



Airbel Impact Lab
Research & Innovation at the IRC



Farmer Seed Stewardship Network (FSSN):

A New Approach to Rooting
Climate-Resilient Futures
in Fragile Contexts



Insights from Syria, Pakistan, Niger & South Sudan

Rescue.org

INSIGHTS FROM SYRIA, PAKISTAN, NIGER & SOUTH SUDAN

The three global challenges of climate change, poverty and conflict are converging to form a new epicenter of crisis in just 17 countries (Figure 1). Communities in these countries—including those in Niger, Pakistan, South Sudan and Syria—are on the front lines of complex and compounding crises, rendering them among the world's most climate-vulnerable populations. Despite the urgent need for effective approaches to adaptation designed for conflict-affected communities, they are being left behind by global efforts on climate action, receiving disproportionately little funding and ineffective solutions designed for more stable contexts. Moreover, despite the fact that adaptation is an immediate priority in frontline communities, the distribution of global climate finance predominantly favors mitigation efforts, leading to an alarming scarcity of funds designated to address critical adaptation needs.

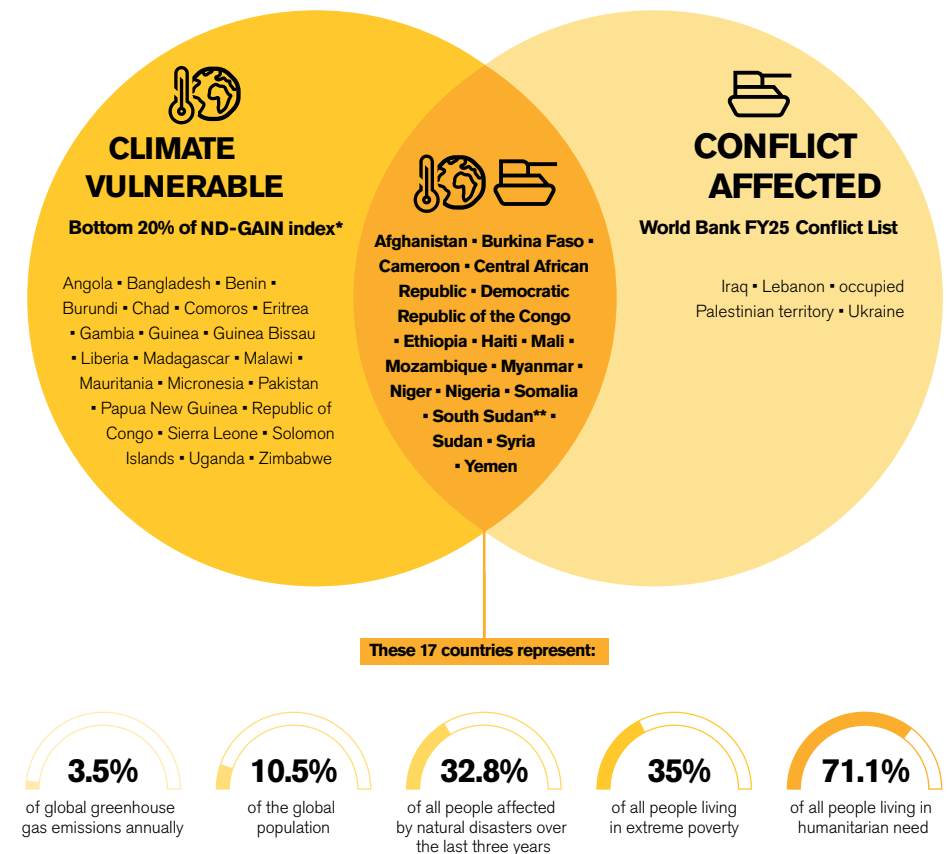
Agro-pastoral communities across Niger, Pakistan, South Sudan and Syria continue to confront the effects of climate change, persistent insecurity and conflict in some areas, economic deterioration, food and supply shortages and high prices for essential items, including food and agricultural supplies. Robust seed systems are essential for these communities, as they ensure timely access to high-quality, suitable seeds, which are foundational to sustaining livelihoods and food security, especially in times of crisis. However, conflict and climate dynamics, coupled with financial barriers, have significantly undermined local seed systems, leaving farmers dependent on low-quality, poorly adapted seeds that drive declining yields over time, ultimately threatening livelihoods and long-term food security in agro-pastoral communities.

In each of these four countries, the Airbel Impact Lab, IRC's Research & Innovation Unit, and IRC's Country Teams, in coordination with farmers and local stakeholders, are developing the Farmer Seed Stewardship Network (FSSN), a resilience- and adaptation-focused solution designed to enhance seed, food and livelihood security for farmers and their communities. The FSSN employs a citizen-science approach to test, multiply, and distribute locally adapted, high-yielding seeds, fortifying local seed systems for long-term sustainability. While the core tenets of the FSSN remain consistent across all project sites, the specific implementation and solution package has been customized in each target location to address the local social, political, economic and climatic conditions, ensuring the approach is both effective and contextually relevant.

COVER: Lilla Ambhu wishes she could send her children to school, but after heavy flooding wreaked havoc on their province in Pakistan, they all have to work at the farm in order to generate income for the family.

In Syria and Pakistan, where our work is at a later stage, we have been testing our solutions to achieve an overall enhancement of seed and food security for farmers and their communities. Now, we are taking these learnings to Niger and South Sudan, where our work is just getting off the ground as we prepare to prototype our initial solutions. The FSSN is showing early promise in demonstrating that building climate resilience in conflict-affected contexts is possible. A concerted effort by a coalition of governments, multilateral bodies, peer organizations and funders is needed to invest in the full range of conflict-sensitive solutions to transform climate resilience in conflict-affected countries, those most affected by and least responsible for climate crisis.

FIGURE 1: The Overlap Between Climate Vulnerability and Conflict



*ND-GAIN, Notre Dame Global Adaptation Initiative. | **Notes countries that are extremely climate vulnerable but are not ranked in index. Source: United Nations Environment Programme (UNEP)

RESEARCH OBJECTIVES, METHODS AND SCOPE

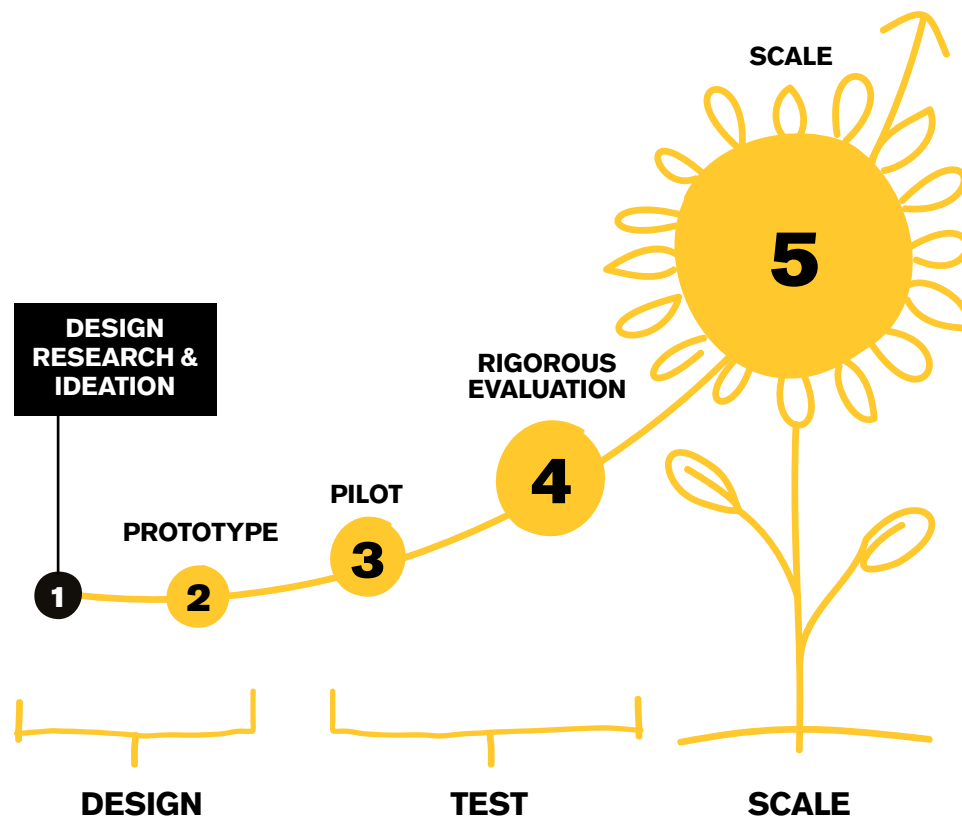
In 2021, the IRC initiated a design project in Niger, Pakistan, South Sudan, and Syria to enhance farmers' access to quality climate-adapted seeds. Over the past three years, the initiative has advanced through Airbel's innovation-to-scale pipeline (Figure 2), beginning in northeast Syria, followed by Pakistan and now expanding to Niger and South Sudan. The project focuses on addressing barriers to seed security by improving availability, accessibility and quality. Methods include formative evidence reviews and desk reviews, interviews and focus group discussions with agro-dealers, private sector actors, agricultural extension workers, researchers and academics, representatives from international agriculture organizations and non-governmental organizations (NGOs), seed producers and farmers in target locations (both male and female), and workshops which leverage human-centered design and behavioral science methods with the IRC's country-based agricultural livelihoods technical teams and the farmers. Additionally, IRC's innovation teams have applied cost analysis and strategic frameworks to project the scale potential of the solution in each location and identify opportunities for increasing efficiency.

CHALLENGES ACROSS THE EPICENTER OF CRISIS

To ensure that we are working toward solutions with scale and impact potential across the target countries at the epicenter of crisis, we separately evaluated supply and demand challenges in the local seed systems in Niger, northeast Syria, Pakistan and South Sudan and then identified common issues. Across agricultural communities in all four countries we found a severe lack of high-quality seeds in markets and significant barriers to farmers' access to the limited extant supply, coupled with a vicious cycle that results in continually diminishing yields, further degrading the local seed system and endangering seed and food security.

On the supply-side, there are two critical problems. First, there is a lack of new, high-quality seeds entering the market (1) because the typical sources of improved seeds—research institutions, import from neighboring countries and private sector companies—have been unable to supply new and sufficient, high-quality seeds due to conflict (1A) and a lack of financial incentives (1B). Second, the existing open-pollinated seed varieties are not being produced in a way that sustains the system (2), leading extant supply to diminish in quality and availability season after season. This is the result of a confluence of factors, including: (2A) conflict, which degrades critical irrigation

FIGURE 2: Innovation-to-Scale Pipeline

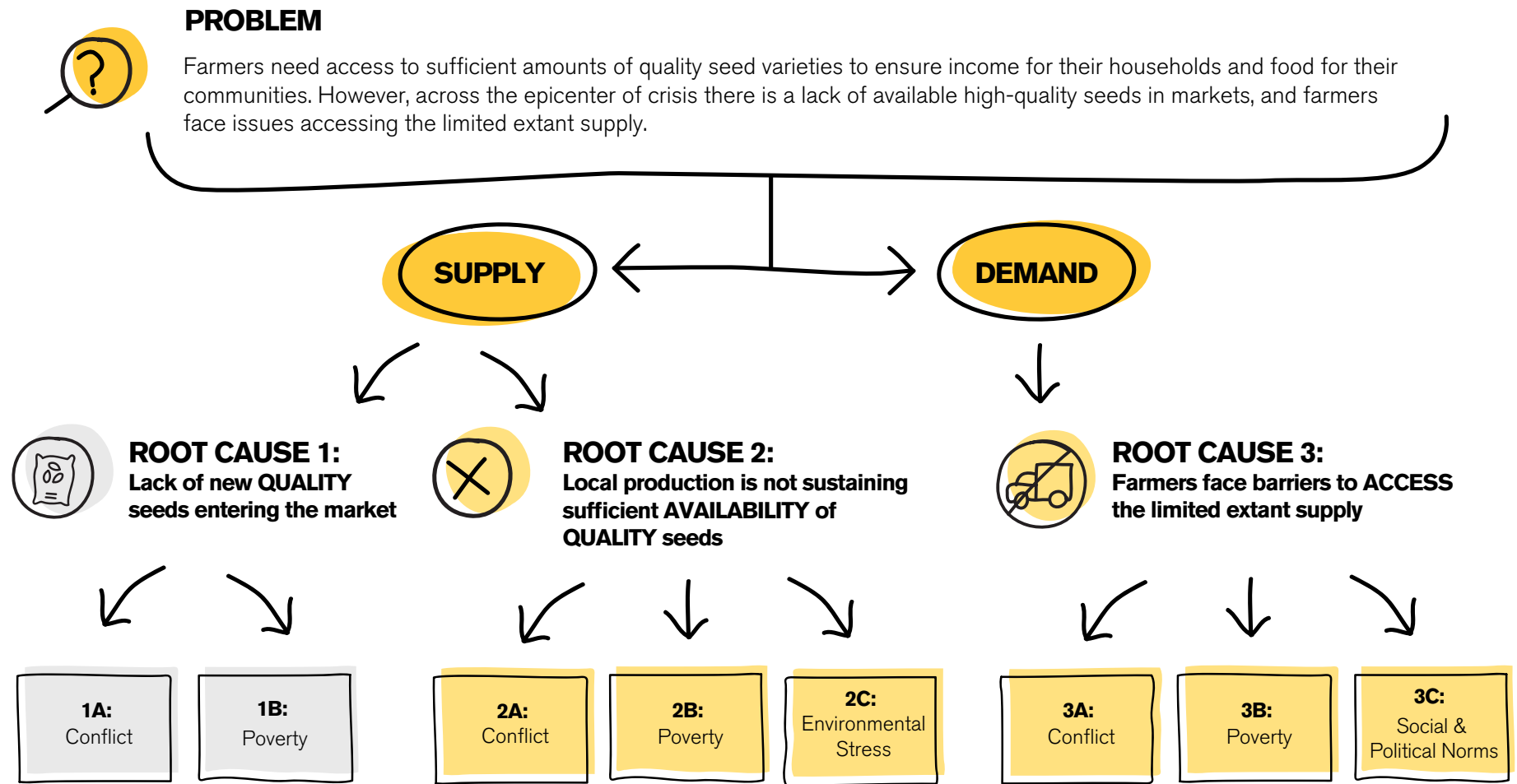


infrastructure, and disrupts governance systems, rendering seed quality controls weak to non-existent, as well as disrupts extension services and research efforts, which results in the use of suboptimal agricultural methods and inputs and contributes to a reduction in quality and yield; (2B) poverty, which drives farmers to use negative and short-term coping mechanisms such as early harvest or use of low-quality seeds, which are more affordable but contribute to reduced seed quality and availability for future seasons; and (2C) environmental stress, including abnormally high temperatures, erratic rainfall and the spread of plant diseases, which reduces or destroys yield quantity and quality at harvest, and shifts the necessary markers of quality for seed varieties.

