Climate change is a human problem

Finding the missing voices of climate resilience

Edited by Juhi Jain & Rahab Kariuki

Busara

Acknowledgments

This book exists because of a shared belief that climate change must be understood through human experience. We are profoundly grateful to all our authors and contributors, whose ideas, voices, and lived perspectives give this volume its depth and purpose. We thank them for their generosity of thought, rigor, and willingness to challenge and expand the conversation on climate resilience.

Our sincere appreciation goes to the leaders at Busara Center for Behavioral Economics for championing this work and for creating the space where behavioral science, policy, and human stories can meet. Busara's commitment to building evidence that advances equity and resilience continues to guide and inspire the work the Food Systems and Climate Resilience (FaRM) and Risk Management teams continue to do.

We extend a heartfelt thanks to our colleagues at Busara, specially Michael Onsando, Hitha M, Tony Mogaka, and Stephen Ndirangu whose creativity, patience, and craft shaped this volume from early drafts to final design. Their ability to translate complexity into clarity and narrative has been essential in bringing this book to life.

Finally, we acknowledge the communities, farmers, workers, and families whose experiences animate these pages.

Their resilience, insight, and aspirations are the foundation of this work. This book is for you - and because of you.
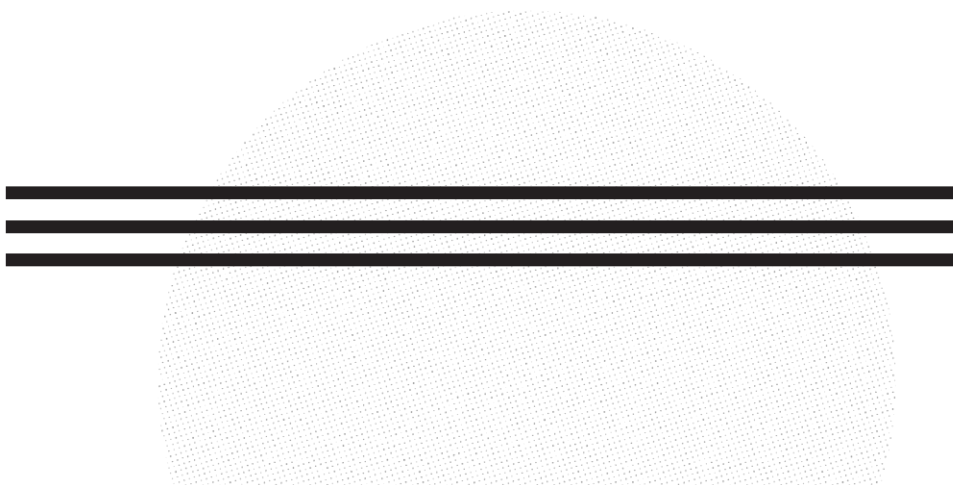
Introduction

Climate change is a human problem. It is not a distant phenomenon to be studied in laboratories or debated in abstract policy forums. It is a reality unfolding all around us, transforming landscapes, disrupting livelihoods, and fundamentally altering the daily lives of communities across the globe. Yet, while the world talks about emissions, mitigation, and adaptation, the voices of those most affected often remain unheard. This book seeks to change that. It amplifies the experiences, insights, and agency of the people living on the frontlines of climate change, centering human perspectives in a conversation too often dominated by numbers and models.

At its core, this volume is about resilience. Not as an abstract concept, but as the practical, lived capacity of communities to respond, adapt, and thrive in the face of mounting climate risks. It emphasizes that resilience is not just about infrastructure, technology, or policies—it is also about behaviors, norms, and social systems. How people perceive risk, make decisions under uncertainty, share knowledge, or support one another profoundly shapes the success of adaptation efforts. Understanding these human dimensions is critical if we hope to design interventions that are not only effective but equitable and sustainable. Even interventions such as agricultural insurance, designed to reduce vulnerability, depend on trust, understanding, and accessibility; without these human dimensions, such tools often fail to reach those who need them most. Understanding these human dimensions is critical if we hope to design interventions that are not only effective but equitable and sustainable.

Contributions examine how systems thinking clarifies our shared responsibility for climate consequences and the need for collective action (Fadila Jumare). We include an analysis on behavioral research for climate solutions (Berber Kremer) and advocate for simplifying communication to scale agricultural insurance in Africa (Rahab Kariuki), alongside work on the role of collective solidarity in responding to uncertainty (Tahira Mohamed) and the importance of Indigenous knowledge systems in risk management (Wairimu Muthike and Jackline Chemtai in their pieces). Dr. Hendrik Bruns' case study uses Behavioural Systems Analysis to unpack why food redistribution systems in the European Union often fail to operate at scale. His analysis maps the incentives, bottlenecks, and feedback loops that shape organizational decisions, offering practical pathways for designing more effective and equitable redistribution policies.

The book also explores the intersections that make climate action both complex and urgent. Gender, nutrition, livelihoods, and indigenous knowledge are all deeply intertwined with climate resilience, influencing who is most vulnerable and how solutions can be inclusive.

Building resilience requires intentionality: ensuring women, marginalized groups, and local actors are not passive recipients of aid but active participants in shaping their own futures. It requires trust, collaboration, and shared responsibility across communities, governments, and institutions.

Ultimately, this book is an invitation—to see climate change through a human lens, to listen to those at the margins, and to reflect on our collective responsibility. It is a call to action, grounded in evidence and human experience, that emphasizes what is possible when we combine behavioral insight, social systems thinking, and collective effort. Climate change is a human problem, but human ingenuity, solidarity, and agency can make resilience possible.

Juhi and Rahab

At its core, this volume is about resilience. Not as an abstract concept, but as the practical, lived capacity of communities to respond, adapt, and thrive in the face of mounting climate risks. It emphasizes that resilience is not just about infrastructure, technology, or policies—it is also about behaviors, norms, and social systems.

Image credit: Anthony Mogaka Midjourney V 7.0

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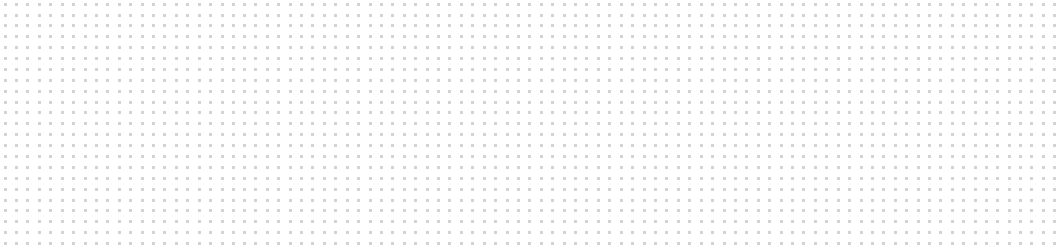# Section 1

Climate change through the lens of behavior and systems
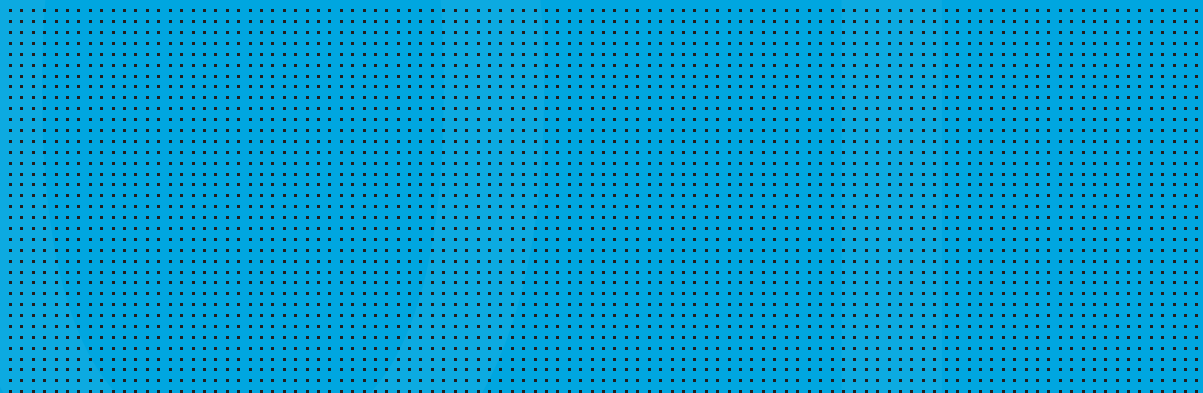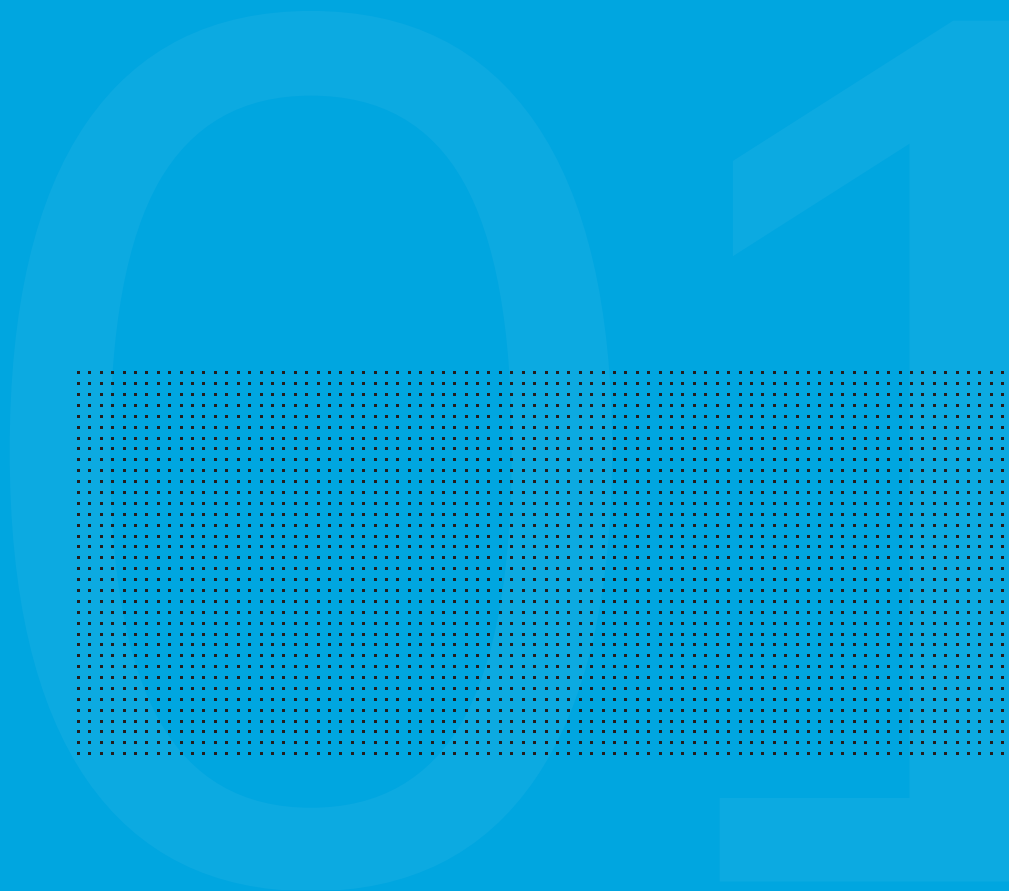
A systems view on climate change and shared responsibility: Connecting human decisions to climate consequences

By Dr. Fadila Jumare

Climate change is not an inevitable natural phenomenon. It is the cumulative result of human choices, reinforced by systems and ideologies that normalize harmful patterns of production and consumption. While technology and policy play vital roles, the crisis is fundamentally a human problem, driven by behaviors, perceptions, and structures that shape how people live, work, and consume. Every heatwave, flood, and shifting season is ultimately the result of countless human decisions. What we consume, how we travel, how we produce and handle food, and how we manage or mismanage waste all contribute to exacerbating climate conditions. The drivers are not abstract. They lie in our daily habits, social norms, and market practices that, when repeated across billions of people, create planetary-scale consequences.

A systems-thinking lens reveals that no single actor, decision, or moment of waste exists in isolation. Instead, individual behaviors are embedded within and continually shaped and reinforced by interlocking economic, social, and ecological structures. For example, stringent cosmetic and marketing standards in food systems create market incentives that prioritize appearance over nutrition, leading retailers to reject or discount perfectly edible produce and pushing farmers to absorb the losses (Kechagias et al., 2024). Urban waste and recycling systems also shape behavior. Studies show that logistical barriers such as distance to collection points, inconvenient infrastructure, and lack of coordinated reverse-logistics systems significantly reduce household recycling, even among motivated residents (Oluwadipe et al., 2022). Agricultural value chains often penalize farmers for variability and non-standard products, reinforcing production and grading practices that increase loss and waste upstream (Segrè et al., 2014).

Climate change, therefore, is fundamentally driven by human behavior operating within interconnected ecological, social, and economic systems, and its impacts cascade across health, livelihoods, and ecosystems (WHO, 2023). Addressing it requires simultaneously changing the choices people make, through behavioral and social interventions and redesigning the systems, incentives, and policies that shape and constrain those choices (Edmondson, et al., 2022).

The food system: From farm to bin

Take food for example. When was the last time you threw away a dented tomato or bruised banana? That moment of rejection, repeated millions of times a day, adds up to national mountains of waste. Farmers, under pressure to meet rigid market standards, harvest early or overproduce without guaranteed buyers.

At the market level, urban vendors discard tons of edible produce daily to maintain appearances. Supermarkets overstock shelves because abundance sells. At the household level, waste looks small: a wilted bunch of spinach or leftovers tossed at the end of the week. Each actor from plantation and production to retail and household plays a part in this chain of loss. At the national level, this translates into billions in lost value, reduced food security, and unnecessary emissions from crops that never feed anyone and when aggregated, the numbers are staggering. A World Bank (2025) report highlighted significant loss of perishable food, with more than one-third lost before reaching consumers which account for 8–10% of global greenhouse gas emissions according to UNCC (2024).

A systems-thinking lens shows not only that individual actions matter, but how each action triggers consequences for the next actor in the chain. For example, a farmer's decision to overharvest is rarely an isolated choice. It is shaped by buyers who demand visually uniform and appealing produce, insurers who require volume to offset risk, and wholesalers who penalize variability. Because these actors reward consistency over sustainability, farmers respond by harvesting more than needed to meet cosmetic standards or avoid rejection Jumare et al. (2023).

The supermarket's decision to stock only uniform produce creates a powerful ripple effect upstream. When retailers enforce strict cosmetic grading, distributors must sort aggressively, discarding anything imperfect. This, in turn, pressures farmers to overproduce and over-sort at the farm gate, knowing that only a portion of their harvest will meet appearance-based specifications. The result is a predictable chain reaction: retailer preference → distributor sorting → farm-level overproduction → greater waste

and environmental burden.

Meanwhile, consumer preferences for cosmetic perfection reinforce the same cycle. When shoppers consistently choose flawless produce, retailers double down on strict standards, suppliers tighten their requirements, and farmers continue to bear the cost of producing aesthetically 'perfect' crops. In this way, perceptions, convenience, and incentives stack on top of one another, reinforcing waste at every step Jumare et al. (2023), while the climate and resource costs, water, land, energy, emissions remain largely invisible.

For small holder farmers in many parts of the Global South such as Oyo, Osun and Ondo states in the South West region of Nigeria, the stakes are higher because climate vulnerability intersects with fewer financial, infrastructural, and institutional buffers (Ojo et al., 2024). Farmers facing erratic rains or floods often operate without crop insurance, reliable irrigation, or affordable cold storage conditions that make them far more exposed to climate shocks than their counterparts in wealthier economies (Tofu et al., 2022). For example, Harvey et al. (2014) explained how smallholder farmers in Madagascar have limited adaptive capacity due to resource constraints, making them especially vulnerable. These pressures force immediate survival decisions: selling produce at a loss, harvesting too early to avoid spoilage, or discarding surplus when markets collapse. Such choices are not unique to the Global South, but they carry disproportionate consequences there because a single failed season can threaten food security and household income. At the same time, it is still the Global South that bears the impacts of climate change driven significantly by historical emissions and overconsumption elsewhere while contributing the least to its causes (UNFCC, 2006).

Behavioral science and human behavior

Behavior change is the missing link between policy ambition and practical impact particularly in the Global South, where communities are often portrayed as passive recipients of climate solutions rather than active agents shaping them. While climate-friendly technologies exist, people continue to overconsume, resist lifestyle shifts, and cling to patterns that feel normal even when those patterns are destructive. The psychology of denial and delay compounds this problem: people may acknowledge climate change in the abstract but push action into the indefinite future, waiting for 'someone else' to solve it.

Evidence from behavioral insights reveal that habits are sticky and default systems often reinforce high-carbon behavior. For example, Sharrma et al. (2024) a study on recycling behavior shows that when recycling bins are poorly placed or unaccompanied by social proof, uptake remains low despite awareness campaigns. Similarly, in a food waste study, vendors are more likely to display and sell imperfect produce to prevent waste when they see their peers doing so, demonstrating that behavior spreads socially (Jumare et al., 2025). These imply that when climate-friendly actions feel inconvenient, socially unsupported, or disconnected from personal benefit, people naturally deprioritise them (Sharrma et al. 2024).

Therefore, our ability to respond to the climate crisis is limited less by technological solutions and more by the perceptions that shape everyday choices. As such, bottom-up movements that normalize sustainable habits and policies designed with these social and psychological levers in mind can break this inertia.

In conclusion

Climate change is a product of human systems, behaviors, and values especially, inaction, and a reluctance to change comfortable patterns. Addressing it will require more than new technologies or policies. It will demand a fundamental rethinking of how we live, what we value, and how we relate to one another and the planet. Farmers' livelihoods, market dynamics, and environmental health are inseparably linked. Supporting farmers in sustainable practices is not just climate action, it is also an investment in social stability and food security.
Numbers matter, but agency matters more. The interconnected structures we live in are built from billions of micro-decisions. Each discarded apple, each policy delayed, each comfort we refuse to give up accumulates into planetary consequence. If the system is broken, it is because our actions have broken it. And if the system is to change, it will only be because we act, alongside farmers, vendors, consumers, supermarkets, and policymakers alike.

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This is not your problem or my problem. It's our problem. And the system will only change if we act collectively.
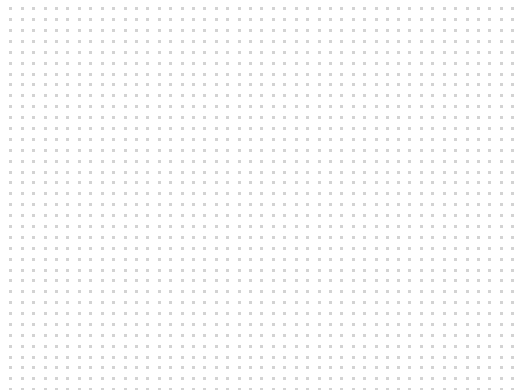
What is Behavioural Environmental Economics & Policy?

By Dr. Sanchayan Banerjee

What is Behavioral Environmental Economics & Policy?

It is becoming harder to ignore a simple truth, dealing with climate change and the loss of biodiversity isn't only about new technologies or big policy shifts. It's also about how people live in the day to day. Researchers have been pointing this out for years (Gardner & Stern, 1996; Nielsen et al., 2024). When you look closely, the small choices add up. Eating more plant-based meals, sharing rides, or cutting back on flights may sound minor, but studies show that changes like these could reduce global emissions by 40–70% (Creutzig et al., 2022). That's an enormous amount coming from behavior alone.

There's another insight that often gets missed, people usually want the service something provides, not necessarily the object itself. We want mobility, more than we want cars; comfort and convenience, more than gadgets. That means the way products are designed and offered can nudge whole populations toward more sustainable habits (Creutzig et al., 2024). Understanding why people adopt certain behaviours and resist others, has become central to staying within planetary boundaries. It also shapes what some call ecological rationality (Buckton et al., 2023; Drews, 2023), the shared ability to act together, and act quickly, for a fair and sustainable ecological transition.

This is why behavioral insights matter. They give us a way to look beneath the surface of environmental problems and see the everyday decisions that drive them.

They help us understand why people make the choices they do—and how those choices shape environmental problems. In this article, I use that lens to show how behavioural economics, and behavioural science more broadly, can help us rethink environmental decision-making. Also, how the tools of behavioral economics—and behavioral science more broadly—can help us understand why people act the way they do when the environment is at stake.

I call this emerging space Behavioural Environmental Economics and Policy (BEEP). The aim is to combine what we know about human behavior with the tools of economics and public policy to better understand and address environmental challenges. Others have made similar arguments before (Shogren & Taylor, 2008), but BEEP brings these threads together into one space, making it easier to see how behavioral insights can support smarter, more effective environmental action.

