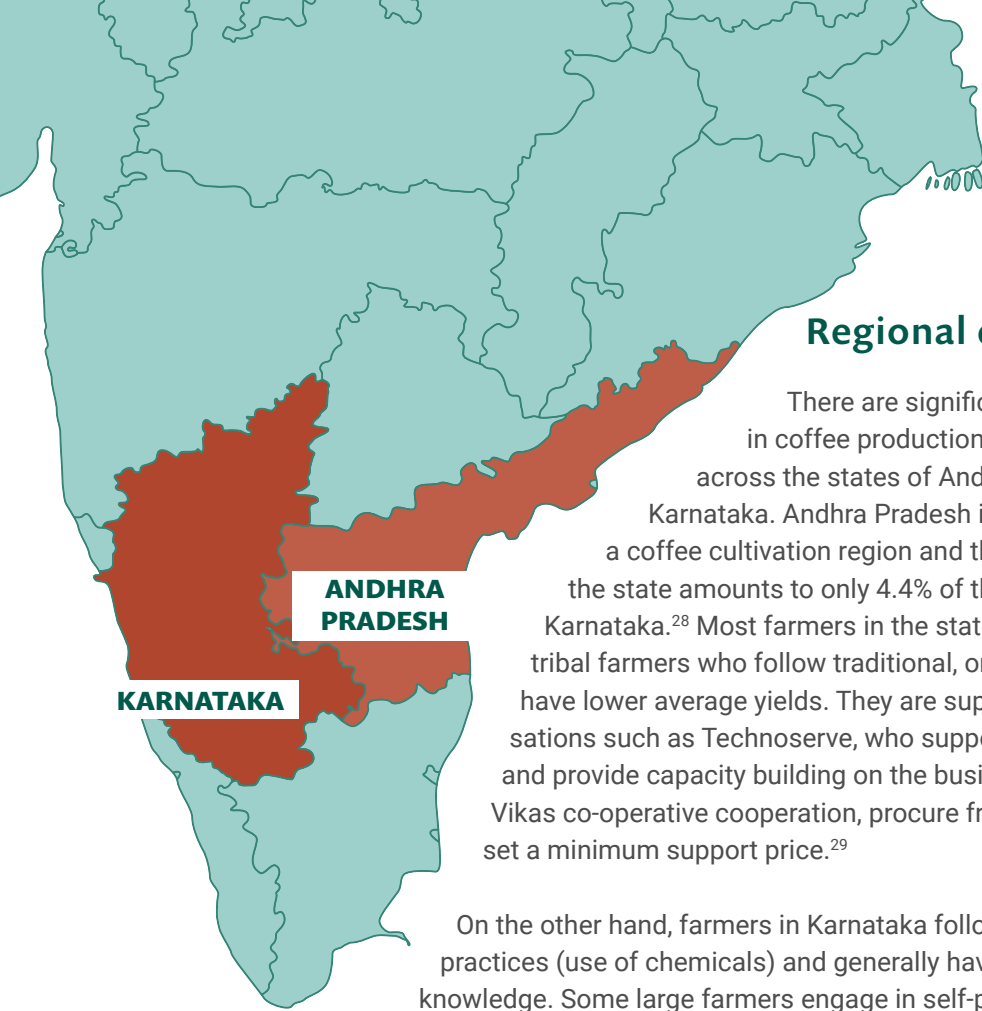
27. Nzeyimana, I., Hartemink, A.E., Ritsema, C., Mbonigaba, J.J.M. and Geissen, V. (2019). Mulching effects on soil nutrient levels and yield in coffee farming systems in Rwanda. *Soil Use and Management*, 36(1), pp.58–70.



Market linkages



**UNDERSTANDING EXISTING SOURCING
MODELS FOR COFFEE AND SPICES;
TRADER AND PRODUCER DYNAMICS;
AND AGENT CULTURE IN THE COFFEE AND
SPICE SUPPLY CHAIN.**



Regional differences

There are significant differences in coffee production and value chains across the states of Andhra Pradesh and Karnataka. Andhra Pradesh is traditionally not a coffee cultivation region and the produce from the state amounts to only 4.4% of that produced from Karnataka.²⁸ Most farmers in the state are smallholder, tribal farmers who follow traditional, organic practices and have lower average yields. They are supported by organisations such as Technoserve, who support market linkages and provide capacity building on the business end, and Girijan Vikas co-operative cooperation, procure from tribal farmers and set a minimum support price.²⁹

On the other hand, farmers in Karnataka follow “conventional” practices (use of chemicals) and generally have more advanced knowledge. Some large farmers engage in self-processing, have their own brands and sell directly to corporates (brands like ITC and Nestle). The smallholder farmers in Karnataka sell their produce to village level aggregators or commission agents who aggregate the produce and then sell it to larger traders or processing agents.³⁰

This suggests that information delivery services and market linkage partners may need to tailor their services based on whether or not farmers are based in traditional or non-traditional coffee growing areas.

Based on out turn³¹ and moisture content, if 7000 rupees is the rate for Cherry coffee the traders fix it at 6000 rupees. Transport charges are

more. – Interview with D.S. Sathish, Basrikatte, Chikmagalur city

Farmers as price takers

Overall, we noted that smallholder coffee growers sell their produce in local markets, which are fragmented and exploitative. A survey from Chikmagalur and Hassan districts, in Karnataka, found that over 90% of growers sold their produce at the farm gate level.³² In our interviews, we found approximately 50% of farmers (N=140) sell their coffee to local traders

28. Coffee Board of India. (n.d.). Statistics on Coffee. [online] Available at: <https://www.indiacoffee.org/coffee-statistics.html> [Accessed 28 Sep. 2021].

29. Kovel Foundation, SMILE Foundation, Girijana Vikas Swatchanda Seva Samstha (2021). Interview with NGOs supporting farmer producer organizations in Andhra Pradesh. 2 Aug.