On the demand-side, farmers are unable to sufficiently or consistently access the seeds that do exist (3). This is the result of a number of factors, namely: (3A) conflict, which has resulted in an exodus of research institutions and academics—thereby limiting information about seed varieties available to farmers while also degrading critical infrastructure and limiting physical access to markets; (3B) poverty, which limits farmers' buying power to

purchase seeds, which results in over-reliance on low-quality seeds available locally, further diminishing yields and income; and (3C) social and political norms in certain contexts, which further limit access for women, youth, and displaced populations. As a result, farmers cannot sufficiently access seeds that are available.

FIGURE 3: Root Cause Analysis

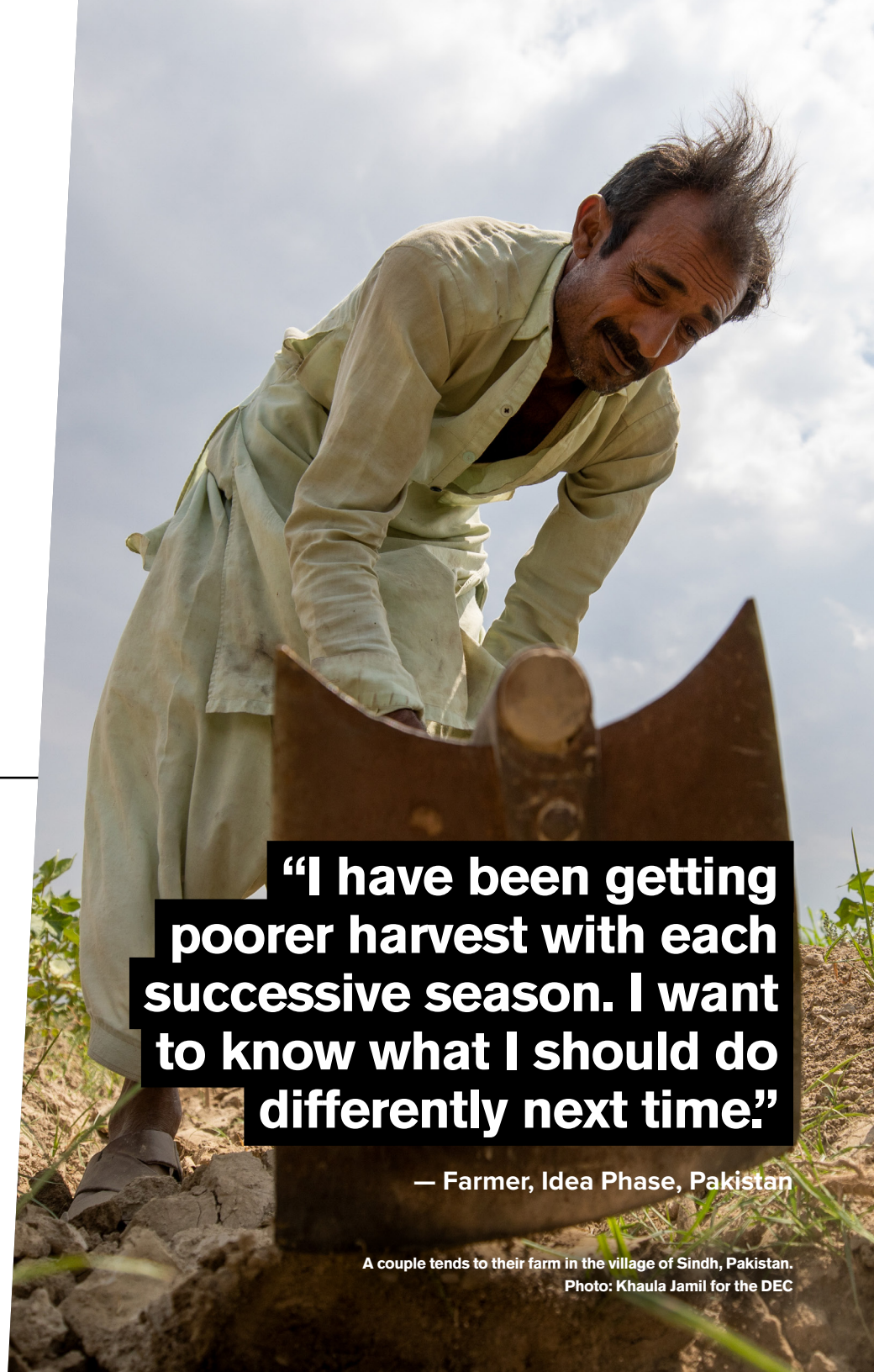
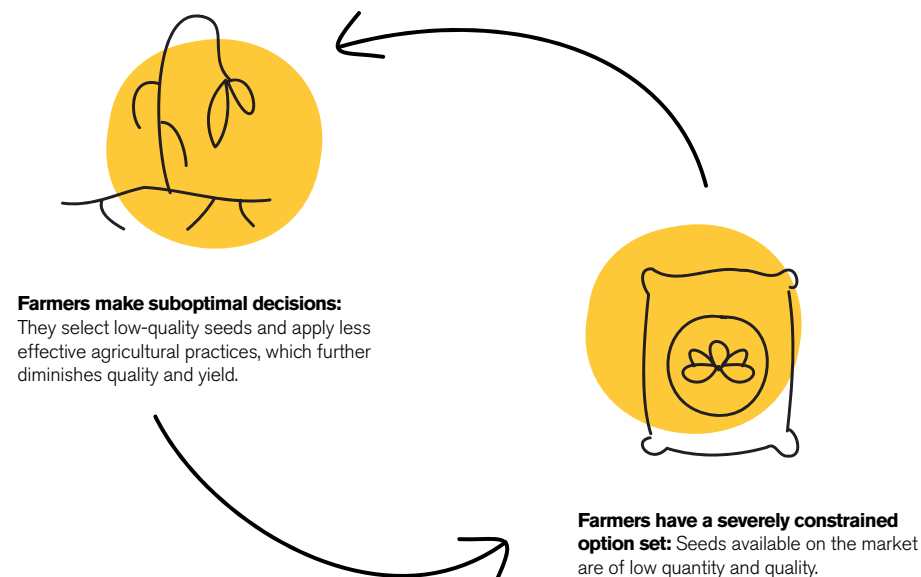


Root causes in yellow have the potential to be mitigated through the FSSN.

Furthermore, suboptimal decision-making in one season results in an even more constrained option set the next season as low-quality seeds and less effective farming practices are continuously being used to produce seeds for the following year (Figure 4). All the while, environmental stressors and conflict continue to inflict further damage on the system.

Existing solutions do not address the root causes of the problem, nor do they interrupt the vicious cycle. The most typical current approaches are primarily seed aid (either distribution of cash to purchase seeds or the seeds themselves) and stand-alone training in climate-smart agricultural practices. Seed aid in the form of cash and trainings in climate-smart agricultural practices are insufficient when there is minimal to no seed available in the local market, when the market is not functioning at all and/or when the seeds that are available are of low quality. Seed aid in the form of in-kind distribution is not a sustainable solution, as it fosters over-reliance on NGO support, weakens local seed markets and leads to the proliferation of low-quality or poorly adapted seeds in local seed systems. Seed aid also suffers from quality control issues due to inadequate oversight and lack of support for farming communities, rendering it ineffective in fortifying local seed systems in the long run. New or adapted approaches that address the deficiencies in the systems are needed to disrupt the vicious cycle and strengthen seed security in fragile and conflict-affected contexts.

FIGURE 4: Vicious Cycle



“I have been getting poorer harvest with each successive season. I want to know what I should do differently next time.”

— Farmer, Idea Phase, Pakistan

A couple tends to their farm in the village of Sindh, Pakistan.
Photo: Khaula Jamil for the DEC



“Performing the testing on plots side by side, it became easy to understand the effect of the experiments and to understand the differences between two varieties.”

— Participating Male Farmer, Pilot Year 1, Syria

In northeast Syria, a farmer inspects mature wheat as part of the first year of the IRC's Seed Security Project.

FARMER SEED STEWARDSHIP NETWORK (FSSN): ROOTING CLIMATE RESILIENT FUTURES

The FSSN was first designed in collaboration with IRC's technical team, farmers and stakeholders in northeast Syria and is now expanding to Niger, Pakistan and South Sudan. The core model is grounded in universal objectives, outcomes, features and behaviors that apply across all four countries. These central tenets form the foundation of the FSSN approach to strengthening seed system security, with adaptations to ensure that the model is effective in each unique local context. These adaptations are tailored to local needs, enabling the most effective implementation through targeted, context-specific interventions that maximize impact in each setting.

Universal Objectives & Outcomes

The key objectives of the FSSN are to disrupt the common vicious cycle (Figure 4) identified across all four countries and support farmers to be stewards of their own economic futures while restoring and maintaining the health of their land. We are empowering farmers to be citizen scientists so that they can build a more resilient system themselves by:



1. Testing existing seed varieties to identify those best adapted to the local climatic conditions



2. Multiplying the identified higher-yielding and more climate-resilient seed varieties and donating a portion of the yield to other farmers to expand the network



3. Repeating each season with a growing network of farmers, progressively enhancing the availability of quality seeds and ensuring that vulnerable communities can continue farming even when institutions fail

The FSSN model addresses root causes on both the supply-side (Figure 5) and demand-side (Figure 6) to fortify local seed systems and ensure long-term seed and food security in target communities.

FIGURE 5: Supply-Side Root Causes and FSSN Interventions

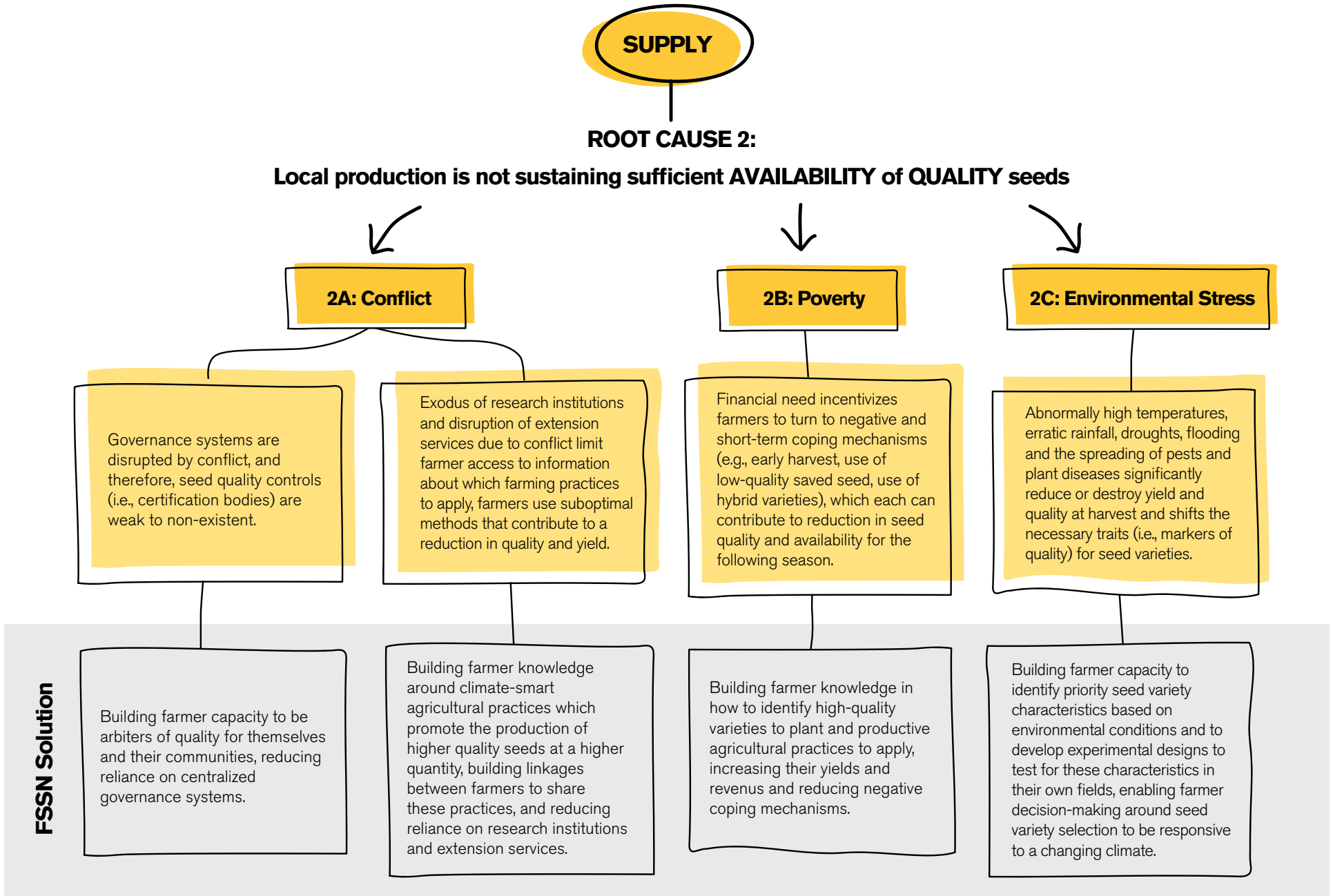
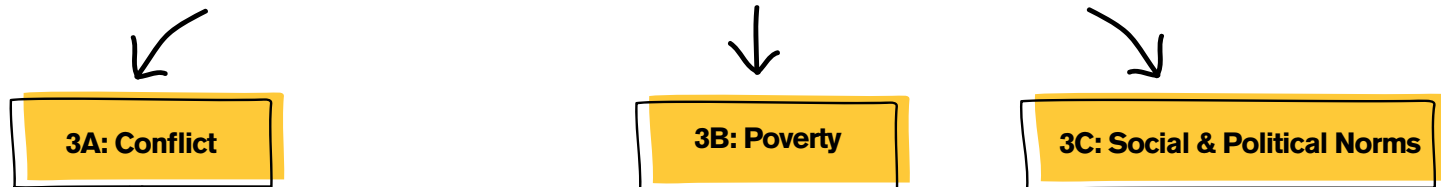