For a long time, economics has leaned on a simple idea, people make decisions by weighing costs and benefits. This 'rational actor' story has shaped how we explain everything from pollution to overfishing to climate change, and it underpins familiar policy tools like taxes and subsidies meant to steer behaviour (Hanley et al., 2019). But everyday experience shows that people's decisions are often more complex than this model suggests. People hesitate, guess, follow habits, copy friends, avoid losses, or simply do what feels manageable in the moment. The rational actor model helps explain the broad strokes of environmental problems, but the finer details, the ones that determine whether policies actually work, live in the messier side of human behaviour.

Insights from psychology have also shown us that people don't move through the world like perfect calculators. When we acknowledge these cognitive limits, and step away from the narrow idea of strict economic rationality, we often end up with policies that work better and feel more legitimate. Using a behavioral lens helps researchers and practitioners design interventions around how people actually make choices. Relying on shortcuts, influenced by others, and guided by habits that aren't quirks of human nature but everyday realities. In this way, BEEP reorients environmental economics around 'reasonable humans' (Banerjee & Dold, 2025; Madsen et al., 2024), whose behavior regularly stretches beyond the boundaries of standard models.

Reasonableness gives us a way to understand people whose choices make sense in a broader human context, even if they don't line up with strict rationality.

A striking example of this came in 1989, when the Exxon Valdez oil tanker spilled millions of gallons of crude off the coast of Alaska. The U.S. needed to estimate the damages to seek compensation. Traditional market measures, like lost fisheries and tourism revenue, captured some of the costs, but they left out a crucial part of the story. How do you put a price on untouched wilderness or wildlife that people enjoyed without ever visiting? What about future tourism opportunities that are now gone forever? The spill was more than an economic loss; it was an environmental disaster that would affect generations. To address this, economists used the contingent valuation method, surveying Americans about how much they would be willing to pay to prevent future spills. Exxon challenged the approach as hypothetical and unreliable, prompting the National Oceanic and Atmospheric Administration to convene a blue-ribbon panel chaired by Kenneth Arrow and Robert Solow.

> **The rational actor model helps explain the broad strokes of environmental problems, but the finer details, the ones that determine whether policies actually work, live in the messier side of human behaviour.**

The Exxon Valdez case also taught a broader lesson about the value of the environment. It showed that these values, whether captured by markets or not, could influence billion-dollar settlements.

It also revealed a gap between what theory predicted and how people actually behaved. Standard economics suggested that willingness to pay and willingness to accept should be about the same, but the Arrow panel in 1993 found a consistent difference: people usually demanded more to give something up than they would pay to acquire it. This gap sparked a wave of experimental research. Scholars like Jack Knetsch, Richard Thaler, and Daniel Kahneman demonstrated that the difference was not random but rooted in predictable behaviors, like loss aversion, the endowment effect, and income limits. These early insights helped show how behavioral economics could inform environmental policy, providing a clearer picture of how people actually make decisions about the world around them.

There are other examples that show why a BEEP approach matters. Take the Chipko movement in India, where people hugged trees to protest commercial deforestation. This simple act reflected deeper psychological insights, showing how powerful social and community norms can be in shaping behavior. In Kenya, the success of the Kenya Ceramic Jiko program highlighted similar lessons. Community leaders acted as trusted messengers, social norms helped spread adoption, and local artisans designed stoves that truly met community needs. Today, these kinds of insights are often identified through behavioral diagnostics, showing just how much understanding human behavior can improve environmental programs.

More recently, BEEP has played a key role in reshaping environmental policy. One of the clearest examples is green nudging, which uses subtle changes in how choices are presented to encourage more sustainable behavior. Today, green nudges are being applied in many areas, from food to energy and transport, showing how small adjustments can have broad impacts. But the role of behavioral insights goes far beyond creating new tools. They also strengthen traditional policy instruments like carbon taxes. By understanding how people perceive these taxes, policymakers can address misconceptions, such as worries about unfairness, and make them more acceptable and effective. In this way, behavioral insights help ensure that both innovative and conventional approaches to environmental policy are grounded in how people actually make decisions.

Behavioral approaches can help people understand risks in a way that feels real, which in turn encourages them to take protective steps, like buying flood insurance, a choice many often avoid. Research is showing that pairing behavioral insights with economic policies can make those policies work much better, because they tackle the hidden biases that often get in the way. For example, when carbon taxes are framed as climate dividends, with the money clearly returned to households, people are more willing to accept them. Similarly, setting green energy as the default option makes low-carbon choices feel normal, rather than something extra or difficult.

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In conclusion

Looking ahead, behavioral insights hold huge promise for changing how we understand environmental challenges and for shaping policies that actually work in the real world. This article has explored the rise of Behavioural Environmental Economics and Policy, or BEEP, showing how psychology and behavioral economics have added depth and nuance to environmental thinking. We've seen how these insights challenge the assumptions of traditional rational-choice models and highlight the value of approaches that start with how people actually behave. We see the impact of BEEP in many everyday ways, from how people's different attitudes toward risk, time, and information shape simple choices like recycling or saving energy, to how these behaviors affect whether policies meant to encourage sustainable action actually work.

BEEP can be applied to uncover and tackle key challenges, from methodological gaps, such as the need for a mixed-methods toolkit, to institutional barriers, like policy silos, regulatory inertia, and mismatches between evidence and policy. It can also help address global issues, including equity considerations and the creation of comprehensive databases. Scaling up BEEP to environmental challenges in the Global South will require fresh thinking, since many behavioural insights have so far been developed in the Global North. For instance, studies led by Busara in Kenya found that standard tests, like the Trier Social Stress Test, did not work as expected because Kenyan participants naturally excelled in public speaking.

In this way, this article aims to provide a brief, structured resource for practitioners and academics who are exploring how behavioural insights can be applied to environmental economics.

Image credit: Anthony Mogaka
Midjourney V 7.0

Cultivating resilience- The case for depth before scaling in agricultural insurance

By Rahab Kariuki

I have never met anyone who doesn't want insurance right after a loss. For instance, when severe floods struck parts of Nairobi in April 2024, nearly everyone wished they had insurance to help them recover. Conversations on social media reflected a widespread sentiment: many people would have eagerly bought coverage if they could turn back time. However, statistics show that less than 3% of Kenyans hold any form of insurance, even when it's both available and affordable. This gap between what people desire after disaster and the choices they make beforehand highlights the persistent challenge of why insurance uptake is so low where it's needed most?

Yet, despite the potential of climate insurance to serve as a crucial safety net for smallholder farmers in Africa since its introduction two decades ago, many national agriculture insurance programs remain in their early stages and struggle to achieve effective scale. This paradox is worth exploring, as it highlights the disconnect between the desire for insurance and its actual uptake. With over 15 years of experience in agricultural index insurance and behavioral science, I have witnessed both the rise and fall of various index insurance programs. Given the increasing impact of climate change on agricultural productivity, it is urgent that we make index insurance work for the majority of farmers and stakeholders to enhance resilience and secure livelihoods across the continent.

Few African countries, including Zambia, Uganda, Kenya, Rwanda, and Senegal, have successfully established national crop insurance programs. Meanwhile, others, such as Ethiopia, Tanzania, Mali, Mozambique, and Benin, are still in the pilot stages of development. A notable example of a program that has achieved scale is Zambia's Farmer Input Support Programme (FISP), which has insured 1,024,434 farmers annually since 2017 according to the 2023/2024 implementation handbook. The success of Zambia's FISP program shows that large-scale insurance coverage is possible when integrated into a broader government agricultural support package. It also highlights the importance of strong public-private partnerships and effective delivery systems in reaching millions of smallholder farmers. Although these programs have demonstrated some success, there remains significant potential for growth. For example, Kenya's program has struggled to find a sustainable funding model. Farmer subsidies are available in some places, but in others, the program remains unfunded.

> **The success of Zambia's FISP program shows that large-scale insurance coverage is possible when integrated into a broader government agricultural support package.**

Looking at these case studies, literature identifies three primary barriers contributing to low uptake—basis risk, high costs, and low literacy (Ali et al., 2020; Carter, 2017; Smith, 2019)—it is important to note that the extent of government support varies considerably among these countries which in turn contributes to additional bottlenecks in scaling. Common recommendations to address these issues, including improved design, enhanced education, and increased government support (Nshakira-Rukundo et al., 2021; Greatrex et al., 2015), often overlook the critical role of human behavior in the uptake of these already complex products.

I align with those who advocate for tailoring insurance solutions to local contexts and farmer preferences (Jensen and Barrett, 2017), as well as combining insurance with disaster assistance and safety nets to broaden protection (Kramer et al., 2022; Greatrex et al., 2015).

The narrative surrounding these challenges is often oversimplified. For instance, financial literacy is frequently cited as a barrier; however, behavioral science reveals that merely providing information does not necessarily lead to a change in the way people operate. This is largely due to the classic intention-action gap, which persists when we focus solely on delivering information without addressing the underlying motivations and emotional responses that drive decision-making. Interestingly, offering background information on how an index is derived or payouts computed will only increase resistance to purchase (Elabed and Carter, 2015).

However, I argue that the crucial question isn't why these programs aren't scaling, but rather whether there is substantial evidence of impact that justifies scaling.

Factors such as risk aversion and value perceptions pose a more significant influence on individuals' decisions than the mechanics of the product itself (Brick et al., 2015). Additionally, many programs fail to engage adequately and consistently with farmers, neglecting the importance of understanding their unique contexts and needs. By not involving farmers in the co-design process, these programs miss the opportunity to address the psychological and behavioral dimensions that truly impact uptake.

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Therefore, a more nuanced approach that incorporates behavioral insights alongside structural considerations is essential for creating effective and sustainable insurance solutions. This article presents an alternative perspective on scaling these initiatives based on my experience working in agriculture insurance and now, applied behavior science research in insurance.

From my analysis of successful case studies like India and Zambia, I have identified a three-stage maturation model for index insurance programs:

Stage	Description	Key thresholds to advance
Foundational policy initiatives stage	Establishes the essential regulatory frameworks and institutional support for index insurance programs.	• **Initial pilot success:** Successful implementation of pilot projects showing feasibility. • **Regulatory frameworks:** Development of laws and regulations supporting index insurance, ensuring legal backing and consumer protection.
Data-driven innovation and efficiency stage	Focuses on leveraging data analytics and technology to improve insurance product effectiveness.	• **Increased demand from stakeholders:** Clear demand from farmers and agricultural organizations for tailored products. • **Investment in technology:** Adoption of advanced data collection and analysis tools for better product design and delivery.
Adaptive learning and continuous improvement stage	Embraces dynamic feedback loops for ongoing refinements and scaling of insurance programs.	• **Demonstrated impact:** Evidence of improved farmer resilience and satisfaction such as higher crop yields, financial stability. • **Increased trust among farmers:** Established reputation for reliability and effectiveness, leading to greater participation and investment.
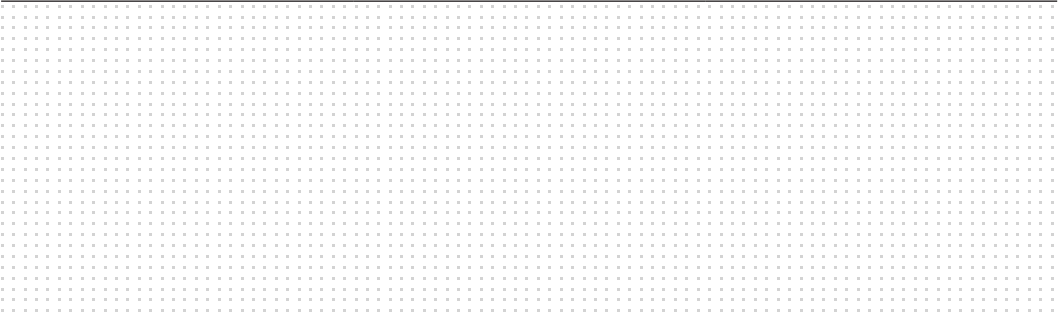
In my assessment most African schemes appear to be stuck in the first two stages, which hinders their growth potential. To advance these programs to stage three, I propose a focus on 'increasing depth before scaling'. Here, I outline three key arguments on how to achieve this depth in the 'adaptive learning and continuous improvement' stage.

Insured smallholder farmers are severely underinsured

A critical gap exists in the ratio of insurance coverage to the actual risk exposure faced by farmers. Many existing schemes adopt a bundling approach that primarily focuses on insuring the cost of inputs—such as seeds, fertilizers, and input loans—rather than addressing the true exposure, which is the value of the expected yield. Farmers are fundamentally in the business of producing a harvest and aim to earn more than just break even.

Unfortunately, these bundling strategies and partnerships often fail to track individual farmers' data, making it challenging to enhance retention and re-enrollment rates among insured farmers. Even in the successful case of the Zambia FISP program, if the government subsidy were to be withdrawn, would the over one million insured farmers renew their policies? If insurance merely protects banks and input providers—who, by the way, do not purchase agricultural insurance for their own exposure—how does it genuinely protect and facilitate farmers' businesses and livelihoods?

The emphasis on bundling insurance products with input loans often results in a narrow focus that overlooks the broader needs of farmers. While bundling may seem like a straightforward approach to scaling, it can inadvertently limit the scope of coverage and fail to address the comprehensive risks farmers encounter. By aligning insurance products with the real risks farmers face, we can build trust and encourage wider participation in these programs.

Insurance product communication is confusing

Based on the above point, if we are not falling back on simple bundling partnerships, a crucial factor in achieving depth is the effective communication of product offerings. Farmers often receive marketing information under the guise of financial literacy, but these training sessions typically last no more than an hour and are often delivered by unqualified and untrusted representatives. This situation leads to increased ambiguity, heightened risk aversion, confusion and reluctance to adopt new products. Given that as an industry we rarely develop new insurance products, it is crucial to recognize that the primary gap in insurance lies in communication. Investing in message testing, well designed communication campaigns that simplify and demonstrate how these products meet farmers' needs is vital.

The real barrier lies not in financial literacy but in demonstrating the value of index insurance.

Much like how individuals use mobile money services without fully understanding their mechanics, farmers can engage with climate insurance if they perceive its benefits clearly.

> **While bundling may seem like a straightforward approach to scaling, it can inadvertently limit the scope of coverage and fail to address the comprehensive risks farmers encounter.**

The challenge is conveying how these products can mitigate risks and enhance financial stability. When mobile money services were introduced in Kenya, early users tested the system by sending small amounts and confirming receipt before sending larger sums. This gradual approach allowed them to build confidence in the system. For insurance, however, the testing process takes longer, and an underinsurance mistake can be costly if a payout is needed. To mitigate these risks, it's crucial to provide clear, practical demonstrations of how index insurance works and how it can deliver tangible benefits to farmers' lives.

To do this, insurers should focus on relatable examples and practical demonstrations that resonate with farmers' experiences. For instance, simply reframing livestock index insurance as a policy designed to cover household expenses during a drought reveals significant differences in demand among women in Northern Kenya (Hobbs, 2019). Furthermore, the use of interactive tools, such as AB Entheo's ResilientMe! and UC Davis SimPastoralist games, has proven to be a more effective approach.

Moreover, leveraging trusted individuals— such as local leaders or fellow farmers who have benefited from index insurance—as advocates can enhance credibility. Social proof through community testimonials can significantly increase engagement, making farmers more likely to participate in these programs.

Insurance outreach is limited primarily to smallholder producers

Lastly, we need to consider expanding the application of index insurance beyond smallholder producers and beyond agriculture. Currently, many schemes focus solely on encouraging individual farmers to insure their production neglecting County governments, development partners, input providers and offtakers among other stakeholder which limits the business case and sustainability of agriculture insurance. By insuring all value chain actors—suppliers, distributors, and processors—we can spread the risk and make the cost of insurance more manageable for farmers.

Climate risks affect many industries including healthcare, energy, transportation, finance, real estate, tourism, manufacturing, construction, and technology among others. Index insurance can be applied as an innovative financing and safety net mechanism in these areas too. This broader approach not only enhances the sustainability of insurance programs but also promotes a more resilient agricultural ecosystem. For instance, integrating health insurance solutions into agricultural support efforts provides a holistic approach to farmer welfare. By protecting not only the farmers but also their households and entire value chains, we can create a more stable environment that reduces risk for everyone involved.

Lessons from microfinance and national health insurance

The concept of increasing depth before scaling has been notably successful in the field of microfinance, particularly in developing countries. For instance, organizations like Grameen Bank initially focused on understanding the financial behaviors and requirements of low-income individuals, which allowed them to design products that were not only accessible but also build trust and engagement.

This deep engagement ensured that when they scaled their operations, they did so with a solid foundation of client understanding and product relevance.

Similarly, national health insurance programs have demonstrated the importance of robust government support and well-defined policy frameworks. By showing clear and immediate benefits, these programs have built strong public trust. Agricultural insurance schemes can learn valuable lessons from these successful models to overcome common barriers. For example, just as health insurance programs utilize subsidies from private sector and government levies to encourage enrollment among low-income populations, agricultural insurance can implement sustainable premium support measures to alleviate the financial burden on smallholder farmers.

As I conclude, I cannot help but think back on my journey in the agricultural index insurance sector. I am reminded of a smallholder farmer named Jane, whom I met during my first week of fieldwork with Kilimo Salama in Laikipia, Kenya. Jane had dedicated her life to cultivating her family's land, carefully nurturing her crops and saving every penny she could. When she first heard about index insurance, she was hopeful it would provide the safety net she desperately needed. However, like many farmers, she found the seed insurance payouts inadequate, found the products confusing, and felt they did not sufficiently cover her actual risks.

While this encounter was 16 years ago, Jane's experience illustrates the urgent need for change in our approach to climate insurance. We must ensure that farmers like her can access coverage that truly reflects their vulnerabilities. By focusing on increasing depth through tailored products, simplified communication, and broader applications, we can empower farmers to protect their livelihoods effectively.

This is not just about scaling insurance programs; it's about creating meaningful solutions that resonate with the realities of farmers' lives. We have the opportunity to make a lasting impact, to transform index insurance from a mere concept into a powerful tool for resilience.

Insurance is not just a product, but a lifeline. By prioritizing depth before scaling, we can ensure that every farmer has the opportunity to thrive, just like Jane.

What is index (climate) insurance?

Index insurance, also called climate insurance, is a simple form of insurance designed to help protect people and businesses, especially farmers, against the risks caused by weather or climate events such as droughts or floods. Instead of paying out based on proof of individual damage, index insurance pays out when a specific weather measurement (like rainfall or temperature) crosses a certain pre-set level, known as the "index trigger." This makes payouts fast and easy for everyone involved.
As climate change brings more unpredictable and extreme weather, index insurance offers a practical solution. It gives communities a financial safety net, helping them recover faster when disasters strike, and supports people living in areas most affected by changing climate conditions.

Characteristics of the three steps in the maturation model

1. **Foundational policy initiatives**
   - → **Regulatory framework:** Establishes clear guidelines and regulations that govern the operation of index insurance, ensuring compliance and protecting farmers' interests.
   - → **Institutional support:** Involves the creation of supportive institutions and agencies tasked with implementing and managing insurance programs effectively.
   - → **Accessibility:** Ensures that insurance products are accessible to a broad range of farmers, particularly smallholders, through subsidies, outreach programs, and simplified processes.
   - → **Stakeholder engagement:** Encourages collaboration among various stakeholders, including government agencies, insurers, NGOs, and farmer organizations, to create a holistic approach to index insurance.

2. **Data-driven innovation and efficiency**
   - → **Advanced data utilization:** Employs data analytics, satellite imagery, and weather forecasts to develop accurate and relevant indices for crop insurance.
   - → **Technology integration:** Incorporates modern technology into product delivery, such as mobile applications for policy management, premium payments, and claims processing, enhancing user experience and efficiency.
   - → **Risk assessment improvement:** Utilizes data to enhance risk assessment processes, enabling insurers to better understand and mitigate potential risks associated with agricultural production.
   - → **Tailored product development:** Focuses on creating insurance products that are specifically designed to meet the diverse needs of different farmer demographics and agricultural practices.

3. **Adaptive learning and continuous improvement**
   - → **Feedback mechanisms:** Establishes systematic channels for collecting feedback from farmers and stakeholders to inform product refinements and adjustments.
   - → **Iterative product development:** Engages in a continuous cycle of testing, learning, and adapting insurance products based on real-world experiences and changing conditions.
   - → **Stakeholder collaboration:** Promotes ongoing collaboration and communication among all stakeholders to ensure that insights and lessons learned are shared and integrated into the program.
   - → **Responsive strategies:** Develops strategies that can quickly adapt to changing agricultural conditions, market dynamics, and farmer needs, ensuring that insurance products remain relevant and effective over time.