30. Expert [anonymity requested] (2021). Interview with market linkages expert. 13 Aug.

31. Out turn refers to the amount of clean coffee produced obtained after processing. The out turn test is a common test used by traders to determine coffee quality, and hence prices.

32. Babu, P. (2019). Value Chain Upgrading Strategies for Integration of Indian Small Coffee Growers in Global Coffee Value Chain. *Economic Affairs*, 64(4).



or markets.³³ In more recent interviews, 40% (N=20) of farmers reported that they would sell the coffee at the price offered by the trader even if they were unhappy with the price, while 35% (N=20) reported they would try to explore other markets.

Traders consider out turn and moisture and fix the prices so I am not able to negotiate with them. – Interview with Mr Prakash, Chikmagalur

This narrative was supported by interviews with members of organizations working on the marketing side of the coffee industry. Experts mentioned that while larger farmers may set up direct contracts with buyers, most farmers are smallholders who sell to local markets. Several factors contribute to these less than ideal market conditions, as discussed below.

LACK OF INFRASTRUCTURE

What is the challenge?

Research highlights the complex, fragmented nature of traditional coffee value chains in India.³⁴ The coffee production process undergoes several steps: after the cherries have been harvested, they are taken to a curing center where they are cleaned and prepared for roasting. Smallholders, who deal with relatively small amounts of coffee, usually sell directly to a local trader or agent who pays them on the spot and bears the costs of transporting the coffee to the curing agent. This is where smallholders often lose value on their coffee as local traders set the price for the farmers' produce.

In the next stage of the value chain, coffee is sorted and graded, and beans are separated by weight and other factors that determine their quality and hence their price. Larger farmers may skip the local trader and process their coffee themselves or take their produce directly

33. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 1. 6 Jul.

34. Chengappa, P.G., Devika, C.M. and Manjunatha, A.V. (2019). Coffee value chains in India: exploring sustainability oriented markets. *Agricultural Economics Research Review*, 32(1), p.91.

Harvested coffee, Aldur taluk, Chikmagalur district, Karnataka





to the curing houses for processing. However, smallholder farmers do not have the infrastructure to undertake these value addition activities themselves.³⁵

One way that farmers can overcome these costs is through aggregation, as Farmer Producer Organizations (FPOs) often take on processing and other activities in the value chain that can deliver higher prices. However, they also come with their own set of challenges as we highlight later.

FPOs provide agricultural inputs like fertilizers, micronutrients, and chemicals at a lower rate than the market – 5 to 10% cheaper – and give a discount for agricultural machinery. They reduce the middlemen in markets and in the purchase of inputs and help growers sell coffee at good prices. – *Interview with Mr Subramani, Kodagu*

Solutions and strategies

How can farmers gain an advantage when selling to local agents, or access higher markets? The relevant questions here include:

- How can we leverage the relatively high smartphone ownership within our farmer base to improve output market access? For example, can mapping features be utilized to link farmers to nearby traders or markets?
- Our service offers a free hotline where farmers can access daily local and international coffee prices. These prices are benchmarks and, as discussed below, prices offered by local agents vary. Can providing on-demand price information increase farmers' bargaining power? If so, how can we effectively promote the price feature?

Barriers

One of the barriers smallholders face in output markets is that they lack the infrastructure or access to infrastructure to sort, grade, and process their coffee. This makes them more dependent on local traders and bound by the prices they are offered. While aggregation is one possible way to overcome these challenges, it comes with its own set of challenges, as discussed in detail below.

"If coffee is not dried properly, the traders or agents send it back and ask growers to dry it properly. Traders check the moisture levels and out turn and then deduct payment. – *Interview with A.G Nannaiah, Virajpete, Madikeri*



³⁵. Expert [anonymity requested] (2021). Interview with market linkages expert. 13 Aug.



LACK OF PRICE TRANSPARENCY

What is the challenge?

Our understanding of how prices are set comes mainly from interviews with market experts. Reference prices for an area are usually set by “reference mandis,” which are larger markets. However, a local trader may offer a different price depending on the quality and the practices a farmer employs (for example, organic farming). The challenge is that there is no transparency in how these standards and prices are set. This is exacerbated by the fact that most smallholders do not sort and grade the coffee themselves and traders may offer a lower price for the whole harvest if they find issues with some of the coffee.

Traders will not buy coffee at existing coffee prices. When traders provide information about prices [they say] it will be more, but [when it comes to] selling the coffee, traders fix a certain [lower] rate and give the unnecessary reason that the moisture content is not good. – Interview with A.G Nannaiah, Virajpete, near Madikeri

Solutions and strategies

Currently, farmers can access daily price information by calling into our free hotline. This is the most accessed feature on our hotline. A recent survey found that 95% percent of farmers (N=64) are interested in receiving price alerts from us.³⁶ A survey conducted in December 2020 found that 93% (N=27) of farmers who had accessed our price information found it useful in negotiating prices with buyers/traders. In more recent interviews, farmers mentioned using price information for other reasons: to be aware of the price differences

³⁶. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 2. 16 Aug.



Use of tarpaulin for drying of coffee on cement drying yards, Chikmagalur district, Karnataka



between various markets or within districts, and to compare prices in newspapers and those from traders. This suggests that providing price information is a promising area to increase farmers' bargaining power. While the evidence on the impact of market information systems is mixed, the literature generally suggests that the impact of providing information is highly context-specific. Hence, we would need to better understand the local market structure and price setting mechanisms in order to understand if information can lead to improved outcomes for farmers.

The key question is how can we best promote transparency in output markets? For example, can we provide relevant and useful information about sorting and grading, quality specifications or weighing practices?

We would like to continue investigating the best method of delivering price information to farmers, such as improving access to information on our hotline, and exploring ways to deliver price alerts to farmers.

