ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: FULL PROPOSAL

Country/Region: Uzbekistan/Central Asia
Project Title: Resilient Food Systems Through Climate Services for Agriculture in Uzbekistan
Thematic Focal Area: Agriculture
Implementing Entity: International Fund for Agricultural Development (IFAD)
Executing Entities: Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan
AF Project ID: AF00000369
IE Project ID: **Requested Financing from Adaptation Fund (US Dollars):** 10,000,000
Reviewer and contact person: Neranda Maurice-George **Co-reviewer(s):**
IE Contact Person:

Technical Summary	The project “Resilient Food Systems Through Climate Services for Agriculture in Uzbekistan” aims to contribute to rural poverty alleviation in the country through increased climate services for agriculture, improving resilience, incomes and enhanced economic growth in rural farming communities and at the sector level. This will be done through the three components below: Component 1: Development of a near real-time farm advisory information system (USD 4,601,000). Component 2: Modeling the impact of climate change on agriculture to improve decision making and planning (USD 1,975,000) Component 3: Reaching the last mile and getting climate services to farmers (USD 1,784,000). Requested financing overview: Project/Programme Execution Cost: USD 870,000 Total Project/Programme Cost: USD 9,230,000 Implementing Fee: USD 770,000 Financing Requested: USD 10,000,000 The initial technical review raises some issues, such as the need for more details regarding project beneficiaries, social sustainability, project management, the ESMP, and the budget for the Midterm Review, as is discussed in the number of Clarification Requests (CRs) and Corrective Action Requests (CARs) raised in the review. The second technical review finds that the revised proposal has not sufficiently addressed a few Clarification Requests (CRs) on vulnerable groups and ESMP and a Corrective Action Request (CARs) on budget and core indicators. The third technical review finds that the revised proposal has one outstanding CARs to address on core impact indicators.
Date:	January 31, 2025

Review Criteria	Questions	Initial Technical Review Comments (8 September 2024)	Second Technical Review Comments (5 December 2024)	Third Technical Review Comments 23 January 2025	Response IFAD 8 Feb 2025

Country Eligibility	1. Is the country party to the Kyoto Protocol or the Paris Agreement?	**Yes**.	**-**	**-**	
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	**Yes**. Uzbekistan is particularly vulnerable to climate change impacts, including increased heat waves, droughts and extreme rainfall events, which are exacerbating several challenges facing the country such as water scarcity, soil degradation, and increased incidence of pest pressure and disease outbreak in agricultural systems.	**-**	**-**	
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	**Yes**. As per the Endorsement letter dated July 31, 2024.	**-**	**-**	
	2. Does the length of the proposal amount to no more than One hundred (100) pages for the fully-developed project document, and one hundred (100)	**Yes.**	**-**	**-**	

	pages for its annexes?				
	3. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	**Yes**. As outlined on pages 17-26 and 84-86. The project supports activities designed to reduce vulnerability and address the adaptation gap linked to a lack of data on agro-climate conditions and uncoordinated data collection which reduces institutional capacity, prevents informed decision making for climate-resilient farming and hinders agricultural productivity. The concrete adaptation measures include installing 40 Automatic weather stations, meteorological services, and the development and local application of last mile climate services (10 days bulletin and seasonal drought forecast bulletin) co-designed by task forces made up of technical experts, including IT specialists, agriculturalists, and the end users-farmers. The resulting real-time	-	-	

		weather advisory system, the Climate Services System (CSS), will include provision of crop specific advisories, establishment of a seasonal long range weather forecast, and monthly seasonal forecast, and the development of a hydrological service. capacity building activities , including technical training in data sharing and analysis, and training in climate modeling.			
	4. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	**Yes**, but more details are needed regarding vulnerable groups and the presence of indigenous peoples. Direct beneficiaries include: 1,000 farmers (700 men and 300 women) engaged in co-design of climate services, 400 staff (270 men and 130 women) from targeted institutions, 350 field staff (250 men and 100 women), 30,000 end users trained in use of climate services (26,000 men and 9000 women) and a total of 100,000 individuals provided with	**CR1**: **Not cleared.** The addition of the number of dekhan farmers per region on page 16 is well noted as well as clarification regarding indigenous groups, but this information does not address the clarification request regarding the need for gender disaggregated data on total end users provided with access to climate services, as well as what percentage of aforementioned end	**CR1: Cleared.** As per amendments to pages 17-18 and 25 of the revised proposal; results framework at page 88 of the revised proposal and Annex 6 page 148 of the tracked changed version of the proposal.	

		climate information services. Project benefits include boosting crop yields and increasing profitability resulting from real-time agrometeorological information that enhances farmers' decision-making, optimizing crop diversification, planting, irrigation, fertilization, and pest management. The project will specifically target horticulture, which is especially important for women, therefore addressing existing gender inequalities with respect to access to and benefit from value chains. Particular attention will be given to female youth who face higher unemployment and who are not in employment, education or training. Annex 4 includes a gender assessment and gender action plan. The project also provides environmental benefits through the promotion of sustainable practices like conservation agriculture, agroforestry, and water	users is made up of the “vulnerable dekhan (unregistered farmers)”, “better off farmers” and vulnerable women. Additionally, the resoinses have not addressed how the project will aim to create awareness and encourage the inclusion of people with disabilities through its climate services if activities are not explicitly targeting these groups. (page 15).		

		management, which all contribute to long-term economic viability. However, more data is needed on the communities in the project area, including gender disaggregated data on total end users provided with access to climate services, as well as what percentage of aforementioned end users is made up of the “vulnerable dekhan (unregistered farmers)”, “better off farmers” and vulnerable women mentioned on page 15 as a special focus of the project. More details are needed on how the project will aim to create awareness and encourage the inclusion of people with disabilities through its climate services if activities are not explicitly targeting these groups. (page 15). Additionally, more clarity is needed on the presence of indigenous groups in the project area since page 186 of the proposal states			

		that there are no indigenous groups present in the target area and there is no risk to" indigenous people's rights to traditionally owned or otherwise occupied and used lands, territories, waters, coastal seas and other resources and/or livelihood systems", but also states that the project could "result in the utilization and/or commercial development of natural resources on lands and territories inhabited by indigenous peoples". **CR1**: Kindly provide more details regarding the percentage makeup of dekhan farmers and better off farmers, as well as clarification on the presence of indigenous groups and their representation in the consultations process.			
	5. Is the project / programme cost effective?	**Yes.** As outlined on page 50 which includes a comparison with other possible interventions and	**-**	-	

		estimated costs per beneficiaries of ongoing meteorology initiatives in Uzbekistan and other countries.			
	6. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	**Yes.** As outlined on page 53. The project is aligned with national sustainable development strategies and adaptation programs, including the (I)NDC focused on Climate adaptation of the social sphere, the national 2022-2026 Development Strategy, Agriculture Development Strategy of Uzbekistan for 2020-2030, Decree No. PF-615930 "on the further development of the knowledge and innovation system and the provision of modern services in agriculture", and the draft “Sectoral Adaptation Plan for the Agricultural Sector” of the NAP being developed by UNDP with funding from GCF.	**-**	**-**	
	7. Does the project / programme meet	**No.** More information is needed on regulations,	**CAR1**: **Cleared.**	**-**	

	the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	standards, and requirements for installation of meteorological stations and gauges. **CAR1**: Please include specific rules and regulations under the Land Code, such as land use or tenure regulations or water quality regulations.	As per additional informational included on page 56.		
	8. Is there duplication of project / programme with other funding sources?	**Unclear.** The proposal lists other relevant and potentially overlapping projects and includes plans for coordination and sharing of lessons learned, and the plans to form technical committees for coordination between certain projects are well noted. However, more specific details are needed regarding how the project will build upon certain initiatives or avoid duplication of efforts, particularly for FUME and Green Central Asia projects. **CR2: Please** specify the project target areas of the	**CR2 and CR3**: **Cleared.** As per additional details included on page 57.	**-**	

		other initiatives to ensure they do not cover the same project area or communities or how the activities will avoid overlap. **CR3**: Please also provide details on avoiding overlap or ensuring synergies with the "Upgrading of Hydromet Services in Central Asian Countries" and CAMP4ASB projects.			
	9. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	**Unclear.** Knowledge management activities are spread between the components, including the development of the Climate Services System, CSS, a web portal and app which will include agro-meteorological services and pest and disease forecasting under component 1, and capacity building and technical skills in component 3. However, it is unclear whether the CSS is the same as the M&E/KM system mentioned on page 60, as the M&E/KM system is not included in the components section nor	**CR4**: **Cleared.** As per additional information included on page 58. It is recommended that knowledge management activities, including The publications such as the main report, thematic reports, scientific articles, policy briefs and related materials mentioned on page 40 be explicitly mentioned under component 2.	**-**	

		are details of this system mentioned in the activities section. Page 60 states “that the project will contract a specialized M&E/KM expert to set up the M&E/KM system. KM will enable the country programme to contribute to a knowledge base of practical and actionable know-how that can be used to address better challenges tackled by the project. It will comprise a project website for the communication of basic information about project features and updates on implementation, platforms for data management to maintain statistics, a repository of knowledge products such as reports and studies for analysis and official reporting, as well as brochures, booklets and audiovisual communication for awareness raising and training purposes.” While not a requirement, it is recommended to include knowledge management			

		under a dedicated component. **CR4**: Please clarify under which component the aforementioned KM system will be housed and explicitly include its development in the activities.			
	10. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	**Yes.** As outlined on pages 61-67 and annex 2. A grievance redress mechanism is outlined on pages 80-81. However, it includes the condition that the complaint must be lodged by at least two people, which depending on the complaint, particularly one related to gender based violence, could be overly restrictive. Additionally, it is imperative that the grievance mechanism be easily accessible, even without access to the internet portal or phone app, and that stakeholders be able to access it privately, and without fear of retribution.	**CR5**: **Cleared.** **CR6: Cleared.** **CAR2**: **Cleared.** Based on new information provided on pages 88 and 89 of the proposal.	**-**	

		CR5: Please include a participant list and date of consultation with the Women's Business Association. **CR6**. Kindly include consultation techniques used for the consultations. Please see **CR1** regarding clarifications on the presence of indigenous groups. **CAR2**: Please ensure that the grievance mechanism is easily accessible to all stakeholders and without undue access restrictions or conditions.			
	11. Is the requested financing justified on the basis of full cost of adaptation reasoning?	**Yes.**	**-**	**-**	
	12. Is the project / program aligned with AF's results framework?	**Yes.** As outlined on page 87. The project is aligned with AF outcomes, 2,3,4, and 7.	**-**	**-**	
	13. Has the sustainability of the project/programme	More details are needed regarding how the project	**CR7**: **Cleared.**	**-**	

	outcomes been taken into account when designing the project?	will ensure social sustainability. The project's sustainability is grounded in the fact that Uzhydromet will maintain ownership of the assets established by the project (e.g.the automated observation network, the databases, the servers) and fully ensure their operation and maintenance during and after the project implementation period. By involving agricultural producers and Uzhydromet in the project's design, the initiative aims to create lasting connections among data producers, users, and Uzhydromet. The project will integrate climate services into national policies, modernize agricultural practices, and adopt a new cost-recovery business model to ensure financial viability. Key strategies for long-term sustainability include integrating costs into the national budget, implementing a cost-recovery model, attracting investment, ensuring Uzhydromet's ownership of	As per additional information included on pages 56 and 96.		

		assets, and building staff capacity through training. Additionally, the preparation of regular bulletins and policy briefs, agrometeorology and climate scenarios will promote sustainable agricultural practices. By aligning farming activities with weather conditions, farmers can reduce the use of agrochemicals, optimize planting and harvesting schedules, and adopt conservation practices. This reduces pollution, soil erosion, and ecosystem degradation, contributing to long-term environmental sustainability. However, regarding social sustainability, feedback from consultations with womens' groups cited many women's inability to afford internet capabilities on their cell phones, preventing them from accessing climate data. The proposal mentions "internet subscriptions" as a mitigation measure, but provides no details about how or who will provide the			

		subscription or how any potential arrangement would be sustained beyond the project. **CR7:** Please include more details regarding how the project will ensure the social sustainability of project activities, including addressing the issue of women's access to internet capabilities.			
	14. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	**Yes.** As per the checklist on page 72. The project is listed as a Category C. The project includes a gender assessment and gender action plan in annex 4, however more details are needed on how the project will ensure women benefit from and can access enhanced climate services from the project. Additionally, page 80 states that a detailed gender assessment will be carried out in the first year of implementation to mainstream gender	**CR8**: **Cleared.** As per revisions and additional information included on pages 43 and 82.	**-**	

		throughout the project, but this activity has been carried out during consultations for project preparation and informed project design, including to challenges and risks faced by women in agriculture and informing activities related to horticulture and women's potential inability to afford the internet capabilities needed to access the proposed CSS. **CR8**: Please provide more details clarifying the objective of the additional gender assessment and how it differs from the gender assessment used to inform the gender action plan. Please also see **CR7** regarding social sustainability.			
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	**Yes.**	**-**	-	

	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	**Yes.**	**-**	**-**	
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)?	**Yes.**	**-**	**-**	
Eligibility of IE	1. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	**Yes**. IFAD is a Board accredited Implementing Entity with accreditation valid until December 2025.	**-**	**-**	
Implementation Arrangements	1. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	No. An M&E budget is included on page 83. More details are needed regarding program management and risk mitigation measures for some of the highlighted project implementation and program management risks on page 80. For example, the project cites lack of collaboration and data	**CR9**: **Cleared.** As per additional information included on page 76. **CAR3**: **Cleared.** As per additional information included on page 96.	**-**	

		sharing between ministries as “high” risk, and states that project Implementation will be carried out by the same project management unit under Uzhydromet, but then goes on to state that the project structure foresees that different agencies lead on the implementation of components. Additionally, while the cost of another gender assessment is included in the budget, the gender focal point mentioned on page 77 as being part of the PMU and in the Gender action plan is not included in the breakdown of the PMU project execution costs in the detailed budget. **CR9:** Please provide more details regarding agencies responsible for implementation of components. **CAR3:** Please clarify how the gender focal point will be budgeted to ensure that implementation			

		arrangements incorporate gender responsive elements.			
	2. Are there measures for financial and project/programme risk management?	Financial and program risk management arrangements are outlined on page 78 and on pages 32-33 outlining the development of Standard Operating Procedures SOPs to make climate data open source, a key mitigating measure to address barriers to accessing data, for example. However, more details are needed regarding program management for social risk management and accessibility of the grievance redress mechanism. Please see **CARs 2 and 3.**	**Cleared.**	**-**	
	3. Are there measures in place for the management of environmental and social risks, in line with the Environmental and Social Policy and	The ESMP is included on page 119. More information is needed regarding implementation of the ESMP, including budget provisions and coordination between	**CR10**: **Partially cleared.** More information has been included on implementation arrangements and gender responsive elements.	**CR10: Cleared.**	