FIGURE 6: Demand-Side Root Causes and FSSN Interventions



ROOT CAUSE 3

Farmers face significant barriers to ACCESS the limited extant seed supply

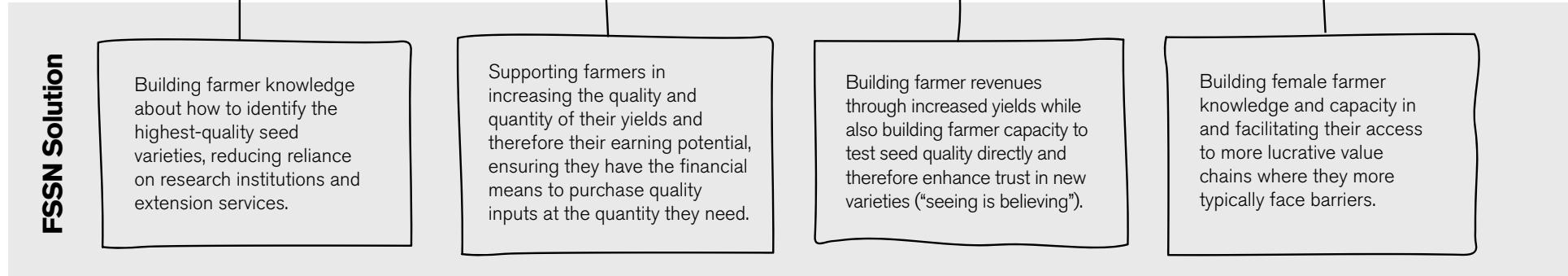


Exodus of research institutions and disruption of extension services due to conflict limit farmer access to information about quality seed and generate over-reliance on information from peers. Farmers therefore are unable to select appropriate and quality varieties.

Existing financial insecurity is compounded by lack of functioning financial systems and, in some contexts, volatile inflation. Farmers are therefore unable to cover the cost of the quantity or quality of seed they need.

High level of risk aversion related to trying new seeds or agricultural approaches given the relationship of these choices to income and constrained financial capacity.

Women's time is constrained by domestic responsibilities, and their access to decision-making, land and particular value chains may be limited. This is a particular challenge where there is a high rate of woman-headed households.



FSSN Solution

Building farmer knowledge about how to identify the highest-quality seed varieties, reducing reliance on research institutions and extension services.

Supporting farmers in increasing the quality and quantity of their yields and therefore their earning potential, ensuring they have the financial means to purchase quality inputs at the quantity they need.

Building farmer revenues through increased yields while also building farmer capacity to test seed quality directly and therefore enhance trust in new varieties ("seeing is believing").

Building female farmer knowledge and capacity in and facilitating their access to more lucrative value chains where they more typically face barriers.



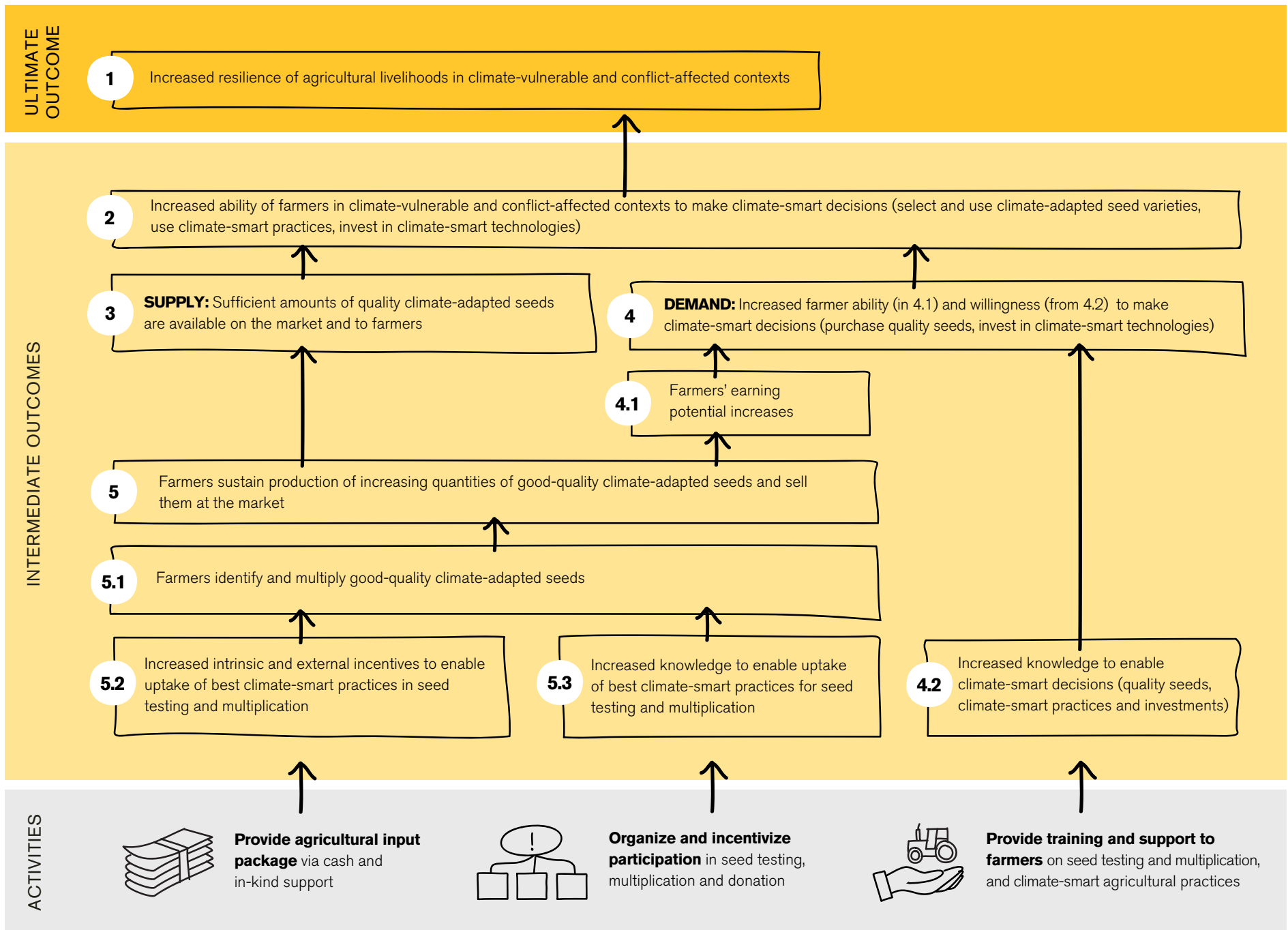
The IRC's first Farmer Seed Stewardship Network empowers farmers to be citizen scientists so that they can test and multiply seeds that are resilient to a changing climate.

The FSSN currently does not introduce new seed varieties to markets, given 1) the lack of dependability of institutions in fragile and conflict-affected states (FCAS), which plays a major role in seed importation; 2) regulations that, in some contexts, limit NGO ability to introduce new seed varieties; and 3) where importation is feasible, the potential for this approach to creating a dependency on the IRC. The FSSN therefore currently does not aim to operate on root cause 1 (Figure 2); however this is an area for further research and exploration in the future once the FSSN is established in its current form.

Instead, working in partnership with farmers, local stakeholders and IRC technical teams, the FSSN takes a community-led approach by developing new mechanisms that promote an enabling environment wherein farmers can make more optimal decisions about 1) what seed varieties to plant and 2) which agricultural practices to apply.







In short, we aim to disrupt the vicious cycle in which suboptimal decisions from farmers lead to lower yields, which in turn compounds problems of seed quality, availability and access for future seasons. The FSSN will have succeeded when farmers are equipped and empowered with the information, practices and finances they need to make better decisions that in turn lead to an increasingly better option set of quality seeds available on the market that are accessible to farmers beyond those participating directly in the network. This logic model is represented in the Theory of Change (Figure 7). While the approach to the organization of activities and incentivization of farmers varies across contexts where the FSSN is being designed and tested, the basic logic model remains the same:

FIGURE 7: FSSN Theory of Change (ToC)



Universal Features & Behaviors

To achieve the outcomes and establish the virtuous cycle described above, the FSSN includes 10 basic features, consistent across all geographies although implemented differently depending on the local context; these are:

UNIVERSAL FEATURE*	RATIONALE
Commitment to a multi-season approach	Builds trust with farmers and communities and reflects the need for a minimum of three agricultural cycles to accurately evaluate seed resilience characteristics and ensure sustainable impact
Collaboration framework among community members, farmers, private sector actors, institutional and humanitarian actors 	Ensures broad acceptance of approach across communities, enables access to communities and promotes efficiency by leveraging existing capacities
Provision of start-up assistance (e.g. inputs, cash, trainings)	Provides incentives to farmers to participate and donate while ensuring they have the necessary resources to be successful in the project
Consistent communication with participants throughout the season (WhatsApp, SMS, field visits) 	Ensures ongoing learning, promotes adherence to project guidelines, reduces uncertainty and ensures farmers have ongoing, timely support to adapt to changes in volatile environments and that they are taking necessary action at the appropriate time
Identifying enthusiastic expert farmers as early adopters	Encourages more risk-averse and less experienced farmers to participate in future seasons through “seeing is believing”
Developing leadership pathways for participating farmers 	Promotes farmer ownership and ensures community-based pathway to scale project
Sharing findings on seed quality across agricultural communities at the end of the season 	Increases impact by spreading knowledge beyond direct project participants while advertising project successes to attract new participants
Celebrating farmer successes at the end of the season 	Lifts up successful participants as models for their communities, motivating their continued participation and inspiring the participation of others
Continuous monitoring, evaluation, learning and iteration based on new findings	Ensures model continues to adapt with the evolving needs and contextual realities of farmers living in volatile climatic and conflict conditions
Integrating specialized components to mitigate identity-based barriers to agricultural value chains 	Promotes greater access for marginalized groups to agricultural value chains and decision-making, ensuring more holistic community support and resilience building

*Icons denote features that are contextually adaptable.

Finally, to ensure success the FSSN promotes the following farmer behaviors across target geographies, while the approaches implemented to promote the adoption of these behaviors varies between countries and communities based on the unique barriers and enablers therein:

1. Use of **quality, climate-adapted and high-yielding** seeds
2. Uptake of **climate-smart** agricultural practices
3. Saving quality seeds for **future seasons**
4. **Seed donation** between farmers
5. **Skill sharing** between farmers
6. Including farmers with **vulnerable identities** in agricultural decision-making

The following sections offer in-depth analyses of the seed system disruptions and tailored FSSN adaptations for Syria, Pakistan, Niger and South Sudan. Each approach is a locally-adapted variation of the FSSN, designed to address the unique challenges faced by farmers in these contexts while promoting long-term seed and food security.

“Quality seeds are key to sustainable farming, but knowledge, support and training are equally critical. As women farmers, these are some of our urgent needs.”

— Female Farmer, Idea Phase, Pakistan



After the conflict in Syria in 2012 prevented Fadia,* 30, from entering university, she embraced opportunities in agriculture. Through the FSSN, she received financial assistance for essential inputs from the local market and training in climate-adapted agricultural techniques.

* Name changed to protect person's privacy.

FSSN PROJECT SITES

SYRIA

- **Phase:** Phase 3 — Pilot Year 3
- **Target Locations:** Trbepiyeh, Raqqa, Amuda
- **People in Need:** 122,000
- **Potential 5-Year Reach:** 73,000

PAKISTAN

- **Phase:** Phase 2 — Prototype
- **Target Locations:** Khyber Pakhtunkhwa (KP), Sindh
- **People in Need:** 1,430,000
- **Potential 5-Year Reach:** 85,000

NIGER

- **Phase:** Phase 2 — Prototype
- **Target Location:** Diffa
- **People in Need:** 35,000
- **Potential 5-Year Reach:** 20,000

SOUTH SUDAN

- **Phase:** Phase 2 — Prototype
- **Target Locations:** Northern Bahr el-Ghazal (NBG), Unity
- **People in Need:** 65,000
- **Potential 5-Year Reach:** 81,000*

*In South Sudan, where reach is greater than the number of people in need, the project has the potential to reach some farmers multiple times.

DEEP DIVE: **NORTHEAST SYRIA**



Highlights: In northeast Syria, we learned...

- In contexts where trust hinges on the credentials of those providing agricultural recommendations, direct experience and demonstrated success within the FSSN can establish sufficient credibility.
- In areas where WhatsApp is widely used, the platform serves as a highly effective tool for disseminating agricultural information both formally and informally.
- In contexts facing extreme climate and conflict volatility, it is vital to continually assess changes in the enabling environment, such as inflation, access to fuel and the emergence of new pests, and iterate the project accordingly.