Barriers

The main barrier that farmers face in this challenge is the lack of transparency in how traders decide prices for their quality. Barriers, such as the lack of infrastructure or price transparency, detailed below, contribute to the larger issue of farmers becoming price takers.

Interviews conducted with coffee growers,
Hassan district, Karnataka





I am from Shringeri and the curing works are in Chikmagalur and Mudigere so transportation costs are the major issues when coffee rates are low. If the out turn is 28% the traders say, according to them, the out turn is 24% or 26% and traders fix the amount at 100 to 200 rupees less per kg. Traders lie about the out turn percentage to all growers. — Interview with Mr Prakash, Chikmagalur

LACK OF FORMAL CREDIT

What is the challenge?

Another challenge we identified in output markets is that farmers often enter into financial relationships with local traders. When they need credit, farmers take informal loans from traders and are then forced to sell their produce to them in return.³⁷ This weakens farmers' bargaining power as they do not have the option to explore other markets and often have to accept whatever price they are offered. This challenge was mentioned by the market experts and various organizations that work with FPOs. In surveys conducted in December 2020, we found that 84% of farmers (N=125) reported selling to the same buyer for over five years, suggesting restricted flexibility to change buyers.³⁸

Solutions and strategies

Financial support schemes for coffee growers could provide farmers with access to formal credit, or other forms of financial assistance, to reduce their reliance on informal loans.

Barriers

The larger barrier here is that farmers lack access to formal financial and credit markets and therefore have to rely on informal markets. Often the easiest source may be the traders to whom they sell. Trust may also be a factor here, particularly if formal financial structures are newer to the area or if there is a general lack of trust in government or official institutions. Farmers may feel more confident and comfortable selling to traders whom they have known and worked with for many years.

I have taken development loans for incentive cultivation of coffee, fencing and irrigation purposes, also a drying yard and a godown [storage warehouse]. I have paid back the loans for irrigation, the drying yard and the godown. — Interview with Mr Subramani, Kodagu

37. Kovel Foundation, SMILE Foundation, Girijana Vikas Swatchanda Seva Samstha (2021). Interview with NGOs supporting Farmer Producer Organizations in Andhra Pradesh. 2 Aug.

38. Krishi Taranga coffee growers (2021). Price survey. December 2020.



Limited role of certification

Certification programs measure standards of farming that promote the protection of the environment, the well-being of workers, or the productivity of a farm. Certified coffee displays labels confirming that the coffee was produced in a sustainable manner. Certification programs in India include Rainforest Alliance-UTZ, Common Code for Coffee Community (4C), organic certification, Nespresso, and Fairtrade.

What is the challenge?

Larger producers usually undertake certification individually while smallholders organize into FPOs or other aggregation structures for group certification.

In our farmer interviews (N=20) none of the farmers had certification, although 50% said they were interested.³⁹ A larger survey of coffee growers in Coorg, Karnataka, found organic growers received the highest financial returns, followed by certified growers. The certifying company offers a premium price for certified coffee but may not always be able to purchase all the certified coffee. Many certified growers end up selling their coffee to local buyers who may not offer a premium price and it may be expensive and time-consuming to transport coffee to another seller. In this survey, only 22% of certified growers reported income increases. While growers found it easy to follow the certification standards, they felt these were often imposed without consideration for local context.⁴⁰ This was echoed by several of the experts we spoke to, who said there was not a clear financial incentive for farmers, particularly smallholders, to undertake the costs of certification.⁴¹ It does appear that organic certification provides premium prices, but the time costs of getting certified may be a deterrent for many farmers.

When my father was alive, we had some certification from the Coffee Board itself. But now because of organic and inorganic cultivation I have not tried certifying. – Interview with D.S. Sathish, Basrikatte, Chikmagalur

Solutions and strategies

We would like to explore whether certification should be promoted for certain groups, for example farmers who are already farming organically and who would not have to make much more effort to be certified. This could mean potential income gains for them.

Barriers

There are costs to certification, including the costs of surveying, equipment, construction of warehouses, etc. One expert we spoke to indicated that certification is only economically

39. Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 1. 6 Jul.

40. Chengappa, P., Rich, K., Muniyappa, A., Babu, P. and Rich, M. (2014). NUPI Working Paper 830 Perceptions and Practices Sustainability Coffee Certification in India. [online] Available at: https://ciaotest.cc.columbia.edu/wps/nupi/0032497/f_0032497_26389.pdf [Accessed 19 Oct. 2021].

41. Expert [anonymity requested] (2021). Interview with market linkages expert. 13 Aug.



feasible at a group level; the costs for individual farmers may be too high.⁴² Some certification processes may also require time – organic certification requires three to five years of organic farming before certification can be granted. For most smallholders, this may not be a realistic investment of time, finances, and effort. On the output side, certification should mean farmers access premium prices, but whether this is actually the case in South India is not certain.

Limited role of FPOs/cooperatives

FPOs are farmer associations that provide capacity-building and training to members, facilitate output aggregation, process coffee, facilitate access to larger markets to obtain higher prices, and more.

What is the challenge?

A well-functioning FPO can provide farmers with cheaper inputs (through bulk orders), facilitate access to technologies, provide financial support, facilitate processing and aggregation to obtain better returns through value addition, facilitate certification, and more. However, the impact of these organizations can be limited due to lack of working capital, lack of technical know-how, management issues, and difficulty in accessing higher markets.⁴³

FYM is 100% guaranteed for organic certification but other products available in the market are not organic and agents lie that all the products are organic. How can I certify? This is my big question. – Interview with D.S. Sathish, Basrikatte, Chikmagalur



42. Expert [anonymity requested] (2021). Interview with market linkages expert. 12 Oct.

43. Farmer Producers' Organizations (FPOs): Status, Issues & Suggested Policy Reforms. (2019). [online] National Bank for Agriculture and Rural Development, pp.1–10. Available at: <https://www.nabard.org/auth/writereaddata/CareerNotices/2708183505Paper%20on%20FPOs%20-%20Status%20&%20%20Issues.pdf> [Accessed 29 Oct. 2021].