When safer feels riskier: Risk perception as a barrier to climate-resilient farming

By Jackline Chemtai and Dr. Fadila Jumare

Climate change is disrupting agriculture in profound and far-reaching ways, threatening both livelihoods and food systems. Unpredictable rainfall patterns, prolonged droughts, extreme heat, floods, and shifting seasons are reducing crop yields, degrading soil quality, and increasing pest and disease outbreaks. These disruptions are further heightening the risk of crop failure, income loss, and widespread food insecurity, especially in regions where agriculture is already vulnerable. In response, a range of climate-smart practices, including drought-tolerant seeds, adaptive livestock systems, and improved water and soil management, offer pathways to build resilience and stabilize food production.

While farming has always involved risk, climate change has amplified uncertainty, making traditional practices less predictable and more precarious. Building climate-resilient farming systems has therefore become essential. Yet while climate-smart practices— drought-resistant seeds, improved irrigation, and integrated pest management—are designed to reduce vulnerability, many farmers remain hesitant to adopt them.

For smallholders, familiar methods offer a sense of security, while new practices are seen as uncertain and potentially risky. This paradox highlights that resilience is not only about technology or agronomic design but also about trust, perception, and human judgment. Without shifting how farmers perceive and value these tools, even the most effective innovations will remain underutilized in the face of mounting climate pressures.

The central reason for this lies not in the technical or financial feasibility of innovations, but in how farmers and the agents who support them perceive risk. For many, change feels more uncertain than continuity. This perception gap between what is objectively safer and what feels riskier, shapes decisions across the agricultural system and ultimately determines whether climate-smart agriculture can deliver on its promise.

For farmers, every decision balances immediate survival with uncertain future gains. Traditional practices, refined over generations, are valued not just for cultural continuity but for their reliability in managing known risks. Loss aversion plays a strong role here: the fear of losing a harvest, income, or social standing outweighs the potential benefits of experimentation. Which is precisely why, adoption of climate-smart practices is further constrained by the emotional dimensions of decision-making.

> **While farming has always involved risk, climate change has amplified uncertainty, making traditional practices less predictable and more precarious.**

Trust in advice, fear of reputational loss, and experiences of failed interventions all weigh heavily. A farmer may see a drought-tolerant seed as promising, but if the seed fails once, the loss is compounded, both harvest and trust are gone. This gap between technological solutions and farmer perceptions is not just a communication problem, it is a growing fault line in our ability to build climate resilience. At its core, this perception gap swallows both trust and opportunity. On one side, governments, researchers, and donors are developing climate-smart interventions like drought-tolerant seeds, weather advisories, improved insurance products, and adaptive irrigation systems. And on the other side, farmers operate under intense immediate pressures where survival outweighs long-term gains; each planting season brings a cascade of urgent decisions: how to stretch limited cash across inputs, school fees, and food; how to navigate unpredictable rainfall without reliable forecasts; how to recover from a poor harvest while still paying debts to input dealers or savings groups. Many rely on informal safety nets e.g., neighbors, relatives, or community support whose strength depends on reciprocity. It is in the space between these two realities that well-intentioned solutions often falter. Tools designed to reduce risk fail to align with the pressures shaping daily life, investments underdeliver on their potential, and the very vulnerabilities they aim to address continue to deepen.

If this perception gap remains unaddressed, climate-resilient farming will remain more of a concept than a lived reality. Farmers will continue to rely on coping strategies that worked in a past climate but no longer match current extremes. Promising innovations will stay on the shelf, and the impacts of climate shocks will cascade, reducing yields, undermining rural incomes, and widening inequality. Bridging this gap is not optional; it is central to ensuring that climate-smart agriculture moves from theory to everyday practice.

Insurance and advisory services reveal this dynamic clearly. Farmers often reject insurance because the sure cost of a premium feels heavier than the uncertain chance of payout. As one farmer in Nakuru, Kenya put it, 'Why pay every season if I may never see the benefit?' Similarly, climate advisories may be ignored if they conflict with local wisdom or come from a source perceived as distant or generic. Farmers in a cognitive mapping study (Vyas et al., 2024) emphasized that they trust advice more when it is regionally specific, delivered in a familiar way (such as through SMS or community programs), and when it acknowledges their lived experiences of weather unpredictability. In their words, 'If the forecast does not match what we see in the sky, we will follow our elders.' These voices underscore that relevance, trust, and resonance with local knowledge are as critical as accuracy in shaping the uptake of both insurance and climate services.

Climate services

Climate services are information and advisory systems that provide farmers with timely, location-specific guidance on weather, seasonal forecasts, and climate risks. They include tools such as SMS-based weather alerts, radio and TV advisories, agricultural extension bulletins, early warning systems, and digital platforms that translate climate data into practical recommendations, e.g., when to plant, how to manage pests, whether to irrigate, or how to prepare for drought.

Yet farmers do not make these choices in isolation. Much depends on the agents who deliver products, information, and assurances, actors who sit at the frontline of agricultural change. Extension officers, agro-dealers, and sales representatives play the critical role of translating technical innovations into everyday decisions, their influence therefore, is not mechanical but relational. Farmers judge new practices not only on their agronomic promise but also on whether the messenger appears credible, empathetic, and dependable. In this way, agents often become the hinge on which adoption either succeeds or stalls.

The difficulty is that many of these frontline actors operate within fragile systems. Our research with agribusinesses in Kenya has shown that training is inconsistent, incentives reward short-term sales rather than long-term trust, and high turnover erodes continuity. Farmers encounter agents who appear and disappear with each season, leaving little space for confidence to take root. In such contexts, the risk of adopting something new feels amplified rather than reduced. Even the most climate-resilient seed can look like a gamble if farmers doubt whether support will be there when things go wrong. This dynamic reveals another layer of the perception gap: the last mile is less about logistics than about trust, design, and credibility. Farmers weigh choices through social and emotional lenses, while agents themselves must balance slim margins, juggle multiple products, and guard their reputations in the community. If incentives align with farmers' well-being, agents can anchor resilience. If not, they become another weak link in a chain already strained by climate uncertainty. The way agents are trained, rewarded, and recognized shapes adoption outcomes as much as the attributes of the products they deliver.

The implications reach far beyond the farmer–agent relationship. Decades of investment in agricultural research will only bear fruit if adoption pathways are trusted and credible. Rural livelihoods will grow more resilient when agents are supported as entrepreneurs and knowledge brokers, not treated as disposable sales channels. And food systems will adapt more sustainably when farmers experience innovation as a safeguard rather than a risk. Strengthening last-mile agent networks is therefore not a marginal fix but a central pillar of climate-smart agriculture, and a decisive factor in whether smallholder communities can navigate the turbulence of a changing climate.

Shifting perceptions, however, requires more than information. Behavioral insights show that adoption improves when trusted messengers deliver advice tailored to local realities (Vyas, et al., 2024), when benefits are immediate and visible, when risk is shared and validated through peers or demonstrations, and when solutions are designed for affordability and ease (Busara, 2022), lowering the psychological cost of experimentation.

Image credit: Anthony Mogaka
Midjourney V 7.0

Evidence from large-scale pilots reinforces how framing and reliability shape trust in agricultural insurance. Farmers are more willing to pay when premiums are presented as a manageable share of seasonal income, rather than an abstract annual cost. Early, visible payouts further strengthen credibility, studies show that when compensation was delivered within three months, farmers reinvested up to 70 percent back into production, seeing insurance as a safeguard rather than a gamble. Yet this trust is fragile: delays, mismatches between payouts and local weather experiences, or opaque triggers quickly erode confidence.

In this sense, adoption hinges less on the actuarial soundness of products than on whether farmers perceive insurance as timely, fair, and proportionate to their livelihoods (Hazell, P et al., 2010). Similarly, A study conducted in Tamil Nadu, India, on the effectiveness of SMS-based extension advisories illustrates this dynamic clearly. Farmers were far more likely to act on market and weather advisories, with adoption rates above 50 percent, because the information was timely, specific, and directly applicable to their decisions . In contrast, adoption of technology advisories, such as pest or nutrient management recommendations, remained low at just 20 percent, largely because farmers viewed generic or unclear messages as irrelevant . Credibility was also fragile: while some farmers adopted advice directly, many chose to first validate it through trusted peers or agro-dealers (Vyas, 2024). In the end, the study concluded that SMS advisories were valuable for raising awareness, but sustained adoption required advice to be locally grounded and reinforced by credible messengers and personal interaction with extension officials (Murugan and Karthikeyan, 2017). These lessons remind us that services must remain locally grounded and responsive to farmers' lived realities if they are to sustain adoption.

Ultimately, climate-smart and resilient agriculture is not simply about new seeds, technologies, or markets. It is about how farmers and agents perceive and manage risk. For farmers, survival instincts rooted in loss aversion and trust shape every choice.

For agents and companies, risk perception must be treated not as an afterthought but as a central design constraint. Building resilience therefore requires closing the perception gap between those designing solutions and those meant to adopt them, access and information alone are not enough. Adoption demands emotional safety, cultural resonance, trust, and in the end, resilience is not only about reducing exposure to climate shocks, it is about ensuring that safer choices also feel safer.

> **Farmers are more willing to pay when premiums are presented as a manageable share of seasonal income, rather than an abstract annual cost. Early, visible payouts further strengthen credibility, studies show that when compensation was delivered within three months, farmers reinvested up to 70 percent back into production, seeing insurance as a safeguard rather than a gamble.**

Section 2

How behavior shapes
food, farming, and climate
adaptation
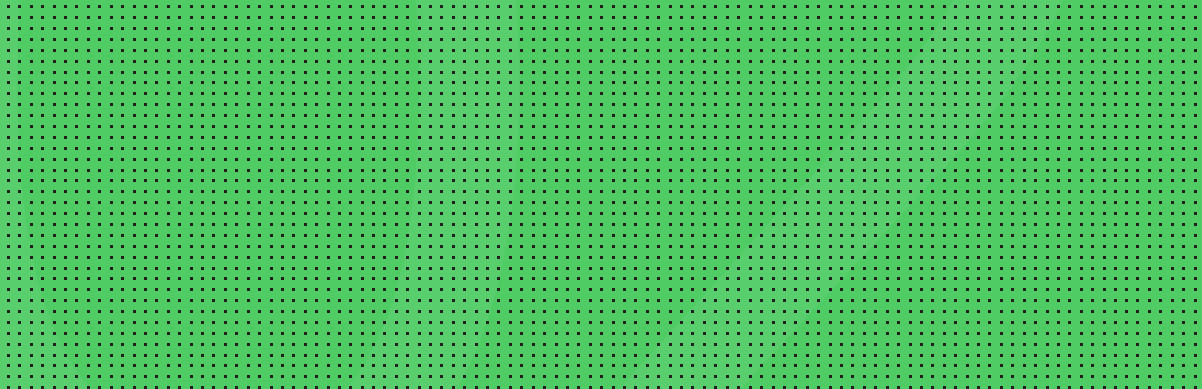
Not just what we eat: Rethinking diets in a warming world

By Juhi Jain

As the planet heats up, food itself is becoming more precarious. Climate change is no longer a distant threat to agriculture; it is already altering what grows, how it grows, and who can afford to eat it. Rising temperatures, erratic rainfall, floods, and droughts are disrupting harvests worldwide, particularly in Africa. Staple crops are experiencing a decline in yield and nutritional quality, while nutrient-rich foods, such as vegetables, fruits, pulses, and animal-source products, are becoming increasingly scarce and more expensive.

The consequences are deeply human. In many parts of the world, households are being forced to make trade-offs that erode their nutritional security. For wealthier households, climate stress means higher prices and shifting diets; for poorer ones, it means fewer meals, reduced diversity, and chronic under-nutrition. These shocks are particularly harmful to women and children, whose nutritional needs are higher but for whom, access is often last.

This is the overlooked face of the climate crisis: its quiet but direct impact on nutrition.

Beyond production and information

Addressing this impact of climate change on nutrition requires three linked lenses:
• Agriculture- What can be produced and how resilient production is
• Policy-How markets, subsidies, and social protection shape affordability and access, and
• Behavior- How people perceive, value, and choose food.

Much of the existing commentary centers on agricultural production or policy information campaigns—grow more, fortify more, tell people what to eat—but those approaches alone often miss the everyday realities that determine whether nutritious food is chosen, cooked, and consumed. For instance, a mother may receive advice to make meals more nutritious by adding fresh vegetables, but if the nearest market only sells wilted produce that she can't afford, she is forced to cook the same starchy staples again.

These constraints highlight an important truth: the diets people choose to consume are embedded more in identity, aspiration, affordability, and habit, than in nutrients and carbon footprints.

> **For wealthier households, climate stress means higher prices and shifting diets; for poorer ones, it means fewer meals, reduced diversity, and chronic under-nutrition.**

Any credible strategy must therefore treat these behavioral drivers as first-order constraints and align agricultural and policy actions to make nutritious choices desirable, affordable, and practical. Each of these behavioral factors shapes what ends up on a plate, often more powerfully than information about health or sustainability:

• **Identity:** Food is culture, heritage, and belonging. Communities often hold onto dishes that anchor them to family, festivals, and memories. Asking someone to abandon rice in Odisha or bananas in Uganda is not simply a nutritional shift; it feels like an erosion of identity. Sustainable diets must therefore build on cultural anchors rather than try to replace them.

• **Aspiration:** Food is also a signal of status and modernity. In many countries, upward mobility is often expressed through increased consumption of meat, packaged foods, or international brands. Conversely, traditional foods like cassava, millets or sorghum are sometimes stigmatized as "poor people's food," even when they are healthier and more climate-resilient. Nutrition interventions must work with, not against, people's aspirations. Making nutritious, sustainable foods desirable and aspirational is essential.

• **Affordability:** No matter how appealing a diet may seem on paper, if families cannot afford diverse, nutritious foods, they will often default to cheaper alternatives. This is especially true in contexts of rising food prices and climate shocks, where affordability determines whether a household buys vegetables, lentils, or just another bag of rice. Policies such as subsidies, social protection, and innovative pricing strategies are crucial to making sustainable choices economically viable.

• **Habit:** Finally, food decisions are deeply habitual. From how tea is sweetened in the morning to what snacks are bought on the way home, routines and convenience drive eating more than conscious choice. Habits are hard to shift, but small nudges (like redesigning menus, changing defaults, or using visual cues) can open pathways for gradual, lasting dietary change.

These forces interact with production and policy. For instance, making a nutritious crops available does not guarantee uptake unless prices defined by policy and desirability align. Taken together, these three forces remind us that food choices are rarely about nutrients alone. They are daily decisions shaped by culture ,aspiration, cost, habit, and social expectations, and any strategy for climate-resilient nutrition must take these realities into account.

Sustainable diets can reduce agricultural emissions, improve resilience, and combat undernutrition. But evidence shows that awareness and availability by themselves seldom change consumption patterns (Farwood 2025). Even when people know what's better for them to consume, deeply entrenched behaviors, social norms, and structural frictions hold them back. The real dietary challenge is choosing food that is affordable, nutritious, varied, and liked in a fluctuating landscape of food options, personal needs, resources, and social constraints. (Farwood 2025). Effective interventions in food environments require an understanding not just of what people eat, but also why and how they make food decisions in specific contexts.

Technical solutions alone—new crop varieties, fortification, logistics—often stumble because they fail to connect to these behavioral realities. A fortified cereal may sit on a store shelf if its taste or packaging feels unfamiliar. Nutritional education may raise awareness but not change entrenched habits. Improved production can lower farm risk but consumer prices need policy tools such as subsidies and safety nets, to be made more affordable. And when programs overlook intra-household dynamics—who decides what to buy, who eats first, whose time is limited—the most vulnerable continue to lose out. The lesson is clear: agriculture and policy may build the foundation, but behavioral design determines whether that foundation leads to sustained dietary change.

In Barwani, a tribal district in India, despite high child malnutrition rates parents often dropped out of treatment programs at nutrition centers, seeing them as burdensome, time-consuming, and socially intimidating. A seemingly simple but significant behavioral tweak of giving children a simple toy during each visit, transformed attendance. The toy proved to be a positive reinforcement and a tangible cue for parents to return, making the experience emotionally rewarding rather than stressful. This addressed key behavioral drivers: it tapped into aspiration (parents felt recognized and proud for participating), aligned with social norms (visiting the center became a socially acceptable and even desirable action), and leveraged habit (the toy served as a simple reminder to attend follow-ups). Parents began returning consistently, children completed treatment, and follow-up visits soared (Jain, 2022).

In Bangladesh, the SHIKHA project faced a similar behavioral bottleneck. Verbal counseling on maternal and child diets had limited impact, as advise was easily forgotten and hard to translate into daily meals. The program introduced a visual aid: a sturdy melamine plate printed with photos of diverse, locally resonant meals and key messages in Bangla (FHI 360, 2015). This tangible tool turned abstract guidance into something visible and actionable, helping mothers link it to habit. Mothers could use it as a cue for portioning and planning, embedding healthier choices into everyday routines. Nutrition outcomes improved because the intervention connected information to identity (familiar foods), habit (a visible daily prompt), and affordability (realistic meal components).

In Odisha, India, the Millets Mission revived the cultivation of traditional, climate-resilient grains. Farmers once again grew nutritious millets, supported by policy incentives and procurement programs. Yet, as researchers observed, production success did not automatically translate into consumption (Samtani, R., Mishra, S., & Neogi, S., 2024). Millets were still seen as 'poor people's food'- culturally outdated, aspirationally low. Bridging this gap required not just agricultural revival but behavioral repositioning and policy reinforcement. Where the program paired production with recipe campaigns, school feeding inclusion, and local branding, demand rose. Where these were missing, millets remained a niche crop. The lesson here is that even when supply chains and policies align, diets change only when people want to eat differently.

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Improved production can lower farm risk but consumer prices need policy tools such as subsidies and safety nets, to be made more affordable.

These stories reveal a common thread: effective nutrition interventions succeed when they address the behavioral drivers that truly shape food choices—identity, aspiration, habit, and social norms— and make healthy options practical and desirable. Small, context-rooted changes in design—paired with supportive policy and agricultural systems—can drive measurable improvements in nutrition outcomes. The future of climate-resilient diets depends on scaling such integrative thinking: crops that are both sustainable and desirable, prices that make diversity affordable, and policies that reinforce healthy defaults rather than fight entrenched preferences.

If the climate crisis is reshaping what can be grown, then the nutrition crisis demands that we rethink how we choose food. Technical progress alone will not bridge this gap.

Only by connecting agriculture, policy, and behavior, grounding interventions in culture, aspiration, and everyday reality, can we build food systems that are not just sustainable on paper but nourishing and resilient in the lives of people facing a warming world.

What technical fixes should account for to be effective

Technical solutions—new resilient crop varieties, fortification, cold chains, or market logistics—are necessary, but at times, insufficient. Some common limitations that they come with are as follows:

→ Availability is not acceptability. A fortified cereal on the shelf will be ignored if it doesn't align with people's taste preferences or sense of food identity.

→ Having the necessary information does not automatically translate into a change in behavior. Nutrition education often raises awareness but rarely shifts entrenched habits or social norms.

→ Supply-side fixes ignore demand-side affordability. Improved supply can raise incomes for producers but may not lower prices for vulnerable consumers without policy tools (subsidies, cash transfers).

→ One-size interventions miss intra-household dynamics. Who controls purchases and feeding matters—women's time constraints, work patterns, and social norms influence whether nutritious options reach children and mothers.

These shortcomings show why solutions must combine technical, policy, and behavioral design.

Image featuring Juhi's visit to the nutrition center in Barwani, Madhya Pradesh.

Image credit: Government of Madhya Pradesh

Image featuring the toy bank at the nutrition center in Barwani, Madhya Pradesh.

Image credit: Government of Madhya Pradesh

Understanding the interconnection of global nutrition, gender, and climate resilience

By Wanja Nyaga

Overview of the triple threat

Women bear a disproportionate responsibility for securing food, water, and fuel for their households in many global contexts. This places them at the intersection of three major global issues: malnutrition, climate change, and gender inequality. These crises don't exist as separate issues and are interconnected, creating a complex web of vulnerability. Understanding these connections is essential for designing integrated development and policy interventions.

Beyond preventing hunger, global nutrition also involves ensuring access to nutrient-dense foods that promote productivity and overall health. In the World Health Organization's (WHO) framework, gender refers to the power dynamics and sociocultural roles that influence individual and collective opportunities. Climate resilience refers to the ability of individuals, communities, and systems to anticipate, absorb, adapt to, and recover from climatic shocks and stresses. Each domain shapes and constrains the others; gender roles affect dietary decision-making and agricultural practices; nutritional deficits undermine adaptive capacity, and climate variability exacerbates both gendered vulnerabilities and food insecurity.

