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Aligning Food Systems in National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs) Pakistan Case Study

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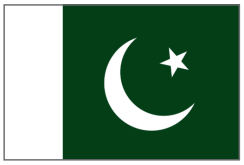

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List of Acronyms

ACAP	Acumen Climate Action Pakistan Fund
AWD	Alternate Wetting and Drying
BOLD	Biodiversity for Opportunities, Livelihoods and Development
CCDR	Country Climate and Development Report
COP	Conference of the Parties to the UNFCCC
CSA	Climate-Smart Agriculture
FAO	Food and Agriculture Organization of the United Nations
FY	Fiscal Year
GDP	Gross Domestic product
GHG	Greenhouse Gas
IBIS	Indus Basin Irrigation System
IGES	Institute for Global Environmental Strategies
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
M&E	Monitoring and Evaluation
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NGP	National Genebank Programme
PARC	Pakistan Agricultural Research Council
PGRFA	Plant Genetic Resources for Food and Agriculture
PGRI	Plant Genetic Resources Institute
PRIAT	Punjab Resilient and Inclusive Agriculture Transformation Project
RCC	Regional Collaboration Center
SDG	Sustainable Development Goal
UAE	United Arab Emirates
UNFCCC	United Nations Framework Convention on Climate Change

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This case study was significantly enriched by the technical contributions and breakout discussions of the Pakistani delegation during the technical workshop on "Cross-Linkages among Food System Actors and Aligning Food Systems in National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs)" held in Bangkok in November 2025. We also extend our thanks to all other workshop participants for their invaluable insights and collaborative knowledge sharing.

Finally, we acknowledge the vital roles played by the dedicated finance and administrative teams at the IGES and the Crop Trust, with special thanks to Natcha Thongchan (IGES) whose support was fundamental to the successful

FOREWORD

Agriculture today is evolving under pressures that extend far beyond any single sector or discipline. Ensuring stable and productive food systems increasingly requires coordinated action among institutions that conserve biodiversity, those that develop and distribute improved varieties, the extension services working directly with farmers, and the policymakers shaping national priorities. At the foundation of all these efforts lies one essential resource: the plant genetic diversity safeguarded in genebanks and maintained in farmers' fields.

This beneficial diversity, accumulated over millennia, is the raw material for every new crop variety, every breeding breakthrough, and every resilient production system. Yet its strategic importance has long remained implicit rather than central in national planning. The case studies presented here examine how national seed systems are reflected in overarching development priorities and strategies for transforming the food system, including the goals set out in National Adaptation Plans (NAPs), and Nationally Determined Contributions (NDCs). They also shed light on the roles and connections between genebanks, breeders, extension services, farmers, ministries, and financial institutions, and highlight where greater coordination in the area of climate resilience could be most beneficial.

This work was made possible through close international collaboration. The Institute for Global Environmental Strategies (IGES), together with the UNFCCC Regional Collaboration Centers (RCC) for Asia-Pacific and for MENA & South Asia, convened partners from Lao PDR, Viet Nam, and Pakistan to examine how their food and seed systems connect to national policy frameworks. The Crop Trust contributed technical leadership on the role of genebanks, providing expertise on conservation, data management, seed systems, and long-term strategies for securing plant genetic resources for food and agriculture.

The Biodiversity for Opportunities, Livelihoods and Development (BOLD) project, funded by the Government of Norway, has been instrumental in creating the enabling conditions for this work. BOLD strengthens national genebanks, supports the safe conservation and sharing of plant genetic resources, develops new climate resilient plant varieties, improves seed system linkages, and helps ensure that genetic diversity flows from conserved collections into farmers' hands where it can make a real difference. The project embodies the Crop Trust's long-standing mission: to secure crop diversity forever and make it available, without restriction, to all who depend on it.

These case studies illustrate what international cooperation can achieve. Government representatives, researchers, breeders, extension agents, farmers' organizations, and development partners brought their collective experience to map seed system actors, identify institutional bottlenecks, and design realistic action plans rooted in each country's priorities and capacities. Across all three countries, a similar insight emerged that genebanks are most valuable when they are connected actively, visibly, and sustainably to the broader agricultural system. This includes breeders who depend on diverse germplasm, extension services that support local adaptation, private seed enterprises that scale availability, and farmers who conserve, innovate, and ultimately determine which varieties thrive.