ROOT CAUSE 2: Supply-Side Challenges in Seed Quality and Availability

Over a decade of conflict (2A) in northeast Syria has disrupted the entire seed value chain for commercial farming. Before the onset of war in 2011, agriculture in Syria was managed through a highly centralized and tightly controlled government system. While this meant that Syria was once home to world-renowned agricultural research centers and one of the world's largest seed banks, it also created vulnerabilities and eroded the ability of farmers to ensure their own resilience now that that system has disappeared. The Syrian government no longer provides agricultural extension services, financial support or loans to farmers, and there are very limited existing community seed banks or farmer associations to support farmers in the absence of the government. As government research and seed multiplication centers are not functional, the seeds that farmers have access to (typically, old seeds from past seasons) have degenerated over time—losing their quality and productivity, lowering yield and consequent income for the farmers. Exacerbating these challenges further, the war has impacted technological aspects of the agricultural system, resulting in severe damage to irrigation infrastructure and other agricultural facilities. Many farmers



Rashad,* 32, is a livelihood center officer with IRC Syria. He manages the Seed Security Project in Trbespiyeh, which provides high quality seeds, seed testing, agricultural education and support to farmers.

* Name changed to protect person's privacy.

lack access to sustainable irrigation systems, rendering their operations less resilient in the face of extended droughts. Imported seed varieties from Turkey and Iraq, although of good quality, are not adapted to local conditions and typically deteriorate after the first year.

While the region's self-administered government—officially referred to as the Autonomous Administration of North and East Syria (AANES)—provides some support to local farmers, it lacks sufficient resources and capacity to adequately meet the needs of farmers. The limited availability and accessibility of agricultural inputs and farming equipment—driven by both conflict and poverty (2B)—remain a challenge for farmers in northeast Syria, many of whom rely on outdated farming methods, suboptimal technologies and poorly adapted seeds that limit crop yield and overall security of the agricultural system.

These challenges are compounded by environmental stress (2C)—namely, widespread drought, fluctuating rainfall patterns and decreasing water levels in the Euphrates basin—which have reduced food production and availability in the region. In the 2020/21 season, erratic rainfall and abnormally high temperatures affected main eastern cereal-producing areas, resulting in the loss of some 90% of wheat and barley crops in northeast Syria (NES AWG et al., 2021). Additionally, the Alouk Water Station, a critical source of potable water in northeast Syria, ceased functioning in September 2022, further exacerbating the water crisis.

ROOT CAUSE 3: Demand-Side Challenges in Accessing Seed

The conflict (3A) has destroyed key transportation infrastructure needed to access seeds and other agricultural inputs, further compounding the challenges faced by farmers. Additionally, conflict has disrupted the

functioning of research institutions and extension services, leaving farmers without access to critical information about quality seed varieties and agricultural best practices.

Financial barriers (3B) further exacerbate demand-side challenges. Farmers and agro-dealers are adversely impacted by inflation, unstable exchange rates and the absence of government support and financial institutions. Many farmers resort to borrowing cash from relatives and friends, accumulating debt and selling seeds at unfavorable prices to pay back these loans. As farmers struggle to repay debts, agro-dealers, in turn, limit sales on credit. Transportation, labor and agricultural inputs including pesticide, fertilizer and fuel, are increasingly cost-prohibitive, placing additional strain on farmers' ability to access necessary resources.

Social and political norms (3C) also play a critical role in demand-side challenges, particularly for women farmers. Although women are highly active in agriculture in northeast Syria, they often have less decision-making and purchasing power. Their activities in the agricultural realm are largely dictated by cultural norms that discourage them from operating farming machinery, instead confining them to manual labor. Women are typically limited to cultivating vegetables and barley for animal feed, which, compared to wheat, are less lucrative and subject to greater cost volatility.

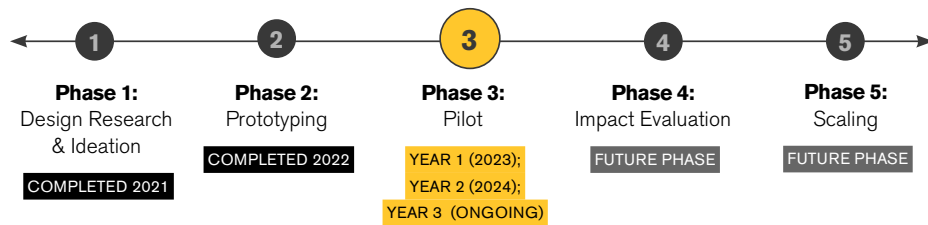
These intersecting challenges—stemming from conflict, financial constraints and social and political norms—create significant barriers to accessing seeds, further straining the agricultural system and threatening the livelihoods of farming communities in northeast Syria.



In northeast Syria, climate change has contributed to widespread drought, fluctuating rainfall patterns and decreasing water levels. These challenges, along with the conflict and poverty, have contributed to a decline in wheat production.

FSSN in Northeast Syria

Target Location(s): Trbespiyeh, Raqqa, Amuda

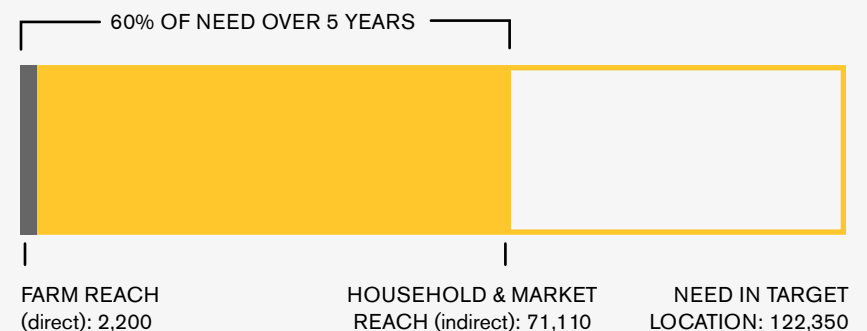


Across Syria, there are over 455,000 people in need of food and agricultural assistance, including over 122,000 people within the northeast, a region historically known as the country's "breadbasket" for its significant contributions to the nationwide wheat and barley stock. Within northeast Syria we launched the FSSN first in Trbespiyeh and Raqqa and in year two of pilot implementation expanded to Amuda based on recommendations from the AANES, as the selected locations demonstrate significant potential

for seed multiplication owing to farmers' prior experience in this practice. Additionally, farmers in these areas have reliable access to irrigation resources, a key criterion for ensuring accurate and dependable results by the end of the season, particularly for testers.

Wheat, a critical cash crop, was selected as the target value chain due to its central role in food and livelihood security in all three locations. Since the war began in 2011, wheat production has sharply declined, a trend further exacerbated by recent climate shocks. Wheat is the backbone of food security in northeast Syria, where, as a result of diminishing seed quality and availability and therefore diminishing grain yields, bakeries have been coping by combining wheat with maize to make bread, thereby compromising the nutritional value of the food. Over five years, we estimate we will partner with approximately 2,200 farms in seed multiplication, where participating farmers will produce sufficient seed to reach an additional 71,000 people within farming households and through market interactions. Ultimately, we estimate the FSSN's localized seed multiplication approach has the potential to address approximately **60% of need in northeast Syria**, produce over **\$9M USD more in profits** for farmers participating directly in the project and have **9.4 times the reach and impact** of traditional seed aid.




Target Value Chain		Wheat
Direct Reach	Number of farms participating directly in the project over 5 years	2,200
Indirect Reach	Number of people reached with quality seed within farming households and through market interactions over 5 years	71,110
Profits	Additional income produced for seed multipliers over 5 years	USD\$9.1M
Multiplier Effect	Average amount of hectares that can be planted with seed produced from just 1 hectare over 5 years	9.4x





To achieve the projected reach and impact, IRC's innovation, technical and country teams conducted interviews and focus group discussions using user-centered and behaviorally-informed tools to design the foundational FSSN, upon which all further models are based. The foundational model was

subsequently refined over two years of pilot testing, with the third year of implementation currently underway. The contextually specific features of the FSSN in northeast Syria are outlined in Figure 8 below.

FIGURE 8: FSSN Contextual Adaptations in Northeast Syria

CATEGORY	ADAPTATION	RATIONALE
Model Organization	The core model was designed for northeast Syria, therefore no adaptations are needed in the model's organization.	
Collaboration 	Coordinate with AANES to ensure access to target populations, distribute seed at the beginning of the season, purchase seed at the end of the season and validate testing findings.	AANES retains a partial monopoly on the local seed system, necessitating close collaboration with officials to ensure the effective implementation of the FSSN.
	As the project scales and farmers take on an increasing degree of ownership and leadership, local civil society organizations (CSOs) and NGOs, as well as international NGOs (iNGOs) , are proposed to provide a support system for farmers in accomplishing discrete elements of implementation.	Given the limited presence of research institutions, private sector actors, and government actors in northeast Syria, CSOs, NGOs and iNGOs are the primary stakeholders present and able to provide support to farmers. Their participation will enable the project to scale beyond the IRC's operating footprint.
Mitigating Identity-based Barriers 	Farming families are encouraged to register a female member of the household as the project participant.	In northeast Syria, women more typically cultivate vegetables and barley for animal fodder, whereas wheat, a more lucrative and price-stable value chain, has been male dominated. By encouraging women's participation in wheat multiplication, we are increasing their earning potential and expertise in support of their involvement in decision-making on family farms.
	Success stories of past female participants are shared across communities, including in video testimonials (shown to current participants during training sessions), through community dialogues and during IRC field visits and farmer field schools.	Through a series of behavioral experiments in target locations in northeast Syria, we found success stories to be a highly productive means of encouraging the participation of women and buy-in from their families and a potential pathway to increase community trust in women's expertise in agriculture.
Farmer Leadership Pathways 	Successful farmers, both male and female, from past cycles are invited to become peer mentors to provide support to farmers participating in future cycles.	In northeast Syria, early behavioral testing revealed that farmers highly value credentials as a signifier of expertise and are unlikely to take advice from peers who do not have advanced degrees in agriculture. However, given the highly constrained operating environment, which contains limited options for partners for scale, farmer leadership and peer-to-peer learning emerged as a promising pathway. We therefore seek to learn through our pilot if success in the project itself might be viewed as a sufficient credential and therefore if we can increasingly transition successful farmers to mentor and train their peers while dialing back IRC staff support. Thus far we have found positive reception, with our behavioral experiments indicating that farmers are willing to trust peers with experience developed through previous FSSN cycles and are even open to accepting a reduced input package in exchange for peer support.

<p>Celebrating Successes</p> 	<p>Champion farmers are selected at the end of seed testing and multiplication based on their engagement with the project, adherence to project guidelines (including climate-smart agricultural practices) and yield. Champion farmers receive prizes (e.g., pesticide sprayer, irrigation sprinkler, solar panels) and are invited to serve as peer mentors in the following season.</p>	<p>During prototyping, farmers in northeast Syria suggested prizes for top-performing participants as a helpful motivator for participation and follow-through. Prizes motivate participation and adherence to project guidelines by leveraging farmers' goal-oriented nature and strong need for achievement. The tangible intrinsic and social rewards of competition drive effort and proper implementation, encouraging the adoption of sustainable agricultural technologies that might otherwise be cost-prohibitive. This approach is informed by early behavioral testing, which indicates that participants are willing to complete tedious tasks to attain the end reward and that being recognized as a change-maker and success story within their communities strongly motivates farmers to participate.</p>
<p>Communications</p> 	<p>WhatsApp groups used for real-time agricultural training support, weather and critical alerts, and intra-community collaboration.</p>	<p>In northeast Syria, where literacy rates are high, the majority of farmers have internet access and smartphones and already use WhatsApp on a daily basis, rendering WhatsApp groups a convenient and effective communications platform. This component of the solution receives very positive feedback across all participants but is particularly beneficial to women participants who are generally new to the wheat value chain and therefore more self-conscious about asking questions in in-person group settings.</p>
	<p>Monthly field visits from an agricultural expert.</p>	<p>In northeast Syria, farmers are eager to expand their knowledge, enhance skills and access information on modern agricultural methods to improve yields and livelihoods. They are keen to connect with broader agricultural advancements, and IRC and its peers are seen as trusted channels for facilitating this exchange. Field visits are especially valued for providing personalized, one-on-one interactions with experts, leading to better agricultural practices and results. This support is particularly crucial for women, whose mobility and ability to attend trainings are often limited by social norms and household duties.</p>

“If I was ever in doubt, I would ask a question, and within one or two hours, I would get a response from the expert. I asked my questions, and was able to get a lot of support through the WhatsApp group.”

— Participating Male Farmer, Pilot Year 1, Syria

Progress to Date: Successes & Challenges

The FSSN is currently in its third year of pilot implementation in northeast Syria. To date, the IRC has partnered with 353 farms directly, which have collectively produced 1,597 MT of seed, sufficient to reach an additional 3,646 people within households and through market interactions. Twenty-four percent of direct participants have been women, the majority of whom have never participated in wheat cultivation before.

Each implementation year, through ongoing field visits, the collection and analysis of monitoring and evaluation data and interviews with participating farmers at the middle and end of the season, IRC teams identify the key FSSN successes and challenges and leverage findings to plan for future cycles and inform our work in other locations.



Key Successes

According to participating farmers and monitoring and evaluation data

- Seed testers have identified a more **drought-resistant seed variety** which can yield up to double the current average. This variety is now being multiplied.
- The average usage rate of **climate-smart practices** among participating farmers rose from just 7% before the launch of implementation to a staggering 78% in just two years, with nearly 1 in 4 participating farmers over those two years making **climate-smart capital investments** in their farms and farmers consistently expressing high satisfaction with IRC's training and support.
- Women demonstrated high motivation and performance** across all aspects of the project; in the second year of the pilot, women collectively outperformed their more experienced male counterparts, surpassing the average yield of men by 0.4 tons.

