

# Integrating the Development Program for Agri-Food System with Climate Change Policies and Commitments in Tajikistan<sup>1</sup>

Suresh Babu, Sino Tohirzoda, Kamiljon Akramov and Nandita Srivastava

<sup>1</sup> The preparation of this paper is funded by the USAID mission in Tajikistan and USAID's Comprehensive Action for Climate Change Initiative (CACCI-Asia) under their support to the Committee for Environmental Protection (CEP) of Tajikistan toward the implementation of NDCs through the technical support from the International Food Policy Research Institute (IFPRI).



---

## CONTENTS

**Introduction..... 4**

**Conceptual Framework ..... 4**

**Key National Documents..... 5**

**Integration Analysis..... 6**

    Irrigation..... 7

    Food and Nutrition Security..... 9

    Soil Fertility ..... 10

    Land..... 12

    Agricultural Information and Knowledge systems ..... 15

    Sustainability..... 18

**Recommendations..... 20**

    Policy Level..... 20

    Institutional level ..... 21

    Technical level ..... 22

**Concluding Remarks ..... 22**

**References ..... 24**

---

## TABLES

**Table 1: Aspects of integration in the Irrigation sub-sector ..... 7**

**Table 2: Aspects of Integration in the Food and Nutrition Security sub-sector ..... 9**

**Table 3: Aspects of Integration in the Soil Fertility sub-sector ..... 11**

**Table 4: Aspects of Integration in the Land sub-sector ..... 13**

**Table 5: Aspects of Integration in the Agricultural Information and Knowledge Systems sub-sector..... 15**

**Table 6: Aspects of Integration to Ensure the Sustainability of the Agriculture Sector ..... 18**

---

## FIGURES

No table of figures entries found.

## INTRODUCTION

At COP28 countries recognized that unprecedented adverse climate impacts are increasingly threatening the resilience of agriculture and food systems and ability to produce and access food in the prevailing scenario of mounting hunger, malnutrition, and economic stresses. As a result, over 150 countries have signed the Declaration On Sustainable Agriculture, Resilient Food Systems, And Climate Action committing to expedite the integration of agriculture and food systems into climate action and, simultaneously, to mainstream climate action across our policy agendas and actions related to agriculture and food systems (United Nations Framework Convention on Climate Change (UNFCCC), 2023).

Currently, there is no concrete framework and approach available at the country level on how to support this integration process. Thus, in this paper, we are proposing a conceptual framework to undertake such an integration analysis of key national level climate change related and agriculture policy documents. Using Tajikistan as a case study, we identify synergies and existing gaps and provide recommendations on strengthening sectoral integration to achieve climate change goals.

In the year 2022, 55 percent (402 million) of the people in the world affected by hunger, were living in Asia. During the COVID-19 pandemic, the number of people who could not afford a healthy diet increased globally, and significantly in Asia. Unemployment, high incidence of climate shocks, poverty, income inequality, food price inflation, and the decline in foreign currency reserves have engendered the lack of affordability healthy diet (Food and Agriculture Organization (FAO) et al 2023).

Climate change-related events are adversely affecting food systems in Asia. Rising temperatures, changing precipitation levels and extreme climate events, such as heatwaves, droughts and typhoons, will persist as vulnerability drivers to shape agricultural productivity in Asia. The agriculture sector is also a contributor to green house gas emissions (GHG) in the region - the increase in synthetic fertilizer and energy use in agricultural production and the rise in livestock production have resulted in increased methane emissions in Asia. In countries like Tajikistan, the rate of soil erosion and water crisis across has been on the rise (Intergovernmental Panel on Climate Change (IPCC), 2022; Aryal, 2022). Central Asia's dependence on water resources is a key reason for its high sensitivity to climate change. This dependence stems from low water productivity. Variations in water resource availability may lead to far-reaching effects on the agriculture sector, a major recipient (Central Asia Regional Economic Cooperation (CAREC) Institute, 2022). A recent study found that the effect of climate change on Tajikistan's agricultural sector is mostly negative. Crops, including wheat, barley, maize, fruit, and vegetables, are particularly vulnerable to climate change in Tajikistan (Khakimov et al, 2020).

## CONCEPTUAL FRAMEWORK

For the purpose of integrating sectoral strategies with national climate goals, this paper introduces a conceptual framework.

The first step is to identify key sector specific development policies and climate change action and commitments related documents. Each policy should be reviewed to understand the key themes, overall objectives, and related strategies. Upon completion of the review, the synergies and gaps between the key documents can be analyzed under related thematic areas. In the case of the agriculture sector, food systems related themes such as food and nutrition, soil, irrigation, sustainability, and knowledge systems can be considered. Under each thematic area, the following aspects of integration can be analyzed:

- i) Goals and objectives
- ii) Mitigation and adaptation: Strategies and approaches
- iii) Capacity strengthening
- iv) Monitoring, reporting, and verification

Upon completion of this analysis, a multistakeholder workshop can be conducted to discuss the key results and also develop a roadmap for building synergies at the implementation stage through effective resource mobilization and coordination.

In the case of Tajikistan, the key climate change related documents including the NDC and the NDC implementation plan alongside a draft outline of the updated agriculture development strategy were reviewed earlier this year. A workshop on 'Mainstreaming Climate Change Sectoral Interventions for Implementing NDC' was co-organized by USAID, CEP, NDC Partnership, and IFPRI, on Mar 9, 2023, in Dushanbe, Tajikistan for key stakeholders. The workshop included sessions on mainstreaming agricultural development strategies and water management strategies for NDC implementation and related investment. Suresh Babu (IFPRI) presented 'Mainstreaming agricultural development strategies for NDC implementation'. Sino Tohirzoda, In Country Facilitator and Head of NDC Secretariat, CEP, gave a presentation on 'Roadmap for NDC Implementation Plan'. The feedback received during this workshop has been incorporated in the thematic analysis discussed in the next section on integrating the Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030 (ASDP) with the national level climate change related policies. The results of this study will be shared with relevant stakeholders for review and feedback. Upon incorporating the feedback, a second multistakeholder workshop will be conducted to disseminate the results and discuss pathways for coordination and joint implementation of integrated action on the ground.

