

Waiting For Help: Farmer-Extension Misalignments Within a Climate Resilience Development Program in Central Aceh

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Abstract

This study explores how farmers and extension workers in Central Aceh interpret climate resilience within a SCOPI–BPP agricultural program, and how these differing interpretations may shape trust, collaboration, and the uptake of adaptation practices. Farmers tend to value short-term assistance and responsive crisis aid over long-term development due to the disastrous impacts of increasing climate shocks in recent years. Extension workers, by contrast, are limited in their ability to provide aid through the limited funds of their development agency and prioritize the long-term goals of climate resilience through training. The study develops a lens based on relational equality (power dynamics of trust and collaboration) for interpreting interactions between both groups, offering a hypotheses that requires further testing. Using a sequential explanatory mixed-methods design (forty surveys conducted across three villages immediately after a four-month heatwave, elaborated by fourteen farmer interviews and seven

extension officer interviews) the analysis suggested a possibility of fracturing due to long-term misalignment. While long-term development is more impactful with established farmer communities and is unanimously seen as a benefit, entrant communities are prioritized for short-term aid when available as an incentive for further partnership. Extension workers tend to emphasize “willingness to collaborate” as a heuristic for allocating attention for aid, making established communities that are dependent on the development agency to shift their dependencies onto peer networks and informal adaptive structures. As climate shocks increase in frequency and severity, it is hypothesized that further misalignment may lead to a fracturing of collaboration, although follow-up research is required.

Introduction

The threat to Indonesia's agricultural economy has large implications. Its contributions to global agricultural exports, such as Coffee, being the second largest producer (Indonesia Investment, n.d), reveal the larger consequences of decreased agricultural productivity for worldwide necessities. Alongside this, agriculture is the largest sector of employment and contributes 12 percent to Indonesia's national GDP (excluding the vast informal economy) (Statista, 2025). Climate shocks caused by the El Niño effect have the capacity to destabilize the resources that the Indonesian population and economy rely on.

The coffee sector is particularly vulnerable to climate fluctuations. In fact, by 2050, 50% of the global landmass currently used for coffee production will be unsuitable for farming (Hermanoso, 2023), and Indonesia's land area for Arabica coffee could decrease by up to 37% (Bilen, 2022). Coffee plants require a specific temperature and rainfall range, so they suffer

when conditions slightly stray out of the norm (SEI, 2024). For instance, drought and heat during an El Niño can stress coffee trees, while erratic rains can disrupt flowering and bean development (Reuters, 2023).

These slight changes in climate conditions can drastically affect the quality of the coffee product, decreasing the feasibility of producing “specialty” coffee that many regions in Indonesia rely on for a market advantage. Arabica, for example, thrives only in cooler high-altitude microclimates (Siregar, 2025). Besides the unpredictable climate shocks and rising temperatures that pose a threat to these climates, pests and disease numbers increase rapidly with warmer climates.

Over 90% of all coffee in Indonesia is grown by small-scale farmers (Outloo, 2024). Roughly 1.25 million hectares of coffee farms exist across Sumatra, Java, Sulawesi, Bali, Aceh, and other regions (Reuters, 2023), and 1.3-1.8 million Indonesian families depend on coffee farming for their livelihoods (Rushton, n.d). It is fair to say that the impacts of climate unpredictability have rippling effects on millions of households and call for action to be taken in the development of climate resilience.

One group of solutions for rural development of climate resilience has been the agricultural extension service facilitated through extension officers. In the context of climate change mitigation, extension officers provide systems of information, training, and technical assistance to disseminate solutions to the effects of climate change and to promote communication of best practices that would decrease the risk of preventable climate disasters, such as fires, and reduce emissions.

Indonesian public development agencies, which often deploy extension workers, have developed specific programs to develop climate resilience among farmers. For instance, ecosystem-based adaptation approaches (such as using shade trees for coffee plants, harvesting water, using organic fertilizers, etc.) are being introduced as part of extension advice to buffer against climate shocks (SEI, 2024).

The Gayo Highlands in Central Aceh specialise in Kopi Gayo Arabica, an origin-protected coffee that is the primary source of income for farmers in the three study villages of Atu Lintang, Kute Panang and Bintang. Recent years have brought longer and hotter summers—typically lasting from March through June—with extreme hot days (temperatures above 35 °C) projected to become more frequent across Indonesia over the course of this century (The World Bank Group, 2025). Farmers have reported more unpredictable winds and rainfall patterns associated with El Niño events, which exacerbate the dry season. These climatic shifts have created a range of challenges that threaten coffee yields, including fungal root infections, insect outbreaks, disruptions in soil microbiology, heatwaves, forest fires, and water shortages. Research on global coffee production notes that warming temperatures and humidity accelerate the spread of pests and diseases such as coffee leaf rust and reduce the area suitable for Arabica cultivation, potentially shrinking coffee-growing zones by half by mid-century (Nansen Chen, 2025).

SCOPI (the Sustainable Coffee Platform of Indonesia) is a national multi-stakeholder group that provides training materials, master-trainer support, sustainability standards and market links for smallholder coffee producers (SCOPI, n.d). Its mandate is to develop curricula and

certify practices; it does not control emergency budgets or purchase equipment, which limits its ability to respond to short-term crises (SCOPI, n.d). The Central Aceh Agricultural Development Agency (Balai Penyuluhan Pertanian or BPP) implements on-the-ground agricultural extension programs, developing climate-resilient practices and procuring equipment such as water pumps or shade nets. In Central Aceh, SCOPI's long-run standard-setting and training work runs alongside BPP's field implementation, with extension workers acting as the direct trainers. Extension sessions typically alternate between presentations on problems and solutions (with question-and-answer discussions), demonstrations of new practices or technologies (for example, producing organic fertilizer) and group discussions on community and agricultural challenges. Several sessions draw on curricula and demonstration tools delivered through SCOPI channels and adapted by BPP staff to local conditions. This institutional division means that resilience initiatives prioritize long-term capacity building, while short-term crisis assistance remains loosely defined and often under-funded.

The climate resilience development by the agricultural extension workers focuses on long-term development of combating the symptoms of the larger issue of climate change. SCOPI's role supports this long-horizon orientation by standardizing practices, convening buyers, and helping farmer groups meet market requirements for "sustainable" coffee. The issue arises when considering that many of the subsequent climate impacts have proven to increase in severity with each summer, and many farmers have reported that one of the most detrimental issues has been the unpredictability and frequency of short-term climate shocks. These climate shocks are a large cause for the decrease in production output, and the solutions provided by

these extension workers are oriented towards dealing with consistent long-term problems. This is where the partnership is tested locally: farmers judge both BPP and SCOPI programs not only on future-oriented gains but on whether someone can help when a shock hits.

The focus of this study is on exploring the factors and consequences of a central misalignment between the short-term needs of Gayonese coffee farmers due to the increasingly unpredictable and disastrous climate and the agricultural development agency's long term resilience goals which do not easily accommodate for rapid response.

This paper argues that although farmers generally see the resilience program as beneficial, established farming groups become increasingly dissatisfied as the agency fails to address short-term climate crises. Extension officers operate under resource limits and slow administrative processes, which pushes them to ration assistance through informal judgments of "willingness," a pattern that tends to favor new entrant groups. Although there is a need for follow up research, this points to a long-term fracturing of extension-farmer relations that could impede on the development program's goals if short-term assistance is not accounted for in the program.

Literature Review

Climate change continues to negatively impact global agricultural production. A 2008 study (Cumhur Aydinalp and Cresser, 2008) notes that global climate change deteriorates multiple agricultural production factors, including geographical shifts, reduced water availability, rising sea levels, increased greenhouse gas emissions, and changes in soil biochemistry. These

impacts reflect not only environmental stress but also economic and social vulnerabilities, showing that resilience must be understood across environmental, social, and economic dimensions. Each dimension interacts with agricultural practice: environmental shifts affect soil and rainfall; economic changes alter markets and livelihoods, and social resilience shapes how communities mobilize in response.

