

Afghanistan Climate-Smart Agriculture Action Plan



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Afghanistan

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Acronyms and Abbreviations

AAIP	Afghanistan Agricultural Inputs Project
ACAL	Afghanistan Chamber of Agriculture and Livestock
AEZ	Agroecological Zone
AI	Artificial Intelligence
AMD	Afghanistan Meteorology Department
ARAZI	Afghanistan Independent Land Authority
ARIA	Agricultural Research Institute of Afghanistan
BCM	Billion cubic meters
CSA	Climate-Smart Agriculture
CSAAP	Climate-Smart Agriculture Action Plan
DIEM	Data in Emergency Monitoring
DM	Dry Matter
EFSP	Emergency Food Security Project
ESV	Ecosystem Services Value
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Statistics
FFS	Farmer Field School
FSN	Food Security and Nutrition
FTE	Full-Time Equivalent
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HMRB	Harirod-Murghab River Basin
HRB	Helmand River Basin
IA	Irrigation Association
IDP	Internally Displaced Person
IFC	International Finance Corporation
IIASA	International Institute for Applied Systems Analysis
IOM	International Organization for Migration
IPC	Integrated Food Security Phase Classification
IPCC	Intergovernmental Panel on Climate Change
IRDP	Irrigation Restoration and Development Project
ITA	Interim Taliban Administration
KRB	Kabul River Basin
LSU	Livestock Unit
MAIL	Ministry of Agriculture, Irrigation, and Livestock
MIGA	Multilateral Investment Guarantee Agency
NC	National Collection
NEPA	National Environmental Protection Agency
NGO	Nongovernmental Organization
NRB	Northern River Basin
NRM	Natural Resources Management
PARB	Panj-Amu River Basin
PPP	Public-Private Partnership
PPQD	Plant Protection and Quarantine Directorate
R&D	Research and Development

RCP	Representative Concentration Pathway
SGR	Strategic Grain Reserve
SMEs	Small and Medium Enterprises
SSP	Shared Socioeconomic Pathway
SWI	System of Wheat Intensification
TEEB	The Economics of Ecosystems and Biodiversity
UNCCD	United Nations Convention to Combat Desertification
UNICEF	United Nations Children's Fund
USDA	United States Department of Agriculture
WHO	World Health Organization
WUA	Water User Association

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Executive Summary

1. Afghanistan stands at a critical crossroads. As of early 2025, nearly 15 million people are facing acute food insecurity, with 3.1 million already in emergency conditions. These figures are not just numbers; they reflect a deepening crisis of hunger, collapsing rural livelihoods, and systemic fragility that threaten the country's long-term stability. The situation is particularly dire for vulnerable groups, with over 1.2 million pregnant and breastfeeding women and 3.5 million children under five suffering from acute malnutrition. This is not simply the consequence of isolated shocks but the result of a complex web of climate-induced stress, economic contraction, gender exclusion, and institutional disintegration. In this context, the Afghanistan Climate-Smart Agriculture Action Plan (CSAAP) emerges as a vital instrument to address urgent needs while laying the foundation for resilient, inclusive, and sustainable rural development.

Climate change impacts and the need for investing in resilience

2. Climate change has become a force multiplier of vulnerability across Afghanistan. The country is among the most climate vulnerable in the world and one of the least equipped to adapt. The frequency of droughts has doubled, from once every three years to once every other year, while floods regularly devastate pastures, farmland, homes, and infrastructure. Afghanistan's surface water availability is expected to decline by up to 26 percent by 2030, further constraining already fragile irrigation systems and reducing crop yields. Land degradation is widespread, with approximately 15 million ha of rangeland severely degraded, while deforestation has wiped out 70 percent of forest cover in some provinces. These pressures not only threaten the environment but also drive conflict over increasingly scarce resources, particularly water and pasture, exacerbating intercommunal tensions. Climate projections show significant declines in potential productivity for key staples such as wheat and rice, with national average wheat yields projected to drop by 6–13 percent by the 2080s. Rice productivity is also projected to be negatively affected by up to 3 percent by the 2050s, and by up to 14 percent by the 2080s, with net irrigation requirements in major rice-growing areas increasing by 42 percent in the central region and, 19 percent in the southeastern and west-central regions by the 2080s. These trends underscore the urgency of investing in climate-resilient crop varieties, improved agronomic practices, and water management systems to buffer against the adverse impacts of climate change on staple food production.
3. Conversely, the CSAAP identifies emerging opportunities for horticultural crops, which may benefit from certain aspects of climate change, such as longer growing seasons and expanded agroecological zones in some regions. If supported with adequate investment in infrastructure, research, and market access, horticulture could play a pivotal role in diversifying rural livelihoods, enhancing nutrition, and increasing agricultural income. This dual perspective—managing risks to staples while capitalizing on opportunities in horticulture—forms a critical pillar of the CSAAP's strategic approach to building a more resilient and productive food system in Afghanistan.
4. The choice between investing in resilience or responding with humanitarian aid represents a dilemma in the development and the humanitarian nexus. While aid provides urgent relief, over-reliance can foster dependency, whereas underinvestment in resilience increases vulnerability to future shocks. Striking a balance requires assessing investment opportunities, avoidable agricultural losses, and the importance of local food production for nutrition and food security. The CSAAP provides a structured framework to address these challenges by stabilizing food production, boosting rural incomes, and building long-term climate resilience. Its investment areas—food systems resilience, horticulture, livestock, agribusiness, and rural transformation—tackle systemic bottlenecks such as poor seeds, inefficient irrigation, and weak markets while embedding gender inclusion and climate-smart technologies throughout. Rather than focusing on short-term fixes, the plan promotes sustainable, evidence-based, and inclusive transformation of the agrifood system.

Analytical approach for the CSAAP

5. The development of the CSAAP followed a structured four-step methodology to ensure alignment with national priorities, technical rigor, and stakeholder ownership. Step 1 focused on analyzing Afghanistan's national development plans, climate strategies, and agricultural policies, establishing climate-smart agriculture (CSA) as a central pillar of resilience building and rural transformation. Step 2 involved a detailed diagnostic of climate risks and vulnerabilities using agroclimatic modeling, land use projections, and productivity analyses. This helped assess the potential impacts of climate change on crops, livestock, and water systems while identifying opportunities for horticultural expansion and agribusiness development. Step 3 prioritized CSA options using a multicriteria framework that assessed each intervention's impact on productivity, resilience, and emissions. This phase combined technical analysis with extensive consultations to ensure the proposed solutions were context specific and inclusive, addressing the needs of women, youth, and vulnerable communities. Step 4 synthesized these findings into investment packages and a strategic implementation roadmap. It also examined policy, institutional, and financing reforms needed to scale CSA solutions, with a strong emphasis on private sector engagement, market access, and blended finance. By integrating public and private roles, the CSAAP presents a coordinated and actionable plan for climate-resilient agricultural transformation.

Climate-smart investment packages

6. After identifying the key interventions needed to transform the national food systems, the CSAAP is organized into five integrated investment packages aimed at tackling Afghanistan's severe food insecurity, economic instability, and climate vulnerability. These packages provide a comprehensive framework for transforming Afghanistan's agrifood systems through targeted, scalable, and inclusive interventions. Each investment area responds to specific structural gaps ranging from staple food resilience and high-value crop commercialization to livestock productivity, agribusiness development, and holistic rural transformation. Together, they aim to boost productivity, generate employment, reduce emissions, and build lasting resilience across Afghanistan's diverse agroecological zones, while leveraging the power of public-private partnerships (PPPs) and locally driven solutions.

Investment Package 1: Food Systems Resilience Project

7. This package focuses on strengthening the resilience and productivity of Afghanistan's staple crop systems, particularly cereals. It promotes the use of climate-resilient seeds, sustainable land and water management, and agricultural mechanization to improve yields and reduce vulnerability to climate shocks. The project supports improved on-farm practices, rehabilitation of small-scale irrigation, and the reduction of postharvest losses. It also integrates legume-based cropping systems to diversify production and improve soil health and household nutrition. The package enhances national food security by improving cereal self-sufficiency and strengthening local milling industries.

Investment Package 2: Horticulture Commercialization Project

8. Targeting Afghanistan's high-value fruit and vegetable sectors, this package aims to improve the efficiency and competitiveness of horticultural value chains. Investments are concentrated in high-potential areas with comparative advantage in production and market access. Key interventions include improved extension services, agrologistics infrastructure such as cold storage and solar drying, and support to women's nutrition gardens. The package fosters crop diversification, supports nursery development, strengthens farmer cooperatives, and encourages export-oriented production. It also emphasizes the role of the private sector in expanding processing, transport, and marketing capacity.

Investment Package 3: Livestock Development Project

9. This package strengthens livestock-based livelihoods and protein supply, especially in rural and pastoral areas. It targets cattle, sheep, goats, and poultry systems, with a focus on improving breed quality, feed availability, and

animal health services. The package also supports women-led livestock activities and the expansion of dairy and poultry enterprises near urban markets. Pastoralist communities such as the Kuchi are supported through improved rangeland management and migration route protection. By building veterinary networks, women's extension services, and fodder cooperatives, the project enhances both resilience and commercialization across the livestock sector.

Investment Package 4: Agribusiness Development Project

10. Designed to strengthen rural enterprise ecosystems, this package focuses on enabling business development, access to finance, and market linkages across agrifood value chains. It includes support for business environment reforms, enterprise incubation, and skills development for youth and women. It promotes the creation of agro-processing zones, packaging and aggregation centers, and digital platforms for market access. Key components include blended finance instruments, Islamic financial services, and PPPs that crowd in private capital. The package serves as a bridge between rural producers and urban markets, unlocking opportunities for job creation and inclusive growth.

Investment Package 5: Afghanistan Rural Transformation Project

11. This integrated package synthesizes elements from the other four to promote holistic, area-based rural development. It includes territorial investments in land tenure reform, participatory agricultural research, farmer field schools (FFSs), agroweather and market information systems, and resilient infrastructure. The package supports cooperative strengthening, financial inclusion, and improved service delivery through local institutions. It prioritizes fragile and underserved regions, supporting women and youth as key agents of change. By building the foundations for climate-smart rural economies, this package aims to catalyze long-term resilience, equity, and food system transformation across Afghanistan.

Investment costs and costs of inaction

12. Transforming Afghanistan's agriculture and food systems into a more productive, resilient, and climate-adaptive sector over the next decade will require a targeted and well-coordinated investment of US\$7.4 billion. This level of financing, structured across five strategic pillars of CSAAP, is not only economically justified but also represents an urgent and strategic imperative to prevent escalating future losses, support recovery, and protect vulnerable rural livelihoods. The five investment pillars include Climate-Smart Agriculture (US\$3.1 billion), Integrated Natural Resources Management (US\$2.6 billion), Agribusiness Development (US\$1.5 billion), Agriculture Research and Development (US\$149 million), and Climate and Market Information Services (US\$30 million). Together, these investment areas encompass a wide range of critical interventions—ranging from sustainable crop and livestock intensification and land rehabilitation to enterprise growth and digital infrastructure. They are designed to not only improve productivity and preserve ecosystems but also strengthen systems for timely, data-driven risk management and planning, particularly in the face of growing climate variability and market uncertainty. These coordinated investments are foundational to strengthening national and household food security; accelerating inclusive rural development; and building durable, long-term resilience across Afghanistan's diverse and fragile agrifood systems.
13. In stark contrast, the cost of inaction is estimated at US\$39.6 billion—more than five times the required investment. The most substantial foregone benefits would arise in natural resource management (US\$16 billion), CSA (US\$14 billion), and agribusiness development (US\$8.5 billion). Even the least capital-intensive pillars, such as agricultural research and development (R&D) and information services, would incur losses of US\$709 million and US\$363 million, respectively, if neglected. On average, the cost of action represents just 19 percent of the cost of inaction, making a clear economic case for immediate intervention. The data also reveal that certain areas, despite requiring minimal investment, offer disproportionately high returns. For example, climate and market information services need only US\$30 million but could avert losses exceeding 10 times that amount. Similarly, agriculture R&D

shows a 5:1 benefit-to-cost ratio. These findings highlight both the urgency and high-impact potential of even modest investments, particularly in knowledge, innovation, and decision-support infrastructure. The implications for policy are clear: delaying action significantly increases long-term costs and reduces the effectiveness of future interventions. Strategic prioritization and scaling, especially in CSA and integrated resource management, can mitigate climate risks, enhance food and water security, and create economic opportunities. Failure to invest now would deepen vulnerability, erode productivity, and entrench poverty, especially in climate-exposed rural regions.

Jobs generation through the CSAAP

14. The implementation of the CSAAP is expected to generate 7.4 million new jobs across Afghanistan's agrifood system—a 65 percent increase—through investments in climate-resilient farming, value-added processing, and improved market infrastructure. Of these, 93 percent will be in on-farm activities, with the remainder in processing, transport, and retail, fueling rural revitalization and inclusive economic growth. The Action Plan will also expand women's participation in agriculture from 5.46 million to 8.5 million, creating 3 million new jobs and addressing long-standing barriers such as mobility constraints, insecure land rights, and limited financial access. Targeted interventions like gender-responsive extension and women-led producer groups will empower women as leaders in climate-resilient transformation. At the same time, youth employment is projected to rise from 6.2 million to 10.8 million—an increase of 175 percent—by opening new roles in mechanized farming, horticulture, livestock services, and agri-tech. Through investments in skills development, enterprise incubation, and digital market access, the CSAAP provides young Afghans with meaningful pathways out of economic marginalization and into the forefront of sustainable agricultural development.

Climate change mitigation through the action plan

15. The CSAAP delivers substantial climate co-benefits by both reducing greenhouse gas (GHG) emissions and enhancing carbon sequestration across Afghanistan's agrifood systems. By promoting the widespread adoption of more efficient, sustainable, and regenerative land use practices, the plan facilitates a strategic shift from a high-emission trajectory toward a carbon-reducing and climate-resilient pathway. Collectively, the proposed interventions are expected to result in a net reduction of approximately 375 million tons of carbon dioxide equivalent (tCO₂-e) over the implementation period. Among the interventions, improved grassland management stands out as the largest single contributor to emission reductions, accounting for 276 million tCO₂-e in avoided emissions. This is made possible through a combination of practices including the restoration of degraded rangelands, introduction of rotational grazing systems, and regeneration of native grass cover—all of which enhance soil health and ecosystem resilience. Simultaneously, targeted investments in sustainable forest management such as reforestation, afforestation, and the protection of forested watersheds are projected to contribute an additional 164.5 million tCO₂-e in carbon sequestration. Together, these nature-based solutions not only play a crucial role in mitigating climate change but also generate co-benefits by enhancing biodiversity, improving water regulation, and strengthening the provision of vital ecosystem services. By combining targeted emissions reductions with large-scale carbon sequestration, the CSAAP not only enhances agricultural resilience and productivity but also positions Afghanistan to capitalize on emerging opportunities in carbon finance.

The role of the private sector in implementing the action plan

16. Afghanistan's development landscape is undergoing a major shift, marked by declining aid, restrictive policies, economic contraction, and weakened institutions—all of which have diminished the effectiveness of traditional aid delivery. In this context, the private sector has emerged as a resilient and dynamic driver of local development, with strong potential for inclusive growth, especially for women and youth. Despite ongoing challenges such as limited finance and market uncertainty, recent regulatory reforms and financial strategies signal a growing commitment to enabling private sector-led development, especially in agriculture. The CSAAP underscores the vital role of private

investment, innovation, and public-private partnerships in transforming Afghanistan's food systems and building climate resilience. With limited public service capacity, the private sector is essential for delivering scalable solutions across the agrifood value chain from input supply to processing and market access. Key investments in solar-powered cold storage, dairy and poultry processing, and packaging help reduce postharvest losses, improve quality, and open new markets while supporting job creation and climate goals. Local enterprises also drive innovation in areas like food processing, organic inputs, e-commerce, and logistics—linking producers to markets and stimulating rural incomes. Special emphasis is placed on supporting women- and youth-led enterprises through targeted financing and mentorship. The private sector is equally critical in developing digital infrastructure and services, such as payment platforms, weather insurance, and advisory tools, which can improve transparency, reduce risk, and strengthen resilience when backed by strong public-private collaboration.

17. The CSAAP marks a strategic shift in Afghanistan's development approach—from donor-led delivery to a more sustainable, market-driven model that leverages private capital, innovation, and local capabilities. In response to shrinking fiscal space and declining aid, the Action Plan promotes co-financing with the private sector, risk-sharing, and long-term partnerships to scale impact in a fragile, resource-constrained context. By moving beyond traditional aid and emphasizing local ownership and market-based solutions, the CSAAP enhances efficiency, accountability, and innovation, the groundwork for resilient, climate-smart agrifood systems that can adapt and thrive in the face of ongoing uncertainty.
18. In conclusion, the Afghanistan CSAAP is a comprehensive, forward-looking strategy to address one of the country's most urgent and complex development challenges. It presents a clear investment case for resilience—one that promises food security, economic recovery, and climate adaptation. The plan must now move from paper to practice. It will require bold leadership, coordinated action, and sustained commitment from policy makers, development partners, the private sector, and Afghan communities themselves. The cost of inaction is too high. The opportunity for change is within reach. Now is the time to act.



1.



Introduction

1. Afghanistan continues to grapple with one of the world's most severe and persistent food crises,¹ consistently ranking among the top 10 countries with the highest number of people experiencing acute food insecurity (FSIN, and GNAFC).² Although some improvements have been observed recently due to food assistance and a relatively good harvest, about 14.8 million people (32 percent of the population) were projected to face crisis or worse (Integrated Food Security Phase Classification, IPC Phase 3 or above) during the 2024–2025 lean season, including 3.1 million in emergency (IPC Phase 4).³ These levels, while slightly lower than the previous year, remain significantly above pre-2021 levels, reflecting deep structural vulnerabilities in the food system and economy (figure 1).
2. **The crisis is exacerbated by multiple, overlapping shocks.** Weather extremes, including La Niña-driven below-average rainfall and rising temperatures, have undermined agricultural productivity and damaged critical infrastructure across all 34 provinces. Afghanistan ranks fourth among countries most at risk of climate-related crisis⁴ and is considered the seventh most vulnerable country⁵ with the least coping capacity. The frequency of droughts in the country has increased from an average of once every three years during 1986–2012 to once every other year during 2013–2023. These intensifying droughts and floods damage crops, disrupt supply chains, and increase food prices. Such climatic shocks—coupled with economic instability and conflict—worsen food insecurity. Floods cause immediate crop and infrastructure damage, while droughts exacerbate water scarcity and lower crop yields, driving up food prices and lowering agricultural wages.
3. **Economic factors such as inflation, rising fuel costs, and currency depreciation reduce the purchasing power of consumers and strain affordability.** Economic pressures have further eroded the purchasing power of Afghan households, intensifying food insecurity and limiting access to essential goods and services. Over the past several years, Afghanistan's economy has faced prolonged contraction, marked by declining public revenue, reduced foreign aid, and weak private sector activity. This fragile economic environment has led to frequent fluctuations in food and fuel prices, with rural households disproportionately affected due to their reliance on local markets for both inputs and consumption. Inflation in staple food prices and the cost of agricultural inputs such as fertilizers, seeds, and animal feed have made farming more expensive and less profitable, while higher fuel prices have increased transportation costs, directly affecting food affordability and market connectivity. The depreciation of the Afghan afghani has also raised the cost of imported goods, including essential commodities and machinery, placing additional strain on both producers and consumers. For low-income rural families, these trends translate into difficult trade-offs between food, health care, and education while diminishing their ability to invest in productive assets or climate-resilient technologies.
4. **Conflict-related constraints and gender-based restrictions continue to severely hinder food access, livelihood opportunities, and the resilience of rural households,** particularly for women and other vulnerable groups. Ongoing

¹ Food crisis is defined as a situation where acute food insecurity requires urgent action to protect and save lives and livelihoods at local or national levels and exceeds the national resources and capacities to respond.

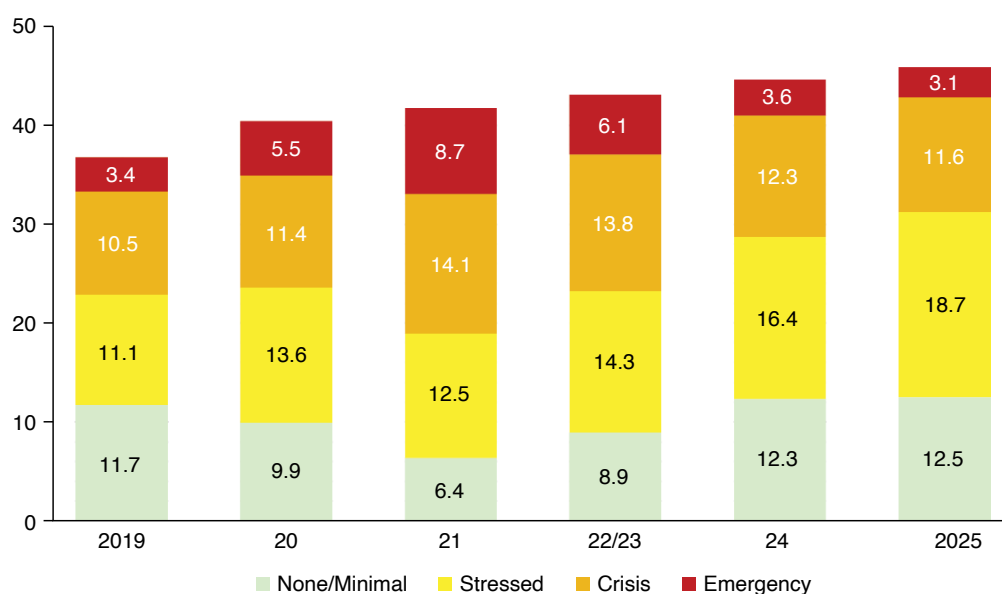
² Food security exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

³ Acute food insecurity arises when one, some, or all dimensions of food security—food availability, access, utilization and stability—are disrupted, whether by shocks or other factors. It can be temporary or persistent over time, largely due to structural causes, or occur at a specific point in time and of a severity that threatens lives or livelihoods, regardless of the causes, context, or duration.

⁴ See <https://drmkc.jrc.ec.europa.eu/inform-index/Portals/0/InfoRM/2023/INFORM%20Annual%20Report%202023.pdf>.

⁵ <https://gain.nd.edu/our-work/country-index/>.

FIGURE 1: EVOLUTION OF AFGHANISTAN POPULATION IN ACUTE FOOD INSECURITY, 2019–2025 (MILLIONS)



Source: GRFC 2025. Data for 2025 are projections.

insecurity and localized conflict have disrupted agricultural activities, displaced farming communities, and limited access to rangelands, markets, and essential services such as extension and veterinary care. These disruptions disproportionately affect smallholders and pastoralists who rely on seasonal mobility and secure access to land and water resources. In parallel, restrictions on women's participation in economic life have sharply curtailed their ability to contribute to household income, access productive resources, or engage in local value chains. Despite women comprising more than half of the agricultural labor force, social norms and institutional barriers, exacerbated under the current political context, have limited their mobility, financial inclusion, and access to advisory services. This not only undermines household food security but also weakens the overall productivity and adaptability of the rural economy. Moreover, the loss of women's income and autonomy has direct consequences for child nutrition, education, and health care—key pillars of long-term human capital development. In the absence of targeted investments and protective policies, these exclusions compound existing inequalities and further entrench food insecurity. A climate-smart approach to agriculture in Afghanistan must therefore address both conflict sensitivity and gender inclusion as foundational elements of resilience, ensuring that women are

supported as farmers, entrepreneurs, and leaders in the transformation of local food systems. These combined challenges leave vulnerable households particularly at risk.

5. **Persistent food crises rank Afghanistan among the top 5 countries requiring support to prevent further deterioration of food and nutrition security.** In 2022, more than 30 percent of the country's population was undernourished (against 14 percent in South Asia, 11 percent in Middle East and North Africa, and 9 percent in the world).⁶ It has one of the world's highest rates of stunting in children under five, at 35 percent (table 1). The rate of wasting, the extreme manifestation of severe acute malnutrition, in Afghanistan is extremely high: 9.5 percent, one in three adolescent girls suffers from anemia, and only 12 percent of Afghan children ages 6–24 months receive the right variety of food in the quantity needed for their age. Evidence from the recent IPC report shows marginal improvements in food security since the worst situation following the political transition in 2021. In 2023, 11.6 million (25 percent of the population) experienced high levels of acute food insecurity (IPC Phase 3 or above)

⁶ The prevalence of undernourishment (SDG 2.1.1) is calculated by the FAO to measure chronic hunger, that is, the long-term inability to meet dietary energy needs of a country.

TABLE 1: AGRICULTURE AND FOOD SECURITY IN AFGHANISTAN COMPARED TO SOUTH ASIA AND MIDDLE EAST AND NORTH AFRICA

		Afghanistan	South Asia	Middle East and North Africa
Population	million	40	1,989	464
Rural population	million	31	1,231	200
Rural / Total population	%	70	62	43
Employment in agriculture	million	19	273	30
Employment in agriculture	%	47	42	15
Prevalence of undernourishment	%	30.4	14.2	11
No. of undernourished people	million	11.6	284.9	51
Under-5 stunted children	%	35.1	30.5	22.5
Under-5 stunted children	million	2.0	53.7	12.4
Arable land	million ha	7.8	219.3	70
Arable land / person employed in agriculture	ha/person	0.41	0.80	2.33
Land area equipped for irrigation	million ha	1.8	118.7	37.8
% of arable land equipped with irrigation	%	5.6	54.1	54
Rice yield (2022)	kg/ha	3,500	4,292	4,500
Wheat yield (2022)	kg/ha	2,500	3,129	2,800
Raw milk of cattle (2022)	kg/animal	750	1,760	1,500
Agriculture production per ha of agriculture land	US\$/ha	155	2,123	1,800

Source: Food and Agriculture Organization Statistics (FAOSTAT).

Note: The Middle East and North Africa data exclude Afghanistan and Pakistan.

compared to the same period in previous years (18 million in 2022 and 15 million in 2023).⁷ These improvements can be attributed to the scale of coordinated food emergency agricultural production assistance, including the Emergency Food Security Project's (EFSP) nationwide interventions implemented by the World Bank in collaboration with the Food and Agriculture Organization of the United Nations (FAO) to stabilize food production.

6. **In this context, the Climate-Smart Agriculture Action Plan (CSAAP) recognizes the urgent need to improve food security, stabilize rural livelihoods and increase resilience to economic shocks.** The objective of the CSAAP is to identify the CSA investments that offer the greatest potential to

transform Afghanistan's agriculture and food systems into a more productive and climate-resilient sector. The CSAAP places a strong emphasis on generating a robust evidence base to demonstrate the role of CSA in addressing Afghanistan's food system vulnerabilities. Recognizing the complex interplay between climate shocks, agricultural underperformance, and chronic food insecurity, the plan prioritizes data-driven approaches to inform policy, guide investments, and scale effective interventions. Through the evaluation of proven CSA practices such as climate-resilient seed systems, sustainable rangeland management, and low-emission livestock strategies, the plan aims to build credible, context-specific evidence on the productivity, resilience, and mitigation benefits of CSA. This knowledge will be critical for mobilizing public and private investment, informing national adaptation strategies, and aligning food system transformation efforts with Afghanistan's long-term development and climate goals.

⁷ Food insecurity reflects the lack of regular access to enough safe and nutritious food for normal growth and development and an active and healthy life and is measured through people consultation using the Food Insecurity Experience Scale (FIES) (SDG 2.1.2).

7. Furthermore, a major focus of the CSAAP is to inform the next generation of agriculture and food system investments that are essential for driving long-term food security, climate resilience, and economic recovery in Afghanistan. Building on lessons learned from earlier initiatives, the CSAAP aims to transition from short-term crisis response to more strategic, integrated investments that address the root causes of vulnerability. This includes identifying scalable innovations, cost-effective technologies, and institutional models that can guide the design of future interventions across key value chains. By embedding evidence-based planning and climate-smart principles into investment programming, the CSAAP will help ensure that new agricultural investments are better targeted, more inclusive, and capable of delivering both immediate livelihood benefits and sustained development outcomes across rural Afghanistan.
8. The report is structured to provide a comprehensive and logical progression from evidence gathering to actionable planning. Chapter 2 outlines the methodological approach, detailing the analytical framework, data sources, and tools used to assess Afghanistan's food systems, climate risks, and investment priorities. Chapter 3 presents an in-depth review of Afghanistan's food systems and rural livelihoods, exploring the country's agricultural production patterns, market structures, socioeconomic drivers of food insecurity, and the institutional landscape shaping rural development.

This chapter lays the groundwork for understanding the systemic vulnerabilities the CSAAP seeks to address.

9. Chapter 4 examines the vulnerability and projected impacts of climate change, analyzing how shifting temperature and precipitation patterns, extreme weather events, and related ecological degradation are expected to affect the yield and suitability of key crops, livestock systems, water resources, and rural livelihoods. It also highlights population groups and regions most at risk. Chapter 5 moves into investment planning, describing the process of identifying a long list of potential CSA interventions and the criteria used to prioritize them, including their expected contributions to productivity, income generation, environmental sustainability, inclusivity, and climate resilience.
10. Chapter 6 focuses on investment design and costing, presenting estimated investment needs, the costs of inaction, and illustrative examples of bundled investment packages aligned with regional agribusiness opportunities. Finally, Chapter 7 offers conclusions and a roadmap for rolling out the CSAAP, considering Afghanistan's evolving political and operational context. It emphasizes the importance of coordination among national and international stakeholders, the significance of leveraging the private sector as co-financiers and implementers where possible, and the need for adaptive implementation in a dynamic and fragile environment.



2.

Methodological Approach

11. The development of the CSAAP was guided by a structured methodology that integrated diverse sources of information, expert consultations, and analytical approaches to ensure a comprehensive and evidence-based framework. Given the constraints on field-based research and broader stakeholder engagement at the time of the study, the methodology relied on a combination of literature reviews, spatial and data analysis, and targeted expert inputs. The process was designed to capture the complexities of Afghanistan's agrifood systems, climate vulnerabilities, and investment needs by drawing on past and ongoing studies, review of past investment programs by development partners, institutional knowledge, and sector-specific assessments. A multistep approach was adopted, beginning with a detailed background analysis and data collection, followed by the identification of key issues and investment priorities, the structured development of investment packages, and a final assessment of scaling up opportunities and broader investment implications. This structured process ensured that the CSAAP was grounded in the best available evidence, aligned with national priorities, and capable of supporting resilient and climate-smart agricultural development in Afghanistan. The four key steps are discussed below.
 - review, spatial and climate analyses were carried out using the FAO land cover data and climate change modeling (FAO and IIASA 2022) to assess the impacts of climate variability on crops and agricultural systems.
13. Household-level data analysis was another critical component. The FAO Data in Emergency Monitoring (DIEM) household survey data were examined to understand livelihood characteristics within different agroclimatic zones, incorporating information on household assets and regional variations (FAO 2023). Recognizing the limitations of available quantitative data, expert engagement was prioritized through focus group discussions and specialist questionnaires. These activities, facilitated through the FAO's six regional offices in Afghanistan, allowed for the collection of more up-to-date and qualitative insights on food security, staple crops, horticulture, and livestock. Additionally, a dedicated horticulture study was conducted to provide in-depth analysis of fruit value chains, focusing on apples, citrus, grapes, and pomegranates. This study, undertaken with national consultants working in the field, assessed the role of input suppliers, processors, service providers, and traders while also gathering updated production and market data.