	Gender Policy of the Fund?	IFAD's M&E function and the PMU's M&E officer within MoE. **CR10**: Kindly provide more details regarding the M&E by IFAD versus the PMU housed within Please see **CARs 2** and **3, CRs 1** and **7.**	Please see **CR 1**.		
	4. Is a budget on the Implementing Entity Management Fee use included?	**Yes.** As per detailed budget on page 96.	**-**	**-**	
	5. Is an explanation and a breakdown of the execution costs included?	**Yes.** As per information provided on pages 95-96 of the detailed budget.	**-**	**-**	
	6. Is a detailed budget including budget notes included?	A detailed budget and notes are included on pages 91-96. However, more details are needed regarding resources allocated for gender-responsive implementation. The implementation arrangements on page 75 and the operational arrangements to implement the gender action plan on	**CAR4**: **Mostly cleared.** 1. Please include final evaluation costs in the EC budget. 2. Please move mid-term evaluation costs to IE fees.	**CAR4: Cleared.** Based on amendment to page 101 of the track-changed version of the re-submission.	

		page 135 mention a gender focal point and include steps for gender-responsive activities, however neither a gender specialist or gender focal point are included in the budget. **CAR4:** Please clarify how the project will ensure that adequate resources are allocated in the project/programme budget for gender-responsive implementation.			
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	**Yes.** The proposal includes a budgeted M&E plan on pages 81- 83. However, more information is needed on resources for gender responsive implementation. Please see CAR.	**-**	**-**	
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the	**Yes.** As per M&E budget included on page 83. The mid-term evaluation and terminal evaluation	**CAR5**: **Cleared.**	**-**	

	supervision of the M&E function?	budgets sum to USD 80,000, which is below 1% of the total project budget. **CAR5:** Please ensure that the budget allocated to mid-term review and terminal evaluation is between 1-5% of the total project budget.			
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	**Yes.** As outlined on page 86.	**CAR6 (NEW):** Please include the core impact indicator tables identifying the core impact indicators that are relevant for this proposal. • Methodologies for reporting Adaptation Fund core impact indicators (**For fully-developed proposals**) (78 kB, DOC)	**CAR6(NEW): Not Cleared.** In addition to the insertion at Annex 6 page 148 (tracked changed version) for direct beneficiaries, please insert a core indicator reporting table for Early Warning Systems as per Methodologies for reporting Adaptation Fund core impact indicators	**CAR6**: We inserted the core indicator on early warning systems on page 145.
	10. Is a disbursement schedule with time-bound milestones included?	**Yes.**	**-**	**-**	

ADAPTATION FUND

FULLY DEVELOPED PROPOSAL FOR SINGLE COUNTRY

PART I: PROJECT INFORMATION

Title of Project: Resilient food systems through climate services for agriculture in Uzbekistan

Country: Republic of Uzbekistan

Thematic Focal Area: Agriculture

Type of Implementing Entity: Multilateral Implementing Entity

Implementing Entity: International Fund for Agricultural Development (IFAD)

Executing Entity: Ministry of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan

Amount of Financing Requested: 10,000,000 (in U.S Dollars Equivalent)

Letter of Endorsement (LOE) signed: Yes ☒

Stage of Submission: ☒ This proposal has been submitted before as a concept note

Contents

A. Project background and context

Location and climate

Uzbekistan is a landlocked country located in Central Asia. It borders Kazakhstan to the north, Tajikistan to the southeast, Kyrgyzstan to the northeast, Afghanistan to the south, and Turkmenistan to the southwest. The country's location in the heart of Central Asia gives it a diverse landscape and climate. The geography of Uzbekistan varies from vast plains to rugged mountains. The expansive Kyzylkum Desert dominates the northern part of the country. At the same time, the southern regions are home to Pamir and Tian Shan mountain ranges. The Fergana Valley, nestled in the eastern part of the country, is a fertile and densely populated region.

In terms of climate, Uzbekistan experiences a continental climate with hot summers and cold winters. The country experiences significant temperature variations throughout the year. During the summer months, from June to August, temperatures can reach very high levels, often exceeding 40 degrees Celsius in the lowland areas. Winters, from December to February, are generally cold, especially in the mountainous regions, with temperatures dropping below freezing. Spring and autumn, from March to May and September to November, are relatively short seasons characterized by mild temperatures. Precipitation in Uzbekistan is generally low, particularly in the arid regions. Most rainfall occurs in the spring and autumn, although it is still relatively scarce. The Fergana Valley, more influenced by the mountains, receives a slightly higher amount of rainfall than the rest of the country.

Environmental and agro-ecological conditions

A significant portion of Uzbekistan's land is classified as agricultural, making up about 61% of the country's total land area. It includes arable land used for crop cultivation, permanent pastures, and meadows for livestock grazing. The fertile soil in the valleys and plains supports agricultural activities, particularly in the Fergana Valley and the Zeravshan and Syr Darya river basins. The main crops grown in Uzbekistan include cotton, wheat, barley, corn, rice, fruits, and vegetables. Cotton production is significant to the country's economy and accounts for a substantial portion of the agricultural land use. Uzbekistan is one of the largest cotton producers globally. Wheat is also a staple crop, with other grains supporting the domestic food supply. Besides crop cultivation, livestock rearing is essential to Uzbekistan's agricultural sector. Livestock, including cattle, sheep, and goats, grazes on the available pastures and contributes to meat and dairy production. The country also has a small but growing poultry and aquaculture industry.

Uzbekistan has some forested areas, primarily in the mountainous regions, accounting for about 7% of the total land cover in 2018[1]. These forests are a valuable resource for timber and provide habitat for diverse plant and animal species.

The agroecosystem of Uzbekistan faces various problems. Water scarcity and inefficient irrigation systems limit agricultural productivity. Soil degradation, including salinization and erosion, affects soil fertility and reduces crop yields. Overreliance on cotton monoculture leads to ecological imbalances and limits crop diversification. Finally, pest and disease management poses challenges, requiring sustainable and integrated approaches to minimize the use of chemical pesticides and ensure crop health. Addressing these problems is crucial for promoting sustainable agriculture, preserving natural resources, and enhancing food security in Uzbekistan. Climate change is exacerbating most of these problems, for example, through increased average temperatures and increased incidence of heat waves, droughts and extreme rainfall events, and thawing at higher altitudes. Rising temperatures and altered

[1] https://unfccc.int/sites/default/files/resource/FBURUZeng.pdf

precipitation patterns likely influence pests' range, abundance, and behaviour, leading to increased pest pressure and disease outbreaks in agricultural systems. At the same time, the country lacks a practical integrated climate services framework for agriculture, which poses a significant adaptation deficit to the agricultural sector.

Population, economy and poverty

Uzbekistan declared its independence from the USSR on September 1, 1991. Since then, the country has transitioned to a Presidential Republic. The present presidency has brought some reforms and focused on economic development and regional cooperation. After an initial phase of market liberalization, the Government of Uzbekistan has initiated a second phase of reforms addressing land, labour, capital markets and structural constraints such as dominant state-owned enterprises and banks. A significant medium-term challenge is ensuring reform inclusivity and transparency.

Based on data from the Statistics Agency[2] in 2023, the population was approximately 36 million. The economically active population is about 15 million people. Life expectancy for men is 72.1 years and for women, 76.6 years. Currently[3], Uzbekistan's population aged 15 to 24 is about 5.54 million people, 12% smaller than the age group of 25-34 (6.2 million people). Within the next ten years, a less numerous age group of 15-24 will gradually replace a considerably more numerous age group of 25-34, bringing down the absolute number of births in the population. This pattern will probably last for the next 15-20 years until the most numerous age group of 0-9 years starts to take effect. According to IFAD[4], 49.5 per cent of the population live in rural areas and 75 per cent of the lower-income population. Of these, almost two-thirds make their living from agriculture.

Migration from rural areas of Uzbekistan to other countries has been a significant phenomenon with multiple drivers and implications. Factors such as limited economic opportunities, poverty, and challenges related to agriculture, including climate change, water scarcity and land degradation, have contributed to rural-to-urban and rural-to-international migration in Uzbekistan. Rural migration challenges rural communities: the outflow of labour from rural areas leads to labour shortages, impacting agricultural productivity and rural development. It may also contribute to an ageing population in rural areas as younger generations migrate. From 1990 to 2019, the share of households headed by single women increased from 17.6 per cent to 22.6 per cent. *De facto*, however, there are numerous female-headed households due to male out-migration, with personal remittances constituting 20.8 per cent of the GDP. Recent data also highlight a strong gender digital divide, especially in rural areas[5]. The maternal mortality ratio in Uzbekistan has improved from 41 in 2000 to 29 in 2017. World Bank data shows maternal mortality[6] in Uzbekistan is higher than its regional average.

The 2021 average GNI per capita was approximately $2,150, making the country a lower-middle-income country. Uzbekistan's Human Development Index (HDI) value was 0.722 in 2021, ranking 101 out of 191. The agriculture sector involves crop cultivation, livestock rearing, and fisheries. The industry sector encompasses manufacturing, mining, and construction. The services sector includes trade, finance, transportation, tourism, and professional services. These sectors contribute to the country's economic output and employment. One critical vulnerability is its heavy reliance on commodity exports, particularly in the cotton and natural gas sectors. Another vulnerability arises from the limited

[2] https://stat.uz/
[3] https://www.eurasian-research.org/publication/a-brief-review-of-uzbekistans-demographic-profile/
[4] https://www.ifad.org/en/web/operations/w/country/uzbekistan
[5] https://www.undp.org/sites/g/files/zskgke326/files/2023-03/Final_Gender%20Digital%20Divide%20in%20Uzbekistan_d.pdf
[6] The maternal mortality ratio is the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination per 100,000 live births.

diversification of the economy, including the rural economies. The dominance of certain sectors, such as agriculture and energy, exposes Uzbekistan to risks associated with market fluctuations, climate change impacts on agriculture, and volatility in energy prices. Additionally, the country's infrastructure, including transportation networks and industrial facilities, may be vulnerable to natural disasters, such as earthquakes and droughts, disrupting economic activities and hindering recovery. Furthermore, socio-economic vulnerabilities, such as a large informal economy and income inequality, can exacerbate the impact of shocks on vulnerable populations, making it challenging to achieve inclusive and equitable economic growth.

Uzbekistan has made significant progress in reducing poverty over the past few decades. According to the World Bank, the poverty rate in Uzbekistan decreased from around 28.1% in 2001 to approximately 11.8% in 2017. This decline in poverty reflects the country's sustained economic growth and various poverty reduction initiatives implemented by the government. The government has focused on diversifying the economy, improving infrastructure, expanding access to education and healthcare, and promoting employment generation to reduce poverty and improve living standards.

According to data from the Asian Development Bank (ADB)[7],17.0% of Uzbekistan's population lived below the national poverty line in 2021. In 2022, the proportion of the employed population living on less than $1.90 per day (purchasing power parity) was 6.6%. Additionally, the under-five mortality rate in 2021 was 14 per 1,000 live births. Of Uzbekistan's 32.9 million people, 49.5% reside in rural areas, and 75% of the lower-income population lives in these regions. Among the rural population, nearly two-thirds are engaged in agricultural activities. Although rural poverty declined to 13.7% in 2015, it remains higher than the regional average. Free compulsory education for all has enabled Uzbekistan to achieve one of the highest literacy rates globally.

Based on a World Bank study[8], due to the strong economic growth Uzbekistan made progress in reducing gender inequality. However, several demographic and structural challenges remain, including effectively engaging women in the economy. While modernizing various sectors of the economy will foster progress and development, it may also result in setbacks for women, as they lack the skills and education needed to adjust to a changing reality successfully. Women still face low labour demand and a lack of formal employment opportunities. Rural women are insufficiently integrated into the formal labour market.

Gender. Women represent approximately half of Uzbekistan’s resident population, which was estimated to be 35.3 million persons at the beginning of 2022, according to the Statistics Agency. Agriculture remains a crucial industry in the country’s economy and the primary sector of employment. In 2018, women held the majority of jobs within this sector, particularly those involving the production of goods for family use[9].

Uzbek society adheres to quite strict gender roles that stem from stereotypes about what is expected for women and men, with the former expected to be in charge of child rearing and housework, which acts as a deterrent for women to obtain formal employment or start a business. The UNDP report (2023) on Negative Impact of Gender Stereotypes and Patriarchal Norms on Gender Equality in Uzbekistan showed that: (i) 70 percent of respondents support the stereotype that women should spend more time with family, run the household and care for their children; (ii) 61 percent of men agree that only a man can be a successful entrepreneurial.

[7] https://www.adb.org/countries/uzbekistan/poverty
[8] https://documents.worldbank.org/en/publication/documents-reports/documentdetail/542521504159371275/diagnostic-study-of-barriers-for-strengthening-livelihoods-of-low-income-rural-women-in-uzbekistan
[9] Listening to the Citizens of Uzbekistan survey, 2018.

Additionally, gender stereotypes and cultural norms often hinder women's and girls' access to digital technologies[10], which exacerbates economic inequalities. Uzbekistan's leadership has demonstrated its commitment on improving women's access to digital skills and services and as a result, women's use of the internet and smartphones is becoming a more acceptable norm.

Over the past decade, rural transformation, migration dynamics as well as patterns in remittance flows in Uzbekistan are influencing these rigid dynamics, with implications on women's role in agriculture and their increasing presence in rural areas. Notwithstanding the upward trend of women's contribution to labour force in rural areas, their ability to cultivate land as independent farmers on a commercial basis is limited, which translates in their dependence on family networks. This is mostly caused by the Mahalla (where people apply for land) as well as by persistent discriminations at the community level. A survey conducted by in 2012 in eight provinces within the framework of the GENNOVATE research project showed that: [in Andijan, middle class women reported that "the new development in the farming system which allows them to be become farm managers was not rapidly adopted by local people. It is always difficult for women to be as active as men because women usually have more duties than her job." Poor women in Andijan likewise reported "widespread traditional stereotypes"][11].

Against this backdrop, since the privatization of state agricultural enterprises, the accepted farming model became one in which small independent farms are managed by men, while unpaid family members provide most of the labour, most notably women[12].

Moreover, many rural women lost their livelihoods because of climate change, and are overrepresented in informal employment; their housework responsibilities also encompass a variety of agricultural tasks, which have direct implications on their workload.