“The support from the agricultural expert was very beneficial. The agricultural expert provided me the recommendation to change my irrigation time in order to manage the effects of the heatwave. Instead of irrigating during the day, I started irrigating the fields at night. This helped mitigate the loss of flowering and save expenses.”

— Participating Male Farmer, Pilot Year 2, Syria

“Two men from my village were surprised to see how healthy my crops were. They came to ask me what I had done differently. I felt very proud to show them my fields.”

— Participating Female Farmer, Pilot Year 1, Syria



Key Challenges

For continued research and iteration

- In the first year of the pilot, approximately 50% of farmers experienced **nematode infestations**, a new emerging pest in the region. Nematode prevention and management strategies were subsequently integrated into the project curriculum.
- Fuel shortages** in the first two years of the project delayed or prevented irrigation and likely reduced yields. IRC teams are currently prototyping more energy efficient approaches to irrigation suitable for project sites.
- Hyperinflation** is shifting farmer needs around input package support and **willingness to donate**. In response, IRC teams have recalibrated the input package based on current market prices, will conduct further behavioral testing this year to identify the ideal input package going forward and have reduced the required donation from 15% to 10% of yield.

Overall, the FSSN in northeast Syria is demonstrating significant early potential in promoting the adoption of climate-adapted seeds and practices within target communities and empowering women's participation. However, addressing the identified challenges and maintaining flexibility will be critical to navigating the uncertainties of the evolving security context.

DEEP DIVE: PAKISTAN



Highlights: In Pakistan, we learned...

- In contexts where the private sector has a strong presence, integrate the development of entrepreneurial skills into trainings and formalize linkages between farmers and premium markets to ensure off-takers of surplus quality seeds.
- In contexts where there is a strong tradition and comparative advantage in the cultivation of non-cash or non-staple crops, these should be integrated into project delivery and not replaced by priority FSSN value chains.
- In contexts where social norms hinder female participation, project delivery should prioritize gender-sensitive adaptations, such as recruiting women farmers through male relatives and prioritizing the hiring of female field officers.

ROOT CAUSE 2: Supply-Side Challenges in Seed Quality and Availability

In Khyber Pakhtunkhwa (KP) and Sindh provinces, political instability (2A) and governance gaps have hindered effective agriculture policies, rendering farming communities especially vulnerable. Ongoing security threats—particularly in KP province—disrupt farming activities, causing displacement and hampering agricultural productivity. Additionally, national and regional governments lack the necessary resources, including human, financial and logistical, to produce substantial quantities of high-quality seeds and distribute them effectively through market systems or other means.

Socioeconomic disparities and poverty (2B) exacerbate seed security challenges. Farmers often source lower-quality (typically more affordable) seeds from the local market or rely on informal seed exchange systems due to limited financial resources.

Environmental and climatic stressors (2C) also pose a substantial threat to seed quality and availability in both provinces. Pakistan is one of the 10 countries most affected by climate change; increasingly erratic weather



Mahin stands in the thriving field grown from the high-quality seeds he received.

patterns, including rising temperatures, droughts and floods, are disrupting planting seasons and damaging crops, leading to uncertain harvests. Both KP and Sindh were severely impacted by the historic 2022 floods in Pakistan, which affected 33 million people (15% of the population) and caused \$30 billion USD in economic losses by devastating crops, livestock, forests and infrastructure (GoP, 2022). The government estimates that 6.5 million acres of crops were destroyed, and farmers lost critical agricultural inputs, including seeds (Baigal, 2023). Diminishing water resources and inefficient technologies also strain irrigation systems, leaving fields parched and hindering crop growth. These challenges disproportionately impact smallholder farmers, who lack the resources and knowledge to take adaptive actions.

ROOT CAUSE 3: Demand-Side Challenges in Accessing Seed

On the demand-side, ongoing security threats (3A)—particularly in KP province—pose a challenge to seed security, as they disrupt farming activities, causing displacement and hampering agricultural productivity. These dynamics significantly affect farmers' ability to access quality seeds and other essential agricultural inputs.


Farmers in KP and Sindh provinces face significant financial barriers (3B), limiting their access to quality seeds. When financial support is available for farmers, it is often difficult to access or financially burdensome. These financial pressures also disproportionately impact smallholder farmers, rendering them especially reliant on lower-quality seeds from the local market or informal seed exchange systems. Moreover, climate-induced disasters—including floods, drought and heat—result in substantial losses in the agricultural sector, further limiting farmer incomes and therefore their financial ability to purchase quality seeds.

Social and political norms (3C) further constrain access to seeds, particularly for female farmers. Patriarchal structures in KP and Sindh provinces restrict women's participation in the agricultural sector. Female farmers encounter significant hurdles to accessing quality seeds, training, information, technology and financial resources, leaving them heavily dependent on informal seed exchange systems. Women in these provinces also typically lack landholding rights and related decision-making capacities, which are crucial for adapting to the effects of climate change. As a result, female farmers are especially vulnerable to environmental and economic pressures, further limiting their ability to secure and utilize high-quality seeds.



In Sindh province, Pakistan, weather events have become more extreme due to climate change. In the past few years, heavy flooding has destroyed livelihoods, displaced communities and increased food insecurity.

FSSN in Pakistan

 **Target Locations:** Khyber Pakhtunkhwa (KP), Sindh



Across Pakistan there are currently 1,740,000 people in need of food and agricultural assistance, including 1,430,000 people within the FSSN's current target locations in KP and Sindh. IRC's innovation, technical and country teams determined that these locations are ideal to design and test the FSSN approach for a variety of reasons: 1) heightened vulnerability to climate disaster, including severe droughts and floods (as experienced in 2010, 2014 and 2022); 2) the high degree of diversity within the agro-ecological zones of both provinces, which increases the applicability of findings to other parts of the country and sets the project up for scale; 3)

established farmer engagement and IRC presence; and 4) a substantial majority (up to 80%) of the population in both regions relies on agriculture for their primary livelihood.

Given that Pakistan has two main growing seasons, **Rabi** (winter) and **Kharif** (summer), a multi-season approach has been selected that integrates multiple value chains across each year of implementation to ensure maximal agricultural productivity for participating farms. **Wheat** (a Rabi crop in both KP and Sindh), **maize** and **mungbean** (Kharif crops in Sindh and KP, respectively) were selected as target value chains due to their status as major staple and cash crops; all play pivotal roles in food security and livelihoods in Pakistan, but farmers struggle to obtain climate-resilient seed varieties for these crops. We estimate that, over five years, we will partner with approximately 900 farms in seed multiplication, where participating farmers will produce sufficient seed to reach an additional 84,000 people within farming households and through market interactions. Ultimately, we estimate the FSSN's localized seed multiplication approach has the potential to address approximately **6% of need in KP and Sindh**, produce nearly **\$5.7M USD more in profits** for farmers participating directly in the project and have up to **42.4 times the reach and impact** of traditional seed aid. The projected reach of 6% of need is lower in Pakistan than in other contexts due to the higher population in

Target Value Chain		Wheat	Maize	Mung Bean
Direct Reach	Number of farms participating directly in the project over 5 years	900	540	471
Indirect Reach	Number of people reached with quality seed within farming households and through market interactions over 5 years	40,389	33,666	9,822
Profits	Additional income produced for seed multipliers over 5 years	USD\$1.8M	USD\$3.5M	USD\$392K
Multiplier Effect	Average amount of hectares that can be planted with seed produced from just 1 hectare over 5 years	42.4x	36.5x	12.4x

6% OF NEED OVER 5 YEARS



need and higher overall population. In future phases of this project, technical and innovation teams will explore alternative pathways to scale specifically for Pakistan and the reach implications therein, given the comparatively larger population and comparatively more robust enabling environment in terms of potential partners.

To achieve the projected reach and impact, IRC's innovation, technical and country teams conducted interviews and focus group discussions using user-centered and behaviorally-informed tools to understand how to adapt

the FSSN's key features for KP and Sindh (Figure 9). It is important to note that the FSSN has not yet been implemented in Pakistan. All adaptations described herein are based on design research, ideation and prototyping with farmers and stakeholders in target locations. And, while these adaptations have thus far demonstrated high potential, all require further testing. For example, due to the higher magnitude of need and limited reach of the FSSN model in Pakistan as proposed, future testing would need to include developing scaling pathways that would enable more rapid scale-up.



FIGURE 9: FSSN CONTEXTUAL ADAPTATIONS IN PAKISTAN

CATEGORY	ADAPTATION	RATIONALE
Model Organization	Seed multiplication and testing across three value chains and two seasons allows farmers to test and produce seeds that are well-suited to the local context and growing calendars.	The farming calendar in Pakistan has two main seasons, Rabi (winter) and Kharif (summer), during which different crops are cultivated. To ensure participating farmers are maximizing production and that the project can operate continuously, we are testing and multiplying seed varieties across multiple value chains which are relevant to each season and target province.
	Intercropping with horticulture in Swat, KP to diversify livelihoods and increase availability and quality of seeds in local communities.	Swat, in KP is a major producer and exporter of fruits and vegetables in Pakistan. Farmers in Swat expressed interest in intercropping staple crops with fruit trees to diversify income and strengthen climate resilience practices without sacrificing their comparative advantage in horticulture.
	Facilitation of the adoption of hermetic storage bags through demonstrations, training and financial support (potentially bulk pricing, landlord support for tenant farmers or loans).	Farmers in both KP and Sindh rely on insufficient seed storage methods like plastic bags, clay mounds and steel containers, which are prone to pests and water damage and require frequent treatment. While farmers are aware of these limitations, financial constraints and preference for traditional approaches hinder their ability to adopt improved methods. During prototyping, farmers suggested that demonstrations, training and financial support would be crucial to facilitate adoption, especially where traditional practices are deeply rooted.
	Training in entrepreneurial skills is included in the curriculum and farmers are formally linked with premium markets to off-take seed.	During testing in Pakistan, farmers expressed concern about their ability to sell off their surplus seed produced through multiplication, as it is priced higher than grain, given its comparative quality. To address this, the FSSN will ensure that farmers are equipped with entrepreneurial skills and also develop linkages between participating farmers and private sector actors.

Collaboration



<p>Federal Seed Certification and Registration Department (FSC&RD) and governmental seed councils are proposed partners for quality control and regulation.</p>	<p>Pakistan's robust institutional framework for seed certification and registration ensures quality control and availability of certified seeds in both public and private sectors. By collaborating with breeders, ministries, and provinces, these institutions regulate seed variety movement and support national seed policies. Leveraging this framework throughout the project will help maintain high standards and ensure access to quality seeds.</p>
<p>Research and academic institutions are proposed to support in testing, development and provision of quality seeds.</p>	<p>Academic and research institutions in KP and Sindh possess demo plots as well as expertise in quality seed production and technical support. Partnering with them will strengthen capacity and provide ongoing support for seed testers and multipliers.</p>
<p>A government extension department is proposed to send targeted messages to farmers, serve as the first source of information about the FSSN and implement Farmer Field School (FFS) trainings.</p>	<p>Provincial agricultural extension departments can provide their farmer databases, support capacity building, and offer technical assistance in seed production and multiplication, while facilitating coordination at regional and district levels.</p>
<p>Local NGOs and CSOs are proposed to ensure that farmers see and understand support messages, offer technical support for input distribution and extension department training design and follow-up on FSSN implementation. They also are proposed to serve as the entry point to farmer engagement and support social mobilization into the FSSN.</p>	<p>Partnering with trusted local organizations deeply rooted in target communities serves as an effective and efficient approach to project implementation, particularly in remote areas of KP and Sindh where IRC does not have field offices. These organizations bring decades of agricultural expertise, established networks with farmers, researchers and the private sector as well as strong credibility within the community, which facilitates smoother social mobilization and behavior change. This strategy aligns with IRC's commitment to promoting localization, reduces operational costs, minimizes field movement (lowering the project's carbon footprint), and ensures sustainable, inclusive, and cost-effective project delivery.</p>
<p>A Farmer Service Center (FSC) is proposed to register farmers as shareholders of the FSC, negotiate subsidized rates of inputs and provide access to the seed market for farmers to facilitate trade.</p>	<p>FSCs, integral to Pakistan's agricultural framework, support cooperative and collective farming at the district level and should be leveraged as key partners in the network to ensure smoother integration of FSSN participants into Pakistan's broader agricultural value chain.</p>
<p>Agro-dealers are proposed as a source for quality seed for project participants, with participating seed multipliers purchasing directly on the market from licensed sources.</p>	<p>FSSN could disrupt agro-dealer markets by bypassing them in seed sales and input distribution, creating potential risks like fraud. To mitigate this, agro-dealers are onboarded early and offered partnership opportunities for those who complete training. Trained agro-dealers, who learn seed quality standards from FFS and receive FSC&RD licensing, will ensure farmers buy from those following established procedures.</p>
<p>Private sector actors are proposed to take surplus multiplied seed at the end of each season.</p>	<p>Unlike other locations where the FSSN is being designed and tested, there is a thriving private sector in Pakistan that provides greater existing market opportunities to farmers. The FSSN will therefore formally develop linkages between participating farmers and the private sector, ensuring farmers have access to premium markets at stable prices while private sector partners secure a reliable supply of quality seed.</p>

<p>Mitigating Identity-based Barriers</p> 	<p>Landlords facilitate the participation of tenant farmers by, for example, relaying phone messages regarding recruitment and other program information, attending trainings with tenant farmers and helping to facilitate input distribution and exchange.</p>	<p>In Sindh in particular, there is a significant proportion of tenant farmers within the target population for whom landlords make all decisions, including what is to be farmed, who farms, and which inputs are used. Additionally, tenant farmers often lack access to phones, while most landlords in our target area do have phone access. Involving landlords at every step of the tenant farmer journey is therefore necessary to both ensure tenant farmer access to the project and overcome barriers like technology access, illiteracy and innumeracy.</p>
	<p>Female farmers are recruited through messaging to male relatives, via farmer testimonials and in-person via female field officers and trusted female community leaders.</p>	<p>Social norms in our target areas often limit women's participation due to communication barriers with unrelated men. Recruiting women farmers through these alternative channels fosters trust and ensures social and physical safety.</p>
	<p>Female field officers facilitate visits to the farms of female participants.</p>	<p>Social norms in our target areas often limit women's participation due to communication barriers with unrelated men, therefore female field officers are essential to create an acceptable and comfortable environment for women farmers to express themselves openly.</p>
	<p>Partner with community-based organizations (CBOs) to train and empower women in Swat, KP, to lead fruit tree nurseries and produce high-quality saplings for intercropping with staple crops.</p>	<p>In Swat, horticulture is a key agricultural practice for women in particular, and CBOs that support this practice are currently heavily reliant on NGOs for their operation. Through fruit tree nurseries, the FSSN aims to promote expanded market opportunities for both CBOs and women (therefore increasing the independence of both) while improving sapling quality and promoting climate resilience for the broader farming community.</p>
<p>Communications</p> 	<p>Regular field visits from an agricultural expert.</p>	<p>Regular field visits provide timely communication of seed quality findings, climate-smart practices and action reminders while ensuring that farmers receive support without requiring literacy, numeracy or technology access.</p>
	<p>WhatsApp messages and groups to communicate critical information to farmers.</p>	<p>WhatsApp is the preferred platform for male farmers in both provinces. Farmer groups in KP already have active WhatsApp groups and have indicated their preference to continue using these or similar groups and receive messages collectively. By leveraging platforms that the target communities already actively use, we are able to ensure smoother communication with participating farmers in the target areas.</p>
	<p>Community-centered framing (instead of individual-focused framing) for all program messaging, emphasizing benefits for the entire community rather than just individuals.</p>	<p>This approach ensures that messages are shared with community members who don't have phones, especially women. In Sindh, in particular, this concept has been validated by farmers who expressed that their core values include diversity, inclusivity and a strong sense of community.</p>

“We are poor, we have a lot of responsibilities, taking care of my children as a widow. A program like this we will join, as long as we have female support and you involve our men.”