In Indonesia, these symptoms of climate change weigh heavily on the agricultural economy. A study by the International Food Policy Research Institute (Oktaviani et al. 2025) concluded that climate change's most significant economic effect on the Indonesian economy falls on agriculture, particularly in rural areas and among poorer households. These groups are most vulnerable to declining productivity and falling prices, particularly due to the shocks caused by recurring “El Niño” and “La Niña” phenomena. (Lilyk Eka Suranny et al., 2022). These phenomena occur due to wind and water disruptions across the Pacific Ocean, factors that rural farmers have little hand in controlling (Ocean Service, 2025). Rural economies bear the brunt of climate change and show why resilience is central to adaptation as the most feasible method of protecting the agricultural economy. The Center for Climate and Energy Solutions defines climate resilience as “the ability to prepare for, recover from, and adapt to [climate] impacts,” a definition that frames this discussion (C2ES, 025). Impact mitigation and small-scale solutions are considered the most feasible in this stage (Imelda and Hidayat, 2024).

Building climate resilience in rural economies requires long-term commitment and the coordination of multiple stakeholders. Government agencies set policies, NGOs and international donors provide resources, and local groups implement and adapt strategies. These actors may

collaborate effectively, but they may also clash over priorities, timelines, and accountability.

Climate service organizations commonly include the collection and analysis of data, alongside technical assistance for public or private organizations in developing climate-responsive policies and training (Ioannis Charalampopoulos and Fotoula Droulia, 2024). However, these services often fail to reach small-scale producers directly, limiting their impact. Moreover, the separation of climate service organizations from on-site farmers or extension workers distorts their understanding of solution feasibility and possibility.

Agricultural extension services often fill this reach gap between large-scale climate services and individual farmers. Extension provides a means of delivering projects and strategies to rural communities, maintaining consistent contact with farmers, and acting as a bridge between institutions and local practice. A study in the Journal of Bangladesh Agricultural University (Rezwana Ferdousi et al., 2024) examined 45 cases of climate-related extension services in developing countries. It identified eight major roles played by extension officers: supplying inputs, raising awareness, building capacity, disseminating innovations, managing production, managing information, implementing policy, and liaising with other actors. The study, based on multiple case evaluations, also noted that without attention to field-level realities, extension systems risk offering generic services that fail to meet actual farmer needs. This shows us the core limitation of extension services: even when acting as a bridge to implement solutions in rural areas, they lack the responsiveness to improve the separation between climate service solutions and the lived experiences of the farmers. Their lack of responsiveness of extension workers can be attributed to their prioritizing of institutional solutions over farmers' needs,

focusing on a narrow perspective of solutions that misalign with farmers' needs (Norbertus Citra Irawan, 2023).

Perceptions are not only central to climate resilience but also shape outcomes across a range of agricultural collaborations. Research on technology adoption, for example, shows that farmers' willingness to adopt innovations such as improved seed varieties or irrigation techniques depends heavily on whether they perceive these practices as compatible with their immediate priorities and constraints (Feder et al., 2010; Spielman et al. 2021). When extension agents emphasize efficiency gains or environmental sustainability, but farmers perceive high input costs or uncertain benefits, they often miscommunicate or lose the ability to collaborate effectively, lagging behind the adoption and resilience process. Studies in Kenya and Ethiopia find similar dynamics with livestock methods: pastoralists' perceptions of disease risk and veterinary services determine whether they engage with vaccination programs (Catley, Alders, and Wood 2011). Even in market-oriented collaborations, farmers' trust in cooperatives or buyers hinges on perceptions of transparency and fairness in pricing, valid priorities but often overlooked from the perspectives of extension officers who might be unable to adjust pricing or open up a top-down communication channel (Markelova et al. 2008). Across these domains, mismatched perceptions create the same structural problem as in climate adaptation: projects stall when extension workers define needs and benefits differently than their target actors, preventing feasible solutions or preferred implementation for either side.

Compatibility in adoption theory refers to the degree to which an innovation fits farmers' existing values, experiences, and needs. Feder and Umali argue that farmers evaluate new technologies by how well they align with local production systems and budget realities rather than by their theoretical yield advantage (Feder and Umali, 1993). Rogers likewise notes that innovations perceived as consistent with current practices and social norms diffuse more rapidly than those that require substantial changes (Rogers, 2003). These insights reinforce the short-term versus long-term misalignment observed in the field: when extension agents emphasise efficiency gains or environmental sustainability, but farmers face high input costs or uncertain returns, adoption lags. Compatibility, in this sense, is not just a characteristic of technology, but a relational measure of how farmers weigh an intervention against immediate constraints and perceptions of credibility.

Differences in perception between farmers and extension agents have important consequences for collaboration, not just communication. Scientific climate risk assessments often rely on scales and definitions that do not match farmers' lived experiences (Simelton et al. 2023). Farmers may define drought as crop failure or delayed rainfall, while experts rely on meteorological indices. Such mismatches can create confusion and weaken trust. Simelton argues that project developers need to pay closer attention to how both farmers and extension workers understand changing conditions if adaptation programs are to be effective. This emphasizes the importance of integrating local and indigenous knowledge, which can offer practical insights often overlooked by scientific framings.

A growing body of evidence shows that farmers' trust in extension information depends on timely, visible support and ongoing contact ((Nyemeck et al., 2002). find that smallholders in Cameroon are more likely to adopt agroforestry practices when extension agents provide tangible demonstrations and follow-up visits (Nyemeck et al., 2002). Davis reports that in Ghana, dairy farmers' trust in extension advice hinges on whether officers return with feedback and provide assistance during crises (Davis, 2010). In this study, trust is operationalized as reachability and follow-through: farmers emphasized ease of contacting extension officers and tangible support during heatwaves as key determinants of credibility. When advice comes without tools or is delivered after a shock, farmers perceive it as an abstract or irrelevant, weakening trust. These empirical findings reinforce the argument that mismatched perceptions create structural barriers to collaboration; trust requires both relevant information and a demonstration that institutions will respond when needed.

Moreover, if not addressed, this lack of understanding can escalate into larger complications for project implementation. In Malawi, for instance, smallholders reported greater trust in advice from peers and "model farmers" than official extension staff, pointing to a credibility gap (Fan et al., 2025). Fan, using survey-based qualitative analysis, shows that such gaps often stem from farmers feeling that external recommendations do not reflect their realities or urgent needs, reducing cooperation. Extension workers sometimes interpret this reluctance as ignorance or conservatism, creating frustration and mistrust. As exposed through qualitative case studies of East African farmers' perceptions of climate resilience adaptation through extension, while many considered extension officers knowledgeable about climate issues, more experienced

farmers were critical of their advice (Makame and Shackleton, 2019). This suggests that extension advice did not fully address their local challenges, or that experienced farmers were more cautious in adopting change.

Evidence from multiple reviews, such as Anderson and Feder (2007) and IFPRI (2019), shows that agricultural extension projects worldwide still lean heavily toward top-down structures, where directives and technologies are passed down from central agencies with limited adaptation to local contexts. While this model has allowed for the rapid scaling of practices such as high-yield crop adoption during the Green Revolution, these recent assessments argue that this predominance can restrict farmer agency and reduce the responsiveness of services to heterogeneous needs. At the same time, examples of participatory or farmer-led models remain less common and often limited in scope, highlighting how the dominance of top-down structures continue to shape extension outcomes.

Comparative studies suggest that limiting strategies to only one approach, either “top-down” or “bottom-up”, rarely produces satisfactory results. A 2023 review of 65 case studies concluded that while bottom-up approaches can fail to align with larger climate objectives, purely top-down approaches often neglect the immediate needs of vulnerable communities (Grigorieva et al., 2023). While most modern implementation projects rely on top-down approaches, the challenge lies in finding a balance that ensures both efficiency and relevance.

Other work has reinforced this point by highlighting the shortcomings of conventional top-down approaches common in development projects. Such approaches often fail to account

for smallholder farmers' unique, complex needs (Joab J. L. Osumba et al., 2021; Anderson and Feder, 2007; IFPRI, 2019). The authors highlighted the importance of responsive communication channels to tailor interventions better. Similarly, another study of extension workers under the Baghdad Department of Agricultural Extension and Training (Abdel-Hussein and Obaid, 2024) found that a significant barrier to effective extension was the absence of regional specialists identifying farmers' specific needs. These regional specialists would ideally be familiar with the unique environmental circumstances of smaller farmer groups across a larger region and be able to adapt institutional frameworks to specific solutions and be more responsive to their needs by establishing a more personalized communication channel.