Empirical data supports these links. According to the UN Women Gender Snapshot (2024), up to 158 million more women and girls, 16 million more than men and boys, may fall into poverty by 2050 because of climate change. This disproportionate effect underscores the urgent need for gender-responsive nutrition and climate governance, where progress in one area depends on concurrent advances in the others.

Nutrition is a cornerstone of health resilience

Nutrition forms the foundation of human health and resilience. A population's nutritional status directly influences its ability to withstand and recover from environmental, economic, and health shocks. Individuals and communities that maintain optimal micronutrient intake exhibit stronger immunity, faster recovery, and better cognitive performance, essential assets for adaptation and self-reliance in volatile climates.

> **According to the UN Women Gender Snapshot (2024), up to 158 million more women and girls, 16 million more than men and boys, may fall into poverty by 2050 because of climate change.**

From a policy perspective, this requires shifting focus from caloric sufficiency to nutrient adequacy. Malnutrition, whether undernutrition, micronutrient deficiency, or obesity, impairs immune function and increases vulnerability to both communicable and non-communicable diseases. Climate-related disruptions to agriculture and food systems exacerbate these risks through crop loss, soil degradation, and reduced dietary diversity.

Targeted interventions such as nutrition-sensitive agriculture, maternal health programs, and micronutrient fortification that account for behavioral levers are essential pathways to enhancing resilience. Optimal maternal nutrition during the first 1,000 days of life is particularly crucial, as deficiencies during this period can irreversibly impact physical growth, cognitive development, and productivity. Nutrition is therefore both a biological necessity and a strategic tool for public health, economic stability, and climate adaptation policy.

The gender aspect of health and nutrition equity

Gender-based perspectives on nutrition reveal disparities in vulnerability and the allocation of resources. Although women often have limited access to land, financial resources, and education, they frequently oversee food production and distribution in agrarian and resource-dependent societies. Structural inequalities restrict food security and limit women's ability to implement adaptive practices.

There is also a biological and sociocultural burden tied to nutrition and health insecurity for women. Increased nutritional needs during menstruation, pregnancy, and lactation often collide with societal norms that prioritize men and children during mealtimes, perpetuating long-term deficiencies. These trends reduce community well-being, child health, and productivity.

Agency and decision-making are equally important. Women's exclusion from household and community governance limits their participation in climate adaptation strategies, such as adopting drought-resistant crops or improved land management techniques. Conversely, research consistently shows that investing in women's empowerment generates a multiplier effect across development outcomes, including improved dietary diversity, enhanced child welfare, and stronger community resilience. Policies integrating land rights reform, gender-sensitive resource allocation, and inclusive agricultural extension services are not merely equity measures; they are crucial for achieving systemic resilience.

Innovative solutions for health, nutrition, and sustainability

Addressing the interconnected challenges of malnutrition, gender inequity, and climate vulnerability requires transformative innovation grounded in scientific evidence and community participation. Several emerging solutions illustrate this convergence.

Climate-smart agriculture promotes adaptive and sustainable food production. Techniques such as agroforestry, precision irrigation, and the cultivation of drought-tolerant crops improve productivity while conserving biodiversity and soil integrity. Biofortification - the breeding of crops enriched with essential nutrients such as vitamin A and iron - offers a cost-effective approach to addressing micronutrient deficiencies within climate-adapted systems.

Community-led and indigenous initiatives further demonstrate the participatory nature of sustainability. Co-designing nutrition and health programs with local stakeholders produces more lasting and equitable results. Community gardens, cooking classes, and women's cooperatives enhance household nutrition while promoting social cohesion and adaptability, strengthening resilience in multiple dimensions.

A call to action for global cooperation and policy

Local innovations must be embedded in supportive policy frameworks and international cooperation. A systems approach incorporating gender equity, nutrition, and climate resilience into planning, funding, and evaluation is essential, as isolated interventions are insufficient.

Governments should adopt integrated policy instruments, incorporating gender-responsive budgeting and nutrition targets into climate adaptation strategies. National frameworks must align with global standards on sustainable development and food security, such as the UN Sustainable Development Goals (SDGs 2, 5, and 13), to ensure cross-sector accountability.

Multilateral collaboration is crucial. Partnerships among UN agencies, NGOs, and regional bodies facilitate capacity-building, data sharing, and evidence-based policymaking. Investments in women's education and economic empowerment yield higher returns across social and ecological domains, strengthening adaptive governance and intergenerational well-being.

The intersection of gender, nutrition, and climate should be seen not as a challenge to manage but as an opportunity for global renewal. Policymakers, development agencies, and civil society must unite around a shared agenda: fostering inclusive, nutrition-secure, and climate-resilient societies capable of turning vulnerability into sustainable progress.
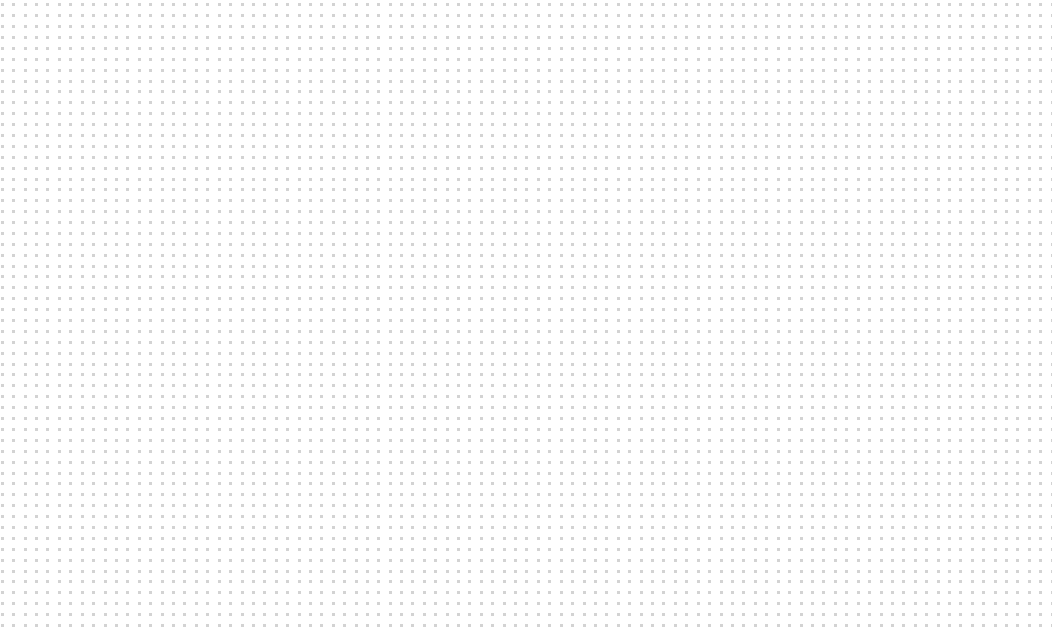
Case Studies

The Mobile Teaching Kitchen: Integrating nutrition, gender, and livelihoods

The Mobile Teaching Kitchen (MTK) initiative offers a tangible model for operationalizing integrated resilience. Operating in India, Mexico, the United States, and the United Kingdom, MTK combines culinary nutrition education with micro-enterprise development, addressing malnutrition at household and community levels. By training marginalized women as "culinary health educators," the program enhances knowledge, generates income, and improves dietary practices simultaneously.

MTK exemplifies gender-transformative programming, where empowerment is a deliberate objective rather than an indirect outcome. Using the "See One, Do One, Teach One" model, knowledge transfer becomes cyclic and scalable, embedding resilience within local social systems. MTK serves as a replicable blueprint for combining education, nutrition policy, and sustainable enterprise development.

Decolonizing food systems: Kenya and India

The 'Decolonizing Food Systems' project, led by the NNEdPro Global Institute and Busara, provides another strong example of intersectional resilience. In Kenya and India, the initiative promotes cultivating indigenous, drought-resistant vegetables such as amaranth and African nightshade. Supporting dietary diversity, soil preservation, and economic stability, these crops help balance climate adaptation goals with improved nutrition.

The project recommends moving away from resource-intensive, maize-centric agriculture toward diversified food sources like sweet potatoes, millet, and sorghum. By combining behavioral insights with agronomic innovation, the initiative advances both food sovereignty and environmental sustainability. Importantly, it supports women's livelihoods by reinforcing smallholder enterprises and market integration, underscoring that gender empowerment is essential for nutritional and climate resilience.

Applying behavioral systems analysis to support the EU in reaching consumer food waste reduction targets

By Dr. Hendrik Bruns[1]

The European Union (EU) and its Member States have set ambitious, legally binding targets to fight food waste: by 2030, Member States must reduce per capita food waste at the retail and consumption stages by 30% compared to 2020 levels[2]. This is a key part of the European Green Deal, the EU's transition towards a circular and climate-neutral economy by 2050, and its commitment to halve per capita global food waste in line with Sustainable Development Goal 12.3. These targets are behavioral at their core. Progress depends on changing how food is purchased, donated, and redistributed.

Achieving these reduction targets requires behavioral change. Effective and efficient food waste reduction policy requires a solid understanding of the behavioral drivers and barriers that shape food redistribution practices across consumers, retailers, restaurants, and the hospitality sector.

These behaviors, however, do not occur in isolation: they emerge from interactions among cognitive processes, social norms, economic incentives, infrastructures, and regulatory conditions. Policy must address the behavioral system as a whole rather than isolated factors — a task that calls for a dedicated systemic approach.

It is time for the EU to move beyond fragmented behavioral analyzes and initiatives. At the Competence Centre on Behavioural Insights (CCBI), we strive towards applying a behavioral systems lens which is not just promising, but necessary to achieve lasting progress on food waste reduction in line with EU goals. Our vision is to employ a holistic conception of behavioral insights applied throughout the policy cycle, drawing heavily on behavioural systems analysis (European Commission, Joint Research Centre et al., 2025).

2 https://food.ec.europa.eu/food-safety/food-waste/eu-actions-against-food-waste/food-waste-reduction-targets_en (last accessed 27/07/2025).

The role of surplus food donation and redistribution in EU policies to reduce consumer food waste

EU policy already recognizes the potential of surplus food donation and redistribution as upstream prevention measures within the EU's food use and waste hierarchy. Consequently, the European Commission has adopted food donation guidelines to clarify provisions in EU legislation and reduce barriers to redistribution.

Between 2018 and 2020, a pilot project on food redistribution across Member States included mapping national regulatory and policy frameworks (European Commission, Directorate General for Health and Food Safety et al., 2020). This was followed by collaborative work with the JRC and food waste experts to systematically analyze food waste interventions, uncovering actionable insights and highlighting gaps that require joint efforts from scientists, policymakers, and practitioners (Bruns et al., 2024; Candeal et al., 2023; Vittuari et al., 2023).

These initiatives underscored the complexity and overlap of national and EU-level policies aimed at reducing food waste, with measures targeting and affecting multiple actors and policy domains. These efforts are further interlinked with broader environmental objectives, including climate change mitigation, biodiversity protection, and sustainable consumption. As these diverse policies often interact and affect behavior in similar contexts, an integrated assessment of their overlaps, interactions, and spillover effects (see, e.g. Alt, Bruns, & DellaValle, 2024; Alt, Bruns, DellaValle, et al., 2024) is essential to understanding their cumulative behavioral and environmental impact (CCBI). A holistic behavioral insights approach based on adequate methodologies is tremendously important to support such a wide lens.

A holistic approach to behavioral public policy

The CCBI has articulated a comprehensive understanding of behavioral insights, most recently in European Commission: Joint Research Centre et al. (2025), positioning behavioral science not merely as a justification for nudges or individual-level interventions, but as a lens for analyzing complex, behaviorally relevant policy challenges based on a thorough understanding and contextualization of behavior. This approach aligns with evolving perspectives in the field (e.g. Hallsworth, 2023; Varazzani & Hubble, 2025) and reflects the importance of consumers in the digital and green transition and related policies.

To implement its vision, the CCBI strives to apply the behavioral systems approach (Del Valle et al., 2024). This methodology integrates behavioral science with systems analysis. We think that this approach enables applied behavioral scientists working at the science-policy interface to inform every stage of the policy cycle, including the formulation, design, implementation, and evaluation of policies.

A key insight from this work is that policies often underperform when they target individual behaviors in isolation from the broader systems that shape them.

"

EU policy already recognizes the potential of surplus food donation and redistribution as upstream prevention measures within the EU's food use and waste hierarchy.

A nudge (or any intervention) may temporarily reduce an undesirable behavior, but if the behavior is driven by persistent structural factors—economic conditions, physical or digital infrastructure, or regulatory barriers—then the effects of the nudge are unlikely to be sustained.

Without recognizing and addressing these systemic influences, behavioral interventions like nudges risk losing their efficacy over time or at scale.

The behavioral systems approach responds to this challenge by, among other things, mapping interventions and structural constraints, anticipating dynamic feedback effects, and fostering coordination across policy domains. The aim is to identify key actors and behaviors, understand how they interact within the system, and pinpoint leverage points where behavioral interventions or other policy tools can drive transformative change. This approach enables policymakers to tackle root causes of behavioral and policy problems rather than merely addressing their symptoms.

A behavioral systems approach to food redistribution

If we want to make food redistribution work at scale to help reach EU food waste reduction targets, we must understand the system that governs it, including actors, their behavioral determinants, and their interactions. Simply understanding individual choices and then devising individual interventions is not enough. The reality is that consumers, retailers, and the hospitality sector operate in a tightly interlinked network where incentives, regulations, and perceptions interact to shape food waste. Treating these actors as isolated decision-makers and targets of policy interventions misses the point.

In our recent exploratory work with Busara, the Food and Agriculture Organization of the United Nations, and scientific experts on consumer food waste, we examined these interdependencies through a behavioral systems lens. Rather than simply asking why people donate or buy surplus food, we looked at how capability, opportunity, and motivation (Michie et al., 2011) interact in shaping supply and demand of redistributed food. It is not enough for consumers to feel motivated to buy redistributed food if they lack the means, convenience, or social support to do so. The same applies to retailers and hospitality services, whose decisions are shaped as much by the policy landscape, regulation, and infrastructure as by good intentions.

Visualizing these relationships in a behavioural systems map revealed relevant interconnections, policy levers (points at which policy interventions could be effective in reaching their goals), and feedback loops.

One such loop suggested that as surplus food supply increases, so could public attention and regulatory engagement. Targeted campaigns, in turn, could improve confidence in the safety and quality of redistributed food, which could boost consumer demand and encourage even greater redistribution (see Figure 1). This is the kind of virtuous cycle policymakers should aim to strengthen.

The exercise was exploratory by design, but the insight is clear: sustainable change in food redistribution benefits from an understanding of the complex behavioral network that governs supply and demand side behaviours. Effective policy intervention therefore depends on aligning the system's feedbacks — the rules, norms, and opportunities that make the desired behavior the natural choice rather than the exception, with appropriate policy tools.

Source: Busara and Food and Agriculture Organization of the United Nations (FAO).

Conclusion/Outlook

The CCBI is beginning to realise its vision to employ holistic behavioural approaches to inform the EU policymaking cycle with knowledge on human behaviour. The value of this approach lies in fostering a contextualized understanding of behaviour and behaviourally relevant policy challenges. Sustainable behavioral change cannot be achieved through understanding individual behaviour in a vacuum or by applying individual-level interventions alone; it demands recognition of the systemic and structural context in which behaviors occur and systemic identification of policy levers. For behavioral public policy to remain relevant, we think it is essential to advance the field by using appropriate methodologies grounded in solid theory and rigorously gathered evidence, applied systematically and consistently to policy challenges. Naturally, this task is complex and requires a broad range of expertise and resources, and efficient coordination of these resources.

The JRC and its partners are committed to advancing this methodology and exploring innovative ways to integrate behavioral and systems analysis to benefit EU policymaking. We look forward to further collaboration with behavioral and systems science experts to enhance the effectiveness, legitimacy, interaction, and impact of EU policies.

> **For behavioral public policy to remain relevant, we think it is essential to advance the field by using appropriate methodologies grounded in solid theory and rigorously gathered evidence, applied systematically and consistently to policy challenges.**

Behavioral research for climate solutions: Understanding insurance for agricultural adaptation

By Berber Kramer

Climate change is accelerating faster than our agricultural systems can adapt. Smallholder farmers, particularly women, are increasingly asked to take risks to adapt to a changing climate. To plant drought-tolerant crops, adopt climate-smart practices, or pay for index-based insurance policies. These are not small decisions. For many, they involve real costs, deferred benefits, and the possibility of disappointment. Too often, resilience programs assume that if farmers are given access to tools, they will use them. But adoption is rarely automatic.

In this article, I propose that behavioral solutions need to be introduced alongside innovations for agricultural adaptation. Adoption of climate-resilient technologies and practices, including insurance, depends not just on affordability or awareness, but on whether farmers trust the actors and institutions promoting them, understand the risks and rewards in a way that feels meaningful, and believe that adopting these innovations is in their best interest. Across studies in Kenya, Ethiopia, India, and Bangladesh, we have seen how behavioral barriers and not a lack of access often explains why promising interventions stall. Solutions that fail to address this gap may fail to improve adoption rates.

Making insurance coverage tangible

One challenge related to low insurance take-up is how farmers perceive its protection against risk. Behavioral research shows that people are less likely to act on a solution when it is ambiguous or psychologically distant. In practice, this means farmers may not choose to plant a drought-tolerant variety or purchase insurance because they do not experience a drought every year, making it difficult to see the solution in action, and as a result, the benefits are not very tangible to them. In addition, the risks covered by most insurance products, for instance, satellite-measured rainfall or vegetation indices, can make the premium-payout link opaque.

One solution is to make the insurance coverage more visible, concrete, and personally relevant. Picture-based insurance (PBI), for example, uses smartphone images of farmers' own crops to settle claims, rather than relying on distant weather stations (Ceballos et al., 2019; see Box 1). In randomized evaluations and framed field experiments in Ethiopia, India and Kenya, PBI increased take-up relative to traditional weather index insurance, and in Kenya the effects were most pronounced among women (Kramer et al., 2025a; Kramer et al., 2024b).

This is because when farmers could see how damage in their own fields was used to inform payouts, insurance became more intuitive and trustworthy. Here, trust emerged from being able to see and verify the basis for payouts.

Visibility helps, but adoption also hinges on social trust. Trust in extension agents, in agro-dealers, or in local farmer groups can dramatically shape whether a new technology is embraced or rejected. This is especially true when farmers face difficult trade-offs such as whether to spend scarce funds on improved seed, fertilizer, or school fees. Insurance providers will therefore want to work through institutions with which farmers are familiar, and it is important not to harm the trust that farmers have in these institutions. Making insurance payouts where and when they are required, managing expectations and ensuring that farmers understand their insurance contracts, offering transparency, and facilitating grievance processes, are important in cultivating such trust.

Access to insurance is gendered

These interpersonal and contextual factors also play out differently for men and women, as women are less likely to have access to formal extension services, have lower financial and insurance literacy, are less likely to control household income, and more likely to bear the social burden of crop failure. Because of restrictions on women's mobility, it can be difficult for women to join extension meetings and trainings, or to access markets. With farming often being considered a male-dominated field, women might have fewer peers or role models. Liquidity constraints are often also more pronounced for female farmers than for male farmers.

Due to such gender differences, research on digital innovations in credit and insurance design in India and Kenya found that the digital solutions appealed most to women, with larger effects on product take-up among women than men (Kramer et al., 2021; Kramer et al., 2024a; Kramer et al., 2024b). This was in part because the product helped address technical confusion around more complicated index insurance products. Trust was also enhanced as products were provided through local (oftentimes female) agents instead of male extension agents, and doorstep delivery overcame mobility constraints. In Kenya, making insurance payouts into women's personal mobile money accounts, to increase control over resources, was an important prerequisite for demand (Kramer et al., 2023).

This means that promoting climate-smart practices and technologies must be intentional and inclusive. Interventions that involve women's groups, foster peer learning, or are delivered through female agents can significantly increase adoption and access among women farmers. Yet too many programs treat them as secondary adopters or assume that what works for men will also work for women.

> **Visibility helps, but adoption also hinges on social trust. Trust in extension agents, in agro-dealers, or in local farmer groups can dramatically shape whether a new technology is embraced or rejected.**

Do farmers see what experts believe they should see?

Efforts to strengthen insurance take-up and agricultural technology adoption more generally must also grapple with an important behavioral reality: farmers believe what they see. And sometimes, what they see seems to contradict what experts believe they should see.