I am deeply grateful to the delegations from Pakistan, Viet Nam, and Lao PDR for their leadership and openness throughout this process. My appreciation also goes to colleagues at IGES and the UNFCCC RCCs, whose collaboration has been essential in shaping the analytical framework and guiding this multi-country effort. Finally, I thank the Government of Norway for its long-term support to the Crop Trust and the BOLD project, which continues to strengthen national capacities and ensure that the world's crop diversity remains protected and accessible for generations to come.

Dr. Benjamin Kilian
BOLD Project Coordinator, Global Crop Diversity Trust

EXECUTIVE SUMMARY

As one of the world's most climate-vulnerable nations and a country in which agriculture underpins the livelihoods of tens of millions, making food systems climate resilient is a key priority for Pakistan. This case study examines the strategic integration of food systems into Pakistan's National Adaptation Plan (NAP) and Nationally Determined Contributions (NDC), and the critical role that genebanks and seed systems must play in building national resilience.

Pakistan's agricultural sector is the backbone of its economy, contributing approximately 23.5% to national GDP and employing 37.5% of the labour force. This vast, diverse, and predominantly smallholder farming base maintains an invaluable reservoir of on-farm genetic diversity, yet it is severely threatened. Pakistan was ranked the world's most climate-affected country in 2022, with 33 million people impacted by extreme weather events. Temperature rises, intensifying floods, and shifting precipitation patterns are already eroding yields: rice and maize face projected declines of up to 25% and 20% respectively under high-emission scenarios, while the 2022–2025 recurring floods have significantly dampened economic growth and devastated agricultural output.

To address these escalating vulnerabilities, Pakistan is aligning its food systems within its national climate frameworks. The NAP 2023–2030 adopts an innovative Agriculture-Water Nexus approach, treating these two interlinked challenges as a unified priority. It focuses on promoting climate-smart agriculture (CSA), modernizing the Indus Basin Irrigation System, and formulating a long-term agriculture growth strategy. Complementing these adaptation efforts, Pakistan's NDC 3.0 sets an ambitious target to reduce projected 2035 GHG emissions by 50%, with agriculture contributing through mitigation co-benefits such as Alternate Wetting and Drying (AWD) in rice cultivation, slow-release fertilizers, and improved manure management.

The Plant Genetic Resources Institute (PGRI) manages a national genebank of over 42,000 seed samples — approximately half of which are local landraces representing irreplaceable on-farm diversity. This repository of genetic diversity can become a critical enabler of country's climate resilience and food system transformation. Yet, the PGRI is not explicitly mentioned in Pakistan's NAP, pointing to a significant integration gap.

Financing the NAP and NDC will be a key challenge. Pakistan's adaptation and resilience needs are estimated at USD 152 billion between 2023 and 2030, yet domestic fiscal space is severely constrained by a public debt hovering around 80% of GDP and an increasing fiscal deficit. Projected available public finance covers only a fraction of these needs and will require tapping into new and innovative sources of finance.

Beyond finance, systemic barriers persist. Reflecting the Pakistani delegation's breakout discussions during the Technical Workshop on "Cross-Linkages among Food System Actors and Aligning Food Systems in National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs)" (Figure ES-1), held November 25–26, 2025, in Bangkok some key systemic gaps were identified through a

stakeholder mapping exercise. The following challenges were highlighted: weak linkages between the genebank, research institutes, and farmers; fragmented provincial implementation of climate policies; insufficient adoption of modern agricultural technologies; and underdeveloped coordination between climate and agriculture ministries.

As part of the same exercise, a three-point action plan was proposed to create operational framework for food systems transformation which is also well linked to NAP and NDC priorities. This plan calls for modernizing agriculture and reducing post-harvest losses through improved access to credit, modern machinery, and cold storage infrastructure. It prioritizes strengthening local governments and farmer cooperatives to close the implementation gap between national policy and provincial action - including making provincial NAPs mandatory for all provinces by 2030. Finally, it focuses on improving linkages across stakeholders by establishing a unified food system transformation policy platform with equal representation from all key actors, and strengthening connections between research institutes, seed banks, industry, financiers, and farmers.