However, critics note that expecting every extension system to employ specialized staff is unrealistic, given institutional and budgetary constraints. As an alternative, Kester-Post (2025) examined the role of localized extension workers in Georgia, USA. Their findings, based on mixed-method fieldwork, indicated that smallholders are more likely to trust and cooperate with training from locally stationed extension agents than general regional officers. The preference was not due to the technical specialization of local agents, but rather their prompt communication and ability to form personal relationships. The study concluded that the perceptions farmers hold of extension services strongly influence the success of development projects. Furthermore, this conclusion allows us to argue for personalized presence in farming areas without the need for multiple specialists for each specific agriculturally unique zone, reducing the amount of manpower required to have successful implementation.

Similar findings come from South Africa. An impact evaluation of extension services found that smallholders often perceived projects as ineffective (Simeon and Antwi, 2022). Farmers placed the most significant weight on three factors: the relevance and quality of services, the usefulness of information for improving production, and the availability of necessary technologies. The study also observed that negative perceptions of extension were positively correlated with farm size: larger farms have more complex or diverse needs, and when extension projects use standardized approaches, they fail to meet these differentiated expectations. The implication is directly relevant to the broader argument: misalignment between farmer realities and extension delivery is not only about climate definitions but also about scale and capacity, reinforcing how one-size-fits-all designs undermine collaboration and trust.

While extension officers tend to be disconnected in their understandings, smallholder farmers on the frontlines of climate change have developed practical knowledge of weather patterns and coping strategies. However, research suggests that their understanding of resilience often focuses on short-term needs and traditional coping mechanisms rather than long-term adaptation. A survey of Gayo Highlands coffee farmers (Abdul Muis Hasibuan et al., 2023) found that farmers ranked climate-related traits such as drought tolerance much lower than yield, quality, or pest resistance. This is consistent with the lack of exposure to agronomic explanations of the impacts of climate change on crops. This prevents proper solutions from coming from isolated farmer groups, as they may misdiagnose the causes of crop failure and implement ineffective or harmful treatments. The study also reported that participation in coffee extension activities hurt farmers' appreciation of climate-resilient traits, implying that current extension

approaches may fail to convey the importance of adaptation or be unfit to existing farmers' understandings of climate change.

Here lies the central misalignment. Farmers, shaped by immediate pressures of survival and productivity, evaluate resilience through what helps them today. Extension workers, by contrast, are trained in adaptation frameworks and tend to emphasize climate-smart practices designed for the long term. Extension is widely recognized as a key channel for climate information, yet its advice does not always align with what farmers see as urgent or applicable. Surveys in Indonesia (Febriani Setyo Sawitri et al., 2025) concluded that extension officers serve as motivators, educators, disseminators, supervisors, and evaluators, though they remain less effective in facilitating networks between actors. This ineffectiveness dilutes the capabilities of extension workers to implement beneficial solutions as they are unable to align the institutional frameworks with the farmers' needs. This perception of ineffectiveness may also mean that farmers may perceive extension messages as abstract or misdirected, while extension workers may view farmers as short-sighted or resistant. The result is a persistent mismatch: what farmers call for immediate assistance is not what extension officers prioritize as necessary adaptation. These tensions, rooted in top-down structures, show that resilience is not an idea contested through trust, credibility, and relevance. Such findings highlight the need to examine how different actors actually understand and define resilience, rather than assuming shared interpretations.

Method and Limitations

Understanding how farmers and extension workers perceive climate resilience requires both measurable patterns and deeper insights into lived experience. A mixed-methods approach was therefore adopted, combining standardized surveys with semi-structured interviews. Following a sequential explanatory design, the study first used surveys to generate comparable data across participants, identifying broad trends and differences between groups. The subsequent interviews were then designed to explain these quantitative results, clarifying why advice was or was not followed, how farmers interpreted institutional credibility, and what collaboration looked like in practice.

This framework is widely used in development and policy research because it allows quantitative breadth to be directly linked with qualitative depth (Ivankova et al., 2006), and is particularly valuable when initial numeric findings reveal paradoxes or unexpected relationships that require contextual explanation (Fetters, Curry, and Creswell, 2013). Surveys on their own risk flattening perception gaps into abstract categories, while interviews alone can produce narratives that are rich but not generalizable. The sequential approach ensures that the qualitative stage builds on and illuminates the quantitative stage, creating an integrated interpretation rather than two parallel strands of data.

Fieldwork was conducted in early August, directly after a four-month historical heatwave. The timing of data collection was a key part of the research framework. Because all three villages had just experienced the same prolonged shock, responses carried out a shared

reference point. This made it easier to see how credibility was tested under stress. Differences in what farmers reported reflect their perceptions rather than differences in focal events.

The three villages, Kute Panang, Bintang, and Atu Lintang, sit within 5 kilometers of each other on the outskirts of the city of Takengon. Consequently, they fall under the same agricultural development branch, which meant institutional rules and resources were consistent across sites. The main difference was how long extension workers had been involved in each village. Notably, average extension involvement in Atu Lintang was 3 years; Bintang was 1-2 years, and Kute Panang was anywhere from 1 day to 6 months. This gave the research a way to hold climate and organizational context steady while still observing how the length of involvement shapes perceptions and relations. In practice, it allowed me to see whether variation in trust, collaboration, or definitions of resilience was driven less by geography or bureaucracy and more by how relationships had evolved over time.

Farmer surveys and interviews were conducted over three days, each day focused on a different farming group. Every participating farmer completed a standardized survey. Afterward, volunteers stayed for interviews. On the fourth day, seven out of the twelve total regional extension workers were also interviewed. I also had consistent informal experiences with every extension worker in the region; many of the conversations have been added to the observation logs. Although, in the formal sense, I have had more interactions with farmers and data collected on their perspectives, the extension workers often aligned their views with the development agency, meaning that there was less variation across the views of extension workers. Moreover,

extension workers don't act as individuals; rather, they have a bureaucratic process of approval and denial for each decision they make (e.g., whether to aid or not, and in what form), which further ensures that the perceptions and actions don't significantly vary across individual workers. Furthermore, these extension workers are residents of the highland, who have been involved in this project since its establishment in the area, meaning that there isn't much temporal variation in their perceptions.

Before each interview, participants gave consent verbally, which was recorded, and surveys (see Image 2, 3, 4) began with a written consent form (see Image 1) that each farmer signed. In total, the study gathered forty survey responses, fourteen farmer interviews, and two extension officer interviews. Working through translation shaped the process. Surveys were translated into Indonesian and English, and at stages extension workers helped with wording. A paid translator, unaffiliated with any agency or local farmer group, was used throughout. This carried the risk of losing nuance or reframing answers in ways that echoed program priorities. To reduce this, I checked translations back into English at several points and debriefed after sessions to note moments of uncertainty. With my limited but sufficient understanding of Indonesian, I was able to cross-check the accuracy of the main ideas transmitted during the official recordings.

Figure 1

Consent form for all interviewed or surveyed

Formulir Persetujuan dan Syarat Partisipasi Penelitian

Judul Penelitian:

Menilai Perkembangan Ketahanan Iklim Petani Kopi dalam Konteks Intervensi Pembangunan Publik-Swasta di Aceh Tengah

Peneliti:

Aditya Chandra
Kontak: 8111918060

Tujuan Penelitian:

Anda diundang untuk berpartisipasi dalam penelitian ini, yang bertujuan memahami bagaimana perusahaan kopi, pelatih, dan petani merespons perubahan iklim seperti gelombang panas dan kekeringan. Penelitian ini bertujuan mengetahui apa saja yang sudah dilakukan, apa yang berhasil, dan apa yang masih perlu diperbaiki agar dukungan ke depannya bisa lebih efektif.