Consider seed trial packs—an increasingly popular approach to promote improved, climate-resilient crop varieties. These trials are meant to empower farmers to 'test and trust' new varieties on their own plots. But in our research in Kenya, we found that this approach can backfire when visual cues send the wrong signals. In Kramer et al. (2025b), providing seed trial packs of a drought-tolerant maize variety did not increase the likelihood of farmers adopting it, or even of farmers perceiving it as a more drought-tolerant variety. When experiencing a drought, the promoted variety's appearance looked no different than the farmers' own varieties, even though it yielded more.

Farmers may have relied on what they saw, not what the yield data showed. And this may have led them to infer that the varieties were not more drought tolerant than their preferred varieties, helping explain why providing seed trial packs did not influence perceptions or adoption.

A similar dynamic emerged in Bangladesh, but in the context of input quality. Through a lab-in-the-field experiment with agricultural input sellers and farmers, we tested whether trust in input markets with unobservable input quality could be enhanced through a buyer-driven accreditation scheme. Farmers were asked to evaluate their input providers after learning about the quality of products they had purchased, and the highest-rated input provider was accredited as a high-quality input provider in this experiment.

This innovation did lead to increased trust in accredited input providers. But not for the right reasons. Farmers gave positive reviews not only after receiving high-quality products, but also if buying inputs at a low price, even if these were low-quality products. As a result of this emphasis on price in farmers' reviews, the buyer-driven accreditation scheme ended up rewarding input providers of low-cost, yet low-quality inputs, which was the opposite of what the scheme intended to do (De Brauw and Kramer, 2022).

Both examples point to a deeper behavioral challenge. Farmers may not see innovations performing in the way that experts would like them to perceive these innovations. And when visual or experiential cues don't align with the promised benefits, trust erodes. For instance, for on-farm trials to be effective, they must be designed in ways that make the advantages of improved varieties both visible and credible.

That may mean testing under realistic stress conditions or coupling trials with trusted intermediaries who can contextualize what farmers see.

Image credit: Anthony Mogaka
Midjourney V 7.0

Going beyond insurance for risk management

Too often, climate resilience programming leans heavily on insurance as the primary risk management tool. But behavioral research shows that financial instruments alone are not sufficient—and sometimes not even appropriate. When insurance coverage does not correlate well with the losses that farmers experience, when farmers distrust insurance providers, or when they struggle to understand coverage mechanisms, uptake remains low, even when subsidies are generous.

In our research in India, Kenya, and Ethiopia, trust in and adoption of the solution improved when insurance was coupled with a transparent, easy-to-understand product design, using visual cues from picture-based claims settlement and trusted delivery channels. But even then, insurance should be one tool among many. Farmers manage risk through a mix of strategies—informal savings, social networks, early warning systems, diversified cropping—and any resilience program must recognize and strengthen this broader toolkit.

Importantly, many of these alternative strategies are embedded in indigenous knowledge systems. Early warning signs based on animal behavior, or local soil and rainfall indicators, often inform farmers' climate responses more than any mobile-based forecast. Dismissing these practices as outdated misses a valuable opportunity to anchor new solutions in trusted traditions. The most effective behavioral interventions don't overwrite local knowledge; instead, they build upon it.

A behavioral lens to climate solutions

So what does it mean to put behavioral science at the center of agricultural climate adaptation?

First, it means that resilience is not just about transferring risk, but about improving understanding and trust between farmers and institutions. This involves bridging gaps to facilitate translating knowledge gains into action, and ensuring that expectations are managed to close gaps between what is promised and what is experienced.

Second, it means recognizing that behavioral bottlenecks are not irrational. When farmers hesitate to adopt new technologies, they are often responding to real histories of broken promises, extractive relationships, or tools that didn't deliver as expected. Building trust means acknowledging that history, and offering solutions that deliver on their promises.

Third, it means co-designing solutions with farmers, rather than for them. Behavioral science offers powerful tools to understand how people make decisions under uncertainty. But these tools are most effective when paired with inclusive processes that center farmers' voices—especially those of women, who still too often remain underrepresented in agricultural research and policy.

Finally, it means resisting the urge to treat behavioral factors as a peripheral concern. In a changing climate, an improved understanding of what drives behaviors is infrastructure. Without it, even the most scientifically sound solutions will sit unused.

With it, the behavioral biases driving decision-making can be addressed to help farmers make informed decisions, take strategic risks, and build lasting resilience.
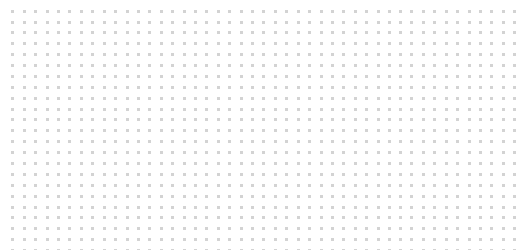
Picture-based insurance

Picture-Based Insurance (PBI) is an innovative approach to deliver affordable multi-peril crop insurance. By relying on smartphone pictures taken from a farmer's field, PBI settles claims based on plot-level damage, resembling indemnity insurance without having insurance agents visit fields to verify losses. Sending in pictures can also make the insurance process more engaging, comprehensible, and accessible to small farmers. Here is how it works:

How it works

1 Farmers download a free app onto their smartphones.

2 Within the app, they enroll as many sites as they prefer.

3 For every enrolled site, they upload an initial overview picture.

4 Every few days from sowing to harvest, farmers upload new pictures for the same sites with the exact same viewframe, aided by the app.
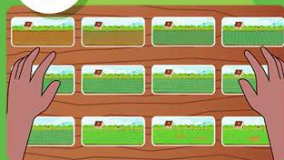
5 After harvest, local agronomists analyze the pictures to verify losses (while data science and image processing techniques are being used to estimate losses from the pictures).

6 Farmers who suffered crop damage receive insurance payouts directly into their bank accounts.

> An initial proof-of-concept (Ceballos et al., 2019) shows PBI to be feasible and sustainable: insurance experts can accurately process claims for sites where farmers report crop damage remotely and in a short period of time; the research team has been able to use machine learning to partially automate image processing and damage classification for claims settlement (Hufkens et al., 2019); and limited smartphone ownership has been overcome by relying on village-based agents to send in pictures on behalf of insured farmers in their villages. The solution was adapted by two private sector companies, which are offering the solution in India and Kenya, respectively.

Given that PBI revolutionizes the insurance-client relationship, enabling insurers to directly observe the farm, PBI could be implemented as indemnity-based insurance, whereby costly in-person visits by insurance agents are replaced by inspections of images of the damaged crop. In addition, the wealth of information in field pictures and the direct communication channel with farmers enabled by a smartphone app could be further capitalized to design more comprehensive risk management solutions for smallholder farming.

Human decisions under climate uncertainty: Experimental insights on insurance uptake among smallholder farmers

By Maryam Anike Yusuf

Subsidizing agricultural insurance is one of the most common tools for helping farmers manage climate risk, that is shaping daily choices and tightening already narrow margins.

Yet even when insurance is available and subsidized, adoption remains low. By observing how farmers in Nasarawa State navigated different subsidy levels, we uncovered some of the behavioral dynamics that sit between climate exposure and insurance uptake.

The frequency of droughts and floods results in volatile yields and slimmer margins, making the stakes for smallholder farmers especially significant. Agricultural insurance, particularly area yield index insurance, is often positioned as the solution to this volatility.

Agricultural insurance is meant to help farmers cushion the blows of droughts, floods and other climate shocks. Yet across Africa, very few farmers are actually protected. Only about 3 percent of smallholder farmers are insured, and in Nigeria, the continent's most populous country, uptake still sits below 5 percent. This is striking because insurance can reduce income loss, improve access to credit and help lower risk aversion.

Nigeria has worked to close this gap for decades, beginning with the Nigerian Agricultural Insurance Scheme in 1987 and later introducing index-based products. Even so, farmers remain hesitant. To understand why and what might encourage uptake, we ran a lab-in-field experiment in 2022 with 665 smallholder farmers in Nasarawa State.

The aim was to observe how farmers respond when insurance premiums are subsidized at different levels. The insights that emerged help clarify the behavioral forces shaping insurance adoption and show why simply offering insurance is not enough.

What we tried out together in the field

Farmers took part in a lab-in-the-field exercise where each person was randomly placed into one of four subsidy groups: 0 %, 30 %, 50 %, or 70 %. In their group, they saw simulated area-yield index insurance options priced with the subsidy already applied. Each farmer received 20,000 digital tokens to spend on whichever option they preferred. They first viewed two default insurance offers, and if they wanted to see more, they could look at up to three additional options by completing a small effort task that stood in for the real-world hassle of shopping around.

To make sure the exercise was fair, farmers were given 2,000 naira to cover transport, and they kept the cash value of any tokens they didn't spend. The 20,000 tokens were worth 4,000 naira.

What we uncovered

• We found that a 50 % subsidy made a clear difference. It raised willingness to pay by 9.7 percentage points compared with the control group. The 70 % subsidy nudged demand up by 8.6 points, although this effect was weaker, and the 30 % subsidy did not shift demand at all.

• Subsidies also changed how farmers searched for options. Across all subsidy levels, farmers were less inclined to look past the first two offers. The 50 % subsidy had the strongest pull, reducing search by 3.7 points. In fact, more than 90 % of participants made their decision based only on the two default options, and fewer than 10 % chose to explore additional ones.

• We also saw that demand generally became stronger as subsidies increased.

Traditional economic theory predicts that risk-averse farmers will buy insurance whenever the expected benefits outweigh the costs. In reality, behavior often looks very different. Even large discounts, like a 70 percent subsidy, do not always lead to the highest uptake. Other factors also hold farmers back, including limited financial literacy and distrust of complex financial products. The timing of insurance payments at the start of the farming season can make things worse, since farmers have other pressing expenses like labor, seeds, fertilizer, and pesticides. Present bias also plays a role, as some farmers prioritize immediate needs over future protection, which keeps insurance adoption low even when it is affordable and available.

Gaps in smallholder insurance coverage across regions, 2018

Gap   Insured
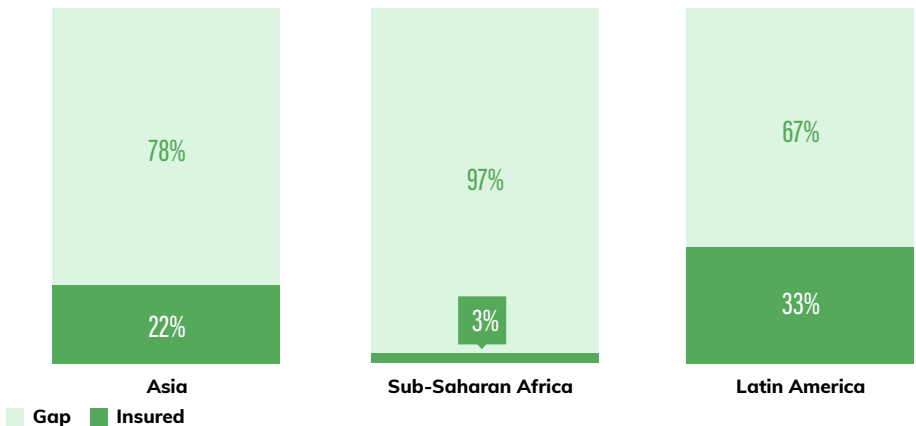
Source: ISF Advisors (2018), *Protecting growing prosperity.*

Figure 1: Proportion of insurance coverage among smallholder farmers in Asia, Africa and Latin America (2018)

Why this matters

The findings from this study underscore the complexity of driving sustained adoption of agricultural insurance among smallholder farmers. While premium subsidies remain one of the most effective tools for increasing insurance uptake, their behavioral side effects carry important implications for both policy design and implementation.

The results of this study highlight just how tricky it can be to get smallholder farmers to consistently adopt agricultural insurance. Premium subsidies are still one of the most effective ways to boost uptake, but they come with behavioral side effects that have important implications for how policies are designed and put into practice.

For policymakers, the evidence highlights that more subsidies is not always better. The 50% subsidy tested in this experiment had the most consistent positive effect on willingness to pay, while the higher 70% subsidy showed diminishing returns and potential complacency among farmers. This suggests that moderate, fiscally sustainable subsidy levels may achieve higher long-term impact than large or full subsidies, which can distort expectations and erode market discipline. Policy makers should therefore view subsidies not as a blanket solution, but as one component of a broader risk management strategy that includes financial literacy, trust-building, and simplified product design.

For policymakers, the findings show that more subsidies are not always better. In this study, the 50% subsidy had the clearest positive impact on farmers' willingness to pay, while the higher 70% subsidy had smaller benefits and may even have led to some complacency. This suggests that moderate, financially sustainable subsidy levels could have a

bigger long-term impact than very large or full subsidies, which can create unrealistic expectations and weaken market discipline. Policymakers should see subsidies as just one part of a bigger risk management strategy that also includes improving financial literacy, building trust, and keeping insurance products simple.

For farmers, the results illustrate that affordability is only part of the challenge.

Even when insurance was heavily subsidized, most participants did not make the effort to explore additional options. Farmers seem to be engaging in satisfaction: 'This looks cheap enough; I'm done.' But cheaper isn't automatically better, and a subsidized default can become sticky, especially when insurance is complex and trust is thin. This lack of active searching indicates that barriers such as low financial literacy, cognitive overload (finding insurance contracts overwhelming), and limited familiarity with insurance products may continue to constrain decision-making even when insurance is subsidized.

Addressing these behavioral barriers is essential to ensure that farmers not only access insurance but also select products suited to their actual needs and risk profiles.

For farmers, affordability is just one piece of the puzzle. Even with heavy subsidies, most didn't look beyond the first options, often thinking 'This looks cheap enough; I'm done.' Low financial literacy, complexity, and limited familiarity with insurance can still get in the way of good decision-making. Addressing these behavioral barriers is key to helping farmers choose coverage that truly fits their needs.

From a behavioral perspective, the results reveal the push and pull between incentives and human instincts under uncertainty. Subsidies ease cash flow but they can also make people less curious about their options or less attentive to the fine print. Choices around risk are not just calculated. They are shaped by perception, timing, trust, and experience. Designing solutions with these human quirks in mind is what turns short-term fixes into changes that really stick.

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The results of this study highlight just how tricky it can be to get smallholder farmers to consistently adopt agricultural insurance.

Recommendations

Aim for the 'Goldilocks' subsidy (~50%) and make it smart.
→ Big enough to overcome liquidity constraints; not so large that it kills scrutiny. Consider declining subsidies over seasons tied to demonstrated value (claims honored, timely payouts).

Make an active choice, the easy choice.
→ Making comparison easier by highlighting the top three or four most important features of an insurance offer to encourage salience and competitive search.

Build trust and salience before you build sales.
→ Publish simple 'claims scorecards"' to show a track record of credibility: % claims paid, average days to payout.

→ Make a portion of the subsidy conditional on completing a 30-minute, mobile-friendly module that uses stories and local examples to explain the insurance offering.

Resilience starts in the mind before the field. Insurance can be a powerful safety net, but only when it is understood, trusted, and chosen actively. Our evidence from Nasarawa shows that a 50% subsidy can unlock demand, yet it can also lull farmers into quick, default choices.

Section 3

Equity, community and
Indigenous climate futures

Breaking silos:
Why collective climate
action needs a shift

By Laura Schun

In a village in central Kenya, Daniel, a coffee farmer, has just completed his fourth training this season. These sessions are part of a growing wave of climate-smart agriculture initiatives (run by NGOs, agritech companies, and government programs) aiming to boost yields and resilience through sustainable agricultural practices (SAPs). For farmers like Daniel the promise of new knowledge is compelling. Extension services are limited, and farmers often attend trainings because there is an incentive (such as input vouchers or seeds) and also because the local extension agent has communicated that it will be beneficial. One workshop introduced composting techniques and hoped Daniel would reduce his reliance on pesticides. Another focused on drought-tolerant seeds and aimed to encourage him to adopt a specific variety promoted by the project. A third demonstrated soil testing with the expectation that Daniel would adjust his fertilizer use accordingly, while the latest one focused on mulching and urged him to include his wife more actively in farm-related decisions.

All of them, he recalls, were run by different entities, none of whom seemed aware of the others. Some messages overlapped, others conflicted. One encouraged the use of synthetic fertilizer; another discouraged it. By the end, Daniel feels unsure which practices

are right for his farm. He's grateful for the attention, but also overwhelmed.

'Too many people come to tell us what to do,' he thinks.

'Then they leave.'

Daniel's story is not unique. Across East Africa (and many other regions), development actors deliver well-intentioned but fragmented interventions. In areas perceived as hotspots or easy to access, the presence of NGOs, donor projects, and government programs can be dense (Koch & Ruben, 2008). In others, farmers are left behind entirely. And where the state cannot provide consistent extension services, these imbalances deepen. The result is a patchwork of effort: uneven, uncoordinated, and sometimes counterproductive.

The problem isn't just that efforts are duplicated; it's that they often speak in different languages. Farmers are left to make sense of conflicting advice from multiple actors (Lamm, et al., 2020). As one observer put it, without coordination, the risk is not just redundancy but confusion, where farmers hear contradictory recommendations that erode trust and discourage adoption of new practices.

Trust and consistency are also fragile. Farmers often describe the fatigue of revolving-door initiatives, with NGOs and companies that arrive for one or two seasons and disappear just as quickly. Such cycles weaken rather than restore the sense of ownership, reinforcing the need for consistent, long-term presence.

This is more than a communications issue. Behavioral science tells us that humans have a limited capacity to absorb and act on complex or conflicting information. Information overload doesn't empower people, it paralyzes them. When extension services or technology dissemination are poorly tailored to farmers' context, adoption rates can stall . And in the context of climate adaptation, where action is urgent and adoption of new practices is critical, disengagement is costly. Several studies show that when extension services are poorly tailored to farmers' circumstances, adoption of promoted practices can stagnate (Mugari et al., 2025; JPAL, 2023).

Farmers, however, are not passive recipients of these interventions. Daniel, like many smallholders across the region, constantly weighs new recommendations against his own experience: his soil, his labor availability, his financial constraints, and the risks he knows well. He adopts what seems workable, modifies practices to fit local realities, and disregards advice that feels misaligned or contradictory. But agency does not automatically translate into well-informed decisions: when the information landscape is fragmented or inconsistent, farmers make the best choices they can within imperfect conditions, which can sometimes lead to practices that cancel each other out or undermine resilience. The challenge is therefore not a lack of agency, but a lack

of systems that recognize that agency and support it with coherent, reliable, and aligned guidance.

The consequences of this fragmentation ripple outward, as donors and implementing agencies unknowingly duplicate efforts. Resources are wasted. Communities become fatigued or skeptical. Progress on shared goals slows, despite the appearance of intense activity.

The promise of collaborative governance

This problem is not new, unique to development or the Global South. Recognizing these challenges, many turn to collaborative governance as a solution. The logic is sound: bring organizations together under a shared strategy, coordinate interventions, reduce duplication, and amplify impact. There exists a plethora of frameworks on global governance (Ansell & Gash, 2008; Emerson, Nabatchi & Balogh, 2012), and different variants of it. However, not a lot of them are adapted to East Africa. Amongst the most famous, we can find public-private partnerships, where governments and private sector partners share risks, resources and benefits to deliver infrastructure or services (World Bank, 2025).

> **Trust and consistency are also fragile. Farmers often describe the fatigue of revolving-door initiatives, with NGOs and companies that arrive for one or two seasons and disappear just as quickly.**

Another well-known model in the developm ent sector would be consortia - voluntary alliances of organizations that pool resources and expertise to pursue a shared goal while maintaining institutional independence (Oxfam, 2016). While less common in the sector, other models such as the triple helix model - innovation ecosystems where universities, industry, government, civil society, and the environment interact to co-create development and innovation- have also been tested and implemented (Gatune, 2023). Our previous research has similarly pointed to co-opetition as another model present in practice, though rarely documented in the region, and often subject to the same pitfalls of competing priorities, unequal power relations, and administrative burdens that characterize more formal frameworks (Oberoi et al., 2023). All of those examples highlight that there is a belief in the potential success of such models.

However, as mentioned by Macharia (Oxfam, 2016), such models often fall short of that promise. Evidence has revealed common pitfalls: slow decision-making, competing priorities, unequal power dynamics, and administrative burdens that weigh down smaller partners. In one study of a consortium strategy in Kenya, local actors reported being sidelined during key decisions, while the reporting demands of the consortium left little room for adaptation or community engagement (Osoo, 2016).

This isn't a failure of intent. It's a failure of design. When collaborative governance is formed hastily, often in response to funding opportunities, there's little time to align visions, anticipate governance challenges, or design mechanisms for inclusive decision-making. The result can be a collective that exists more on paper than in practice: a group of organizations working under the same banner, but still largely in silos.