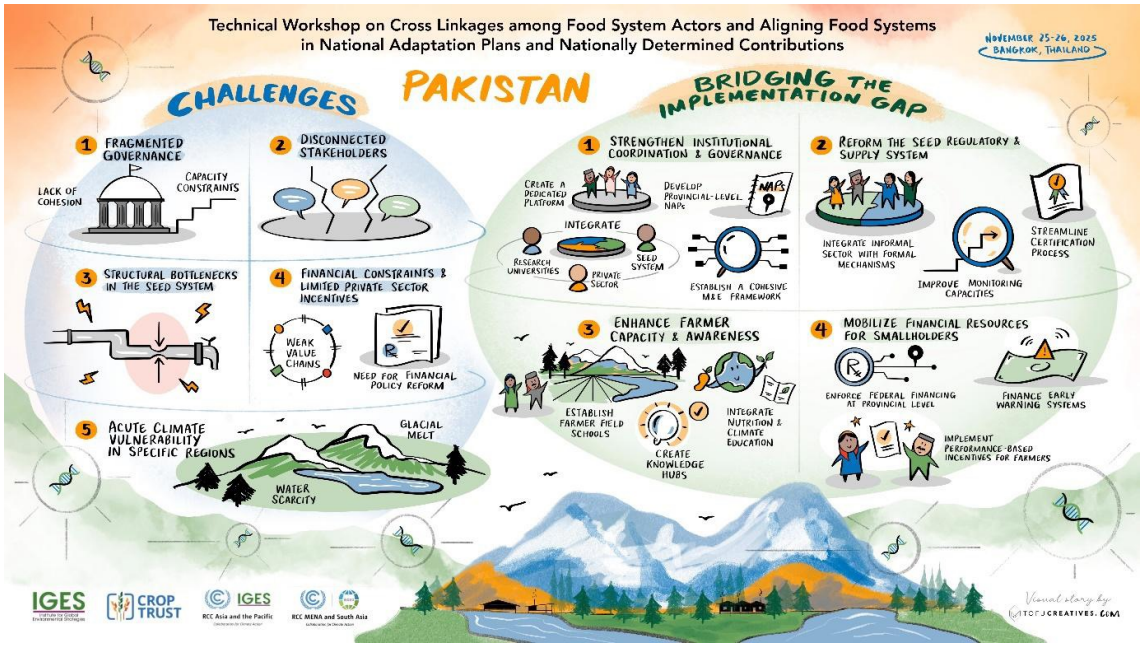


Figure ES-1. Pakistani delegation's breakout discussions during the Technical Workshop on "Cross-Linkages among Food System Actors and Aligning Food Systems in National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs)"

1. BACKGROUND

The Intergovernmental Panel on Climate Change (IPCC) has highlighted that climate change poses severe threats to global food security, with regions such as Asia and the Middle East facing significant declines in agricultural productivity. In response, many countries have prioritized agriculture within their Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) to integrate mitigation and adaptation actions that build resilience while reducing emissions. A critical enabler of this resilience is the integration of cross-sectoral linkages-aligning agriculture with water and health—to ensure efficient resource use and secure the livelihoods of vulnerable groups, including smallholder farmers, women, and indigenous peoples..

The urgency for multi-sectoral strategies is underscored by several global mandates:

- UN Secretary-General's Call to Action for Accelerated Food Systems Transformation: Emphasizes aligning national food systems transformation pathways with evolving NDCs and NAPs.
- COP28 UAE Declaration on Sustainable Agriculture and Climate Action: Affirms that food systems are central to the Paris Agreement and must adapt urgently to climate realities.
- UAE Framework for Global Climate Resilience: Prioritizes climate-resilient food production, regenerative agriculture, and equitable access to nutrition.

Genebanks serve as an essential pillar for sustainable agriculture by preserving the genetic diversity necessary to develop crop varieties that can withstand extreme weather, pests, and diseases. Recognizing genebanks within NAPs and NDCs provides countries with a foundational resource for long-term food system resilience. Initiatives like the Biodiversity for Opportunities, Livelihoods and Development (BOLD) project-funded by the Norwegian Agency for Development Cooperation and managed by the Global Crop Diversity Trust-work to expand the availability of these national crop collections. BOLD supports the implementation of provisions of the FAO International Treaty related to conservation, sustainable use, and sharing of plant genetic resources for food and agriculture (PGRFA), and contributes to the achievement of SDG Target 2.5, which recognizes that maintaining crop diversity through soundly managed genebanks is essential to ending hunger and malnutrition.To foster knowledge exchange following the technical workshop titled Cross Linkages among Food Systems Actors and Aligning Food Systems in National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs), this case study presents a detailed profile of Pakistan. It examines the country's national context, the specific impacts of climate change on its food systems, and the strategic priority measures embedded in its NAP and NDC to drive a resilient agricultural transformation.