Given this framework, the next section discusses key policies and commitments in Tajikistan which are focused on the agriculture sector and climate change.

## KEY NATIONAL DOCUMENTS

Several important country level policy documents in Tajikistan acknowledge the climate change related challenges in the food systems and provide pathways to address them. For instance, Tajikistan's updated NDC discusses that climate-related droughts, declining rain-fed agriculture, declining yields, and production, as well as crop failures and loss of livestock, can have a detrimental effect on farmers' livelihoods. Without substantial adaptation measures, food and nutrition security, poverty eradication, and sustainable development may be adversely affected. The NDC document identifies agriculture as one of the priority sectors and highlights measures which have net mitigation co-benefits and are in line with existing policies and measures, such as:

- Promoting efficient irrigation technologies,
- Rehabilitation of irrigation and drainage systems
- Optimizing the use of fertilizers, i.e. reducing the use of synthetic fertilizers);
- Promoting crop diversity;
- Integrated pest management;
- Advancing integrated food, water and energy systems
- Promoting and scaling of agroforestry, horticulture, viticulture, climate-smart and conservation agriculture;
- Improved pasture management planning;

- Improve existing carbon pools, such as range land management, collection and use of oil cake, rice hulls or other agricultural waste, reducing the use of tillage methods that increase soil carbon, restoring degraded land, etc.;
- Introduction of technologies and equipment for collecting of anaerobic systems, manure storage and processing and also an adequate poultry manure management;
- Mastering ecologically safety, highly efficient and energy-saving technologies for the disposal and use of agricultural waste;
- Biofuel production, including biodiesel and bioethanol (only if net emission reductions can be demonstrated);
- Improved livestock breeding;
- Sustainable practices in the pasture management

In Tajikistan, adaptation measures are of priority both for crop production and livestock sub-sectors. The National Strategy for Adaptation to Climate Change of the Republic of Tajikistan 2030, points out that there are a number of gaps which hinder the agricultural sector's efforts to successfully adapt. Agricultural reform should focus on removing the constraints that tie farmers to creating incentives for efficient water management, and securing land ownership.

The ASDP also acknowledged the low level of adaptation of the agricultural sector to climate change. It highlighted that according to experts, climate change is the main obstacle to the development of the agricultural sector, which is expressed by the high vulnerability of the environment and the low ability of farmers to adapt traditional methods of agricultural activity. The increase in average temperature and the melting of glaciers lead to seasonal changes in the water flow, which in its turn has a negative impact on sustainable water supply and crop productivity. In addition, the increase in droughts, unexpected coldness, torrential rains, and catastrophic floods as a result of overflowing water from glacial lakes, unstable mountain slopes and frequent landslides have a negative effect on the productivity of pastures. Thus, the ASDP has been developed with the aim of further continuing agrarian reforms, establishing a system resistant to climate changes, creation of favorable conditions for promotion of the agricultural sector, increase in productivity, creation of new workplaces, efficient use of water and land, sustainable development, improvement of the level of population's well-being and provision of food security. The program document emphasized the support for climate-adapted methods of agriculture promotion, biology diversity, and ecological stability.

## INTEGRATION ANALYSIS

Using the conceptual framework discussed in Section II, we conduct an integration analysis between agriculture and climate change policies in Tajikistan (discussed in Section III) under various food systems related themes. The themes under consideration are:

- Irrigation
- Food and Nutrition Security
- Soil Fertility
- Land
- Agricultural Information and Knowledge systems
- Sustainability

## Irrigation

In Tajikistan, farmers rely highly on irrigation to increase crop productivity and improve their income and livelihoods. Surface water is the main form of irrigation, and over 40 percent of farmland depends on irrigation pumps to supply them with water (Nekbakhtshoev and Babu, 2022). The table below analyzes the existing policies on the irrigation sector as it relates to the agriculture sector and climate change action.

**Table 1: Aspects of integration in the Irrigation sub-sector**

<b>The Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030</b>	<b>NDC</b>	<b>NDC Implementation Plan</b>	<b>National Strategy for Adaptation to Climate Change of the Republic of Tajikistan</b>	<b>Gaps and Recommendations</b>
<p>Support to upgrade of irrigation infrastructure and new water-saving technologies (this, of course, contains drip irrigation systems, if and when possible)</p> <p>Establishing a long-term irrigation policy or strategy for the purpose to create a self-sustaining system is an important priority of the Program</p> <p>Development of a plan for the repair, reconstruction and renewal of irrigation and drain-age facilities</p> <p>The development of new irrigated lands and the restoration of lands that have come out of agricultural circulation</p> <p>By periodically launching hydro-technical structures, the level of irrigation water</p>	<p>Acknowledges that some measures have a net mitigation co-benefits and are in line with existing policies and measures, such as:</p> <p>Promoting efficient irrigation technologies,</p> <p>Rehabilitation of irrigation and drainage systems</p> <p>Improved management of irrigation and drainage systems</p> <p>Advancing integrated food, water and energy systems</p>	<p>Improved management of irrigation and drainage systems</p> <p>Introduction of "green" technologies and "green" infrastructure in agro-industrial production -includes enhanced irrigation system</p> <p>Widespread adoption of efficient irrigation methods in agricultural lands, including the promotion of drip irrigation systems</p> <p>Rehabilitation of irrigation systems and drainages to improve reclamation of saline lands and wetlands</p> <p>Strengthening the capacity of Water Users Associations</p> <p>Improvement of irrigation practices and infrastructure in 40% of irrigated land</p> <p>Restore the abandoned land in agricultural circulation and expand the area of irrigated land in the Republic of Tajikistan in order to increase the efficiency of</p>	<p>Renovation and improvement of irrigation methods such as drip irrigation for the economical use of water or more expensive crops</p> <p>Strengthen the capacity of Water Users Associations and provide recommendations on efficient water use practices</p> <p>Improvement of the groundwater resources management system</p>	<p>Include in the ASDP program:</p> <p>Improvement of irrigation practices and infrastructure in 40% of irrigated land</p> <p>Incorporate the river basin strategies included in the NDC implementation plan</p>