Their income activities continued to conform to a rigid gendered division of labour. Men usually take on management roles in value chain activities, whereas women are mostly engaged in baking, vegetable farming and sales, as well as sewing and tend to participate as employees or independent wage workers. In general women's labour is widely used in the irrigated agricultural sector, especially for cultivating, harvesting and post harvesting activities. Moreover, with much of agricultural labour not mechanised, this has important implications considering the gendered division of labour, with women carrying out tedious and low-paid manual types of work, such as weeding, thinning plants or sowing seeds. Some tasks on family farms or plots are performed jointly, such as fertilizing or harvesting fruit and vegetables or fodder for animals (FAO, 2019).

Improved extension services in fruit and vegetable production are particularly important for women, whose role in the sector has expanded due to new market opportunities and the need to diversify household income by growing on rented land as well as household plots. For example, a survey conducted by FAO in 2024 found that women accounted for three-quarters of vegetable and bakery vendors in local markets in Andijan. For women doing small scale farming as well as gardening at home pruning has been one of the activities which gave them more ownership and confidence over their farming businesses (FAO, 2019).

Women grow agricultural products for everyday family subsistence and, if women have extra produce, they can sell it or, more likely, engage in barter. Crucially, women's income generation opportunities differ by class, education, and other contextual factors shaping their daily lives.

[10] UNDP, 2022. *Gender Digital Divide Assessment: Uzbekistan.*
[11] Najjar D., Devkota R., Feldman S, (2022). *Feminization, rural transformation, and wheat systems in post-soviet Uzbekistan.* Journal of Rural Studies.
[12] FAO, 2019. *Gender, Agriculture and Rural Development In Uzbekistan.*

A growing trend among rural women, which includes recent school graduates, mothers with young children, and elderly women, is the participation in various types of casual labor as mardikors (typically male casual workers). These women are often hired individually or in small groups on a daily basis to perform tasks such as weeding, digging, harvesting, cleaning livestock shelters, milking cows, and other unskilled activities on private land and farms. Payment for these services is usually minimal and provided in cash, and the nature of the work remains informal. In fact, women usually have to work longer hours for a pay and in informal occupations given their meagre wages and the lack of opportunities for their husbands. In 2021, 38.7 per cent of men and 51.0 per cent of women were employed informally, with the total share of informal employment being significantly larger in agriculture than in non-agricultural sectors[13].

Joint decision-making dynamics usually characterise the production of subsistence crops and dairy products which are women's responsibility while men have the decision-making responsibility for all commercial crops, including livestock. Rural women heavily rely on Women's Committees in the Mahalla, which are extremely important actors for accessing information.

Agriculture, nutrition, health, and food security

According to FAO[14], agriculture plays a major role in the country's economy, in 2019 generating 25.5 per cent (combined agriculture, forestry and fisheries sectors) of gross domestic product (GDP), 8.4 per cent of total exports, and employing about 26.2 per cent of the country's labour force, which amounts to more than 3.5 million people (2020). Uzbekistan has 20.26 million ha of farmland and almost 4.2 million ha of irrigated land. Crop and livestock production are equally important for the agricultural sector, accounting for 50.2 per cent and 49.8 per cent of total agricultural production (in USD) in 2019. Around 80 per cent of the country is classified as desert or semi-desert. Therefore, limited access to water has a strong influence on state land policy and the issue of land privatization. To ensure national food security, the area under irrigated winter wheat has increased in recent years. The shorter crop rotation of spring cotton and winter wheat largely replaced a long-cycle cropping system for cotton and alfalfa. As a result, wheat production in Uzbekistan for the 1991–2016 period increased 17-fold, while cotton production decreased by about 21 per cent due to the reduced planting area (Nurbekov et al., 2018). Most of the achievements in cotton and wheat production are based on high-input-use technologies, which are not sustainable on a long-term basis. The demand for agricultural production is expected to grow in Uzbekistan as the government plans to increase the export potential of many agricultural crops, including fruits and vegetables.

Agriculture plays a crucial role in providing employment and income for rural communities. Many rural households engage in crop cultivation, livestock rearing, and horticulture as their primary economic activities. They rely on the produce they cultivate for subsistence and sale in local markets. Additionally, remittances from migrant workers also play a significant role in the rural economy of Uzbekistan. Many individuals from rural areas migrate to other countries, primarily Russia and Kazakhstan, in search of better job opportunities. They send back remittances to their families, which contribute to the income and livelihoods of rural households. These remittances often support rural communities' education, healthcare, and well-being.

The latest World Agricultural Budget[15] review reveals that public agricultural expenditures are large compared to other countries. However, neither the enabling policy environment nor the

[13] ILO, 2023. *Women and the World of Work in Uzbekistan.*
[14] https://openknowledge.fao.org/server/api/core/bitstreams/ab1402a4-4a8c-415f-85d2-eb7bbfb112cc/content
[15] https://openknowledge.worldbank.org/entities/publication/e008199e-76f0-5651-8a3c-66f5d37ccb5c

public funds' allocative efficiency is fully conducive to generating high, climate-resilient, and inclusive agricultural growth.

FAO Global Hunger Index ranked Uzbekistan in 52nd place among 119 countries in 2018 and reached a "moderate" level with a score of 12.1. In 2019, it took 48th place with a score of 10.7 and ranked 21st out of 116 countries in 2021 with a score of 5.9. Undernutrition remains challenging in rural areas, and anaemia is prevalent among women and children. Inadequate dietary diversity and poor feeding practices contribute to these issues. According to the Global Nutrition Report (2020), Uzbekistan is currently off track in reaching a number of global targets designed to address malnutrition. At the same time, there is not enough data to assess the malnutrition of children under five years old. Access to healthcare services, especially in remote areas, can be limited. Rural populations often struggle to access quality healthcare facilities, trained medical professionals, and essential medications. Maternal and child health remain areas of concern, with issues such as high maternal mortality rates and malnutrition among children requiring attention.

Climate change vulnerabilities, impacts and risks, and adaptation deficit

Being part of Central Asia, climate change is evident in Uzbekistan, where the average annual temperature has been increasing since the 1950s by 0.27°C every 10 years. In 2007 – 2016 the mean annual temperature was 0.6 – 2°C higher than in 1961 – 1990[16]. Precipitation gradually decreased from 1950 until 2013, with the strongest changes observed in south Uzbekistan. Heat waves have been registered in all parts of the country, with the highest growing numbers of affected days in the delta of the Amu Darya[17]. Throughout 2011 – 2016 droughts exacerbated by heat waves were registered every year[18].

Uzbekistan's climate projections indicate that the growth of average air temperature will continue and by 2030 may reach 1 – 1.4°C. Climate modelling further suggests a steady and significant increase in the number of days with the air temperature above 39°C, which is the least favorable for plant development. By 2030 in many regions, especially in the south of Uzbekistan, climate conditions may reach critical levels for the currently grown crops. The impact of a changing climate on Uzbekistan's agriculture, including on the production of fruit and vegetables, is well documented [19,20,21,]. Specific impacts are manifested through short-term or long-lasting severe weather (frost, warm/cold winters, heat waves, persistent droughts) as well as through more fundamental shifts of seasons, phenology, productivity, and agroecological conditions. Reduced water availability and drought have underscored these risks, as has the presence of agricultural pests that may not have previously been found in Uzbekistan.

Uzbekistan is vulnerable to various dimensions of climate change, which challenges the country's socio-economic development and well-being. It faces water scarcity due to multiple factors, including climate change, inefficient water management practices, and upstream

[16] Uzhydromet national official data
[17] Centre of Hydrometeorological Service at the Cabinet of Ministers of the Republic of Uzbekistan. Third national communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change. Tashkent, 2016
[18] FAO, IFAD, UNICEF, WFP and WHO. The state of food security and nutrition in the world 2018. Building climate resilience for food security and nutrition. FAO: Rome, 2018
[19] Centre of Hydrometeorological Service at the Cabinet of Ministers of the Republic of Uzbekistan. Third national communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change. Tashkent, 2016
[20] Sutton W. R., Srivastava J. P., Neumann J. E., Droogers P., Boehlert B. B. Reducing the vulnerability of Uzbekistan's agricultural systems to climate change. Impact assessment and adaptation options. World Bank: Washington DC, 2013
[21] Чуб В. Е. Изменение климата и его влияние на гидрометеорологические процессы, агроклиматические и водные ресурсы Республики Узбекистан. НИГМИ: Ташкент, 2007

water use by neighboring countries. Changes in precipitation patterns, increased evaporation rates, and reduced glacier melt contribute to reduced water availability for irrigation, domestic use, and ecosystems. Adaptation deficits linked to poor water management techniques, lack of water accounting methods to determine how much water exactly has been delivered to whom, and recurrent conflicts between farmers and water consumer associations are expected. Rising temperatures, changing rainfall patterns, and increased frequency of droughts can lead to desertification, soil erosion, and biodiversity loss. Addressing the adaptation gap requires a comprehensive and multi-stakeholder approach that considers a reliable assessment of climate and human intervention's impact on the environment. Lack of data and uncoordinated data collection reduces institutional capacity. Without improving knowledge and knowledge sharing, promoting sustainable land and agricultural management practices and mobilizing financial resources for adaptation initiatives continue to be complex.

These impacts of climate change and environmental shocks are particularly significant given the changing nature of women's engagement in agriculture. Women are more vulnerable to adverse climate impacts due to their marginalization, inequality, and poverty. As outlined in the section above, rural transformation, migration dynamics as well as patterns in remittance flows in Uzbekistan are influencing women's role and presence in rural areas. However, they have limited access to productive resources, like technology, institutional linkages, knowledge, including social and information and communication networks as compared to their male counterparts.

Modelling by the World Bank[22] suggests that, under the medium-impact GHG emission scenario SRES B1, the direct effect of climate changes – not considering water availability – will be a reduction by 2050 in yields of irrigated crops, including cotton, wheat, apples, tomatoes, and potatoes, by about 1 – 13% across all agroecological zones of Uzbekistan. By 2050, climate change can also improve yields of some crops provided that sufficient irrigation water is available. However, water shortages could severely limit the availability of irrigation water: when their effects are taken into account, climate change has a much greater negative effect on almost all crops in almost all river basins, with yield reduction of 10 – 25% through 2050.

For fruit and vegetables included in the World Bank's study (apples, potatoes and tomatoes), even assuming no shortage of irrigation water, yields are forecast to decline by about 1% – 9% under the medium scenario. Under the high-impact SRES A1B scenario which forecasts higher temperature, lower precipitation and soil moisture in virtually all regions of Uzbekistan, yields could be reduced much more severely: by 15% across all agroecological zones (except for no change for tomatoes in the Southern highlands, but up to 24% for apples in the Eastern piedmont). If the availability of irrigation water is taken into account, yield losses expected under the high-impact scenario are even 2.5 – 4 times higher: up to 35 – 45% in most agroecological zones, and up to 56 – 64% in the Eastern piedmont[23].

Consequently, in order to optimise their land-use, agrotechnology and operations and in the end sustain their production and incomes, dehkans, farmers, larger businesses and other players in the horticultural value chain are becoming increasingly dependent on high-quality, tailored and timely climate and agrometeorological information and services.

A climate service for agriculture is a decision-aide derived from climate and agronomical information that assists agricultural sector stakeholders in making improved ex-ante decisions. It provides information on future agro-climate conditions and the potential impacts of climate change on crops, livestock, and other agricultural systems, including recommendations on crop selection, planting dates, irrigation, and other management practices. However, smallholders, especially women farmers, do not have timely access to

[22] Sutton et al. 2013.
[23] Sutton et al. 2013.

climate information and capacity to translate the forecasts into suitable advisories. Also, while developing the agro advisories, gender-differentiated needs are not considered.

Based on the findings of the IFAD missions to develop this project, there are challenges to establishing a coordinated framework for the provision of climate services in Uzbekistan. Various unharmonized crop monitoring systems are in place, and the production of services to farmers is duplicated. Duplication strains government systems, leading to inefficiencies, increased costs, and conflicting information. Coordination and resource allocation suffer, hindering agricultural productivity and informed decision-making for climate-resilient farming.

In addition, regardless of the enormous effort made in the production of climate information bulletins, the present climate services provided by Uzhydromet are not readily usable to farmers due to multiple issues: i) Uzhydromet does not actively engage with farmers and considers their perspectives to address the issues and enhance the usefulness of their climate services; ii) The bulletins are retrospective; they do not include any weather forecast-related information; iii) Climate services are not provided in a user-friendly, actionable format that is easily understandable by farmers. There are no crop recommendations.

***Table 1**. Entities involved in data collection related to real time use of the agricultural land*

Entity	Type of reporting	Collection method	Spatial resolution	Time
Uzhydromet	Crop phases and soil moisture	Manual/paper/Telegram	By station	Decadal retrospective reporting
	Weather data	Mostly automatic transmission	By station	Multiple times per day
	Hydrological data – natural streams	Manual/paper/Telegram	By station	Multiple times per day
MoA Department of Chemicalization, Plant Protection and Quarantine (PPQD)	Crop phases and pest and diseases	Advanced real-time IT system	By field	Fields visited on demand (tbc during project preparation phase)
MoA Land Planning Department	Analysis of planting and growing season of 6 types of main crops	Satellite data	Raster	Once a year
	Planned under presidential decree PQ-273 online real-time collection of field data and productivity mobile monitoring	-	-	-
Ministry of Agriculture	Crop productivity statistics	Tablet	By admin level	Every three months
Ministry of Water Resources	Hydrological data – artificial and irrigation streams, irrigation accounting	Advanced real time IT system	By station	Multiple times per day

***Table 2.** Entities providing services to farmers*

Entity	Type of service	Distribution method	Spatial resolution	Time of service	Usability for farmers
Uzhydromet	Agrometeorological bulletin compiling phenological forecasts of development rates for crops; forecast of the average yield and gross harvest for cotton and cereal crops; recommendations on the optimal timing of field	Distributed to regions and farmers' organizations	National with subdivision of the country into 3 areas	10 days	Scarcely actionable by farmers, scale scarcely relates to ground conditions
MoA Department of Chemicalization, Plant Protection and Quarantine (PPQD)	Field-by-field information on crop phases, pests and diseases, and written pest management recommendations prepared by the MoA officer that visited the farmer's field. Available at https://efito.uz	Not accessible.	Field	On-demand	Not agro-meteorological, pest and disease only
	"Agroko'makchi" or Agro Helper is a mobile application with 36,000 users that provides farmers with information on crop pest and diseases and related regulation on export of agricultural commodities.	Mobile application	None	Static	Useful to look up information. No agro-meteorological advisory
MoA Land Planning Department	A system that helps farmers face many daily questions (marketing, produce storage, land rights, water supply, irrigation water quality, water conservation, soil fertility, equipment, credit, seed selection, erosion control, and plant protection. Available at https://akis-agro-uz.	Public	National	Static with regular updates	The advisory is not agro-meteorological
	PQ-273 online real-time collection of field data and productivity mobile monitoring	-	-	-	Planned
MWR	Water inflow, outflow, and water distribution within the irrigation system.	Password	Field	Near-real-time	Not agro-meteorological