— Female Farmer, Prototyping, Pakistan



Guddi, 35, and her husband work as farmers in their village in Sindh, Pakistan. Photo: Khaula Jamil for the DEC

Farmer Perspectives: Successes & Challenges

During the prototyping phase, which concluded in October 2024, we conducted several user-centered research activities to assess the desirability of our solutions as well as potential challenges, the findings of which can be leveraged to plan for future cycles.



Key Successes

According to farmers in target locations

- All participants showed a **strong interest** in learning about the FSSN, driven by their interest in accessing training and receiving free inputs, as well as by the opportunity to share seeds after multiplication;
- Farmers were particularly excited about the **gender-sensitive** elements of the program aimed at encouraging women farmers' participation;
- While not all farmers fully understood the concept of climate-smart agriculture, all were **acutely aware** of climate change's impact on their crops, recognizing shifts in seasons and the declining effectiveness of their traditional agricultural practices.

“Summers are longer, springs have become shorter and in some years have entirely disappeared, and the winter is shorter, and this is impacting our produce.”

– Male Farmer, Prototyping, Pakistan



Key Challenges

For continued research and iteration

- Farmers have expressed **mistrust** in both strangers and in seed programs, particularly in areas where they have had negative experiences with such programs in the past;
- The majority of farmers are **risk-averse**, having expressed a need for clear proof that the yield will be worth any commitment made;
- **Illiteracy** and **lack of digital connectivity** remain key barriers in the target areas, substantially limiting the ability of many farmers to receive critical information in a timely fashion (e.g., written or digital communications).

Farmers have expressed enthusiasm about the FSSN and its potential adaptations in the target area, especially as they recognize the growing challenges of sustaining livelihoods and food security in a changing climate. However, deeper engagement with farmers and other stakeholders is essential to address behavioral barriers such as mistrust and risk aversion, alongside overcoming logistical challenges that may hinder access to information and participation in the program.

DEEP DIVE: NIGER



Highlights: In Niger, we learned...

- In contexts where communities are mistrustful of NGOs, adopting a participatory approach—such as establishing community-led processes for evidence generation and aligning with crowdsourced preferences—helps build trust and promotes acceptance of new seeds.
- In remote contexts where markets are hard to access and where women are largely confined to household roles, creating local community spaces specifically for women, such as seed boutiques, can foster access, safety and autonomy while promoting new women role models within the community.
- In contexts with high illiteracy and innumeracy rates, pre-recorded audio-visual curricula and printed reference materials tailored for illiterate and innumerate farmers enhance access to critical information for all farmers, regardless of their formal education level.

ROOT CAUSE 2: Supply-Side Challenges in Seed Quality and Availability

Conflict and political instability (2A) have significantly disrupted Niger's seed system, undermining the availability of high-quality seeds. Since gaining independence from French colonization in 1960, Niger has faced recurrent coups, including the most recent in July 2023, which has exacerbated political instability and security concerns (Tangaza & Chothia, 2023; BBC, 2023). Violence from Armed Opposition Groups (AOGs), fallout from conflicts in neighboring countries such as Libya, Mali and Burkina Faso, and terrorist insurgencies have destabilized regions like Diffa, a hub of agricultural activity. Farmers in Diffa, many of whom are smallholders with limited resources, have been further strained by these disruptions. As a result, insecurity has created a fragile environment for agricultural production, limiting farmers' ability to source, produce and multiply high-quality seeds. Additionally, the ongoing coup has impeded the delivery of humanitarian aid, which many farmers rely on for seed access, thereby compounding challenges within the seed system.



After violence broke out near their home in Niger, Kelou Kiari, 25, and her family were forced to seek safety. In Awaridi refugee camp, the IRC provided Kelou's son with treatment for acute malnutrition, putting him on the path to recovery.

Technological and financial barriers (2B) also contribute to the limited availability of quality seeds in Niger. Over 80% of the population relies on agriculture for their livelihoods, but the sector suffers from a lack of resources, including modern farming equipment and climate-smart agricultural practices. Irrigation infrastructure is minimal, particularly in the Diffa region, forcing farmers to depend on unreliable rainfall to grow crops. Furthermore, the country's seed supply chain is poorly structured, with minimal seed quality supply and control, limited seed multiplication and significant post-harvest losses. As a result, many farmers depend on lower-quality seeds available in local markets or provided through limited NGO assistance, which undermines the resilience of the seed system and reduces agricultural productivity. In addition, there has been a rise of private sector seed companies operating in service of the relief seed market created by NGOs, further flooding the market with seed that is maladapted to local preferences and conditions and lacking in regular oversight and quality controls. This rise in private sector seed companies catering to NGOs has led to market distortions in Niger, discouraging the development of local seed production by flooding the market with free, low-quality and maladapted seeds distributed by humanitarian agencies.

Environmental stressors (2C) further exacerbate the challenges facing Niger's seed system. Erratic hydrological patterns, frequent droughts, land degradation and desertification intensify the vulnerabilities of smallholder farmers. As climate conditions worsen, agricultural production becomes increasingly unpredictable, further straining the already fragile seed system. These combined factors—conflict, financial limitations, and environmental

stress—create a complex crisis that significantly limits the availability of high-quality seeds in Niger, resulting in diminishing agricultural productivity and, in some communities, driving famine.

ROOT CAUSE 3: Demand-Side Challenges in Accessing Seed


Conflict and instability (3A) in Niger also create significant barriers to farmers' ability to access seeds. Ongoing violence and insecurity, particularly in the Diffa region, have disrupted agricultural livelihoods by displacing farming populations and destabilizing local markets. These disruptions make it challenging for farmers to access seeds reliably, while the lack of security in the region deters investments in infrastructure and market systems that could otherwise support seed access. The July 2023 coup has caused substantial uncertainty in the country, including the introduction of sanctions, border closures and limitations imposed on financing and mobility to and within the country, further undermining the ability of humanitarian actors to deliver resources—including seed aid—effectively.

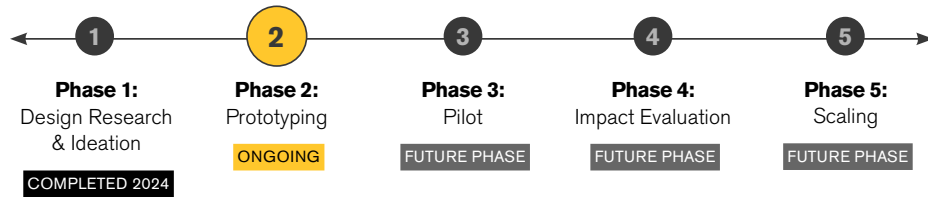
Financial constraints (3B) also severely limit seed access, forcing smallholder farmers with minimal financial resources to rely on affordable but lower-quality seeds. Finally, social and cultural norms (3C) add another layer of complexity to seed access, disproportionately affecting female farmers. Women face substantial gendered barriers to seed security, such as a lack of access to high-quality land and farming equipment and limited decision-making ability. Women also carry a disproportionate burden of domestic responsibilities, which further limits their involvement in agricultural value chains.



In Niger, the IRC is supporting families in Awaridi camp by providing treatment for acute malnutrition and distributing essential food items.

FSSN in Niger

 Target Location: Diffa



Across Niger there are approximately 815,000 people in need of food and agricultural assistance, including over 35,000 people within the FSSN's current target location of Diffa. While the number of people in need within Diffa represents a small proportion of overall need across Niger, IRC's innovation, technical and country teams determined that it is the ideal location to design and test the FSSN approach for a variety of reasons: 1) the concentration of co-occurring conflict and climate crisis; 2) the potential for impact given agriculture is the primary livelihood activity; 3) the IRC's access and contextual expertise due to existing programming; and 4) the high degree of diversity within Diffa's agro-ecological zone, which increases the applicability of findings to other parts of Niger and sets the project up for scale.

Additionally, **millet** and **sesame** were selected as target value chains due to their status as major staple and cash crops; they play pivotal roles in food security and livelihoods in Niger, but farmers are currently unable to obtain climate-resilient seed varieties for these crops. Over five years, we estimate that we will partner with 540 farms in seed multiplication across both value chains, where participating farmers will produce sufficient seed to reach an additional 19,000 people within farming households and through market interactions. Ultimately, we estimate the FSSN's localized seed multiplication approach has the potential to address approximately **57% of need in Diffa**, produce nearly **\$1.6M USD more in profits** for farmers participating directly in the project and have up to **9.87 times the reach and impact** of traditional seed aid.

To achieve the projected reach and impact, IRC's innovation, technical and country teams conducted interviews and focus group discussions using user-centered and behaviorally-informed tools to understand how to adapt the FSSN's key features for the Diffa context (Figure 10). It is important to note that the FSSN has not yet been implemented in Diffa. All adaptations described herein are based on design research and ideation with farmers and stakeholders in target locations, and, while these adaptations have thus far demonstrated high potential, all require further prototyping and testing.

Target Value Chains		Millet	Sesame
Direct Reach	Number of farms participating directly in the project over 5 years	540	540
Indirect Reach	Number of people reached with quality seed within farming households and through market interactions over 5 years	2,461	16,870
Profits	Additional income produced for seed multipliers over 5 years	USD\$573K	USD\$1.15M
Multiplier Effect	Average amount of hectares that can be planted with seed produced from just 1 hectare over 5 years	5.13x	9.87x

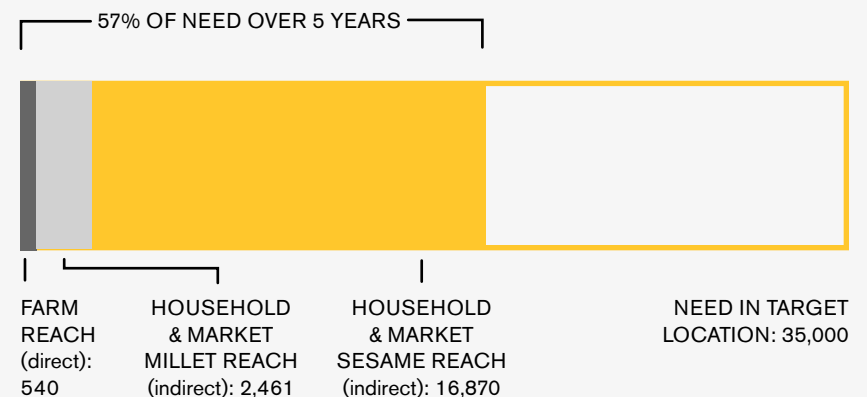








FIGURE 10: FSSN CONTEXTUAL ADAPTATIONS IN NIGER

FEATURE	CONTEXTUAL ADAPTATION	RATIONALE
Model Organization	<p>Participatory approach to seed variety selection for both testing and multiplication involving crowdsourcing preferences of farmers across target villages.</p>	<p>In Diffa, farmers often reject improved seeds due to differences in color, shape or taste, coupled with mistrust of NGOs. A participatory approach, where the community generates and shares evidence, helps overcome these barriers by building trust and fostering acceptance of new seeds.</p>
	<p>As the project scales, small groups of farmers across target villages are organized into local seed cooperatives. The cooperatives collaboratively select seeds to multiply based on local farmer needs and preferences and train farmers to provide light-touch extension support to other farmers across their communities.</p>	<p>In Niger, where formal agricultural systems are underdeveloped, farmer-led cooperatives have successfully offered opportunities to pool resources, enhance market access, improve bargaining power and access financial services, thereby offering a safety net and strengthening collective climate resilience. This model has not yet been tested in Diffa specifically, though it does have the potential to respond to the unique gaps and challenges faced by agricultural communities therein, including limited infrastructure, vulnerability to climate shocks and lack of a seed system.</p>
Collaboration 	<p>Research institutions are proposed to support the selection and provision of seeds to be used in testing and multiplication by triangulating quality indicators with the needs and preferences of communities.</p>	<p>Local market actors lack training to assess seed quality, often leading to ill-informed recommendations to farmers. When quality seeds are unavailable, agro-dealers source inconsistent seeds from Nigeria, which may not suit local conditions. Partnering with research institutions can address these gaps by providing reliable information on seed quality and suitability while also supplying high-quality seeds to strengthen the local seed system.</p>
	<p>Seed inspectors are proposed to verify the quality of seeds used in testing and multiplication and train seed multipliers on seed certification standards and monitoring.</p>	<p>Seed quality control in Niger is limited, and farmers often face barriers to obtaining certification due to lengthy processes and insufficient government support. Collaborating with seed inspectors has the potential to improve certification rates and quality control in Diffa.</p>
	<p>Agro-dealers are proposed to off-take and market multiplied seeds, guaranteeing pricing and reducing the risk for participating farmers.</p>	<p>Financial constraints and limited access to information make Nigerien farmers risk-averse to experimentation. Ensuring fair pricing, information about quality seed varieties and a clear market pathway reduce risk and boost participation in seed multiplication.</p>
Mitigating Identity-based Barriers 	<p>Experienced women farmers operate seed boutiques as agricultural knowledge centers, enhancing women farmers' access to information and support, irrespective of their digital connectivity, literacy or numeracy levels and with the aim of building long-term multi-generational capacity.</p>	<p>In Niger, cultural norms often confine women to household roles, limiting their access to markets, resources, land and decision-making in agriculture. Local seed boutiques operated by women have the potential to address these barriers by providing seeds and inputs close to home, reducing the need for travel, fostering autonomy and promoting the development of new women role models within the community. This empowers women to participate in decision-making, enhances their influence and supports their agricultural involvement.</p>