Step 1: Background analysis and data collection

12. To assess the broader context of agrifood systems, trends, and resilience, the CSAAP relied on multiple sources of information. A comprehensive literature review was conducted, covering key agricultural subsectors, including government and development agency reports, humanitarian food security assessments, and national statistics. While recent data were prioritized, older studies were also considered to provide historical context and a more nuanced analysis of long-term trends. In addition to literature

Step 2: Identification of key issues and investment priorities

14. Building on the background analysis, the study identified key elements of Afghanistan's food system to define intervention priorities. This involved assessing major agricultural systems such as wheat, horticulture, and livestock, along with the livelihoods that depend on them. The analysis was conducted across different agroecological zones (AEZs) to ensure that regional variations in productivity, resource availability, and food security challenges were

fully captured. Stakeholder consultations played a central role in this process. International experts and those from the national agencies provided insights into both short- and long-term needs for different regions, ensuring that CSAAP priorities aligned with local realities and institutional capacities.

15. To further refine the intervention framework, key strategic planning documents, including the Agriculture Sector Roadmap and the Afghanistan Water and Irrigation Investment Roadmap (2020–2030), were reviewed. While these documents provided broad objectives and financial estimates for the agricultural sector, they were developed before recent institutional changes and, in some cases, presented overly optimistic projections. Nonetheless, they served as useful reference points in framing sector-wide priorities and aligning CSAAP interventions with existing plans.

Step 3: Screening and development of investment packages

16. Following the identification of key priorities, potential intervention options were systematically evaluated and structured into investment packages. A review of past and ongoing investment projects in agriculture, livestock, water management, and agribusiness—funded by the World Bank, International Fund for Agricultural Development (IFAD), Asian Development Bank (ADB), and FAO—was conducted. Projects implemented between 2008 and 2020 were analyzed to extract lessons on outcomes, costs, and feasibility. This provided valuable insights into approximate unit costs, potential benefits, and institutional capacity considerations under pre-2021 conditions.
17. To ensure a structured approach to investment selection, prioritization criteria were established, focusing on productivity improvements, jobs creation, income generation, social inclusion, climate resilience, and environmental sustainability. A simple scoring system was applied to assess the relative importance of various interventions and to identify those with the highest potential impact. The proposed investment packages were then subjected to stakeholder validation. In June 2024, a one-day workshop with 40 stakeholders from all major Ministry of Agriculture, Irrigation, and Livestock (MAIL)

directorates was held to review and refine the investment proposals. Their feedback helped finalize intervention compositions and identify specific technical and institutional support activities. Further reviews were conducted with FAO Afghanistan and MAIL technical units, followed by a technical stakeholder review meeting in September 2024 and a Private Sector Consultation Forum in May 2025 to incorporate additional perspectives.

Step 4: Scaling up and assessing investment implications

18. To contextualize the proposed investments and highlight their broader implications, further analysis was conducted on national-scale financing needs and the cost of inaction. Simplified calculations were made to estimate the potential financial and food security risks associated with delayed implementation of CSA interventions. Additionally, projections were developed to assess the scale of production increases required to address food security challenges, with and without CSA measures. This included an evaluation of financing needs at the national level to support sustainable agricultural intensification and climate adaptation. An assessment of private sector investment opportunities in Afghanistan's agricultural sector across various geographic zones, emphasizing each region's agronomic strengths, was also carried out.
19. The environmental implications of the proposed interventions were also considered, particularly in relation to greenhouse gas (GHG) emissions. The likely GHG balance from scaled-up CSA actions was assessed, including the integration of climate-smart livestock practices and watershed restoration efforts. These analyses provided a comprehensive understanding of how CSA investments could contribute to not only food security and economic resilience but also broader ecosystem restoration and environmental sustainability.
20. This structured approach ensured that the CSAAP was developed based on rigorous analysis, stakeholder engagement, and evidence-based prioritization, enabling the identification of targeted and impactful interventions for building a resilient food system in Afghanistan.



3.



Agrifood Systems and Rural Livelihoods in Afghanistan

21. **Agrifood systems are defined as the group of activities related to the production, processing, distribution, preparation, and consumption of food**, along with the outcomes of these activities, including socioeconomic and environmental outcomes (FAO 2021). They play a crucial role in food security and nutrition (FSN), supporting livelihoods and incomes and bolstering the overall economy. Afghanistan has a largely rural-based population, dependent on agriculture for its livelihoods.

22. **Agriculture sector is the dominant sector for Afghanistan's economic development.** The sector expanded by 6 percent in 2024, building on a 2.2 percent recovery in 2023 after a cumulative contraction of 15.7 percent between 2021 and 2023 (World Bank 2025). In 2023, the agriculture sector employed about 46 percent of the population and contributed 35 percent of the country's gross domestic product (GDP) (figure 2). From 2010 to 2017, Afghanistan experienced a noticeable decline in the share of employment in agriculture. This trend was primarily driven by the substantial influx of foreign aid during this period, which expanded opportunities in other sectors, particularly services. However, as donor funding began to decline in recent years, the share of agricultural employment has stabilized or even increased slightly, reflecting a relative shift back to the sector. At the same time, agriculture's contribution to GDP has been rising. This upward trend can be attributed both to improved performance within the sector, such as better yields and favorable seasons, and to a contraction in the relative contributions of other sectors such as services and industry, positioning agriculture a more prominent driver of the national economy. Most of the population are directly or indirectly involved in agriculture, making it the main source of livelihoods in Afghanistan. In rural areas, 27 percent of women participated in the labor force, compared to 81.5 percent of men. The following sections offer a review of Afghanistan's agricultural

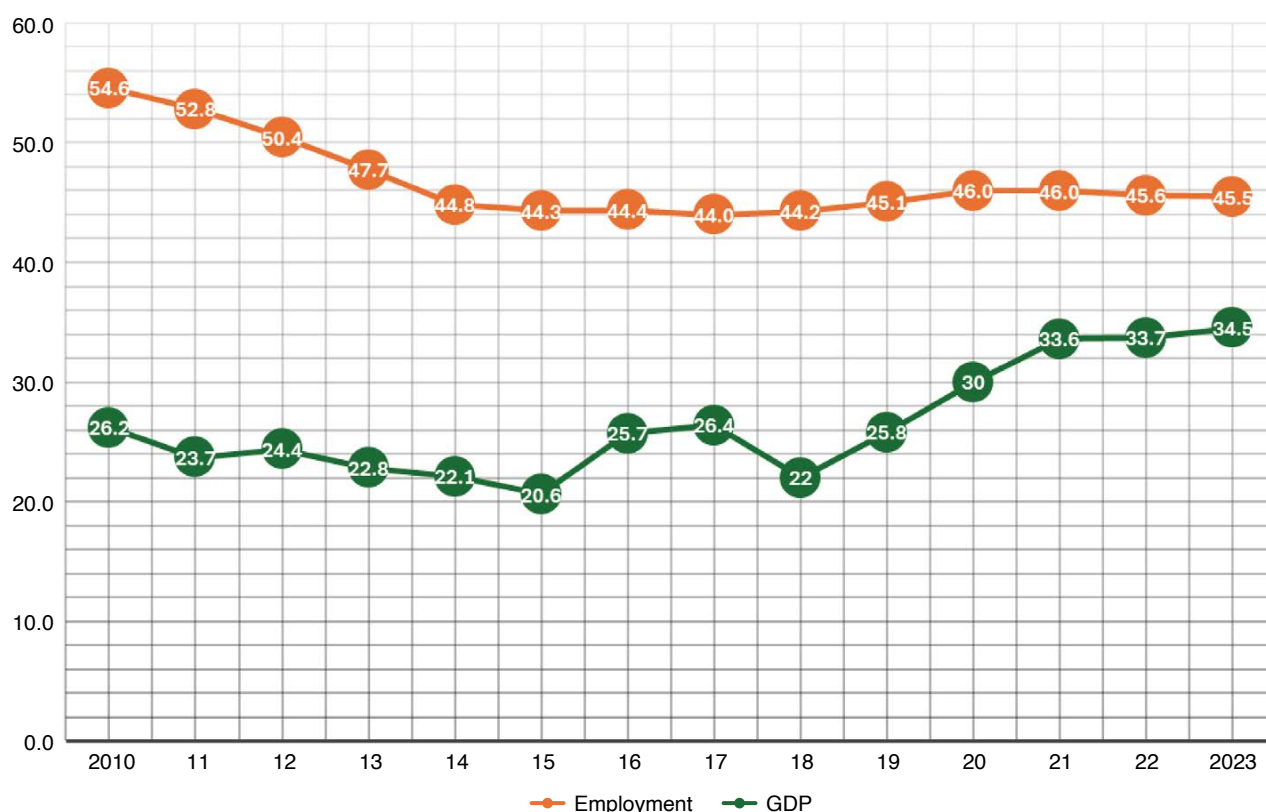
systems, the livelihoods that rely on them, and the key challenges that they face.

Wheat

23. Wheat is the country's major agriculture commodity, crop, and food staple but suffers from climate-driven fluctuations. It is the most produced commodity and the major crop in the country, accounting for about 70 percent of cultivated land area (MAIL GOIRA 2020). Wheat is the key staple food in Afghanistan, accounting for approximately 60 percent of the population's calorie intake, with average consumption ranging from 150 to 162 kg/capita/year; low-quality rice serves as a poor but sometimes necessary substitute. Domestic wheat production varies in Afghanistan, ranging from 2.1 million metric tons (Mt) in 2008 to over 5 million Mt in 2020. Typically, Afghanistan produces approximately 4.8 Mt and consumes 6.3 Mt/year, needing about 1.5 Mt of imports. The Afghan average wheat yield of 2.2 t/ha is modest but comparable, falling slightly below Pakistan's average of 3 t/ha and India's yield of almost 3.5 t/ha. Wheat is cultivated across nearly all provinces of Afghanistan, both in irrigated areas covering approximately 1,167,000 ha, or about one-third of the country's potentially irrigated land, with an average yield of around 3 t/ha, and in rainfed areas spanning roughly 1,345,000 ha where yields are significantly lower, averaging 1.2 t/ha, primarily in 10 northern provinces. In dry years, rainfed wheat area and production can decline sharply by as much as 90 percent. Despite the majority of Afghanistan's arable land being devoted to wheat cultivation, the country remains only about 75 percent self-sufficient in wheat and continues to rely heavily on imports of wheat flour, primarily from Kazakhstan and Pakistan.

24. The wheat sector plays a key role in Afghanistan's agricultural income, employment, and food security

FIGURE 2: POPULATION EMPLOYED IN AGRICULTURE AND THE SECTOR'S CONTRIBUTION TO GDP (%)



Data source: World Bank World Development Indicators.

as well as the economy, which depends on wheat flour imports to fill recurrent shortfall. Before 2020, wheat generated between 1.1 and 1.3 million full-time equivalent (FTE) jobs, of which 639,000–787,000 are on-farm and the rest are in the non-farm economy, including milling and baking. Wheat and its related activities such as logistics and milling represent around 6.5 percent of the national GDP. The private sector plays a key role in the supply chain of wheat and flour, with an annual import volume of more than 2 Mt. Driven mainly by its short-term profit orientation, the private sector predominantly imports wheat in the form of flour rather than grain, posing challenges for the wheat value chain, particularly the milling industry (MAIL GOIRA 2020). Import data from 2017 showed that 86 percent of the wheat is imported in the form of flour and only 14 percent is in the form of grain.

25. Imbalances between provinces and interdependency on wheat are important elements of the Afghan food system. Key wheat markets in major urban consumer centers, situated in or near intense irrigated areas, supply neighboring provinces, which are sometimes

chronically insecure (FEWSNET 2023). Kabul, the capital, supplies the central provinces and is a transit point between the north, south, east, and west. Jalalabad caters to the eastern part of the country. Mazar-e-Sarif supplies the northern provinces and, in a good year, the southern provinces as well. Kunduz provides for the northeastern provinces while Faizabad supplies the chronically food-insecure Badakhshan province. The Maimana market supplies the drought-prone northwest region and Herat serves the west. Kandahar supplies the southwestern part of the country where drought, civil insecurity, and conflict often hinder market activity.

Rice

26. Rice is the second most important cereal crop in Afghanistan in terms of food security and source of income. It is grown in paddy culture in low-altitude river valleys and plains where water is abundant and summers are hot. It is cultivated in 82 districts of 18 mainly northerly provinces that have potential access to reliable irrigation water. Kunduz, Takhar,

Baghlan, Laghman, Nangarhar, Kunar, Herat, and Balkh are the major rice-growing areas. Rice is an important staple food in Afghanistan and currently commands a much higher price than wheat. Its production is dependent on seasonal rain and snowmelt volumes to supply rivers and well-managed irrigation canals. Therefore, farmers as well as the yields and production areas are vulnerable to fluctuations in available surface water resources. Afghanistan has never been self-sufficient in cereals. Despite an annual production capacity of 600,000 tons, another 500,000 or so was imported in 2022 (Statistics Yearbook 2023), indicating an ongoing need to supplement with imports by the private sector or foreign assistance. Rice yields have slowly increased from 2 t/ha in 2000 to 4.6 t/ha in 2022 (the United States Department of Agriculture [USDA] indicated 3 t/ha overall currently, though higher yields have been demonstrated). When compared to regional rice-producing countries (India 4.3 t/ha, Pakistan 3.8 t/ha, and China over 7 t/ha), there remains significant potential for further yield improvement in Afghanistan. Production has also declined due to a reduction in harvested area, which dropped to around 130,000 ha in 2022 from over 200,000 in 2010–2013, a level similar to that of 2000.

Pulses

27. Afghanistan's favorable weather makes it ideal for growing pulse crops, which are crucial for addressing malnutrition. Pulses play a pivotal role in the nutrition context, serving as a vital source of protein and essential nutrients. However, despite agriculture being a primary livelihood for many Afghans, the sector remains underdeveloped and struggles for self-sufficiency. Chickpeas, lentils, cowpeas, soybeans, and other legumes thrive in various regions, but water scarcity poses a significant challenge (although some legumes are more drought tolerant). To enhance production, there is a need for improved seeds, fertilizers, and irrigation technologies, including water-efficient methods and conservation agriculture. In particular, soybeans are vital as a source of plant protein, addressing the widespread issue of protein deficiency. Meeting the daily protein requirements as per World Health Organization (WHO) guidelines remains difficult for many Afghans, necessitating innovative solutions to boost pulse crop production and improve access to nutritious food sources.
28. The pulses sector in Afghanistan presents numerous opportunities across production, processing, and marketing. First, pulses contribute to soil fertility by fixing nitrogen, offering a sustainable approach to agricultural practices. Moreover, the availability of cheap labor, coupled with the short growing season conducive to two-season production annually, enhances productivity. Pulses' suitability for intercropping further maximizes land use efficiency. Notably, their low water and fertilizer requirements during the growing season make them a cost-effective crop choice. From a marketing perspective, pulses enjoy high demand domestically and internationally due to their industrial value and nutritional benefits, serving as an excellent protein source. Additionally, pulse straw serves as valuable animal feed, further enhancing their economic and agricultural significance.
29. The northern and western regions of Afghanistan, particularly provinces such as Balkh, Herat, Badghis, and Faryab, can significantly benefit from the growth of legumes and pulses to improve nutrition. These areas have suitable agroecological conditions for growing crops such as lentils, chickpeas, and mung beans, which are rich in protein and essential nutrients. Legumes and pulses can enhance dietary diversity, address malnutrition, and improve food security, especially in rural communities where access to animal-based protein is limited. Additionally, legumes play a crucial role in nitrogen fixation, which can improve soil fertility and reduce the need for chemical fertilizers, promoting sustainable agricultural practices. By incorporating legumes into crop rotations, farmers can enhance soil health and long-term productivity. Furthermore, expanding legume cultivation can create opportunities for agro-processing, enabling value addition and increasing market opportunities, thus boosting farmers' incomes and contributing to rural economic growth. Finally, promoting legume production can help build resilience against climate change by increasing the diversity of crops grown in these regions, making agricultural systems more adaptable to environmental stresses.
30. The horticulture subsector (fruits, nuts, and vegetables) has one of the most significant agribusiness potential for growth, job creation, and poverty reduction.

Horticulture

30. The horticulture subsector (fruits, nuts, and vegetables) has one of the most significant agribusiness potential for growth, job creation, and poverty reduction.

In 2023, horticulture provided about 37 percent of the country's total exports, and about 61 percent of agricultural exports. Afghanistan's environmental conditions are favorable for the production of many fruits and vegetables. There are many endemic horticultural species, while the wide range of AEZs provides a long season of constant supply. These seasonal advantages could be exploited to supply high-value products during leaner periods in neighboring countries. Horticulture is land and labor intensive; this favors smallholder farmers in Afghanistan, where most farmers are already familiar with growing several horticultural crops.

31. Horticultural crop production, processing, and trade provides nearly 200,000 FTE jobs and seasonal income to as many as 2 million Afghans. The main perennial fruits cultivated in Afghanistan are grapes (fresh and raisin), almonds, pomegranates, apricots, plums, pistachios, citrus fruits, and apples. The subsector covers over 390,000 ha, and almost 14 percent of the total irrigated land area. Afghanistan's diverse geographic and climatic conditions allow a wide range of crops to be produced at different times of the year. The most prominent high-value export crops are grapes, almonds, apples, pistachios, apricots, pomegranates, and melons (table 2). Established markets for Afghan's horticultural products include India, Pakistan, and Iran, and there is potential for expansion to other bigger markets.
32. The vegetable side of horticulture comprises potatoes, onions, tomatoes, melons, and eggplants, representing over 80 percent of the total area

TABLE 2: TOP EXPORTED HORTICULTURAL PRODUCTS 2020–2023 (US\$, MILLIONS)

	2020–21	2021–22	2022–23
Almonds	28.4	56.4	55.83
Apples	15.4	15.6	30.1
Apricots	2.44	2.8	16
Dry apricots	40	19.45	15.9
Grapes	25.7	31.8	47.76
Raisins	84.25	79.27	95.7
Melons	1.7	1.6	4.1
Pomegranates	9.1	17.5	69.51
Pistachios	25.3	27.6	34.3

under vegetable cultivation (GoIRA 2020 Agriculture Roadmap). They are important for wider nutrient intake as well as cash crops, often grown in irrigated areas. They provide opportunities for diversification to help farmers cope with changing climate or new economic situations. Potato is the third-largest staple crop in Afghanistan and is grown in the highland areas of Bamyan, Maydan, Wardak, Ghazni, Badakhshan, and Kabul, covering approximately 55,000 ha, with a steady or slightly increasing trend. Potato is the major crop in Bamyan, grown on about 70 percent of the irrigated land, equivalent to 12,000 ha. Farmers either retain a portion of their harvest or buy potatoes from local markets to use as seed. This reduces genetic vigor and the potential for optimal production, while crops become more vulnerable to environmental stresses. The highland areas of Afghanistan are less infested by insects and diseases, and so the availability of improved seed and modern cultivation practices would increase productivity by an estimated 20–40 percent. Average yields are about 12 t/ha in Afghanistan compared to yields in Pakistan (22 t/ha) and Iran (32 t/ha). Afghanistan is self-sufficient in potato production and exported more than 7,000 tons in 2022 (FAOSTAT). With higher productivity, Afghanistan could become an important regional exporter.

33. All farmers grow some vegetables as an adjunct to their main production system, primarily for their own household consumption. Many smallholder farmers also specialize in growing vegetables with the objective of selling them in local markets. Generally, there are good supplies of both local and imported vegetables in local markets and roadside stalls throughout Afghanistan. Afghanistan exports three main vegetables: onions (US\$33.7 million), cucumber (US\$16.3 million), and tomatoes (US\$41.7 million). The nutritional problems within Afghan households are therefore less about insufficient supplies, at least in more irrigated areas, and more about the cost of fresh vegetables for local consumers and their choice to spend their limited funds on calorie-dense foods such as bread. In remote upland areas, there may be less seasonal availability.
34. Over the last decade, the horticulture subsector has demonstrated steady growth and expansion and continues to expand slowly despite a challenging environment. This growth and expansion are most pronounced in the production of the key value chains

covered in this report (apples, citrus fruits, grapes, and pomegranates) and are fueled by several factors, including the support provided by development projects, the lucrative nature of these value chains compared to alternative crops such as grains, and the demand in both domestic and export markets. The area under apple cultivation, for example, has increased from 8,055 ha in 2010 to 30,163 ha in 2023. This significant expansion in the production area has consequently resulted in a remarkable increase in the overall volume of production, from 59,850 Mt in 2010 to 318,402 Mt in 2023, leading to higher exports.

35. Due to the global increase in food prices, a unique export opportunity has emerged for Afghan products in regional traditional markets and beyond. Data from USDA show that in India, the expanding middle class and increased purchasing power have led to a substantial surge in apple imports, particularly evident from 194,782 Mt in 2019/2020 to 447,938 Mt in 2021/2022, more than double within this time frame. Similarly, the demand for grapes and pomegranates is on the rise in both the Pakistani and Indian markets. Consequently, the country's exports are growing. In 2022–23, Afghanistan's agriculture exports reached US\$1.1 billion, out of which US\$566 million was solely from horticulture. Pakistan and India remain the primary export destinations, as these markets traditionally accept Afghan produce and pay a premium based on size, color, grading, and packaging. Overall, exports of Afghan fruits have shown a significant increase over the last decade, rising from US\$136 million in 2010–11 to US\$566 million in 2022–23.

Livestock

36. Livestock is an important component of Afghan's agriculture sector, with a significant portion of the land dedicated to pastures and subsistence mixed farming. More than 85 percent of rural households keep some form of livestock, making it a critical component of both livelihoods and national food security. The livestock sector contributes around 14–15 percent to the national GDP and is valued at over US\$7 billion. It serves not only as an economic driver but also as an essential source of protein, dairy, and other animal-based products, while animal manure provides both fuel and fertilizer for crop production.
37. Afghanistan hosts a diverse range of livestock species, including sheep, goats, cattle, and poultry. According to FAOSTAT, in 2022, the country had approximately 42 million livestock, including around 14 million poultry birds. Poultry production has shown the greatest increase, followed by gradual growth in goat populations, slight recovery in cattle numbers, and a slight decline in sheep. However, despite the sector's significance, there remains a 30–50 percent shortfall in meeting the country's annual protein consumption needs. Livestock products such as meat, dairy, skins, and wool are integral to both domestic consumption and export markets. Afghanistan has historically been renowned for its wool carpets, with Karakul sheep wool and skins being the main livestock product exports, generating approximately US\$56 million annually—although this figure has been in decline over recent decades. Dairy products such as milk, ghee, and cheese are widely consumed and traded in urban centers. However, the country imports three times the value of its livestock exports, mainly in the form of dairy products and poultry (chicks, eggs, and meat), totaling US\$165 million. This trade imbalance highlights an opportunity for import substitution to enhance domestic protein production.
38. Geographically, livestock distribution varies across the country. More productive irrigated lands in the north, east, and south support higher concentrations of livestock due to better access to fodder and feed derived from crop byproducts. Meanwhile, the upland and mountainous regions serve as vital summer rangelands for pastoralist communities. With strategic investments in improved feed availability, processing infrastructure, and value chain development, Afghanistan's livestock sector has the potential to enhance food security, increase exports, and reduce dependence on imports.
39. Afghanistan's livestock production systems can be categorized into three main types: the crop-livestock mixed sedentary system, mobile nomadic pastoralism, and commercial peri-urban farming. The sedentary system, the most widespread, integrates crop cultivation with livestock rearing, primarily for domestic consumption. Rearing cattle and small ruminants is prevalent, with rural households managing small backyard herds. Women play a crucial role in this system, contributing to livestock care and household nutrition. Despite its prevalence, the sedentary system struggles to fully

meet national protein needs. Cattle are vital for meat and milk production as well as for agricultural labor. Management practices vary across provinces, with animals grazing on community pastures or being housed indoors during extreme weather conditions. Wool and skins, once significant export commodities, continue to be traded but at much lower levels than in the past.

40. Nomadic and transhumant pastoralism, primarily involving small ruminants, forms a crucial seasonal dynamic for specific livelihood groups. Sheep and goats are raised in large flocks, often managed collectively in village-based systems. These flocks migrate to highland pastures at the start of summer and return to the lowlands in autumn. Over 70 percent of Afghanistan's livestock is owned by approximately 1.5 million Kuchi pastoralists, whose livelihoods depend on sheep, goats, camels, and some cattle (Box 1). Their survival relies on extensive seasonal migration patterns and livestock trade. However, they face increasing challenges such as limited access to services, land conflicts, and the impacts of drought.

41. In response to growing market demand, commercial peri-urban and urban livestock farming is emerging as an important sector. Entrepreneurs and investors are adopting modern, intensive systems, particularly in dairy and poultry production. These semicommercial farms cater to urban markets, helping bridge gaps in local protein supply. The expansion of this commercial livestock sector presents opportunities for improving food security and increasing domestic production, but it requires supportive policies, better access to finance, and infrastructure development to sustain growth.

42. Livestock in Afghanistan primarily depends on rangelands, crop residues, and a wide range of cultivated fodder crops for feed resources. Cereal straws, hay, maize stalks, and supplementary items such as cotton seed cakes or maize and barley grain are used to provide feed for cattle, milking cows, and working oxen, especially during winter. Rangelands cover 45 percent of Afghanistan's land area and play a vital role in providing fodder for livestock, including sheep, goats, camels, cattle, and equines. Biomass production is influenced by various factors such as climate, rainfall, altitude, soil type, and erosion. The rangelands are divided into three main categories based on seasonal availability of optimum fodder and are crucial for agro-pastoralists and sedentary populations relying on livestock for sustenance: (a) winter lowlands (16,210,000 ha), (b) spring and autumn (16,030,000 ha), and (c) summer (22,460,000 ha) upland pastures.

Poppy cultivation

43. While it is not a food product, poppy has been a large 'informal' contributor to the agriculture economy and rural livelihoods for several years but is being drastically clamped down. The value of Afghanistan's opiate exports alone has frequently exceeded the value of legally exported goods. Despite being a key crop in over one-third of villages, only less than 20 percent of the overall economic benefit went to farmers (UNODC 2023). The highly effective drug ban by the Interim Taliban Administration (ITA) in 2022 meant selling opium to traders plummeted by 92 percent from 2022 to

BOX 1. KUCHI PASTORALISTS

They are the most important livestock traders in the country, depending solely on a nomadic livestock raising system. The transhumance sector comprises one-third of the small ruminants and most of the country's camels. Goats and sheep are usually raised in this system. The Kuchis totally depend on livestock for their livelihoods and produce the major share of livestock products (meat, skins, cashmere, wool, and dairy) that are marketed domestically or regionally. Despite representing a mere 5 percent of the Afghan population, Kuchis own about 50 percent of the Afghan livestock, mostly sheep. Livestock raised in mobile pastoralism is the main source of livelihood for Kuchis. In fact, livestock is the only source of income for the nomadic Kuchis (FAO 2023). They are also the poorest ethnic group.

2023, resulting in a loss of about US\$1 billion for farmers who mainly switched to wheat, which is less remunerative and drought tolerant than poppy. While the livelihood effects of such a switch are yet to be fully documented, it is clear that climate-resilient and diversified commercial horticulture options are increasingly important and urgent.

Women in agriculture

44. Women in Afghanistan face significant gender disparities in the agricultural sector, limiting their participation and economic opportunities. Despite comprising 54 percent of the country’s agricultural workforce, their engagement is often restricted to lower-value activities due to cultural norms, mobility constraints, and limited access to resources. Approximately two-thirds of the female labor force in agriculture is involved in diverse activities such as farming, livestock production, horticulture, and craftwork. However, their economic independence remains curtailed, with financial inclusion being notably low—only 7 percent of Afghan women have access to a bank account, restricting their ability to invest in agriculture or expand businesses. Additionally, the lack of female extension agents and ITA-imposed restrictions further limit women’s access to agricultural services, impeding the adoption of climate-resilient technologies. Many women-owned businesses have either ceased operations or are functioning below capacity due to these constraints.
45. The livestock sector is a major source of employment for women, with around 60 percent of employed women engaged in this field, primarily as unpaid family workers. At the household level, they are largely responsible for key livestock management activities, yet their contributions remain undervalued. Table 3 highlights the significant role women play in livestock production activities in Afghanistan, particularly in tasks that are critical to animal care and household nutrition. Women are the primary contributors in key areas such as milking (91.5 percent), tending to young animals (90.2 percent), watering (75.5 percent), and feeding (74.2 percent). These responsibilities are essential for maintaining animal health and productivity and indicate the centrality of women’s labor in daily livestock management. Despite often lacking formal

TABLE 3: ROLE ALLOCATION IN LIVESTOCK PRODUCTION ACTIVITIES

Roles	Women	Men	Children	Labor
Feeding	74.2	18.1	7.4	0.3
Grazing	4.3	10.2	27.3	58.2
Watering	75.5	14.6	9.2	0.7
Tending young	90.2	3.5	1.6	4.8
Milking	91.5	2.0	0.0	6.6
Treating/ Breeding	4.8	92.8	1.2	1.3
Average	56.7	23.5	7.8	12.0

Source: FAO 2019.

- recognition or decision-making power, women’s engagement in these activities reflects their deep involvement in sustaining household livelihoods and food systems.
46. In contrast, men dominate more technical or physically demanding tasks such as treating and breeding animals, accounting for 92.8 percent of this activity, while children and hired labor are more involved in grazing—contributing 27.3 percent and 58.2 percent, respectively. This division of labor illustrates a gendered specialization, where women are entrusted with routine, care-intensive tasks, while men and hired labor take on external or specialized roles. Overall, women contribute an average of 56.7 percent of the labor across the livestock value chain, far exceeding the average contributions of men (23.5 percent), children (7.8 percent), and hired labor (12 percent). These figures underscore the critical need for gender-sensitive livestock development policies that recognize, support, and build the capacity of women in the sector.
47. Food insecurity and malnutrition disproportionately affect women, especially pregnant and lactating mothers. Since 2021, approximately 804,365 of these women have suffered from acute malnutrition, exacerbating vulnerabilities, and about 86 percent of female-headed households experience poor food consumption—34 percentage points higher than male-headed households (WFP 2024). As a result, food insecurity forces women into negative coping strategies, including reducing their food intake and increasing unpaid household labor.