Rethinking collaborative governance

Coordination is not a logistical challenge. It's a human one. This is where a shift in mindset could help. What if we stopped thinking about coordination as a structural fix and started thinking about it as a design challenge?

Before forming a consortium or launching a multi-actor initiative, what would happen if we paused to ask: how will this impact the people we're trying to reach? Will they receive a coherent, manageable set of messages? Will their feedback shape the way our organizations collaborate? Are we designing a system that includes invisible, local voices, or simply replicating the same top-down dynamics under a new logo?

Drawing from human-centered design principles, we might treat coordination not just as alignment among organizations, but as an act of empathy and intentionality toward the communities we serve. That means investing time upfront to map what already exists, understand local information ecosystems, and design joint efforts that are easy for people to navigate and act on.

But shifting to a design mindset is not straightforward. It demands confronting the power dynamics that shape whose knowledge influences decisions. Larger international organizations often have more staff, stronger English proficiency, and greater donor familiarity, which allows them to dominate coordination spaces, even inadvertently. Local partners may lack the administrative capacity to meet reporting requirements, limiting their ability to participate meaningfully.

Donor timelines rarely allow for the deep contextual work needed to build trust and shared understanding. These structural and behavioral factors influence not only how organizations collaborate, but what ultimately reaches people like Daniel.

The issue isn't that coordination doesn't work. It's that we too often rush into it with the wrong tools. We treat it as a technical task to be managed, not a behavioral reality to be understood. When multiple actors show up in a village, their good intentions can cancel each other out, unless they speak with clarity, coherence, and care.

If we treat coordination as a design problem, the first step is clarity, not structure. What is the simple purpose we all recognize? Who decides what, by when, and how can a small, local partner raise a concern without friction? Research on collaborative governance shows outcomes hinge less on the banner and more on the quality of shared motivation, joint problem-solving, and visible routines for making and revisiting decisions (Tonelli et al., 2018).

The question is how to make the experience clear for everyone involved. Ask: What keeps power in check? Are there transparent decision notes? Are there clear time limits on approval? Is the leadership regularly transferred? Is there an 'overlap check' to avoid duplicating others? What can we stop, standardize or simplify so that partners spend more time delivering than reporting?

Power dynamics are not a side issue; they shape voice, pace, and whose evidence counts, so we should notice and name them early rather than after trust erodes. Finally, how will we know the system is getting healthier? Pick a few humane signals:

time from idea to decision, proportion of decisions made closest to the problem, and whether partners can state the shared purpose in the same words.

This isn't a call to abandon collaborative models. It is an invitation to rethink how they are built. Effective coordination does not require uniformity, but it does demand shared understanding, humility, and the center of human experience. Continuity is especially critical: when external actors or NGOs eventually withdraw, farmers and local partners should not be left with the sense that the partnership has abandoned them, but rather with capacities and relationships that endure beyond project cycles.

Climate resilience will not be achieved through more activity alone. It will come when the messages we send are not just well-meaning, but well-aligned, when people like Daniel are no longer confused by what they hear, but confident in what they can do.

"

Drawing from human-centered design principles, we might treat coordination not just as alignment among organizations, but as an act of empathy and intentionality toward the communities we serve. That means investing time upfront to map what already exists, understand local information ecosystems, and design joint efforts that are easy for people to navigate and act on.

At risk and still overlooked: Thinking about how we design interventions for women

By Raya Shatry

'I took a loan to rent out a piece of land where I could farm and sell the produce. The farm flooded with all my crops. I had already invested a lot, so I took a second loan from the group [savings group] to try a second time. Again I experienced another flood. Now I work here at the reception during the day and I am a seamstress in the evenings and weekends to try and pay off my debts.' - Jane Doe, Homa Bay town.

Jane is not alone. With the climate shifting under the weight of our emissions and disappearing ecosystems, she will likely be one among many. Often, individuals, especially women, lose their savings or mount debt due to sudden shocks that they could have been insured against. It is easy to say that had Jane had some type of insurance, she would not have had to take a second loan and would not be facing a mountain of debt.

However, the reality is that, despite insurance being a valuable and crucial tool for risk management, it remains heavily inaccessible and underutilized in the global south, especially by women. In order to understand why, we need to go beyond financial and structural barriers and address interventions design, delivery and communication.

Designing studies or interventions for women necessitates more than including a 'gender'checkbox in the outlines. A gendered lens requires intentionality, accessibility, and a clear commitment to making sure women are both present and involved in shaping the outcomes of research. In the several projects we have done across different countries, it is clear how the lack of intentionality directly contributes to the low uptake of behavioral interventions among the population and, in particular, women.

We explore how being intentional in designing for women can ensure that we have effective interventions drawing from the work that Busara has done.

Intentionality

Promoting impactful behavioral change among women needs to start by acknowledging that women are central stakeholders in our communities. Yet in practice, women are often seen as an afterthought, a sidenote or a checkbox in research and intervention design, included as a diversity pool, usually for funding requirements. Intentionality requires acknowledging that women are not only beneficiaries of interventions like insurance, but also key decision-makers in communities.

In Kenya, we have witnessed many interventions rolled out with an emphasis on increasing awareness and promoting financial literacy for women, as an assured way of bringing about uptake of insurance. While both are crucial, we find the reality is that women often have obligations that get prioritized over insurance - school fees, healthcare, and food, for instance even when participants absolutely understand the importance of insurance. Therefore, designing any intervention that does not ask, 'What do we need to understand about women in this particular context' leads to designing unimpactful interventions that fail to address key underlying issues.

Something else that is often overlooked is the fact that women are not homogenous. A young, single woman in an urban location will experience risk, economic instability and household dynamics very differently from a middle-aged, married woman in a rural location. Despite this, solutions are often marketed as a one-size-fits-all output. Insurance products for women or agricultural insurance for female farmers. However, which women are being addressed? What type of farmers are being addressed? Approaches which ignore the intersectionality of gender, age, marital status, education, economic standing, environmental aspects, cultural norms and other factors will miss out on understanding issues that heavily impact behaviors.

Finally, it is important to emphasize that women do not exist in a vacuum. We often find that at the very least, women make monetary decisions in partnership with their spouses and in many cases, defer monetary decisions to their spouses or male figures in their lives. For example, in a Busara study regarding savings groups in Kenya, we find

that even with personal savings, at least 44% of married women budget for their savings with their spouses and an additional 14% save on their own with occasional support from their spouses. In a different study with households, we observed that when making household budgeting decisions, including for insurance, women work in tandem with their spouses or, in some cases, leave the decision-making to the spouse.

Accessibility

One of the biggest challenges we face during field work and intervention uptake is securing sustainable participation from women. Socio-cultural roles like caregiving, household responsibilities and economic responsibilities make it harder to secure continuous or long-term female participation. To overcome this, and avoid creating stressful, restless environments for female participants, we have to ensure that we design our research according to and around these realities rather than enforcing inflexible and demanding timelines and parameters.

With women's savings groups, Busara found that participants are much more receptive when scheduling discussions around the time they already planned to meet. It was easier to coordinate and plan around their schedules rather than extending field days in hopes of getting a larger sample.

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Designing studies or interventions for women necessitates more than including a 'gender'checkbox in the outlines.

In a different project promoting HPV vaccinations, the intervention involved hairdressers as community vaccine champions; we had trainers sit in with them as they were working and catering to their clientele, thus making it convenient for them. Apart from courtesy and effective research design, both methods created a rapport that made the respondents open to understanding what is being discussed rather than restlessly waiting for the session to conclude so they may get back to more pressing matters. Leveraging existing social structures and social time slots provides an effective accessibility strategy for intervention uptake.

Furthermore, it is important to design around the lived realities of women respondents and participants. Often, we find that our respondents are mothers who would attend sessions with their children. And catering to needs that make the environment more accommodating is crucial to good research feedback.

For instance, lengthy sessions could cater to meals and refreshments that reduce fatigue., Having simple toys or activities can help keep children engaged. When we were conducting a card sorting exercise with women, we carried extra boards and cards which children could 'sort' alongside their mothers which helped reduce fussiness and wailing. These small design choices signal respect for women's time, responsibilities, and realities, conditions that make genuine participation possible.

Designing interventions

When designing efficient interventions that align with women's lived realities, they can further be customized to context, and here is a guideline on the best practice methods for designing research interventions for women.

a.) Simplicity and time sensitivity

Insurance and risk management products and protocols are often complex (or overcomplicated) and require in-depth explanations and paperwork. Women who are already stretched for time are very unlikely to immerse themselves in such a complicated-sounding process. Simplifying interventions not only makes it easier for participants but also increases trust; people are more likely to trust what they understand and can comprehend. Some of the ways this can be done is by ensuring that the tools cater to local languages, education levels and even tech-literacy.

b.) Social acceptability and safety

Something that bears reiterating is that context matters. Socio-cultural norms often set certain expectations and restrictions on what may be appropriate or inappropriate for women. It is crucial that interventions avoid placing women in situations that may appear culturally questionable or unsafe. For instance, there are some communities where women cannot attend mix-gender trainings or briefs. Any intervention that does not take this into consideration is bound to fail. Behavioral interventions should be mindful of socio-cultural norms to avoid isolation and stigmatization of female participation.

c.) Leveraging social networks

Our previous work with savings groups and hairdressers highlight how crucial social support networks can be for women's comfort and safety in giving genuine opinions or experiences. Even in settings with strangers, women are likely to engage in personal, private conversations as long as they occur in informal, trusted social circles.

Positive word of mouth on insurance products and risk management methods from trusted peers rather than agents would have a bigger impact on intervention efficiency. Designing around methodologies that include snowballing and leverage social proof can help in uptake of interventions.

d.) Transparency and trust

Women have been a marginalized community in most decision making interventions. They are more risk averse and distrusting because of this. In our previously mentioned work with savings groups, an agent informed us that whenever they introduce something new, it has to work flawlessly otherwise they risk losing the entire group. Slip ups and intervention failures are likely to deepen mistrust and further marginalize women in implementation uptake. To that end, the most important part of study and intervention design is to ensure transparency in every aspect, including possible effects or limitations.

Effective interventions for women require more than inclusion, they demand design grounded in women's actual contexts. When we account for responsibilities, decision-making dynamics, social networks, and trust, participation becomes possible and meaningful. By building around these realities, interventions stop being theoretical solutions and become tools women can genuinely use.

Low uptake of behavioral intervention of risk management mechanisms for women cannot solely be linked to affordability or accessibility. At the center of it all is deliberate study and intervention design. Women need to be prioritized as key stakeholders and decision makers in a context specific lens. This helps us move beyond arbitrary designs in order to cater to core issues and develop relevant interventions to mitigate risk in communities.

Fostering long-term trust among women

In many studies, researchers extract information from communities without disseminating findings of the research. This has shown to create a transactional relationship between researchers and participants, eroding trust over time. This particularly happens when we do not have structured community exit strategies, in short, disappear after data collection without communicating findings to the community. Closing the loop on a study helps to foster trust not only in organizations but in effective interventions too.

In A better how[1], the research process is well summarized in the following steps:

a.) Hire local enumerators for better contextualization of research tools.
b.) Identify and include community focal points such as village heads that would assist with conducting research and identifying any potential conflicts and resolutions.
c.) Involve the larger community by informing them on the study objectives and reaching a mutual understanding.
d.) Ensure an open line of communication throughout the process and stress on informed consent at all stages.
e.) Close the loop on the study by addressing initial expectations, study achievements and learnings on future research.
f.) Finally, share findings with community members to uphold ethical guidelines and avoid a transactional nature of research.

Resilient livelihoods: Social protection and collective solidarity for climate change adaptation in East Africa's drylands

By Tahira Mohamed

Resilience building initiatives have lately emerged as a tool for improving vulnerability to climate crises and food insecurity in rural communities. Social assistance through cash transfers and livestock insurance has become a favored resilience intervention. Evidence has shown that social assistance improves household well-being, reduces stress, improves access to food, affords some income to offset difficulties and reduces poverty.

However, there is a disconnect between the capacity of social protection to enhance resilience and its delivery, which is static, has limited potential to scale, and does not always address everyday crises.

Social assistance remains protective but fails to incorporate an adaptive capacity central to rural livelihoods amid uncertainties. Using qualitative research data collected between (2018-2024), we examined social protection in pastoral areas by comparing Kenya's Hunger Safety Net Programmes (HSNP) and Livestock Insurance Programme (KLIP) with customary redistributive practices (moral economies). These systems operate in parallel and fail to achieve disaster-resilient communities.

Social solidarity networks, like friends, neighbors, and religious groups enable agile responses to covariate shocks and everyday calamities that take the shape of food shortages, livestock raids, and the loss of loved ones. Mainstream social provisioning often undermines these practices through inflexible financing with a sedentary bias.

This article explores how social protection and livestock insurance intersect with local solidarity in pastoral drylands, questioning whether external interventions can align with pastoralists' networks to enhance community resilience.

Following the 2011 Somalia famine, countries in the Horn of Africa, specifically Kenya, Ethiopia and Somalia adopted resilience strategies through IGAD Drought Disaster Resilience Initiatives (IDDIRSI), establishing drought management institutions such as Kenya's National Drought Management Authority (NDMA).

In Kenya, the Hunger Safety Net Programme (HSNP) provides bimonthly unconditional cash transfers of US$ 27 to vulnerable households across eight pastoral counties. Ethiopia's Productive Safety Net Program provides cash or food against public works, or unconditional cash to vulnerable households.

Index-based Livestock Insurance (IBLI), which insures livestock against drought using satellite-derived vegetation indices, has emerged as a major state–private sector intervention in Kenya and Ethiopia, its design links payouts to declines in vegetation cover, providing households with support when drought conditions intensify. These social assistance programs have predictive mechanisms that identify households based on region, vulnerability status, and premium contributions, often ignoring the characteristics of pastoral societies (Derbyshire et al., 2024). While contributing to household food security, coverage remains limited and inadequate for post-disaster herd reconstructions. It remains inadequate because most cash transfers from these social assistance programs are minimal, for instance, HSNP only provides KSH 2700 per month, which simply does not cover the needs of household members, especially some households that have 8 members.

In contrast, pastoralists rely on informal social solidarity based on cultural norms and religious obligations, which for a lot of people is an essential avenue to survive uneven resource access and uncertainties (Mohamed, 2023). In Northern Kenya, these 'moral economies' include redistributive practices, labor sharing, and livelihood diversification (Mohamed, 2022). Examining moral economic changes between 1975-2020 across rural-urban settings and generations, Mohamed found that informal solidarity remains essential but is modified by social and market transformation. Remote areas emphasize comradeship and redistribution, whereas urban-adjacent pastoralists focus on diverse economic relationships and saving groups.

Comparing social protection and the pastoralist's social solidarities

a.) Pastoralists' collective solidarities

Pastoralists have managed crises within drylands and mountainous regions through their movement to better-resourced areas for water, pasture, and security. This movement involves splitting livestock into categories and organizing labor to utilize resources effectively (Dahl, 1979; Mohamed, 2022). Sharing resources among families, neighbors, clans, and religious ties is crucial for survival during seasons of abundance and scarcity.

This redistribution strengthens social relations and ensures resource access and are reinforced by cultural norms. In examining 'resilience from below', a study by Mohamed and colleagues found that herders were central to critical networks, connecting with motorcycle riders for transport and scouting, mobile money agents for urgent cash-needs, and agrovet dealers for medical advice. On the other hand, livestock market brokers link herders to markets and provide cash to meet various needs (Mohamed at al., 2023). Resource sharing remains vital, with herders combining labor to reduce management costs, exchanging animals for milk, and banding together to exploit potentially insecure rangelands due to the threats of livestock raiding and ethnic conflict. These services operate through mutual trust and relationships, although access to them varies among pastoralists (Mkutu, 2008; Mohamed, 2023).
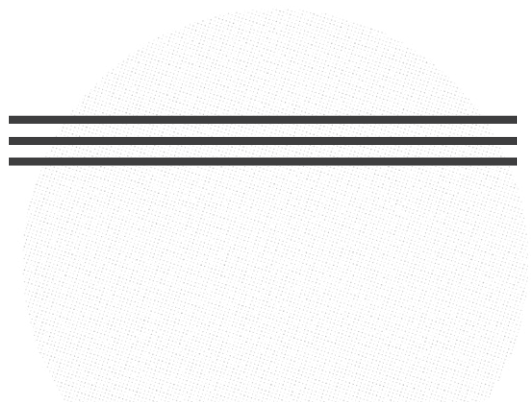
b.) Livestock insurance system

Index-based livestock insurance (IBLI) has emerged as a 'de-risking' tool for drought. The IBLI scaled in Kenya through the Kenya Livestock Insurance Programme as a public-private partnership involving research institutions, the World Bank, and the government (see Fava et al., 2021). Insurance systems correlate rainfall distribution with pasture availability through the normalized difference vegetation index, providing payouts when pasture levels reach certain thresholds that warrant the declaration of a dry spell (Johnson et al., 2023). For instance, the De-risking and Value Enhancement (DRIVE) program has expanded in the Horn of Africa to enhance pastoralists' access to climate risk financing. Taye (2022) challenged insurance assumptions that sometimes don't accurately depict vegetation covers, showing that drought affects areas differently through livestock mobility, with risks varying by wealth and gender. Insurance mainly benefits wealthy male herd owners, while others are excluded. Among pastoralists, buyers are largely affluent men; very few women-led households can afford coverage unless fully subsidized, and the current public–private model prioritizes profit, limiting broader access. Bageant and Barrett 2017 warned of gendered exclusion due to pastoral paternalistic culture. The IBLI now bundles insurance services with veterinary and feed support (Banerjee et al., 2024) to increase uptake. Although insurance can prevent distress sales and improve food security, challenges persist in sustaining this investment and surviving without government subsidies as the intervention is costly.

Image credit: Anthony Mogaka, Midjourney V 7.0

c.) Social protection for humanitarian assistance

Uganda's social assistance is primarily implemented by humanitarian agencies through disaster risk financing, following government withdrawal from structural adjustment programs. Cash transfers are tied to workforce and feeding programs to protect vulnerable households during emergencies. The Third Northern Uganda Social Action Fund (NUSAF), a World Bank-supported safety-net program, provides public work after disasters. The NUSAF has contributed to household food security but promotes dependency and undermines productive mobility (Caravani, 2024). On the other hand, in Libya, the Government created the Zakat Fund, which was co-financed by the government and religious leaders and distributed by volunteers (Caravani et al., 2021). Caravani and colleagues showed that the Zakat fund delivered effective aid with high accountability in an unstable state. Social assistance in both countries is a form of disaster risk financing with varying effectiveness. Trust improves when delivered through local systems, such as Zakat, whereas conventional humanitarian assistance follows fixed plans that are less adaptable to pastoralists' responses to shocks.
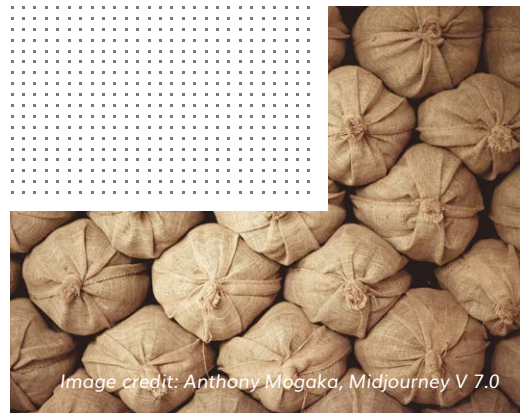

Image credit: Anthony Mogaka, Midjourney V 7.0

Conclusion

Social protection and insurance in pastoral areas address short-term food crises but fail to enhance sustainable food security due to crisis-driven interventions. These programs can disrupt pastoral systems by creating perverse incentives near urban centers and operate separately from pastoralists' social solidarity. The disconnect between these forms of assistance has four aspects: first, properties are collectively owned through family networks, making individual policies ineffective. The crisis response requires collective efforts for safety and strengthening labor relations. Secondly, formal assistance uses fixed quotas and targeting, often excluding eligible households and ignoring dynamic commodities prices. It fails to consider pastoralists' mobility and infrastructure access between remote and urban areas (Mohamed 2022). Fourthly, overlapping social provisions during severe droughts create confusion for pastoralists and government entities, with inconsistent insurance subsidies and cash transfers.

As the Horn of Africa faces climate change, conflict, and structural problems, effectively aligning external and local assistance is crucial to building resilience rather than continuing competing emergency responses. Insurance and social protection must extend beyond emergency assistance to support existing networked solidarity and relationships for long-term food security. Social protection should leverage public-private partnerships while centering the role of everyday community practices. Future research needs to examine how formal protection affects informal assistance and how both systems can effectively enhance their resilience strengthening capacities.