<p>supply will improve</p> <p>Upgrade of irrigation and drainage facilities in the Vakhsh river basin.</p> <p>Taking beneficial measures to introduce new water-saving technologies and water-saving use, taking into account the creation of demonstration plots and their promotion among farmers and other water users.</p> <p>The Ministry of Agriculture of the Republic of Tajikistan, in cooperation with local executive authorities, the Ministry of Energy and Water Resources of the Republic of Tajikistan, the Agency for Melioration and Irrigation under the Government of the Republic of Tajikistan, in order to rationalize water supply and increase the yield and quality of agricultural products, will create opportunities on the ground for creating science-based modules for the distribution of irrigated crops and the structure of sown areas and encouraging the introduction of new technologies, including drip irrigation</p> <p>Specific approaches to the development of green</p>		<p>the country's agricultural production, provide rural people with jobs and improve food security</p> <p>This mitigation action reflects an increase in crop production in response to efforts for increasing resilience to climate change vulnerability in the Pyanj River Basin, including flood protection, improved irrigation and drainage infrastructure, and the development of microfinance services</p> <p>Increase in crop production in response to improved conditions and management of irrigation infrastructure in the Zarafshon river basin and adjacent districts in the Syr-Darya basin, including the strengthening of the institutional base required</p> <p>Increasing crop production through the rehabilitation of irrigation and drainage infrastructure and the development of improved policies and institutions for water resource management with the aim of improving food availability and food access for low-income people in poor rural areas supported by the project</p> <p>Increase in agricultural productivity within the Dangara District through the improvement of water resources management, irrigation infrastructure, and drainage systems</p>		
---	--	--	--	--

technologies will be introduced				
Upgrade of irrigation and drainage facilities in the Vakhsh river basin				

## Food and Nutrition Security

According to the Global Alliance for Improved Nutrition (GAIN) (2023), greater integration of climate thinking, planning, action and finance can open up new opportunities for climate and nutrition action leading to accelerated improvement in outcomes for both. With reference to Tajikistan, food and nutrition insecurity continue to be major challenges, exacerbated by the recent pandemic and Ukraine crisis. According to estimates, by end of 2022, nearly 30% of Tajikistan's population can be classified as moderately food-insecure, while those acutely affected by food insecurity were 8.6% (Sevimli and Jungbluth, 2022). Despite progress made, malnutrition among children and women continues to be a problem-Tajikistan has one of the highest rates of stunting of children under the age of five in the region. The table 2 highlights aspects of integration between ASDP and climate change documents to strengthen food and nutrition security.

**Table 2:** Aspects of Integration in the Food and Nutrition Security sub-sector

The Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030	NDC	NDC Implementation Plan	National Strategy for Adaptation to Climate Change of the Republic of Tajikistan	Gaps and Recommendations
<p>Taking action to increase consumer awareness of food safety and promote food safety systems among traders</p> <p>Development of indicators: - on food security and nutrition security for production and consumption in the country, availability, access to food by region, population groups</p> <p>Introduction of a food security information system and an early warning system</p> <p>Development of a strategy/mechanism of focusing on potential/existing food and</p>	<p>Promoting and scaling of agroforestry, horticulture, viticulture, climate-smart and conservation agriculture</p> <p>Promoting crop diversity</p> <p>Introduction of "green" technologies and "green" infrastructure in agro-industrial production</p> <p>Improved livestock breeding</p>	<p>Adjusting the diets of ruminants including protein content reduction and fat supplementation to reduce GHG emissions. Increasing the fat content in ruminant diets reduces methane emissions from enteric fermentation via biological processes in the digestive system. Improved diets can be applied to 20% of the dairy and beef cattle produced through artificial insemination in 2030</p> <p>Improving livestock productivity and increasing soil carbon stocks by (i) improving the productive capacity of pastures through enhanced access to farming equipment, seeds</p>	<p>Improving community storage systems for crop and food storage to reduce waste</p> <p>Assisting in the development of pasture management schemes</p>	<p>In the ASDP include adjusting the diets of ruminants including protein content reduction and fat supplementation to reduce GHG emissions. Increasing the fat content in ruminant diets reduces methane emissions from enteric fermentation via biological processes in the digestive system. Improved diets can be applied to 20% of the dairy and beef</p>

<p>nutrition crises at the regional/national level in collaboration with the private sector</p> <p>Taking action to increase consumer awareness of food safety and promote food safety systems among traders</p> <p>Improvement of systems related to the cultivation of seeds, the production of seedlings and cuttings</p> <p>Implementation of measures for the protection of plant species and the launch of registration of species</p>		<p>and fertilizers, and veterinary services, (ii) improving breeding and mating techniques, and (iii) improving access to water and water infrastructure. Co-benefits of this action aim to increase the nutritional status and incomes of poor rural households in the Khatlon region</p> <p>Continuation of the Livestock and Pasture Development Project, which aimed to further expand the improvement of the nutritional status and income of poor rural households by enhancing livestock productivity and resilience to climate change, including the development of institutions, the enhancement of animal health, and the development of pasture management</p> <p>Introduction of "green" technologies and "green" infrastructure in agro-industrial production including flood prevention methods, enhanced irrigation, and drainage in sight of water scarcity and excess, protective infrastructure, enhanced crop varieties, and efficient technologies, among others, all of which help build food security in sight of climate change in the Republic of Tajikistan</p>	<p>cattle produced through artificial insemination in 2030.</p>
--	--	--	---

**Soil Fertility**

Soil fertility is important for sustainable agricultural systems contributing to healthy and nutritious food production. In Tajikistan, soil depletion presents a serious threat to water resources and exacerbates the state of food insecurity in the country. With the rise in climate change-related adverse impacts in the country, soil degradation is an urgent and important issue that requires prompt action (United Nations (UN), 2022). The table below discusses aspects of integration in the soil fertility sub-sector.