Visit ot farmers of Kot Sarang, Punjab to view chickpea trials and community seedbank. Crop Trust Photo

2. NATIONAL CONTEXT

Pakistan is the fifth most populous country in the world and second largest economy in the South Asia region, with a GDP of around USD 374 billion and per capita GDP of around USD 1,643 in 2024. Agriculture is the second largest sector of the economy accounting for around 23.54 percent of GDP, behind only the service sector which accounts for 58.6 percent (1). Within the sector, livestock has the highest contribution of around 62 percent, followed by important crops (4.1 percent), other crops (3.3 percent), forestry (0.5 percent) and fisheries (0.3 percent).

In terms of land use, around 47 percent of the national land is utilised for agriculture, covering an area of around 30.5 million hectares. Within this, only 18 percent of the land is rainfed and the remaining cultivated land is dependent on irrigation. Most of the rainfed areas are utilised for winter season crops like wheat, barley, gram, lentils, rapeseed, and canola mustard. Wheat and rice make up the two major staple crops, accounting for 37 and 11 percent of the total crop area, respectively. Sugarcane and cotton are the biggest cash crops, contributing 0.9 and 0.3 percent of GDP. Livestock has a value addition of around PKR 5.5 trillion in 2023, with an estimated livestock population of 225 million (1).

The agriculture sector is the largest provider of employment in the country, accounting for 37.45 percent of the national labour force. Roughly three quarters of Pakistan's poor population lives in rural areas and depend on agriculture and allied industries for their livelihoods. Thus, the agriculture sector is critical for poverty reduction efforts in Pakistan as it provides a direct or indirect income for 70 percent of the rural population (2). Women play a critical role in the agricultural sector in Pakistan. Around 73 percent of the entire women labour force in Pakistan is employed in agriculture (3). However, the role of women in agriculture is limited to largely post harvesting activities including harvesting and weeding. For instance, estimates from the Punjab province suggests more than 80 percent of post-harvest activities are carried out by women whereas only around 5 percent of marketing and off-market transport is done by them (4).

Margalla Bazaar (formerly known as Itwar or Sunday Bazaar) in Islamabad. Crop Trust Photo

3. CLIMATE CHANGE IMPACTS ON FOOD SYSTEMS

Pakistan is among the countries most vulnerable to the impacts of climate change. In 2022, it was ranked as the nation most affected by climate-related extreme weather events, with 33 million people impacted (5). Pakistan lies in a temperate zone and its climate is as varied as the country's topography- generally dry and hot near the coast and along the lowland plains of the Indus River, and becoming progressively cooler in the northern uplands and Himalaya. Through the 20th century warming in Pakistan was around 0.57°C, slightly less than the average over the South Asia region of around 0.75°C. There are also regional differences in warming, with the southern regions of Punjab, Sind, and Baluchistan all experiencing winter warming in the region of 0.91°C–1.12°C during the same period. Precipitation patterns have also been impacted by climate change, with the number of heavy rainfall events increasing steadily since 1960. The nine heaviest rains recorded in 24 hours were recorded in 2010.

Pakistan's crops are highly sensitive to changes in temperature and water availability, with estimates suggesting that temperature rise in the region of 0.5°C–2°C could lead to around an 8%–10% loss in yield (6). With the exception of the northern mountainous region, projected yield declines are widespread, particularly for crops such as cotton, wheat, sugarcane, maize, and rice (7). Rice and maize are likely to be the worst affected, with projected yield declines of 25 percent and 20 percent estimated in high emission scenarios (8). While less information is available on the impacts of the livestock sector, the prolonged drought period between 2015-17 reduced livestock output by 48 percent in the worst affected districts.

Extreme weather events will also have substantial impact on the agricultural sector. This has already been witnessed in the last decade as recurrent major floods in the country have devastated the agriculture sector. During the major floods of 2010, an estimated 2.4 million hectares of crops were lost, with an estimated value of around USD 5.1 billion (7). In fact, the recurring floods between 2022 and 2025 have been a major dampener on Pakistan's economic growth. GDP growth, which was initially expected to strengthen in FY26, is now expected to be lower as agriculture growth slowed sharply to 1.5 percent year-on-year in FY25 from 6.4 percent in FY24 (9).