If FPOs were available in my area they would be helpful for pulping. Also, [with an FPO] it would be easy to avoid middlemen and sell coffee directly. Based on the out turn it is a loss for me to sell coffee to agents. I would accept good prices if FPOs played a main role. – Interview with M.R. Ranganath, Chikmagalur

For FPOs to function efficiently, they often require the support of other organizations that can provide technical, business, and financial assistance. In the more remote and tribal areas in Andhra Pradesh most FPOs are supported by NGOs that have worked with them for several years. However, these NGOs told us it remains a challenge to get higher prices; most output is still sold in the local markets and only a small proportion of output from FPOs will fetch a higher price.⁴⁴

In a case study of certifying cooperatives in Ethiopia, India, and Nicaragua it was observed that success was highly context-specific. Amongst the cooperatives studied, only the Fairtrade cooperative in Araku Valley, Andhra Pradesh provided clear benefits through relatively higher incomes. The tribal Araku region has historically been economically disadvantaged and coffee production provides a stable source of income. Poor infrastructure and difficult geographical terrains in Araku Valley made it difficult for the tribal coffee farmers to transport their own produce to distant markets. The Fairtrade certified cooperative bought coffee from the village center so its members did not need to carry their sacks of coffee to the market. Other benefits for the members included providing advance credit at the beginning of the planting season and subsidized harvesting equipment.⁴⁵

Solutions and strategies

We would like to support the objectives of existing FPOs and NGOs through information sharing. For example, by linking interested farmers to local FPOs, providing information on cultural practices to be shared with group members (via push call, WhatsApp, videos), providing information on prices, etc.

Barriers

As mentioned above, FPOs often have limited financial resources, lack management or business expertise, or face challenges in accessing markets. As a result, they are not able to make a financial profit and may need to shut down.⁴⁶ This is why FPOs often rely on NGOs or other organizations to help them, particularly when they are starting out.

44. Kovel Foundation, SMILE Foundation, Girijana Vikas Swatchanda Seva Samstha (2021). Interview with NGOs supporting Farmer Producer Organizations in Andhra Pradesh. 2 Aug.

45. Jena, P.R., Grote, U. and Stellmacher, T. (2018). Certifying coffee cooperatives in Ethiopia, India and Nicaragua: how far do small-scale coffee producers benefit? Fairtrade and organic agriculture: a winning combination? pp.157–172.

46. Expert [anonymity requested] (2021). Interview with market linkages expert. 12 Oct.



Gender



**UNDERSTANDING THE ROLE OF
WOMEN IN THE COFFEE PRODUCTION
PROCESS AND CHALLENGES FACED
BY WOMEN INVOLVED IN COFFEE
PRODUCTION.**



Role of women in coffee production

As per Census 2011, coffee plantations were major employers of women workers in Karnataka; out of a total of 4.8 lakh average daily workers employed in coffee plantations, 62% were women. Women appear to be employed for specific activities such as coffee picking, weed management, and applying manure and chemical fertilizers.⁴⁷

A study from South India suggests that women's role in coffee production is limited to supporting their husbands by supervising the storage and drying of coffee (as drying yards are usually located closer to homes).⁴⁸ Some women are responsible for recruiting, supervising, and paying female agricultural laborers. During periods of high labor demand, these women recruit their relatives – which is maintained by lending money, allowing them to watch television, etc.⁴⁹

My wife visits the estate whenever it is necessary, for example if I am away from the station she looks after things, and after the harvest and the coffee is dried, she weighs it and keeps a record of the quantity of coffee available after it has dried. – Interview with Virajpete Madhaya, Madikeri

According to a survey of 12 female farmers in Chikmagalur, Karnataka, and neighboring towns, women whose spouses were at the forefront of production became involved through diversification. Women usually manage crops like cardamom, jackfruits, banana, and ginger which were intercropped with coffee depending on the household.⁵⁰

We interviewed female and male farmers to understand their work streams, decision-making, and challenges and observed certain trends:

47. Joy, C.V. (2004). Small Coffee Growers of Sulthan Bathery, Wayanad Kerala Research Programme on Local Level Development Centre for Development Studies Thiruvananthapuram. [online] Centre for Development Studies, Kerala, India: Centre for Development Studies, pp.1–43. Available at: <http://www.cds.ac.in/krpcds/publication/downloads/83.pdf> [Accessed 29 Oct. 2021].

48. Subramaniam, M.B.S. (2020). The Bitter Taste of Patriarchy: Participation of women coffee farmers in production decision making in South India. [Master's Thesis] pp.1–63. Available at: <https://edepot.wur.nl/529390> [Accessed 29 Oct. 2021].

49. Rao, S. (2011). Work and Empowerment: Women and Agriculture in South India. *The Journal of Development Studies*, 47(2), pp.294–315.

50. Subramaniam, M.B.S. (2020). The Bitter Taste of Patriarchy: Participation of women coffee farmers in production decision making in South India.



Pruning activity conducted in coffee fields by women labourers, Vasthara village, Chikmagalur district, Karnataka



Different primary activities. Women were primarily involved in desuckering,⁵¹ weed management and coffee picking (N=12). Men reported spending most time on weed management, pest and disease management, and transplanting (N=28).

Women and men identify similar challenges in the production process. When asked about key challenges in coffee growing, women and men reported similar problems, mainly unseasonal rain and labor shortages.

Female laborers are commonly hired. All 28 male farmers reported hiring female laborers. The activities they worked on included: cleaning (46%), weed management (36%), and transplanting (36%).

Women may face several barriers in coffee production, as do women broadly in the agriculture sector and in formal or informal labor markets. India's 2011 census noted that few coffee plantations provided special facilities for women, such as toilets or rest areas. There is also gender disparity in the wages paid for men and women laborers, although several women justified lower wages as "men do heavier work".