**Table 3:** Aspects of Integration in the Soil Fertility sub-sector

The Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030	NDC	NDC Implementation Plan	National Strategy for Adaptation to Climate Change of the Republic of Tajikistan	Gaps and Recommendations
<p>It is important to introduce improved technologies and methods of land and soil use to maintain the ability to regenerate in the condition of increasing overloads on the soil due to the need to increase production, promote new pasture management schemes, the introduction of technologies such as no-tillage cultivation, etc.</p> <p>Increasing the productivity of pastures, carrying out geobotanical studies of hayfields and natural pastures, as well as conducting large-scale soil analysis in order to prevent soil and land erosion</p> <p>Mapping, classification and analysis of the main zones of soil and water erosion by region</p> <p>Conducting explanatory work among farmers on ways to protect the soil and prevent soil erosion</p> <p>Promotion of mixed cropping methods, crop rotation, crop diversity, etc. as a means of improving soil fertility and</p>	<p>Promoting soil protection and integrated pest management</p> <p>Improve existing carbon pools, such as land management, collection, and use of oil cake, rice hulls, or other agricultural waste, reducing the use of tillage methods that increase soil carbon, restoring degraded land, etc.</p> <p>Introduction of technologies and equipment for collecting of anaerobic systems, manure storage and processing and also an adequate poultry manure management</p>	<p>Increasing the cropping index through crop rotations and intercropping. While stakeholders have prioritized crop rotations and intercropping as adaptation measures, intercropping and crop rotations can both increase the resilience of cropping systems and improve soil carbon to reduce emissions from the agriculture sector</p> <p>Promote favorable growing conditions in sight of climate change through soil protection and integrated pest management practices to minimize loss and damage associated with climate change</p> <p>Improving livestock productivity and increasing soil carbon stocks by (i) improving the productive capacity of pastures through enhanced access to farming equipment, seeds and fertilizers, and veterinary services, (ii) improving breeding and mating techniques, and (iii) improving access to water and water infrastructure. Co-benefits of this action aim to increase the nutritional status and incomes of poor rural</p>	<p>Promote soil health and erosion control, and manage water resources and drainage systems</p>	<p>In ASDP, include promoting rice cultivars with low exudation rates to reduce methane emissions by (i) improving water management in the off-season to avoid avoiding water logging, (ii) adjusting the timing of organic residue additions, (iii) composting the residues before incorporation, and (iv) producing biogas for use as fuel for energy production. In addition, emissions can be reduced by increasing rice production to enhance soil organic carbon stocks,</p>

<p>supporting the sustainable use of resources</p> <p>Conducting an analysis of laboratories in the direction of food safety assessment, soil and water testing, as well as determining the management structure, responsibility and scope of accreditation (testing), taking into account the territorial location and distribution of accreditation powers</p>		<p>households in the Khatlon region</p> <p>Promoting rice cultivars with low exudation rates to reduce methane emissions by i) improving water management in the off-season to avoid avoiding water logging, (ii) adjusting the timing of organic residue additions, (iii) composting the residues before incorporation, and (iv) producing biogas for use as fuel for energy production. In addition, emissions can be reduced by increasing rice production to enhance soil organic carbon stocks</p> <p>Application of advanced weed control methods and farm machinery to cultivate crops with minimal tillage (reduced tillage) or without tillage (no-till). Carbon dioxide emissions are thus reduced by (i) promoting soil carbon gain, (ii) reducing fossil fuel consumption in agricultural lands, (iii) and slowing organic matter decomposition rates</p>		
--	--	---	--	--

**Land**

In Tajikistan, a key constraint in increasing agricultural production is the limited availability of arable land. Despite the land shortage, most portion of the rural population relies mainly on agriculture and labor remittances for their livelihood. Effective land reforms are an important first step in agrarian economies with unequal distribution of land resources. The government has already initiated several land reforms, but challenges exist (Babu and Akramov, 2022). The Table 4 below analyzes integration aspects in the land sub-sector.

**Table 4:** Aspects of Integration in the Land sub-sector

The Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030	NDC	NDC Implementation Plan	National Strategy for Adaptation to Climate Change of the Republic of Tajikistan	Gaps and Recommendations
<p>Development of basic digital agricultural infrastructure (eg. registry of farmers, land, live-stock)</p> <p>Conducting emergency risk assessments, including adverse weather conditions and their impact on agricultural lands and crops</p> <p>Development of plans to reduce damage and return abandoned land to a productive state</p> <p>Increasing the productivity of pastures, carrying out geobotanical studies of hayfields and natural pastures, as well as conducting large-scale soil analysis in order to prevent soil and land erosion</p> <p>Carrying out cadastral work and land surveying using new technology on agricultural lands</p> <p>Presentation of proposals for the promotion and introduction of new technologies for the use of land resources (drawing up instructions and rules, making</p>	<p>Promoting water-energy-land interaction with renewable energy sources</p> <p>Improve existing carbon pools, such as land management, collection and use of oil cake, rice hulls or other agricultural waste, reducing the use of tillage methods that increase soil carbon, restoring degraded land</p>	<p>Restore the abandoned land in agricultural circulation and expand the area of irrigated land in the Republic of Tajikistan in order to increase the efficiency of the country's agricultural production, provide rural people with jobs and improve food security</p> <p>This action encompasses the application of advanced weed control methods and farm machinery to cultivate crops with minimal tillage (reduced tillage) or without tillage (no-till). Carbon dioxide emissions thus reduced by (i) promoting soil carbon gain, (ii) reducing fossil fuel consumption in agricultural lands, (iii) and slowing organic matter decomposition rates</p> <p>Improving agroforestry and/or silvopastoral systems by planting shrubs and trees in pastures and agricultural land. Agriculture sector stakeholders gave high priority to agroforestry measures, including alley cropping, silvopastoral</p>	<p>Agricultural reform should focus on removing the constraints that tie farmers to growing cotton, creating incentives for efficient water management, and securing land ownership</p>	<p>In the NDC implementation plan include:</p> <p>Carrying out activities to introduce the practice of zoning agricultural crops, depending on agro-climatic conditions</p> <p>Development of basic digital agricultural infrastructure (eg. registry of farmers, land, live-stock)</p> <p>Increasing the productivity of pastures, carrying out geobotanical studies of hayfields and natural pastures, as well as conducting large-scale soil analysis in order to prevent soil and land erosion</p>