Syarat Persetujuan:

- Partisipasi Sukarela:**
Partisipasi Anda sepenuhnya bersifat sukarela. Anda bebas untuk tidak menjawab pertanyaan apa pun, berhenti kapan saja, atau menarik kembali jawaban Anda tanpa perlu memberikan alasan apa pun.
- Kerahasiaan:**
Semua jawaban Anda akan dijaga kerahasiaannya. Tidak ada informasi yang akan dibagikan kepada SCOPI, perusahaan kopi, atau peserta lain. Jawaban Anda hanya akan digunakan oleh peneliti (Aditya Chandra) untuk keperluan akademik. Semua laporan akan menggunakan data anonim, tanpa nama atau detail yang bisa mengidentifikasi Anda.
- Akses Eksklusif:**
Hanya peneliti yang dapat melihat jawaban Anda secara penuh. Jawaban Anda tidak akan dibagikan kepada SCOPI, perusahaan, atasan, ataupun staf lain. Data hanya digunakan untuk penelitian ini.
- Hak untuk Mengundurkan Diri:**
Anda berhak berhenti dari survei atau wawancara kapan saja, dan Anda juga dapat meminta agar data Anda dihapus. Tidak ada konsekuensi apa pun jika Anda memilih mengundurkan diri.
- Kontak Lanjutan:**
Jika Anda bersedia untuk diwawancarai lebih lanjut, Anda bisa memilih untuk memberikan kontak di akhir survei. Ini sifatnya opsional.
- Pertanyaan atau Kekhawatiran:**
Jika ada pertanyaan atau hal yang ingin Anda diskusikan tentang penelitian ini, silakan hubungi Aditya Chandra di nomor yang tertera di atas.

Pernyataan Persetujuan:

Dengan menandatangani atau menuliskan nama di bawah ini, Anda menyatakan telah membaca (atau sudah dijelaskan) tujuan dan syarat penelitian ini, memahami hak Anda, dan setuju untuk berpartisipasi di bawah ketentuan tersebut.

Nama/Tanda tangan: _____ Tanggal: _____

Figure 2

First page of distributed survey

Survei Petani Kopi di Central Aceh

*Di bawah ini adalah pertanyaan tentang pengalaman Anda menghadapi perubahan iklim dan cuaca. Anggota SCOPI, Master Trainer, dan Staf [Perusahaan Lokal] **tidak akan melihat jawaban Anda.***

Sudah berapa lama Anda bekerja dengan kopi bersama SCOPI?

- ☐ Kurang dari 1 tahun
- ☐ 1 tahun+
- ☐ 2 tahun+
- ☐ 3 tahun+

Bagaimana Anda menggambarkan tingkat panas dalam dua bulan terakhir?

- ☐ Sangat panas, tidak tertahankan
- ☐ Terlalu panas
- ☐ Cukup panas
- ☐ Biasa saja
- ☐ Lebih dingin dari biasanya

Apakah Anda pernah merasa butuh dukungan lebih untuk menghadapi suhu yang tinggi akhir-akhir ini?

- ☐ Sangat sering
- ☐ Sering
- ☐ Tidak terlalu
- ☐ Tidak pernah

Apakah Anda menerima bantuan selama masa panas panjang atau kekeringan terakhir?

- ☐ Ya
- ☐ Tidak
- ☐ Saya tidak ingat

Figure 3

Second page of distributed survey

Bagaimana Anda menggambarkan pengaruh perubahan iklim pada tanaman Anda?

Tanggapan seperti apa yang Anda lihat terhadap perubahan tersebut?

Apakah Anda bersedia diwawancarai sebagai tindak lanjut survei ini?

- ☐ Ya
☐ Tidak

Jika ya, bagaimana Anda ingin diwawancarai?

- ☐ Wawancara langsung
☐ Wawancara online

Jika Anda bersedia mengikuti wawancara, silakan masukkan nomor kontak Anda dan beberapa hari dalam minggu ini (termasuk akhir pekan) di mana Anda dapat melakukannya”

Figure 4

Third page of distributed survey

Siapa yang paling banyak membantu Anda saat itu?

- ☐ Staf perusahaan
- ☐ Master Trainer
- ☐ Sesama petani
- ☐ Tidak ada
- ☐ Lainnya: _____

Apakah ada perubahan pada pertanian atau hasil panen Anda selama periode tersebut?

- ☐ Ya, perubahan besar
- ☐ Ya, perubahan kecil
- ☐ Tidak ada perubahan
- ☐ Tidak yakin

Apakah Anda menerima saran atau petunjuk tentang cara menghadapi cuaca saat itu?

- ☐ Ya, dan saya mengikuti
- ☐ Ya, tapi saya tidak mengikuti
- ☐ Tidak, tidak dapat saran
- ☐ Saya tidak ingat

Sejak saat itu, apakah Anda melakukan hal berbeda di kebun Anda?

- ☐ Ya
- ☐ Tidak
- ☐ Tidak yakin

Masih ada pertanyaan di halaman berikutnya.

Since the core extension workers set up the meetings with farmers, coordination was easy, but it also likely shaped who attended and what farmers felt comfortable saying. To blunt conforming answers, I told participants the study was independent, held interviews away from the earshot of workers, and reminded them that joining or declining would not affect any services of the program, which was stated as part of their consent form. Moreover, only volunteers stayed for interviews, which probably tilted the sample toward people already willing to talk, and thus those who might be considered as “representatives” of the farmer groups. These representatives tend to be older, male, and more settled in their perception. I ensured there was a fair balance between male and female interviewees, which exposed me to the fact that the involvement of women in direct field farming was comparatively lower than men. Greater weight was given to individual interviews for nuanced interpretation. This weighting acknowledges that the perspectives of farmer leaders may skew data and seek to balance representation between vocal leaders and quieter participants. The “representative” opinion was overrepresented in some surveys; farmer leaders sometimes guided others through questions, which affected the validity of certain free-response items. Many of these items were aggregated due to repetitiveness, limiting the ability to analyse individual differences. Moreover, some groups of participants tended to leave during the training sessions, a group that would be unable to do surveys or interviews. This may have skewed the data in favor of the program, as any participants who left due to doubts or lack of agreement with the training procedure or content would have been unable to contribute.

The “representative” opinion was also overrepresented in the surveys. In Bintang, for some free-response questions, farmer leaders tended to guide other participants through questions, often suggesting answers to the whole group. This greatly affected the validity of certain data points, many of which had to be aggregated due to repetitiveness. On top of that, it prevented a better understanding of certain climate and economic situations in the Bintang village, as some participants chose to follow the leader rather than talk about their personal experiences that may have added more dimensions.

Fieldwork took place right after a long heatwave, so risk and frustration were fresh. That timing likely made concerns feel sharper than in an ordinary season. I asked about both the last season and typical year routines and the change in both across their experience in farming. This allowed me to evaluate the extent to which unpredictable seasons differ from the usual weather and heat, on top of allowing me to get a sense of how impactful the progression of climate change has been on their experiences as farmers and residents of the area.

My presence as an external researcher may also have influenced how people answered. My positionality as a representative of an accredited institution could have invited deference, hopes for future support, or a wish to avoid conflict. I tried to reduce these effects. I used neutral wording, promised confidentiality, and reminded participants that there were no right answers. I asked follow-ups that invited examples from daily work rather than general statements. I checked unclear translations on the spot. Still, some pull toward socially acceptable responses likely remained, and I read the results with that in mind. On top of this, I took a lot of time to connect

with each farmer and ensured my translator did as well, in a way that allowed them to speak to us more informally and without fear of repercussions or superficial standards, allowing for more accurate responses.

Findings

All three villages were surveyed immediately after a four-month heatwave that served as a shared stressor. Farmers uniformly described the past season as hotter and drier than usual; in the surveys, every participant in Kute Panang and Bintang reported “moderately hot” conditions, while a small minority in Atu Lintang labelled the heat “too hot.” The uniformity of heat experience eliminates climatic variation as an explanatory factor, sharpening the focus on perceptions and relationships. Interviews reinforced this commonality: farmers narrated how extended dry spells burned leaves, stressed coffee blossoms, and forced them to cut down plots. One farmer surveyed in Atu Lintang described “temperature increase, crops dying out and soil becoming dry”, while a farmer in Bintang spoke of “rising heat, high fever and illness”. For the purposes of maintaining anonymity outlined within distributed consent forms, survey data will be anonymized, omitting any free response answers or any interview notes that may lead to identification.