48. Broader societal challenges further compound these issues. Women's limited participation in decision-making and economic activities, already constrained by cultural norms, has worsened under the Taliban. Early marriage, high fertility rates, and gender-based violence (GBV) reduce their opportunities for education and economic engagement, negatively affecting their health and productivity. Mobility restrictions and safety concerns further hinder their access to markets, reinforcing their economic marginalization. Afghan women often serve as 'societal shock absorbers' in times of crisis—shouldering increased household burdens while experiencing heightened risks of GBV and forced child marriage, ultimately limiting their capacity to contribute fully to Afghanistan's agricultural and food systems.
49. Efforts to promote gender equality and inclusion in agriculture should focus on addressing structural barriers, providing access to resources and market opportunities, and supporting women to participate more actively in higher-value agricultural activities. Interventions aimed at promoting women's economic independence and enhancing their participation in decision-making processes are essential for achieving sustainable agricultural development and inclusive growth in Afghanistan. Targeted education and outreach initiatives aimed at women can play a pivotal role in equipping them with the necessary knowledge and skills. Additionally, promoting gender-sensitive approaches to ensure women's access to agricultural inputs can foster inclusivity and enable women to actively engage in farming activities. Integrating home gardening practices into value chains, where feasible, not only strengthens food security but also creates income-generating opportunities for women within their communities. Furthermore, emphasizing the cultivation and marketing of products such as mushrooms, aloe vera, vermicompost, and milk products specifically tailored to women's preferences and needs can unlock economic potential and uplift livelihoods. Facilitating market access for products in which women are actively involved is essential for recognizing and valuing their contributions, ultimately fostering sustainable economic development and social progress. It is also important to involve women in community decision-making processes related to agricultural policies and resource management. Establishing women's

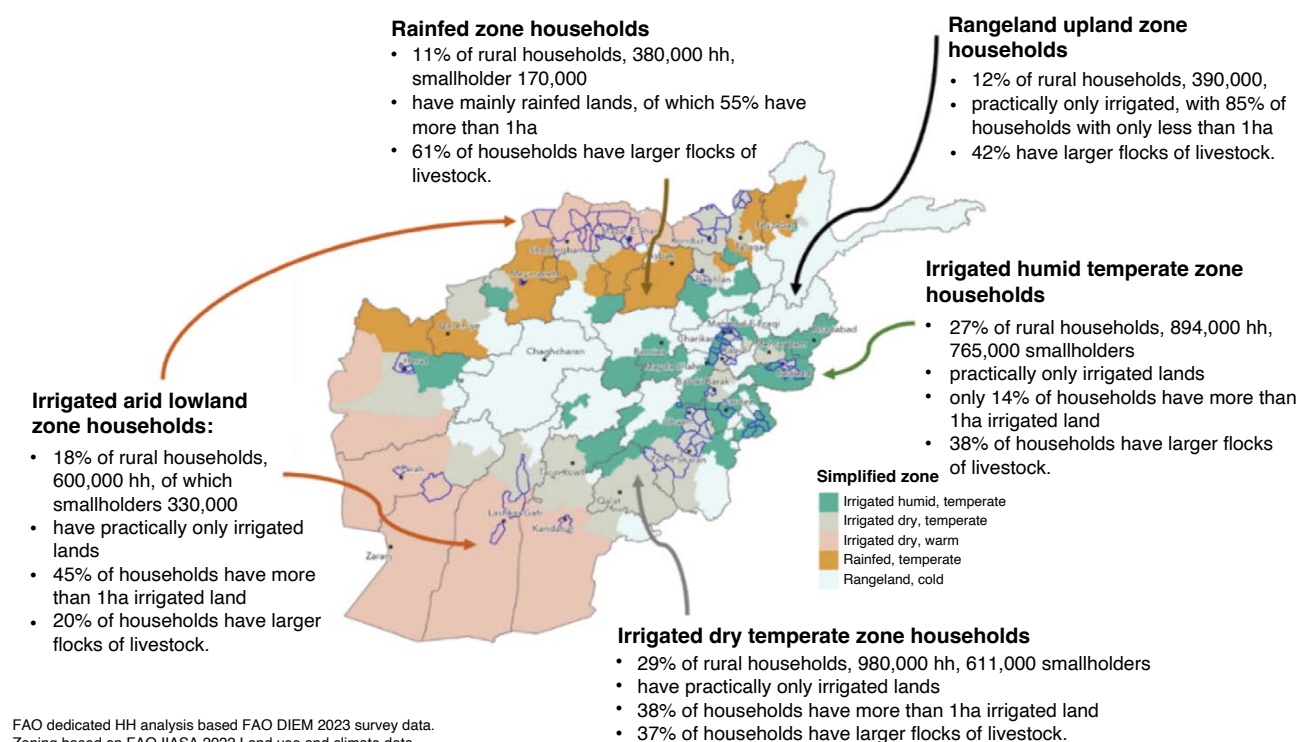
committees to ensure their voices are heard and advocating for their interests are crucial.

Agroecological-livelihood zones for targeting food systems investments

50. Spatial targeting of CSA interventions in Afghanistan is crucial for optimizing resource use, enhancing resilience, and ensuring the effectiveness of agricultural investments. Given the country's diverse agroecological and socioeconomic conditions, a one-size-fits-all approach to CSA would be inefficient. By integrating agroecological information with livelihoods analysis and household survey data, five distinct spatial zones were identified, each requiring tailored CSA strategies (figure 3 and table 4). These zones reflect variations in irrigation access, landholding sizes, population densities, and livestock ownership, which are critical determinants of agricultural productivity and climate vulnerability. Spatial targeting allows interventions to be designed with precision, ensuring that climate-resilient technologies, extension services, and financial support align with the specific needs of each zone. The five zones are as follows:
- **Irrigated arid lowland zone:** 18 percent of the country's estimated rural households are in these zones and have only irrigated land, of which 45 percent of households have more than 1 ha irrigated land, 12 percent more than 2 ha, and 20 percent have larger herds of livestock.⁸
 - **Irrigated dry temperate zone:** 29 percent of rural households are in these zones and have only irrigated land, of which 38 percent of households have more than 1 ha irrigated land, 12 percent more than 2 ha, and 37 percent have larger herds of livestock.
 - **Irrigated humid temperate zone:** 27 percent of all rural households are in these zones and have only irrigated lands, of which only 14 percent of households have more than 1 ha irrigated land, a few have more than 2 ha, and 38 percent have larger herds of livestock.

⁸ Larger herds of livestock are those with more than 4 cattle or 10 small ruminants.

FIGURE 3: CHARACTERISTICS OF THE AGROECOLOGICAL-LIVELIHOOD ZONES FOR CSA TARGETING



- **Rainfed zone:** 11 percent of rural households are in these mainly rainfed lands, of which 55 percent have more than 1 ha of rainfed land, although the remaining smallholders and a small percentage of households also have irrigated land. About 61 percent of households have larger herds of livestock.
- **Rangeland upland zone:** 12 percent of rural households that are in these zones have only irrigated land, of which 85 percent of households have less than 1 ha and 42 percent have larger herds of livestock.

Land degradation

- Land degradation in Afghanistan presents a severe and growing threat to the country's environment, economy, and food security. Approximately 80 percent of the land is at risk of soil erosion, and most areas have already been classified as degraded. Key drivers include overgrazing, deforestation, unsustainable cultivation of marginal lands, and weak land governance. The conversion of rangelands for rainfed wheat cultivation, unregulated timber harvesting, and unplanned settlement expansion

are further degrading soils and vegetation. These anthropogenic pressures have rendered Afghanistan as one of the most ecologically vulnerable countries in the world.

- Climate change has become a powerful compounding factor exacerbating the already critical state of land degradation. Rising temperatures, decreasing and more erratic rainfall, and intensified droughts are accelerating vegetation loss, soil erosion, and desertification. Eastern provinces such as Khost, Laghman, and Nuristan—already ecologically fragile—are experiencing some of the country's highest temperature increases and more frequent natural disasters such as landslides and flash floods. The loss of forest and rangeland cover in these areas has significantly reduced the land's capacity to retain moisture and resist erosion. The impacts of this degradation are widespread. Afghanistan's rangelands—covering roughly 30 million ha and supporting more than 35 million livestock—are vital to rural livelihoods, especially among pastoralist and agro-pastoralist communities. With productivity falling due to land degradation, millions face heightened food insecurity and loss of income. Deforestation, which has reduced Afghanistan's forest cover to just 2 percent of the land area, further

TABLE 4: STRUCTURE OF RURAL HOUSEHOLD POPULATION IN DIFFERENT AGROCLIMATIC ZONES OF THE COUNTRY

Size of land or size of flock size owned	Rate of households in zone with size of land or flocks	Percent of total rural households	Distribution of HH only with large flocks in country	Approximate number of HH (estimate)	Approximate number of people (estimate)
Irrigated Arid Warm & Temperate		18%		613,251	5,519,260
Land irrigated less than 1ha	 55%	 10%		334,330	3,008,966
Land irrigated greater than 1ha	 45%	 8%		278,921	2,510,293
Land irrigated greater than 2ha (subset)	 12%	 2%		73,237	659,135
Medium livestock flocks	 15%	 3%	 3%	109,853	988,681
Large livestock flocks	 6%	 1%	 1%	39,887	358,987
Irrigated Dry Temperate		29%		980,210	8,821,886
Land irrigated less than 1ha	 62%	 18%		611,309	5,501,785
Land irrigated greater than 1ha	 38%	 11%		368,900	3,320,101
Land irrigated greater than 2ha (subset)	 12%	 4%		119,621	1,076,590
Medium livestock flocks	 23%	 7%	 18%	602,240	5,420,164
Large livestock flocks	 14%	 4%	 11%	355,031	3,195,277
Irrigated Humid Cold-Temperate		27%		894,454	8,050,084
Land irrigated less than 1ha	 86%	 23%		765,348	6,888,131
Land irrigated greater than 1ha	 14%	 4%		129,106	1,161,953
Land irrigated greater than 2ha (subset)	 4%	 1%		38,084	342,759
Medium livestock flocks	 28%	 7%	 20%	655,493	5,899,436
Large livestock flocks	 10%	 3%	 7%	244,922	2,204,300
Rainfed Dry/Humid Temperate/Cold		11%		381,440	3,432,958
Land less than 1ha	 45%	 5%		170,190	1,531,711
Land greater than 1ha (mainly rainfed)	 55%	 6%		211,250	1,901,247
Land greater than 2ha (mainly rainfed, subset)	 22%	 3%		84,460	760,140
Land irrigated greater than 1ha	 7%	 1%		27,150	244,352
Medium livestock flocks	 44%	 5%	 9%	292,598	2,633,381
Large livestock flocks	 17%	 2%	 1%	43,550	391,947
Rangeland Humid Cold - Temperate		12%		390,595	3,515,354
Land less than 1ha	 85%	 12%		404,790	3,643,107
Land greater than 1ha	 15%	 2%		70,300	632,704
Land irrigated greater than 1ha	 7%	 1%		34,491	310,419
Medium livestock flocks	 28%	 4%	 9%	293,211	2,638,899
Large livestock flocks	 14%	 2%	 4%	141,399	1,272,588

Source: FAO 2023. Household number estimates are based on 43 million total households, at 9 persons per household, with rural households accounting for 70 percent of the total.

undermines ecosystem services such as groundwater recharge, biodiversity conservation, and protection from soil erosion.

53. To reverse these trends, there is a need to promote sustainable land management and biodiversity conservation. This will help restore degraded rangeland and forest, establish inclusive rangeland and forest management associations, and promote regenerative grazing practices. Integrating women and marginalized communities into restoration activities such as operating small-scale greenhouses or participating in value-added agroforestry enterprises is crucial. Equally important is the need to build institutional and community-level resilience. This includes investing in CSA, improving natural resource governance, and enhancing data and monitoring systems to guide decisions. Strengthening the capacity of local authorities and communities to implement landscape-level planning and restoration is essential, especially as climate change continues to alter Afghanistan's hydrological cycles and vegetation patterns.

Land tenure

54. Land tenure and resource use rights remain among the most complex and contentious institutional challenges facing Afghan agriculture and livestock systems. While a majority of households (38 percent) report ownership of irrigated land, many of these holdings are small—less than 4 jeribs (0.8 ha). Only a minority own larger tracts, and inequalities are especially stark in the distribution of productive, irrigated land. According to a 2003 census cited by Masini and Giordani (2016), farm owners with over 10 ha controlled 70 percent of irrigated land, illustrating persistent concentration of land among a few large landholders. Structural disparities also exist between mountainous and plain regions, with the latter experiencing more unequal land ownership patterns (Pain 2013). Over time, land fragmentation has accelerated, driven by population growth and limited available irrigated land, leading to a decline in average landholding sizes and further intensifying competition over resources.
55. This fragmentation of land is closely tied to poverty and food insecurity. ALCS 2016–17 data showed a clear correlation between land size and poverty incidence, with over half (52.1 percent) of the households owning less than 2 jeribs of irrigated land falling below the poverty line. Even those with larger holdings are not immune, suggesting deeper structural constraints. The situation is further complicated by unresolved land claims from families displaced by decades of conflict, many of whom have returned to find their lands occupied or sold. These tenure insecurities—especially for vulnerable groups such as returnees and women—exacerbate social instability and deter productive investment in agriculture.
56. Rangelands and rainfed lands present a different but equally pressing set of tenure issues. Pastoralists and sedentary farmers regularly compete over access to scarce grazing areas, water sources, and arable land—especially in the Central Highlands, where long-standing tensions between nomadic Kuchi and settled Hazara communities are prevalent. Pasture rights remain poorly defined and unprotected, and external pressures—such as drought, population growth, and urban expansion—have only intensified disputes. The increasing value of peri-urban grazing land has further fueled conflict, while unclear land boundaries and weak enforcement mechanisms continue to prevent resolution.
57. Underlying many of these challenges are overlapping legal frameworks, lack of documentation, and the dominance of informal customary systems. Despite some earlier reforms led by the Afghanistan Independent Land Authority (ARAZI) to improve tenure security—particularly for women, returnees, and the private sector—these initiatives have stalled since 2021. With up to 90 percent of Afghans relying on customary law for land dispute resolution, the system remains highly vulnerable to power imbalances, often disadvantaging women, whose land tenure is largely dependent on their marital or familial ties. Without legal clarity, administrative reform, and inclusive dispute resolution, land tenure insecurity will continue to undermine agriculture and food system resilience in Afghanistan.
58. Improving land tenure security in Afghanistan urgently requires several measures. Strengthening land rights policies and procedures is essential to encourage greater investment in land improvements and the development of efficient land markets. Enhancing the process of issuing land titles for farmers and the

agro-industry, along with creating transparent and easily accessible digital land records, will further support this goal. Building on the successful out-of-court dispute settlement processes and integrating these into the legal framework, coupled with proper regulatory measures, is also crucial. Additionally, enhancing the capacity of the ARAZI to effectively execute its new functions will ensure the success of these initiatives.

59. Improving Afghanistan's land systems, that is, the rules, institutions, and databases that govern land rights and land use, is foundational to these efforts. These systems include the legal frameworks, land agencies, cadastral records, and digital registries that collectively manage land ownership and transactions. Efficient land systems are critical for economic development, as they facilitate secure property rights, better land use planning, and the regulation of land markets. Well-functioning land systems make it easier to do business, stimulate entrepreneurship, and foster job creation by streamlining access to land and reducing uncertainty.
60. Strengthened land systems also unlock private capital by allowing landowners to use property as collateral, especially when supported by digital records and transparent processes. This can significantly improve access to credit, particularly in urban areas. Moreover, securing land rights for women is essential to advancing food security and gender equity. Supporting women with access to land could boost agricultural productivity by 20–30 percent, raise national food output, and improve child welfare (FAO 2011b). Promoting CSA also depends on secure land tenure, which incentivizes sustainable land management. Adopting fast, low-cost technologies such as satellite imagery, the Global Positioning System (GPS), and computerized data systems can accelerate the registration and administration of land rights, ensuring more inclusive and resilient development.

Water resources

61. Afghanistan's river basins are the backbone of its water resources, yet water availability is highly variable due to geography, seasonal flows, and transboundary

dynamics. Afghanistan is hydrologically divided into five main river basins based on its surface water drainage systems: the Harirod-Murghab River Basin (HMRB), Helmand River Basin (HRB), Kabul River Basin (KRB), Northern River Basin (NRB), and Panj-Amu River Basin (PARB). Of these, four, all except the NRB, are transboundary, with rivers flowing into neighboring countries. During the spring, runoff from snow and glacier melt in the mountains leads to high flows in major rivers such as the Kunduz, Kabul, Helmand, and Harirod, often triggering floods and landslides. For the remainder of the year, however, the runoff is irregular and generally low. Smaller rivers behave differently, with many of them flowing for only 3 to 4 months annually.

62. Afghanistan's total surface water potential is estimated at approximately 57 billion cubic meters (BCM)/year, with the majority originating from snow and glacier melt—especially in the Panj-Amu and Kabul River Basins, which receive substantial input from the high-altitude Hindu Kush and Pamir ranges. Approximately 85 percent of Afghanistan's water resources originate in the Hindu Kush highlands, fed by seasonal snow and glacier melt. However, only 30–35 percent of this water is currently utilized, primarily due to outdated and inadequate infrastructure that limits effective storage, distribution, and use. Additionally, transboundary water management poses a growing challenge, with increasing tensions around Helmand River flows to Iran and Amu Darya water allocations among Central Asian neighbors, underscoring the need for improved regional water governance and investment in domestic water systems.
63. Afghanistan's agricultural systems are heavily reliant on variable river flows, which are increasingly under pressure from climate change. This vulnerability is exacerbated by inefficient management of existing irrigation systems. Water availability is particularly critical in key wheat-producing regions and other crop zones that depend on irrigation—largely fed by rainfall, snowmelt, and glacial melt from the highlands of the central regions and the northeastern Hindu Kush.

64. Wheat production in intensively irrigated lowland areas is closely linked to the availability of water, which varies significantly between river basins.

Western and southern irrigated zones—fed by more erratic river flows—tend to exhibit greater variability in wheat area over time, compared to the more stable basins in the north and east, where water supply benefits from heavier snowfall, glacial reserves, and seasonal monsoon influence. Projections indicate an alarming average of 26 percent reduction in annual surface water volumes, with the most severe declines expected in the northwest (table 5). These shifts are driven by changes in snow and glacial melt, and the long-term outlook is especially concerning as contributions from glacier melt to river flows diminish.

65. Compounding these challenges are long-standing irrigation infrastructure and management issues. Poorly maintained canals, distribution losses, inefficient water allocation, and the erosion of traditional governance systems all contribute to current inefficiencies. Groundwater overextraction further undermines sustainability. In key systems such as Nangarhar and Helmand, water losses of 30–40 percent have been recorded. While past projects have attempted to address these constraints, progress has not been sustained in recent years, leaving Afghanistan’s agricultural water resilience critically weakened.

TABLE 5: SURFACE WATER VOLUME IN FIVE AFGHAN RIVER BASINS

River basins	Surface water volume, 1969–1980 (BCM)	Surface water volume, 2007–2016 (BCM)	Decrease 1969–2017 (%)	Projected by 2030 (BCM)	Decrease by 2030 (%)
Kabul	19.3	17.10	–11	15.3	–21
Panj-Amu	21.5	18.70	–13	16.2	–25
Helmand	10.4	8.40	–19	7.1	–32
Haririd-Mughab	3.4	2.53	–26	1.7	–50
North	2.1	2.20	–5	2.0	–5
Total	57.0	49.00	–13	42.3	–26

Source: Shokory, Schaepli, and Lane 2023.

4.



Vulnerability and Projected Impacts of Climate Change

66. This chapter draws extensively on the Afghanistan Agroecological Zoning Atlas, developed by the FAO and the International Institute for Applied Systems Analysis (IIASA). The atlas consists of two volumes: Part 1—Agro-Climatic Indicators (FAO and IIASA 2019), which presents detailed maps and data on Afghanistan’s climate patterns, including historical trends and climate change projections; and Part 2—Agroecological Assessments (FAO and IIASA 2022), which analyzes land suitability for various crops and farming systems under both current and projected climatic conditions.
67. Climate models are based on various GHG emissions scenarios, each representing a different possible future. Representative Concentration Pathways (RCPs) focus solely on atmospheric GHG concentrations, while Shared Socioeconomic Pathways (SSPs) consider factors such as population growth, economic development, education, urbanization, and technological progress, all of which influence future emissions. The numbers following the RCP denote the anticipated change in radiative forcing (measured in watts/m²) from 1750 to the end of the twenty-first century (2100).
68. RCP 4.5, described by the Intergovernmental Panel on Climate Change (IPCC) as a moderate scenario, predicts emissions peak around 2040 and then decreases. It aligns with SSP2, also known as the ‘middle of the road’ scenario, where social, economic, and technological trends largely follow historical patterns without significant changes. On the other hand, RCP 8.5, equivalent to SSP5, represents the highest baseline emissions scenario, with emissions continuing to rise throughout the twenty-first century. This scenario envisions a fossil-fuel-driven development path, marked by increasingly integrated global markets, innovation, and participatory societies that prioritize rapid technological advancements and human capital development to achieve sustainable progress.
69. Climate change will result in higher seasonal and annual temperatures everywhere in Afghanistan, with higher warming expected under RCP 4.5 compared to RCP 8.5. Precipitation changes will be somewhat less uniform, likely leading to reduced annual levels or, at best, remaining at historical levels. The impact of these changes on a farmer’s field will range from very negative to positive, depending on the climate point of departure—such as altitude, prevailing temperature and rainfall in the historical period, the availability or potential development of reliable irrigation, as well as soil and terrain conditions.

Climate change impacts on agroecological zones

70. Climate change will lead to shifts in AEZs. The transition dynamics among AEZ classes indicate that potential multi-cropping opportunities in irrigated areas will expand, provided that sufficient irrigation water is available at the necessary times. For example, the share of potential year-round cropping on irrigated land is expected to increase from an estimated 14 percent of current irrigated land to more than 20 percent by 2041–2070 and, under rapid climate change, up to 35 percent by 2071–2099.
71. Warming will present an opportunity, particularly in the northeastern, central, and west-central regions, where cold and cool temperatures have historically limited the number of suitable cropping days each year. In contrast, in the low-lying southern regions, rising growing-season temperatures may have a negative impact on crop production potential, even with irrigation. Warming will shorten or eliminate the winter dormancy period, defined as the time when average daily temperatures fall below 5°C. This shift will modify the crop calendar for winter and spring crops and may reduce irrigation needs by adjusting the growth cycle to periods with better soil moisture

conditions, as commonly observed in winter rainfall areas. In contrast, the irrigation demand for summer and perennial crops is expected to increase.

72. While the above provides a strong understanding of key agronomic trends emerging with climate change, the impacts on individual crops will vary significantly. These variations will depend on specific temperature requirements and tolerances, the flexibility to adjust crop calendars, the length of crop growth cycles, and the water source, whether rainfed or irrigated. Specific impacts on the production potential land suitability, yields, and production potential that combines the aggregate effects on suitability and yields for selected crops are presented below and in annex 1.

Climate change impacts on cropland suitability and yields of wheat

73. At the national level, and across most regions, the area suitable for wheat cultivation increases slightly under climate change. However, the eastern and southwestern regions are exceptions, where rapid warming, particularly under RCP 8.5, renders some currently suitable cropland unsuitable for wheat production in the long term (table 6). Despite these area changes, the ensemble mean projections show a decline in national average potential wheat yield on suitable land, with reductions of 3–6 percent by

the 2050s and 6–13 percent by the 2080s, depending on the climate scenario. The northeastern region is the only area where average potential wheat yields are expected to increase. Regional yield impacts are detailed in Table 7, while Table 8 presents the combined effects of area and yield changes on potential national wheat production.

Climate change impacts on cropland suitability and yields of rice

74. At the national level, the total area suitable for rice cultivation is projected to change only marginally by the 2050s under climate change scenarios. However, significant regional variations are expected, with both gains and losses across different parts of the country. By the 2080s, under the high-emissions scenario (RCP 8.5), a 10.6 percent reduction in suitable rice-growing areas is projected, with some increases in the central, west-central, and southeastern regions, and substantial declines elsewhere (table 9). A similar but less severe trend is observed for attainable rice yields, which are expected to decline in several regions. This is primarily due to increasingly unfavorable temperature conditions, including heat stress in low-lying areas during summer, a shift from japonica to indica rice varieties, and a shortening of the crop growth cycle. Once adaptive measures

TABLE 6: CLIMATE CHANGE IMPACTS ON SUITABILITY OF CROPLAND FOR WHEAT

Regions	Change in suitable area relative to historical suitable area period of 1981–2010 (%)											
	RCP2.6 vs Historical			RCP4.5 vs Historical			RCP6.0 vs Historical			RCP8.5 vs Historical		
	2020s	2050s	2080s	2020s	2050s	2080s	2020s	2050s	2080s	2020s	2050s	2080s
Northeastern	6.6	5.3	5.8	4.7	4.6	12.2	5.7	5.4	8.9	4.8	7.1	10.9
Northwestern	11.1	8.9	10.1	4.3	10.6	18.4	7.8	8.5	20.8	3.6	9.5	15.0
Eastern	0.5	0.5	0.5	0.4	0.3	0.5	0.5	0.4	0.1	0.4	0.1	–2.1
Central	5.8	6.3	7.4	6.5	9.0	8.3	5.0	8.0	9.5	6.0	8.4	7.6
West-central	6.3	7.4	7.2	6.7	7.7	9.2	5.1	7.4	9.1	5.9	8.8	5.6
Western	2.2	2.1	5.9	5.7	0.7	5.4	3.8	7.5	6.9	–8.4	–1.1	8.2
Southeastern	1.0	1.9	1.4	1.0	1.2	1.6	0.9	1.1	1.5	1.1	1.9	0.3
Southwestern	4.1	4.3	5.8	3.8	1.5	0.9	6.1	4.2	–0.5	3.8	0.4	–8.9
Average	5.6	5.0	6.4	4.5	4.5	8.6	5.3	6.1	8.6	1.3	4.3	6.1

Source: FAO/IIASA 2022

TABLE 7: CLIMATE CHANGE IMPACTS ON ATTAINABLE WHEAT YIELDS

Regions	Potential yield (t/ha)	Change in average potential yield relative to 1981–2010 (%)							
		RCP2.6		RCP4.5		RCP6.0		RCP8.5	
		1981–2010	2050s	2080s	2050s	2080s	2050s	2080s	2050s
Northeastern	2.12		6.6	–1.4	4.9	1.8	6.0	2.5	8.3
Northwestern	2.09		–7.2	–9.5	–13.6	–14.6	–7.1	–13.8	–7.2
Eastern	4.33		–7.4	–8.5	–10.7	–14.3	–10.3	–16.3	–16.0
Central	5.21		–1.8	–2.6	–5.5	–4.8	–4.3	–6.4	–4.8
West-central	4.83		–3.1	–3.6	–4.7	–6.3	–3.6	–5.7	–4.9
Western	2.16		–3.2	–7.3	–7.7	–9.9	–7.5	–11.5	–5.6
Southeastern	5.17		–4.4	–5.1	–7.8	–9.5	–6.6	–10.5	–9.9
Southwestern	3.20		–5.6	–8.2	–7.1	–9.5	–8.2	–10.7	–10.2
Average	2.88		–3.2	–6.3	–5.6	–9.1	–5.3	–9.7	–5.4

Source: FAO/IIASA 2022

TABLE 8: CLIMATE CHANGE IMPACTS ON WHEAT PRODUCTION POTENTIAL

Regions	Potential production (million tons)	Change relative to potential production of 1981–2010 (%)							
		RCP2.6		RCP4.5		RCP6.0		RCP8.5	
		1981–2010	2050s	2080s	2050s	2080s	2050s	2080s	2050s
Northeastern	1.62		12.3	4.3	9.7	14.2	11.7	11.6	16
Northwestern	1.67		1.1	–0.4	1.1	1.2	0.9	4.1	1.7
Eastern	0.5		–7	–8	–10.4	–13.9	–9.9	–16.3	–16
Central	0.94		4.4	4.6	3	3.1	3.4	2.6	3.2
West-central	1.21		4.1	3.3	2.6	2.3	3.5	2.9	3.5
Western	1.76		–1.2	–1.9	–7.1	–5	–0.5	–5.4	–6.6
Southeastern	1.18		–2.6	–3.8	–6.6	–8.1	–5.6	–9.1	–8.3
Southwestern	2.22		–1.5	–2.9	–5.8	–8.7	–4.3	–11.1	–9.8
Total	11.09		1.7	–0.3	–1.3	–1.3	0.5	–1.9	–1.4

Source: FAO/IIASA 2022

such as adjusting planting calendars or substituting rice types are fully utilized, further improvements may depend on the development and adoption of new rice cultivars with enhanced tolerance to heat stress during critical reproductive phases and to cumulative heat exposure throughout the growing season.

75. The combined effects of changes in suitable area and attainable yields on potential rice production are summarized in Table 10. Nationally, rice production capacity is projected to undergo only modest changes by the 2050s under climate change, though regional disparities are considerable. Notable

increases in production potential are expected in the central, west-central, and southeastern regions, while declines are projected in all other areas, especially under the RCP 8.5 scenario by the 2080s. By the 2050s, regional gains and losses largely offset one another, resulting in a modest national decline in rice production potential of approximately 1.9–2.8 percent. However, projections for the 2080s diverge significantly depending on the emissions pathway. Under RCP 4.5, the national reduction remains small at around 1.8 percent, whereas under RCP 8.5, accelerated warming leads to a much steeper decline of 13.8 percent. These projections do

TABLE 9: CLIMATE CHANGE IMPACTS ON SUITABLE CROPLAND AND YIELDS FOR PADDY RICE

Regions	Suitable area (1000 ha)	Change relative to 1981–2010 (%)				Attainable yield (t/ha)	Change relative to 1981–2010 (%)			
		RCP4.5		RCP8.5			RCP4.5		RCP8.5	
	1981–2010	2050s	2080s	2050s	2080s	1981–2010	2050s	2080s	2050s	2080s
Northeastern	184.4	−4	−5.6	−7.6	−30.7	3.17	−0.6	−0.9	−0.9	0.2
Northwestern	121.7	−1.8	−2.2	−3.7	−13.4	3.05	−2.9	−3.9	−3.9	−8.9
Eastern	81.7	0.1	−0.8	−1.8	−7.8	3.29	−1.9	−2.1	−2.8	−6.7
Central	109.2	18	18.8	18.7	21	3.35	5.6	6.5	6.3	5.7
West-central	165.3	7.8	8.7	9.1	10.8	3.24	2.3	2.3	1.9	0
Western	260.4	−8.4	−5.9	−6.2	−19.5	2.92	−1.7	−3.1	−3.9	−8.5
Southeastern	164.5	9.9	10	10.1	9.3	3.27	0.9	0.9	0.2	−2.4
Southwestern	455.9	−9.8	−8.4	−9	−19.5	2.94	−3.3	−4.3	−4.9	−9
Total/Average	1,543.2	−1.7	−1.0	−1.6	−10.6	3.09	−0.2	−0.8	−1.2	−3.7

Source: FAO/IIASA 2022

TABLE 10: CLIMATE CHANGE IMPACTS ON RICE PRODUCTION POTENTIAL AND NET IRRIGATION REQUIREMENTS

Regions	Potential production (1000 tons)	Change relative to 1981–2010 (%)				Net irrigation (mm)	Change relative to 1981–2010 (%)			
		RCP4.5		RCP8.5			RCP4.5		RCP8.5	
	1981–2010	2050s	2080s	2050s	2080s	1981–2010	2050s	2080s	2050s	2080s
Northeastern	527	−4.6	−6.5	−8.5	−30.6	612	1.5	2.5	2.5	1.2
Northwestern	334	−4.6	−6	−7.5	−21.1	739	−0.4	−0.1	0.6	−2.5
Eastern	242	−1.8	−2.9	−4.5	−14	562	8.2	10.1	10.1	11
Central	329	24.7	26.5	26.1	28	456	21.2	26.7	28.6	42.3
West-central	482	10.3	11.2	11.2	10.9	618	9.4	13.3	11.1	18.5
Western	685	−10	−8.8	−9.9	−26.3	1012	−4.8	−6.6	−7.5	−14.8
Southeastern	483	10.9	11	10.4	6.7	561	8.4	13.2	10.7	19.1
Southwestern	1,207	−12.7	−12.3	−13.5	−26.7	886	−6.2	−9.9	−10.2	−16.1
Total/Average	4,290	−1.9	−1.8	−2.8	−13.8	752	−1.6	−1.7	−2.3	−4.0

Source: FAO/IIASA 2022

not account for the potentially beneficial effects of elevated atmospheric CO₂ concentrations.