<p>changes and additions to regulatory legal acts, etc.) for the efficient use of arable land, pastures and other agricultural lands.</p> <p>The development of new irrigated lands and the restoration of lands that have come out of agricultural circulation</p> <p>Carrying out the clarification of legal acts on the rules for the use of land, water, pastures, the organization of dehqan farms, production resources, veterinary and phytosanitary services and other issues related to agriculture, as well as the identification of duplication of tasks and contradictions that hinder the development of the agricultural sector</p> <p>Taking measures to raise awareness level of new technologies among farmers, educational institutions, etc.</p> <p>Mapping, classification and analysis of the main zones of soil and water erosion by region</p> <p>Carrying out activities to introduce the practice of zoning agricultural crops, depending on agro-climatic conditions</p>		<p>systems and agroforestry on slopes. Experts recommend a 27% increase in the agroforestry area</p> <p>Promoting sustainable and integrated agroforestry practices that aim to promote conservation of lands by adopting targeted practices in response to vulnerabilities to climate change with the aim of increasing the resilience of the agriculture sector</p> <p>Integrated pasture management techniques, including improved regulation and enforcement to minimize land degradation in favour of preservation of natural resources against loss and damage exacerbated by climate change</p>		
--	--	--	--	--

Conducting explanatory work among farmers on ways to protect the soil and prevent soil erosion				
--	--	--	--	--

## Agricultural Information and Knowledge systems

The agriculture sector is characterized by limited knowledge and can benefit significantly from improved access to specialized knowledge and innovation and a more favorable business environment for entrepreneurs and farmers (IFAD, 2020; Aga Khan Development Network (AKDN), 2020). The table below discusses integration aspects in the agricultural information and knowledge systems sub-sector.

**Table 5:** Aspects of Integration in the Agricultural Information and Knowledge Systems sub-sector

The Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030	NDC	NDC Implementation Plan	National Strategy for Adaptation to Climate Change of the Republic of Tajikistan	Gaps and Recommendations
<p>Taking measures to reform vocational education and higher education on the basis of the program</p> <p>Taking into account the introduction of new innovative approaches and the use of mobile applications, taking the measures to develop specific approaches to access information for vulnerable farmers and raise their awareness</p> <p>Dissemination of information and knowledge among farmers and proposals for improving forms of cooperation between public and private organizations</p> <p>A thematic working group will be created from among ministries and departments, research institutes, farmers' organizations, and development partners, which will work on the</p>	<p>Raising awareness and improving understanding of the connection between gender and climate change in the development context</p> <p>Systemic capacity development at the national, sectoral, regional and local level is required to improve knowledge and strengthen capacities on the impacts of climate change and the respective mitigation and adaptation measures jointly with promoting strong cooperation with the civil society, academia and the private sector</p>	<p>Developing enhanced seed varieties that are resilient to unfavorable growing conditions resulting from climate change in close collaboration with research institutions, as well as the promotion of their use in agricultural lands</p> <p>Awareness campaigns on climate change and disaster risk management</p> <p>Strengthen the technical capacity of government entities on climate change adaptation and governance</p> <p>Systemic capacity development at the national, sectoral, regional, and local level is required to improve knowledge and strengthen ca-</p>	<p>Improving research and expanding agricultural services through small mobile devices driving to farms to provide and improve farmers' access to information, practices and technologies. Provide communities and farmers with a training kit on appropriate growing options applicable to the predicted climate and water availability</p> <p>Introduce crop diversity and plant breeding knowledge, combined plant cultivation, structure and planting method</p>	<p>The NDC implementation plan should incorporate the development of a detailed plan to disseminate information and knowledge among farmers through various mass media channels, including tele-vision programs, radio and social media</p> <p>Climate policies should support the ASDP in:</p> <p>Developing a thematic working group to support early warning systems and establish a system to regularly collect data on decisions on agricultural land use/planting and</p>

<p>creation of pilot stations that generate information based on the specific needs of the regions and systematize the functions and powers to establish an early warning system. The system will give farmers information to manage risks</p> <p>The Ministry of Agriculture of the Republic of Tajikistan will establish a system to regularly collect data on decisions on agricultural land use/planting. Information on the impact of climate hazards on agricultural production, including the occurrence of pests and diseases, will be effectively communicated to farmers through remote probing, collection and monitoring of data in the field. Trainings, workshops, and media communication tools will be used to increase the capacity of both the country as a whole and farmers to adapt to climate change. Particular attention will be paid to increasing the capacity of the Ministry of Agriculture of the Republic of Tajikistan, the Agency for Hydrometeorology of the Committee for Environmental Protection under the Government of the Republic of Tajikistan and the Committee for Emergency Situations and Civil Defense under the Government of the Republic of Tajikistan to collect and analyze meteorological information. Efforts will be aimed at integrating data collection, trans-</p>		<p>capacities on the impacts of climate change and the respective mitigation and adaptation measures jointly with promoting strong cooperation with the civil society, academia, and the private sector</p> <p>It is suggested that within the first two years of NDC implementation (2020-2022), the Republic of Tajikistan will develop an NDC Capacity Building Action Plan to deliver the necessary knowledge, skills, communication streams, and institutional strengthening required for effective NDC implementation. The NDC Capacity Building Action Plan should enlist a series of capacity-building activities with an estimated timeframe, resources required, and entities responsible for implementation</p> <p>developing curricula for secondary schools, secondary vocational institutions, and higher educational institutions to encompass issues of climate change mitigation, adaptation, disaster risk management, and early warning mechanisms</p>	<p>the impact of climate change.</p> <p>Support measures to digitalize the activities of the Ministry of Agriculture in the agro-industrial complex and improve the computer literacy of employees for the effective use of automation systems</p> <p>Development and presentation of proposals for the digitalization of weather data and identification of ways to communicate information to farmers</p> <p>Development and submission of proposals for a mechanism for analyzing historical weather data</p> <p>Develop and include food systems-specific strategies (as identified in the ASDP) in the NDC Capacity Building Action Plan suggested in the NDC implementation plan, which aims to deliver the necessary knowledge, skills, communication streams, and institutional strengthening required for effective NDC implementation</p>
---	--	---	---