Despite shared climatic conditions, the villages differed markedly in how they responded to this crisis and what they expected from extension. Atu Lintang, where extension involvement spans about three years, shows the highest integration of adaptation practices. All nine surveyed farmers reported having worked with SCOPI/BPP for three years (see Table 1), and eight

reported hearing extension advice and following it. The majority made small or major changes in their farming practices. In interviews, they detailed training benefits: shade management, organic fertilization, and pest control techniques were credited with stabilizing yields. Yet when asked about the recent heatwave, eight of nine said they received no support during the crisis. Farmers explained that requests for water pumps and compressors had been pending for years. They still looked forward to long-term improvements but expressed frustration that short-term issues are damaging half of the existing coffee crop. Our first interviewee detailed that “[the forest fires] prevent most of the coffee from growing. It affects the flower of the coffee so it is unable to bear the fruit. and, water resources become harder to find that's why we are asking for solution and support... About 50% of coffee has been affected... We have asked [for support] but SCOPI and BPP haven't given it yet, but we are looking for solutions to [mitigate] climate change” (Atu Lintang #1, translated). The long-term adaptation uptake alongside the absence of crisis support is the common failure across these projects, a highlight of the one-sided relationship between extension workers and farmers.

Table 1

Farmer Survey Data in Atu Lintang

Questions	#1	#2	#3	#4	#5	#6	#7	#8	#9
How long have you been working with coffee in partnership with SCOPI?	3 years	3 years	3 years	3 years	3 years	3 years	3 years	3 years	3 years
How would you describe the heat levels in the past two months?	Too Hot	Too Hot	Too Hot	Too Hot	Moderately Hot	Moderately Hot	Moderately Hot	Moderately Hot	Moderately Hot
Have you ever felt in need of further support to deal with the recent temperature?	Very Often	Very Often	Very Often	Very Often	Very Often	Very Often	Very Often	Very Often	Very Often
Did you receive any support during the last long dry period or heat?	Yes	No	No	No	No	No	No	No	No
Who gave you the most help during that time?	Master Trainer, Fellow Farmers	Fellow Farmers	"Extension Worker"	Fellow Farmers	Master Trainer, "Agricultural Workers"	Master Trainer, Fellow Farmers, "Cultivators"	Master Trainer	Fellow Farmer	Master Trainer, "Agricultural Extension Worker"

Were there any changes in your farming or harvest during that period?	Yes, but small changes	Yes, major changes	No changes	Yes, but small changes	No changes	Yes, but small changes	No changes	Yes, but small changes	Yes, major changes
Did you hear any advice or instruction about how to handle the weather during that time?	Yes, I followed it	Yes, I followed it	Yes, I followed it	Yes, I followed it	Yes, I followed it	Yes, I followed it	Yes, I didn't follow it	Yes, I followed it	Yes, I followed it
Have you done anything differently on your farm since then?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note. All questions and answers are translated into English from their original Gayonese

Bintang represents an intermediate stage, with one to two years of program involvement. Fourteen farmers participated in the survey; nine reported less than one year of collaboration, while others noted two years. Thirteen considered the heat wave moderately hot, and thirteen said they “often” needed further support (see Table 4). Again, thirteen of fourteen received no assistance during the heatwave (see Table 4). Interviews revealed that farmers have begun experimenting with new practices and recognized the value of training, yet they were split on credibility: six followed advice, five never heard any instructions, and three heard but did not

follow. Some farmers explained that extension workers seemed more focused on regulatory compliance and long-term resilience, leaving immediate needs to be unmet. One of our interviewees mentioned, “We have asked [for assistance], but as far as we have asked we haven't received anything but [SCOPI] training” (Bintang #2, translated) These farmers increasingly leaned on peers and master trainers rather than formal channel: “So the [community of farmers], we help each other, we make shades to protect the plant and create systems to water the plants” (Bintang #2, translated). The data suggest that as involvement increases, farmers become aware of training benefits but remain unconvinced that the institutions will respond when a shock hits.

Table 2

Farmer Survey Data in Bintang

Questions	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14
How long have you been working with coffee in partnership with SCOPI?	2 years +	Less than a year	Less than a year	Less than a year	Less than a year	Less than a year	2 years +	Less than a year	Less than a year	Less than a year	Less than a year	2 years +	2 years +	2 years +

[illegible]

Who gave you the most help during that time?	Master Trainer, Fellow Farmers	Master Trainer, Fellow Farmers	Company Staff	Master Trainer, Fellow Farmers	Fellow Farmers	Master Trainer, Fellow Farmers	Master Trainer, Fellow Farmers	No one	Fellow Farmers	Fellow Farmers	Fellow Farmers	Master Trainer	Master Trainer, Fellow Farmers	Master Trainer, Fellow Farmers
Were there any changes in your farming or harvest during that period?	Yes, major changes	Yes, major changes	N/A	Yes, major changes	Yes, major changes	Yes, major changes	Yes, major changes	Yes, but small changes	Yes, major changes	Yes, major changes	Yes, major changes	Yes, major changes	Yes, major changes	Yes, major changes
Did you hear any advice or instruction about how to handle the weather during that time?	Yes, I followed it	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	Yes, I followed it	Yes, I followed it	Yes, I followed it	No, didn't hear anything	No, didn't hear anything	Yes, I followed it	Yes, I followed it	Yes, I didn't follow it	Yes, I didn't follow it	Yes, I didn't follow it

Have you done anyth ing differ ently on your farm since then?	Yes	Yes	Yes	Yes	No	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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Note. All questions and answers are translated into English from their original Gayonese

Kute Panang is at the beginning of the program. Seventeen participants took the survey, fourteen of whom had been involved for less than a year and three for just over a year. All described the heat as “moderately hot” and all said they “very often” needed more support (see Table 3). Yet fourteen reported receiving no assistance during the heatwave and three said they were unsure whether any support existed (see Table 3). Only one respondent said they had heard advice, and none reported following it, although it should be noted the vast majority of attendees would not have had access to information during the climate shock stage. Changes in farming practices were minimal; ten reported minor adjustments, six indicated major changes, and one reported no change at all. In interviews, farmers acknowledged hearing about SCOPI/BPP but had not interacted with extension workers. When climate shocks struck, they relied entirely on fellow farmers. As one of our interviewees elaborates: “We have never received support... We have some equipments and gears and machines because some other farmers have the stuff... it's a community pillar” (Kute Panang #4, translated). The absence of advice and support in

Kute Panang is significant as it shows that early project stages leave farmers to fend for themselves, reinforcing skepticism toward institutional promises.

Table 3

Farmer Survey Data in Kute Panang Part 1

[illegible]

Did you receive any support during the last long dry period or heat?	No	No	No	No	I don't know	I don't know	No	I don't know	No
Who gave you the most help during that time?	Fellow Farmers	Fellow Farmers	Fellow Farmers	Fellow Farmers, Master Trainer	Fellow Farmers, Master Trainer	"Extension Worker" / Master Trainer	Fellow Farmers	Fellow Farmers	Fellow Farmers
Were there any changes in your farming or harvest during that period?	Yes, but small changes	Yes, major changes	Yes, major changes	Yes, major changes	Yes, major changes	Yes, major changes	Yes, small changes	Yes, small changes	Yes, small changes
Did you hear any advice or instruction about how to handle the weather during that time?	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	N/A	No, didn't hear anything
Have you done anything differently on your farm since then?	No	No	No	No	No	No	N/A	Not Sure	No

Table 3

Farmer Survey Data in Kute Panang Part 2

[illegible]

Did you receive any support during the last long dry period or heat?	No	No	No	No	No	No	No	No
Who gave you the most help during that time?	Fellow Farmers	"Extension workers", /Master Trainer	"Extension workers", /Master Trainer	There was no one.	Fellow Farmers	"Extension workers", /Master Trainer	"Extension workers", /Master Trainer	"Extension workers", /Master Trainer
Were there any changes in your farming or harvest during that period?	Yes, small changes	Yes, small changes	Yes, small changes	Yes, small changes	Yes, small changes	Yes, small changes	No changes	Yes, major changes
Did you hear any advice or instruction about how to handle the weather during that time?	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything	No, didn't hear anything
Have you done anything differently on your farm since then?	No	No	No	No	No	No	No	No

Note. All questions and answers are translated into English from their original Gayonese

Long Horizons and Short Needs

The survey contrasts reveal a consistent pattern: adaptation uptake increases with project involvement, yet crisis assistance remains scarce across all villages. In Kute Panang, only one person heard any advice and none followed it; in Bintang, nearly half the farmers reported

following advice; in Atu Lintang, all but one farmer followed advice and most reported small or major changes. This gradient suggests that programme tenure facilitates the diffusion of practices (from simple shade techniques to pest management) but the number of farmers who received material support during the heatwave does not follow this upward curve: none in Kute Panang, one in Bintang and one in Atu Lintang. Farmers described how they adopted new practices while still lacking water pumps, compressors or tractors during crises. Extension workers attributed this gap to limited budgets and mandates that prioritise training over emergency response. In Bintang, several farmers said officials “only talk” and provide no physical assistance. These accounts underscore that exposure to advice is not the same as credibility; farmers linked credibility to visible support during stress.