In terms of emissions, Agriculture is the second largest GHG emitting sector responsible for around 42 percent of total emissions. Major sources within the sector include agricultural soils (45.5%), enteric fermentation (45.1%), livestock manure management (6.5%), rice cultivation (1.7%), and burning of crop residue (1.1%) (10).

Black gram (''Vigna mungo") regeneration at National Genebank of Pakistan. Mr. Niaz Muhammad, Field Worker, Plant Genetic Resources Institute. Crop Trust Photo

4. FOOD SYSTEMS IN NAP

Pakistan submitted its NAP to the UNFCCC in 2023 covering the period from 2023 to 2030. A key priority in Pakistan's NAP is the 'Agriculture- Water Nexus.' Instead of having the agriculture and water as separate sectors in its NAP, Pakistan's priority is to tackle both interlinked challenges as a single priority. Within this priority three key climate impacts are highlighted: a) decline in crop productivity, b) increasing demand on water resources due to increasing temperatures, and c) redistribution of water resources due to melting glaciers in northern Gilgit-Baltistan and Khyber Pakhtunkhwa regions.

Within the agriculture – food nexus, Pakistan has 3 sub- priority areas and 16 short-, medium-, and long-term sub-objectives, with different government institutions assigned responsibility for implementing each objective:

- **Promote climate smart agriculture:** Improving agriculture and research services, supporting creating of forums to facilitate collaboration between farmer groups and other actors, increase access to credit for technology adoption, restructuring financial tools to target smallholder farmers and encourage crop diversification, and develop risk management systems.
- **Modernizing irrigation systems:** Upgrading Indus Basin Irrigation System (IBIS) rehabilitation program, developing a long-term plan for asset management, developing regulatory frameworks to manage groundwater use, modernizing the abiana framework.
- **Formulating long term agriculture growth strategy:** Establishment of coordinating mechanism between the public and private sector, developing a dynamic dashboard for monitoring crop water requirements, developing an environmental management plan, developing a long-term investment program for culturable wastelands, reduce post-harvest losses.

While the NAP does not specifically mention the role of genebanks, Pakistan's Plant Genetic Resources Institute (PGRI) was established in 1993 through technical cooperation with the Japan International Cooperation Agency (JICA). PGRI consists of three programmes: the Plant Genetic Resources Programme; the National Herbarium Programme; and the National Medicinal, Aromatic Plants and Herbs Programme. The NGP collection comprises more than 42,000 seed samples, with a further 20 accessions conserved in vitro and 293 accessions of various crops in field genebanks, not all of which are under the NGP. About half of the collection is made up of local landraces, representing unique local diversity of many of the crops conserved.

Margalla Bazaar (formerly known as Itwar or Sunday Bazaar) in Islamabad.
Crop Trust Photo

5. FOOD SYSTEMS IN NDC

Pakistan submitted its NDC 3.0 in September 2025 with an updated target to reduce its projected 2035 GHG emissions by 50 percent (17% unconditional and 33% conditional). While there is no specific emission reduction targets for the agriculture, the NDC mentions that sector is a key part of the country's adaptation efforts. It also highlights the mitigation co-benefits of the adaptation actions for the section, particularly, adoption of Alternate Wetting and Drying (AWD) in rice cultivation, application of slow-release fertilizers, enhanced manure management via composting and bio-digesters, and discouraging crop residue burning.

Adaptation is highlighted as a 'central pillar of Pakistan's NDC 3.0,' reflecting the country's acute vulnerability to climate change Within the adaptation section, the NDC highlights some key priorities for the agriculture sector which are largely aligned with the priorities mentioned in the NAP. Some of the key actions mentioned for the agriculture sector including promoting climate resilient crop varieties, boosting on farm irrigation efficiency, and diversifying crops to enhance resilience in the agriculture sector.