<p>ferring important information for farmers through social networks. media and mobile applications, considering the optimization of administrative processes and functions</p> <p>Development of a detailed plan to disseminate information and knowledge among farmers through various mass media channels, including television programs, radio and social media</p> <p>Taking into account the introduction of new innovative approaches and the use of mobile applications, taking the measures to develop specific approaches to access information for vulnerable farmers and raise their awareness</p> <p>Committed to improving agri-cultural practices and developing proposals to increase the incomes of vulnerable farmers</p> <p>Taking measures to reform vocational education and higher education on the basis of the program</p> <p>Taking measures to digitalize the activities of the Ministry of Agriculture in the agro-industrial complex and improve the computer literacy of employees for the effective use of automation systems</p> <p>Organization of pilot demonstration sites with the involvement of the private sector</p>				
---	--	--	--	--

<p>Conducting emergency risk as-assessments, including adverse weather conditions and their impact on agricultural lands and crops</p> <p>Development and presentation of proposals for the digitalization of weather data and identification of ways to communicate information to farmers</p> <p>Development and submission of proposals for a mechanism for analyzing historical weather data</p> <p>Development of an electronic warning and concentration system for farmers (development of the concept and technical documents) and its implementation</p> <p>Taking measures to implement the methodology of objective forecasting of agricultural crops in the regions</p>				
---	--	--	--	--

### Sustainability

The institutional and implementation arrangements governing food and nutrition security are fragmented and suffer from a lack of clarity of the roles and responsibilities of the various actors involved, and weak coordination among the actors, ultimately leading to the inability of the country to address food and nutrition insecurity effectively and in a sustainable and meaningful way (World Bank, 2022).

**Table 6:** Aspects of Integration to Ensure the Sustainability of the Agriculture Sector

<b>The Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030</b>	<b>NDC</b>	<b>NDC Implementation Plan</b>	<b>National Strategy for Adaptation to Climate Change of the Republic of Tajikistan</b>	<b>Gaps and Recommendations</b>
Implementation of measures to promote climate resilient agriculture	Achievement of economically efficient and environ-	Promoting rice cultivars with low exudation rates to reduce methane	Establishing seed banks in communities, especially for	Incorporate financial and investment priority sus-

<p>The program aims to ensure the sustainable development of agriculture supports initiatives on the protection of domestic animal breeds and domestic plant species and develops mechanisms for its implementation. Tajikistan is famous for its various local varieties and breeds. Preservation of biological diversity of agriculture is of great importance to ensure sustainable activity of the sector. The protection of domestic plant and animal species, which includes conducting the census and detailed identification of local species and breeds, as well as the creation of an efficient gene bank, is encouraged</p> <p>Promotion of mixed cropping methods, crop rotation, crop diversity, etc. as a means of improving soil fertility and supporting the sustainable use of resources</p> <p>Assessing the scope and feasibility of the concept, tools and practices of a green economy in agriculture and the food system.</p> <p>Implementation of measures to promote climate resilient agriculture</p>	<p>mentally sustainable management of water resources</p> <p>Sustainable practices in the pasture management</p> <p>Promoting forest protection and sustainable management of existing forests and ecosystem services; restoration in degraded pastures, agroforestry and silvopastoral practices</p> <p>Mastering ecologically safety, highly efficient and energy-saving technologies for the disposal and use of agricultural waste</p> <p>Optimizing the use of fertilizers, i.e. reducing the use of synthetic fertilizers</p> <p>Biofuel production, including biodiesel and bioethanol (only if net emission reductions can be demonstrated);</p>	<p>emissions by (i) improving water management in the off-season to avoid avoiding water logging, (ii) adjusting the timing of organic residue additions, (iii) composting the residues before incorporation, and (iv) producing biogas for use as fuel for energy production. In addition, emissions can be reduced by increasing rice production to enhance soil organic carbon stocks</p> <p>Improvement of the regulatory, finance and legal framework for sustainable forest management</p> <p>Tajikistan second public employment for sustainable agriculture and water resources management project</p> <p>Research and innovation in sustainable forest practices</p> <p>Increasing Innovative and Sustainable Industries</p> <p>Development of Sustainable Infrastructure Developing the foundations of sustainable forestry</p> <p>Increasing the Water User Associations' access to knowledge and resources for improving the sustainable allocation and conveyance of irrigation</p>	<p>crops resistant to drought and disease</p> <p>Promote drought tolerant seeds and practices, and knowledge of plant frost protection</p> <p>Plant trees to protect the community and farm from the wind</p> <p>Develop crop drought insurance options</p> <p>By mapping the vulnerability of climate-updated hazards, notifying communities at risk of floods and landslides, involving communities in the construction of buildings and zones, safe climate events, and providing technical and financial assistance</p>	<p>tainability mechanisms in all key documents</p> <p>Reliable assessment of private sector investment in the field of agriculture and the food system.</p> <p>In ASDP, include:</p> <p>Promoting rice cultivars with low exudation rates to reduce methane emissions by (i) improving water management in the off-season to avoid avoiding water logging, (ii) adjusting the timing of organic residue additions, (iii) composting the residues before incorporation, and (iv) producing biogas for use as fuel for energy production. In addition, emissions can be reduced by increasing rice production to enhance soil organic carbon stocks</p> <p>Mastering ecologically safety, highly efficient and energy-saving technologies for the disposal and use of agricultural waste</p>
--	--	--	---	--

<p>Promotion of mixed cropping methods, crop rotation, crop diversity, etc. as a means of improving soil fertility and supporting the sustainable use of resource</p> <p>Assessing the scope and feasibility of the concept, tools and practices of a green economy in agriculture and the food system</p> <p>Development of indicators: - on food security and nutrition security for production and consumption in the country, availability, access to food by region, population groups</p> <p>Introduction of a food security information system and an early warning system</p>		<p>water through canals and other delivery works, including scheduling, maintenance activities, fee collection, and dispute resolution</p> <p>Ensure sustainable functioning of maintenance and operation system for irrigation and drainage infrastructure, as a basis for sustainable irrigated agriculture and food security, employment of the rural population, and poverty reduction on the ground</p> <p>Livestock protection and promoting plant species</p> <p>intercropping and crop rotations can both increase resilience of cropping systems and improve soil carbon to reduce emissions from the agriculture sector</p>		
---	--	---	--	--

## RECOMMENDATIONS

Based on the analysis, we provide recommendations at the policy, institutional, and technical levels to strengthen integration between agriculture strategies and climate change action in Tajikistan.