Monkey and elephant problems have been observed near my estate so I am worried about women working at the estate. — Interview with M.A Ramakrishna, Madikeri/Kodagu

One study noted that these women workers had low levels of education and minimal savings. They were usually not provided with day-care, sanitation and drinking water facilities.⁵² Separate drinking water and washing facilities for women laborers were provided at 50% of coffee plantation units in the study. About 25% provided separate toilets for women laborers while separate rest shelters and recreational facilities were provided by approximately 30% and 2% of units respectively. Only 15 units in Karnataka, Tamil Nadu and Kerala provided crèche facilities.⁵³

Women in the community

What is the challenge?

Five out of 12 female respondents in our farmer survey were part of a community women's group, such as "Swasahaya Sangha", a self-help group. However, research suggests that women coffee farmers may be reluctant to organize themselves and demand

51. A type of pruning.

52. Rao, S. (2011). Work and Empowerment: Women and Agriculture in South India.

53. Chaya, C.P. (2017). An economic analysis of women labourers in coffee plantations in Karnataka: A case study of Hassan district. [online] Available at: <http://hdl.handle.net/10603/219124> [Accessed 4 Nov. 2021].





higher wages — possibly because some are both cultivators and wage workers, and higher wages would not always work in their favor.⁵⁴

Solutions and strategies

Evidence from our other programs and from the literature suggests that women are able to increase their collective knowledge and engagement through participating in community groups. Through a partnership with Professional Assistance for Development Action (PRADAN), we are exploring opportunities to promote and nurture Producer Groups and Agriculture Production Clusters in Odisha. These groups will enable women to synchronize market-linked production of certain crops, improving their efficiency and sustainability. Several FPOs focus on women, and our interviews with experts indicated that there is some scope for community self-help groups to provide women with better resources and information related to coffee production.

With my [women] family members I conduct several programs related to coffee, cleaning and the role of women [to enable them] to be independent.

— Interview with D.S. Sathish, Basrikatte, Chikmagalur city

We would like to explore the role of women's groups and whether these can be leveraged to increase engagement with, and provide relevant support to, female farmers. Examples of women's self-help groups to explore are Mahila Swasahaya Sangha and Stree Shakti Sangha. The fact that many women in our service are generally involved in day-to-day decision-making and may be primary decision makers also suggests that there is room to cater specifically to the areas in which women work.

Barriers

According to one FPO organizer who has experience with mixed-gender FPOs, men often (but not always) tend to dominate the conversation, even though, according to the

Coffee labourers having lunch on a coffee farm.

54. Rao, S. (2011). Work and Empowerment: Women and Agriculture in South India.





organizers, women use money more productively. This discrepancy has led to some gender-based training within the FPOs. However, certain barriers remain. Women-only FPOs are rare because many women want men to join as they face challenges in certain tasks, particularly those that require transportation or visits to remote locations.⁵⁵

Decision-making in the household

What is the challenge?

Based on our farmer interviews, we identified the following trends regarding women's roles in household decision-making:

Women are generally not the primary decision-makers. Approximately 60% of women said they were not a primary decision-maker for any activities (N=12). Most women reported that male household members (husbands, sons) make decisions about prices and the use of income. Almost all men reported that they were the primary decision-makers.

Women are included in decision-making. Although women report they were not the primary decision-makers, 70% said they had a say in decision-making for some activities (N=12). Some women also said they made decisions about income or prices with male household members. When asked if they discussed day-to-day decisions on the farm with their spouses, 68% of men (N=28) and 58% of women said they do (N=12).

Women who are more actively involved may be heads of households. Four out of the 12 women we interviewed, who were registered on our service, were widowed, which suggests that some women become heads of households and take on decision-making for agriculture or share this role with their sons or brothers. This has also been noticed in other surveys.

My wife and I take care of all the farming activities equally. – Interview with M.A. Ramakrishna, Madikeri/Kodagu

Solutions and strategies

We have been exploring opportunities to increase women's decision-making capabilities across our programs. In one example, PxD ran a pilot project in Odisha during Kharif (autumn) in 2019 in which we sent an advisory related to kitchen gardens to 4,500 women farmers. Kitchen gardens are home gardens where crops are grown for household consumption. These are usually run by women. The program has since been expanded to include approximately 60,000 women farmers, and the kitchen garden advisory was often preferred to other advisories. In coffee production, we can similarly identify opportunities to support women farmers in domains where they have more decision-making power. For example, picking and weed management, and diversification of crops through intercropping.

55. Kovel Foundation, SMILE Foundation, Girijana Vikas Swatchanda Seva Samstha (2021). Interview with NGOs supporting Farmer Producer Organizations in Andhra Pradesh. 2 Aug.



Barriers

One challenge is communicating with female farmers on mobile phones as women may be less likely to have access to a mobile phone. We have made an effort to bring women into the service in other programs and what we have learned from those efforts may be applied to coffee production.

Another barrier may be that women can take on specific activities, but they still lack the authority to make decisions pertaining to them or to the income they obtain. This limits their ability to influence larger agricultural and economic outcomes for themselves and their households.





What we are doing and ideas for impact



Existing features

Our service, Coffee Krishi Taranga, provides several features that are aimed at addressing the challenges discussed above. These include, but are not limited to:

Outbound advisory: we send an advisory on many practices recommended for coping with climate change. These include pest and disease management, irrigation facilities, shade management, lime application, etc.

Inbound Q&A feature: our Q&A feature allows farmers to record questions for agronomists for free. This feature is available to all farmers enrolled in our service.

Inbound price feature: our price feature allows farmers to listen to daily international and local coffee prices for free.