Assessment of data management for the agricultural sector

Uzbekistan has been making significant strides in digitalising its environmental and agricultural sectors. The Government has recognized the importance of technology in improving agricultural productivity and efficiency. Initiatives such as AgTech startups, e-agriculture platforms, mobile applications, and the digitalization of land and agricultural data demonstrate Uzbekistan's commitment to leveraging digital solutions in agriculture. These efforts aim to provide policymakers and farmers with advisory services and digital tools for better decision-making. However, there is still an uncoordinated approach to climate services for agriculture production and distribution; it can pose challenges for effective climate change adaptation, which requires a near-real-time advisory system based on the weather and seasonal forecast. Issues that may arise from such an uncoordinated approach to climate services production and distribution include:

- *Data inconsistency and duplication*: As the table above shows, data collection is duplicated. Lack of coordination results in inconsistencies in collecting, analysing, and interpreting climate data. Repetition can lead to discrepancies in the information provided by different climate service providers, making it difficult for users to rely on accurate and consistent data for decision-making.
- *Limited accessibility*: Climate services are produced for the Government to plan agricultural activities and are not widely accessible to all relevant stakeholders, including key users such as farmers, water resource managers, urban planners, and policymakers who require up-to-date and localized data to develop effective climate adaptation strategies. When strictly necessary (i.e. in case of a request for index based insurance payment), farmers can purchase observation data from the weather stations)
- *Fragmented efforts*: Duplication of efforts and inefficient use of resources among different organizations involved in climate services production, lack of collaboration and communication can lead to redundant activities, wasted time, and overlapping responsibilities, undermining the overall effectiveness of climate services for agriculture.
- *Weak user engagement*: A lack of coordination results in limited engagement and involvement of end-users in utilising, developing and improving climate services. It also reduces the relevance of the information provided, as users' specific needs and priorities may not be adequately addressed.
- *Insufficient capacity building*: Although agricultural authorities report the existence of numerous present and past projects on climate resilient and climate services, capacity-building initiatives, training programs, workshops, and knowledge sharing among stakeholders are uncoordinated, scattered, and limited, hindering the development of expertise and skills needed for utilizing climate services effectively.

In the face of such complexity, the Government's ability to deal with food security issues linked to climate change is inadequate. With the intention of reducing vulnerability and increasing adaptive capacity, the Government requested IFAD support to prepare the proposal to strengthen i) the system of data collection and analysis at the national and regional levels on all food-security-related issues ii) to improve agrometeorological monitoring, analysis and long term decision making based on climate change to better inform the policy at the national level and climate risk reduction at the local level, iii) knowledge management and dissemination and application of information at the local level.

B. Project objectives

The **project goal** is to contribute to rural poverty alleviation in the country through increased climate services for agriculture, improving resilience, incomes and enhanced economic growth in rural farming communities and at the sector level. The Adaptation Fund funding will be used to achieve this goal through the following objectives:

- **Objective 1**. Develop an agro-climatic monitoring, analysis, communication and information system for local level decision making in agriculture and food security (*Component 1*)
- **Objective 2**. Develop institutional and technical capacity for long-term climate scenario analysis, adaptation framework planning and policy-making for agricultural production systems (*Component 2*)
- **Objective 3**. Providing climate services to rural population to increase awareness on predicted adverse impacts of climate change in agriculture, and of appropriate responses (*Component 3*)

Implementation of the Adaption Fund funding will be complemented by the larger IFAD-supported project Dairy Value Chains Development Project II (DVCDP II) to test and validate the agro-meteorology component. The duration of the proposed Adaptation Fund-funded project is five years.

Innovation. The project demonstrates innovation by integrating advanced technologies, such as data analytics and modelling, to provide climate services to farmers. It also utilizes participatory approaches, engaging stakeholders and policy makers to ensure evidence-based policy formulation and adopting climate-smart agricultural practices.

Target groups. The project has two main target groups. It will directly target (1) 30,000 last-mile users under Component 3, particularly smallholder producers and other value chain actors (e.g. medium and large sized farms, agribusinesses) in the horticulture sector, and (2) 1,000 decision-makers at the national and district levels under Component 2. In total, 31,000 people will benefit directly and 541,000 indirectly from the project.

The project will directly target 30,000 last-mile users under Component 3 by raising awareness through seminars on climate change adaptation and the project's information services. It has an indirect target of 70,000 last-mile users, i.e. these people will receive climate information services.

The project has an overall gender target of 30%, meaning that at least 9,000 last mile users and 300 decision makers are women who will be directly targeted.

***Table 3**. Targeted number of beneficiaries at project approval (in alignment with the Adaptation Funds core indicator framework)*

Type of beneficiary	**Direct***			**Indirect****			**Total**		
	People	HH	Women	People	HH	Women	People	HH	Women
Decision makers (under Component 2)	1,000	0	300	0	0	0	1000	0	300
Last-mile users (under Component 3)	30000	30000	9000	510000	70000	255000	540000	100000	264000
Total	31000	30000	9300	510000	70000	255000	541000	100000	264300

*Direct engagement through trainings/seminars etc. | **People receiving climate information services via app or telegram groups

Given that the average household in Uzbekistan has 5.4 members, and that a total of 100,000 households will be directly and indirectly targeted, the project has approximately 541,000 beneficiaries.

The project envisions the majority of the last-mile users, at least 80%, to be vulnerable dekhan farmers and household gardens. *Vulnerable dekhan farmers* are registered farmers, with access to small size plots where they farm for home consumption and local markets. Income level for this group is usually at or not significantly above the national poverty line. *Household gardens* are households in villages or semi-urban areas that use their backyards for orchards and vegetable production. Dekhan households and household gardens also include many vulnerable women.

The project will target medium and large farms that produce for the market, but no more than 20% of last mile users. They often act as intermediaries in their community and play an important role as service providers for smallholder producers.

The project will address key constraints related to climate services for agriculture through a gender lens that will cover three key pillars: (i) collection and dissemination of climate information relevant to addressing shocks and stresses perceived by women in the context of their livelihoods; (ii) selection/development of communication channels that are comfortable for women; (iii) translation of forecasts into appropriate advice for women. The project will include a strategy to ensure women's participation in the use of agro-meteorological data and equitable access to opportunities.

***Table 4**. Number of dekhan farmers per region*

Region	**No. of registered dekhan farms**
Target districts	
Syrdaryo	25484
Tashkent	55380
Feghana	107314
Andijan	120336
Jizzakh	29062
Surkhandaryo	54251
Namangan	114014
Total target districts	*505841*
Other districts	
Karakalpakstan	29219
Bukhara	75273
Qashkadaryo	42412
Navoi	27929
Samarkand	73627
Khorezm	62266
Total other districts	*248460*
Total all districts	*816567*[24]

[24] According to the World Bank estimates, the total number of dehkan farmers including unregistered ones is 5 times larger than 816,567 and constitute around 4.8 million smallholder farmers,

Crops. Grapes, tomatoes, potatoes, carrots, apples, watermelons, cotton, and wheat are among the priority commodities for crop modeling, and pest and disease forecasting. These crops were selected based on their importance in terms of area, export value, total production volume and value. Cotton and wheat were chosen because they account for the largest share of agricultural area (over 70%) and remain two of the key commodities in the country.

***Table 5**. Priority crops targeted under this project (Source: FAOSTAT 2024)*

Item	Area harvested (ha)	Export Value (1000 USD)	Gross Production Value (current thousand US$)	Production (tons)
Grapes	113,083	196,087	682,048	1,760,559
Tomatoes	64,226	57,819	965,875	2,191,153
Potatoes	109,110	607	845,078	3,443,224
Carrots and turnips	47,023	13,181	445,917	3,915,983
Apples	122,459	7,404	542,697	1,313,233
Watermelons	41,922	18,190	194,031	1,439,370
Cotton	1,026,858		3,211,554	3,500,680
Wheat	1,257,071	1,507	765,834	6,270,059

Project area. Based on the Decree № 3893 of 1 August 2018 by the President of the Republic of Uzbekistan, "On supplementary measures to optimise the structure of cultivated land, increase the production of fruit, vegetables and other agricultural crops and their export in 2018", the installation of weather stations will be specifically located in horticultural in the eastern and southern areas of the country.

The project will target horticulture production areas in **Andijan, Jizzakh, Namangan, Sirdarya, Surkhandarya, Tashkent, and Fergana**.

https://www.worldbank.org/en/news/press-release/2023/04/20/second-livestock-sector-development-project-for-uzbekistan

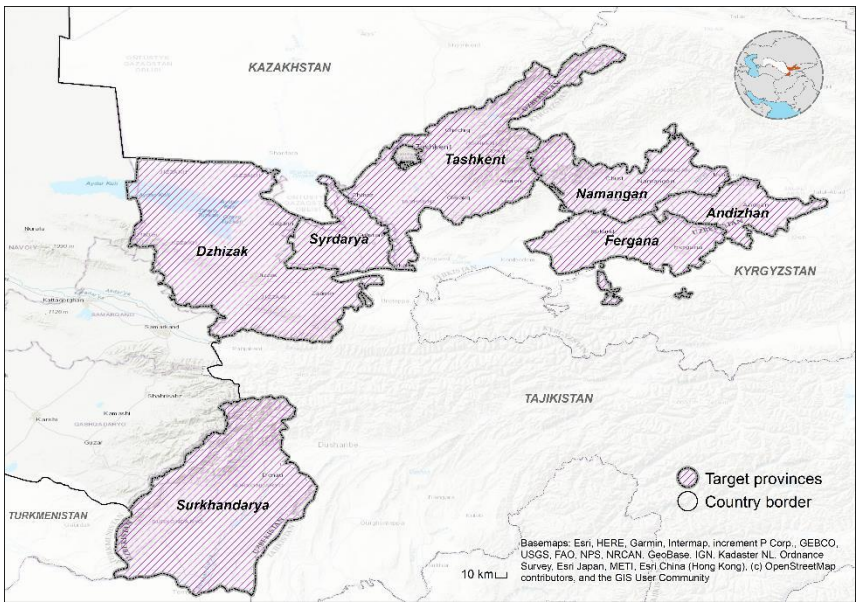

***Figure 1**. Target provinces of the project*

C. Project components and financing

Project components	Expected outcomes	Expected outputs	Amount (US$)
Component 1. Development of a near real-time farm advisory information system	Outcome 1.1. Climate services for agriculture developed	Output 1.1.1. Agro-meteorological station networks improved with automatic weather stations	1,519,500
		Output 1.1.2. Development of agrometeorological climate services	1,821,000
		Output 1.1.3. Development of IT infrastructure	800,000
	Outcome 1.2. Institutional and technical capacity strengthened to facilitate data sharing, analysis and usage of climate information to users at all levels	Output 1.2.1. Inter-ministerial Standard Operating Procedures (SOPs) for climatology and agro-meteorology	80,000
		Output 1.2.2. Training packages for the development and operation of the climate services system	380,500
Component 2. Modeling the impact of climate change on agriculture to improve decision-making and planning	Outcome 2.1. Long term scenario and geospatial data access integrated within the government system	Output 2.1.1. Available data collated and agro-climate impact models developed	725,000
		Output 2.1.2. Climate change impacts and adaptation studies in agriculture	350,000
	Outcome 2.2. Strengthened capacity to deliver agro-climatological information products to policy makers	Output 2.2.1. Training programme for climate modelling and scenario development	80,000
		Output 2.2.2. Training on impact scenarios and adaptation strategies for policymakers and community representatives	820,000
Component 3. Reaching the last mile and getting climate services to farmers	Outcome 3.1. Rural population aware of predicted adverse impacts of climate change in agriculture, and of appropriate responses	Output 3.1.1. Capacity of extension services strengthened to deliver climate services	258,000
		Output 3.1.2. Mobilization of end-users for the co-design of climate services	340,000
		Output 3.1.3. Training of trainers and a communication campaign for promotion of climate services	1,154,000
		Output 3.1.4. Participatory assessment of app usability and impact on crop decision and productivity	32,000
6. Project execution cost (9.5 percent)			870,000
7. Total project cost			9,230,000
8. Project cycle management fee charged by the Implementing Entity (8.5 percent)			770,000
Amount of Financing Requested			**10,000,000**

D. Projected calendar

Milestones	Expected dates
Start of project implementation	June 2025
Mid-term review (if planned)	December 2027
Project closing	June 2030
Terminal evaluation	September 2030

PART II: PROJECT JUSTIFICATION

A. Project components

Describe the project components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience.

The climate services will be embedded in a single information system that will serve two main types of users: (1) last-mile users, particularly smallholder farmers and other value chain actors in the horticulture sector, and (2) decision-makers at the national, provincial and district levels.

Uzhydromet will use real-time data from its network of weather stations to provide climate services tailored to the agricultural sector, particularly horticulture. Uzhydromet will work closely with various government ministries, including the Ministry of Ecology, Environmental Protection and Climate Change (MoE), the Ministry of Agriculture (MoA) and the Ministry of Water Resources (MWR). The Ministry of Ecology will oversee the distribution of real-time data by Uzhydromet to the agricultural sector, ensuring that the information is effectively disseminated and utilized.

- In **Component 1**, the project will develop climate services under the leadership of the Ministry of Ecology, the National Center for Climate Change, and Uzhydromet.
- In **Component 2**, the project will build institutional and technical capacity to assess the impacts of climate change on Uzbek agriculture and water resources. This component will be implemented under the leadership of the National Center for Climate Change under the Ministry of Ecology.
- In **Component 3**, the project will engage and deliver climate services to end-users. AKIS under the MoA will be responsible for this component.

This collaborative approach ensures that climate services are based on a wide range of relevant data, including meteorological information, environmental data, agricultural resource data, and water-related data. By integrating data from these ministries, Uzhydromet is able to provide comprehensive climate services that support informed decision-making, policy formulation, and planning processes in various sectors affected by climate change.

Component 1. Development of a near real-time farm advisory information system

Outcome 1.1. Climate services for agriculture developed

The project will develop climate information services for the agricultural sector, especially for horticulture and orchards. The system, called 'Climate Services System' (CSS), will consist of a web-portal and a mobile application. It will be developed and housed by Uzhydromet. Primary users of the platform will be farmers, farmer representatives, and agricultural extension officers. The project will develop the Climate Services System under Component 1. Component 3 will test and promote climate services to farmers. The Ministry of Ecology and the National Center for Climate Change will oversee the development, processing, and delivery of data and services by Uzhydromet. The following diagram provides an overview of the system.