In vitro storage, National Genebank of Pakistan.
Dr. Muhammad Ahsan Khatana, Scientific Officer
Plant Genetic Resources Institute. Crop Trust Photo

6. MEANS OF IMPLEMENTATION FOR FOOD SYSTEMS TRANSFORMATION

Pakistan's financing needs for its adaptation needs are quite substantial. Already, public spending on climate action, both mitigation and adaptation, had increased from 6.6 percent of GDP to 8.3 percent of GDP at the time of submission of the NAP. The NAP also highlights that the country will have limited ability to raise domestic revenues for climate related projects. In particular, rapidly increasing fiscal deficit and increasing public debt, which stood at around 80 percent of GDP from FY20 to FY23, will continue to constrain mobilization of domestic finance for climate action.

In terms of financing requirements, there are two main estimates for Pakistan. First, is the estimate from the World Bank's Country Climate & Development Report, which is also the estimate used in the NAP. As per this estimate, Pakistan will require USD 152 billion between 2023-2030 for adaptation and resilience. However, a specific estimate for agriculture is not provided. The NDC also contains an estimate for adaptation financing needs, which stands at a total of USD 145 billion between 2023-2030. This includes specific agricultural relevant investments of USD 4 billion on modernization of irrigation system.

Interestingly, the NAP also highlights the anticipated financing gap. A retrospective analysis of recent funding levels provides an illustrative estimate that only approximately US$39 billion in public finance and US$9 billion from public–private partnerships for infrastructure could be available over the next decade for both mitigation and adaptation efforts, including contributions from multilateral development banks

Table 1 Finance needs for Pakistan's adaptation and resilience activities

Report	Scope	Estimated Cost (USD)	Timeframe
World Bank CCDR	Adaptation and resilience	152 billion	2023- 2030
Pakistan NAP	Adaptation and resilience	152 billion	2023- 2030
Pakistan NDC 3.0	Modernization of irrigation systems	4.0 billion	2023- 2030
	Universal water sanitation	55.2 billion	
	Disaster preparedness and response	85.7 billion	
	Total Adaptation	144.9	

7. STOCKTAKE OF CURRENT SUPPORT FOR FOOD SYSTEMS TRANSFORMATION

- **Transforming the Indus Basin with Climate Resilient Agriculture and Water Management** – GCF funded project with total project value of USD 47.7 million. The project is being implemented by FAO. This project aims to develop the country's capacity to use the information it needs to adapt to the impacts of climate change on agriculture and water management by putting in place state-of-the art technology.

- **Acumen Climate Action Pakistan (ACAP) Fund** – GCF funded project with value of USD 90 million with the aim to establish a USD 80 million climate adaptation-focused investment fund in Pakistan, providing patient capital to agribusinesses. The fund's goal is to improve the climate resilience of vulnerable farmers and their livelihoods by providing access to climate adaptation solutions for smallholder farmers. The project is being implemented by the Acumen fund.

- **Punjab Resilient and Inclusive Agriculture Transformation Project (PRIAT)** – World Bank funded project of around USD 200 million aimed at enhancing equitable access to, and productivity of, agricultural water, and improve incomes of farmers in Punjab.

- **Post-floods resilient recovery and strengthening of the livestock sector in Balochistan** – FAO project funded by the EU with a value of USD 18 million with the aim to enhance food security and resilience status of the livestock farmers/households in line with the post-flood 4R framework and climate smart approaches.

Mr. Rizwan Nazir, a lab attendant with Plant Genetic Resources Institute, assists in the characterization of National Genebank of Pakistan rice accessions in the NARC fields in Islamabad. Crop Trust Photo

8. STAKEHOLDER MAPPING

The main objective of the stakeholder mapping was to identify to what extent the seed system actors interact with each other, with a focus on the linkages between the genebank and other actors. Participants were asked to rate the relationship between actors on a four-point scale with 1 = no contribution and 4 = significant contribution. For Pakistan, participants identified 10 stakeholders which are critical to seed systems in the country and the relationship across these stakeholders were then mapped.

Figure 1 shows the systems diagram that emerged from the stakeholder mapping exercise utilising the participatory analysis tool (11). It reflects the Pakistan delegation's breakout discussions during the Technical Workshop on 'Cross-Linkges among Food System Actors and Aligning Food Systems in National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs),' held November 25–26, 2025, in Bangkok, Thailand.