[CKT's information about how] to provide irrigation, fertilizers and cultivation methods at the right time is helpful. I can listen to advice and plan to apply fertilizers in the correct way. — *Interview with M.R. Ranganath, Chikmagalur*

Current tests and improvements

We have also tested and tried several programs that aim to increase the uptake of recommended practices or provide additional features to farmers. These include:

Outbound content simplification: the main method for providing agricultural information to farmers is through the outbound service. These messages are usually shared by Coffee Board scientists, and at times can be quite lengthy and filled with technical jargon. To increase the accessibility of these recommendations, we use a template to simplify and redesign the message. We sometimes test these redesigned messages against the originals to find out if farmers like the revised format and are more able to recall the information.

Inbound price feature accessibility: to improve the usability of the price feature, we simplified the format in which price information was delivered on the inbound hotline. Previously, farmers would hear both international and local prices in one, longer message. Given that most farmers are interested in local prices, we split the message into two shorter messages. Farmers will now hear local prices followed by international prices.

Price feature delivery: based on farmers' feedback, we are exploring how we can deliver outgoing price alerts to farmers, particularly those who may not be able to access the inbound service. This includes sending a weekly outgoing price alert via push call or SMS.

Inbound reminder messages: the inbound service theoretically provides an important function to farmers as it allows them to access timely and customized agronomic advice and listen to or repeat previous announcements, and more. However, there is generally little engagement with the inbound service. Only 45% of active users have called in, and only 56% of those users have actually accessed a feature. While there may be several reasons for this, lack of awareness is likely to be one factor.⁵⁶ To address this, we have generated a calendar of reminder messages which will be sent to either subsets of users or all users and are aimed at increasing traffic to the hotline.⁵⁷

Remote training: another tool for increasing farmers' awareness of, and engagement with, the inbound service is remote training. This refers to phone-based training provided to farmers by surveyors who explain how to access the inbound service, what features are offered, how to use them, and that give farmers an opportunity to test the service themselves. Building on a similar A/B test that was run in Odisha, we ran a mini-randomized experiment in which we provided training for different users (farmers who are highly engaged in the outbound service or farmers who have attempted to use the inbound service).

56. This is based on descriptive evidence from the Karnataka context, as well as from other PxD projects.

57. We ran an A/B test on reminder messages for the inbound service in Odisha and found that reminders increased traffic to the hotline but did not necessarily increase successful use of the service.



Live call center: we are introducing a new feature to our service, a live call center, in which trained agents will answer farmers' questions or redirect them to relevant information channels. One identified barrier to accessing the hotline service (which is an Interactive Voice Response service) is digital literacy. A live call center can eliminate the challenges farmers may face with automated instructions, such as how to record a question. We hope that this will increase our ability to provide customized and timely advice to farmers.

Priority practices: our service sends advisories on several different topics during the year. Each topic is important, but some recommendations may be more important – they may result in larger yields or advise on easier strategies for action. To encourage adoption of these practices, one message may not be enough so we are running an A/B test to assess the impact of sending multiple reminders on the adoption of white stem borer management practices (via push call or SMS).

Future tests and improvements

Research agenda

In addition to these existing tests and improvements, we are building a larger research agenda that builds on the key challenges identified in this report. Our main focus is on weather, as this appears to be the most pertinent challenge for coffee growers. We are working on a research proposal in which we look into how weather forecasts or real-time weather alerts can influence

The PxD and Coffee Board team explaining the Krishi Taranga service to farmers, Chikmagalur district, Karnataka





the likelihood of farmers adopting weather-based recommendations.

We have also started further scoping on the other key challenges identified in this report, in particular, identifying relevant information for output markets and exploring women's needs within the coffee sector. For the former, we are looking into how local prices are set, what standards are used to determine the price a farmer receives, and the structure of local coffee markets. For gender, we are running additional interviews with leaders of local women's groups in order to understand whether we can leverage these networks to provide relevant agricultural information to women coffee growers.

Once we have completed necessary scoping and determined potential research ideas, we will hold a research workshop. The goal of this conversation will be to obtain external, expert feedback on our research agenda.

Pilot with the Sustainable Trade Initiative (IDH)

In addition to the scoping and improvements we will run directly through the CKT service, we are also working with the Sustainable Trade Initiative (IDH) on a pilot program in Karnataka. For a subset of 12,500 farmers, spread across 30-45 villages, we will demonstrate proof-of-concept for a market linkages model, bundled with advisory information and in-person field demonstration of recommended practices, that empowers farmers with information to capture higher prices and enter newer markets, and to incentivize the adoption of sustainable practices. PAD will collaborate with IDH to identify aggregation structures for coffee growers, conduct capacity building activities, and connect farmers to buyers for both coffee and spices. This work will have two key aims: i) to build capacity among the farmer aggregation structures to ensure implementation of credible verification protocols to determine if aggregated units are following sustainable practices, focusing on practices such as agroforestry and water and soil improvement, and ii) to develop a consortium of private sector partners and buyers to source from farmer aggregation units, ideally with a focus on responsible and sustainable sourcing.

Service improvements

Most of the growers are not aware of CKT so they need to advertise more about their services. I want CKT to provide [information about the] latest techniques. – Interview with P.A. Kanteesh Kumar, Madikeri

We also wish to improve on and understand how we can build on our existing capabilities to provide a better service:

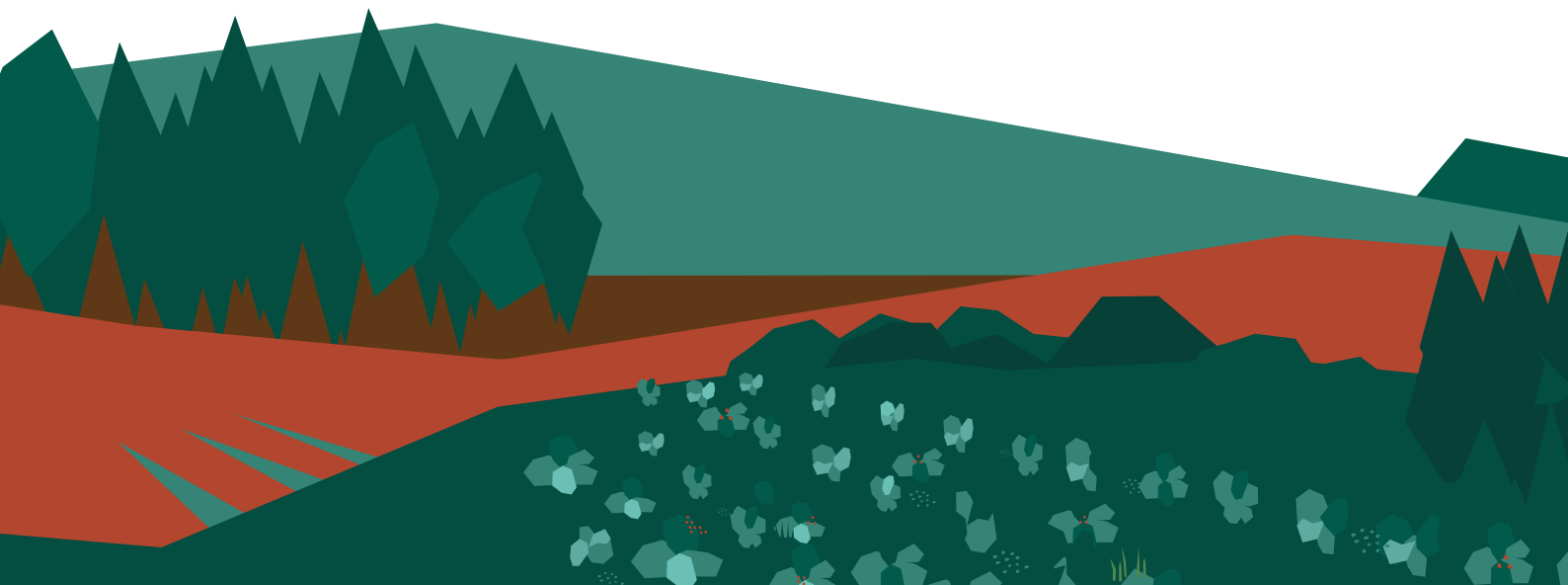
Approximately 44.2% of our farmers use smartphones and 89% have completed secondary education. This is higher than in many other locations, and suggests there is room to reach farmers through text-based and internet-based channels (SMS, WhatsApp, etc.)

Engagement with our outbound advisory is high, while engagement with the inbound is low. Over 91% of our farmers have picked up at least one call in the last six months. However, only 38% of those active farmers have called inbound during the same time, with around



46% of calls being blank (no feature accessed). The inbound service is intended to increase program effectiveness by (1) increasing program reach, (2) allowing farmers to access timely and customized information and (3) ensuring our advisory is relevant by helping us understand farmers' challenges and respond contemporaneously. We want to explore how to increase engagement with, and accessibility of, this service.

As discussed, providing price information seems to be a relatively easy way to support farmers in the output markets. Our surveys have demonstrated that farmers are very interested in price information but the overall access to our price feature on the hotline is low. This is linked to the low engagement with the inbound hotline. We would specifically like to explore how to promote the price feature and how to communicate price information to farmers in an easy, accessible, and actionable way.





BIBLIOGRAPHY

Atkinson, K. (2019). Coffee and Climate Change in a Biodiversity Hotspot: The nexus of agriculture, climate adaptation and biodiversity conservation in Kerala, India. *escholarship.org*. [online] Available at: <https://escholarship.org/uc/item/63d9j05r> [Accessed 28 Sep. 2021].

Babu, P. (2019). Value Chain Upgrading Strategies for Integration of Indian Small Coffee Growers in Global Coffee Value Chains. *Economic Affairs*, 64(4).

Bunn, Christian, et al. "A Bitter Cup: Climate Change Profile of Global Production of Arabica and Robusta Coffee." *Climatic Change*, vol. 129, no. 1-2, 13 Dec. 2014, pp. 89–101, 10.1007/s10584-014-1306-x.

Expert [anonymity requested] (2021). Interview with market linkages expert. 13 Aug.

Expert [anonymity requested] (2021). Interview with market linkages expert. 12 Oct.

Chaya, C.P. (2017). An economic analysis of women labourers in coffee plantations in Karnataka: A case study of Hassan district. [online] Available at: <http://hdl.handle.net/10603/219124> [Accessed 4 Nov. 2021].

Chengappa, P.G. and Devika, C.M. (2016). Climate Variability Concerns for the Future of Coffee in India : An Exploratory Study. *International Journal of Environment, Agriculture and Biotechnology*, 1(4), pp.819-826.

Chengappa, P.G., Devika, C.M. and Manjunatha, A.V. (2019). Coffee value chains in India: exploring sustainability oriented markets. *Agricultural Economics Research Review*, 32(1), p.91.

Chengappa, P., Rich, K., Muniyappa, A., Babu, P. and Rich, M. (2014). NUPI Working Paper 830, Perceptions and Practices: Sustainability Coffee Certification in India. [online] Available at: https://ciaotest.cc.columbia.edu/wps/nupi/0032497/f_0032497_26389.pdf [Accessed 19 Oct. 2021].

Coffee Board of India. (n.d.). Statistics on Coffee. [online] Available at: <https://www.indiacoffee.org/coffee-statistics.html> [Accessed 28 Sep. 2021].

Farmer Producers' Organizations (FPOs): Status, Issues & Suggested Policy Reforms. (2019). [online] National Bank for Agriculture and Rural Development, pp.1-10. Available at: <https://www.nabard.org/auth/writereaddata/CareerNotices/2708183505Paper%20on%20FPOs%20-%20Status%20&%20Issues.pdf> [Accessed 29 Oct. 2021].