The mismatch also appears in the definition of resilience. Extension workers generally define resilience as the capacity to absorb shocks and adapt over time, equating it with new technologies or ecological adjustments. Farmers, however, view resilience in situational terms like getting through droughts, salvaging harvests, and mitigating pests. When farmers are asked to adopt composting or soil amendments while their crops are wilting, they see institutional priorities as detached from their lived realities. This divergence is not just semantic; it shapes which kinds of support are deemed legitimate and influences whether farmers trust the program. Farmers told us they adopted practices because they believed in the long-term vision but still emphasized the need for immediate assistance when heatwaves hit.

At the same time, I recognise that this pattern does not prove that crisis support drives adoption. Other factors could explain the differences between sites. Leadership norms and the

strength of local cooperatives may shape how quickly information spreads; previous exposure to other training programs or networks could give farmers a head start; and the severity or timing of heatwaves likely varies between villages. For example, studies on extension effectiveness show that farmers are more responsive when local extension agents are embedded in the community and cultivate personal relationships. Such differences could account for the higher uptake in Atu Lintang even without crisis support. Similarly, evaluations of extension services across smallholder farms find that perceptions of relevance and trust vary with farm size and complexity. These observations remind me that the gradient in my data may reflect heterogeneity rather than a single mechanism.

Therefore, it should be framed that all mechanism language (“credibility minted in crises”) is a working hypothesis consistent with the data. The correlation between programme tenure, crisis assistance and adoption should be read as farmers’ descriptions of why they acted, not as a verified causal effect. The accounts show that farmers often connect their willingness to adopt the presence or absence of timely support, but I cannot rule out alternative pathways. The interpretation that credibility is forged in crisis and spent on adaptation is a contribution in progress, offered as a lens rather than a conclusion.

Finally, returning to the structural context that underpins this misalignment. SCOPI and BPP are mandated to build long-term resilience through training, certification, and market linkages. Budgets and responsibilities prioritize workshops, field demonstrations and monitoring over emergency response. Neither organization has a clear line item for water pumps or compressors, and when farmers ask for immediate help, extension workers must seek approval

through multiple levels of administration, leading to delays or denials. This structure produces the gap between long horizons and short needs. Recognizing the structural source of this gap reframes the problem: it suggests that aligning program goals with farmers' time horizons requires adjusting mandates and budget lines, not just changing attitudes.

From Hearing to Doing

Survey results show a clear drop-off between exposure to extension advice and actual practice. In Bintang, fourteen participants reported hearing advice; only three said they did not follow it. This implies that approximately 14 of 17 farmers adopted at least one recommended practice, a rate that stands out as relatively high compared with adoption rates reported in comparable extension programs elsewhere. In Atu Lintang, one farmer heard advice but did not follow it; and in Kute Panang, almost no one received advice. These numbers might indicate that simply hearing recommendations does not guarantee behavioral change, yet they also show that Bintang's adoption rate compares favorably with typical uptake levels reported in similar contexts.

The Bintang case therefore suggests that, under certain conditions, extension messaging can be translated into practice. Interviews from Bintang reveal that farmers valued the training and began to experiment with new techniques. Some noted that extension officers were more responsive during the first two years of involvement, and this responsiveness may have helped build credibility. Adoption literature notes that innovations diffuse more readily when farmers perceive them as compatible with existing practices and when extension agents provide timely,

tangible support (Feder and Umali, 1993; Rogers, 2003). The relatively high uptake in Bintang hints that trust, perceived relevance and some level of crisis responsiveness may have aligned here to produce more positive outcomes. This observation should not be read as evidence that the program always works; rather, it underscores the potential efficacy of the model when key conditions are met.

At the same time, caution is warranted. In Bintang, vocal farmer leaders often guided other participants through survey questions, and volunteers were more likely to stay for interviews. These dynamics may have overrepresented the views of engaged farmers and masked divergent experiences within the community. That sample bias suggests that the high adoption rate should be interpreted as an upper bound, reflecting the responses of farmers most involved in the program.

Trust emerges as a mediating factor rather than a background condition. The conceptual framework stresses that collaboration hinges on whether differing perceptions of climate resilience can be negotiated into workable arrangements. In this case, trust was closely tied to the ability to reach extension workers. Farmers who could easily contact master trainers were more likely to try new practices, while those who struggled to get through felt abandoned. In Kute Panang and Bintang, several farmers said they had “no clear channel” to request assistance; as a result, they turned to peers or master trainers for help. By contrast, some farmers in Atu Lintang had personal relationships with trainers, which allowed for communication, though it did not always guarantee material support. These accounts illustrate specific obstacles; they should not be read as blanket explanations for all non-adoption.

Studies on technology adoption emphasize that farmers assess both the credibility of the source and the practical costs and benefits before changing behavior (Tonkin et al. 2016). When extension messages focus on long-term efficiency gains, but farmers face immediate costs or uncertain short-term benefits, adoption lags. Our findings contribute to this debate by showing that credibility is forged in crisis response and spent on long-term adaptation. Advice that is not backed by visible assistance erodes trust, making farmers hesitant to invest labor or resources in recommended practices. Over time, the gap between hearing and doing can foster a sorting process: farmers with greater resources or stronger connections remain engaged, while others disengage, perceiving the program as unresponsive. Recognizing this pattern helps explain why exposure alone is insufficient. Rather, it is the interplay of timely support, clear communication, and perceived relevance that turns hearing into doing.

Who is Worthy of Assistance?

Development scholars have long used “willingness” as shorthand for farmers’ commitment or efficiency. Ethnographic accounts show that project staff often interpret attendance at training sessions, adoption of recommended practices, or deference to expertise as evidence that someone is “serious” or “cooperative” (David Mosse, 2025). In practice, these markers are administrative heuristics, not measures of intrinsic motivation. In this paper I treat “willingness” as an analytic lens rather than a moral judgment. It helps explain how extension officers screen farmers and justify allocating their scarce time and resources. In this study, willingness appears both as a signal of cooperation and as a filter that determines who receives support and who does not.

Interviews with extension workers showed that decisions about who receives assistance are framed as a matter of “willingness” and “seriousness”. Officers said they concentrate their limited time and resources on farmers they perceive as committed, in practice prioritising those who attend training sessions or have already adopted recommended practices. Our first extension interviewee elaborates that “All the farmers agree with the help, the problem is that they often overrely on us and they ask for extra material and money and time. Or for extra education. They want more... We give it to the farmers who have shown that they really want to make changes and are directly working and showing that they would use the equipment. Many farmers are able to use communal equipment but choose not to.” (Extension #3, translated). This focus creates a self-reinforcing cycle: farmers who are already cooperating receive more attention, while less-engaged households are deprioritized. Officers present this as an efficient use of scarce resources; yet it effectively gatekeeps support and leaves those most in need at the margins.

That gatekeeping logic is closely tied to fears of over-reliance or “being used.” Officers worried that providing short-term assistance might create a dependency and divert them from their mandate of building long-term capacity. This fear echoes donor discourses of self-reliance and “graduation” programs, where participants are expected to move quickly from aid to independence. In their view, willingness protects budgets and ensures that resources go to those who will “use them well”. Yet this logic can undermine inclusion by screening farmers who are equally vulnerable but lack the capacity to demonstrate commitment in the prescribed ways.

Social policy scholars describe similar dynamics through the notion of deservingness. A widely cited framework identifies five dimensions along which recipients are judged: control

over their circumstances, attitude toward support, reciprocity (past contributions), identity (shared group membership), and need (Knotz et al, 2021; Ferguson, 1990). I introduce this model here as a heuristic to read the language of allocation, not as a coding scheme. When officers emphasize seriousness and commitment, they implicitly invoke these categories: those who attend meetings display the “right” attitude; those who adopt practices demonstrate reciprocity; those with other income sources may appear less needy or more in control. None of these criteria were explicitly stated by officers, but they help interpret why willingness becomes a moralized filter.