The Pakistan delegation attended the technical workshop on "Aligning Food Systems with NAPs and NDCs," held November 25–26, 2025, in Bangkok, Thailand

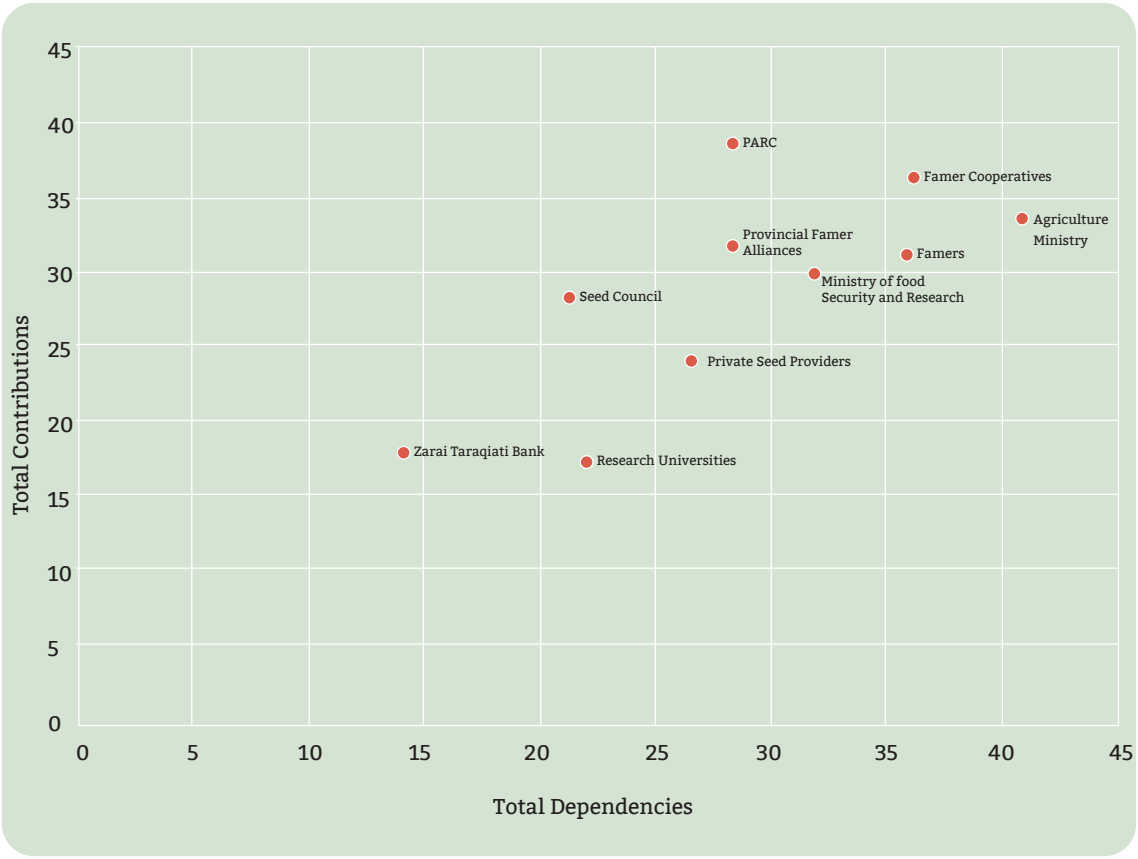


Figure 1. Stakeholder Mapping for Seed System Actors in Pakistan

The following broad conclusions can be drawn about the roles and strategic importance of key actors related to seed systems from this exercise:

- **The core engine (Top-right: Contributes a lot / Depends a lot):** These actors are the powerhouse of the system. They are highly integrated and dependent to each other:
  - Government Ministries play a critical role in the seed system. The Ministry of Agriculture has both a high contribution and dependence in the systems. This shows the high level of regulation in this sector in Pakistan, with the policies and process setup by the Central Ministries strongly influencing the action of all the other actors. Ministry of Food Security and Research also plays a central role with a high contribution particularly through its functions related to regulation, certification, and approval of seed varieties and seed companies.
  - Farmers and cooperatives have both a high contribution and dependence in the systems as they are the primary actors responsible for the effective adoption and end use of different seed varieties. The role of cooperatives is particularly notable in Pakistan, where the farming sector is dominated by smallholder farmers- around 97 percent of whom own less than 12.5 acres of land (12). In this context, cooperatives enable seed multiplication and local production through localized seed banks, facilitate bulk procurement to reduce costs, distribute seeds through local networks, and represent farmers' collective interests in seed policy and regulatory discussions.