> **As the Horn of Africa faces climate change, conflict, and structural problems, effectively aligning external and local assistance is crucial to building resilience rather than continuing competing emergency responses.**

Image credit: Anthony Mogaka
Midjourney V 7.0

Knowledge at the margins: Reframing resilience through Indigenous behavioural systems

By Wairimu Muthike

Modern risk management strategies often default to financial and institutional mechanisms like insurance schemes, index based payouts, credit buffers etc that are designed from the top down. While these tools are valuable, they are incomplete. Resilience has never been built by payouts alone. It has been shaped by behaviors, relationships, and knowledge passed down in the spaces where the weather meets the land.

Drawing from our knowledge systems work in Cherangany and Kakamega, and supported by a broader scan of Indigenous knowledge across Africa, Asia, and the Americas, this article argues for a reframing of resilience: one that recognizes Indigenous knowledge systems as a form of risk navigation encoded in farming calendars, oral histories, and social norms, and essential to climate adaptation. By shifting the focus of authority and innovation to the community level, we can move from imposing external models to building resilience that emerges from the lived experience of those most exposed to climate shocks.

Climate risk management at the margins

The urgency of climate change has intensified the search for 'scalable' adaptation solutions, often centering on financial products. Yet in rural and resource dependent communities, risk is mediated less by formal markets and more by relationships, rituals, and resource practices rooted in local context. In Cherangany and Kakamega, farmers described early warning systems that are neither digital dashboards nor meteorological bulletins. They are rooted in behavioral cues: the flowering of certain trees, the nesting patterns of birds, the feel of the wind at dusk.

These signals are interpreted within social networks, prompting coordinated planting, harvesting, or migration decisions. Such knowledge systems do more than respond to climate risk; they shape the very definition of risk.

Yet, in most conversations about climate risk management, these systems barely register. Risk is modeled in spreadsheets and managed through products like insurance policies or emergency funds. While financial models calculate 'loss' in economic terms, Indigenous systems may prioritize seed preservation, herd continuity, or community safety over immediate income gains. These priorities are deeply behavioral, reflecting collective memory and shared identity.

Where resilience already lives

Across the world, people have devised ingenious ways to read and respond to climate uncertainty. In the high Andes, farmers lay stones around their crops to trap heat by night and protect against frost by day. In East and West Africa's Sahel, small zai pits capture every drop of rain in thirsty soil. In Ladakh, India, villagers sculpt ice into towering 'stupas'that melt slowly through the summer, feeding crops when rivers run dry. These aren't relics. They are adaptive technologies refined over centuries still in use because they fit the rhythms, resources, and realities of the communities they serve. They work because they are sustained not by subsidies, but by collective effort, intergenerational teaching, and cultural pride. Their endurance is a behavioral achievement as much as a technical one. And they matter now more than ever. Climate change is accelerating faster than agricultural systems can adapt. Heatwaves, erratic rainfall, soil loss these are not future risks; they're here. And so are the solutions, if we know where to look.

A Grain that carries climate memory

Pearl millet is a case in point. Domesticated over 5,000 years ago during the

desertification of the Sahara, it was a lifeline thriving in poor soils and low rainfall where other staples failed. It traveled with migrating communities, was intercropped with nitrogen fixing cowpeas and anchored food systems resilient to drought.

This was not just agronomic ingenuity, it was behavioral. Farmers chose millet because it fit their priorities: survival in scarcity, diversity in diets, and security in the face of uncertainty. They carried it with them as they moved, embedding it into cultural diets and rituals, and passing the practice on across generations. Then came colonialism, new crops, and market pressures.

Maize and cassava fast growing with high yields pushed millets to the margins. The loss was not just nutritional; it was behavioral and ecological. Where millets once buffered against failed rains, maize demanded more water and fertilizer, leaving farmers exposed to the very climate shocks that millets had withstood for millennia.

To marginalize millets is to marginalize a piece of climate memory: a living record of how people and plants co-adapt to shifting weather over generations. It's a reminder that resilience is not just about what we grow, but how and why we choose it.

> **While financial models calculate 'loss' in economic terms, Indigenous systems may prioritize seed preservation, herd continuity, or community safety over immediate income gains.**

Behavioral science as a bridge

Bringing these systems into the mainstream is not about romanticizing tradition or rejecting innovation. It's about understanding the behavioral logic that makes them stick and building on that.

Behavioral science can help decode why certain practices endure, making these logics visible and bridge them with modern tools. Like pairing traditional trust networks with early warning cues and climate forecasts. Factoring in identity and pride tied to a crop's cultivation. And the decision making heuristics that makes sustained practice and maintenance possible. These are the 'invisible infrastructures' of resilience and are often stronger than the physical tools themselves.

Imagine pairing traditional cues for rainfall with modern forecasts to improve planting decisions. Or adapting zai pits from the Sahel to similar drylands elsewhere, guided by local farmers rather than external blueprints. These are hybrid systems where Indigenous knowledge and modern science don't compete, but complete each other. Such integration transforms risk management from a transactional safety net into a relational and adaptive system, one that recognizes that resilience is as much about behavior and culture as it is about finance or infrastructure.

From margins to mainstream
The irony is that Indigenous behavioral systems are often dismissed as anecdotal, sitting at the margins of policy and program design, even as climate extremes push the limits of conventional solutions. But these systems have already survived the kind of environmental upheavals we are now trying to prepare for.

To bring them from the margin to the mainstream means giving them legitimacy in policy, co-creating interventions with the people who hold them, and measuring their impact not only through yield or GDP, but through continuity, equity, and dignity. Because risk management beyond insurance is not just about covering losses after a disaster. It is about ensuring that, when the sky changes color or the soil cracks underfoot, people still have the knowledge and the confidence to act.

In conclusion

Resilience is not a product we deliver like insurance, and knowing that it is more than a payout after a disaster, it is the capacity to anticipate, adapt, and reorganize in the face of uncertainty. Indigenous behavioral systems, from the living root bridges of Meghalaya, the chinampas of Mexico, the pearl millet fields of the Sahel offer living proof that resilience is possible without constant external inputs.

Although even these systems are not invincible. Living root bridges strain under deforestation and shifting rainfall, chinampas face pollution and urban encroachment, and millet cultivation is threatened by market displacement and harsher droughts. Indigenous knowledge, like ecosystems themselves, have limits when the pace of climate change outstrips the conditions it evolved within. By embedding behavioral science into the recognition, preservation, and evolution of these systems, we can design climate responses that are not just technically sound, but socially legitimate, culturally aligned and enduring. The question is not whether these systems work, they have for centuries, but whether we will recognize their value before they are lost.

Communities as stewards, not beneficiaries

By Jackline Chemtai and Laura Schun

Communities, especially those living closest to forests, wetlands, grazing lands, and rivers, are often framed as 'stakeholders' in restoration efforts; however, this framing is too passive.

In truth, they are already active stewards, even if that stewardship is under-recognized, under-resourced, and frequently undermined not by accident, but by design, because acknowledging it would fundamentally redistribute power, authority, and resources.

Granting communities their rightful place as custodians of land, water, forests, and wildlife, challenges entrenched state and corporate interests that benefit from centralized control and commodification.

Conservation models, historically shaped by colonial logics, erased local land management to justify exclusionary parks and reserves, while modern mechanisms like carbon markets and offsetting schemes frame communities as 'beneficiaries' rather than owners to preserve external control over revenues and decision-making. Knowledge hierarchies also play a role: technical, donor-driven metrics and project cycles privilege short-term, measurable outputs that fit funding frameworks, while sidelining the slow, relational, and often invisible practices of local stewardship.

This invisibilization is reinforced by political economies of visibility, where flashy interventions like mass tree planting attract political capital and investment, while daily acts of care e.g., rotational grazing, indigenous seed saving, or sacred grove protection remain unseen because they cannot be easily branded or monetized. In this way, the consistent under-recognition of stewardship reflects a deliberate design that safeguards existing power structures, rather than a neutral oversight.

Today, many conservation and ecosystem-management efforts still operate on familiar patterns of centralized decision-making, external funding cycles, and what could be called 'recipient' rather than 'owner-custodian' models of community involvement. In this model, land- and resource-rights are often held by the state or large entities. Communities are invited to participate or be consulted, rather than to govern, and external targets (often short-term) dominate the agenda.

This translates to local people frequently lacking meaningful decision-making authority over resource use, exclusion rights (deciding who uses the land/how), or benefit-sharing mechanisms.

For example, a global review found that across 249 reported cases of community forest management interventions, in more than half of them (134) the tenure rights of the community were compromised, either the design did not secure local decision-making, or the formalization process excluded pre-existing rights (Henry, 2020) Similarly, although many 'community forestry' programs have been rolled out , one large scale study found that the rollout of India's social forestry program did not lead, on aggregate, to reductions in deforestation rates, suggesting that without more structural change the top-down design does not translate into conservation outcomes.(Kraus et al., 2021)

Evidence and lessons from community-led practices

From a behavioral science perspective, the fact that communities are treated as passive participants rather than owners undermines key drivers of sustainable behavior. Empirical evidence shows that ownership and secure rights matter: when people perceive that they own the resource (or their group does), they are more likely to invest in its long-term health, monitor changes, act to protect it, and engage in restoration activities. When instead their role is disconnected from authority or benefits, motivation is weaker, monitoring costs rise (because external actors must step in) and the risk of defection or free-riding grows (Wagner, 2025; van der Werff, Steg and Keizer, 2013).

When communities are given recognition, authority, and a fair share of benefits, the results are transformative. In northern Kenya, community conservancies have demonstrated how granting local groups rights to land and wildlife, strengthens both ecological and social resilience. Rotational grazing is not only

reducing conflict and land degradation but also restoring wildlife corridors and building new income streams through eco-tourism and conservation enterprises (Pas, Watson and Butt, 2023). In Botswana and parts of southern Africa, elephant populations have flourished not only because of strong enforcement, but because conservation was designed with communities, not against them. Community-based natural resource management (CBNRM) has allowed local people to derive tangible benefits from tourism and wildlife management, shifting elephants from being viewed as threats to being seen as sources of livelihood and pride (Hoon, 2014). These examples show that stewardship thrives when it is recognized and rewarded, rather than suppressed.

One of the clearest global illustrations of this principle comes from India. In Andhra Pradesh, the Community Managed Natural Farming (APCNF) program has become one of the largest agroecological transitions in the world. Rather than imposing top-down technologies, APCNF builds on farmers' knowledge and collective organization, enabling communities to regenerate soil health, reduce dependence on chemical inputs, and restore ecological balance across millions of hectares. Farmers are not treated as passive recipients of innovation but as custodians of their own agroecosystems, supported through peer-to-peer knowledge sharing, women-led self-help groups, and village-level natural farming resource persons (Kumar et al., 2009).

Early evidence shows higher farm incomes, reduced indebtedness, and improved resilience to climate shocks because stewardship has been institutionalized at scale. APCNF demonstrates that when community agency and ecological care are placed at the center, food systems can be both sustainable and just.

These examples show what is possible when communities are trusted as stewards. But they also reveal a deeper challenge, recognition itself cannot overcome the structural barriers many smallholder farmers face. In regions like East Africa, coffee farmers willing to adopt climate-smart practices often confront a steep paradox: to secure long-term resilience, they must first endure years without income as entire farms are replanted and yields temporarily disappear (Poncet et al., 2024). During this period, families still need food, schooling, and healthcare. Expecting them to bear this transition risk alone, while private companies and consumers ultimately benefit from sustainable supply chains, creates an impossible burden.

Without transitional support sustainability becomes a gamble farmers cannot afford. Rwanda offers a promising model: during coffee renovation cycles, cooperatives have received income support and technical training, ensuring livelihoods are protected while ecological practices take root (Sucafina, 2025[3]). Such approaches show that stewardship thrives when risk and responsibility are shared, local knowledge shapes interventions, and economic survival is treated as integral, not incidental, to restoration.

It also means ensuring they benefit materially, whether through improved soil fertility, diversified incomes, or long-term tenure security. Without this, restoration becomes an aesthetic exercise: planting trees without planting justice.

The role of businesses: investor or intervener?

The private sector has a crucial role to play from agriculture to finance, corporates are both contributors to ecological degradation and potential drivers of its reversal but how they show up matters. Too often, the corporate approach to restoration is shaped by offsetting logic, emissions here, tree-planting there; a ledger of extraction balanced with a portfolio of redemption. This mindset, while well-intentioned, risks commodifying ecosystems into units of carbon or compliance, failing to see landscapes as living systems, intertwined with human identity, dignity, and sovereignty.

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https://sucafina.com/na/news/supporting-coffee-farmers-toward-a-living-income

Businesses can become enablers of stewardship rather than owners of it. A food company might invest in regenerative agriculture not simply to secure its supply chain, but to support healthier soils, more resilient farmer incomes, and reduced dependency on external inputs. A bank might underwrite restoration projects not only for climate risk mitigation but to unlock green employment in rural economies. A technology firm might develop tools to track ecosystem health not for control, but for community-driven monitoring and decision-making. The key shift is from restoration as a product to restoration as a partnership, and in that partnership, the logic must shift too from short-term ROI to long-term resilience. Ecological recovery takes time; forests grow in decades, soil rebuilds slowly, behavioral change is even slower. If the private sector wants to support meaningful restoration, it must align with the pace of nature, not the speed of markets. This also requires correcting misaligned incentives. Corporations are often the primary beneficiaries of sustainability transitions (through supply chain resilience, consumer trust, or compliance with legislation), yet farmers and frontline communities absorb the uncertainty, costs, and behavioral load of change. A stewardship model worthy of the name must redistribute this imbalance, shifting responsibility from those least able to bear it toward institutions with the resources to absorb risk.

Equally, when businesses engage, they must do so inclusively. Programs designed without gender sensitivity risk reinforcing inequalities: for example, if land title is required for participation, women, who in many regions lack formal ownership despite being the majority of smallholder farmers, may automatically be excluded. True shared stewardship cannot ignore such inequities; equity across genders is not an add-on but a precondition for lasting resilience.

Towards lasting stewardship

The kind of meaningful restoration that is slow, adaptive, and enduring depends not on new technologies or financial incentives alone, but on restoring relationships: between people and land, between institutions and communities, and between knowledge systems long dismissed and those newly emerging. For decades, communities have stewarded ecosystems through collective norms, informal institutions, and deeply held values that align personal and communal well-being with ecological care. These behavioral systems are fundamental as they rely on trust, social cohesion, and a sense of control over one's environment. When people feel ownership and fairness, when governance is participatory and benefits are equitably shared, stewardship becomes a long-term commitment. The private sector and other actors must learn to work within these rhythms, not around them. Supporting community-led restoration means shifting from extractive engagement to a reciprocal partnership where authority is shared, risks are distributed, and resilience is co-created because the future of our ecosystems will be decided not by how much we invest, but by who we trust to lead.

In practice, this means moving beyond short-term project cycles toward long-term engagement, adaptive support, and patient accompaniment, approaches already shown in agricultural transitions to strengthen trust and sustain adoption. Progress here does not emerge from checklists or one-off incentives; it is cultivated through constancy, equity, and care.

Indigenous knowledge systems in risk management and early warning

By Jackline Chemtai

On 30th July 2025, my world changed irreversibly. I lost my father. The grief was profound, but what stayed with me most was the incredible power of community in times of crisis. My family had never purchased funeral insurance, yet immediately after his passing, my sisters and I began considering a family last-expense cover. What struck us, however, was that even without formal protection, we were not left alone to carry the burden. Friends fundraised on our behalf without being asked, while neighbors arrived at our home with food, cooked for the mourners, and stood with us through the funeral.

This support was neither orchestrated nor contractual; it was spontaneous, reciprocal, and deeply rooted in cultural values. In my pastoral Pokot community, such practices are not limited to funerals. When drought strikes, households share livestock or move animals across territories to reduce collective losses and when disease outbreaks decimate herds, kinship networks restock the affected households. Risk, in our world, is not borne individually but distributed across the community. This is not unique to the Pokot but across Africa, and indeed globally, Indigenous knowledge systems (IKS) have for centuries embodied ways of anticipating, absorbing, and redistributing risk. They demonstrate that resilience is not only about infrastructure or technology; it is about solidarity, reciprocity,

and collective wisdom. Anthropologists and climate adaptation scholars note that pastoralist cultures, for instance, have historically practiced restocking: households that suffer devastating losses of livestock during drought or disease are supported by kin and neighbors who contribute animals to help them recover (Leal Filho et al., 2022; Zvobgo et al., 2022). Such practices are not incidental acts of kindness but deeply embedded norms of reciprocity that safeguard against destitution.

In rural Ethiopia for example, households embedded in wider kinship networks often rely on those ties rather than on formal measures such as crop insurance or savings buffers. While some economists caution that this reliance may reduce incentives for private risk mitigation, it underscores the enduring power of kinship-based systems as informal safety nets (Ready, 2018). The social capital embodied in these networks; trust, reciprocity, and collective identity is what sustains households by proving to be a vital mechanism of risk-management. . Research in Kenya and Uganda has further demonstrated that bonding social capital, or the close-knit ties of kinship and friendship, substantially enhances the ability of communities to cope with shocks, precisely because resources are shared and collective action is mobilized quickly (Ready, 2018).

These systems are reinforced by cultural and philosophical values that normalize mutual support which is reflected in Southern Africa's Ubuntu—I am because we are—encouraging individuals to prioritize the well-being of others, embedding solidarity in the very definition of personhood. Again, this solidarity spirit is not only seen in Africa, but also in the Andean highlands where the practices of Ayni (reciprocal labor exchange) and Mink'a (collective work projects) similarly ensure that when disaster strikes, neighbors contribute labor and resources with the expectation that such support will one day be reciprocated,(Neef et al., 2018) and even in distant geographies like the Arctic, Inuit hunters have historically shared hunting yields with entire communities, ensuring that no household starves in seasons of scarcity (Ready, 2018). What unites these diverse contexts is a principle of solidarity: risk is absorbed not by isolated households but by the community as a whole.

Indigenous early warning systems: reading nature's signs

If collective risk-sharing provides the safety net after a disaster, indigenous early warning systems provide the anticipatory intelligence that enables communities to prepare before disaster strikes. Long before meteorological agencies and satellites, people learned to read subtle cues in the environment, refining a sophisticated form of ecological forecasting. East African pastoralists, for instance, monitor the behavior of both domestic and wild animals. When cattle refuse to graze, birds fail to nest at expected times, or bulls lose interest in mating, elders interpret these as signs of impending drought. Such knowledge, passed down through generations, enables herders to make critical decisions about mobility, herd management, and resource use

weeks in advance (FAO, 2008; Leal Filho et al., 2022). Among the Borana Oromo of Ethiopia, specialized observers known as Ayyantu study the stars and advise community councils (gada) on the likely onset of rains or drought, shaping decisions about migration and water conservation (Birhanu & Husen, 2018).

Beyond Africa, similar traditions flourish; in the Andes, Quechua and Aymara farmers observe the brightness of the Pleiades star cluster in June; when the stars appear dim, they collectively delay planting, interpreting the sign as a warning of late and erratic rainfall associated with El Niño (Orlove et al., 2000). A good example of how these systems have averted danger is in Simeulue Island, Indonesia, where oral histories and songs (smong) preserved memories of past tsunamis, teaching villagers to flee to higher ground when the ocean suddenly recedes, and this knowledge, carried across generations, saved thousands of lives during the 2004 Indian Ocean tsunami (ReliefWeb, 2005).

These early warning systems are powerful not only because of their accuracy but because they are embedded in trusted social structures. Elders, shamans, or rainmakers interpret the signs, convene councils, and mobilize communities. Warnings are disseminated in familiar cultural idioms, reinforced through ritual and story, and acted upon collectively. Unlike top-down meteorological bulletins that often fail to resonate locally, Indigenous systems draw their authority from within, making them both intelligible and legitimate.

Behavioral and cultural foundations of collective resilience

The effectiveness of these Indigenous systems rests on their behavioral foundations. Trust in knowledge holders ensures that warnings are heeded and norms of reciprocity and obedience to communal authority embed cooperation in everyday life. Collective memory, preserved in songs, stories, and rituals, keeps alive the lessons of past disasters, shaping risk perception and motivating preparedness. Distributed cognition, and the pooling of observations from many individuals enables communities to detect patterns that no single person could perceive (Leal Filho et al., 2025).

From a behavioral science perspective, these dynamics align with well-established principles; trust in authority figures increases compliance, and social proof—seeing others act—reinforces individual action. Vivid collective memories anchor risk perception in ways that abstract probabilities cannot. And collective efficacy, the belief that joint action can change outcomes, fuels cooperation. In this sense, Indigenous knowledge systems are not merely cultural traditions; they are sophisticated behavioral architectures for managing uncertainty.