Importantly, willingness is difficult to measure. Officers seemed to equate it almost exclusively with the adoption of new practices. In early-stage groups there are many opportunities to implement new techniques, so participants naturally appear “serious.” In longer-running sites, however, farmers have already implemented most recommended practices and have fewer visible actions to signal engagement. Without new techniques to adopt, these farmers may seem less willing, even though they reorganized their entire production around extension advice (Willem van Oorschot, 2014). The survey data suggests that acute support does not increase over time. Kute Panang, the most recent site, reported receiving a water compressor within months of joining, while Atu Lintang, after three years of participation, still lacked a requested water pump and reported no responsive assistance. This pattern could indicate that initial responsiveness functions as an incentive to attract participants, whereas support tapers as projects mature. Alternatively, it may reflect a belief among officers that long-term participants

should be more self-sufficient. Either way, the decline in assistance over time invites further inquiry into how willingness is evaluated at different stages of the program.

This brings us to a longstanding concern about moral hazard. Policymakers often worry that providing immediate support will discourage self-reliance or reduce incentives to invest in longer-term solutions. Extension officers echoed this fear when explaining why they avoid giving crisis assistance. In their view, doing so could shift the program from resilience-building to dependency management. Yet the farmers' experiences complicate this logic: they describe trust as something earned when institutions respond to acute hardship. Farmers across sites said the greatest obstacle to resilience was the lack of timely help during heatwaves. They turned to peers and master trainers for sharing water pumps, coping strategies or small-scale equipment. Officers recognized and even encouraged this peer reliance, but it also signals a gap in formal support that erodes institutional credibility. Large-scale evaluations of multi-component support program, such as the Graduation model, show that a combination of short-term assistance and long-term investment can yield sustained gains in well-being (Banarjee et al., 2015). Adaptive social protection frameworks similarly emphasize that timely crisis response should be integrated with long-term adaptation (Bowen et al., n.d.). My further discussions, thus should be seen as a working proposition requiring more analysis and data collection within different aligning scenarios.

Structural resource constraints magnify these tensions. Both farmers and extension workers noted that budgets and responsibilities were geared toward training and long-term adaptation rather than emergency relief. Officers said they must seek approval for every

equipment request; delays and denials are common. The organizations involved (BPP and SCOPI) define resilience in terms of long-term adaptation, not short-term survival. Farmers, however, judge resilience by whether someone can help today. These diverging definitions collide during crises, and the absence of short-term assistance becomes a visible indicator of institutional distance.

Across the overlapping lenses of willingness, deservingness, and moral hazard, we see how criteria for help become moving targets within institutional constraints. None operates in isolation; together they shape how extension workers justify their decisions, how farmers interpret those decisions, and how collaboration evolves over time. The evidence shows that “who is worthy of help” is not a question of structural mandates, relational histories, and contested definitions of responsibility. Understanding these dynamics sets the stage for the recommendations that follow, where I explore how more transparent and responsive allocation criteria could bridge the current trust gap without undermining long-term goals.

Resource Constraints

Both farmers and extension workers identified a structural reason for the absence of crisis assistance: the program mandate emphasizes training and long-term development over emergency support. Extension officers explained that budgets are tied to training materials, demonstrations and monitoring, not to purchasing water pumps or compressors. When farmers requested such equipment, officers had to seek approval from higher levels and often encounter delays or denials. In addition, the partnership between SCOPI and BPP is oriented toward

sustainability standards and market access. SCOPI is described as a “national multi-stakeholder group that supports training, standards, and market links for sustainable coffee”. This orientation privileges long-horizon outcomes such as improved coffee quality and certification. BPP, the governmental agricultural development agency, focuses on disseminating technologies, organizing farmer groups, and reporting progress to higher authorities. Neither institution is designed to act as an emergency relief agency. As a result, when a record heatwave hits, extension workers could offer advice but not tangible support. This institutional bias is not malicious; it rather reflects how resilience is defined at the organizational level. Nevertheless, it conflicts with farmers’ expectations and, as shown in the data, undermines trust.

Resource constraints are compounded by the scale of the challenge. Over 90 % of coffee in Indonesia is grown by smallholders; 1.3–1.8 million families depend on coffee farming. The Central Aceh branches of BPP and SCOPI serve only a fraction of these households. Each extension worker manages multiple villages and hundreds of farmers. Even with unlimited commitment, they cannot provide equipment for everyone. Interviews revealed that extension workers sometimes use personal funds to fill gaps, but this practice is ad hoc and unsustainable. Farmers are aware of the logistical limits; yet they perceive the lack of crisis aid as evidence that institutions undervalue their survival. The findings thus support the second hypothesis that program length increases adaptation uptake but does not increase practical support. Institutional mandates and resource constraints create a ceiling on what extension officers can deliver, regardless of how long they work with a village.

Peer Networks and Informal Coping

When formal support is absent, farmers rely on peer networks. Across all villages, the most common answer to “Who gave you the most help during the last dry period or heat?” were fellow farmers. In Kute Panang, eight respondents named fellow farmers; five mentioned a combination of extension workers or master trainers, and two cited both. In Bintang, master trainers and fellow farmers jointly topped the list, with “company staff” and “no one” appearing only once. In Atu Lintang, the answers were more varied. Some said master trainers, others fellow farmers, cultivators or extension workers, but still showed strong peer reliance. Interviews detailed how farmers share water pumps, labor and coping strategies. They teach each other shading techniques, coordinate irrigation schedules, and collectively petition authorities for support. Farmers often frame this peer support positively; it is fast, culturally comfortable and based on reciprocal trust. However, they also recognized its limits. Peers cannot always afford the necessary equipment, and collective action does not replace systemic assistance during extreme events like forest fires or prolonged droughts. Extension workers themselves sometimes encourage peer reliance, recognizing that formal channels are slow. But the prevalence of peer networks further diminishes the perceived necessity of extension. Farmers may conclude that they can manage on their own, using indigenous knowledge and community solidarity. This risk is particularly high in Kute Panang, where the project’s presence is minimal; if farmers do not experience crisis support in the early years, they may disengage before adaptation practices take root.

Peer networks substitute for institutional gaps, functioning as informal “adaptive infrastructure.” Such networks draw on social capital (the trust, norms, and networks that enable

collective action) as well as longstanding traditions of mutual aid. Elinor Ostrom's work on collective action emphasizes that communities often self-organize to manage common resources when formal institutions fail (Ostrom, 1990). Adger notes that social capital can enhance resilience by fostering cooperation, shared learning, and reciprocity during crises (Adger, 2003). In Central Aceh, peer networks operate as local support systems: farmers lend pumps, share labor and pool knowledge, creating a form of "adaptive infrastructure" that bridges immediate needs. These networks fill in for absent or delayed institutional support and create the trust necessary for sharing risk. At the same time, they are inherently limited by the resources available within the community; collective action cannot generate large capital investments or sustain prolonged support without external backing. Recognizing these networks as adaptive infrastructure invites questions about how formal programs might complement rather than duplicate or undermine them.

The prevalence of peer networks suggests that resilience programs should partner with these groups, not bypass them. Co-funded tools (such as shared pumps or shade nets) could be managed collectively, with rotating leadership to ensure fair access and avoid elite capture. Local tracking systems, maintained by farmer groups and verified by extension officers, could make resource distribution transparent and responsive. Program staff would need to support peer leaders with training and modest stipends, treating local knowledge as an asset rather than an afterthought. At the same time, partnering with peer networks poses risks. Without safeguards, powerful farmers may dominate decision-making, excluding poorer or less connected households. Bureaucratization can also stifle the spontaneity and responsiveness that make peer

support effective. Development studies highlight that community-driven initiatives are most successful when they are genuinely co-created and when institutional actors respect and compensate for local labor (Ostrom 1990; Adger 2003). Any formal partnership must therefore include mechanisms to monitor participation, rotate leadership, and ensure that the benefits of collective action are broadly shared.

Several peer-compatible designs could enhance resilience while leveraging existing networks. Village emergency kits could store pumps, hoses and shade nets in communal locations, with clear protocols for borrowing during heatwaves or droughts. Rotating tool banks could allow farmers to access larger equipment on a schedule, spreading costs, and maintaining equipment collectively. Peer-verified micro-grants or voucher schemes could provide small amounts of cash or inputs to households facing acute stress, with community groups validating requests and tracking repayment or follow-up. Similar models have been tested in other regions: Ragasa and colleagues found that farmer organizations in Ghana improved adoption and trust when they managed inputs and training collectively (Ragasa et al. 2016), while the FAO's Cash+ program pairs cash transfers with productive assets and training to enhance both short-term coping and long-term resilience (FAO 2017). Implementing such models in Central Aceh would require adaptation to local norms and careful monitoring to prevent misuse. They nonetheless illustrate how peer networks can be harnessed as delivery channels rather than informal stopgaps.