76. In terms of irrigation, the amount of water required to realize the simulated production potential increases in the central, west-central, and southeastern regions. Minimal changes are observed in the northeastern and northwestern regions, while irrigation requirements decline in the western and southwestern regions. Overall, national average irrigation demand decreases slightly due to shifts in the geographic distribution of suitable cultivation areas.

Climate change impacts on cropland suitability and yields of potato

77. At the national level, the total area suitable for potato cultivation remains relatively stable under three of the four climate scenarios outlined in Table 11. However, regional shifts are more pronounced, with both increases and decreases in suitability depending on location. A significant national-level decline of approximately 10 percent in suitable area is

TABLE 11: CLIMATE CHANGE IMPACTS ON CROPLAND SUITABILITY AND YIELDS FOR POTATO

Regions	Suitable area (1000 ha)	Change relative to 1981–2010 (%)				Attainable yield (t/ha)	Change relative to 1981–2010 (%)			
		RCP4.5		RCP8.5			RCP4.5		RCP8.5	
	1981–2010	2050s	2080s	2050s	2080s	1981–2010	2050s	2080s	2050s	2080s
Northeastern	405	6.6	12.2	5.2	4.4	2.08	7.4	15.1	14.8	18.9
Northwestern	207	−5.2	−12.6	−17.3	−40.8	1.51	0.2	0.1	5.1	49.3
Eastern	104	−0.1	−4.3	−9.2	−49.4	4.63	−0.2	−0.3	−1.4	−2.8
Central	168	5	3.3	3.1	0.9	4.73	−10	−10.2	−9.9	−9.8
West-central	212	2.2	1.3	0.8	−1	4.44	−11.9	−9.9	−10.1	−2.8
Western	123	3.8	−7	3.2	−19.1	1.89	−13.9	−5.2	−12.7	−5.2
Southeastern	210	−5.6	−4.2	−4.6	−9.1	4.53	−7	−5.6	−4.7	−2
Southwestern	103	−5.8	12.9	12.4	5.9	3.93	−1	−1.5	5	6.5
Total/Average	1531	1.0	1.5	−0.7	−10.1	3.24	−5.0	−2.0	−1.3	4.7

Source: FAO/IIASA 2022

projected only under the most severe climate change scenario—RCP 8.5 by the 2080s. Regionally, warming is expected to have the most adverse effects on potato suitability in the northwestern, eastern, and western regions. In contrast, the northeastern and central regions show modest gains in suitability across all scenarios. National average attainable potato yields are projected to remain relatively unchanged, though substantial regional differences persist. These regional yield changes reflect not only variations in local climate conditions but also shifts in the extent of suitable land. For example, a region’s average yield may rise if

climatic improvements enhance productivity in high-performing areas or if currently less productive areas become unsuitable and are excluded from the average.

78. The combined effects of changes in suitable area and attainable yields result in a slightly negative overall impact on national potato production potential. While increases are projected in the northeastern and southwestern regions, most other regions are expected to experience declines—particularly the northwestern, western, southeastern, and eastern regions (table 12). By the 2050s, the national

TABLE 12: CLIMATE CHANGE IMPACTS ON POTATO PRODUCTION POTENTIAL AND NET IRRIGATION REQUIREMENTS

Regions	Potential production (1000 tons)	Change relative to 1981–2010 (%)				Net irrigation (mm)	Change relative to 1981–2010 (%)			
		RCP4.5		RCP8.5			RCP4.5		RCP8.5	
	1981–2010	2050s	2080s	2050s	2080s	1981–2010	2050s	2080s	2050s	2080s
Northeastern	758	14.5	29.1	20.7	24.2	63	0.6	1.1	13.3	13.3
Northwestern	281	−5	−12.5	−13.2	−11.7	151	−13.2	−11.9	−9.3	−1.3
Eastern	434	−0.3	−4.6	−10.5	−50.8	124	10	9	9.5	10.8
Central	717	−5.5	−7.3	−7.2	−9	159	−2.6	−8.5	−0.8	3.3
West-central	845	−9.9	−8.7	−9.4	−3.8	234	−8.7	−9.4	−6.9	5.3
Western	209	−10.7	−11.8	−9.9	−23.4	246	−6.9	−11	−7.3	−15
Southeastern	856	−12.2	−9.6	−9.2	−10.9	191	−0.6	2.1	3.9	18.1
Southwestern	363	−6.7	11.3	18	12.8	225	−0.8	−1.6	−2.1	−0.4
Total/Average	4,463	−4	−0.6	−2	−5.9	178	−3.6	−4.4	−1	7.4

Source: FAO/IIASA 2022

potato production potential is projected to decline moderately by approximately 2 percent to 4 percent due to climate change. Looking ahead to the 2080s, outcomes vary more significantly depending on the emissions pathway: under RCP 4.5, the national decline remains modest at around 1 percent, while under RCP 8.5, the impact of accelerated warming leads to a more substantial decrease of about 6 percent. Potatoes are highly sensitive to elevated temperatures, making them vulnerable to warming trends. As a result, crop calendars will need to shift toward cooler periods of the year. These adjustments, along with changes in the geographic distribution of suitable cultivation areas, are expected to result in relatively minor changes in net irrigation requirements.

Climate change impacts on cropland suitability and yields of citrus

79. As shown in Table 13, the national area suitable for citrus cultivation is projected to increase substantially by the 2050s, both on land currently used for fruit trees and vineyards and on existing irrigated cropland. Correspondingly, citrus production potential (Table 14) is also expected to rise. This trend, driven by warming

temperatures, is projected to continue through the 2080s. In fact, the highest citrus production potential is observed under the RCP 8.5 scenario in the 2080s, primarily due to the steady expansion of areas with little to no frost risk.

Climate change impacts on rangeland production

80. Table 15 presents the distribution of rangeland, and the areas deemed at least marginally suitable for grazing, categorized by region and broad elevation ranges. The data show that approximately 10 percent of rangeland classified under the Afghanistan Land Cover Database lies below 1,000 m, 24 percent between 1,000 and 2,000 m, 41 percent between 2,000 and 3,000 m, and the remaining 25 percent above 3,000 m. The total area assessed as suitable for grasses and pasture legumes under rainfed conditions with low input and management amounts to 24.1 million ha. Among Afghanistan's 34 provinces, 5 have over 80 percent of their land classified as rangeland: Ghor (89 percent), Bamyan (86 percent), Panjsher (86 percent), Daykundi (84 percent), and Wardak (82 percent). Furthermore, eight provinces: Ghor, Badakhshan, Herat, Kandahar, Ghazni, Bamyan, Badghis, and Daykundi

TABLE 13: CLIMATE CHANGE IMPACTS ON SUITABILITY OF CROPLAND FOR CITRUS

Regions	Land with fruit trees and orchards					Suitable area (1000 ha)	Irrigated cropland			
	Suitable area (1000 ha)	Suitable area ensemble mean (1000 ha)					Suitable area ensemble mean (1000 ha)			
		RCP4.5		RCP8.5			RCP4.5		RCP8.5	
	1961–2010	2050s	2080s	2050s	2080s		1961–2010	2050s	2080s	2050s
Northeastern	0.2	1.4	1.8	1.7	2.1	29.1	88.3	100.6	87.3	73.4
Northwestern	0.06	0.9	3.5	2.1	5.1	16.1	10.1	35	13.7	26
Eastern	3.4	3.1	2.4	1.8	1.1	87.5	85.4	74.4	67.3	32.7
Central	0	0.1	2	3.5	17.2	0	0.1	9	16	86.7
West-central	0	2.4	5.6	6.5	11.7	0	30.2	83.5	100.8	169
Western	0.03	0.3	0.8	0.5	0.7	2.4	21.7	41.3	25.3	26.4
Southeastern	0.1	0.6	1.4	1.6	2.6	32.4	86.4	124.2	137.4	164.8
Southwestern	3.7	11.5	14.5	13.9	12.8	65.4	100.3	113.7	105.4	76.6
Total	7.4	20.3	32	31.7	53.4	232.9	423.4	581.5	553.1	655.6

Source: FAO/IIASA 2022

TABLE 14: CLIMATE CHANGE IMPACTS ON CITRUS PRODUCTION POTENTIAL

Regions	Land with fruit trees and orchards					Potential production (1,000 tons)	Irrigated cropland			
	Potential production (1,000 tons)	Potential production ensemble mean (1,000 tons)					Potential production ensemble mean (1,000 tons)			
		RCP4.5		RCP8.5			RCP4.5		RCP8.5	
	1961–2010	2050s	2080s	2050s	2080s		1961–2010	2050s	2080s	2050s
Northeastern	0.7	4.1	5.4	4.9	5.8	95	270	309	265	210
Northwestern	0.1	2.4	9.4	5.7	14.4	40	26	98	36	72
Eastern	10.2	8.6	7	5.4	3.5	265	248	218	197	96
Central	0	0.2	5.4	9.2	49.7	0	2	24	42	248
West-central	0	6.7	16	18.5	35	0	83	238	287	508
Western	0.1	0.7	2.1	1.3	1.9	6	56	110	65	70
Southeastern	0.3	1.6	3.9	4.6	8	90	241	356	394	495
Southwestern	9.8	32.1	42.4	39.8	37.3	175	276	327	297	220
Total	21.3	56.5	91.6	89.5	155.4	673	1,203	1,681	1,582	1,918

Source: FAO/IIASA 2022

collectively account for 51 percent of the country's total rangeland area.

81. Table 16 presents estimates of potential biomass production and yield for areas classified as rangeland under the Afghanistan Land Cover Database, based on simulations using rainfed conditions and low input assumptions for the average climate during 1981–2010. Nationally,

average attainable rainfed pasture yields decrease with elevation—from approximately 2.4 tons of dry matter (DM) per ha below 1,000 m to just 0.2 tons of DM per ha above 3,000 m. This trend, observed across all regions, is primarily due to shorter growing seasons and reduced photosynthetic activity at higher altitudes. However, absolute yield values vary by region depending on local precipitation levels. Under these conditions, the total potential

TABLE 15: LAND SUITABLE FOR GRAZING IN CURRENT RANGELANDS

Regions	Classified as rangeland (1,000 ha)					Suitable area (1,000 ha)				
	<1000 m	1000–2000 m	2000–3000 m	>3000 m	Total	<1000 m	1000–2000 m	2000–3000 m	>3000 m	Total
Northeastern	394	739	1,132	2,348	4,613	365	543	701	1,250	2,859
Northwestern	1,194	963	1,114	542	3,814	1,094	817	895	434	3,240
Eastern	84	295	149	623	1,151	77	233	87	356	755
Central	1	234	996	1,060	2,291	—	205	791	716	1,713
West-central	—	243	2,056	2,110	4,409	—	201	1,628	1,670	3,499
Western	842	1,901	4,225	713	7,681	779	1,730	3,589	565	6,663
Southeastern	2	392	1,231	90	1,715	2	305	986	65	1,358
Southwestern	346	2,523	1,555	147	4,571	316	2,333	1,307	107	4,063
Total	2,863	7,290	12,458	7,633	30,244	2,633	6,367	9,984	5,163	24,150

Source: FAO/IIASA 2022

biomass production of suitable rangeland in Afghanistan is estimated at 19.2 million tons of DM. Based on a daily feed requirement of 12.5 kg DM per livestock unit (LSU) and assuming a 50 percent fodder utilization rate, this production could support approximately 2.1 million LSU—roughly one-third of the national livestock herd.

82. Table 17 summarizes the simulated impacts of climate change on rangeland production potential, highlighting directional changes by region and

elevation range. Overall, at the national level, rangeland productivity is projected to remain stable or slightly improve under climate change, though with significant regional and altitudinal variation. Positive changes are most likely in the northeastern, northwestern, and western regions—particularly at elevations above 2,000 m. In contrast, productivity is expected to decline in low-lying areas below 1,000 m, affecting much of the southwestern, southeastern, and eastern regions. In the west-central and central regions, where

TABLE 16: POTENTIAL BIOMASS PRODUCTION AND YIELD OF CURRENT RANGELAND

Regions	Potential biomass production (1,000 tons Dry Matter, DM)					Average potential yield (tons DM/ha)				
	<1000 m	1000–2000 m	2000–3000 m	>3000 m	Total	<1000 m	1000–2000 m	2000–3000 m	>3000 m	Average
Northeastern	881	1,016	452	219	2,568	2.42	1.87	0.65	0.17	0.9
Northwestern	1,780	939	441	78	3,238	1.63	1.15	0.49	0.18	1
Eastern	250	731	121	152	1,254	3.22	3.13	1.39	0.43	1.66
Central	1	472	804	177	1,454	2.49	2.31	1.02	0.25	0.85
West-central	—	210	923	418	1,550	n.a.	1.05	0.57	0.25	0.44
Western	1,110	1,630	1,117	91	3,947	1.43	0.94	0.31	0.16	0.59
Southeastern	11	723	1,194	82	2,011	6.14	2.37	1.21	1.27	1.48
Southwestern	180	2,039	900	12	3,131	1.6	1.22	0.6	0.24	0.79
Total/Average	4,213	7,760	5,952	1,229	19,153	2.42	1.87	0.65	0.17	0.9

Source: FAO/IIASA 2022

TABLE 17: IMPACTS OF CLIMATE CHANGE ON RANGELAND PRODUCTION POTENTIAL

Regions	Change of potential biomass production					Change of average potential yield				
	TOTAL	<1000 m	1000–2000 m	2000–3000 m	>3000 m	TOTAL	<1000 m	1000–2000 m	2000–3000 m	>3000 m
Northeastern	▲	▲	▲	▲	▲	▲▲	▲	▲▲	▲▲	▲▲
Northwestern	▲	◀▶	▲	▲	▲	▲	▼	▲	▲	▲
Eastern	▼	▼	▼	▼	◀▶	▼	▼▼	▼	◀▶	▲▲
Central	▼	▼	▼	▼	▼	◀▶	▼	▼	◀▶	▼
West-central	▼	n.a.	◀▶	◀▶	▼	◀▶	n.a.	▼	◀▶	◀▶
Western	▲	▲	▲	▲	▲	▲	▲	▲	▲▲	▲
Southeastern	▼	▼▼	▼	▼	▼	▼	▼▼	▼▼	▼	▲
Southwestern	▼	▼▼	▼	▲	▼	▼	▼▼	▼	▲	▲
TOTAL	◀▶	▲	◀▶	▲	◀▶	▲	◀▶	◀▶	▲	▲

Note: Arrows indicate changes of simulated potential grass biomass production of less than 3% (◀▶), 3%–15% (▼, ▲), 15%–30% (▼, ▲) and more than 30% (▼▼, ▲▲) compared to baseline conditions.

water availability is already a critical constraint, rangeland productivity shows little change, even at higher altitudes, despite warming trends.

83. The above analyses show that the challenges posed by climate change and its cascading impacts on food security in Afghanistan will continue to increase

over time. By focusing on resilience and sustainable food system solutions, Afghanistan can build a more robust and adaptive food system that ensures food security and safeguards the livelihoods of the millions of Afghan people. The next chapter focuses on identifying and prioritizing interventions for food systems resilience.

5.



Interventions for Climate-Resilient and Inclusive Food Systems

84. The development of CSA investment packages for Afghanistan followed a structured process starting with the identification of long lists of potential activities. These were informed by background analyses of key agricultural subsectors, previous plans and projects, and input from expert regional teams. Activities were catalogued by subsector such as cereals, horticulture, and livestock using both historical data and cost-benefit evidence from prior evaluations. To prioritize interventions from the long lists, a set of simplified but meaningful criteria was applied. These criteria aimed to balance agricultural productivity, income generation, job creation, and inclusion, alongside environmental sustainability and resilience to climate change. They also emphasized outreach to vulnerable groups such as women and nomadic pastoralists, job creation for youth, and alignment with national food security and economic development goals. The inclusion of value-added components and potential for private sector engagement further shaped the investment strategy (table 18). Each intervention was then assessed and scored on a 5-point scale against the prioritization criteria (annex 2). Higher-scoring interventions, especially those achieving multiple benefits, were selected as the core components of the investment packages.

85. The final investment packages aim to be both technically sound and practical, targeting productivity gains, enhanced resilience, environmental rehabilitation, and stronger market linkages. They also strive for inclusivity, explicitly addressing the needs of vulnerable farming populations and creating pathways for economic participation, especially by women and youth. By integrating these elements, the packages are designed to support both short-term recovery and long-term transformation of Afghanistan's agrifood systems. The CSA investment planning approach blended analytical rigor with stakeholder input and practical

experience, resulting in prioritized, criteria-driven intervention packages. These offer a roadmap for climate-resilient agricultural development, aligned with both national priorities and the urgent needs of farming communities under stress from economic, social, and environmental challenges.

Agribusiness cluster development: Opportunities and investment requirements

86. The identification and development of six agribusiness clusters in Afghanistan represent a pivotal strategy for revitalizing the country's agricultural sector and unlocking inclusive economic growth. These clusters—Northern Plains, Eastern Zone, Central Highlands, Southern Zone, Western Zone, and the Kabul Region—were defined based on agroecological conditions, production patterns, market access, infrastructure potential, and existing private sector activity. The cluster-based approach is designed to promote regional specialization, support value chain integration, and catalyze both domestic and foreign investment in agribusiness development (annex 3).

87. **Northern Plains Cluster.** This cluster comprising Balkh, Kunduz, and Baghlan is one of Afghanistan's most agriculturally productive regions, characterized by large-scale cultivation of wheat, rice, cotton, and a variety of fruits and vegetables. Livestock keeping is also widespread. The region offers strong potential for investment in mechanized farming, water-efficient irrigation systems, and agro-processing facilities such as flour mills, rice mills, and cotton ginneries. Livestock value chains, including dairy and meat, can be strengthened through investment in feed production, cold chains, and veterinary services. The estimated investment requirement for

TABLE 18: PRIORITIZATION CRITERIA FOR INVESTMENT PACKAGES

No.	Criterion	Description
1	Productivity	Interventions that significantly improve yields of staple crops, livestock, and other essential commodities for national food security and dietary diversity
2	Income generation	Activities that increase farmers' incomes through market-oriented production and sales, helping both subsistence and commercial farmers reduce poverty and improve livelihoods
3	Inclusivity	Measures that can reach a large number of smallholder farmers, especially vulnerable groups such as women, nomadic pastoralists, and youth (with a focus on job creation)
4	Climate resilience	Interventions that build resilience to current and future climate shocks through improved practices, technologies, innovations, and systems
5	Environmental benefits	Activities that enhance soil health, restore rangelands, improve biodiversity, and increase the efficiency of water and livestock systems, with potential for GHG mitigation
6	Value addition	Investments that strengthen value chains, promote agro-processing, attract private sector engagement, and generate employment through economic diversification

this cluster is approximately US\$300 million in the short to medium term, primarily for infrastructure development, modern farming equipment, and medium- to large-scale processing units.

88. **Eastern Zone Cluster.** With favorable climatic conditions for horticulture, the Eastern Zone encompassing Nangarhar, Laghman, and Kunar holds significant promise for high-value cash crops such as citrus, vegetables, and intensive livestock production. Investment opportunities include the development of agro-processing units for dried fruits, juice extraction, vegetable sorting and packaging, and small-scale dairy and poultry production. Financing of small and medium enterprises (SMEs) and improvements in energy access and cold storage are essential to unlock this region's export potential. An estimated US\$240 million is needed to upgrade value chains, strengthen market linkages, and improve agricultural logistics.
89. **Central Highlands Cluster.** Renowned for potatoes, apples, apricots, and dairy products, the Central Highlands, including Bاميان and Daikundi cluster, is well suited for import substitution and the development of value-added agribusinesses. Investments in cold storage, solar-powered refrigeration, and potato processing for products such as chips can reduce postharvest losses and open new markets. Supporting women's participation in dairy cooperatives and improving access to extension services are essential components. The estimated investment requirement for this cluster is

US\$160 million, focused on cold chain infrastructure, community-based enterprises, and feed production.

90. **Southern Zone Cluster.** The Southern Zone comprising Kandahar, Helmand, and Uruzgan is known for production of premium pomegranates, grapes, almonds, melons, and dairy products. Opportunities exist for large-scale processing facilities for fresh and dried fruits, juice production, almond packaging, and dairy product standardization. Investments in solar-powered cold storage, logistics, and export certification systems will be crucial. This cluster requires an estimated US\$300 million, with a focus on horticulture commercialization, postharvest handling, and private sector-led agribusiness expansion.
91. **Western Zone Cluster.** Home to Afghanistan's renowned saffron industry, the Western Zone consisting of Herat, Badghis, and Farah offers considerable potential in saffron processing, branding, and export enhancement. In addition, grapes, dried fruits, and dairy are key products that can benefit from investment in modern processing and packaging facilities. Development of local machinery production, SME support, and improved access to energy and finance are also needed. An investment of US\$250 million is estimated to strengthen this region's competitiveness and enhance value chain efficiency.
92. **Kabul Region Cluster.** With good road connectivity and proximity to urban markets, the Kabul Region

covering Kabul, Parwan, Wardak, Logar, Paktika, and Ghazni is ideal for scaling up high-value crops such as apples, grapes, apricots, pine nuts, and vegetables. Opportunities include establishing aggregation and packaging centers, cold storage facilities, and urban-based peri-urban commercial farms. Enhancing digital platforms for market access and investing in logistics and storage infrastructure are key to realizing the full potential of this cluster. The region is projected to require US\$250 million investments to modernize supply chains and support agri-entrepreneurship.

Private capital mobilization

93. Mobilizing private sector investment is essential for unlocking the full potential of Afghanistan's agribusiness clusters, which span the Northern Plains, Eastern Zone, Central Highlands, Southern Zone, Western Zone, and the Kabul Region. These clusters offer regionally tailored opportunities for commercial agriculture, value-added processing, and agri-logistics. Realizing these opportunities, however, requires targeted financing, risk mitigation, and strategic partnerships. Ending poverty and hunger globally will require an estimated US\$140 billion in additional annual financing, of which US\$50 billion is expected from the private sector (World Bank 2018). This reflects a leverage ratio of 1.8:1, meaning that every US\$1.80 in public investment could mobilize US\$1 in private financing. Applying this ratio, an investment of US\$1.5 billion in Afghanistan's agribusiness clusters could potentially attract an additional US\$834 million from private sources, underscoring the critical role of coordinated public-private investment approaches.
94. A range of actors—including SMEs, Islamic financial institutions, international agribusinesses, and global development finance institutions—play complementary roles in capital mobilization. SMEs serve as the cornerstone of local agribusiness ecosystems. With adequate access to capital and technical support, they can spearhead investments in aggregation centers, cold storage, solar-powered facilities, and small-scale processing units, especially in high-potential value chains such as dairy, dried fruits, vegetables, and poultry. Their agility and deep integration into local economies make them ideal agents for driving innovation and inclusive growth.
95. Islamic banks and financial institutions are particularly important in Afghanistan's financial landscape. By offering instruments such as Murabaha (cost-plus financing), Ijara (leasing), and Salam (advanced purchase agreements), these institutions facilitate culturally appropriate access to capital for farmers and agri-entrepreneurs. Islamic finance mechanisms can be scaled through dedicated credit lines and partnerships with microfinance institutions and community-based cooperatives.
96. International agribusinesses and foreign investors bring critical expertise, technology, and market access. These actors can play a transformative role in developing export-oriented processing and packaging industries, particularly for high-value crops such as saffron, grapes, almonds, and pomegranates. With appropriate risk mitigation and regulatory support, foreign investors can strengthen supply chains, standardize quality, and enhance Afghanistan's competitiveness in regional and global markets.
97. Crucially, the role of international development finance institutions cannot be overstated. The International Finance Corporation (IFC) is uniquely positioned to catalyze private investment through its blended finance instruments, equity co-investments, and advisory services. IFC can work directly with commercial banks to extend credit to agribusinesses while also partnering with local and foreign firms to strengthen value chains and improve operational efficiency. Its involvement sends a strong signal to other investors, helping de-risk projects and expand the pipeline of bankable agribusiness ventures.
98. In parallel, the Multilateral Investment Guarantee Agency (MIGA) plays a vital role in de-risking foreign and domestic investments by offering political risk insurance and credit enhancement tools. MIGA's guarantees can help mitigate risks associated with currency inconvertibility, expropriation, conflict, and contract enforcement—critical concerns in fragile environments such as Afghanistan. By protecting commercial lenders and equity investors, MIGA supports the inflow of long-term capital into infrastructure, processing, and logistics, aligned with agribusiness development.
99. To effectively mobilize capital, several investment mechanisms must be leveraged in tandem. These include blended finance, which combines

concessional resources with private investment to improve risk-return profiles; guarantee schemes to unlock commercial lending; and public-private partnerships (PPPs) for large-scale infrastructure such as agro-industrial parks, storage hubs, and irrigation systems. The integration of Islamic finance and digital platforms can further enhance financial inclusion and investment reach, particularly in underserved rural areas.

100. In summary, scaling investment in Afghanistan's agribusiness clusters requires an orchestrated effort involving local entrepreneurs, financial institutions, international investors, and global development actors. By aligning incentives, reducing risk, and deploying innovative finance tools, the private sector can drive a resilient and inclusive transformation of the country's food and agricultural systems.

Agricultural research and development

101. Supporting Afghanistan's Research and Development (R&D) units is critical to the success of the CSAAP. These units play a central role in generating, testing, and scaling innovative technologies and practices tailored to local agroecological conditions. Strengthening their capacity through targeted investments in infrastructure, skilled personnel, and collaborative research will enable the development of climate-resilient crops, improved livestock systems, and efficient natural resources management (NRM) strategies. Supporting these institutions ensures evidence-based decision-making and equips farmers with the tools needed to adapt to and mitigate the impacts of climate change.
102. The Agricultural Research Institute of Afghanistan (ARIA) operates under three main directorates: the Adoption and Basic Research Directorate, the Soil Research Directorate, and the Livestock Research Directorate. It manages 20 regional research stations across the country. These directorates, through the research stations, are tasked with developing and delivering new techniques and technologies to address and reduce the impacts of climate change. Their efforts focus on three priority areas: building the capacity of researchers to align their work with CSA priorities, establishing laboratories for disease management and input quality control—given that

functional labs are currently lacking—and providing the necessary tools and equipment to the research stations. These measures are essential to improve the analysis, mitigation, and dissemination of technologies that address climate shocks.

103. To enhance effectiveness, stronger coordination is needed within the MAIL, led by the General Directorate of Planning. Additionally, collaboration with the National Environmental Protection Agency (NEPA) is crucial for climate change analysis, policy development, and setting strategic priorities. NEPA plays a central role in managing climate-related data and coordinating among stakeholders involved in addressing climate shocks and implementing relevant programs.
104. **Delivery of climate information services and advisories.** The Afghanistan Meteorology Department (AMD) plays a critical role in seasonal forecasting and the dissemination of early warning reports. However, to effectively support extension services and enable farmers to anticipate and mitigate climate shocks, there is a pressing need to expand and modernize weather forecasting stations and strengthen institutional capacity. While Kabul Agricultural Faculty is developing models to anticipate climate change impacts, further investments in training and technical support are essential to improve the accuracy and accessibility of these models. Equally important is the integration of climate change and CSA content into the curricula of agricultural faculties across the country. With approximately 800 faculty members currently in place, these institutions have significant potential to build a new generation of students and extension agents equipped with the knowledge and skills to promote CSA practices through research and outreach.
105. To help Afghan farming communities adapt to climate change in the near term, localized awareness and capacity-building initiatives are crucial. This includes establishing district-level training centers to provide hands-on learning opportunities and tailored support. Public awareness campaigns should accompany these efforts, not only to promote CSA technologies but also to link them with broader goals such as improving food and nutrition security. These campaigns should include education on nutrition, food preparation, and utilization while also offering guidance on livelihoods, value addition, and

enterprise development in agriculture. Additionally, identifying and promoting local economic opportunities—such as cultivating medicinal plants for niche markets—can diversify income sources and enhance resilience in vulnerable communities.

106. **Crops research and development.** Under the Adaptive and Basic Research Directorate, a major priority is the development and dissemination of climate-smart agricultural technologies to help farming communities cope with the increasing impacts of climate change. Innovation in this area hinges on the advancement of basic research programs, particularly in modern laboratories dedicated to variety development. Introducing drought-resistant and climate-resilient crop varieties, especially for rainfed agriculture, is urgently needed. However, there is a growing risk of losing traditional wheat and cereal landraces and germplasm, which form the foundation of research and breeding programs. To prevent this, ex situ conservation in a well-maintained national Gene Bank is essential. Additionally, the potato tissue culture program, previously supported by the FAO, has become weak and nonfunctional, requiring renewed attention and investment in tissue culture laboratories. While the FAO continues to support adoption research and the seed sector, sustained and expanded engagement is critical to ensure long-term functionality and impact.

107. Water availability and management remain central to climate resilience in agriculture. To mitigate the effects of extreme weather, it is essential to refine and promote climate-smart practices that include water harvesting during the wet season, improved on-farm water efficiency, and the use of drought-tolerant crop varieties. Innovations must also focus on developing and promoting locally appropriate machinery such as seed drills, laser levelling tools, and technologies for sustainable rice and wheat intensification (SRI/SWI). Meanwhile, the increased frequency of climate extremes is expected to heighten the threat of pests and diseases, an area under the mandate of the Plant Protection and Quarantine Directorate (PPQD). Although the Afghanistan Agricultural Inputs Project (AAIP), funded by the World Bank, has established a network of laboratories and quarantine facilities, most remain unequipped and nonfunctional. These labs require urgent upgrading to enable effective plant protection and safeguard agricultural productivity

108. **Livestock research and development.** There is an urgent need to strengthen Afghanistan's livestock sector to better cope with the impacts of climate change, particularly through the improvement of livestock breeds and practices under a comprehensive One Health strategy. This effort requires focused investment and institutional support within the Livestock Research Directorate. A key step will be the establishment of dedicated livestock research stations across major AEZs, including Herat, Balkh, Kunduz, Helmand, Nangarhar, and Kabul provinces. These stations will serve as hubs for research, innovation, and dissemination of climate-smart livestock technologies tailored to local conditions.