Disruption in a changing climate and the need for hybrid systems

Yet these systems are under strain. Elders in the Arctic now lament that 'the old signs no longer mean what they used to,' as climate change disrupts familiar weather patterns (Cultural Survival, 2010) and in East Africa, shifting rainfall patterns have reduced the reliability of traditional indicators, creating uncertainty where once there was clarity. In response, formal systems have stepped in with satellite data, rainfall indices, and mobile-based alerts. They promise precision and speed, yet often fail to connect with the logic of the people they aim to serve. Index insurance for example has been seen as an important tool for managing the risks faced by smallholder farmers in developing countries. However, uptake has been disappointingly low. Basis risk is frequently cited as a key reason: a risk-averse individual may prefer to forgo insurance entirely rather than purchase an index product that might fail to pay out when they actually experience a loss, even if the premium is actuarially fair. (Jensen, Barrett and Mude, 2016). This mismatch between empirical loss and model output erodes trust, reinforcing perceptions that formal systems are arbitrary or externally imposed.

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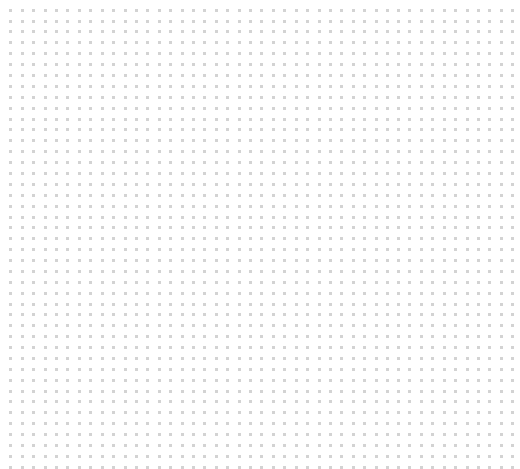
One practical way to rebuild trust in insurance systems is to involve farmers directly in defining the triggers that determine when payouts occur. Farmers should help set the trigger levels themselves and contribute their own records of droughts or other disasters, documenting how these events affected them and their land. This kind of co-production of knowledge ensures that insurance products reflect lived realities rather than abstract models. A former colleague once illustrated this perfectly. While reviewing a product termsheet with a maize farmer in Cherangani, Kenya, the farmer noted that, in their region, the product would always trigger payouts. Over the next three years, it did exactly that. The reason was simple: the model had ignored a key local factor—the soil's capacity to retain moisture. The farmers, however, already understood this nuance. Their knowledge could have prevented an expensive design flaw, showing why true collaboration between farmers and insurers is not optional but essential for building products that actually work.

Ignoring Indigenous systems has left dangerous gaps. False negatives in satellite models translate into household insolvency and food insecurity. Communication failures such as SMS alerts delivered in unfamiliar languages or outside trusted networks result in warnings that are received but not acted on(IAPAD, 2016). Policy interventions that restrict herd mobility or rezone communal lands remove the very mechanisms by which communities transform forecasts into action (FAO, 2008; Leal Filho et al., 2022). In short, by privileging precision over participation, formal systems have produced information that fails to shape behavior. Communities, however, are adapting. Rather than abandoning their traditions, many are integrating them with scientific forecasts.

In Vanuatu for example, local signs of fish poisoning have been combined with meteorological data to create hybrid early warning systems (CIMA Research Foundation, 2025). While seasonal climate outlook forums in Africa are increasingly bringing together meteorologists and pastoral elders, co-producing forecasts that draw legitimacy from both science and tradition. These hybrid systems suggest a way forward: combining the precision of scientific tools with the trust, cultural resonance, and collective mobilization of Indigenous practices.

The lesson here is that resilience is never purely technical. It lives in the ways people cooperate, remember, and act together when conditions change. Indigenous systems of risk-sharing and early warnings reveal that communities have long built their own institutions to manage uncertainty; institutions that blend ecological observation with trust, reciprocity, and collective authority (Leal Filho et al., 2022; Ready, 2018). When these systems are dismissed or replaced by externally engineered models, entire layers of understanding are lost. The result is a development landscape full of alerts no one trusts and insurance schemes that fail when they are needed most.

Legitimizing Indigenous systems means more than token acknowledgment; it requires embedding them in policy and practice, creating spaces where community rituals, kinship networks, and ecological forecasting are recognized as legitimate forms of risk management. It calls for insurance products that resonate with existing mutual aid traditions, early warning systems that build upon trusted channels of communication, and disaster preparedness plans that align with cultural logics.

Combining local ecological indicators with scientific measurements in practice. East African herders monitor vegetation color, bird nesting, and animal behavior as early signs of drought; these can be quantified and entered into national early-warning databases alongside NDVI and rainfall figures. In the Andes, the brightness of the Pleiades star cluster is still used to predict rainfall, and when correlated with satellite data it has improved seasonal forecasts (Orlove et al., 2000).

This integration does more than add data points. It gives local observations formal standing, ensuring that forecasts reflect how communities actually read the environment. When both knowledge systems are aligned, the precision of scientific tools is matched with the sensitivity and spatial detail of lived experience.

One practical way to rebuild trust in insurance systems is to involve farmers directly in defining the triggers that determine when payouts occur. Farmers should help set the trigger levels themselves and contribute their own records of droughts or other disasters, documenting how these events affected them and their land.

Image credit: Anthony Mogaka
Midjourney V 7.0

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- Jackline Chemtai

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Meet our authors

Dr. Fadila Jumare

Fadila Jumare is a research expert with extensive experience in food waste, nutrition, and food safety. She holds a Ph.D. in Social Development and combines behavioral science with hands-on research to address real-world development challenges.

Recently, Fadila was a research and advisory expert at Busara, where she designed and led studies on food systems, supported teams to deliver impactful projects from surveys to prototypes, and ensured strong ethics and research quality. Previously, she analyzed policies and budgets for Nigeria's National Assembly, authored reports on health and education, and published in reputable academic journals.

Dr. Sanchayan Banerjee

Dr. Sanchayan Banerjee is an Associate Professor (Sr. Lecturer) of Economics and Public Policy, Professional Education Lead for the Policy Institute, and Director of the Behavioural Public Policy Lab at King's College London. He is a Visiting Fellow of the London School of Economics and an affiliate of Amsterdam Sustainability Institute and Institute for Environmental Studies at Amsterdam. His research focusses on developing citizen-oriented participatory public policies and testing their effectiveness and legitimacy using large-scale experiments.

Sanchayan is an editor of PLOS One, Nature Scientific Reports, Frontiers in Behavioural Economics and Humanities & Social Sciences Communications journals. He is the founding chair of Behavioural Transformations and Behavioural insights for Policy (BiP). He holds an MSc and PhD from the London School of Economics.
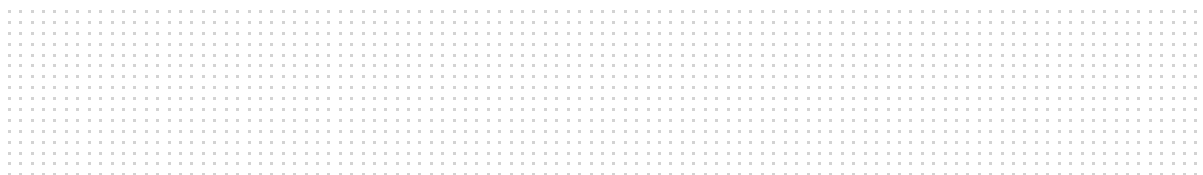
Rahab Kariuki

Rahab is building the risk management research portfolio at Busara, using behavioral science to reimagine insurance and enhance the resilience of rural communities and women.

Rahab is an Agronomist with over 19 years of experience in the insurance industry. During her career, she has worked in life insurance sales, taught insurance agents at the College of Insurance in Nairobi, and spent 10 years developing agriculture insurance products with Syngenta Foundation and ACRE Africa.

Jackline Chemtai

Jackline is an inclusive climate-risk insurance practitioner working at the intersection of climate change, human decision-making, and financial resilience. Raised in West Pokot, Kenya, her lived experience of environmental risk and community-based coping systems shapes her conviction that climate change is, at its core, a human problem rooted in behaviour, power, and unequal access to protection. She is a Senior Associate at Busara, where her work sits at the intersection of behavioural science, climate adaptation, and social innovation, bringing the logic of communities into the logic of formal systems. Through applied research on risk-management and insurance solutions, her work helps position insurance not merely as a financial product, but as a tool for resilience. She is currently pursuing a Master's in Sustainable Development at the University of Sussex and is a certified actuarial analyst and certified microinsurance expert, grounding her work in participatory research that bridges data, policy, and lived realities while challenging technocratic climate responses and advancing people-centred adaptation pathways.

Juhi Jain

Juhi is a Director at Busara, where she leads the Food Systems, Agriculture and Climate Resilience Management (FaRM) team. Over the last decade, Juhi's work has focused on strategy formulation and the implementation of national-level and global sustainability and inclusion programs. Prior to her current role, she worked at the Bill and Melinda Gates Foundation, managing policy advocacy and behavioral insights investments for the Foundation's India office.

As Manager at the Behavioral Insights Unit at NITI Aayog, the Government of India's apex policy institution, chaired by the Prime Minister, she led "Mission LiFE", an international initiative nudging sustainable lifestyles. Juhi has also supported entrepreneurship and start-up ecosystems in India through her work with the Atal Innovation Mission.

With over a decade of experience at the intersection of policy, behavior change, and sustainable development, Juhi has led transformative initiatives globally. She has represented India in policy dialogues, including the EUVP and the Australia-India Youth Dialogue, and is also a Salzburg Global Fellow and a TEDx speaker. Her core area of work is sustainability and climate change.

Wanja Nyaga

Wanja Nyaga is a registered nutritionist with experience in both clinical and public health settings that spans across the globe. She holds an MSc in Human Nutrition from the University of Aberdeen and BSc Food Nutrition and Dietetics from the University of Nairobi. She currently serves as an Academic Officer at the NNEdPro Global Institute for Food, Nutrition and Health (UK). As a distinguished researcher and knowledge translation expert, Wanja has contributed to high-level global policy documents, most notably as a contributor to Chapter 4 of the UNEP report on Measuring Progress: Water-related ecosystems and the SDGs. Her prolific writing and research portfolio includes:

• Leading a T20 Policy Brief for the G20 Summit in India on nutritional well-being and planetary health

• Contributing to the UN Food Systems Summit 2021 international surveys and reports

• Publishing work on medical nutrition education, food system decolonization, and sustainable practices across the UK, India, and Mexico.

Beyond her academic and policy work, she is a dedicated advocate for maternal health—having presented the Nothing About Us Without Us (NAUWU) strategy to the Scottish Government—as well as dedicating her time in workplace wellness and global nutrition equity.
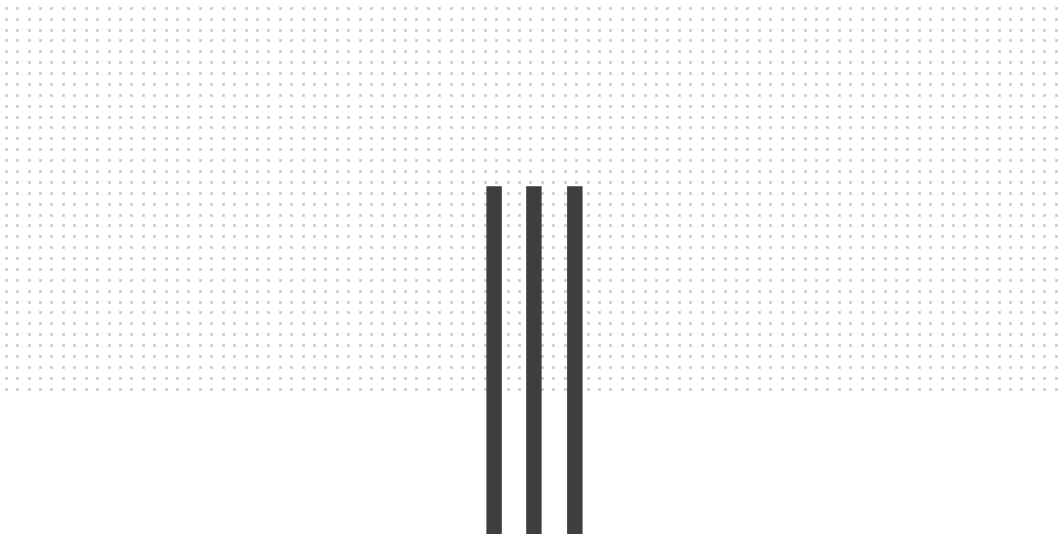
Dr. Hendrik Bruns

From 2020 to 2025, Hendrik worked as a Policy Analyst at the Competence Centre on Behavioural Insights (CCBI) within the European Commission's Joint Research Centre. Previously, he spent 1.5 years as a postdoctoral researcher at the University of Hamburg, where he also earned his PhD in Socioeconomics. His work has focused on understanding and countering mis- and disinformation, supporting climate action, and designing effective, behaviourally informed interventions to motivate sustainable behaviour. He contributed to an EU-wide research project on reducing consumer food waste, supporting Member States in meeting the EU's food waste reduction targets. He also led a project to develop harmonised EU waste-sorting labels and contributed to broader CCBI initiatives advancing the field of behavioural public policy.

Berber Kramer

Berber Kramer is a Senior Research Fellow in the Markets, Trade, and Institutions Unit of the International Food Policy Research Institute (IFPRI). Her research focuses on the behavioral drivers of financial inclusion, technology adoption, gender equity, and adaptation to climate change. She leads, among others, a research program that aims to strengthen, evaluate, and scale digital financial services for smallholder farmers in Ethiopia, India, and Kenya through innovations in the design of agricultural credit and insurance. She has a PhD in economics from the Tinbergen Institute, the Netherlands, and is currently based in Nairobi, Kenya.
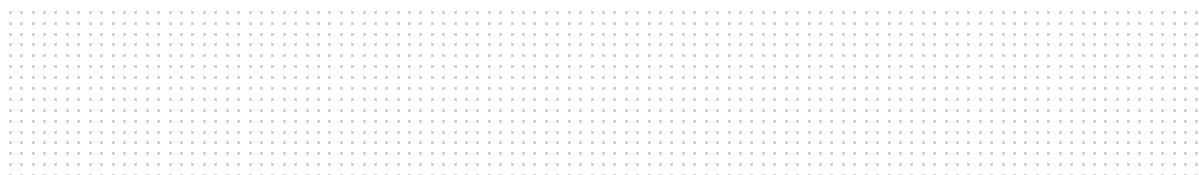
Maryam Anike Yusuf

Maryam Anike Yusuf is a behavioural scientist and data science practitioner with seven years of experience designing and delivering experimental and mixed-method research across Africa and Asia. Her work focuses on the intersection of behavioural economics, digital technology, and inclusive development. Maryam has led research initiatives for organisations including the Gates Foundation, USAID, the World Bank, and the Mastercard Foundation. She specialises in applying causal inference and machine learning to evaluate the impact of financial, health, and agricultural innovations. Maryam holds an MSc in Behavioural Economics and Data Science from the University of East Anglia and a BSc in Economics and Business Finance from Brunel University.

Laura Schun

Laura is an Associate at Busara, where she leads research projects from design to analysis and dissemination. Her work examines how people make decisions within systems that often disadvantage them, with a particular focus on smallholder farmers, informal vendors, and low-income consumers. She has worked across a range of agriculture and food systems topics, aiming to stay close to lived realities and support practical, context-appropriate solutions.

Before joining Busara, she worked across public and private organizations on sustainability, social impact, and environmental governance in India and France. She holds a Bachelor of Science in Political Science from Leiden University, where she also completed a minor in sustainable development.
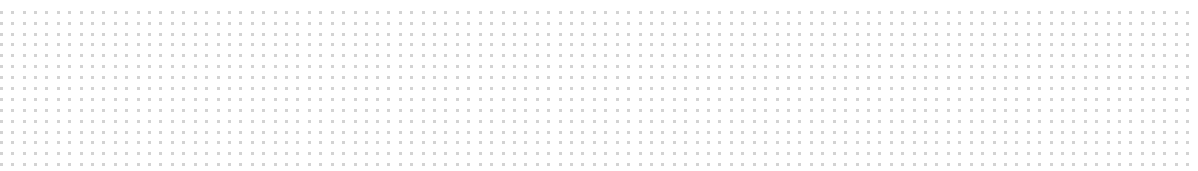
Raya Shatry

Raya Shatry is a senior research analyst working with the risk management portfolio at Busara. She designs experimental research, leads fieldwork, and conducts both qualitative and quantitative data analysis to generate actionable insights for policy and development projects. With a strong academic background in Political Science and a focus social intersectionality and public policy administration, Raya brings a unique interdisciplinary approach to data-driven problem solving in risk management. Her work bridges research, project management and client engagement, contributing to evidence-based outputs.

Tahira Mohamed

Tahira Mohamed is a food security and development expert and currently the Regional Partnership and Engagement Lead for the Jameel Observatory, based at the International Livestock Research Institute. Her research examines resilience-building programs and humanitarian support in response to crises in the Horn of Africa. She completed a PhD at the University of Sussex under the PASTREs program on moral economy practices and vernacular social protection in northern Kenya.

She has nearly 10 years of research experience in pastoralism, climate change, social protection, humanitarian and development programmes, livelihood transformation, photo-voice, and migration.
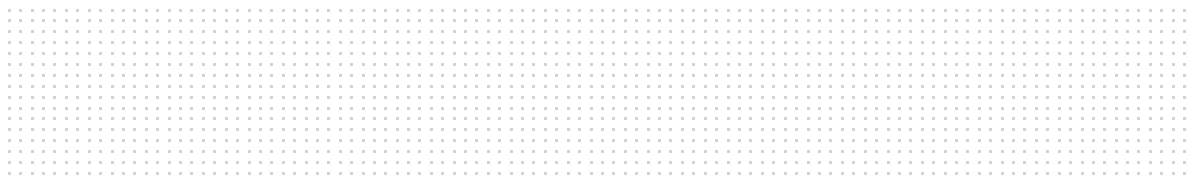
Wairimu Muthike

Wairimu (Nimo) Muthike is a food scientist and applied behavioural systems practitioner working at the intersection of food systems, climate risk, and knowledge systems in the Global South. Her work centers on a simple but often overlooked premise: climate change is not only an environmental or technical challenge, but a challenge shaped by behaviour, relationships, identity, and lived experience.

She currently serves as Associate Vice President at Busara, where she leads interdisciplinary efforts linking behavioural science, policy design, and large scale implementation across agriculture, nutrition, and climate resilience. Prior to this, she spent over a decade in implementation roles, co-designing nutrition sensitive and climate adaptive programmes with smallholder farming communities across Africa. Nimo's work focuses on how communities anticipate, absorb, and adapt to uncertainty, and how indigenous and behavioural knowledge systems function as living infrastructures for resilience that often is more durable than formal financial or institutional mechanisms alone.

Climate change is a human problem
Finding the missing voices of climate resilience

Climate change is often framed as a technical problem, measured in emissions, modeled through scenarios, addressed through policy targets. But its consequences are lived through human decisions, relationships, and systems. This book starts there.

Climate change is a human problem, brings together contributions from researchers and practitioners who examine how behavior, social norms, power, and knowledge shape climate risk and resilience. The chapters explore why well-intended solutions succeed, stall, or fail across food systems, agriculture, insurance, nutrition, gender, and indigenous knowledge, and also what can change when human experience is taken into account.

This publication traces patterns, explores how people make decisions under uncertainty, how institutions shape outcomes, and how resilience is built or undermined, through everyday choices. It argues that effective and equitable climate action depends not only on technology and policy, but on understanding the systems and behaviors that connect them to lived experiences.

This is a book for anyone grappling with the human dimensions of climate change, and looking for ways to design responses that reflect people's realities.
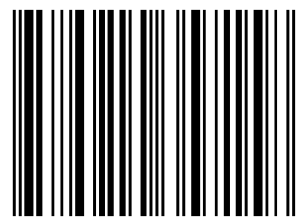
About Busara

Busara is a research and advisory organization, working with researchers and organizations to advance and apply behavioral science in pursuit of poverty alleviation. Busara pursues a future where global human development activities respond to people's lived experience; value knowledge generated in the context it is applied; and promote culturally appropriate and inclusive practices. To accomplish this, we practice and promote behavioral science in ways that center and value the perspectives of respondents; expand the practice of research where it is applied; and build networks, processes, and tools that increase the competence of practitioners and researchers.

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