- The Pakistan Agricultural Research Council (PARC), which houses Pakistan's gene bank is positioned near the center-right reflecting its essential role as the primary provider of genetic resources and expertise for the whole system.
- Private seed providers also play an important role with both high contribution and dependence in the overall functioning of the seed system.

- **Supportive drivers (Top-Left: Contributes a lot / Depends little):** These actors provide high value to the system while remaining relatively independent of its internal domestic dynamics
  - Pakistan's seed council come across as a net positive contributor acting as the apex policy and regulatory body for the country's seed sector. Its core role is to ensure that farmers have access to quality, reliable, and well-regulated seeds across crops.
  - Provincial Farmer Alliances also contribute positively to the system acting as a important collective platforms that enable farmer's interest to be considered in broader policy and regulatory discussions.

- **Peripheral enabler (Bottom-Left: Contributes little / Depends little):** These actors provide a positive effect on the system but show lower dependence possibly because of weak linkages with other actors in the system
  - The Zarai Taraqiati Bank, a state-owned agricultural development bank, was identified as a key actor in the system, primarily as a provider of affordable credit to smallholder farmers for adoption of different seed varieties. However, the linkages between the bank and the other stakeholders in the system are still underdeveloped.
  - Research universities were another possible strong enabler for the seed system, yet these entities largely continue to operate in their own silos and connections with other parts of the systems are weak.

9. ACTION PLAN

The Pakistani delegation at the workshop identified some key actions needed for strengthening seed system, enabling food systems transformation, and improving integration with Pakistan's NDC and NAP.

Action 1: Modernizing agriculture and reducing post-harvest losses

Improved access to modern equipment and farming techniques was highlighted as a key requirement for meeting the agriculture related goals in Pakistan's NDC and NAP and for improving the uptake and utilisation of climate resilient seed varieties:

- Provision of low-cost credit for adoption of modern farming machinery
- Awareness raising around the benefits of modern farming methods and technical training for improved adoption of modern machinery
- Performance related subsidies for farmers to upgrade equipment and inputs to reduce post-harvest losses
- Improving cold storage facilities should be a key priority area in national agricultural policies, including in NAP and NDC. This is essential for reducing post-harvest losses.

Action 2: Strengthening local governments and farmer cooperatives

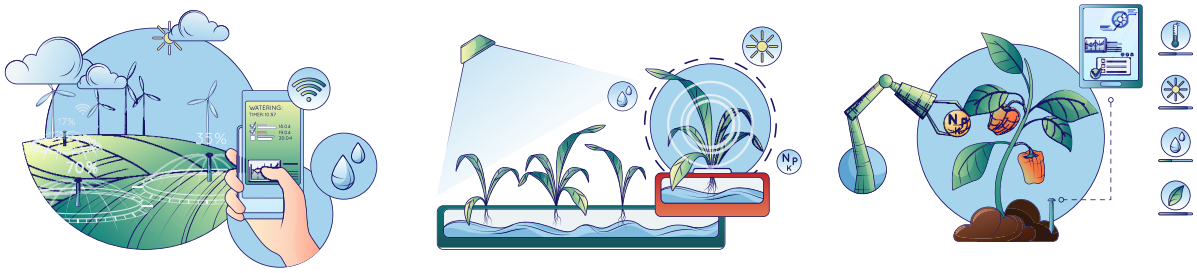
Provincial governments along with farmer cooperatives are best placed to improve linkages between national stakeholders (such as the gene bank) and farmers thereby enabling smoother functioning of seed system. Provincial level planning is also critical for implementing agricultural related priorities in the NAP and NDC.

- Better implementation of existing federal agricultural policies, particularly those related to subsidies, at a provincial level through greater involvement of local governments and farmer cooperatives in the implementation process
- Developing provincial NAPs as an urgent priority with a goal for all provinces to have a NAP in place by 2030

Action 3: Improving linkages across stakeholders

While many stakeholders have the potential to contribute positively to food system transformation, yet the full potential of these stakeholders is yet to be realised due to inadequate linkages:

- Creation of a policy platform for food system transformation with a mandate to assess existing technology and finance gaps, develop unified M&E framework, and install effective early warning systems. This platform should have equal representation from all stakeholders identified in the mapping exercise.
- Research institutes should be better connected to seed banks, industry, financiers, and farmers.
- Improved coordination between the Climate Ministry and the Agriculture Ministry on matters related to food systems transformation



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