109. To support these research stations, it is essential to develop diagnostic and disease identification laboratories, along with a central vaccine production facility in Kabul. Building the technical capacity of staff is equally important and should be pursued through a mix of short-, medium-, and long-term training programs to reorient research and field activities toward climate-smart livestock development. In addition, establishing livestock product quality control laboratories and equipping quarantine stations with functional testing facilities will be critical to ensure effective disease management, support livestock value chains, and enhance market access for Afghan producers.

Stakeholder consultations and validation

110. Stakeholder engagement was central to the development, refinement, and validation of the CSAAP, ensuring that the process was grounded in national realities, institutional perspectives, and practical experience from the field. Multiple rounds of structured consultations were conducted to guide methodological development, prioritize investment needs, validate findings, and align proposed interventions with stakeholder expectations. These engagements brought together technical experts, public sector institutions, and private sector actors, each contributing distinct insights to shape a comprehensive and credible action plan.
111. The first major consultation was held in June 2024, in the form of a one-day national technical workshop attended by 40 representatives from all

major departments and directorates of the MAIL. This workshop reviewed preliminary findings and discussed core methodological approaches and investment priorities. Participants provided feedback on the structure and composition of proposed intervention packages, drawing attention to region-specific priorities, institutional support requirements, and technical refinements that could enhance implementation feasibility.

112. This was followed by a broader stakeholder review meeting in September 2024, which included representatives from FAO technical units, provincial agricultural departments, development partners, and other sectoral agencies. This round of consultation provided an opportunity to validate sectoral priorities, estimate cost ranges, and ensure that the recommended investment packages were aligned with field-level realities. Importantly, stakeholders helped assess the robustness of criteria used to prioritize interventions—such as climate resilience, productivity, inclusion, and environmental co-benefits—and their applicability across Afghanistan’s AEZs.

113. To further strengthen the methodology and investment framework, a follow-up technical session was organized in February 2025. This focused on finalizing cost estimates, refining scale-up assumptions, and reviewing the proposed sequencing of interventions. Particular attention was given to assessing financing needs under different scenarios and incorporating updated stakeholder perspectives gathered through the FAO’s ongoing field operations and regional networks.

114. Furthermore, a private sector consultative forum jointly organized by the World Bank and IFC was convened in May 2025 to foster dialogue on agribusiness development and validate the agribusiness cluster component of the CSAAP. Emphasizing the World Bank’s strategic shift toward deeper private sector engagement, the meeting underscored the importance of inclusive collaboration to unlock investment opportunities in agriculture. The forum included participants MAIL, Ministry of Finance, UN agencies, agribusiness firms, input suppliers, processors, traders, and financial intermediaries as well as representatives from chambers of commerce and producer organizations. Their inputs were instrumental in verifying the

commercial viability and scalability of proposed interventions in horticulture, livestock, and value chain development. The forum helped ensure that the CSAAP’s agribusiness strategy addressed key barriers to private sector participation, such as access to finance, input quality, market infrastructure, and service delivery, thereby enhancing the Action Plan’s investment readiness and potential for leveraging blended finance.

115. These multilevel consultations ensured that the CSAAP methodology and investment framework were both technically robust and broadly endorsed. They helped translate data and analysis into actionable, context-sensitive investment plans with a strong foundation of institutional and stakeholder ownership.

Adaptation phases for long-term resilience of the food systems

116. Following the prioritization of interventions, it is essential to sequence them strategically across the adaptation phases to ensure coherence, effectiveness, and long-term impact. This sequencing provides a roadmap for action, enabling stakeholders to respond to immediate needs while steadily advancing toward more sustainable and resilient food systems. It allows for a logical progression from immediate, low-cost actions that address urgent vulnerabilities to more complex and resource-intensive interventions that drive systemic and transformative change. By aligning interventions with the short-, medium-, and long-term phases of adaptation, stakeholders can optimize resource allocation, build institutional capacity over time, and create the enabling conditions necessary for sustained resilience. This phased approach ensures that early gains are consolidated, while setting the foundation for more ambitious shifts in agricultural practices, food systems governance, and rural livelihoods.

117. Afghanistan’s food systems face increasing pressure from climate change, natural resource degradation, and economic volatility. To address these complex challenges and ensure long-term food security, a phased adaptation framework is essential. This

framework consists of three progressive stages—incremental, systemic, and transformative—each aligned with specific timelines, investment needs, and implementation strategies (table 19).

118. The first stage, incremental adaptation, focuses on short-term measures over a one- to five-year horizon. These are small-scale, localized interventions designed to reduce risks while preserving the current food system structure. Actions during this phase emphasize improved management practices, particularly the use of climate-resilient and nutrient-rich crops that can withstand variable rainfall and temperature extremes. Strengthening animal health services and fodder management supports pastoral livelihoods, while better postharvest storage reduces food losses and enhances availability. Traditional irrigation techniques such as *karez* rehabilitation and small-scale drip irrigation improve water use efficiency. While these interventions are relatively easy to implement using local knowledge, farmer cooperatives, and nongovernmental organization (NGO) support, their impact remains limited to short-term relief without inducing structural change.
119. Systemic adaptation, which spans a six- to ten-year time frame, focuses on institutional, policy, and market-level reforms that enable broader food system resilience. This phase aims to integrate agroecological practices and more diverse farming systems, such as conservation agriculture, intercropping, and agroforestry. Significant investments in rural infrastructure—roads, cold storage, irrigation networks, and processing units—are needed to reduce vulnerability and enhance connectivity. Addressing land tenure inequalities and improving access to productive resources are also key to achieving sustainable land use. This phase introduces financial instruments such as weather-indexed insurance and microfinance, while embedding climate risk into agricultural policies.
- Digital innovation, including precision agriculture and climate advisory tools based on artificial intelligence (AI), becomes increasingly important. Systemic adaptation demands policy reform, cross-sectoral coordination, and considerable funding, but it lays the groundwork for transformative change.
120. The final phase, transformative adaptation, takes place over a period exceeding 10 years and involves fundamental changes in how food is produced and how rural livelihoods are structured. It requires a shift from monocropping to diversified and climate-resilient farming systems that can withstand long-term environmental stress. Large-scale landscape restoration efforts, including watershed rehabilitation and reforestation, contribute to soil health and water security. This phase also includes facilitating livelihood transitions for vulnerable groups such as pastoralists and rainfed farmers, enabling them to shift into alternative, climate-resilient economic activities. Overhauling water infrastructure, with investments in storage systems, desalination, and resource-efficient technologies, is central to ensuring sustainability. Transformative adaptation relies on strong governance, sustained international partnerships, and access to climate finance. Although its impact is gradual and long term, it is critical for ensuring generational resilience and food system transformation.
121. Taken together, these three phases provide a comprehensive pathway for building resilient food systems in Afghanistan. Each phase responds to different scales of risk and opportunity, offering a logical sequence from immediate relief to deep structural change. For lasting impact, interventions must be integrated, adequately funded, and responsive to the needs of local communities. Through coordinated action across these phases, Afghanistan can transition toward a more resilient, inclusive, and sustainable food future.

TABLE 19: ADAPTATION PHASES TOWARD ENSURING LONG-TERM RESILIENCE OF AFGHANISTAN'S FOOD SYSTEMS

Adaptation phase	Timescale (years)	Description	Interventions	Implementation considerations
Incremental	Short term, 1–5	Small-scale, localized changes that maintain the existing food system structure while reducing risks. They typically involve improved management practices and efficiency gains.	Focus on food and nutrition security using climate-resilient and nutrient-rich crops, adoption of drought-tolerant varieties and short-season crops to cope with shifting rainfall patterns; Strengthening animal health services and improved fodder management to support pastoral livelihoods; Use of better postharvest storage techniques to reduce losses and improve food availability; Water conservation techniques, including expansion of traditional irrigation methods such as karez rehabilitation and small-scale drip irrigation.	Requires minimal policy change but depends on training, local knowledge, and availability of resources. Can be rapidly implemented through local extension services, NGOs, and farmer cooperatives. Provides immediate relief but has limited long-term transformative impact.
Systemic	Medium term, 6–10	These interventions aim to modify broader institutional, policy, and market systems to enhance resilience across the food system.	Agroecological and integrated farming systems such as expansion of conservation agriculture, intercropping, and agroforestry practices; Climate-resilient infrastructure development including investments in roads, cold storage, irrigation networks, and food processing units; Addressing inequities in land ownership and access to natural resources to ensure sustainable land use; Market-based and financial instruments such as scaling up weather-indexed insurance and microfinance solutions for smallholder farmers; Mainstreaming climate risk into agricultural policies and improving early warning systems; Adoption of AI-based climate advisory tools, precision farming, and digital marketplaces.	Requires policy reforms, institutional coordination, and significant financial investment. Impact begins in the medium term but lays the foundation for long-term resilience. Can be supported by PPPs, donor funding, and government-led programs.
Transformative	Long term, >10	This level of adaptation involves fundamental shifts in food system structures, leading to new models of production, livelihoods, and value chains for climate resilience.	Transitioning from monocropping to climate-resilient diversified farming systems; Large-scale landscape restoration; Economic and livelihood transitions such as supporting pastoralists and rainfed farmers to transition into alternative climate-resilient livelihoods; Large-scale water management and irrigation overhaul, including investing in water storage infrastructure, desalination technologies, and watershed restoration.	Requires strong governance, sustained financial investment, and institutional support. Impact is multigenerational, ensuring long-term food security and resilience. Requires international cooperation, technology transfer, and climate finance investments.



6.



The Costs of Action, Inaction, and Investment Packages

Cost of action

122. Transforming Afghanistan's national agriculture and food systems into a more productive, resilient, and climate-adaptive sector over the next 10 years will require an estimated investment of US\$7.4 billion (table 20). These costs are organized into six priority areas, each reflecting critical interventions necessary to strengthen food security, enhance livelihoods, and build resilience across the agricultural value chain.

Climate-smart crop production

123. The assessment of investment costs entailed evaluating the gap between current crop production and population-based dietary requirements, using per capita consumption as a benchmark. It then estimated the land required to close this gap under existing productivity levels and explores how CSA practices such as improved seed varieties, soil management, and water-efficient irrigation can reduce additional land needs through yield improvements. Comparisons are made between business-as-usual and CSA-enhanced scenarios to identify the most efficient path forward. Investment needs based on unit costs are quantified for adopting CSA technologies and rehabilitating irrigation systems to support sustainable intensification. The analysis also includes a targeted 25 percent expansion in fruit-growing areas to promote export growth (annexes 4a and 4b).

Improved livestock management

124. The investment costs covered extensive livestock production systems, intensive livestock production systems, and livestock processing and marketing. For extensive livestock production systems, the cost estimates cover only essential veterinary services

and localized forage development support. They do not include investments in broader pasture management or large-scale rangeland development. For intensive livestock production systems, the estimates encompass a more comprehensive package, including forage development, improved feeding practices, veterinary services, and livestock housing. The estimates for livestock processing and marketing account for support in processing animal products, procurement of relevant equipment, and marketing activities (annex 4c).

Integrated natural resources management

125. NRM is being approached through a comprehensive and integrated investment strategy that addresses both water and land resources. The improved water management initiative focuses on developing major new water supply infrastructure for irrigation, including conveyance systems, large canals, major weirs, and small dam storage. Designed to cover 500,000 ha, this effort is expected to benefit approximately 1 million households. With an estimated unit cost of US\$2,500/ha, the total investment required amounts to US\$1.25 billion.
126. In parallel, an estimated US\$1.32 billion is earmarked for broader NRM, targeting landscape restoration and sustainable land use. This includes the restoration and management of 400,000 ha of subtropical dry forests, 750,000 ha of rangelands, and 1.5 million ha of grasslands. The investment also supports agroforestry and catchment treatment activities across an additional 500,000 ha. Together, these efforts form a cohesive integrated natural resources management framework aimed at enhancing ecosystem services, improving agricultural productivity, and building resilience to climate change (annex 4d).

TABLE 20: CSA INVESTMENT COSTS

No	Interventions	US\$, millions
1	Climate-smart crop production	2,091
2	Improved livestock management	1,030
3	Agribusiness development	1,500
4	Integrated natural resources management	2,475
5	Agricultural research and development	149
6	Integrated climate and market information services	30
	Total	7,375

Agribusiness development

127. The US\$1.5 billion reflected in the investment framework represents the public cost associated with enabling and supporting private agribusiness development across Afghanistan's six regional clusters. This public financing is intended to cover critical public goods and services—including land access facilitation, infrastructure development, regulatory support, and the provision of incentives and risk mitigation instruments. These funds will be used to create an enabling environment that attracts private capital into value chain investments in production, processing, agrolistics, and market technologies. By absorbing up-front costs and addressing market failures, the public investment will help de-risk private sector participation and catalyze large-scale, long-term agribusiness transformation in the country. Details are provided in annex 3.

Agricultural research and development

128. A total investment of **US\$149 million** is required to strengthen Afghanistan's agricultural R&D system. This comprehensive investment will support institutional capacity building, infrastructure enhancement, development of climate-smart technologies, and human capital development. Key priorities include strengthening the Agriculture Research Institute of Afghanistan, upgrading regional research stations, promoting innovation in crop and livestock technologies, training researchers and extension agents, and establishing localized training centers across the country. Together, these efforts aim to build a resilient, knowledge-driven

agricultural sector that can support sustainable growth and improve food security (annex 4e).

Integrated climate and market information services

129. A dedicated investment of US\$30 million in climate and weather information services will support the development of integrated agroweather forecasting tools and market information systems, designed to help Afghan farmers navigate the growing challenges posed by climate variability and change. This initiative aims to enhance farmers' capacity to make informed decisions—on what to produce, when, where, and how—by equipping them with timely, accurate, and location-specific information. The agroweather component of the investment will significantly bolster Afghanistan's long-term capacity to adopt CSA technologies and sustain productivity under shifting climatic conditions. It will include the installation of new automated weather stations, establishment of regional agrometeorological centers, and development of climate-resilient advisory systems powered by big data analytics and AI. These services will provide tailored, forward-looking insights into weather trends, growing conditions, and risk management strategies.

130. In parallel, the market information systems component will be developed to collect, analyze, and disseminate real-time data on market conditions, prices, demand trends, and value chain dynamics. This will support farmers to align production with market opportunities, reduce postharvest losses, and improve profitability. Together, these investments will create a robust digital backbone for informed, climate-resilient agricultural planning and market engagement.

Cost of inaction

131. Investing in the CSAAP is not only economically prudent but an urgent necessity to prevent substantial future losses. The total cost of action across CSAAP's five pillars—Climate-Smart Agriculture (US\$3.1 billion), Integrated Natural Resources Management (US\$2.6 billion), Agribusiness Development (US\$1.5 billion), Agriculture R&D (US\$149 million), and Climate and Market Information

Services (US\$30 million)—amounts to US\$7.4 billion. These targeted investments are essential to improve productivity, resilience, sustainability, and inclusiveness across agrifood systems.

132. In stark contrast, the cost of inaction is estimated at US\$39.6 billion—more than five times the required investment (table 21 and annex 5). The most substantial foregone benefits would arise in NRM (US\$16 billion), CSA (US\$14 billion), and agribusiness development (US\$8.5 billion). Even the least capital-intensive pillars, such as agricultural R&D and information services, would incur losses of US\$709 million and US\$363 million, respectively, if neglected. On average, the cost of action represents just 19 percent of the cost of inaction, making a clear economic case for immediate intervention.
133. The data also reveal that certain interventions, despite requiring minimal investment, offer disproportionately high returns. For example, climate and market information services need only US\$30 million but could avert losses exceeding 10 times that amount. Similarly, agriculture R&D shows a 5:1 benefit-to-cost ratio. These findings highlight both the urgency and high-impact potential of even modest investments, particularly in knowledge, innovation, and decision-support infrastructure.
134. The implications for policy are clear: delaying action significantly increases long-term costs and reduces the effectiveness of future interventions. Strategic prioritization and scaling, especially in CSA and integrated resource management can mitigate climate risks, enhance food and water security, and create economic opportunities. Failure to invest now would deepen vulnerability, erode productivity, and entrench poverty, especially in climate-exposed

rural regions of Afghanistan. The CSAAP presents a compelling and time-sensitive investment opportunity. With every dollar spent offering substantial returns in avoided damages, enhanced productivity, and long-term resilience, the cost of inaction is unaffordable. Urgent, sustained, and well-prioritized investments are not only justified, but they are also indispensable for building a sustainable future for agriculture, people, and the planet.

Investment packages

135. The investment packages have been carefully prepared in response to Afghanistan's urgent food security and livelihood resilience challenges. Though referred to as 'projects', this term understates their true ambition and scope. These packages are, in fact, comprehensive, multi-year investment strategies designed to catalyze systemic transformation across Afghanistan's food and agricultural systems. Their goal extends beyond implementing isolated interventions—they are designed to lay the foundation for long-term resilience, inclusive economic recovery, and sustainable development. Through coordinated action and strategic investment, these initiatives seek to address immediate needs while also building the institutional and infrastructural capacity required for a more secure and self-reliant future.

Investment Package 1: Food Systems Resilience Project (US\$450 million)

136. The Food Systems Resilience Project is an initiative aimed at strengthening Afghanistan's agricultural backbone by addressing chronic food insecurity and enhancing climate resilience. The project is designed to expand into agroecologically suitable

TABLE 21: COSTS OF ACTION VERSUS INACTION FOR THE ACTION PLAN

	Climate-smart agriculture	Integrated natural resources management	Agribusiness development	Agriculture R&D	Climate and market information services	Total
Cost of action (US\$, millions)	3,121	2,475	1,500	149	30	7,375
Cost of inaction (US\$, millions)	14,000	16,008	8,500	709	363	39,580
Action/Inaction	22%	16%	18%	21%	8%	19%

Note: CSA combines the costs for improved crops and livestock production.

areas that have not been previously served by major interventions such as the EFSP. In doing so, it will help close geographic gaps in agricultural development and ensure that vulnerable and underserved farming communities are brought into the fold of national resilience-building efforts.

137. Central to the project is the goal of increasing cereal productivity through the widespread adoption of climate-resilient, high-yielding seed varieties. These improved inputs will be tailored to withstand increasingly unpredictable rainfall and temperature extremes while also enhancing yields in fragile rainfed systems. The introduction of short-cycle and nutrient-dense crop varieties will contribute not only to household food availability but also to improved dietary quality and overall nutrition.
138. The project will promote agricultural mechanization across the target areas to address severe labor shortages and low production efficiency. Mechanized planting, harvesting, and postharvest operations will enhance productivity, reduce drudgery, and support the scaling-up of farm operations, especially in areas with growing demand for local cereals. Mechanization will also contribute to cost reductions for farmers and better integration into commercial value chains.
139. Water management will be another key priority, given Afghanistan's increasing exposure to drought. The project will improve irrigation efficiency through small-scale interventions such as drip systems and the rehabilitation of traditional water infrastructure like *karez*. These methods are both culturally accepted and cost-effective, allowing communities to better manage water scarcity while stabilizing agricultural outputs.
140. To diversify farming systems and enhance resilience, legumes will be integrated into cereal-based production systems. Legume intercropping and rotation improve soil fertility, reduce pest cycles, and contribute to better-balanced diets. This diversification strategy also lowers the risks associated with monocropping and helps build agroecological resilience in the face of growing climate uncertainties.
141. Investments in agricultural research and extension will accelerate the adoption of new practices and technologies. Strengthened extension services, both

public and community based, will deliver training on CSA, postharvest handling, and improved farming practices. These efforts will be crucial to scaling innovations and ensuring that farmers have timely access to technical support.

142. A major strategic objective of the project is to reduce postharvest losses through improved storage, drying, and processing infrastructure. These interventions will enhance the national cereal balance by reducing waste along the supply chain and increasing food availability, especially during lean seasons. Additionally, this will support smoother market functioning and stabilize grain prices in rural and urban markets alike.
143. Finally, the project will invest in revitalizing the domestic milling industry to strengthen Afghanistan's food self-sufficiency. By expanding wheat milling capacity and upgrading processing equipment, the project will add value locally, create employment opportunities, and reduce reliance on imported flour. Collectively, these interventions form a comprehensive package that addresses immediate food security needs while laying the foundation for a more climate-resilient and self-reliant agricultural system.

Investment Package 2: Horticulture Commercialization Project (US\$350 million)

144. The Horticulture Commercialization Project is a transformative initiative designed to unlock the economic, nutritional, and export potential of Afghanistan's high-value fruit and vegetable sector. Horticulture already plays a critical role in rural incomes, but systemic inefficiencies and infrastructure gaps prevent the sector from reaching its full potential. This project aims to modernize horticultural value chains and reposition the sector as a driver of inclusive rural development and international trade.
145. The project will invest comprehensively along the horticulture value chain—from production and harvest to processing, transport, and market access. Key infrastructure improvements will include cold storage facilities, solar-powered processing units, and packaging centers, all of which are critical to

reducing postharvest losses and improving quality. These investments will be prioritized in high-potential areas with established production systems and strong market linkages.

146. A central feature of the project is its geographic targeting strategy, which concentrates investment in zones with the greatest agroecological and commercial potential. By doing so, the project will foster economies of scale, reduce per unit investment costs, and create the critical mass needed to attract private investors. This focus will also ensure that government and donor funds are used efficiently and effectively, with tangible returns in the short and medium term.
147. The project will directly leverage private sector activity by aligning with the agribusiness clusters already identified in key provinces. These clusters offer a platform for scaling investments in value addition, agri-logistics, and export-oriented production. Collaboration with agribusinesses, cooperatives, and traders will foster stronger supply chain integration and help align smallholder production with commercial demand.
148. Women's participation will be actively promoted through the establishment of home nutrition gardens and tailored training programs. These gardens will not only improve household food diversity but also create income opportunities for women in the informal economy. The project will provide seeds, tools, and extension services to support these efforts and ensure their sustainability.
149. The project also promotes diversified cropping systems that improve resilience and increase income stability. By encouraging intercropping, off-season vegetable production, and the use of improved varieties, farmers will be better positioned to manage climate variability and meet year-round market demand. This strategy also helps prevent overdependence on a few key crops, thereby spreading risk and enhancing ecological balance.
150. In parallel, the project will support branding, certification, and export facilitation for Afghan horticultural products. Improved standards and traceability systems will allow Afghan produce to meet international market requirements, especially for key export crops such as apples, grapes, pomegranates, and apricots. Strengthened

marketing will boost competitiveness in regional markets, increasing foreign exchange earnings and rural employment.

151. While positioned as a development 'project', the Horticulture Commercialization Project functions as a catalytic investment strategy that will activate a broad ecosystem of public, community-based, and private sector actors. The implementation of this package will require coordinated engagement across key stakeholders in the horticulture value chain. On the public side, the Government of Afghanistan will play a leading role through institutions such as the Perennial Horticulture Development Centers, which conduct vital R&D for both fruit and vegetable varieties. Extension agents specializing in fruits and vegetables will be instrumental in disseminating improved practices to farmers, while government market promotion agencies and quarantine and quality control laboratories will ensure that Afghan produce meets domestic and international standards. At the community level, strong partnerships will be built with vegetable and fruit farmer associations, women-led vegetable groups, vegetable seed grower cooperatives, and fruit nursery organizations, who will serve as critical intermediaries in production, input use, and knowledge transfer. The private sector will also be central to scaling commercialization, with input suppliers, transport and logistics providers, traders, processors, and exporters driving market connectivity and value addition. By bringing these diverse actors together in a coordinated and mutually reinforcing manner, the horticulture investment package aims to unlock a high-performing, inclusive, and competitive horticultural economy in Afghanistan.
152. In summary, the Horticulture Commercialization Project combines infrastructure development, private sector partnerships, inclusive approaches, and strengthening market systems to deliver a high-impact, scalable model of agribusiness-led growth. It will enhance food security, stimulate rural economies, and help position horticulture as a signature sector of Afghanistan's economic renewal.

Investment Package 3: Livestock Development Project (US\$200 million)

153. The Livestock Development Project is designed to modernize and expand Afghanistan's livestock sector,

which is central to food security, rural livelihoods, and national nutrition. From backyard poultry keepers to nomadic pastoralists and peri-urban dairy farms, livestock plays an essential economic and cultural role across Afghan society. This project will strengthen the sector by improving productivity, resilience, and value chain integration.

154. A foundational goal is to enhance the contribution of livestock to protein nutrition and household income through the improved production of dairy, meat, and eggs. Demand for these products is growing, especially in urban centers, but domestic supply chains remain weak. By investing in production systems and market infrastructure, the project aims to reduce imports, stabilize prices, and improve dietary diversity.
155. The project will introduce improved livestock breeds, better feed management practices, and strengthened veterinary services. Animal health systems will be upgraded through training of paravets, supply of vaccines, and establishment of mobile veterinary clinics, especially in remote areas. Feed markets will be developed to improve access to quality inputs year-round, addressing one of the most persistent bottlenecks in livestock productivity.
156. Pastoralist communities, who manage over 70 percent of the country's livestock, will be a key focus. These groups face increasing vulnerability due to land degradation, climate change, and conflicts over grazing routes. The project will support rangeland rehabilitation, establishment of grazing management plans, and community-level institutions for dispute resolution, ensuring a more stable and sustainable livestock economy.
157. Commercial livestock opportunities will be developed in and around urban markets where the demand for dairy and poultry products is high. Investment in milk collection centers, small-scale processing units, and cold storage will help bridge the gap between rural producers and urban consumers. These efforts will also support the emergence of local agribusinesses and encourage youth employment in livestock-related enterprises.
158. Recognizing the critical role of women in livestock care, the project will invest in women-centered extension services, training in animal husbandry, and the formation of women's producer groups.

Special attention will be given to poultry and dairy, two subsectors where women's participation is particularly high. This inclusive approach will boost productivity while advancing gender equity and economic inclusion.

159. Value chain strengthening will also be central to the project. Through partnerships with the private sector, producer organizations, and processors, the project will support quality control, market information systems, and branding of Afghan livestock products. Improved cold chains and logistics will reduce spoilage and enhance consumer confidence in locally sourced animal products.
160. The investment package will rely on a wide and coordinated network of public, community-based, and private sector actors to ensure successful implementation and sustainable impact. The government will play a pivotal role through its research and breed improvement centers, food safety agencies, livestock markets, and quarantine and disease control laboratories. Veterinary officers and livestock extension agents operating at provincial, district, and community levels will provide technical oversight, training, and health surveillance. At the community level, implementation will be grounded in active engagement with livestock keeper associations, women's groups, fodder seed producers, dairy cooperatives, paravets, and pasture user groups. These actors will facilitate outreach, local adaptation of interventions, and collective action around rangeland use and animal health. The private sector will be central to service delivery and value chain integration, including private veterinarians, traders in livestock products, feed and veterinary input suppliers, and retail outlets for animal-based goods. Together, these stakeholders will form a cohesive ecosystem to support improved productivity, disease control, value addition, and equitable participation in Afghanistan's evolving livestock economy.
161. Overall, the Livestock Development Project offers a comprehensive package of interventions that blend productivity enhancement with equity and resilience. By addressing technical, economic, and social constraints, the project will build a robust livestock sector capable of meeting growing domestic demand, contributing to national food and nutrition security, and supporting long-term rural development.

Investment Package 4: Agribusiness Development Project (US\$350 million)

162. The Agribusiness Development Project aims to transform Afghanistan's agricultural economy by stimulating private sector-led growth in agribusinesses. The project focuses on enabling high-potential value chains to become competitive, inclusive, and resilient through comprehensive interventions that improve the business environment; expand access to finance; enhance skills; and build efficient, structured markets.
163. A central component of this investment is the reform of the agribusiness enabling environment. The project will work with government ministries, regulatory agencies, and industry associations to streamline licensing and inspection procedures, improve food safety and quality standards, and enhance trade facilitation systems. Policy reforms will focus on reducing transaction costs, eliminating barriers to investment, and encouraging private participation across the value chain. Public-private dialogue platforms will be institutionalized to ensure inclusive and transparent policy processes.
164. To address persistent financing gaps, especially for SMEs, the project will establish dedicated access to finance mechanisms. These will include matching grants for agribusiness expansion, partial credit guarantee schemes to de-risk lending by financial institutions, concessional lines of credit, and innovative Islamic finance instruments. Special financial products will be designed for women-led businesses, cooperatives, and youth entrepreneurs to foster inclusive participation in the agribusiness economy.
165. Recognizing the critical role of human capital, the project will invest in skills development and entrepreneurship support. This will involve the establishment of agribusiness incubators, vocational training centers, and business advisory services tailored to the needs of processors, marketers, logistics operators, and service providers. Curriculum will focus on technical skills (for example, quality control, cold chain operations), business acumen (for example, record keeping, investment planning), and soft skills (for example, leadership and negotiation), with targeted outreach to women and rural youth.
166. Building competitive and inclusive markets is another pillar of the project. Public investments will upgrade

market infrastructure, including wholesale and retail markets, aggregation centers, and packaging and grading facilities. Digital platforms will be developed to facilitate real-time price information, product traceability, and efficient matching of buyers and sellers. The project will support certification schemes for organic, halal, and export markets to increase the value of Afghan products in regional and international markets.

167. The project will also support the development of agribusiness clusters and industrial zones, where anchor enterprises can co-locate with smallholder suppliers, service providers, and logistics operators. These clusters will be supported through shared infrastructure, coordinated services, and investment promotion activities to attract both domestic and foreign investors. By integrating actors across the value chain, the project will foster economies of scale, improve market coordination, and generate significant employment in rural areas.
168. To enhance sustainability, all investments will integrate climate-smart technologies and green practices. Support will be provided for the adoption of renewable energy solutions in processing and storage, waste-to-energy systems, and environmentally responsible packaging technologies. Agribusinesses that demonstrate strong environmental and social safeguards will receive preferential access to financial and technical support.
169. Lastly, the project will include a robust monitoring and results measurement system to track outcomes, inform adaptive management, and ensure accountability to beneficiaries and stakeholders. Strategic partnerships with development banks, donors, and private sector associations will be leveraged to scale impact and share lessons across regions. Through this comprehensive package, Afghanistan aims to create a thriving agribusiness ecosystem that delivers jobs, income, and food system resilience, while supporting local communities and boosting national economic recovery.

Investment Package 5: Afghanistan Rural Transformation Project (US\$400 million)

170. The Afghanistan Rural Transformation Project is designed to drive inclusive, climate-resilient rural growth by integrating production, market access,

and enterprise development across key agricultural and livestock systems. This comprehensive investment targets rural communities across diverse AEZs, focusing on raising productivity, improving livelihoods, and fostering economic self-reliance through sustainable, market-oriented rural development.