Farmer Leadership Pathways 	<p>A “trainer-of-trainers” (ToT) model will be implemented by which selected farmers become crop-specific experts and guide other farmers through multiplication.</p>	<p>Experienced leader farmers within the community can provide timely agricultural advice, reducing reliance on IRC extension support, and assist in the early diagnosis of production challenges by alerting extension officers. This approach addresses the shortage of extension services in Diffa while fostering trusted local expertise in remote or hard-to-reach areas.</p>
	<p>Experienced women farmers train younger women through an apprenticeship model within the seed boutiques.</p>	<p>Empowering women farmers to mentor younger women through an apprenticeship model, with support from local seed boutiques as knowledge hubs, helps overcome resource barriers and societal norms that limit women’s entry into agriculture while providing consistent support and inspiring greater female participation in agriculture in Diffa.</p>
Celebrating Successes 	<p>A community event showcases seed testing results and celebrates multipliers’ achievements, raising farmer awareness about the benefits of the project and incentivizing participation in future cycles.</p>	<p>End-of-season events acknowledge and reward farmers as experts, enhancing the communities’ trust in both their abilities and the project itself. Moreover, showcasing successful outcomes triggers motivation among other farmers to adopt best practices, leveraging the behavioral concept of “seeing is believing,” which farmers in Diffa noted during interviews is highly influential in their communities’ decision-making and in mitigating risk aversion. Finally, celebratory events create aspiration by elevating the status of successful participants and trigger wider adoption of improved seeds and practices across the community.</p>
Sharing Findings 	<p>Printed reference materials are distributed at communal points (such as women-led seed boutiques) that provide guidance on how to identify quality seeds based on results from the seed testing, ensuring relevant information reaches end users irrespective of degree of digital connectivity or mobile access.</p>	<p>Our in-country research highlighted a strong sense of community but also revealed cultural norms that isolate women, limiting their empowerment and access to livelihoods. Displaying results in seed boutiques helps women farmers identify improved varieties, addressing knowledge gaps and resource access challenges in the target area.</p> <p>High illiteracy rates and limited smartphone access, particularly in semi-urban areas like Diffa, further compound these challenges. Distribution of non-digital reference materials enhances access to essential information for all farmers.</p>
Communications 	<p>Weather alerts and critical action reminders are communicated to farmers via SMS or radio, for those with access to these devices. Communications are designed to be adaptable to farmers’ degree of digital connectivity.</p>	<p>SMS and radio ensure that alerts reach as many farmers as possible. This approach is particularly relevant in Diffa, where limited internet access among farming households makes alternative platforms such as WhatsApp impractical.</p>
	<p>Weather alerts and critical action reminders are communicated directly through the seed boutiques for those without mobile connectivity.</p>	<p>Delivering agricultural information in person ensures greater inclusivity of farmers in Niger—particularly women, who are less likely to own or have access to mobile phones.</p>
	<p>Pre-recorded audio-visual curriculum is used for farmer training, developed to ensure access for and inclusion of non-literate and non-numerate farmers and independent of internet access.</p>	<p>In Diffa, illiteracy and innumeracy are significant barriers to accessing agricultural knowledge and training.</p>

Farmer Perspectives: Successes & Challenges

The FSSN is launching its prototyping phase in Niger this year. During the design research and ideation phase, we conducted several user-centered research activities with local farmers and seed system stakeholders to assess the desirability of our solutions as well as potential challenges, the findings of which are being leveraged to plan for future phases.



Key Successes

According to farmers in target locations

- **All proposed solutions** were rated “Highly Desirable” by farmers (scoring an 8/10 or above) in user-centered research activities;
- Farmers are **eager to participate** in seed testing and multiplication efforts, driven by the need for quality adapted seeds and the chance to learn new agricultural practices that will enhance both subsistence and cash crop yields, ultimately improving household food security and income;
- Farmers, particularly women, expressed **strong enthusiasm** for the women-led seed boutiques, believing the initiative could not only inspire more women to enter agriculture but also improve seed and input access for the entire community.

“Yes, the farmers will be open to learning because our old methods are archaic and do not allow us to have a good yield in the face of climate change.”

— Male Farmer, Idea Phase, Niger



Key Challenges

For continued research and iteration

- Farmers expressed concerns about the **variability of seed testing** results, specifically noting uncertainty of whether farmers would consistently follow program guidelines;
- The majority of farmers expressed a preference for testing **only millet seed varieties**, although sesame is likely to produce greater income and seed quantity gains. Further research is required to gain deeper insights into local preferences;
- The **optimal location of seed boutiques** to ensure the maximum number of farmers have safe and consistent access requires further research and analysis.

While farmers in the target communities have shown early enthusiasm for the FSSN, further research during the prototyping phase is essential to ensure that the solutions are both impactful and tailored to farmer behaviors, preferences and needs.

DEEP DIVE: SOUTH SUDAN

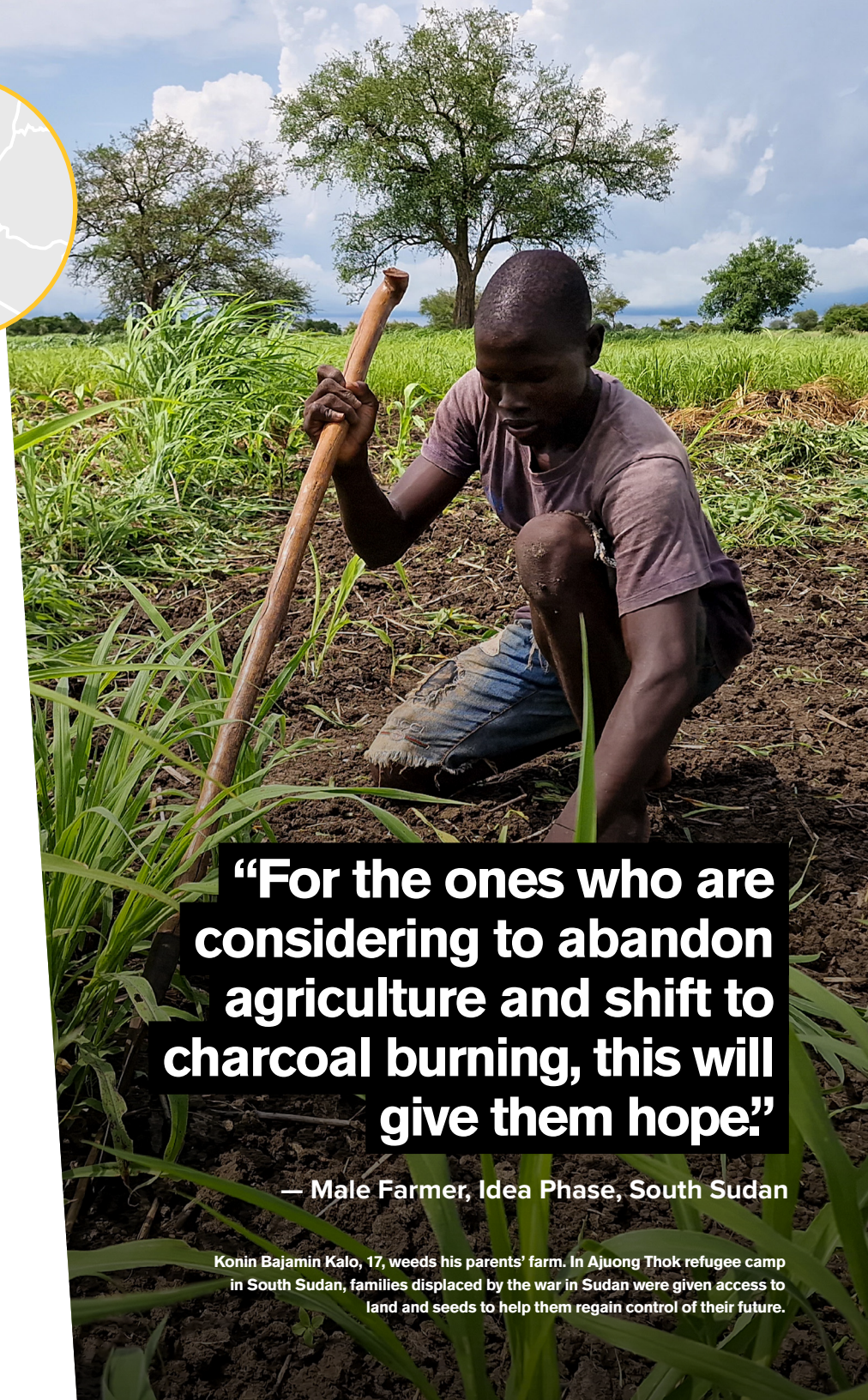


Highlights: In South Sudan, we learned...

- In contexts marked by over-reliance on NGO seed aid, community-led seed banks that conserve and catalog indigenous seeds for further multiplication are a promising avenue for shifting ownership to communities and laying the foundation for the establishment of resilient local seed systems.
- In contexts characterized by high rates of food insecurity and child malnutrition, schools and health centers can serve as additional seed distribution points, ensuring the rapid and widespread distribution of fortified, nutritious seed throughout the community.
- In contexts where certain crops are stigmatized (e.g., labeled as “poor man’s crops”), posters and program advertisements may offer an effective non-digital way to communicate information that drives long-term behavioral change, and fosters a cultural shift that helps destigmatize the cultivation of nutritious crops.

ROOT CAUSE 2: Supply-Side Challenges in Seed Quality and Availability

South Sudan’s agricultural sector, which sustains over 95% of households through subsistence farming, faces significant challenges in ensuring the quality and availability of seeds. Conflict and political instability (2A) have significantly disrupted agricultural activities, reducing the capacity for seed production and quality control. Decades of civil war and post-independence crises have disrupted agricultural production, weakened local seed systems and led to the extinction of indigenous staple crop genetic resources. High rates of displacement have further exacerbated these issues, resulting in labor shortages, limited access to land and, ultimately, reduced agricultural outputs. Efforts by the Government of South Sudan (GoSS) and development partners to enhance agricultural systems and foster local seed multiplication have been substantial, but the country’s farming communities remain heavily reliant on humanitarian seed aid, with over 10,000 tons distributed annually. In addition, there is a significant dependency on



“For the ones who are considering to abandon agriculture and shift to charcoal burning, this will give them hope.”

— Male Farmer, Idea Phase, South Sudan

Konin Bajamin Kalo, 17, weeds his parents’ farm. In Ajuong Thok refugee camp in South Sudan, families displaced by the war in Sudan were given access to land and seeds to help them regain control of their future.



Nyapar Kujiek carries a watering can through her garden. Through the IRC women's center in Knaynhial, South Sudan, she received cash assistance, which has allowed her to grow food for her family and generate income.

low-quality imported seeds from neighboring countries, which are often cheaper than those that could be produced locally. This reliance—on both aid and imports—not only undermines the development of in-country seed production, it also perpetuates the cycle of dependency. Inadequate infrastructure and ongoing insecurity, particularly in regions like Unity State, exacerbate the challenge by limiting access to markets and making it difficult to transport agricultural products, which further impedes the availability of quality seeds. Combined, these factors significantly deteriorate the security and resilience of South Sudan's seed system, especially in the most vulnerable regions.

Poverty (2B) further exacerbates the challenges facing the agricultural sector and the seed system. Farmers often lack the financial means to purchase high-quality seeds or invest in improved agricultural inputs and technologies. This is compounded by an underdeveloped local seed market, which offers limited options and often fails to meet the needs of farmers. Poverty also weakens the broader agricultural system, as technological inputs such as irrigation infrastructure and climate-smart farming tools remain inaccessible for most. Finally, limited access to information and communication technologies hinders farmers' ability to obtain timely weather forecasts and other critical agricultural information.

Environmental stress (2C) also plays a substantial role in the diminished quality and availability of seeds. South Sudan's climate is characterized by distinct wet and dry seasons, with heavy rains during the wet season leading to flooding, especially in Unity State (Sabr et al, 2023). Flooding and other climate-related challenges, such as rising temperatures and drought risks, continue to disrupt agricultural cycles in South Sudan. These environmental factors not only

damage crops but also exacerbate challenges in seed production and availability, further reducing the access of South Sudanese farmers to high-quality, climate-resilient seeds. The lack of infrastructure, such as irrigation systems and modern farming technologies, compounds these challenges by leaving farmers dependent on rainfall and low-tech agricultural practices, making them highly vulnerable to environmental shocks. For some farmers, these challenges have been so severe that they have not been able to generate any yields in three years.