### Policy Level

At the policy level, an important action identified by the NDC implementation plan is improvement of irrigation practices and infrastructure in 40% of irrigated land. While ASDP discusses the challenges with the current irrigated land, it would be efficient to align strategies to achieve this goal. Since the ASDP and NDC implementation plan both discuss river basin management, stakeholders should work synergistically on managing the different river basins identified in the respective documents.

With regard to the nutrition- climate change linkage, the NDC implementation plan focusses on adjusting the diets of ruminants including protein content reduction and fat supplementation to

reduce GHG emissions. As the agriculture sector is contributor to GHG emissions, this strategy should be appropriately incorporated in the ASDP. The ASDP can create synergies with the NDC implementation plan by focusing on reducing methane emissions by promoting rice cultivars with low exudation rates through (i) improving water management in the off-season to avoid avoiding water logging, (ii) adjusting the timing of organic residue additions, (iii) composting the residues before incorporation, and (iv) producing biogas for use as fuel for energy production. In addition, emissions can be reduced by increasing rice production to enhance soil organic carbon stocks.

For efficient use of land resources, NDC implementation plan must include actions on introducing the practice of zoning agricultural crops, depending on agro-climatic conditions. To prevent land and soil erosion, the plan should also incorporate increasing the productivity of pastures, carrying out geobotanical studies of hayfields and natural pastures, as well as conducting large-scale soil analysis.

To ensure that integrated action is sustainable, incorporating financial and investment priority sustainability mechanisms is essential. The ASDP highlights that overtime it is expected that the role of the private sector for funding purposes will grow. Relatedly, the NDC implementation plan also states developing de-risking mechanisms to promote investment for the international community and the private sector.

Availability of seeds is another important sustainability concern, as highlighted by the NSACC, and the ASDP should promote establishment of seed banks in communities, especially for crops resistant to drought and disease.

Develop and include food systems-specific capacity building activities in the NDC Capacity Building Action Plan suggested in the NDC implementation plan, which aims to deliver the necessary knowledge, skills, communication streams, and institutional strengthening required for effective NDC implementation. Some of the focus areas can be training farmers on methods to improve irrigation facilities, crop rotation, intercropping, and crop diversity to build resilience to droughts and pests.

## **Institutional level**

Strong ongoing multistakeholder collaboration is the foundation for effective integration. Organizational capacity to combine the goals, design interventions that are implemented collectively, and monitor and learn from the progress requires close coordination by related entities. For example, it is essential to provide institutional support to farmers through public and private extension systems and other local bodies to enhance productivity and livelihoods as well achieve cost-effective climate action at the community and farm levels. Since irrigation and related water issues are crucial from the perspective of productivity and sustainability, strengthening the capacity of Water Users Associations is important.

The research and knowledge system should be strengthened through adequate financial support. Aside from the government and donor community, promoting private sector involvement through financial and technical support is important. Funding can be channelized for conducting climate focused agriculture research such as developing enhanced seed varieties that are resilient to unfavorable growing conditions resulting from climate change.

Effective institutional frameworks and communication streams are key for coordinated and streamlined NDC implementation. This is line with ASDP's emphasis that the Ministry of Agriculture together with relevant ministries and departments should carry out the clarification of legal acts on the rules for the use of land, water, pastures, the organization of dehkan farms, production resources, veterinary and phytosanitary services and other issues related to agriculture, as well

as the identification of duplication of tasks and contradictions that hinder the development of the agricultural sector. The NDC implementation plan should support measures to digitalize the activities of the Ministry of Agriculture and other relevant ministries and improve the computer literacy of employees for the effective use of automation systems.

As discussed in the ASDP, support should be provided to create thematic working group among ministries and departments, research institutes, farmers' organizations, and development partners, which will work on the creation of pilot stations that generate information based on the specific needs of the regions and systematize the functions and powers to establish an early warning system. The system will give farmers information to manage risks. Similarly, Ministry of Agriculture of the Republic of Tajikistan should involve climate change focused government and non-government bodies to help establish a system to regularly collect data on decisions on agricultural land use/planting including information on the impact of climate hazards on agricultural production, including the occurrence of pests and diseases. Aside from integrated action to establish the data system, capacity strengthening trainings and workshops should be conducted to enhance the skills of Ministry of Agriculture of the Republic of Tajikistan, the Agency for Hydro-meteorology of the CEP and the Committee for Emergency Situations and Civil Defense under the Government of the Republic of Tajikistan, among others to collect and analyze meteorological information.

For tracking integrated action, stakeholders must develop a monitoring, reporting, and verification systems. Once a roadmap is developed for building synergies at the implementation stage, appropriate indicators can be identified for tracking. The NDC implementation plan has already provided several agriculture sector focused monitoring indicators.

## Technical level

Enhancing the productive capacity of smallholder farming systems by improving access to inputs, infrastructure, and markets is a key priority for both ASDP and climate action policies. Adaptation actions should promote favorable growing conditions considering climate change through soil protection and integrated pest management practices to minimize loss and damage associated with climate change. Use of sustainable and integrated agroforestry practices should be a priority. Promoting green technologies, optimizing the use of synthetic fertilizers, and adopting efficient irrigation methods including drip irrigation systems, can bring immediate joint benefits for the agriculture sector and climate change. To reduce methane emissions, promote rice cultivation management, as discussed in the NDC implementation plan. Strategies on improved pasture management and improved regulation and enforcement to minimize land degradation in favor of preserving natural resources against loss and damage exacerbated by climate change is another priority area. Incorporating strategies to improve soil carbon stock and practicing sustainable cultivation and designing extension programs to reach farmers will have both immediate and long-term benefits to Tajikistan farmers. For environmental sustainability, encourage highly efficient and energy-saving technologies for the disposal and use of agricultural waste.

## CONCLUDING REMARKS

The Declaration On Sustainable Agriculture, Resilient Food Systems, And Climate Action at COP28 clearly highlights the need for integrating food systems into national climate change commitments. The first step toward achieving this goal is to have a conceptual framework to guide the integration process. The framework proposed in this paper can be a starting point to mainstream sectoral policies into climate action commitments. Using Tajikistan as a case study, we undertook a thematic integration analysis of the Development Program Of The Agri-Food System

And Sustainable Agriculture For The Period Up To 2030, NDC, NDC implementation plan, and National Strategy for Adaptation to Climate Change of the Republic of Tajikistan to identify synergies and gaps and provide recommendations. Similar analysis can be undertaken for integrating other sectors with climate action initiatives in Tajikistan. The approach developed in this paper can also be used by other countries to fast track the process of integrating sector-specific strategies with climate action.