171. At its core, the project promotes CSA and food system resilience. It will support the adoption of improved, high-yielding, and climate-resilient crop and fodder varieties, enhance irrigation and water harvesting infrastructure, and promote sustainable land and rangeland management. Special emphasis will be placed on vulnerable communities and women farmers, ensuring equitable access to agricultural inputs, technologies, and productive assets.
172. The project will also support the transformation of high-value horticulture and livestock value chains. This includes expanding orchards, greenhouse vegetable farming, and backyard gardens for household nutrition and income. In the livestock sector, investments will support breed improvement, commercial feed and fodder systems, animal health services, and the establishment of dairy and meat processing hubs. Market connectivity will be enhanced through investment in storage, processing, and transport infrastructure, with renewable energy solutions prioritized.
173. To improve farmers' ability to make informed decisions and adapt to changing conditions, the project will establish integrated agroweather and market information systems. These platforms will disseminate localized, timely, and personally relevant information on weather forecasts, pest alerts, market prices, and best agronomic practices via SMS, community radio, digital apps, and extension agents. This will enable producers to respond to risks and opportunities more effectively, strengthening productivity and resilience.
174. A strong focus will be placed on participatory agricultural research and knowledge dissemination. The project will strengthen linkages between national research institutions and farmers by supporting on-farm trials, farmer-led innovation platforms, and adaptive research initiatives. Farmer field schools (FFSs) will be scaled up to build local capacity in sustainable production practices, pest management, climate adaptation, and value addition. These FFSs

will also serve as hubs for women's inclusion and peer learning.

175. The project aims to accelerate agribusiness development and rural enterprise creation by improving the enabling environment, expanding access to finance, and strengthening entrepreneurial ecosystems. Key interventions include business registration reform, tax incentives, and the development of agribusiness incubators. Matching grants, credit guarantees, and tailored financial products will be offered to smallholder cooperatives, women-led enterprises, and youth entrepreneurs, particularly in processing, transport, and input supply. Rural economic clusters will be developed as integrated zones that co-locate production, processing, storage, logistics, and market services. These clusters will unlock economies of scale, attract private investment, and foster innovation, employment, and income generation. Public investment in rural roads, renewable energy, digital platforms, and shared infrastructure will improve the competitiveness and resilience of these territories.
176. A key enabler of rural transformation under this project will be improved land tenure security, particularly for women, smallholders, and agro-industrial investors. Strengthening land rights will increase incentives for long-term investment, improve access to finance, and reduce conflict over land use. The project will support efforts to clarify land ownership, formalize land use agreements, and expand land certification coverage through inclusive and participatory processes. Special provisions will ensure that women's access to land is safeguarded and expanded, including through joint titling and legal awareness campaigns. Modern, digital tools such as geospatial mapping, mobile-based land registration platforms, and integrated land information systems will be deployed to enhance transparency, reduce administrative barriers, and modernize land administration. By securing land rights and making land governance more inclusive, the project will lay a foundation for equitable, climate-resilient rural development.
177. To strengthen the rural enterprise ecosystem, the project will support the establishment of Agribusiness Resource and Support Centers at provincial or district levels. These centers will serve as dedicated hubs for incubating rural enterprises, offering a range of services including technical advisory, business

development support, market access facilitation, and mentorship for micro, small, and medium size agribusinesses. In parallel, enterprise financing mechanisms such as matching grants, concessional loans, and credit guarantees will be introduced to de-risk private investment—particularly for women-led and youth-led businesses—thereby catalyzing inclusive rural entrepreneurship.

178. The package will also invest in skills development and youth employment programs, directly linking vocational training to market opportunities through apprenticeships, internships, and job placement schemes. These programs will be tailored to the demands of the evolving agrifood system, including digital agriculture, logistics, and agro-processing. A strong social inclusion agenda will ensure that vulnerable groups—especially women, returnees, internally displaced persons (IDPs), and landless rural households—have equitable access to productive resources, services, digital tools, and leadership opportunities within cooperatives and enterprises.

179. To address fragmented value chains, the project will support the formation, formalization, and capacity building of producer groups and cooperatives, enabling better aggregation, improved bargaining power, and stronger linkages to markets and financial services. Moreover, a PPP platform will be developed to foster structured collaboration between government entities, the private sector, and development partners. This platform will facilitate co-investment, share risk, and scale up innovative rural solutions while tailoring interventions to Afghanistan's socioeconomic diversity and post-conflict challenges.

180. Lastly, the project will invest in institutional capacity building, governance, and digital monitoring systems. Local governments, producer organizations, and community-based institutions will be capacitated to lead implementation through participatory planning, budgeting, and performance tracking. Real-time monitoring, impact evaluation, and grievance redress mechanisms will ensure accountability and continuous improvement. Through this transformative investment, Afghanistan's rural economy will be revitalized—creating jobs, boosting food security, enhancing gender equity, and positioning rural areas as drivers of national recovery and inclusive growth.

Jobs creation by the action plan

181. The implementation of the CSAAP is expected to significantly expand employment opportunities across Afghanistan's agrifood system. By investing in climate-resilient production, agro-processing, and improved market infrastructure, the Action Plan will generate an estimated 7.4 million additional jobs across the cereal, horticulture, and livestock value chains, an increase of over 65 percent compared to a baseline scenario without the plan. Of this, 6.9 million jobs (over 93 percent) will be in on-farm activities, reinforcing the plan's central aim to stimulate rural livelihoods and agricultural resilience. An additional 540,000 jobs will be created in processing and 50,000 in transport and retail, highlighting the CSAAP's contribution to downstream economic activity (table 22 and annex 6).

TABLE 22: JOBS GENERATED BY THE ACTION PLAN (MILLIONS)⁹

Value chain	Without the action plan	With the action plan	Number of additional jobs			
			Total	On farm	Processing	Transport/Retail
Cereals	3.6	5.6	1.9	1.4	0.48	0.05
Horticulture	1.8	3.8	1.9	1.9	0.05	—
Livestock	6.3	9.9	3.6	3.6	0.01	—
Total	11.7	19.3	7.4	6.9	0.54	0.05

⁹ Given the limited data availability in the horticulture value chain, it was assumed that processors will take care of the local transportation. As exports are concerned, it was assumed that the additional production being exported will be transported with larger trucks, instead of leading to an increase in the number of jobs.

182. Employment in cereal value chains is projected to rise from 3.6 million to 5.6 million jobs, generating an additional 1.9 million jobs. Most of this growth will occur on farm (1.4 million jobs) due to increased productivity, mechanization, and improved seed systems. The remaining gains will come from processing (480,000 jobs) and transport and retail (50,000 jobs), reflecting improvements in postharvest handling and market access. The horticulture subsector is set to experience one of the largest proportional increases in employment, rising from 1.8 million to 3.8 million jobs—an addition of 1.9 million jobs. These gains are primarily on-farm activities, as investments in commercial orchards, women’s home gardens, cold storage, and value addition are scaled. While modest gains are anticipated in downstream processing and retail (50,000 jobs), further investments in postharvest handling could enhance employment in these areas. With livestock serving as a major livelihood source, employment in this sector is projected to grow from 6.3 million to 9.9 million jobs, adding 3.6 million new positions. Both on-farm activities (for example, feeding, breeding, and animal health) and processing jobs (for example, dairy and meat value chains) will benefit. Though the gains in transport and retail are modest (10,000 jobs), there is potential for further growth through dairy and meat value chain investments.
183. The CSAAP is projected to significantly expand economic participation among Afghan women by creating inclusive employment opportunities across key agricultural value chains. The implementation of the plan is expected to increase women’s participation in the agrifood system from 5.46 million to 8.5 million, marking a net gain of 3 million jobs—an overall increase of 123 percent (table 23).
184. The number of women employed in cereal production is expected to more than double, rising from 0.7 million to 1.5 million, representing a 123 percent increase. This surge reflects expanded access to improved seed systems, mechanization, and community-based extension services tailored to reach women farmers. Women’s participation in the horticulture value chain is projected to increase from 360,000 to 1.1 million, a remarkable 212 percent growth. This reflects the CSAAP’s emphasis on home nutrition gardens, women-led vegetable production, and expanded access to agrologistics and market linkages—sectors where women play a critical role. In the livestock sector, where women are already highly involved in household-level animal husbandry, employment is expected to grow from 4.4 million to 5.9 million, adding 1.5 million new positions. These gains are driven by investments in feed systems, veterinary services, dairy processing, and pasture management—areas where women’s traditional roles are now being linked to commercial opportunities.
185. The CSAAP’s inclusive design helps address long-standing barriers to women’s economic participation, such as limited mobility, lack of land ownership, and exclusion from formal financial systems. Through targeted interventions such as gender-responsive extension, women’s producer groups, and access to climate-smart technologies, the plan enables women to engage in both subsistence and income-generating activities. These job opportunities will enhance not only women’s incomes and household food security but also their voice in agricultural decision-making and contribution to local economies. The plan positions women as central agents of climate-resilient rural transformation by more than doubling their participation in key

**TABLE 23: IMPACT OF THE JOB CREATION ON WOMEN
(MILLIONS)**

	Without the action plan	With the action plan	Change in participation	% Change
Cereals	0.70	1.5	0.8	123
Horticulture	0.36	1.1	0.7	212
Livestock	4.40	5.9	1.5	34
Total	5.46	8.5	3.0	123

agricultural sectors. This is a critical step toward achieving inclusive growth, food system resilience, and gender equity in Afghanistan.

186. The Action Plan is also projected to significantly boost youth employment across Afghanistan's agrifood system (table 24). With over 70 percent of the population under the age of 30 and growing rural unemployment, the plan provides a timely and inclusive response by targeting high-potential value chains where youth can meaningfully engage. According to the projections, youth participation in agriculture-related employment will increase from 6.2 million to 10.8 million, resulting in an additional 6.05 million jobs, a 175 percent increase overall.

187. Youth employment in the cereal value chain is expected to grow from 1.2 million to 2.8 million, an increase of 1.6 million jobs or 136 percent. These new positions are driven by productivity-enhancing practices, mechanization services, and the expansion of digital advisory tools and local input supply networks where youth can play key roles as operators, service providers, and entrepreneurs. The horticulture sector presents one of the most dynamic opportunities for youth, with participation growing from 600,000 to 2.1 million—a gain of 1.4 million jobs and a 228 percent increase. Youth are especially well positioned to engage in areas such as protected cultivation, fruit and vegetable aggregation, processing, cold storage operations, and e-commerce platforms for market access. The livestock sector also shows strong youth employment growth. Jobs in this area are projected to increase from 4.4 million to 5.9 million, adding 3.05 million new positions, a 161 percent increase. Young people will benefit from roles in veterinary services, fodder production, animal husbandry, dairy processing,

and cooperative management, especially in peri-urban and pastoral communities.

188. This indicates that the Action Plan explicitly recognizes the demographic dividend and the urgency of addressing youth underemployment in rural areas. By investing in agribusiness skills development, enterprise incubation, climate-resilient farming, and digital market integration, the plan offers youth a pathway out of economic marginalization. These opportunities not only improve individual livelihoods but also contribute to broader social stability, economic revitalization, and climate resilience

Impacts of the CSAAP on vulnerable populations

189. In addition, implementing the CSAAP will deliver transformative impacts for Afghanistan's most vulnerable populations, particularly those facing acute food insecurity. By stabilizing and increasing domestic food production, the plan directly improves food availability, access, and nutrition security, especially in rural and conflict-affected areas. Investments in climate-resilient seeds, irrigation, diversified cropping systems, and livestock help shield smallholders from recurring droughts and climate shocks, which disproportionately affect the poorest households. The inclusion of legumes, horticulture, and dairy in farming systems also contributes to more diverse and nutritious diets, addressing micronutrient deficiencies among women and children. By promoting localized value chains and improved market access, the CSAAP reduces dependency on volatile imports and humanitarian aid, while building stronger,

TABLE 24: IMPACT OF THE JOB CREATION ON YOUTH (MILLIONS)

	Without the action plan	With the action plan	Change in participation	% Change
Cereals	1.2	2.8	1.60	136
Horticulture	0.6	2.1	1.40	228
Livestock	4.4	5.9	3.05	161
Total	6.2	10.8	6.05	175

self-sustaining rural economies. Targeted support for marginalized groups, including gender-responsive services, access to finance, and climate and market information tools, ensures that the benefits of the plan reach those most in need—making it a powerful vehicle for equity, resilience, and food security in Afghanistan.

190. The CSAAP offers long-term, systemic benefits that far outweigh the temporary relief provided by humanitarian aid during food crises in Afghanistan. While humanitarian aid is critical for saving lives during acute emergencies by addressing immediate food gaps and malnutrition, it is inherently short term, reactive, and often limited in scope. It does not address the structural causes of food insecurity such as climate vulnerability, weak agricultural systems, and lack of rural employment. As a result, communities remain exposed to future shocks, perpetuating cycles of dependence and crisis.
191. In contrast, the CSAAP tackles the root drivers of chronic food insecurity through sustainable investments in climate-resilient production, improved irrigation and seeds, value-added processing, and inclusive rural livelihoods. It builds long-term food availability by increasing domestic agricultural productivity and strengthening local food systems, reducing reliance on imports and emergency assistance. The plan is expected to create new jobs, enhance nutrition security, and improve economic resilience, especially for women and youth; groups often excluded from the formal economy

and heavily impacted during crises. Moreover, the CSAAP reduces the need for repeated emergency interventions by building adaptive capacity at the household, community, and system levels. It supports market development, infrastructure, and institutional coordination, allowing food systems to better withstand shocks and recover more quickly. In essence, while humanitarian aid addresses symptoms, the CSAAP addresses causes, making it a more cost-effective, empowering, and durable solution to Afghanistan’s persistent food insecurity.

Climate mitigation impact of the action plan

192. As shown in Table 25, the CSAAP delivers significant climate co-benefits by reducing GHG emissions and enhancing carbon sequestration across Afghanistan’s agrifood systems. The carbon balance estimation includes forest restoration on 1 million ha and improved grassland management on 15 million ha, with varying degrees of enhancement and intervention. The carbon balance assessment also envisions increased livestock populations and productivity across the entire country. For crop production, higher productivity levels under the Action Plan would result in a lower expansion of cropland—an additional 998,000 ha compared to 1,873,300 ha in a scenario without the Action Plan. This productivity gain, however, is accompanied by increased use of agricultural inputs. Through

TABLE 25: CARBON BALANCE ESTIMATE FOR THE ACTION PLAN (tCO₂-e)

Activities	Without the action plan	With the action plan	Balance
Conversion of degraded land to cropland	1,634,593	–56,107	–1,690,700
Production of annuals other than rice	10,635,280	5,671,553	–4,963,727
Horticultural crops production	–6,494,878	–7,753,032	–1,258,154
Rice production	8,898,875	8,595,322	–303,553
Grassland management	0	–275,734,800	–275,734,800
Livestock production	272,774,396	348,836,383	76,061,987
Forest management	0	–164,831,509	–164,831,509
Fertilizer and other inputs	14,610,016	12,452,951	–2,157,065
Total	302,058,282	–72,819,239	–374,877,521

the adoption of more efficient, sustainable, and regenerative land use practices, the Action Plan shifts the balance from a high-emission baseline to a carbon-reducing pathway. Overall, the CSA interventions are projected to result in a net emissions reduction of 374.9 million tons of CO₂ equivalent (tCO₂-e), a transformative contribution to national climate targets. This outcome reflects the plan's core principle that food system transformation must deliver climate co-benefits alongside improved productivity and enhanced resilience.

193. The most substantial contribution comes from improved grassland management, which alone accounts for 275.7 million tCO₂-e in avoided emissions. This is achieved through restoring degraded rangelands, introducing rotational grazing, and regenerating native grass cover. In parallel, investments in forest management—including reforestation, afforestation, and protection of forested watersheds—deliver an additional 164.8 million tCO₂-e in carbon sequestration. These two nature-based solutions not only lower emissions but also enhance biodiversity and ecosystem services.
194. In the crop sector, the Action Plan promotes conservation agriculture, agroforestry, and precision irrigation, leading to a combined reduction of over 8 million tCO₂-e across cereals, rice, and horticulture. For example, emissions from annual crop production decline by nearly 5 million tCO₂-e, while rice emissions are reduced through water-saving practices such as alternate wetting and drying. Even horticultural systems, which already act as a carbon sink, are further enhanced through low-emission practices and solar-powered irrigation. While livestock emissions increase (by 76 million tCO₂-e) due to productivity gains and herd growth, these are more than offset by gains in pasture carbon sequestration and feed conversion efficiency. Reductions in fertilizer-related emissions (2.16 million tCO₂-e) also reflect the benefits of better nutrient

use efficiency. By combining emissions reductions with large-scale carbon sequestration, the plan not only strengthens resilience and productivity but also opens opportunities for carbon finance, results-based climate funding, and engagement in voluntary carbon markets.

195. By delivering measurable reductions in greenhouse gas emissions and enhancing carbon sequestration, the Action Plan, particularly through Investment Package 1: The Food Systems Resilience Project positions Afghanistan to access emerging streams of carbon finance and performance-based climate funding. This package promotes sustainable land use, climate-resilient seed systems, reduced postharvest losses, and optimized water and fertilizer use—actions that generate verifiable mitigation outcomes. For example, improved cereal and rice production practices, such as alternate wetting and drying (AWD) and conservation agriculture, significantly lower methane and nitrous oxide emissions. These outcomes create eligibility for Results-Based Climate Financing (RBCF) programs, while also enabling participation in Voluntary Carbon Markets (VCMs) by certifying emission reductions under standards like Verra or Gold Standard.
196. The project's emphasis on sustainable intensification and agroecological diversification also lays the groundwork for piloting nature-based carbon credit initiatives, including reforestation of degraded lands and grassland restoration, which can be monetized to generate additional revenue for local communities and cooperatives. In the medium term, these actions can feed into the establishment of a national carbon registry, enabling Afghanistan to engage in Article 6 transactions under the Paris Agreement. Investment Package 1 not only enhances food security and system resilience but also acts as a lever to unlock climate-aligned finance that can sustain long-term agricultural transformation and contribute to the country's Nationally Determined Contributions (NDCs).

7.



Conclusion: Rolling Out the Action Plan

A changing operating environment for development

197. Afghanistan is undergoing a profound transformation in its development landscape. The decline in foreign aid, compounded by restrictive policies, economic contraction, and deteriorating institutional capacity, has significantly reduced the absorptive space for traditional aid delivery. At the same time, the Afghan economy is facing persistent challenges: low growth, high unemployment, inflation, and a large and growing population. Nearly one in four youth remains unemployed, and restrictions on women's participation in the public sector have exacerbated poverty and dependency among women and girls.

198. In this constrained environment, the private sector has emerged as one of the few remaining dynamic spaces capable of delivering local development outcomes. While still underdeveloped and facing substantial barriers—including low consumer demand, limited finance, and regulatory uncertainty—the private sector is less affected by ITA restrictions and shows signs of resilience, adaptability, and potential for inclusive growth, particularly for women and youth. As a positive development, the Ministry of Finance recently outlined new microfinance regulations aimed at encouraging new entities to register and operate, thereby increasing access to finance for agricultural SMEs. It also introduced tax exemptions and is in the process of developing a five-year strategy, underscoring commitment to enable private sector growth. The CSAAP recognizes that achieving long-term transformation in Afghanistan's food systems and climate resilience will depend heavily on mobilizing private investment, enterprise innovation, and co-delivery of public goods. Strengthening these partnerships is essential to

build a more resilient, inclusive, and sustainable agricultural economy.

Strategic role of the private sector in the CSAAP implementation

199. The successful rollout of Afghanistan's CSAAP hinges on the active engagement of private sector actors across the entire agrifood system—from input supply and production to processing, logistics, and market access. Given the limited public service delivery capacity and the urgent need for scalable, sustainable solutions, the private sector is positioned as a strategic partner in delivering climate-resilient outcomes at the farm, enterprise, and system levels.

200. In climate-resilient food production, private firms can lead the expansion of improved seed systems, mechanization services, and climate-smart technologies. Agribusinesses, including seed companies, irrigation system suppliers, and equipment vendors can ensure the timely delivery of certified, stress-tolerant inputs tailored to Afghanistan's diverse AEZs. By investing in service delivery models such as franchise agro-dealers, fee-for-service mechanization providers, and bundled input-finance packages, the private sector can reduce barriers to technology adoption for smallholders and pastoralists.

201. In horticulture and livestock development, private processors, aggregators, and logistics providers are essential for unlocking the value of high-potential value chains. For instance, investments in solar-powered cold storage, fruit drying, packaging facilities, and dairy and poultry processing units

not only improve product quality and reduce postharvest losses but also create jobs and open access to domestic and regional markets. These interventions directly support CSA objectives by reducing emissions, enhancing resource efficiency, and increasing economic resilience.

202. Moreover, the private sector plays a transformative role in agribusiness and SME development. Local enterprises can drive innovation in food processing, organic input production, veterinary services, e-commerce platforms, and agrologistics. By building functional linkages between producers and markets, these businesses create multiplier effects that improve rural incomes and stimulate inclusive economic growth. Special emphasis will be placed on supporting youth- and women-led enterprises through financing, mentorship, and policy advocacy.
203. Private actors are also key partners in developing climate-resilient market infrastructure and services. These include digital payment systems, weather index insurance schemes, traceability platforms, and agroweather advisory tools. When properly enabled through public-private collaboration, such services can enhance transparency, reduce transaction costs, and improve risk management for farmers and agri-enterprises alike.
204. The private sector will be instrumental in enabling the shift toward territorial and value chain-based planning under the CSAAP. This involves aligning investments geographically across six agribusiness clusters identified for their comparative advantage and climate potential. Through strategic partnerships, private investors and service providers can help operationalize these clusters as engines of inclusive rural transformation—delivering climate-smart goods, services, and market access to thousands of Afghan farmers. By leveraging the reach, innovation, and capital of the private sector, the CSAAP transforms agrifood system development into an opportunity for shared prosperity, resilience building, and economic inclusion at scale. Unlocking this potential will require enabling policies, risk-sharing instruments, and strong public-private coordination—but the payoff is a food system that is not only productive and adaptive but also self-sustaining in the long term.

Moving from scale to leverage: A shift toward co-financing and shared delivery

205. The CSAAP represents a strategic shift in Afghanistan's development model—from donor-driven delivery to a model centered on leveraging private capital and capabilities. This pivot is not only a response to the country's constrained fiscal space and declining aid flows but also a practical approach to scaling impact under a fragile and resource-scarce context. Rather than expanding solely through public programs, the CSAAP seeks to catalyze growth by co-financing interventions with the private sector, building ownership, efficiency, and sustainability from the ground up.
206. The shift toward co-financing and shared delivery involves using public funds and donor grants to de-risk investments and incentivize private sector participation in high-impact areas. For example, matching grants can support agribusiness expansion in underserved regions; blended finance instruments can unlock capital for cold storage, solar irrigation, or seed multiplication enterprises; and partial credit guarantees can encourage banks and microfinance institutions to lend to rural SMEs, especially those led by women or youth. These mechanisms allow public investments to serve as a multiplier, crowding in private capital rather than substituting for it (annex 7).
207. Shared delivery models also enable the private sector to contribute to functions traditionally managed by the public sector, such as agricultural extension, logistics, veterinary services, and input distribution. Under the CSA framework, service delivery can be outsourced or contracted to local enterprises or cooperatives, improving efficiency while fostering local economic development. These models are particularly relevant in the Afghan context, where public institutions face operational constraints, but local businesses remain active and responsive.
208. Furthermore, the shift to leverage-based investment encourages modular and demand-driven programming. Rather than prescriptive national rollouts, CSA interventions can be piloted and scaled in agribusiness clusters or value chains where private

sector interest already exists. This includes dairy and poultry enterprises in peri-urban zones, saffron and dried fruit processors in export-oriented corridors, and fodder producers or solar irrigation suppliers in pastoral regions. By anchoring investment to existing commercial demand, the CSAAP reduces risk and increases the likelihood of sustainable outcomes.

209. To support this transformation, foundational investments in financial infrastructure are also critical. These include expanding access to Islamic finance tailored for agriculture, improving digital payment systems to facilitate input purchases and crop sales, and strengthening anti-money laundering and know-your-customer (AML/KYC) frameworks to enable responsible capital flow. Improved financial access is not just a precondition for enterprise growth but also a means of linking farmers to markets and building rural resilience.
210. Ultimately, the move from scale to leverage reflects a pragmatic reorientation of development strategy. It recognizes that Afghanistan's food system cannot be rebuilt by the public sector alone and public funds must be used more strategically to unlock private capital, crowd in expertise, and scale market-led solutions. By embracing co-financing and shared delivery, the CSAAP offers a path to resilience and recovery grounded in local ownership, financial sustainability, and long-term impact.

Creating opportunities for women and youth through private sector engagement

211. Women and youth represent both the most vulnerable groups and the greatest untapped potential in Afghanistan's rural economy. As public sector employment opportunities have diminished—particularly for women—the private sector offers one of the few remaining spaces for economic engagement, innovation, and leadership. The CSAAP strategically leverages this opening by positioning women and youth not only as beneficiaries but also as drivers of transformation across climate-resilient agriculture, agribusiness, and rural service delivery.
212. Women play a central role in Afghanistan's food systems, particularly in livestock management, backyard horticulture, food processing, and

home-based trade. Despite accounting for more than half of the agricultural workforce, women remain largely excluded from land ownership, formal markets, financial services, and agricultural extension. The CSAAP addresses these barriers by promoting targeted interventions—such as women's producer groups, gender-sensitive extension services, and home nutrition gardens linked to commercial markets. It also supports inclusive land tenure reforms and tailored financing mechanisms, such as Islamic microfinance products, to increase women's access to productive assets and entrepreneurship opportunities.

213. For Afghan youth, who face rising unemployment and limited mobility, the CSAAP offers pathways to meaningful economic engagement through skills development, enterprise incubation, and rural employment generation. Investment packages are designed to integrate youth into high-potential value chains—such as dairy, poultry, horticulture, logistics, and agri-tech—by connecting them to training, mentoring, and startup capital. The plan also encourages the adoption of digital agriculture solutions, which provide new roles for tech-savvy youth in data collection, climate information services, traceability, and e-commerce platforms.
214. Private enterprises—especially small and medium size agri-businesses—are uniquely positioned to create decent jobs and inclusive value chain opportunities for women and youth. Through procurement, training, and partnerships with cooperatives and local NGOs, the private sector can absorb and support these groups at scale. For instance, dairy processors can build networks of women milk suppliers, logistics companies can engage youth as aggregation agents or transporters, and input dealers can hire young extension agents to reach underserved communities. When supported by the right policy and financing environment, these models not only improve livelihoods but also contribute to social cohesion, resilience, and long-term recovery.
215. By anchoring gender and youth inclusion within private sector development, the CSAAP offers a pathway to inclusive climate adaptation that strengthens both the economy and community resilience. It recognizes that without unlocking the full potential of women and youth, Afghanistan's rural transformation will remain incomplete and its food systems fragile.

Unlocking private sector potential through a five-pillar strategy for resilient growth

216. To effectively mobilize the private sector as a partner in CSA and food system transformation, the CSAAP outlines a deliberate strategy to enable, attract, and scale private investment. The Action Plan aligns with the evolving development strategy for Afghanistan by operationalizing five pillars to enable private sector leadership.¹⁰ These pillars address not only the financial and technical barriers facing Afghan entrepreneurs and investors but also the systemic constraints to inclusive and climate-resilient enterprise development.

(a) New pathways for investment and partnerships.

The first pillar focuses on identifying and supporting new sectors, actors, and business models capable of delivering public goods alongside profit. This includes tapping into emerging value chains such as organic and drought-tolerant horticulture, renewable energy solutions for cold storage and irrigation, and mobile-based agricultural services. It also involves cultivating partnerships with Islamic financial institutions, diaspora investors, and regional agribusinesses, offering them co-investment opportunities in climate-smart infrastructure, logistics, and services.

(b) Localization of implementation. Recognizing the declining space for direct international engagement, the CSAAP supports a pivot toward local procurement, local enterprise development, and decentralized delivery models. By directing more donor and public spending through Afghan SMEs, cooperatives, and social enterprises, the plan strengthens local markets, creates jobs, and builds implementation capacity. This approach enhances ownership, resilience, and cost-effectiveness while ensuring that resources circulate within communities.

(c) Strengthening rural financial infrastructure. Access to finance remains one of the largest barriers for smallholder farmers and rural enterprises. The CSAAP addresses this by

promoting blended finance tools, Islamic-compliant credit products, and digital financial services. Efforts will also focus on improving the enabling environment for financial inclusion and building partnerships with microfinance institutions and agricultural banks. The goal is to lower the cost of capital, expand rural credit, and support underserved groups, particularly women and youth.

(d) Knowledge, data, and market intelligence. For the private sector to take informed risks, it needs access to timely and reliable data on markets, weather, input demand, and investment opportunities. The CSAAP proposes investments in integrated agroweather, climate, and market information systems to build a credible evidence base for action. These tools will help de-risk investment, guide public-private coordination, and enhance transparency and accountability throughout agrifood value chains.

(e) Building strategic alliances and platforms.

The final pillar centers on aligning actors—donors, development banks, government institutions, NGOs, and businesses—around a shared agenda for agrifood transformation. This includes establishing investment facilitation platforms, technical working groups, and CSA finance pipelines to crowd in funding, harmonize standards, and accelerate project execution. In particular, coordination with IFC, MIGA, and regional private equity networks will be key to scaling commercial solutions and de-risking early-stage ventures.

217. Together, these five pillars provide a practical roadmap for unlocking private sector potential as both a driver and co-investor in Afghanistan's CSA agenda. By enabling Afghan businesses to deliver climate-resilient goods, services, and jobs at scale, the CSAAP bridges the gap between humanitarian relief and long-term rural transformation anchored in markets, innovation, and local opportunity. The centrality of the private sector in rolling out the CSAAP reflects both principled commitment and pragmatic necessity. Afghanistan's development future cannot depend solely on public aid or government service delivery. By unlocking the capacity, capital, and innovation of the private sector, the CSAAP offers a path toward inclusive, climate-resilient recovery—one grounded in local opportunity, financial leverage, and long-term sustainability.