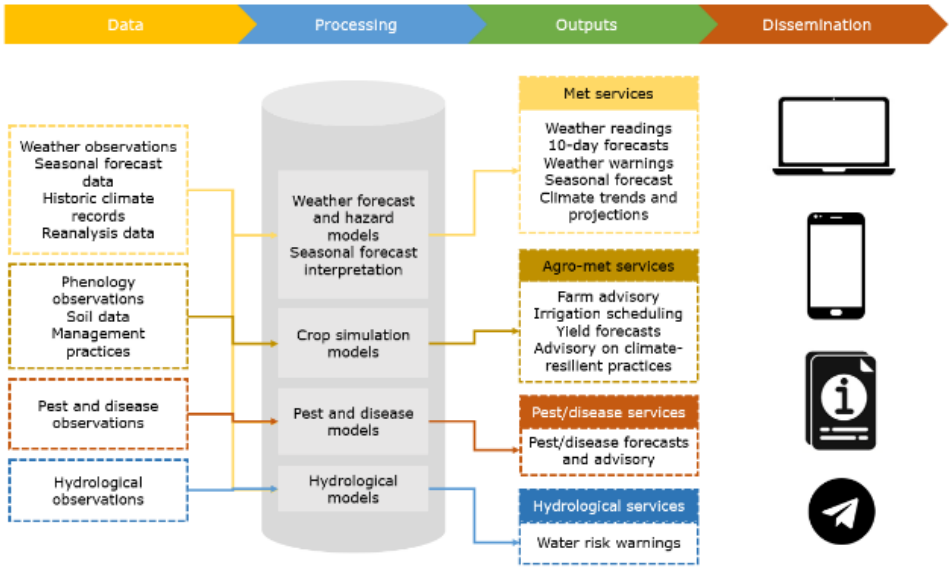

Figure 2. *Proposed scheme of the Climate Services System*

Service components. The system has the following service components that are described in the following and more in detail in the table below:

- *Meteorological services*.
    - *Current weather observations*. Users can view near-real time readings on temperature, rainfall, humidity, etc. from automated weather stations.
    - *10-day forecasts*. Users receive 10 days weather forecasts for rainfall, temperature, humidity, etc.
    - *Weather warnings*. Users receive alerts for heat waves, frost, heavy rainfall, heavy snowfall, strong winds, drought, floods, mudflows, etc.
    - *Seasonal forecasts*. Users receive forecasts about seasonal climate developments for example if spring is likely be hotter or more rainy than usual.
    - *Climate trends and projections*. Users see figures, graphs and maps showing past trends and future projections from 1980 to 2100, and in comparison to the current weather.
- *Agro-met services*:
    - *Crop-specific advisory*. Users receive farm advisory (e.g. when to plan and harvest), irrigation scheduling and crop yield predictions for an area.
    - *Advisory on climate resilient practices*. Users receive strategic advice on adaptive measures to protect crops and equipment and prepare for a hotter and more variable climate.
- *Pest and disease forecasting.* User will see risk levels and incidences for pests and diseases in horticulture and other important crops.

- *Hydrological services*. Users can see the risk level of irrigation water availability for an area on a map.

Uzhydromet will be primarily responsible for data collection and provision of met and agro-met services. Uzhydromet will work closely with MoA and MWR for pest and disease forecasting and hydrological services.

Digital dissemination tools. The system will package and display information through the following dissemination tools:

- *Web-portal*. The online portal will be structured according to the service components of the system.
- *Mobile application*. An easy-to-use app will be available on Android and IOS.
- *Bulletins*. The system will package information into 10-day and seasonal bulletins for different regions and at the national level.
- *Telegram messages*. The system will generate telegram messages for Uzhydromet's communication and technical specialists, which can be modified and distributed to Uzhydromet's telegram group and farmers' telegram groups.

Communication channels for disseminating information will be explored to overcome gender barriers.

Features of the Climate Services System. The system will have following features:

- *Accessible*. The web-portal and mobile application will be freely accessible. Users won't be charged.
- *Languages*. The platform will be Uzbek, Russian and English.
- *Understandable.* Information products will be presented and explained in an understandable way.
- *Actionable advice*. Recommendations will be relevant, easy to understand and actionable for farmers and those who work with them.
- *User-friendly.* The interface of the web portal and mobile application will be simple and attractive.
- *Location-specific*. Users can receive information such as weather forecasts or crop advisories for a specific location. Users can choose which station they want to view the data from.
- *Crop-specific*. Users can choose to receive information for specific crops that are the most relevant to them.
- *Gender-inclusive*. Advisory will address the information needs of men and women working in the agricultural sector.
- *Website and device accessibility.* Consideration is given to the colour, size and layout of text, possibly voice output systems to make digital services more accessible to people with visual impairments and other forms of disabilities.
- *Gamification*. The system will engage users in interesting ways, e.g. by including a "Did you know" section with interesting facts about agriculture and climate (e.g. Ten years ago, the cherry blossoms bloomed two weeks later).

Feedback mechanism. The system will allow users to provide feedback. The project will have procedures for processing and responding to feedback received. This mechanism is part of the project's complaint procedures (its grievance redress mechanism).

Communication channels. The preliminary communication channels identified during the design include:

- *Direct channels*. Users access information directly from the web-portal and mobile application. They can also provide feedback.
- *Agricultural extension services*. Extension workers access climate information and use it in their work with farmers.
- *Telegram*. Uzhydromet's communication officer disseminates information through a main telegram group. Many extension services and farming communities also have established telegram groups. They can forward messages from the main group into local telegram groups.
- *Media*. Journalists can access information directly from the system. They will also receive information from Uzhydromet's communication officer.
- *Private sector agri-tech*. Agri-tech companies use weather information (e.g., through an API) to deliver their digital services (e.g., precision agriculture) to farmers.

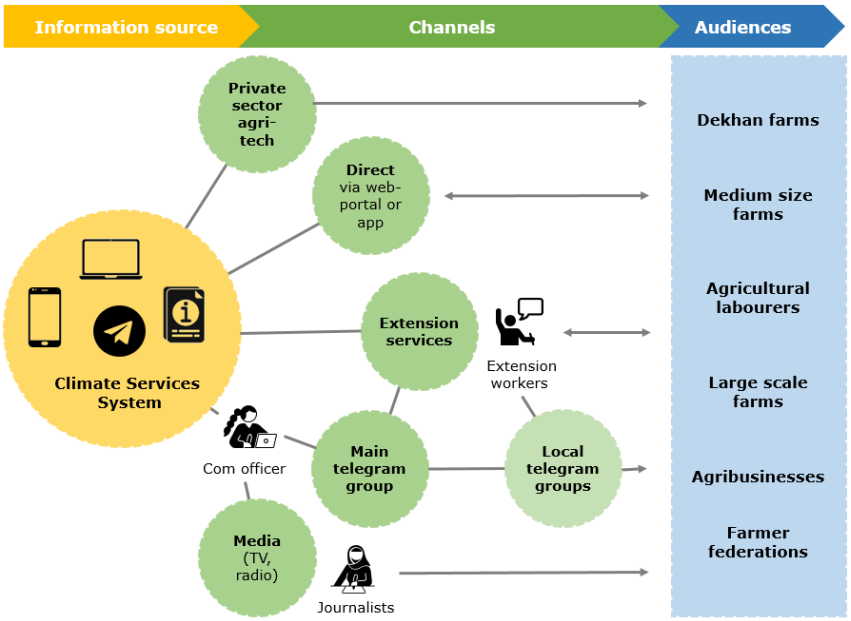

Figure 3. *Possible communication channels, pathways and audiences of the Climate Services System*

Co-design of the Climate Services System. The design and delivery of climate services involves multiple entities and disciplines. The project will establish multidisciplinary working groups – so called task forces – to bring together technical experts from different domains, agriculturalists and IT experts to design the climate services. The development of the services will go through several phases. The end users, the farmers and those working with them, will be involved in all phases of the system service design.

***Table 6**. Components of the Climate Services System, including service frequency, responsibility, data inputs and outputs, and processing*

Service components	**Description** *What does the service look like? What are users going to get?*	**Frequency** *How often is the service delivered?*	**Authority** *Who is responsible for delivering the service?*	**Input data** *Where does the data come from?*	**Output type** *What data will be used for the services?*	**Output format** *What format does the data have?*	**Processing** *How is the data processed?*
Weather parameters	Near-real time readings on temperature, rainfall, humidity, etc.	Every 5 minutes	Uzhydromet met-service department	Uzhydromet station network	Stations observations	CSV	Automatized cleaning and dissemination
Weather forecasts	10 days weather forecasts for rainfall, temperature, humidity, etc.	2 times daily	Uzhydromet met-service department	Uzhydromet station network	Weather forecasts	Various (e.g. NetCDF)	SmartMet software with library of forecast models
Weather alerts	Alerts for heat waves, frost, heavy rainfall, heavy snowfall, strong winds, drought, floods, mudflows, etc.	On demand	Uzhydromet met-service department	Uzhydromet station network	Weather warnings	Text, graphics	SmartMet Alert software with library of hazard models Possibly models from UNDP GCF and AF projects on drought, mudflow and floods
Seasonal forecasts	Forecasts about seasonal climate developments for example if spring is likely be hotter or more rainy than usual	Monthly	Uzhydromet met-service department	Copernicus climate change service (C3S) seasonal forecasts	Seasonal forecasts	Various (e.g. NetCDF, GRIB, graphics, text)	Interpretation and recommendations by experts
Historical trends and climate projections	Figures, graphs and maps showing past trends and future projections from 1980 to 2100, and in comparison to the current weather	Bi-monthly	Uzhydromet climate department	Reanalysis, historical station observations	Climate projections	NetCDF, GRIB, CSV	Workflow to compare current observation with historic and climate trends One-off computation of climate data
Crop management, water needs and yield forecasts	Forecasts on crop development and advisory on farm activities (e.g. when to plant, fertilize, irrigate, harvest, etc.)	On demand	Uzhydromet's agro-meteorology department in collaboration with AKIS	Climate data (recent and forecasts), crop phenology observations, soil data, management practices	Crop development phases, irrigation scheduling, yield forecasts	Text, graphics	Crop simulation models, possibly derived from APSIM

Service components	**Description** *What does the service look like? What are users going to get?*	**Frequency** *How often is the service delivered?*	**Authority** *Who is responsible for delivering the service?*	**Input data** *Where does the data come from?*	**Output type** *What data will be used for the services?*	**Output format** *What format does the data have?*	**Processing** *How is the data processed?*
Climate-smart advisory and climate risk management	Strategic advice on adaptive measures to protect crops and equipment and prepare for a hotter and more variable climate (e.g., installing drip irrigation, lining canals, shifting to water-efficient crops).	On demand	Uzhydromet's agro-meteorology department in collaboration with AKIS	Database of adaptation practices by hazard, value chain step and user	Advisory on climate-resilient practices	Text	Interpretation and recommendations by experts
Disease and pests	Risk levels and incidences for pests and diseases	On demand	MoA plant protection and quarantine department in collaboration with Uzhydromet's agro-meteorology department	Historical climate data and weather forecast data Observations on infestations of pests and diseases	Pest and disease forecasts	Text, map, pictures	Pest and disease models, possibly derived from VIPS
Water risk	Risk level for irrigation water availability for an area	Bi-weekly	MWR in collaboration with Uzhydromet's hydrology department	Network of Uzhydromet and MWR hydrological stations	Water risk maps	Map	Hydrological models

Output 1.1.1. Agro-meteorological station networks improved with automatic weather stations

This output will extend the coverage of Uzhydromet's agro-meteorological station network in the main horticultural production areas and expand and digitize the field data collection of Uzhydromet's specialists. The following infrastructure will be procured under the project:

- 40 automated agricultural weather stations to collect data in areas of horticulture and orchards not currently covered
- 40 smart insect (pheromone) traps for monitoring of pest and disease populations for predictive modelling
- 1 fully equipped climate lab at Uzhydromet headquarters in Tashkent
- 100 tablets for data collection by Uzhydromet staff in the field
- 15 printers
- 20 computers for data quality control and analysis at headquarters and regional offices
- 80 mobile soil temperature and moisture instruments for field staff to collect data at different locations in the regions

Automated agro-meteorological stations. In total, 40 agro-meteorological stations covering horticulture production areas will be installed. They will collect agro-meteorological data, including air and soil temperature, air and soil humidity, rain, wind direction and speed, saturation dew point, evapotranspiration, and vapor pressure. All newly installed stations will be automated and connected to Uzhydromet servers. Stations will follow WMO standards in specification and design. Station types that have previously been installed in Uzbekistan include Amudario, Meteobot, MicroStep-MIS stations and T-Warner.

***Figure 4**. Scheme of an agro-meteorological station (Source: UNDP 2021)*

The locations of new stations will be set up according to the following criteria:

- Stations will be located in major horticultural and orchard production areas, making them more useful and accurate for crop production data and forecasting.
- There are no existing Uzhydromet or MoA stations nearby.
- Dekhan farmers are present around the location.

- There is a demand by farmers for a weather station.
- There is a responsible agency in the vicinity, ideally Uzhydromet or some other government agency, that will take care of the station.
- The land where the station will be located is owned by the government.

Other government agencies have automated weather stations. The PQPA has for example 24 automated weather stations installed by the UNDP project "Climate Change Risks in Fergana Valley" in the Fergana valley. This output will explore whether these and other government weather stations can be integrated into the Uzhydromet's network to centralize data collection and distribution.

The map below shows current station locations and areas that are suitable for new stations. The exact locations of the stations will be decided through a participatory process involving farmer representatives, regional Uzhydromet, PPQD and AKIS staff.