Guillemot, J., le Maire, G., Munishamappa, M., Charbonnier, F. and Vaast, P. (2018). Native coffee agroforestry in the Western Ghats of India maintains higher carbon storage and tree diversity compared to exotic agroforestry. *Agriculture, Ecosystems & Environment*, 265, pp.461-469.



Haggar, J. and Schepp, K. (2012). Coffee and Climate Change Impacts and options for adaption in Brazil, Guatemala, Tanzania and Vietnam. National Resources Institute Working Paper Series: Climate Change, Agriculture and Natural Resources, [online] No. 4, pp.1-50. Available at: <https://www.nri.org/publications/working-paper-series/4-coffee-and-climate-change/file> [Accessed 14 Sep. 2021].

Jaramillo, J., Chabi-Olaye, A., Kamonjo, C., Jaramillo, A., Vega, F.E., Poehling, H.M. and Borgemeister, C. (2009). Thermal Tolerance of the Coffee Berry Borer (*Hypothenemus hampei*): Predictions of Climate Change Impact on a Tropical Insect Pest. *PLoS ONE*, 4(8), p.e6487.

Jaramillo, J., Muchugu, E., Vega, F.E., Davis, A., Borgemeister, C. and Chabi-Olaye, A. (2011). Some Like It Hot: The Influence and Implications of Climate Change on Coffee Berry Borer (*Hypothenemus hampei*) and Coffee Production in East Africa. *PLoS ONE*, 6(9), p.e24528.

Jena, P.R., Grote, U. and Stellmacher, T. (2018). Certifying coffee cooperatives in Ethiopia, India and Nicaragua: how far do small-scale coffee producers benefit? Fair Trade and organic agriculture: a winning combination? pp.157-172.

Joy, C.V. (2004). Small Coffee Growers of Sulthan Bathery, Wayanad. Kerala Research Programme on Local Level Development, Centre for Development Studies Thiruvananthapuram. [online] Kerala, India: Centre for Development Studies, pp.1-43. Available at: <http://www.cds.ac.in/krpcds/publication/downloads/83.pdf> [Accessed 29 Oct. 2021].

Karuthara, S., Nestle. (2021). Interview with market linkages expert. 12 Oct.

Kimemia, J.K. (2016). Climate change and its mitigation in sustainable coffee production. [Presentation]. Available at: <https://www.kalro.org/sites/default/files/2016-Coffee-Climate-change-and-its-mitigation-in-sustainable-coffee-KIMEMIA.pdf> [Accessed 28 Sep. 2021].

Kovel Foundation, SMILE Foundation, Girijana Vikas Swatchanda Seva Samstha. (2021). Interview with NGOs supporting farmer producer organizations in Andhra Pradesh. 2 Aug.

Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 1. 6 Jul.

Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 2. 16 Aug.

Krishi Taranga coffee growers (2021). Qualitative farmer surveys: Round 5. 24 Sep.

Krishi Taranga coffee growers (2021). Price survey. December 2020.

Kutywayo, D., Chemura, A., Kusena, W., Chidoko, P. and Mahoya, C. (2013). The Impact of Climate Change on the Potential Distribution of Agricultural Pests: The Case of the Coffee White Stem Borer (*Monochamus leuconotus* P.) in Zimbabwe. *PLoS ONE*, 8(8), p.e73432.

Machenahalli, S., Ranjini, A. P., Madhu S., Giri, Sudha M., Daivasikamani, S. and Surya Prakash Rao N. (2019). Disease of Coffee during monsoon season and their management.



[online] Planter's World, May, pp.4-7. Available at: <https://krishi.icar.gov.in/jspui/bitstream/123456789/23682/1/coffee%20disease%20during%20monsoon.pdf> [Accessed 14 Sep. 2021].

Market Research & Intelligence Unit, Coffee Board (2021). Database on Coffee. [online] Coffee Board of India, pp.1-127. Available at: https://www.indiacoffee.org/Database/DATABASE_Jan2021.pdf [Accessed 14 Sep. 2021].

Nzeyimana, I., Hartemink, A.E., Ritsema, C., Mbonigaba, J.J.M. and Geissen, V. (2019). Mulching effects on soil nutrient levels and yield in coffee farming systems in Rwanda. *Soil Use and Management*, 36(1), pp.58-70.

Pokiya, T. (2021). Expert Interview: Agronomist. 16 Jun.

Rao, S. (2011). Work and Empowerment: Women and Agriculture in South India. *The Journal of Development Studies*, 47(2), pp.294-315.

Singh, D. (2019). India is waking up and smelling the coffee when it comes to climate change. [online] *Acclimatise News*. Available at: <https://www.acclimatise.uk.com/2019/09/10/how-india-is-waking-up-and-smelling-the-coffee-when-it-comes-to-climate-change/> [Accessed 14 Sep. 2021].

Subramaniam, M.B.S. (2020). The Bitter taste of Patriarchy: Participation of women coffee farmers in production decision making in South India. [Master's Thesis] pp.1-63. Available at: <https://edpot.wur.nl/529390> [Accessed 29 Oct. 2021].

Wang, N., Jassogne, L., van Asten, P.J.A., Mukasa, D., Wanyama, I., Kagezi, G. and Giller, K.E. (2015). Evaluating coffee yield gaps and important biotic, abiotic, and management factors limiting coffee production in Uganda. *European Journal of Agronomy*, 63, pp.1-11.

Watts, C. (2016). A Brewing Storm: The climate change risks to coffee. [online] *The Climate Institute*, pp.1-14. Available at: <https://www.juntospelaagua.com.br/wp-content/uploads/2016/09/Pesquisa-sobre-caf--The-Climate-Institute.pdf> [Accessed 22 Sep. 2021]

The research included in this report was made possible through funding by the Walmart Foundation. The findings, conclusions and recommendations presented in this report are those of Precision Development (PxD) alone, and do not necessarily reflect the opinions of the Walmart Foundation.



PxD
PRECISION
DEVELOPMENT



precisiondev.org