¹⁰ "Afghanistan: The Changing Context and the Need for a Pivot: A New Approach and Possible WBG Role." (internal document)

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Annex 1: Climate Change Impacts on Production and Cropland Suitability in Afghanistan

Crop	Historical, 1981–2010		RCP8.5 in 2050s		RCP8.5 in 2080s	
	Suitable Area (1000 ha)	Potential Production (1000 tons)	Change of Suitable Area	Change of Production	Change of Suitable Area	Change of Production
Wheat	4 270	11 086	↑	↔	↑	↓
Barley	4 954	13 931	↑	↔	↑	↓
Maize, grain	2 782	15 060	↑	↑	↑	↔
Maize, silage	3 253	23 783	↔	↔	↑	↔
Rice, paddy	1 543	4 290	↔	↔	↓	↓
Sorghum	4 060	14 882	↑	↑	↑	↑
Oat	3 746	5 118	↓	↓	↓	↓
Rye	3 926	5 767	↔	↓	↓	↓
Millet	2740	5 701	↓	↓	↓	↓
Buckwheat	1 484	928	↓	↓	↓	↓
Chickpea	1 011	1 293	↑↑	↑	↑↑	↑
Gram	1 621	1 696	↓	↓	↓	↓
Potato	1 531	4 463	↔	↔	↓	↓
Sweet potato	2 204	9 401	↓	↓	↔	↓
Sugar beet	849	2 798	↓	↓↓	↓↓	↓↓
Sugarcane	653	2 947	↑↑	↑↑	↑↑	↑↑
Groundnut	1 337	1 665	↔	↔	↓	↓
Rapeseed	2 139	2 222	↑	↔	↑	↓
Sesame	2 298	3 285	↓	↓	↓	↓
Soybean	2 506	4 637	↔	↓	↓	↓
Sunflower	2 239	4 013	↓	↓	↓	↓
Cumin	1 180	614	↑	↑	↔	↓
Mustard	618	458	↑↑	↑↑	↑↑	↑↑
Cotton	1 976	946	↑	↑	↑	↑
Flax	2 881	1 057	↓	↓	↓	↓
Alfalfa	2763	24 875	↑	↑	↑	↑
Citrus	267	767	↑↑	↑↑	↑↑	↑↑
Olive	2210	2 850	↓	↓	↓	↓
Cabbage	1 704	3 007	↓	↓	↓	↓
Onion	1 170	4 007	↓	↓	↓	↓
Tomato	1 522	3 823	↓	↓	↓	↓

Note: Arrows show results without CO₂ fertilization effects and indicate changes of less than 3% (↔), 3%–20% (↓, ↑), 20%–50% (↓↓, ↑↑) and more than 50% (↓↓↓, ↑↑↑) compared to baseline conditions. Suitable areas include prime (VS), good (S), moderate (MS) and marginal (mS) extents on rain-fed cropland and prime, good and moderate extents on irrigated cropland. Potential refers to maximum possible production on all suitable cropland. Potential production is given as dry weight of harvested product except for sugar crops (1000 tons sugar), cotton (1000 tons lint) and olive (1000 tons oil). For cotton, citrus, rice and sugarcane the marginally suitable extents were not included.

Source: FAO/IIASA 2022.

Annex 2: CSA Investment Options Prioritization Tables

(a) Cereals and legumes—Short- to medium-term investment options

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Develop the Seed System to Enhance Yields, Stress Tolerance, and Reduce Losses - Strengthen the production of breeder and foundation seeds, ensuring varietal purity and consistent quality through maintenance and purification practices. - Expand local certified seed production to improve access to reliable planting material, particularly in remote areas and among resource-poor farmers.	4	2	2	3	3	4	18	60
Promote Adoption of Improved Seed Varieties and Climate-Smart Agronomic Practices - Support farmer uptake of improved and resilient seed varieties alongside complementary practices such as balanced fertilizer use and the introduction of alternative, resource-efficient crops. - Conduct field demonstrations, FFSs, and field days to showcase benefits and build capacity. - Enhance access to climate-resilient seeds and strengthen extension services to raise awareness and promote adoption of improved agronomic practices. - Integrate seed adoption with broader crop diversification strategies and sustainable farming techniques.	4	3	4	5	2	3	21	70
Promote Efficient Use of Fertilizers and Agricultural Inputs - Establish fertilizer quality control centers across all AEZs to ensure the availability of safe and effective inputs. - Promote integrated soil fertility and pest management approaches, including crop-livestock integration and practices that enhance soil organic matter. - Provide tools and equipment to improve land use efficiency and support sustainable input application.	4	4	2	3	3	3	19	63

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Enhance Water Efficiency and Allocation in Irrigated Wheat and Cereal Systems - Rehabilitate critical irrigation infrastructure to improve local water delivery and reduce system losses. - Promote supplementary irrigation to enhance crop reliability during dry spells. - Support on-farm water management practices to optimize water use efficiency and equitable allocation among farmers.	4	3	3	5	4	1	20	67
Strengthen Rainfed Wheat Production Through Timely Access to Inputs and Water - Improve access to rainfed-adapted seed varieties and other essential inputs tailored to low-moisture conditions. - Promote supplementary irrigation during critical growth stages to stabilize yields and reduce climate-related risks.	3	3	4	4	2	1	17	57

(b) Cereals and Legumes—Long-term investment options

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Accelerate Development and Release of High-Yielding, Disease-Resistant, and Climate-Resilient Varieties - Strengthen regional research stations to further develop and refine locally adapted crop varieties, including those suited for rainfed areas. - Enhance collaboration between research institutions and extension services to ensure timely dissemination and adoption of improved technologies.	4	4	3	5	1	2	19	63

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Diversify Seed Production Systems Through Inclusive Public-Private-Farmer Partnerships - Promote greater involvement of the private sector and farmers' organizations in seed production and distribution to strengthen and expand local seed systems. - Improve farmer access to quality seed and complementary input packages through collaborative models that support both commercial and smallholder needs.	3	3	2	2	1	4	15	50
Expand CSA Practices Tailored to Agroecological Zones and Climate Challenges - Promote context-specific CSA practices, such as conservation agriculture and the System of Wheat Intensification (SWI), to build resilience and improve productivity. - Encourage private sector participation in the local production and supply of agricultural machinery to support widespread adoption. - Facilitate access to mechanization options suited to the diverse needs and capacities of smallholder farmers across different AEZs.	4	3	3	5	3	3	21	70
Strengthen and Expand Agricultural Extension Systems for Broader Outreach and Inclusivity - Enhance public extension services to improve coverage and technical support across regions. - Promote localized farmer-to-farmer knowledge exchange to leverage community-based learning. - Develop and support women-led extension models to ensure gender-responsive outreach. - Engage private extension providers to complement public efforts and expand access to advisory services.	3	3	4	3	2	2	17	57

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Enhance Intensive Irrigation Through Improved Water Access, Equity, and Efficiency - Undertake major rehabilitation of irrigation systems, guided by feasibility studies and climate-resilient basin planning. - Implement land levelling and provide on-farm irrigation support to boost water use efficiency. - Strengthen Water User Associations (WUAs) at the main canal level and Irrigation Associations (IAs) at the farm level to ensure equitable water distribution and local governance. - Deliver integrated support packages—including canal rehabilitation, quality seeds, fertilizers, small-scale machinery, and extension services through demonstration plots, FFSs, and targeted training on efficient water use, improved agronomic practices, postharvest handling, and market access.	5	4	4	4	3	4	24	80
Rehabilitate and Expand Upland River and Stream Systems for Improved Irrigation and Water Use Efficiency - Rehabilitate and strengthen water harvesting structures to enhance water availability in upland areas. - Promote supplementary irrigation to support crop production during dry spells. - Improve on-farm water management practices among smallholders, particularly in rainfed and water-scarce regions. - Where feasible and sustainable, develop new irrigation areas based on assessments of future water availability and climate conditions.	4	3	4	4	2	1	18	60

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Support Smallholder Cereals Producers to Access Markets and Reduce Value Chain Losses - Strengthen local processing capacity through support for small-scale mills, improved storage facilities, and stronger linkages to private sector marketing—promoting the use of green technologies. - Organize and build the capacity of wheat farmer groups to enhance collective action and bargaining power. - Support the formation of processing associations to coordinate and scale value-addition activities. - Enhance certification systems for wheat trade by promoting relevant standards and phytosanitary compliance to improve market access, including for export.	2	4	2	1	3	4	16	53
Develop Strategic Grain Reserves (SGRs) to Enhance Food Security and Market Stability - Establish and manage SGRs to support domestic wheat production, ensure food availability during crises, and stabilize local market prices. - Review the relevance and design of SGR operations to align with current needs and market dynamics. - Rehabilitate existing silos and invest in the development and standardization of grain storage systems to ensure quality preservation and efficient reserve management.	4	1	3	5	1	1	15	50
Activate Quarantine Stations at Border Entry Points to Ensure Safe and Disease-Free Import of Wheat and Cereal Products - Operationalize and strengthen quarantine facilities at all major entry ports to prevent the introduction of pests and diseases through imported wheat seeds and cereal products. - Ensure compliance with phytosanitary standards to safeguard domestic agriculture and maintain quality control in the food supply chain.	3	1	1	2	3	3	13	43

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Expand Access to Credit, Finance, and Insurance to Support Adoption of Improved Practices, Inputs, Machinery, and Processing - Facilitate affordable and inclusive financing solutions to enable farmers and agri-entrepreneurs to invest in climate-smart practices, quality inputs, modern machinery, and postharvest processing. - Promote tailored credit schemes and partnerships with financial institutions to meet the diverse needs of smallholders and agribusinesses.	3	4	3	3	2	4	19	63
Promote Private Sector Investment in Agricultural Infrastructure and Localized Equipment Provision - Encourage private sector engagement to invest in essential agricultural infrastructure, including production and processing facilities. - Support the localization of equipment manufacturing and distribution to improve accessibility and reduce costs for farmers and agri-processors.	3	4	2	2	3	4	17	57

(c) Horticulture: Shorter- to medium-term investment options

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Vegetables								
Develop Targeted Vegetable Horticulture Value Chain Packages for Diverse Zones and Farming Systems - Design and implement value chain interventions tailored to specific AEZs and farm typologies to boost vegetable production and profitability. - Introduce appropriate postharvest technologies and best practices to improve product quality, extend shelf life, ensure food safety, reduce losses, and enhance value addition.	4	3	3	3	3	4	20	67

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Strengthen Horticulture Extension Services for Vegetables and Fruits - Build the capacity of key actors—including extension specialists, farmer groups, women's groups, and NGOs—to support improved vegetable and fruit production as well as postharvest management practices. - Develop and distribute locally adapted training manuals and materials in local languages for use in training-of-trainers programs and as reference guides for extension personnel.	4	4	4	3	2	3	20	67
Establish and Strengthen Farmer Associations for Vegetables - Build the organizational capacity of farmer associations to support collective marketing, processing, and access to inputs and advisory services. - Promote peer-to-peer learning on production techniques and value addition. - Facilitate market access through collective sales, grading, and packaging initiatives. - Provide training and technical support for institutional development and governance.	3	4	3	3	2	4	19	63
Strengthen Quality Input Value Chains for Key Horticultural Crops: Example—Virus-Free Potato Seed System - Establish a fully operational tissue culture laboratory staffed with trained government personnel to produce clean, high-quality planting material. - Construct cold storage facilities to preserve seed quality and extend shelf life. - Deliver training and capacity-building programs on tissue culture techniques and improved potato production practices. - Provide targeted extension services to promote healthy potato cultivation and support market engagement.	4	3	2	2	3	3	17	57

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Fruits								
Enhance Capacity in Fruit Tree Management through Practical Training • Deliver hands-on training in improved fruit tree cultivation practices through FFSs, demonstration plots, farmer-to-farmer knowledge exchange, and cross-learning visits. • Key focus areas include effective fertilization and irrigation techniques, proper pruning methods, integrated pest and disease management, and opportunities for intercropping to enhance productivity and sustainability.	3	4	2	3	4	5	21	70
Establish and Strengthen Farmer Associations for Fruits • Build the organizational capacity of farmer associations to support collective marketing, processing, and access to inputs and advisory services. • Promote peer-to-peer learning on production techniques and value addition. • Facilitate market access through collective sales, grading, and packaging initiatives. • Provide training and technical support for institutional development and governance.	3	4	3	3	2	4	19	63
Establish Community-level Collection Centers • Set up collection centers at the community level to enhance market access for local producers by providing facilities for postharvest handling, grading, and linkage with buyers. • Site selection and center design should be informed by regional and local needs, developed in close collaboration with leading private sector actors investing in modern horticulture.	2	4	2	1	3	5	17	57

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Strengthen Vertical Linkages Across the Horticulture Value Chain - Facilitate stronger connections between producer and marketing groups with wholesalers, exporters, and processors by supporting structured negotiations and partnership development. - Promote the adoption of quality standards and agreed-upon minimum delivery volumes as part of formalized supply agreements to enhance trust, consistency, and market access.	3	4	2	1	3	5	18	60
Build Basic Information Base on Horticulture Conduct a baseline survey to assess current technology use, crop yields, varieties and farming practices, production costs, production dispersion, access to infrastructure, market channels, and prevailing prices.	4	3	2	3	2	3	17	57

(d) Horticulture: Long-term investment options

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Identify Markets and Crops with new opportunities for horticultural exports: - Conduct a comprehensive analysis of market trends beyond traditional outlets, including demand and requirements and the comparative advantage of Afghan products while factoring in climate change projections to assess future potential. - Identify communities with suitable agroecological conditions for the optimal production of high-potential crops, along with the necessary local services and input supply systems to support their development.	3	4	2	3	1	5	18	60

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Ensure Germplasm for Quality Seedlings and stocks - Revitalize the national collections (NCs) of fruits and nuts across six key AEZs, focusing on commercially viable and high market value varieties. - Ensure the availability of local germplasm to support targeted fruit breeding programs aimed at enhancing drought resilience, late flowering traits, and tolerance to pests and diseases. - Enhance private sector awareness and engagement in the production of high-quality planting materials.	5	4	2	4	2	5	22	73
Build Irrigation Capacities for Fruits and Vegetables - Strengthen farmers' capacity to operate and maintain tertiary-level irrigation systems by establishing or reinforcing local water management institutions, including traditional Mirab systems and IAs. - Rehabilitate, reconstruct, and upgrade irrigation infrastructure (for example, watercourses) to reduce conveyance losses, ensure equitable water distribution, and improve irrigation efficiency. - Promote improved water management practices to enhance land and water productivity through initiatives such as on-farm demonstration sites. - Encourage adoption of efficient on-farm irrigation technologies, such as drip irrigation for orchards, to optimize water use.	5	4	3	5	4	2	23	77

(e) Livestock—Short- to medium-term investment opportunities: Sedentary small-scale and emerging commercial

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Sedentary (Small-scale) and Emerging Commercial Livestock Keepers (cattle and poultry)								
Animal Health and Disease Control for healthier and more shock-resilient stock: - Enhance disease surveillance and reporting systems, upgrade veterinary infrastructure and training, and support widespread adoption of vaccination and biosecurity practices. - Promote climate-smart livestock practices, including integrated agroforestry (where appropriate), sustainable pasture management, and water conservation methods.	4	3	3	4	2	2	18	60
Improved Breeding for more productive and stress-tolerant animals: Establish breeding centers and implement breed improvement programs, including training in artificial insemination, to support breed diversification and the development of climate-resilient livestock. Facilitate local breed stock marketing to strengthen value chains.	4	3	2	3	2	3	17	57
Animal Nutrition and Feed Management for healthier and more productive, and hence more resilient stocks: Boost local feed production, promote fodder conservation methods, deliver training on balanced livestock nutrition, and support the creation of community-based feed banks.	5	4	3	4	2	3	21	70
Access to Livestock Extension Services for inclusive outreach of technical support: - Strengthen extension services, train and deploy more extension workers, establish FFSs for knowledge sharing, and promote farmer-to-farmer learning exchanges, and common interest groups. - Provide dedicated women-led livestock extension support.	4	3	5	3	2	3	20	67

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Improved Market Access for Livestock Keepers , to increase income - Strengthen PPPs to enhance the production, value addition, and marketing of animal products. - Support the development and capacity of dairy cooperatives to improve collective processing and market access.	3	4	3	1	1	5	17	57

(f) Livestock—Long-term investment opportunities; Sedentary small-scale and emerging commercial

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Sedentary Small-scale and Emerging Commercial Livestock Keepers (cattle and poultry)								
Climate- and Disease-Resilient Livestock Systems - Invest in R&D for climate- and disease- resilient livestock breeds. - Further expand outreach of appropriate health services to address new outbreaks.	4	3	3	4	2	2	18	60
Capacity Building and Knowledge Transfer to Ensure Outreach and Inclusive Support to Livestock Keepers - Enhance training programs for livestock farmers, extension workers, and veterinary professionals. - Build dedicated corps of women extension support, and women groups and networks. - Invest in research and knowledge dissemination platforms to facilitate the adoption of innovative livestock technologies and practices.	4	4	4	4	2	3	21	70

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Feed and Fodder Development for Increased Production and Animal Health - Establish feed processing units and small storage facilities in partnership with the private sector to produce mixed feed on a commercial basis. - Support farmers organized in producer groups to produce fodder seed. - Improve the utilization of crop and industrial byproducts for fattening and milk production based on the feeding concentrated feed and urea molasses mineral block.	4	4	3	3	3	5	22	73
Infrastructure Development to Protect Livestock and Assets to Support Animal Health - Invest in improved livestock housing infrastructure, including ventilation systems, waste management facilities, and animal welfare standards. - Upgrade veterinary clinics.	3	4	2	2	3	3	17	57
Market Access and Value Addition to generate additional incomes - Establish cold chain facilities for value-added products. - Improve market linkages for livestock products, establish processing and value-addition facilities, and promote branding and certification for quality assurance. Encourage entrepreneurship and business development in the livestock sector.	3	5	3	1	3	5	20	67

(g) Livestock—Short- to Long-term investment opportunities: Pastoralists and small ruminants

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
SHORT-MEDIUM TERM								
Pastoralists and Small Ruminants' Systems								
• Emergency fodder supply systems	3	2	5	5	1	2	18	60
• Targeted animal health and extension services support to pastoralists	4	3	4	3	1	2	17	57
• Enhance grazing management system	4	3	4	4	3	2	20	67
• Provide access to water and feed	3	2	5	5	1	2	18	60
LONG TERM								
Pastoralists and Small Ruminants' Systems								
Improved breeding programs	4	3	3	4	2	2	18	60
Dedicated feed, health, and extension and value-addition services to pastoralists	4	4	5	4	1	4	22	73
Pasture/rangeland management to increase resource productivity and resilience • Pasture development • Pasture group development • Conflict resolution.	4	3	4	5	4	2	22	73
Strengthening livestock value chains • Processing and marketing	3	5	3	1	3	5	20	67

(h) Water and natural resources management—Short- and medium-term investment options

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Water Resource Management - Update comprehensive assessment of water resources to understand availability, quality, and distribution patterns, also in line with future needs and updated climate and hydrological modeling. - Implement water monitoring systems to track water availability and usage, allowing for efficient water management. - Promote water-saving techniques such as drip irrigation, sprinkler systems, and precision farming to optimize water use in agriculture.	4	2	2	5	4	2	19	63
Water Storage and Harvesting, and Asset Safeguarding - Construct small-scale water reservoirs and ponds to capture and store rainwater for agricultural and livestock use during dry periods. - Promote the use of rainwater harvesting techniques, such as rooftop collection systems and contour trenches, to recharge groundwater sources. - Ensure small-scale flood proofing of infrastructure with local labor. - Construct contour bunds, check dams, and terraces.	5	3	3	5	4	3	23	77
Water Efficiency Measures - Provide training and extension services to farmers and livestock owners on efficient water use practices, including proper irrigation scheduling, soil moisture monitoring, and water recycling. - Encourage the adoption of drought-tolerant crop varieties and livestock breeds that require less water.	4	4	3	5	3	3	22	73

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Rangeland Rehabilitation - Implement controlled grazing or rotational grazing systems. - Reseed degraded pastures with fast-growing grasses or legumes.	3	2	4	5	5	3	22	73
Agroforestry Interventions - Plant multipurpose trees and shrubs (for example, fodder trees and nitrogen-fixers). - Promote hedgerows or live fences to reduce erosion.	4	2	4	5	5	3	23	77

(i) Water and natural resources management—Long-term investment options

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Integrated Water Resource Management for Sub-Basin (and basin) Development and Allocation Based on Climate Scenarios - Develop short- and long-term comprehensive water management plans that integrate agriculture, livestock, and environmental considerations, and other uses. - Invest in water infrastructure development, including reservoirs, canals, and pumping stations, to enhance water storage and distribution. - New irrigation command area development with improved irrigation network in river basin with abundant water availability, such as the Amu River basin, including the development of strategic small dams.	4	3	2	5	4	3	21	70

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Irrigation System Upgrade and Modernization to Increase Efficiency, Reduce Losses, and Increase Supply - Upgrade/rehabilitate the existing traditional irrigation system (main, secondary, and tertiary canals) to control conveyance losses and improve irrigation efficiency. - Invest in upgrading existing irrigation systems by replacing inefficient open channels with piped or pressurized systems for improved water distribution and reduced water losses. - Promote the use of modern irrigation technologies, such as automated irrigation controllers and soil moisture sensors, to optimize water use efficiency.	5	4	3	5	4	3	24	80
Watershed and Natural Resources Management - Upper areas: trenches, check dams - Middle areas: check dams, groundwater recharge and water harvesting, channel rehabilitation, riverbank protection - Integrated planning and implementation across entire watersheds - Infrastructure for long-term water storage and distribution	3	2	4	5	5	3	22	73
Afforestation and Reforestation - Establish community or buffer zone forests. - Promote indigenous and drought-resistant tree species.	3	3	4	5	5	3	23	77
Ecosystem Restoration Restore wetlands, riverbanks, and other ecologically sensitive areas.	3	3	4	5	5	3	23	77

Description of activities	Increases productivity	Income generation	Inclusivity and jobs	Climate resilience	Environmental benefits	Value addition	Total score	Total score (%)
Water Governance and Policy for Resilient Water Management and Use - Strengthen the capacity of human resources working in water-related institutions, including capacity to support WUAs and IAs. - Strengthen institutions responsible for water governance, regulation, and enforcement to ensure equitable and sustainable water allocation. - Develop and implement policies that incentivize water-efficient practices and discourage wasteful water use.	3	2	5	5	5	1	21	70
Climate-Resilient Water Management Strategies and Design - Incorporate climate change considerations into water management strategies by assessing future water availability and developing adaptation plans for river basins and sub-basins, and specific storage and major irrigation schemes, including for multiple use. - Design and invest in climate-resilient infrastructure, such as water storage and conveyance systems designed to withstand extreme weather events.	3	2	3	5	4	1	18	60
Research and Innovation for Resilient Water Management - R&D in water-efficient agricultural practices, drought-resistant crop varieties, and livestock water management technologies. - Foster innovation through partnerships with research institutions, private sector entities, and farmers' organizations to develop and promote water-saving solutions.	4	3	2	5	4	4	22	73
Land Use Planning and Governance - Develop and enforce sustainable land use plans. - Strengthen community-based NRM institutions and land tenure security.	3	2	5	5	5	1	21	70

Annex 3: Agribusiness Clusters

(a) Investment Priorities in Agribusiness Clusters

Over the next decade, a total of US\$1.5 billion in public investment will be required across Afghanistan's six agribusiness clusters: the Northern Plains, Eastern Zone, Central Highlands, Southern Zone, Western Zone, and Kabul Region. These clusters reflect distinct agroecological and market characteristics, and the investments are strategically distributed to maximize regional comparative advantages, strengthen value chains, and improve market access.

The investments have been categorized into six major areas that are essential for transforming Afghanistan's food and agricultural systems into competitive and climate-resilient sectors.

1. Medium- to Large-Scale Production of High-Value Crops and Livestock Products (US\$330 million)

This category represents the single largest area of investment, accounting for US\$330 million. Investments will target the expansion of commercial-scale horticulture, grains, and livestock production. The Northern Plains, Southern Zone, and Kabul Region lead in this area, reflecting their potential for cereals, cotton, almonds, fruits, and livestock. This category will focus on modernizing farming systems, boosting productivity, and enhancing the domestic supply of high-demand commodities.

2. Advanced Production Technologies and Quality Inputs (US\$220 million)

To support sustainable intensification, US\$220 million will be required in the provision and dissemination of advanced production technologies and high-quality inputs. These include improved seeds, veterinary products, irrigation equipment, and digital tools for precision agriculture. The largest requirements are in the

Northern Plains, Southern Zone, and Kabul Region—areas where adoption of such technologies will have significant productivity impacts.

3. Agro-Processing and Value-Addition Facilities (US\$225 million)

Investments in agro-processing and value addition will amount to US\$225 million, enabling Afghanistan to retain more value from its agricultural outputs and reduce postharvest losses. Focused investments in the Southern Zone, Western Zone, and Central Highlands will support fruit drying, juice extraction, flour milling, and cotton ginning facilities, while also stimulating rural industrial growth.

4. Cold Storage and Logistics Infrastructure with a Focus on Renewable Energy (US\$270 million)

A key constraint in Afghan agriculture is the lack of reliable storage and logistics infrastructure. To address this, US\$270 million will be required for developing cold chain systems powered by renewable energy. This includes solar-powered cold rooms, refrigerated transport, and regional storage hubs. The Eastern Zone, Southern Zone, and Kabul Region—due to their strong market linkages and perishable crop production—should receive the highest allocations.

5. Commercial Feed and Fodder Production and Processing Systems (US\$220 million)

As livestock productivity is heavily constrained by feed shortages, the CSAAP proposes investment of US\$220 million in establishing commercial feed and fodder production facilities across all clusters. Investments in the Northern Plains and Southern and Western Zones will focus on crop residue processing, silage production, and fodder seed multiplication to support both sedentary and pastoral systems.

6. Meat and Dairy Processing Facilities (US\$235 million)

The final investment category focuses on scaling up meat and dairy processing capacity, with a total of US\$235 million. These funds will be used to develop

milk collection centers, abattoirs, refrigerated transport, and packaging facilities. The Northern Plains, Southern Zone, and Eastern Zone lead in this area, given their concentration of livestock and growing urban demand for processed animal products.

TABLE 3.1: INVESTMENT REQUIREMENTS FOR THE AGRIBUSINESS CLUSTERS (US\$, MILLIONS)

	Northern Plains	Eastern Zone	Central Highlands	Southern Zone	Western Zone	Kabul Region	Total
Medium- to large-scale production of high-value crops and livestock products	70	50	30	60	60	60	330
Advanced production technologies and quality inputs	50	30	25	50	30	35	220
Agro-processing and value-addition facilities	45	30	30	50	40	30	225
Cold storage and logistics infrastructure with a focus on renewable energy	40	50	30	50	50	50	270
Commercial feed and fodder production and processing systems	45	35	20	40	40	40	220
Meat and dairy processing facilities	50	45	25	50	30	35	235
Total	300	240	160	300	250	250	1,500

(b) Detailed Assessment of Opportunities Across the Agribusiness Clusters

Cluster	Northern Plains (Balkh, Kunduz, and Baghlan Provinces)	Eastern Zone (Nangarhar, Laghman, and Kunar Provinces)	Central Highlands (Bamyan and Daikundi Provinces)	Southern Zone (Kandahar, Helmand, and Uruzgan Provinces)	Western Zone (Herat, Badghis, and Farah Provinces)	Kabul Region: Kabul, Parwan, Wardak, Logar, Paktika, Ghazni)
Potential	Wheat, rice, cotton, and various vegetables and fruits such as grapes and melons, nuts and livestock	Citrus fruits, vegetables, and high-value cash crops, and intensive livestock production	Potatoes, apples, apricots and dairy farming	Pomegranates, melon grapes, dairy, and almonds	Saffron, grapes, dairy products, dried fruits, and wheat	Apple, grapes, apricots, pinenuts, vegetables, and dried fruits
Agribusiness opportunities	Mechanized farming, higher efficiency irrigation, establishment of agro-processing units such as flour mills and cotton ginning facilities, and development of livestock value chains, vegetable processing facilities	Crop diversification, agro-processing for dried fruits, juice extraction, and vegetable export, dairy, and poultry processing facilities	Development of cold storage facilities, potato processing industries	Expansion of horticulture-based agribusinesses and fresh and dried fruit processing	Saffron and grapes processing and export, and expansion of the dairy industry	Commercialization of high-value crops. Process and export key products such as pine nuts, apples, grapes, apricots, and other dried fruits
Key strategic agribusiness/agrologistics interventions	Expansion of improved commercial farming, SME investment in aggregation/packaging centers Investment in wheat milling industry and including supportive policies to allow the growth of local milling industry Large processing facilities and cold chain system for agri-livestock processing, including through improved access to service land Investment in local production of agricultural technologies, including irrigation or import of modern machineries and irrigation systems	Addressing of key needs of industrial parks including energy to attract private investment Commercialization of citrus industry SME investment in agrologistics in key fruit and livestock zones Expansion of dairy production facilities to increase capacity for local supply Development of supply chain for poultry feed and slaughterhouses Solarization and mini grids to power agribusiness	Solar-powered storage at both small and large scales, given the unique climatic conditions Commercialized, export-oriented potato production with varieties suitable for chips Solarization and mini grids to power agribusiness	Large-scale processing facilities for grapes and pomegranates and dried fruits processing Investment in improved technologies and machines Expansion of dairy production and processing facilities to increase capacity for local supply Solarization and mini grids to power agribusiness	Large-scale processing facilities for grapes, saffron, and dried fruits. Cold chain system and warehouses SME investment in aggregation/packaging centers Invest in agricultural technologies and machinery Solarization and mini grids to power agribusiness	Processing facilities, cold chain system and cold storages SME investment in aggregation/packaging centers Investment in aggregation/packaging centers Solarization and mini grids to power agribusiness

Cluster	Northern Plains (Balkh, Kunduz, and Baghlan Provinces)	Eastern Zone (Nangarhar, Laghman, and Kunar Provinces)	Central Highlands (Bamyan and Daikundi Provinces)	Southern Zone (Kandahar, Helmand, and Uruzgan Provinces)	Western Zone (Herat, Badghis, and Farah Provinces)	Kabul Region: Kabul, Parwan, Wardak, Logar, Paktika, Ghazni)
Investment cost (US\$, millions)	300	240	160	300	250	250
Investment mechanisms to mobilize private capital	Financing for SMEs and large businesses, including Islamic financing Blended financing and guarantee mechanisms to attract foreign investment	Financing for SMEs and large businesses, including Islamic financing Blended financing guarantee mechanisms to attract foreign investment	Financing for SMEs and agribusiness, including Islamic financing	Financing for SMEs and large businesses, including Islamic financing Blended financing guarantee mechanisms to attract foreign investment	Financing for SMEs and large businesses, including Islamic financing Blended financing guarantee mechanisms to attract foreign investment	Financing for SMEs and large businesses, including Islamic financing Blended financing guarantee mechanisms to attract foreign investment
Potential private sector players	Large agribusinesses already operating that have expansion and improvement potential Other investors including those engaged in other areas as well as services that are no longer attractive Foreign investors	Large agribusinesses already operating that have expansion and improvement potential Other investors including those engaged in other areas as well as services that are no longer attractive Foreign investors	Local agribusiness and SMEs	Large agribusiness already in business that have the expansion and improvement potential Other investors including those engaged in other areas as well as services that are no longer attractive Foreign investors	Large agribusiness already in business that have the expansion and improvement potential Other investors including those engaged in other areas as well as services that are no longer attractive Foreign investors	Large agribusinesses already operating that have expansion and improvement potential Other investors including those engaged in other areas as well as services that are no longer attractive Foreign investors
Role of IFC	Enhance access to finance through commercial banks IFC with equity investment partnerships with local and foreign companies	Enhance access to finance through commercial banks IFC with equity investment partnerships with local and foreign companies	n.a.	Enhance access to finance through commercial banks IFC with equity investment partnerships with local and foreign companies	Enhance access to finance through commercial banks IFC with equity investment partnerships with local and foreign companies	Enhance access to finance through commercial banks IFC with equity investment partnerships with local and foreign companies
Role of MIGA	Risks guarantee of both commercial banks and investors	Risks guarantee of both commercial banks and investors	n.a.	Risks guarantee of both commercial banks and investors	Risks guarantee of both commercial banks and investors	Risks guarantee of both commercial banks and investors

Annex 4: Assumptions for the CSA Investment Costs

(a) Land and other requirements for CSA and sustainable intensification

	Current production (Mt/year)	Per capita consumption (kg/year)	Required production Mt/year	Production gap (Mt/year)	Current area (M ha)	Land requirement without CSA (M ha)	Current yield (t/ha)	Optimal yield with CSA (t/ha)	Area required with CSA (M ha)	Incremental area relative to current area
Wheat	3.6	150	6.0	2.40	1.400	2.333	2.50	3.13	1.867	0.467
Rice	0.4	25	1.0	0.60	0.114	0.285	3.50	4.20	0.238	0.124
Maize	0.5	25	1.0	0.50	0.179	0.358	2.80	3.50	0.286	0.107
Fruits	1.5	50	2.0	0.50	0.150	0.200	10.00	14.00	0.143	0.064
Vegetables	0.6	50	2.0	1.40	0.039	0.130	15.00	21.75	0.090	0.051
Legumes	0.2	20	0.8	0.60	0.133	0.532	1.50	2.25	0.355	0.222

Note: Calculation assumes a population of 40 million.