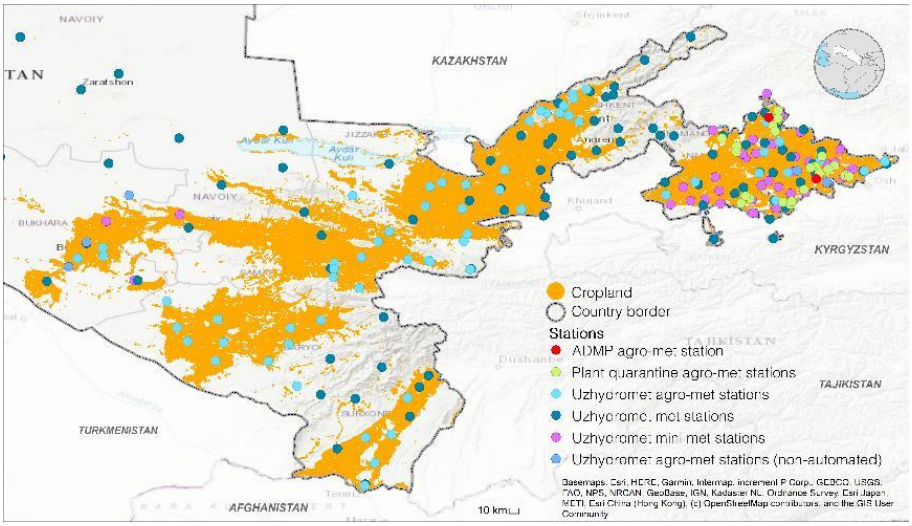

***Figure 5**. Current station coverage*

Smart pheromone traps. Agro-meteorological stations will be equipped with intelligent insect (pheromone) traps to monitor pest and disease populations. Pheromones are used to attract a pest (such as the codling moth) into a trap. The traps are equipped with cameras that take pictures of the captured insects. The images can be used to determine what type of pest is present and estimate how big their population is. This data is then used with weather forecast data to model pest development and formulate management responses that help prevent production losses while minimizing the use of chemicals. The use of smart pheromone traps has been successfully piloted in the Fergana Valley as part of the UNDP project "Climate Change Risks in Fergana Valley". The traps will be installed and maintained by PPQD and Uzhydromet staff. Risks of pest contagion and recommendations for pest and disease management will be issued by PPQD and disseminated through Uzhydromet's web portal, mobile application and bulletins.

Digitizing field data collection. Regional and district Uzhydromet offices will be equipped with new computers, tablets for field data collection, and mobile soil temperature and moisture instruments. Uzhydromet specialists will be equipped with tablets to replace paper-based field data collection. The tablets will enable Uzhydromet experts to photograph crop development stages, record the geolocation of sampled sites and record field data in a standardized format, reducing effort and errors. This will enable Uzhydromet

to collect data from more locations and extend its data collection to more crops. Mobile soil temperature and moisture instruments will enable field staff to record soil parameters for orchards and horticulture, which will be used to model crop cycles, and pest and disease cycles.

Activities under this output include:

- Preparation of inventory assessment and feasibility survey of all currently available instruments, including preparation of plans for the integration, operation and maintenance of new stations and equipment into Uzhydromet's station network
- Assessment of the feasibility of integrating the MoA and MWR weather stations into the Uzhydromet station network
- Preparation of instrument specifications, installation design and location assessment in collaboration with other partners including MoA staff and farmer representatives
- Procurement of stations, tablets and manual instruments according to the specifications
- Installation of stations, manual instruments and tablets
- Testing and calibration of instruments for proper functioning and harmonization with additional monitoring infrastructure supported by other agencies

Output 1.1.2. Establishment of meteorological services

Under this output, the project will develop the following service components:

- Customize SmartMet software to provide weather forecasts and warnings for the agricultural sector
- Develop a *seasonal forecast service*
- Integrate *climate trends and projections* into the Climate Services System

This output will develop the following service components of the Climate Services System:

- *Weather parameters*. Users will be able to see the current automated weather station observations of temperature, rainfall, humidity, etc. The data will be provided in near real time through a simple workflow. The data will be displayed as numbers and on a map.
- *10-day weather forecasts*. Users will receive forecasts for rainfall, temperature, wind, humidity, etc. These are presented as easy-to-understand tables and graphs.
- *Weather alerts*. Users will receive warnings for hazardous weather conditions such as heat waves, frost, heavy rainfall, heavy snowfall, strong winds, etc. They are displayed as text and on a map. Advice is given on what users can do to avoid the negative effects of extreme weather.

Uzhydromet is currently working with the Finnish Meteorological Institute (FMI) to install its SmartMet software, a freely available, open-source weather forecasting software package that has been installed in over 30 countries. It is expected to be operational by the end of 2024. Further customization is needed to meet the needs of the agricultural sector.

The project will engage the Finnish Meteorological Institute (FMI) as a technical assistance provider to help tailor SmartMet and SmartMet Alert (for weather warnings) to the agricultural sector. This will include support for

- Data integration, automated production and setup of forecaster tools/workstations
- Development of national warning map production and automated warning text formulation, standard common alerting protocol (CAP), etc.

- Integration of weather forecasts and warnings into web-portal and mobile application of the Climate Services System
- Integration of weather forecasts into agrometeorological services (e.g. crop simulation models, and pest and disease models)

Drought, flood and mudslide warnings could also come from models currently being developed by the UNDP GCF-funded Multi-Hazard Early Warning System project (view more). An integration of these models into the Climate Services System is desirable. The project will investigate the feasibility of such integration.

The Met Service Department of Uzhydromet will be responsible for the development of this service. It will be responsible for the operational provision of all short- and medium-range weather forecasts and the issuance of weather warnings.

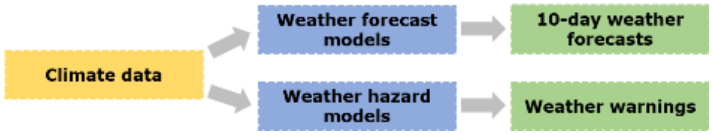

***Figure 6**. Input and output of weather forecast and weather alert models*

Seasonal forecasts. The Climate Services System will provide seasonal forecasts every month for up to four months. It includes seasonal predictions of the likelihood of climatic anomalies, including temperature, rainfall and other climatic variables, with local weather variations specified to the greatest extent possible. For example, farmers will be able to know when the spring growing season is likely to start and whether it is likely to be hotter or wetter than usual. The project will evaluate the most appropriate seasonal forecasting models from the Copernicus Climate Change Service (C3S). As seasonal forecasts have a high degree of uncertainty and can be misinterpreted, all forecasts and related advice will be provided by specialists in Uzhydromet's Met Service Department who are trained in their interpretation. The Finnish Meteorological Institute (FMI) will provide technical assistance to develop this service.

***Figure 7**. Input and output of weather forecast and weather alert models*

Historical trends and climate projections. The Climate Services System will include a section on historical trends and climate projections. This helps build awareness through evidence and can help farmers decide how to prepare for a hotter climate. It will include the following elements:

- *Historical trends and climate projections*. Users can see maps and graphs showing historical trends and projections of parameters related to temperature, precipitation, and humidity for different decades and climate periods until 2100.
- *Climate impacts on agriculture*. The service will show how climate change is likely to affect agriculture (e.g. future crop suitability and yield estimates; or water availability for irrigation).
- *Adaptation measures in agriculture*. Users see options how they can adapt to climate change. These are described further below.

The web portal, mobile app and bulletins will display historical and projected climate data in the context of current weather. This is done in a way that is easy to understand. For example, the application can show the current temperature in the context of the average

monthly temperature 10 years ago and the predicted average temperature 10 years from now. This helps users put today's weather in context and see trends and variations for themselves.

The data under this service component will be derived from regional climate models developed by the Potsdam Institute for Climate Impact Research (PIK) that will be produced under Component 2.

Output 1.1.3. Development of agro-meteorological services

Under this output, the project will carry out the following activities:

- Adapt *crop simulation models and frameworks* to provide farm advisory, irrigation scheduling and yield forecasts for at least 5 crops
- Expand and digitize *field data collection protocols* to collect agro-metrological measurements and crop phenology of at least 10 crops
- Develop a *database for adaptation measures* for climate-related hazards affecting horticulture and other agricultural products
- Develop *operational guidelines*, including workflows, deliverables, and timelines for agro-meteorological service delivery.

Crop simulation models. The CSS will provide forecasts for selecting the most favorable weather conditions for soil preparation, planting, growing and harvesting crops, and other agricultural operations. This information will be derived from crop simulation models that the project will adapt and modify. The models describe the processes of crop growth and development as a function of weather conditions, soil conditions, and crop management. The project will explore and implement the latest state-of-the-art open source software applications for crop modeling such as APSIM or the Decision Support System for Agrotechnology Transfer (DSSAT).

Uzhydromet's Agro-Met Service Department is responsible for developing and providing this service in close cooperation with AKIS. The project will secure technical assistance on crop modeling for capacity building and service development, e.g. from the University of Queensland (UQ) for APSIM.

Grapes, tomatoes, potatoes, carrots, apples, watermelons, cotton, and wheat are among the priority commodities for crop modeling. Phenology data will be collected from fruit trees. Based on model output and expert interpretation, the service will produce:

- *Crop calendars*, which provide advice on the optimal timing, rate and other specifics for certain farming operations such as planting, fertilizing, and harvesting for a crop
- *Irrigation scheduling*, advising farm operators when and how much to irrigate
- *Crop yield predictions*, providing estimates on how big the harvest could be.

Forecasts are presented on the web-platform and mobile application by crop in easy-to-understand tables, graphs and explanatory text to guide farmers and extension specialists. The forecasts are prepared or updated on a weekly basis using historic and seasonal climate forecast data. As the season progresses, weather forecast information can be replaced with observations.

***Figure 8**. Input and output of crop simulation models*

Climate-smart advisory and climate risk management services. The CSS will raise awareness of how the agricultural sector can prepare for a changing climate and reduce the risk of negative impacts from weather-related hazards. It will advise on adaptation measures based on weather-related hazards and climate projections. Uzhydromet's Agro-Met Service Department will provide advice in cooperation with AKIS.

Climate smart advice will be delivered in combination with hazard warnings. Messaging will be targeted by climate hazard, crop, value chain stage and user. Messaging will take into account gender, as men and women have different information needs due to their roles on the farm. Under this activity, the project will develop a database of adaptation measures, many of which will be identified by the adaptation assessments under Component 2 (see Output 2.1.2). The climate-resilient practices in the database are categorized based on the FAO 2022 conceptual framework:

- *Climate hazard*. Heavy rainfall, floods, frost, seasonal variability, etc.
- *Crop type*. Fruits, vegetables, grain, etc.
- *Value chain step*. Production, storage, transportation, processing and marketing.
- *Timeframe*. Immediate, short-term, seasonal and long-term
- *Actors/users*. Family farmers, dekhan famers, farmer workers, managers of large farms, farm workers, agricultural traders, extension workers, etc.
- *Gender-sensitive*. Whether the practice is best suited for men, women, or both.

Adaptation measures can be implemented in different agricultural areas along the value chain, including short-term measures that can be carried out immediately to long-term changes to crops and technology. Measures can include:

- Frost/freeze protection methods for horticulture
- Change to more resilient, water-efficient and profitable crops and varieties
- Protected agriculture (e.g., shade nets and greenhouses protect from hail and heavy rain)
- Nature-based farming, agro-ecology and/or regenerative farming to increase farm ecosystem resilience
- Irrigation (e.g., drip irrigation or canal lining to increase water efficiency and reduce water losses)
- Transportation and storage (e.g., reducing produce loss during heat waves)

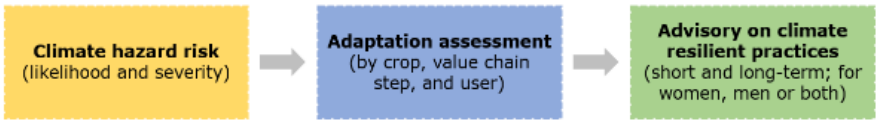

***Figure 9**. Main steps from the hazard warning to action*

Output 1.1.4. Development of pest and disease forecasting services

Under this output, the project will carry out the following activity:

- Test and validate at least *7 pest and disease models* to provide digital forecasts, risk assessments and advisory

Pest and disease risk will be assessed around the installed weather stations, some of which will have smart pheromone traps to monitor moth infestation in fruit trees. Farmers and extension workers will be alerted to pest risks to important agricultural and horticultural crops. The project will install the latest state-of-the-art open source software application

for pest prediction, called VIPS, developed by the Norwegian Institute of Bioeconomy Research (NIBIO). Existing pest and disease forecasting models will be implemented for test and validation under Uzbek conditions, some models will be available from the current VIPS services, while others will be selected and implemented as part of this project. Forecasting models targeting pests and diseases for Grapes, tomatoes, potatoes, carrots, apples, watermelons, cotton, and wheat will be prioritized. Weather data and pest observation data will be used in the models to predict risk levels and pest migration, including field validations.

Pest and disease forecasting services will be developed and provided by the PPQT of the MoA in close cooperation with the Agro-Met Service Department of Uzhydromet. The project will engage NIBIO as a technical assistance provider to:

- Advise on the installation of the VIPS digital pest prediction platform, and
- Support the adaptation, implementation, test and validation of at least 7 pest models.

NIBIO will also provide training on pest and disease forecasting (see output 1.2.2).

Pest forecasts will be integrated into "Agroko'makchi" or Agro Helper, the mobile application for farmers of PPQD. The same information will also be featured in Uzhydromet's web-portal and mobile application.

The use of agro-met stations with smart pheromone traps in combination with pest models has been successfully tested in in the UNDP project "Climate Change Risks in Fergana Valley", that developed forecasting models for pests affecting apple, pear, apricot, plum, cherry and grape, such as Cydia pomonella (codling moth), Yponomeuta malinellus Zeller (apple ermine moth), Grapholita molesta (oriental fruit moth), Hoplocampa testudinea (apple sawfly).

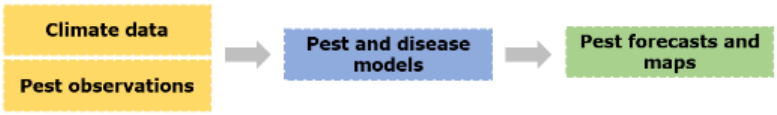

***Figure 10**. Input and output of pest forecast models*

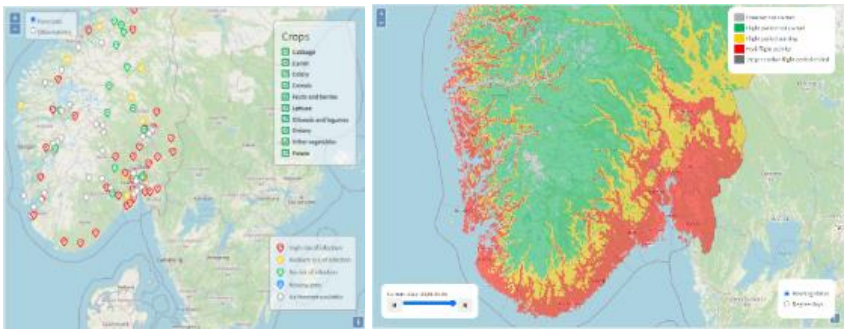

***Figure 11**. Left: Pest forecast map of VIPS; Right: Carrot rust fly (Psila rosae) risk map (Source: VIPS)*

Output 1.1.5. Development of hydrological services

Under this output, the project will carry out the following activity:

- Setting up a *hydrological model* to produce water risk maps.