These additions tie back to the hearing–doing logic: peer credibility compensates for institutional distance. Farmers trust advice when it comes through peers who have successfully implemented practices and when they have seen tangible support during crises. Recognizing peer

networks as adaptive infrastructure, building programmatic partnerships with them, and designing models that work through them may help transform informal coping strategies into formally supported resilience pathways.

Future Risks

If present trends continue, what trajectories might unfold? The data allows several extrapolations. First, long-term adaptation may be a plateau. In Atu Lintang, adaptation adoption is high, but farmers still lack crisis support. If repeated shocks go unanswered, trust may erode to the point that even established farmers question the program's relevance. Some interviewees already hinted at this, saying they would "work around" climate problems on their own and that the project would "help a little bit" but not solve the issue. Even one of our extension interviewees mentions, "We cannot solve the issue. We are trying to work around it. in the long term it will help them a little bit, but I don't think we can really do anything," (Extension #1, translated). Without renewed credibility, farmers could revert to traditional practices or seek alternative support networks, undermining the gains of the past three years.

Second, inequities could widen. Gatekeeping based on "willingness" will continue to concentrate resources among farmers who already have the capacity to adopt new technologies. As climate shocks intensify and budgets remain limited, extension officers may double down on efficiency, further marginalizing those with fewer assets. This selection effect could create a bifurcated rural economy: a group of model farmers connected to SCOPI/BPP and integrated into sustainable value chains, and a larger group of farmers who rely solely on peer support and

informal markets. Such division undermines social cohesion and may exacerbate economic inequality.

Third, peer networks might substitute formal extensions. If farmers consistently find more reliable support from each other, they could build autonomous cooperatives. This is not inherently negative; farmer-led cooperatives have successfully managed resources and negotiated with buyers in many contexts. However, without institutional backing, their capacity to invest in larger infrastructure—like irrigation systems or storage facilities—would be limited. Moreover, the lack of institutional involvement could make it harder to access certification programs or sustainability premiums associated with SCOPI. The challenge for extension is to partner with these networks rather than inadvertently compete with them.

Finally, climate change will magnify misalignments. The heatwave studied here is part of a pattern: climate projections indicate that the Gayo highlands will experience more frequent and severe extremes. The conceptual lens notes that climate resilience requires the ability to prepare for, recover from, and adapt to impacts. If assistance remains centered on long-term adaptation without mechanisms for rapid response, each new shock will erode trust further. Farmers may become increasingly risk-averse, prioritizing immediate survival over participation in extension, thereby weakening the very collaboration needed for large-scale adaptation.

Discussion

Our findings sharpen and expand several strands of research on extension services, climate resilience, and farmer collaboration. Much of the extension literature critiques “one-size-

fits-all” programs that focus on institutional goals such as yield maximization. Evidence from randomized evaluations shows that many traditional government extension services emphasize the highest possible yields or food security targets rather than farmers’ profits and often fail to provide timely or tailored advice (J-PAL & ATAI, 2018). In our case, the problem is not only a mismatch of priorities but also of time horizons: extension projects built around long-term adaptation may ignore the short-term shocks that most vividly shape farmers’ perceptions. Our data show that farmers adopt practices when trust is built through credible crisis assistance; advice offered without such support feels abstract. This insight aligns with broader adoption studies: researchers have shown that farmers’ uptake of innovations depends on whether new practices are perceived as compatible with immediate needs and resource constraints (Feder and Umalí, 1993). When advice highlights long-term efficiency gains, but farmers face high costs or fear short-term losses, adoption lags. By conceptualizing trust as a currency minted in crises and spent on adaptation, our analysis reframes “credibility” as the hinge between hearing and doing.

The study also speaks directly to the debate between top-down and participatory extension approaches. Reviews of extension programs note that most initiatives still rely on hierarchical structures where directives and technologies are handed down from national agencies with minimal adaptation to local contexts (J-PAL & ATAI, 2018). Such top-down models were effective in scaling a few high-yield practices in the Green Revolution, but more recent assessments argue that they can suppress farmer engagement and reduce responsiveness to heterogeneous needs (J-PAL/ATAI, 2018). Comparative studies suggest that programmes that are purely top-down or purely bottom-up rarely succeed; effective strategies blend centralized

resources and technical expertise with community-defined objectives and locally tailored delivery (J-PAL & ATAI, 2018). Our case illustrates this tension: extension officers emphasize long-term resilience but lack mechanisms for crisis support, while farmers see resilience as the ability to manage acute heatwaves and water scarcity. The resulting credibility gap echoes findings from other contexts, such as work showing that differing definitions of drought between farmers and experts create confusion and erode trust (Simelton et al., 2013).

These results underscore the potential of genuinely participatory models. Participatory and farmer-led approaches involve farmers in defining resilience objectives and co-designing interventions, potentially reducing perception gaps. Our data suggest that when farmers' definitions of resilience (such as water access during heatwaves or immediate pest control) are integrated into program goals, collaboration deepens. Yet participation must be substantive: if farmers are only supplying labor while decisions remain top-down, hierarchies persist. Studies on extension and access also show that gendered dynamics shape who benefits; across settings, women often face lower access to training and resources, with implications for productivity and adoption (Ragasa et al., 2016).

Recommendations

Addressing the misalignment requires institutional shifts. First, improve farmers' ability to request help quickly and equitably to create a two-way communication channel that lets farmers signal shocks and get responses, rather than relying on informal networks. This could take the form of a toll-free phone line, a WhatsApp group moderated by extension staff, or

designated “help points” in each village. However, each modality has limitations: digital tools require connectivity, affordable data, and literacy, which often aren’t easy to find in rural areas. Connectivity and cost barriers mean a single mobile-based channel might exclude the poorest or least literate farmers. A blended approach that mixes low-tech (public call points, in-person liaison) and digital channels reduces that risk. Whatever channel is used, it should incorporate feedback loops so that extension officers can respond on the basis of need rather than perceived “willingness,” thereby addressing gatekeeping biases.

Second, ensure that rapid assistance is available to stabilize livelihoods during crises. The aim is to demonstrate that institutions value immediate survival needs alongside long-term adaptation. This could involve a flexible fund to finance pumps, compressors, shade nets, transport, or emergency labor. The preferred option is a small, transparent budget held at the local level; it should be disbursed through clear criteria tied to shock's severity and tracked publicly to prevent misuse. Limited budgets and administrative capacity, however, mean funds at risk being depleted quickly or misallocated. Research on digital advisory services warns that even modest costs can be prohibitive (Châteauvieux et al., 2024), and “last-mile” interventions must be matched with credit or other support to be effective (Ferdinand et al., 2021). To mitigate these limitations, the fund should be replenished through partnerships (for example, with SCOPI buyers or NGOs) and accompanied by guidelines on fair allocation.

Third, formalize and support peer networks to strengthen community-based responses. The goal is to harness local mutual aid while avoiding the replication of existing inequalities. Options range from training peer leaders to manage response funds and equipment, to

co-designing extension curriculum with farmer groups. The blueprint on digital climate services stresses that co-creation should value and compensate for local knowledge rather than extract it. A preferred pathway is to include gender-balanced leadership quotas and provide stipends for participation, ensuring that the network remains inclusive. Monitoring participation rates and rotating leadership can help counteract elite capture.

Fourth, redesign training so that long-term practices are always paired with immediately actionable coping strategies. The aim is to make recommendations relevant to farmers' present constraints. For instance, a session on organic fertilizer could include demonstrations of mulching to retain soil moisture during heatwaves. This approach builds research showing that farmers adopt innovations when they see them as compatible with immediate needs. A possible limitation is information overload: packing too many topics into one session can confuse participants or dilute messages, especially where literacy levels vary. To mitigate this, trainers should break sessions into modular units, test comprehension, and adapt content to the farming calendar. The delivery medium can vary (on-farm demonstrations, radio programmes, or short video clips), but the main shift is to treat coping and adaptation as continuous and complementary aspects of development.

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