ROOT CAUSE 3: Demand-Side Challenges in Accessing Seed

The accessibility of seeds in South Sudan is severely constrained by several overlapping factors, including conflict, financial barriers and social norms. Ongoing conflict and instability (3A) have disrupted agricultural production and seed distribution, particularly in conflict-affected areas. Insecurity makes it difficult for farmers to access both local seed markets and international aid, while the breakdown of infrastructure further limits farmers' ability to obtain the seeds they need to sustain production. The government's inability to provide adequate support, coupled with the challenges posed by humanitarian aid dependency, underscores the difficulty in ensuring that farmers have access to high-quality seeds during critical planting seasons.

Financial constraints (3B) are a significant barrier to seed access in South Sudan. Many farmers, especially smallholders and displaced persons, lack the resources to purchase high-quality seeds or invest in climate-smart technologies. Limited access to financial services and credit mechanisms forces farmers to rely on lower-quality seeds, which yield less and are more vulnerable to environmental stress. This reliance on poor-quality seeds contributes to low productivity and food insecurity, entrenching poverty in agricultural communities.

Finally, social and political norms (3C) in some regions of South Sudan exacerbate the challenges faced by certain groups, particularly women, youth and farmers with disabilities. In many cases, these groups face additional barriers in accessing seeds, including restrictions on land ownership, limited access to farming equipment and agricultural knowledge, and the disproportionate burden of domestic responsibilities. In some regions, prevailing gender norms limit women's participation in agricultural production and decision-making, including their access to land and seeds. As a result, these farmers are not only excluded from accessing vital agricultural resources, they also remain vulnerable to the compounded effects of conflict, economic hardship and environmental stress.


“This is very excellent because different quantity and quality of seeds will be available to us. With this, nobody can come and tell us what we should cultivate. We can tell them that we already have seeds and know how to cultivate them properly.”

— Female Farmer, Idea Phase, South Sudan



A farmer, who is a refugee, was given access to land and seeds to grow crops to sustain his livelihood in South Sudan.

FSSN in South Sudan

 Target Locations: Northern Bahr el-Ghazal (NBG), Unity

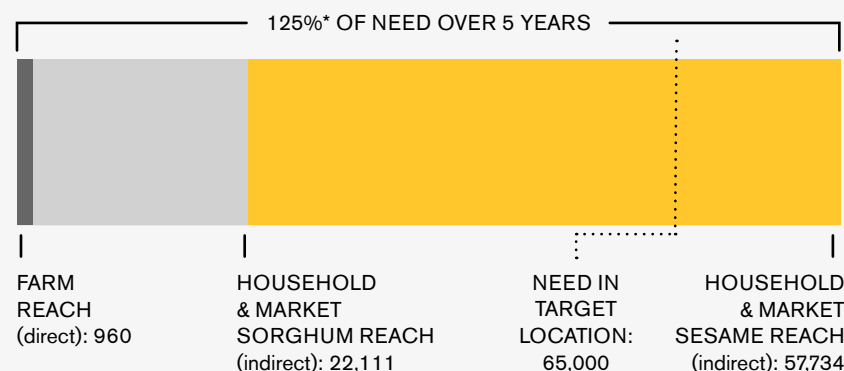


Across South Sudan, there are 1,880,000 people in need of food and agricultural assistance, including approximately 65,000 people within the FSSN's current target locations across Unity and Northern Bahr el-Ghazal (NBG) states. IRC's innovation, technical and country teams determined that three counties in particular (Ajuonthok and Bentiu in Unity state and Aweil in NBG state) would be ideal locations to design and test the FSSN approach for a variety of reasons, including: 1) substantial presence of returnees,

internally displaced people (IDPs) and refugees; 2) frequent occurrence of floods, droughts, conflict and illness; 3) comparatively high levels of food insecurity with, on average, 50% or more of the population reaching level 3 or above on food insecurity classifications; and 4) IRC's existing access and operation in these locations.

Sorghum and **maize** were selected as target value chains due to their status as major staple and cash crops in South Sudan, contributing significantly to food security and rural livelihoods. Sorghum in particular is a critical crop for food security in South Sudan, where it accounts for 76% of the national staple food supply. Over five years, we estimate we will partner with approximately 960 farms in seed multiplication, in which participating farmers will produce sufficient seed to reach an additional 79,845 people within farming households and through market interactions. Ultimately, we estimate the FSSN's localized seed multiplication approach has the potential to address **125%* of need in Ajuonthok, Bentiu and Aweil**, produce approximately **\$1.2M USD more in profits** for farmers participating directly in the project and have up to **30.56 times the reach and impact** of traditional seed aid.

Target Value Chains		Sorghum	Maize
Direct Reach	Number of farms participating directly in the project over 5 years	960	960
Indirect Reach	Number of people reached with quality seed within farming households and through market interactions over 5 years	22,111	57,734
Profits	Additional income produced for seed multipliers over 5 years	USD\$339K	USD\$813K
Multiplier Effect	Average amount of hectares that can be planted with seed produced from just 1 hectare over 5 years	12.02x	30.56x







*Reach is calculated in terms of how many farmers can be reached within households and via market interactions with the seed produced through multiplication over 5 years. This project is projected to produce sufficient seed to reach all people in need in target locations and some multiple times.

To achieve the projected reach and impact, IRC's innovation, technical and country teams conducted interviews and focus group discussions using user-centered and behaviorally-informed tools to understand how to adapt the FSSN's key features for the South Sudan context (Figure 11). It is important

to note that the FSSN has not yet been implemented in South Sudan. All adaptations described herein are based on design research and ideation with farmers and stakeholders in target locations, and, while these adaptations have thus far demonstrated high potential, all require further prototyping and testing.

FIGURE 11: FSSN CONTEXTUAL ADAPTATIONS IN SOUTH SUDAN

CATEGORY	ADAPTATION	RATIONALE
Basic Model	<p>Community-led seed banks collect and catalog indigenous seeds, which are sent to the IRC-managed core seed bank for cultivation. Genetically pure, climate-resilient seeds are then returned to local banks for multiplication and distributed to the community before the planting season.</p>	<p>The community-led seed bank model is particularly well suited to South Sudan, given agricultural communities therein often rely on strong traditional and community ties: It provides a promising and culturally relevant solution for filling critical gaps, given the absence of formal seed systems and limited government and private sector capacity and a locally owned alternative to external aid. Further, the networked approach consisting of local seed banks connected by a core seed bank responds to the country's diverse agro-ecology, which the seed banks support through conservation, testing and distribution tailored to specific conditions.</p>
Collaboration 	<p>Research institutions are proposed to help assess the purity and morphology of the seeds collected at community seed banks as well as the genetic purity of seeds produced at the core seed bank.</p> <p>Moreover, research institutions could help in developing sorghum and maize cultivation practices that integrate indigenous practices.</p>	<p>Data gaps in seed characteristics and climate-smart practices limit agricultural productivity in South Sudan. Partnering with research institutions can generate localized knowledge, guiding seed selection and developing localized climate-smart practices to ensure a more productive and resilient seed system.</p>
	<p>Schools and health centers are proposed to serve as additional seed distribution points.</p>	<p>With over 60% of South Sudan's population facing acute food insecurity and 31% of children under age 5 suffering from malnutrition, ensuring the rapid distribution of fortified, nutritious seeds is crucial. By utilizing additional distribution points, this solution broadens access to fortified seeds quickly across the community.</p>
Sharing Findings 	<p>Exhibitions at the end of the season celebrate success and disseminate information on the morphological characteristics of various seeds.</p>	<p>Farmers in South Sudan face barriers to seed security, including limited options, overreliance on aid and lack of awareness about improved seeds. End-of-season exhibitions address these challenges by showcasing the benefits of superior, locally produced seeds while promoting the program, encouraging future participation and motivating farmers to source fortified seeds for upcoming seasons.</p>

 <p>Communications</p>	<p>Micro-lessons on production techniques are shared by IRC field experts both in-person during field visits and after field visits via SMS to socialize knowledge of multiplication and cultivation to community members.</p>	<p>With limited internet access, SMS-based micro-lessons offer an effective means of overcoming knowledge gaps and reinforcing field-visit learnings without requiring internet connectivity. Micro-lessons shared in person during field visits ensure that farmers without phones can still access critical information.</p>
	<p>Posters and program advertisements serve as a non-digital means of communicating information that challenges limiting perceptions and biases with the potential to promote behavior change in communities.</p>	<p>In South Sudan, sorghum is often stigmatized as a “poor man’s crop,” although its cultivation is vital to nutrition and food security. To challenge this perception, IRC distributes posters and program advertisements throughout villages, aiming to instill pride in sorghum cultivation. This non-digital approach ensures that all community members, regardless of digital access, can engage with key messages.</p>
 <p>Mitigating Identity-based Barriers</p>	<p>In-school education integrates curricula on the nutritional characteristics of seeds multiplied in order to boost interest in fortified food production.</p>	<p>This feature engages younger generations, increasing awareness of fortified food production. Students share knowledge with their families, creating a ripple effect. In South Sudan, where malnutrition is high, this solution enhances access to and adoption of fortified seeds, improving nutrition and food security outcomes.</p>

Farmer Perspectives: Successes & Challenges

The FSSN is launching its prototyping phase in South Sudan this year. During the design research and ideation phase, we conducted several user-centered research activities with local farmers and seed system stakeholders to assess the desirability of our solutions as well as potential challenges, the findings of which will be leveraged to plan for future phases.



Key Successes

According to farmers in target locations

- **All proposed solutions** were rated “Highly Desirable” by farmers (scoring an 8/10 or above) in user-centered research activities;
- Farmers are **eager to participate** in the FSSN due to their belief that the intervention will enhance access to safe, secure and locally available high-quality seeds, ultimately increasing yields and household food security outcomes;
- Farmers believe that the FSSN is a **long-term solution** that offers hope for the community to be able to sustain agricultural activity for years to come.



Key Challenges

For continued research and iteration

- Farmers expressed concerns about a **potential lack of continuity** if the program ends, urging the IRC to consider implementing the project as a sustained effort to ensure that farmers get the long-term support they need;
- Farmers also voiced concerns about the **effective and timely implementation** of the project, citing past negative experiences with other programs where delays in seed distribution hindered multiplication;
- Farmers raised concerns about **equity in benefiting** from the project, noting that the lack of large-scale roll-out could lead to inequities, with only small groups of farmers receiving access to training and information.

While farmers in the target communities have shown early enthusiasm for the FSSN, further research during the prototyping phase is essential to ensure that the solutions are impactful, tailored to farmer preferences and address their needs and concerns.

MAKING CLIMATE ACTION WORK FOR FRONTLINE COMMUNITIES

Strengthening seed systems is particularly critical in FCAS, where the combined impacts of a changing climate with conflict and political fragility threaten food security and livelihoods. The FSSN solution prioritizes the development of resilient, locally driven seed systems as a vital safeguard for these vulnerable communities, equipping them to adapt to climate shocks and build lasting resilience. However, right now the business-as-usual approach to climate action and financing isn't designed to promote solutions like the FSSN.

The global systems in place to address conflict, climate change and extreme poverty are failing the very communities they are meant to protect as they approach these crises in isolation rather than addressing their interconnected nature, leaving those facing all three increasingly vulnerable. In conflict-affected regions—where these crises converge most severely—the current approach is fragmented and unable to meet the scale of the challenge. The climate finance, development finance and humanitarian aid systems are not only disconnected from one another, but are also out of sync with the realities on the ground. As a result, the world's most vulnerable communities—particularly those living beyond the reach of central governments—are left without the support they need to adapt to climate shocks and build long-term resilience. Currently, 90% of climate financing is focused on middle-income, high emission-producing countries. For the remainder, the more fragile or conflict-affected a country is, the less climate finance it will receive, according to UNDP. Agro-pastoral communities are particularly underrepresented in the climate financing scene, with the total climate financing supporting small-scale agriculture representing only 1.7% of total climate finance tracked, and addressing only a fraction of the needs of small-scale agricultural producers (Chiriack et al).

In order to change the business-as-usual approach, wherein the most vulnerable populations are systematically left out of climate action, we must make a concerted, collective effort to prioritize the needs of conflict-affected frontline communities, focusing on contexts that are experiencing extreme and concurrent climate vulnerability and fragility. This requires a shift to an approach that prioritizes local knowledge, conflict-sensitive delivery methods and community engagement.

The present climate funding gap and the state-centric approach to delivering climate support perpetuates a cycle of vulnerability, hindering communities' ability to build resilience and exacerbating the impacts of climate change and conflict dynamics. To break this cycle and promote global climate justice, world leaders must commit to shifting power to communities at the epicenter of the crisis. This requires:

- **Improving mapping** of intersecting climate and conflict risks down to the local level to target action where it is most needed;
- **Investing in innovative and conflict-sensitive adaptation** and resilience through localized and community-led approaches like those proposed within this case study, which require meaningful non-governmental partnerships;
- **Making climate finance more equitable** and accessible to adequately resource action with decision rules that ensure the most impacted communities receive the resources they need;
- **Adopting a people-centric approach** to delivery that embraces a more flexible partnership model so public sector, civil society, and international organizations can work together to better meet client needs;
- **Breaking down the traditional silos** between humanitarian, development, and climate efforts and to mitigate donors' risk aversion, ensuring sustained support for critical climate projects in conflict-affected states and fostering a lasting commitment to building resilience across the epicenter of crisis.

By prioritizing these strategies, international donors can ensure that communities at the epicenter of crisis have the resources they need for effective adaptation and resilience building. Transitioning from short-term relief to sustainable solutions is essential to empower local communities to protect their livelihoods and ensure food security in the face of a changing climate. Only by acting upon these recommendations can we truly address the climate crisis, particularly in areas that suffer the dual burdens of climate change and conflict, fostering a future of greater security, well-being and resilience for all.

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