While crop simulation models estimate water needs at the field level, this service aims to assess water supply through irrigation. The goal is to assess the risks associated with hydrologic drought in the agricultural sector.

This service is provided by the Hydrological Department of Uzhydromet in cooperation with MWR. Hydrological data on natural watercourses are collected by Uzhydromet, and hydrological data on canals and reservoirs are collected by MWR. The MWR is currently developing its own system. The PMU will explore synergies for data exchange and service provision to farmers.

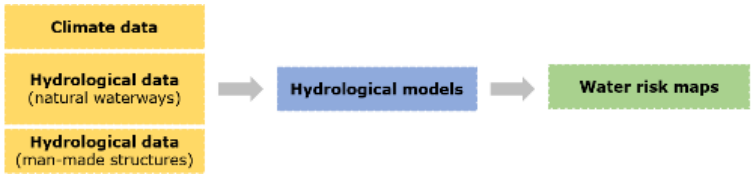

***Figure 12**. Input and output of hydrological models*

Output 1.1.6. Development of IT infrastructure

Under this output, the project will develop all the front and backend components of the CSS, including:

- Development/update of Uzhydromet's *catalogue for climate data*
- *Server setup*
- Installation and setup of *software packages* for
    - Weather forecasting and warning (SmartMet, SmartMet Alert)
    - Crop simulation models (e.g. APSIM)
    - Geo-portal displaying historic trends and climate projections (e.g. similar to PIK's climate portal)
    - Pest and disease models (e.g. VIPS)
    - Hydrological models
- Set up and automation of workflows of *modelling processes*
- Development of *service manager interfaces*
- *Mobile application* and *web-portal* development
- Development of *web-services* of web-portal and mobile application
- Linkage and integration of *telegram bots*

Field Code Changed

This output will be implemented by the IT department of Uzhydromet in cooperation with the technical departments of Uzhydromet. The IT experts will use agile software development, which means they will work very closely with users. The IT department of Uzhydromet will cooperate with the IT departments of other ministries to ensure data exchange and the provision of climate data to other applications such as "Agroko'makchi" or Agro Helper.

The IT development process includes the following steps:

1. Formation of requirements and development of technical specifications
2. Preliminary design
3. Implementation of the technical project
4. Working documentation

Outcome 1.2. Institutional and technical capacity strengthened to facilitate data sharing, analysis and usage of climate information to users at all levels

This outcome is to strengthen the institutional and technical capacity to develop and operate Climate Services System. This outcome includes outlining institutional coordination mechanisms between the technical units of Uzhydromet, the MoA and the MWR. It also includes capacity development for the respective entities to implement the new services that the project will develop.

Output 1.2.1. Inter-ministerial Standard Operating Procedures (SOPs) for climatology and agro-meteorology

Under this output, the project will carry out the following activities:

- Development of *standard operating procedures (SOPs)* that regulate the sharing of climate and hydrological data between at least 3 ministries and with the public.

This activity aims to establish procedures between Uzhydromet, the MoA, the MWR, and other entities to share data with each other and to share data publicly. Currently, data sharing mechanisms are poorly developed and inefficient. The standards and procedures will govern the efficient distribution of data to different users. Each entity will receive the data it needs in an efficient manner and in a format it can use for its purposes.

Uzhydromet is the main provider of climate and hydrological data for natural waterways. These data are needed by other ministries. For example, the MWR needs climate and hydrological data for its hydrological assessment and water management. The PPQD needs climate data for pest and disease management. Public entities that need climate data include universities that need data for research, and private sector actors, such as agribusinesses that need climate data for their products and services, such as precision agriculture, or insurance companies that offer climate risk products.

The SOPs to be developed will govern data sharing. They will specify the following:

- Data owners/providers and users
- Procedures that specify how data will be shared, how often, to what extent, and how it will be processed and used
- Data standards and format
- Data classification, if the data is open source, restricted, or confidential
- Data security to protect personal data and protect systems from malicious hacking

The PMU will facilitate the development of SOPs. This includes the following steps:

1. Assessment of data sources, providers and public and private users
2. Producing draft SOPs laying out roles and responsibilities and data infrastructure for harmonized data collection and manipulation, distribution and usage
3. Inter-ministerial consultations on the proposed SOPs and consultations with other stakeholders such as universities, private sector and farmer representatives
4. Testing and evaluating data sharing services
5. Approval of the regulation

Output 1.2.2. Training packages for the development and operation of the climate services system

Under this output, the project will carry out the following activities:

- Organize 11 *training packages* for about 70 people (at least 30 women) to equip them with the necessary knowledge to design the Climate Services System.

- Organize *field trips* of Uzhydromet experts to farmers to understand what climate services they need and in what format.
- Organize *trainings* for 350 people (at least 100 women) on how to operate the Climate Services System once they are developed.

Training will focus on government staff from Uzhydromet, MoA and MWR. Training of farmers and other stakeholders will be carried out under Components 2 and 3.

Training will be organized in two phases. In the first year of the project, trainings will be conducted with a selected number of staff to learn best practices, methods and data sources. The aim is to equip a pool of people with the necessary knowledge and skills to develop the Climate Services System for Agriculture. In a second phase, in the third and fourth years of the project, the project management unit will organize training on the operation of the Climate Services System.

For the duration of the trainings, the project management unit will designate a staff member as the training coordinator to organize the trainings. This includes organizing the training needs assessment and organizing the training (e.g. logistics, English-Uzbek interpretation, invitations, physical and virtual training locations). Training providers will be procured in accordance with IFAD procurement guidelines. Capacity building activities will target women to ensure gender equality.

Training packages to design the Climate Services System. In the first year of the project the project management unit will organize the training packages listed in the table below. The packages for experts from different departments cover a range of topics that are important for the design of the Climate Services System. Training can be either in-person, virtual or hybrid. Selected technical officials will be trained abroad.

***Table 7**. Training packages to inform the design of the Climate Services System for Agriculture*

Training	Description	Possible provider	Primary audiences	Trainees numbers
Weather forecasting and warnings	Professionals learn how to operate and apply SmartMet and SmartMet Alert software in the context of agriculture.	FIM	Uzhydromet met department, National Center for Climate Change	10-15
Drought and flood forecasting	Professionals learn how the drought, flood and mudslide models developed by UNDP work.	UNDP	Uzhydromet met department, National Center for Climate Change	10-15
Seasonal climate forecasting	Professionals learn about state-of-the-art seasonal forecasting models and how to interpret the data for farm advisory services.	C3S User Learning Services	Uzhydromet met department, National Center for Climate Change	3-5
Crop simulation modeling	Professionals learn how to use state-of-the-art crop modeling frameworks for farm advisory, irrigation scheduling, and yield forecasting.	APSIM	Uzhydromet agro-met department, AKIS, PPQD, National Center for Climate Change	10-15
Climate modeling	Professionals learn about the data inputs and outputs of regional climate models under different scenarios.	PIK	Uzhydromet agro-met, met and hydrological department, National Center for Climate Change	7-10
Hydrological modeling with climate projections	Professionals learn how to use climate projections in hydrological models.	PIK	MWR, Uzhydromet hydrological department, National Center for Climate Change	7-10
Climate risk assessment along the agri-food value chain	Professionals learn how to assess climate risks and identify adaptation options along agricultural and horticultural value chains.	FAO	AKIS, Uzhydromet agro-met, National Center for Climate Change	7-10
Remote sensing for climate and land use monitoring	Professionals learn about various satellite data and Earth observation products and how to use them for weather forecasting and agriculture.	FAO	Uzhydromet agro-met, met and hydrological department, National Center for Climate Change	7-10

Pest and disease modeling	Professionals learn state-of-the-art models and services (such as VIPS and IPM Decisions) for assessing pest risks to agricultural and horticultural crops using weather data and pest observations.	NIPIO	PPQD, Uzhydromet agro-met department, National Center for Climate Change	7-10
Database management, agile software development, web-services, interface design, etc.	Professionals learn about IT system integration, web-services, agile software development, cloud-computing, etc.	TBD	Uzhydromet IT department, National Center for Climate Change	5-10
User-oriented product design, interface design and gamification	Professionals learn how best to involve farmers into the design of the Climate Services System in order to create an attractive user experience.	TBD	PMU, National Center for Climate Change	7-10
Gender-sensitive design of digital services	Professionals learn about how to best to include women in the design of digital services in an inclusive and participatory way (e.g. FAO 2024).	TBD	PMU, AKIS, Uzhydomet, Farmer Council, National Center for Climate Change	20

Field trips for the National Center for Climate Change and Uzhydromet experts to farmers. In the first year of the project, the project management unit, in cooperation with AKIS, will organize one-day field trips for Uzhydromet experts from the headquarters to nearby farms. The goal is to meet farmers and learn where they get weather data, how they use it, and what climate-related hazards they face. Experts from the National Center for Climate Change and Uzhydromet, AKIS and farmers will hold discussions and roundtables to better understand user needs for climate services and how best to communicate with farmers and those who work with them.

Trainings on how to operate the Climate Services System. To ensure the sustainability and continued operation of the information systems, the project management unit will organize training for staff on service delivery (e.g., service requirements, service delivery steps, approval procedures, learning mechanisms, etc.) based on the operational manuals to be developed. Training will be organized for the staff of Uzhydromet, the National Center for Climate Change, AKIS, PPQD and MWR as well as representatives from the Ministries of Agriculture and Ecology, and other relevant stakeholders, who are operating or using the climate services. These training sessions will be organized in the fourth and fifth year of the project for each of the service components and/or service delivery functions, i.e.

- Weather forecasts and alerts
- Seasonal forecasting
- Collection of field observation data
- Crop simulation modeling
- Climate-smart advisory and climate risk management, including end-user needs and gender-sensitive advisory
- Pest and disease forecasting
- Hydrological forecasting

The **activities** of this output include:

- Organizing field trips of Uzhydromet experts to farmers
- Conducting a training needs assessment
- Procurement of training providers
- Organizing first phase trainings
- Organizing second phase trainings
- Conducting a training evaluation for both training phases
- Storage and dissemination of training materials

Component 2. Modeling the impact of climate change on agriculture to improve decision-making and planning

This component aims to build institutional and technical capacity to assess the impacts of climate change on Uzbek agriculture and water resources. The goal is to promote and enforce resilience measures in national and provincial policies and regulations, and to raise awareness among about 30% of the rural population of the projected adverse impacts of climate change on agriculture and appropriate responses.

This component will be implemented under the leadership of the National Center for Climate Change under the Ministry of Ecology, Environmental Protection and Climate Change (MoE).

Outcome 2.1. Long term scenario and geospatial data access integrated within the government system

Output 2.1.1. Available data collated and agro-climate impact models developed

Under this output the project will carry out the following activities:

- Digitalization of approximately *10 million climate records* from 1980 to 2010
- Adapting and further development of *3 modules for climatic, hydrological and crop suitability modelling* for different scenarios for Uzbekistan
- Producing *climate projection data* for the Climate Services System

Digitizing climate records. The project will provide further resources to the Uzhydromet Climate Records Digitization Initiative to continue digitizing climate records. Uzhydromet has climate records from 80 meteorological and agro-meteorological stations (air temperature, soil temperature, precipitation, wind speed and direction, air pressure, atmospheric phenomena, humidity, cloud cover, snow cover) from 1887 to 2010. To date, Uzhydromet has digitized 17 million records from 1980 to 2010 with funding from the Korean government through WMO. The digitization is done in three stages:

1. Scanning paper records and converting it into electronic format
2. Manually digitizing data in Microsoft Excel, as most of the records were poorly stored, preventing the use of digitizing software
3. Verifying the data using the double-key method, a process which uses two different operatives to capture information simultaneously.

Adapting and running climatic, hydrological and crop suitability modules. The objective of this activity is to calibrate regional climate models for Uzbekistan and calculate the necessary data on climate trends and projections for the Climate Services System developed in Component 1. The output will be geospatial layers on climate parameters

such as temperature, precipitation, humidity from 1980 to 2100 in 10- and 30-year periods, annually and for different seasons, and under different climate scenarios.

This activity will be led by Uzhydromet's Research Institute of Hydrometeorology (NIGMI) and the Uzhydromet Climate Change Department with the support of Potsdam Institute for Climate Impact Research (PIK), a German research organization that has conducted extensive climate change research in Central Asia and has developed a climate portal for Central Asia. PIK will be contracted to provide data, model and services. The following actions will be conducted:

- *Regional climate models*. Future climate projections will be computed based on an ensemble of climate models driven by three shared socioeconomic pathway scenarios for all of Uzbekistan at a 0.5-degree resolution using current data from the CMIP6 project. The aim is to understand how different climate patterns, extremes and seasonality of climate parameters relevant for hydrology and agriculture (temperature, precipitation and radiation) will change across the country.
- *Hydrological modelling*. The project will assess the impact of climate change on water availability for rainfed and irrigated crops in Uzbekistan. It includes hydrological modelling of the main river basins up to the end of the century and evaluates annual and seasonal changes in water availability. The applied model integrates all relevant hydrological and vegetation processes, has a spatial resolution of 500 m, and takes into account local topography, soil properties, and crop and reservoir management.
- *Crop suitability modelling*. Based on regional climate and hydrology modelling, the project will analyse climate change impacts on various crops in Uzbekistan. It will provide long-term projections of crop production and effects of possible adaptation measures, helping to understand the impacts of climate change on agriculture. For this module PIK will collaborate with the Leibniz Institute of Agricultural Development in Transition Economies (IAMO) who have developed similar products in Armenia (see here).

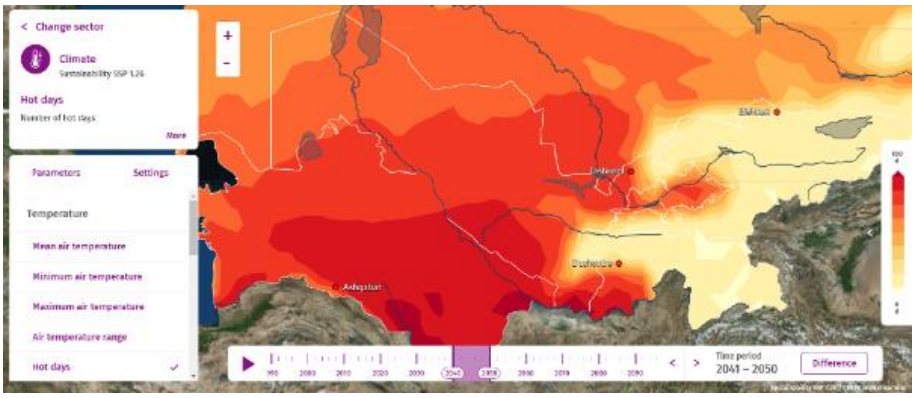

***Figure 13**. Screenshot of PIK's climate change portal showing the projected number of hot days per year in the decade from 2040 to 2050 (Source: PIK)*

Output 2.1.2. Climate change impacts and adaptation studies in agriculture

Under this output, the project will carry out the following activities:

- Organize *climate change impact and adaptation studies* in 4 thematic areas
- Conduct a *gender* assessment *for climate change adaptation in agriculture*

- Ensure that study findings and recommendations are incorporated into *policies and regulations* that promote and enforce resilience measures.