(b) CSA costs of production

Crops	CSA unit cost (US\$/ha)	Irrigation cost (US\$/ha)	CSA total (US\$, millions)	Irrigation cost on incremental area (US\$, millions)	Total cost (US\$, millions)
Wheat	200	1,200	373	560	933
Rice	500	2,000	119	247	366
Maize	200	1,000	57	107	163
Fruits	800	2,000	171	129	300
Vegetables	500	2,000	45	101	146
Legumes	200	500	71	111	182
Total			836	1,255	2,091

(c) Improved livestock production

	Number of beneficiary households	Unit cost (US\$)	Total (US\$, millions)
Extensive production system	2,000,000	200	400
Intensive production system	800,000	600	480
Processing and marketing of livestock products	100,000	1,500	150
Total			1,030

(d) Integrated natural resources management investment costs

	Number of beneficiary households	Hectares	Unit cost/ha (US\$)	Cost (US\$, millions)
Improved water management	1,000,000	500,000	2,500	1,250
Forest management and restoration	—	400,000	500	200
Rangeland management and restoration	37,500	750,000	500	275
Grassland management and restoration	75,000	1,500,000	200	300
Agroforestry and catchment treatment	25,000	500,000	900	450
Total				2,475

(e) Agricultural Research and Development

		Unit costs (US\$)	Amount (US\$)
Directorates—support for administrative management and regional coordination	3	3,000,000	9,000,000
Enhance research facilities in regional research stations	10	5,000,000	50,000,000
Develop climate-smart crop technologies	—	—	20,000,000
Develop climate-smart livestock technologies	—	—	20,000,000
Train PhD researchers	100	30,000	3,000,000
Train MSc researchers	300	10,000	3,000,000
Train laboratory technicians	100	7,000	700,000
Train district extension workers	800	8,000	6,400,000
Establish localized training centers in each district	34	500,000	17,000,000
Add 30% maintenance costs for facilities	—	—	20,100,000
			149,200,000

(f) Integrated climate and market information services

	Qty	Unit cost (US\$)	Amount (US\$)
A. Agroweather Systems tools			
Installing new automated weather stations with complete add-ons	120	56,000	6,720,000
Maintenance costs, including software update at 35%			2,352,000
Modernizing agrometeorological stations	100	6,000	600,000
Upgrading early warning systems			400,000
Establishing earth observation satellite weather data stations			1,500,000
Capacity building in weather forecasting			400,000
Capacity building in meteorological telecommunication and instrumentation			250,000
Integrating earth observation satellite and ground weather stations			300,000
Total (A)			12,522,000
B. Market Information System tools			
Data tablets and other equipment for data capture			2,500,000
Segmenting and registering farmers, agro-pastoralist, and other stakeholders			2,500,000
Digitizing historical data and collecting agricultural statistics			2,000,000
Setting up infrastructure for AI and big data analytics			1,500,000
Disseminating integrated weather and market advisories	10	500,000	5,000,000
Call centers for disseminating integrated weather and market information			1,200,000
Establishing governance system			700,000
Infrastructure maintenance/software update			2,425,000
Total (B)			17,825,000
Total (A + B)			30,347,000

Annex 5: Methodology for Cost of Inaction

Climate-smart agriculture

1. Failure to implement CSA in Afghanistan carries substantial annual economic costs, estimated at between US\$1.0 billion and US\$1.4 billion for the crop and livestock sectors alone (table 5.1). In the crop sector, climate-induced yield losses—driven by increasing drought frequency, heat stress, and pest outbreaks—are projected to cost between US\$350 million and US\$500 million annually. Further losses of US\$100–150 million are expected from reduced export earnings and food availability, particularly in high-value horticulture, while an additional US\$150–200 million is projected in elevated food import costs to fill production gaps. These figures underscore the high opportunity cost of not investing in resilient seed systems, climate-informed agronomy, and postharvest infrastructure.
2. In the livestock sector, the absence of CSA leads to reduced productivity from heat stress, poor nutrition, and disease, resulting in losses of US\$200–250 million/year. Degradation of rangelands due to unsustainable grazing practices accounts for another US\$100–150 million annually, while the lack of support for pastoralists and women-led livestock enterprises contributes to a further US\$100–150 million in lost income opportunities. These combined losses reflect not only reduced sectoral output but also worsening food security, rising rural poverty, and diminished resilience to climate shocks. Without urgent CSA investments, Afghanistan risks deeper structural vulnerabilities in its agrifood systems.

Restoring degraded natural landscapes

3. The cost of inaction was assessed by estimating the monetary value of ecosystem services lost due to degradation of forests, rangelands, and grasslands slated for restoration. The concept of ecosystem services value (ESV) views ecosystems as natural assets contributing to wealth, well-being, and sustainability, thereby helping policy makers recognize their value and make informed decisions (Costanza et al. 2014). This report quantifies the economic value of four key ecosystem services—provisioning, regulating, habitat, and cultural—using the value transfer method (de Groot et al. 2012). For each land cover type, the ecosystem service value was calculated by multiplying the area targeted for restoration by the corresponding ESV coefficient (table 5.2).

Improved water management

4. Improved agricultural water management in Afghanistan has the potential to avert substantial economic losses from recurrent droughts, which are among the most critical threats to agricultural productivity and rural livelihoods. It is estimated that drought-related losses in the agricultural sector amount to approximately US\$280 million annually, stemming from reduced crop yields, livestock mortality, and the disruption of food supply chains.

TABLE 5.1: ESTIMATED COSTS OF NOT IMPLEMENTING CSA IN AFGHANISTAN

	Loss category	Assumptions	Estimated cost (US\$, millions)
Crops	Yield losses from climate stress	15–25% yield loss due to droughts, heatwaves, pests—Applied to total crop output (approximately US\$2.5–3 billion/year)	350–500
	Loss in export earnings and food availability	Horticulture exports valued at approximately US\$200 million/year Without CSA, 40–60% loss due to poor resilience and postharvest losses	100–150
	Additional food imports due to production gaps	Higher import needs due to local production deficits 10–15% increase in national food import bill (wheat, oil, and so on)	150–200
		Crops subtotal	600–850
Livestock	Reduced productivity (milk, meat, eggs)	10–20% drop in yields due to disease, heat stress, poor feed Losses apply to approximately US\$1.5 billion livestock GDP	200–250
	Rangeland degradation	Degraded grazing reduces feed productivity and increases costs Opportunity cost of not implementing rotational grazing and reseeded	100–150
	Household income loss (women and pastoralists)	1 million livestock-reliant households lose approximately US\$100–150/year due to lack of services, improved breeds, and CSA inputs	100–150
		Livestock subtotal	400–550
		Total annual costs (Crops + Livestock)	1,000–1,400
		Costs over 10 years	10,000–14,000

Over a 10-year period, this amounts to US\$2.8 billion. By investing in resilient irrigation infrastructure, efficient water use technologies, and sustainable land management practices, Afghanistan can mitigate the impacts of water scarcity and climate variability, stabilizing agricultural output and enhancing food security. These interventions would not only safeguard the livelihoods of millions of rural households but also significantly reduce the fiscal and humanitarian burden of emergency drought response and recovery efforts.

5. The analysis assumes a cost of US\$100/ha/per year due to inefficient irrigation systems, reflecting

productivity losses from outdated infrastructure, seepage, and poor water distribution. Afghanistan's traditional irrigation systems suffer from 30–60 percent water losses, and interventions under projects, such as the World Bank's Irrigation Restoration and Development Project (IRDP), suggest benefit gains of up to US\$300/ha/year from improved systems. The US\$100/ha/year figure provides a conservative estimate of the opportunity cost of inaction (World Bank 2022).

6. Ecosystem degradation is estimated to result in US\$25 million annually in lost services, particularly across Afghanistan's degraded rangelands and

TABLE 5.2: ESVS OF NATURAL VEGETATION

Land cover	Million ha	ESV coefficient (in 2007 US\$ million)	Amount (in 2007 US\$ million)	Amount (in current US\$ million)
Grassland	1.5	2,872	4,308	6,548
Woodland	0.75	1,588	1,191	1,810
Forest	0.4	5,263	2,105	3,200
Total				11,558

Note: ESVs in 2007 are based on de Groot et al. (2012). The values in 2007 were converted to current US dollars by multiplying by 1.52.

watersheds. This draws on global estimates by The Economics of Ecosystems and Biodiversity (TEEB) and United Nations Convention to Combat Desertification (UNCCD) that value ecosystem services in the range of US\$25–50/ha/year, especially in fragile dryland contexts. Health-related costs are estimated at US\$15 million/year, reflecting the public health burden of poor water quality and sanitation in rural communities. WHO and United Nations Children’s Fund (UNICEF) indicate that inadequate water and sanitation can cost low-income countries 1–2 percent of GDP, largely due to diarrheal disease and malnutrition (TEEB 2010; UNCCD 2017; WHO 2012; UNICEF 2020).

7. Water scarcity in rural Afghanistan has been linked to internal displacement and migration, particularly as agricultural livelihoods become unsustainable. The analysis includes a conservative estimate of US\$10 million/year to account for the social and economic costs of displacement, such as humanitarian support, resettlement, and foregone rural productivity. Studies from the International Organization for Migration (IOM) and the Global Commission on Adaptation underscore the growing link between climate-induced water stress and population movement in fragile settings (GCA 2019; IOM 2022; World Bank 2016).
8. The monetary value of ecosystem services lost due to degradation of forests, rangelands, and grasslands for restoration (US\$11.5 billion) was added to the cost of inaction for improved water management (US\$4.5 billion) to arrive at the total cost of inaction of US\$16 billion for integrated natural resources management.

Agribusiness development

9. Afghanistan’s agriculture sector contributes an estimated 20–25 percent of national GDP, equivalent to roughly US\$4–5 billion annually in pre-2021 terms. However, much of this output is concentrated in low-value, informal activities characterized by limited productivity, high postharvest losses, and minimal value addition. The sector remains largely subsistence based, with weak integration into formal markets and underdeveloped agro-industrial capacity. As a result, agriculture’s full economic potential remains untapped. With a proposed US\$1.5 billion in targeted

TABLE 5.3: COST OF INACTION FOR IMPROVED WATER MANAGEMENT

Items	Value
Agricultural area affected (ha)	500,000
Yield loss per ha (tons)	0.5
Market price per ton (US\$)	300
Annual economic loss from yield reduction (US\$)	75,000,000
Irrigation inefficiency cost (US\$/ha)	100
Annual cost due to inefficiency (US\$)	50,000,000
Ecosystem degradation cost (US\$/year)	25,000,000
Health-related water cost (US\$/year)	15,000,000
Migration/Displacement cost (US\$/year)	10,000,000
Total annual cost of inaction (US\$)	165,000,000
Total over 10 years (A)	1,650,000,000
Annual agricultural damages due to drought (US\$)	280,000,000
Total over 10 years (B)	2,800,000,000
Total cost of inaction over 10 years (A + B)	4,450,000,000

public investment, supported by approximately US\$834 million in private co-financing, there is significant scope to shift agriculture from a low-productivity sector to a dynamic engine of rural economic growth, job creation, and national food and export security (table 5.4).

Increased agricultural GDP

10. The increased agricultural GDP is derived from four key sources: on-farm productivity gains, value addition through processing and storage, improved market efficiency, and the growth of agribusiness enterprises and cooperatives. Investments targeting on-farm productivity are expected to yield substantial economic returns. Assuming a 10–15 percent increase in yields across key commodities—such as cereals, horticulture, and livestock—within the designated agribusiness clusters, and applying these gains to approximately 20–25 percent of Afghanistan’s agricultural land base or workforce, the projected incremental contribution to agricultural GDP is estimated at US\$200–250 million/year. These gains would result from the adoption of improved seed

TABLE 5.4: ESTIMATED ECONOMIC BENEFITS OF INVESTING IN AGRIBUSINESS CLUSTERS DEVELOPMENT

No.	Benefit	Assumptions	Estimated value (US\$, millions)
1	Increased Agricultural GDP	About US\$400–550 million/year from increased yields, commercialization, and value addition	4,000–5,000
2	Postharvest Loss Reduction	Reduction of losses in perishable crops from 30–40% to 15–20%, (approximately US\$100 million/year)	1,000
3	Import Substitution (Dairy, Poultry, Grains)	Reduced dependence on approximately US\$165 million/year in food imports; partial substitution over 5–10 years	1,000–1,500
4	Export Growth	High-value horticultural crops (for example, saffron, dried fruits, and nuts) and processed livestock products; US\$50–80 million/year added	500–800
5	Environmental Benefits/ Avoided Land Degradation Costs	Soil erosion, rangeland degradation, overgrazing; estimated losses of US\$200–300 million over 10 years avoided	200–300
6	Employment and Livelihoods	About 500,000–700,000 jobs × avg. value added ~US\$600–800/year in rural economy (income effect over 10 years)	Included in GDP estimates in number 1
Total			6,500–8,500

varieties, climate-resilient practices, better irrigation, and expanded access to quality inputs and extension services.

11. Value addition through agro-processing and improved storage has significant potential to boost agricultural GDP. Typically, processed agricultural goods such as dried fruits, milled wheat, and dairy products command 30–100 percent higher market value compared to raw commodities. If just 10–15 percent of Afghanistan’s primary agricultural output was processed locally, the resulting increase in GDP could reach US\$100–150 million annually. This would be driven by expanded agro-processing facilities, improved handling and packaging, and reduced losses through better postharvest management, allowing more value to be captured domestically across rural and peri-urban economies.
12. Enhancing market efficiency and reducing postharvest losses can also generate significant economic gains. Investments in cold chain systems, logistics, and structured markets help minimize spoilage, improve product quality, and enable farmers to secure better prices. By promoting improved postharvest handling, storage, and aggregation, it is possible to recover 10–15 percent of the value currently lost due to inefficiencies in the supply chain. These improvements are estimated to

contribute an additional US\$50–75 million/year to agricultural GDP, while also strengthening market linkages and rural incomes.

13. Finally, the growth of agribusiness enterprises and cooperatives plays a vital role in stimulating rural economies through expanded services, trade, and employment. As new SMEs emerge across input supply, processing, logistics, and export-related activities, they create a ripple effect that benefits the broader economy. These secondary impacts—driven by increased demand for agricultural services, equipment, packaging, and market access—are estimated to contribute an additional US\$50–75 million annually to agricultural GDP. This growth reinforces value chain integration and provides critical pathways for rural entrepreneurship and job creation.

Postharvest loss reduction

14. Postharvest losses in Afghanistan represent a major source of economic inefficiency and food insecurity, particularly for perishable crops such as fruits, vegetables, dairy, and meat. These commodities, which account for approximately half of the country’s agricultural output—valued at around US\$2.5 billion annually—are highly

vulnerable to spoilage due to inadequate storage, poor handling, and limited access to markets and processing facilities. Current estimates suggest that 30–40 percent of this perishable output is lost each year, resulting in nationwide losses of up to US\$750 million annually.

15. With targeted investment in cold storage, solar-powered refrigeration, improved packaging and grading, postharvest handling practices, and structured market systems, it is realistic to reduce these losses to 15–20 percent. This would translate into the recovery of 10–15 percent of previously lost value. Applying these improvements to the agribusiness clusters—which are expected to affect approximately 40 percent of the at-risk value chains—is estimated to yield annual savings of US\$100–150 million. Over a 10-year horizon, this results in a cumulative reduction in postharvest losses valued at approximately US\$1 billion, representing a conservative but achievable gain tied directly to the planned infrastructure and market interventions.
16. This estimate does not include multiplier effects such as increased farmer incomes, enhanced food availability, or additional export earnings derived from higher product quality. Nonetheless, even the direct economic recovery from reduced losses provides a compelling case for investment. Reducing postharvest inefficiencies will not only improve overall productivity but also increase market stability, reduce price volatility, and contribute meaningfully to national food security.

Import substitution

17. Afghanistan currently spends an estimated US\$165–200 million/year on the import of agrifood products that could be produced or processed locally. These include dairy products, poultry meat and eggs, refined wheat flour, and various processed horticultural goods. Despite the country's agricultural potential, limited domestic processing capacity, low productivity, and weak market systems have resulted in a dependence on food imports from neighboring countries. This reliance not only puts pressure on foreign exchange reserves but also exposes the country to regional price volatility and supply disruptions.
18. Strategic investments in livestock productivity, feed and fodder systems, dairy and meat processing, and horticulture value addition are expected to significantly enhance Afghanistan's ability to meet domestic demand. With improved infrastructure, processing facilities, and supply chain coordination, Afghanistan could substitute a substantial portion of these imports. A conservative estimate suggests that 10–15 percent of current food imports could be replaced by Afghan-produced alternatives over a 10-year period. This would translate into annual savings of approximately US\$100–150 million, achieved through increased local availability of processed dairy, poultry, and staple food products.
19. Over a 10-year horizon, the cumulative benefit of import substitution is estimated at US\$1.0–1.5 billion. These gains would grow gradually as domestic capacity strengthens and consumer confidence in local products increases. While this estimate does not account for broader macroeconomic effects such as improved trade balance or local multiplier effects, it underscores the importance of building competitive agribusiness value chains to reduce food import dependency and enhance national food sovereignty.

Export growth

20. Afghanistan has strong comparative advantages in several high-value agricultural products with proven export potential—particularly dried fruits, nuts, fresh fruits, saffron, pomegranates, grapes, melons, almonds, raisins, and carpets made from livestock products (for example, wool and skins). Prior to 2021, agricultural exports regularly accounted for US\$700–900 million annually, with the bulk concentrated in a few high-value commodities and informal trade routes. However, limited cold storage, poor postharvest handling, weak branding, inadequate certification systems, and fragmented logistics networks have historically constrained the sector's growth.
21. The proposed investments in agribusiness clusters aim to directly address these barriers by improving product quality, processing, storage, and packaging, while also strengthening compliance with regional and international food safety standards (for example, SPS, Halal, and organic certification). By expanding

cold chain infrastructure, developing solar-powered drying and packaging units, and facilitating producer-exporter linkages, Afghan agribusinesses will be better positioned to meet the standards of higher-value export markets in South Asia, the Middle East, and Central Asia.

22. A conservative estimate assumes that new or enhanced exports of high-value crops and livestock products enabled by these investments could generate US\$50–80 million in additional export earnings annually by year 5 onward, as infrastructure and market systems mature. This projection is based on modest increases in the volume and value of horticulture, dairy, and livestock exports and does not assume full market penetration or global competitiveness in all product categories.
23. Cumulatively, this would result in US\$500–800 million in new export revenue over 10 years, particularly from targeted clusters in the Northern Plains, Eastern Zone, and Western Zone, where horticulture and livestock potentials are strong. This estimate does not account for additional export growth from future trade facilitation reforms, expanded air corridors, or potential accession to new regional trade agreements, which could push total export gains even higher. Still, the projected US\$500–800 million benefit illustrates the tangible and scalable value of investing in Afghanistan’s agribusiness export capacity.

Environmental benefits/avoided land degradation costs

24. Afghanistan faces persistent environmental degradation, particularly in the form of soil erosion, overgrazing, rangeland depletion, inefficient irrigation, and deforestation. These pressures are estimated to cost the country approximately US\$120–150 million annually, equivalent to 3–4 percent of agricultural GDP, through lost productivity, natural resource depletion, and increased vulnerability to drought and conflict. Strategic investments under the agribusiness cluster framework aim to mitigate these losses by promoting climate-smart practices, including conservation agriculture, sustainable rangeland and water management, manure use, and the deployment of renewable energy technologies

such as solar-powered irrigation and cold storage. As these clusters are expected to cover roughly 30–40 percent of agricultural and rangeland areas, it is estimated that they could avert 15–25 percent of current degradation-related losses. This translates to US\$20–30 million annually, or US\$200–300 million over 10 years, in avoided environmental costs. While this estimate does not capture co-benefits such as biodiversity conservation, improved water security, or carbon sequestration, it highlights the significant return on investing in sustainable land use and NRM as part of Afghanistan’s rural transformation strategy.

Research and development

25. Agriculture contributes approximately US\$4.5 billion to Afghanistan’s GDP each year, yet public investment in agricultural R&D remains critically low, estimated at just US\$1.8 million annually, or 0.04 percent of GDP. Findings from this CSAAP indicate that, after factoring in necessary capital expenditures, an annual investment of about US\$3.7 million (0.082 percent of GDP) is required to meet minimum R&D needs. This reveals a funding gap of roughly US\$1.9 million/year. Applying a conservative R&D output elasticity of 0.015, this underinvestment translates into an estimated economic loss of US\$70.8 million annually—or US\$708 million over a decade—due to missed opportunities in adopting improved technologies, developing climate-resilient crop varieties, and strengthening extension systems. While this estimated loss may appear modest in isolation, it masks the far-reaching and compounding impacts of R&D. Over time, underinvestment erodes productivity gains, increases input costs, and weakens resilience—ultimately undermining long-term sectoral growth. If not addressed, persistent underfunding will leave Afghanistan’s agriculture sector increasingly exposed to climate shocks, food insecurity, and deepening rural poverty.

Integrated weather and market information services

26. Weather forecasting and early warning systems are essential tools for enhancing agricultural productivity and resilience. Globally, the minimum estimated annual socioeconomic benefit of accurate weather prediction is approximately US\$33 billion, primarily

through improved decision-making, optimized planting and harvesting times, and reduced losses due to extreme weather events (World Bank 2021). In 2023, the global agricultural GDP was valued at US\$3.8 trillion. Afghanistan contributed roughly 0.11 percent to this global agricultural output. By applying this proportional contribution, we can estimate the minimum value of weather prediction benefits to Afghanistan's agricultural sector. Using the global benchmark, Afghanistan stands to gain approximately US\$36.3 million annually in increased

agricultural productivity directly attributable to improved weather forecasting capabilities. Over a 10-year period, this equates to a cumulative benefit of US\$363 million. This estimate underscores the substantial return on investment that can be achieved through targeted improvements in agrometeorological infrastructure, data systems, and dissemination tools. Strengthening Afghanistan's capacity to generate, interpret, and apply weather and climate information can significantly improve agricultural planning and resilience.

Annex 6: Assumptions for Jobs Creation

1. Relevant data entry modules in the EX-Ante Carbon Balance Tool (EX-ACT) for Value Chain Assessment (version 3.5) was also used to assess the impact of the CSAAP on jobs creation including the rates of participation of women and youth at different stages of the value chain. The analysis included both 'without-project' and 'with-project' scenarios, drawing on data from FAO Afghanistan, secondary sources, and expert inputs. The data included information on the number and size of value chains

actor units along the value chain; the number of workdays required at different stages such as primary production, processing, transportation, and storage; and the number of days needed to constitute one full-time equivalent position and relative contribution of women and youth.¹¹ Table 6.1 lists the assumptions inputted in the EX-ACT value chain models for internal calculations. EX-ACT then uses the volume of flows from the value chains data in tables 6.2 to 6.4 to estimate the number of jobs created.

TABLE 6.1: ASSUMPTIONS USED FOR ESTIMATING JOBS CREATION ACROSS AGRICULTURAL VALUE CHAINS

	Cereals		Horticulture		Livestock	
	Without the action plan	With the action plan	Without the action plan	With the Action Plan	Without the action plan	With the action plan
On farm job (in person-days/year)	400	360	600	700	1400	1960
% women	20	30	20	30	70	60
% youth	35	55	35	55	30	50
Jobs in processing (in employee/year)	8	12	8	12	8	12
% women	5	10	5	10	5	10
% youth	20	30	20	30	20	40
Jobs in storage (in employee/year)	5	7	5	7	5	7
% women	5	5	5	5	5	10
% youth	30	60	30	60	30	60
Jobs in transport (in employee/year)	5	5	5	5	5	5
% women	5	5	5	5	5	5
% youth	50	60	50	60	50	60

¹¹ Details on the methodology and calculations performed by EX-ACT value chain are available at <https://openknowledge.fao.org/handle/20.500.14283/cc7977en>.

TABLE 6.2: CEREALS VALUE CHAIN

	Without the action plan	With the action plan
Production quantity (tons per year)	4,125,000	8,260,000
Land use (ha)	1,650,000	2,360,000
Self-consumption (%)	70	60
On farm losses (%)	18	9
Losses during processing (%)	7	3
Losses during storage (%)	9	4
Losses during transport (%)	2	2
Transformation rate by mills (%)	60	75
Energy used to process 1 ton of cereal (kWH per ton)	80	100
New infrastructure (m²), including traditional flour mills (<i>Zirandas</i>) and storage		6,959,065, of which 6,014,545 m² is new flour mills, and the rest is storage

TABLE 6.3: HORTICULTURE VALUE CHAIN

	Without the action plan	With the action plan
Production quantity (tons per year)	1,800,000	3,750,000
Land use (ha)	180,000	257,000
Self-consumption (%)	12%	15%
On farm losses (%)	35%	12%
Losses during processing (%)	10%	5%
Losses during storage (%)	5%	3%
Losses during transport (%)	10%	5%
Energy used to process 1 ton of grape	Raisins are assumed to be dried in a traditional raisin house	
Electricity used for storage (kWH per year)	According to the information provided by MAIL of cold storage industry of Afghanistan in 2017, most of the cold storage plants were using AC power as a source of energy (https://afghanistan.moore-global.com/MediaLibsAndFiles/media/afghanistan.moore-global.com/files/Research/16-Cold-Storage-Industry-of-Afghanistan.pdf). The refrigerant type used in an AC system depends on its age with an older system likely to use R-22. This assumption was used in the analysis.	

TABLE 6.4: LIVESTOCK VALUE CHAIN

	Without the action plan	With the action plan
Production quantity (liters per year)	3,096,000	10,067,400
Animal used (heads)	4,500,000	6,300,000
Self-consumption (%)	80	50
On farm losses (%)	20	10
Losses during processing (%)	13	7
Losses during storage (%)	5	3
Losses during transport (%)	10	5
Energy used to process 1 ton of milk (kWH per ton)	80	100
Water use to process 1 liter of milk (m ³ per liter)	0.98	0.98
Electricity used for storage (kWH per year)	4,705	43,944
New infrastructure (m ²) including new milk processing plants and collection centers		1,445,000, of which 1,400,000 m ² is new milk processing plants

Annex 7: Engaging the Private Sector to Co-finance and Implement the CSAAP

1. Engaging private sector actors to co-finance and implement agribusiness interventions through PPPs can help unlock Afghanistan's rich agricultural potential while generating jobs and improving food security. Given the context of fragility, the strategy should blend development support with private investment incentives (Table 7.1). The five key steps involved are discussed below.
2. First, it is vital to create an enabling policy and regulatory environment. This includes developing PPP-friendly legal frameworks that clearly define the roles and responsibilities of each party, establish fair risk-sharing arrangements, and provide robust mechanisms for dispute resolution. Streamlining procedures related to land access, licensing, and taxation is also critical to lowering the cost and complexity of doing agribusiness. In parallel, governments should establish clear, bankable investment pipelines featuring agribusiness projects with strong commercial viability and developmental impact to attract serious private sector interest.
3. Second, identifying and structuring bankable PPP opportunities is essential for attracting private sector investment in agribusiness. This begins with conducting pre-feasibility studies and market assessments to pinpoint viable value chains—such as agro-processing, storage, and logistics—that offer both commercial potential and developmental impact. Once identified, projects should be structured to ensure commercial viability, with clearly defined return profiles and incentives such as minimum revenue guarantees or viability gap funding to mitigate risk. Importantly, projects should be packaged to leverage the private sector's strengths in operations, marketing, and technology, making them attractive and investable propositions.
4. Third, using public funds to de-risk investments is a key strategy for engaging the private sector in agribusiness PPPs, particularly in fragile settings like Afghanistan. Blended finance solutions—such as grants, concessional loans, and credit guarantees—can be employed to lower risk exposure and improve the attractiveness of agribusiness ventures. Additionally, matching grants or performance-based subsidies can incentivize co-investments in critical areas like infrastructure, equipment, and capacity building. Public entities can also provide anchor investments or secure offtake agreements—such as school feeding programs or export contracts—to enhance market assurance and provide predictable revenue streams for private partners.
5. Fourth, strengthening institutions and intermediation platforms is crucial to enabling effective agribusiness PPPs in Afghanistan. A dedicated PPP unit within MAIL could be established to lead the development, structuring, and promotion of agribusiness PPP pipelines. At the same time, ACAL could be reactivated or reinforced to serve as a voice for agribusiness stakeholders, help identify investment opportunities and facilitate partnerships. Donor-supported platforms such as those offered by IFC,

TABLE 7.1: ENABLERS FOR PPP SUCCESS IN AFGHANISTAN

No.	Area	Key actions required
1	Policy	Develop a clear agribusiness PPP framework.
2	Projects	Identify and structure bankable, commercially viable agribusiness projects.
3	Finance	Blend donor, public, and private funds to reduce risk.
4	Capacity	Strengthen MAIL, Afghanistan Chamber of Agriculture and Livestock (ACAL), and local business support service to manage and deliver PPPs.
5	Incentives	Use offtake agreements, tax breaks, and grants.

World Bank, or Green Climate Fund (GCF) can also be leveraged to provide technical assistance, build capacity, and support investment facilitation efforts.

6. Fifth, providing targeted incentives is essential to attract private sector participation in agribusiness PPPs. Offtake agreements, such as contracts with government institutions or large buyers, can reduce market uncertainty by guaranteeing demand and revenue for private investors. Tax incentives—such as exemptions or reductions on imports of equipment, income, or value added taxes—can further improve project profitability and lower entry barriers. In addition, grants or co-investment subsidies can be used to support capital expenditures, encourage innovation, and enhance the commercial viability of projects, particularly in underserved or high-risk

regions. Together, these incentives help align private interests with public development goals. In addition, enabling local SMEs and agripreneurs to participate in agribusiness PPPs is vital for fostering inclusive and sustainable development. This involves building the capacity of SMEs to prepare viable business plans, access finance, and engage in structured partnerships. Special emphasis should be placed on supporting women-led enterprises through targeted PPP interventions in sectors such as dairy, poultry, and kitchen gardening, where women play a prominent role. Inclusive business models should also be piloted, where local firms co-invest alongside public support in areas like postharvest technologies, enabling them to become reliable actors in value chains while contributing to job creation and local economic growth.



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