## REFERENCES

- Aga Khan Development Network (AKDN) (2020). "Tajikistan: Agriculture and Food Security". <https://the.akdn/en/where-we-work/central-asia/tajikistan/agriculture-and-food-security-tajikistan>
- Aryal, J. P. 2022. Contribution of Agriculture to Climate Change and Low-Emission Agricultural Development in Asia and the Pacific. ADBI Working Paper 1340. Tokyo: Asian Development Bank Institute. <https://doi.org/10.56506/WDBC4659>
- Babu, Suresh Chandra; and Akramov, Kamiljon T. 2022. Agrarian reforms and food policy process in Tajikistan. Central Asian Journal of Water Research 8(1): 27-48. <https://doi.org/10.29258/CAJWR/2022-R1.v8-1/27-48.eng>
- Central Asia Regional Economic Cooperation (CAREC) Institute (2022). Water-Agriculture-Energy: Nexus In Central Asia Through The Lens Of Climate Change. <https://www.carecinstitute.org/wp-content/uploads/2022/08/Report-on-Water%E2%80%93agriculture%E2%80%93energy-nexus-in-Central-Asia-through-the-lens-of-climate-change.pdf>
- FAO, IFAD, UNICEF, WFP and WHO (2023). The State of Food Security and Nutrition in the World 2023. Urbanization, agrifood systems transformation and healthy diets across the rural–urban continuum. Rome, FAO.
- Global Alliance for Improved Nutrition (GAIN) (2023). Accelerating Action And Opening Opportunities: A Closer Integration Of Climate And Nutrition 2023 I-Can Baseline Assessment. Geneva, GAIN. <https://www.gain-health.org/sites/default/files/publications/documents/Accelerating-Action-and-Opening-Opportunities-A-Closer-Integration-of-Climate-and-Nutrition.pdf>
- Government of the Republic of Tajikistan (2019). National Strategy for Adaptation to Climate Change of the Republic of Tajikistan for the Period up to 2030. <https://leap.unep.org/countries/tj/national-legislation/national-strategy-adaptation-climate-change-republic-tajikistan>
- Government of the Republic of Tajikistan (2021). The Updated NDC of the Republic of Tajikistan. <https://policy.asiapacificenergy.org/sites/default/files/Updated%20Nationally%20Determined%20Contributions%20%28NDC%29%28EN%29.pdf>
- Government of the Republic of Tajikistan (2022). NDC Implementation Plan Republic of Tajikistan.
- Government of the Republic of Tajikistan (2023). The Development Program Of The Agri-Food System And Sustainable Agriculture For The Period Up To 2030.
- IFAD (2020). "Republic of Tajikistan: Country Strategic Opportunities Programme 2019-2024". <https://webapps.ifad.org/members/eb/130/docs/EB-2020-130-R-19.pdf?attach=1>
- IPCC. 2022. Climate Change (2022): Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, USA. doi:10.1017/9781009325844.
- Khakimov, P. & Aliev, J. & Thomas, T. & Ilyasov, J. & Dunston, S., (2020) "Climate Change Effects on Agriculture and Food Security in Tajikistan", *Silk Road: A Journal of Eurasian Development* 2(1), 89–112. doi: <https://doi.org/10.16997/srjed.33>
- Nekbakhtshoev, N., & Babu, S.C. (2022). Agrarian Reform and Water Resource Management: A Case Study and Lessons from Tajikistan. Central Asian Journal of Water Research.
- Sevimli, O.; Jungbluth, F. (2022). 'Tackling food insecurity in Tajikistan'. Washington DC, World Bank. <https://blogs.worldbank.org/europeandcentralasia/tackling-food-insecurity-tajikistan#:~:text=According%20to%20the%20World%20Food,than%20double%20to%20reach%208.6%25>
- United Nations (UN) (2022). 'Soils, where food begins: Tajikistan marks World Soil Day 2022'. Tajikistan: UN. <https://tajikistan.un.org/en/211555-soils-where-food-begins-tajikistan-marks-world-soil-day-2022>
- UNFCCC (2023) "COP28 UAE Declaration On Sustainable Agriculture, Resilient Food Systems, And Climate Action". <https://www.cop28.com/en/food-and-agriculture>
- World Bank (2022). "Republic of Tajikistan: Additional Financing for Tajikistan Strengthening Resilience of the Agriculture Sector Project". <https://documents1.worldbank.org/curated/en/099650012052210530/pdf/BOSIB09e728f4205e08c4a02663ef56acc1.pdf>

---

## ACKNOWLEDGEMENTS

The authors would like to thank Matt Curtis, Agathe Sector, Daler Asrorov, and Emily Weeks of USAID for their constant support and for facilitating our work in Tajikistan and with the NDC Partnership. Members of the CEP and the development partners in Tajikistan provided valuable inputs in preparing this paper.

---

## ABOUT THE AUTHORS

**Suresh Babu** ([s.babu@cgiar.org](mailto:s.babu@cgiar.org)) is a Senior Research Fellow and Head of the Capacity Building in the Development Strategy and Governance Unit of the International Food Policy Research Institute, Washington, DC.

**Sino Tohirzoda** ([tohirzoda@gmail.com](mailto:tohirzoda@gmail.com)) is an In-Country Facilitator and the Head of NDC Secretariat in the Committee for Environmental Protection (CEP), Dushanbe, Tajikistan.

**Kamiljon Akramov** ([k.akramov@cgiar.org](mailto:k.akramov@cgiar.org)) is a Senior Research Fellow in the Development Strategy and Governance Unit of the International Food Policy Research Institute, Washington, DC.

**Nandita Srivastava** ([n.srivastava@cgiar.org](mailto:n.srivastava@cgiar.org)) is a Research Analyst in the Development Strategy and Governance Unit of the International Food Policy Research Institute, Washington, DC.