Climate change impact and adaptation studies in agriculture. The overarching theme of the studies is the future of Uzbekistan's agriculture in the context of climate change. The objective of the studies is to use climate projection data to understand how climate change will affect the agricultural sector and food security in Uzbekistan. They will formulate policy and research recommendations for adaptation pathways. The studies can cover the following areas:

- *Future water availability and irrigation strategies*. This study will use hydrological models in combination with climate projects to understand water risk and vulnerability for people in different parts of the country.
- *Impacts of climate change on crop pests and diseases*. This study will examine the spread, frequency and severity of pests and new emerging pests using climate projections.
- *Adapting horticulture to climate change*. This study will specifically examine the impacts of climate change on horticulture and explore adaptation options.

Under the leadership of the National Climate Centre of the MoE, a scientific committee will be established with representatives from Uzhydromet, Uzhydromet's Research Institute of Hydrometeorology (NIGMI), MoA, MoE, and MWR. This committee will oversee the studies to be conducted by government research institutes and universities. The project will manage this process by

1. Defining the scope and outcomes of the studies
2. Issuing a call for proposals
3. Overseeing the studies being conducted
4. Publishing the results of the studies.

The publications will include a main report, thematic reports, scientific articles, policy briefs and related materials. The main report and thematic reports are designed to appeal to the general public and policymakers. They will be available in English, Russian and Uzbek. The results of the studies will provide the content for the training of decision makers and community representatives under Output 2.2.2. of this component.

Informing policies and regulations on climate change adaptation. The project will actively identify ways to incorporate study findings and recommendations into national and provincial policies and regulations to promote and enforce resilience measures. Policies and regulations may include, for example, regulations for a specific agricultural sector (e.g. horticulture), provincial water plans, or updates to Nationally Determined Contributions (NDCs).

Gender assessment for climate change adaptation in agriculture. The project will commission an assessment to look specifically at ways to protect women from the impacts of climate change and help them adapt. Men and women have different roles on the farm. This varies according to the type of farm. The aim is to develop gender-sensitive approaches and tools for climate change adaptation in agriculture. Gender-sensitive adaptation extension will be integrated into Uzhydromet's Climate Services System (see Output 1.1.3).

Outcome 2.2. Strengthened capacity to deliver agro-climatological information products to policy makers

Output 2.2.1. Training programme for climate modelling and scenario development

Under this output, the project will organize the following activities:

- Organize on *training on climate impact modelling* for 50 people (at least 20 women)

- Organize *scientific exchanges* with PIK for 3 people (at least 2 women)

Training on climate impact modeling. The project will organize training for professionals in Uzbekistan how to model and assess the impact of climate change on agriculture. The goal is for Uzbekistan to be able to continue modeling climate change after the project ends. Professionals will learn how to set up climate models, where the data comes from, and how to assess the impact of climate change on hydrology and agriculture. The trainings will target professionals from Uzhydromet, MoA and MWR, as well as national universities.

The PMU will organize training. PIK will be contracted to conduct the training. They will create the curriculum and materials. Training will be held in person in Uzbekistan and virtually.

Scientific exchange programme with PIK. The project will fund three-month stays in Potsdam, Germany, at PIK for three people to learn about the latest climate research and methods.

Output 2.2.2. Training on impact scenarios and adaptation strategies for policymakers and community representatives

Under this output the project will carry out the following activities:

- Organizing a conference for high-level decision makers from 3 ministries
- Organize climate info sessions with journalists
- Conduct a training-of-trainers for 350 Uzhydromet and MoA field staff (at least 100 women)
- Conduct seminars with 500 local policy makers and community representatives (at least 30% women)

Climate conferences. The project will organize at least one conference on climate change impacts in the agricultural sector. It will also contribute to and participate in climate change networks and initiatives such as the Central Asia Climate Information Portal (CACIP) of Central Asia Regional Economic Cooperation Program (CAREC). The conference will bring together the MoE, MWR, MoA and other ministries concerned with agriculture and the impact of climate change on the sector. The project will present study findings and organize high-level dialogues in collaboration with universities/research institutions, multilateral agencies, NGOs and technical networks to ensure broad outreach.

Training with journalists. The project will organize trainings with journalists to raise awareness about the impact of climate change on agriculture, water and food security.

Climate adaptation seminars at local level. The project will use a training of trainers approach to train regional MoA extension experts and Uzhydromet experts on the impacts of climate change on agriculture. The trained experts will then hold seminars in their districts with local policy makers and community representatives. The goal is to have a dialogue about what climate change means in practice for the community and how the community can prepare for a future warmer climate.

Component 3. Reaching the last mile and getting climate services to farmers

Outcome 3.1. Rural population aware of predicted adverse impacts of climate change in agriculture, and of appropriate responses

This component will manage user engagement in the design of the Climate Services System and promote its widespread use. The goal is to engage 100,000 farmers and other end-users. The component will also strengthen the MoA extension system to use climate information in their regular work.

AKIS under the MoA will be responsible for Component 3. They will work in close cooperation with Uzhydromet, which is responsible for the technical development and provision of the climate services system under Component 1.

In the first year, the project will initiate the design of the Climate Services System. A pool of staff will be trained on various topics to acquire the necessary knowledge to design the climate services, and a user assessment will be carried out. From year 2 onwards, the project will develop and expand the system together with farmers and agribusinesses, the end users of the services. The system development and wide-scale promotion will go through the following phases:

1. *Pretotyping*. In the second year, the project will develop several pretotypes of the service system to test ideas quickly, easily, and inexpensively.
2. *Prototyping*. A first or preliminary version of the Climate Services System will be tested in the third year with about 1,000 farmers and people working with them.
3. *Large-scale application*. Services will be promoted widely in the fourth year of the project through a media campaign and training of trainers programme.
4. *Full scale application*. All climate services will be operational and widely promoted in the final year of the project. A participatory evaluation will capture the reach and impact of the system.

	YEAR 2	YEAR 3	YEAR 4	YEAR 5
	Pretotyping	**Prototyping**	**Large-scale application**	**Full scale application**
	100 farmers (30% women)	**1,000 farmers** (30% women)	**30,000 users**	**100,000 users**
	Selected farmers around agro-met stations	Farmers around agro-met stations	Mass media and farmer seminars	Mass media and farmer seminars
	Climate service development			
10-day weather forecast	Yes	Yes	Yes	Yes
Weather alerts	1 hazard	5 hazards	10 hazards	10 hazards
Seasonal forecast	1 variable	Selected variables	Selected variables	Selected variables
Climate projections	1 variable	Selected variables	Selected variables	Selected variables
Crop forecasts	1 crop	4 crops	8 crops	8 crops
Resilience advisory	1 crop	4 crops	8 crops	8 crops
Pest forecasts	1 pest	3 pests	7 pests	7 pests
Water risk forecast	No	Yes	Yes	Yes

***Figure 14**. Development phases of the Climate Services System*

Output 3.1.1. Capacity of extension services strengthened to deliver climate services

Under this output, the project will:

- Strengthen the capacity of 80 AKIS regional branches to integrate agro-meteorological services into their operations

The aim is to provide the regional extension branches and officers of AKIS with the necessary capacity to use the Climate Services System as part of their work. The PMU will conduct a detailed capacity needs assessment in the first year of the project. Project support may include equipment (e.g. computers or tablets) and training, or logistical support to reach farmers.

Output 3.1.2. Mobilization of end-users for the co-design of climate services

Under this output the project will carry out the following activities:

- Conduct a user assessment for agro-meteorological services
- Organize user engagement with 100 farmers in the pretotyping phase (30% women)
- Organize user engagement with 1,000 farmers and their organizations in the prototyping phase (30% women)

User assessment for climate information services. This assessment will be conducted in the first year of the project. The goal is to gain a thorough understanding of who the audiences of the Climate Services System are in order to provide the right services to the right audiences. The assessment will be carried out in close cooperation with the multidisciplinary task force of Component 1.

The assessment process will be based on a participatory approach. Training and sensitization will be provided to all PMU and AKIS staff and key partners to ensure that they understand who the project target group is, how to identify them and how to reach them. Social consultation activities go to the last mile to ensure that the project target group is reached. Activities are tailored to the project's target group and informed by clear gender and youth inclusion messages; they are conducted in target communities and involve all representatives of the different target groups, including poor subsistence and semi-subsistence households, women and youth from different socio-economic groups. The results of consultation activities should be highlighted in a final report.

The menu of climate information needs and most relevant and appropriate digital and communication tools to improve the quality of climate information services in agriculture will be defined in consultation with target communities and tailored to the socio-economic characteristics of the target group.

The assessment will look at:

- *Types of farmers and actors along the value chain*. The assessment will classify and describe different user types. These include dekhan farmers, large farms, traders, agro-dealers, warehouses, agricultural laborers, women, men and youth engaged in horticulture and other major crops. Further levels of disaggregation will include, head of households and socioeconomic status as these may shape roles, constraints and hence information needs.
- *Information usage and needs*. The assessment will identify how farmers currently use weather information, where they get their information, what their information needs are, what are the best communication channels to reach them, what are the climate-related challenges they face, and when is the best time to disseminate information. More in particular, women and women's organizations will be consulted to assess perceived shocks and stresses that are specific in the context of their livelihoods. Understanding the vulnerability context and the livelihoods

decision-making dynamics will pave the way in identifying the most relevant and actionable climate information needs and in ascertaining priorities.

- *Communication pathways and networks*. The MoA has often established farmer networks with one farmer as the "chief farmer" representing the interests of 5-20 neighbouring farmers. Many farming communities have established telegram groups. The assessment will map these groups and their communication channels, which are important channels for disseminating climate-related information. Gender barriers in accessing communication channels available for climate services will be specifically assessed. The final choice on the selection and/or development of information channels (website, app, etc.) will be done in consultation with local mahalla leaders, women's and community organizations. In recognizing which mediums of information sharing are comfortable for women, the project can work with communities to tailor functional uses of new technologies to their particular livelihoods, thus increasing relevance, accessibility, and utilization in rural agricultural communities.
- *Partner institutions and projects.* The assessment will map other donor-funded projects (see Part II, section on duplication), farmer organizations and civil society organizations, working with farmers that could benefit from climate services. The assessment will also identify private sector interventions that can leverage the potential of climate information for commercialization (e.g. precision agriculture, insurance, etc.).
- *Information usage and tailored advisory services.* A range of information services tailored to women's expressed interests, in addition to climate information, will be provided with the objective of increasing the value of advisory services to women. This will include the introduction of climate information services in a way that decreases women's labour and time investment in agricultural and household tasks.
- *Geospatial assessment*. The assessment will use cadastral information and agricultural statistics to map the main horticultural areas and the largest concentrations of dekhan and small-scale producers that the project can target.

Organizing the pretotyping and prototyping. AKIS will be responsible for organizing user engagement in a participatory manner to co-design the format, messaging and content of the climate services. In the second year of the project, several pretotypes of the Climate Services System with limited functionality will be presented to 100 test users who will provide their feedback on how to improve the services. It is normal for pre-pretotypes to be exploratory. The idea is to eliminate 90% of the elements that are misleading. Only a small group of users is needed for this purpose. Test users will give feedback on accessibility, usability, if content is understandable and what actions they think they should take based on the information provided to them. In the third year, the same approach will be used with 1,000 test users to evaluate a more advanced prototype of the service system with more features.

This approach is based on FAO 2021's recommendation for a series of feedback mechanisms to systematically engage producers and users of information in the co-design and co-production of climate services.

AKIS will identify test users with different profiles, from dekhan farmers to large-scale farmers, and their workers, at least 30% of them women, to provide feedback on the first versions of the climate service. Users will be identified from all areas where the project intervenes. Their farming operations need to be close to a met or agro-met station. These users will be compensated for their time and as an incentive to provide constructive feedback.

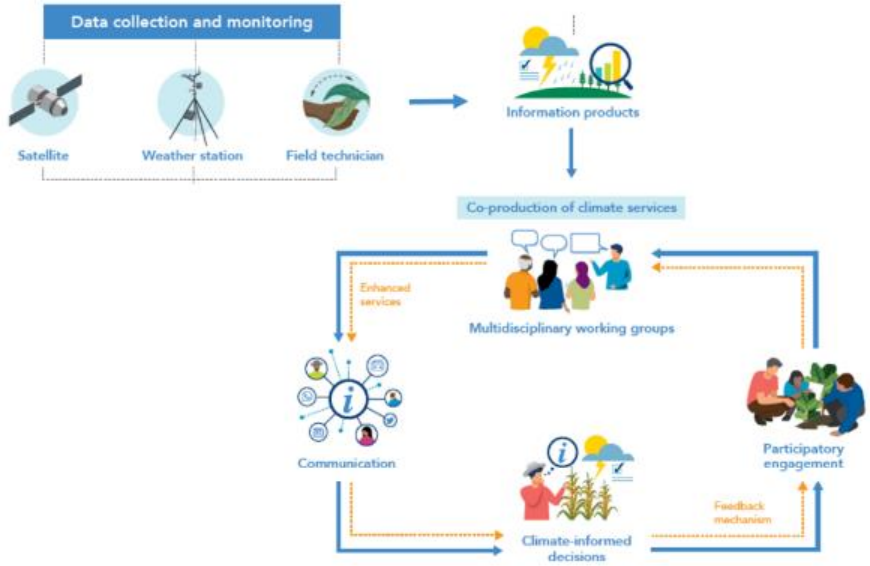

***Figure 15**. Framework for effective climate services provision (Source: FAO 2021)*

Output 3.1.3. Training of trainers and a communication campaign for promotion of climate services

Under this output, the project will organize the following activities:

- Conduct training of trainers for 350 AKIS extension specialists and regional Uzhydromet staff (30% women)
- Conduct 1,000 seminars with 30,000 farmers and other actors of the agri-food chain actors (at least 30% women)
- Communication campaign to reach at least 30% of the rural population

These activities will be carried out in the last two years of the project. The main objective is to promote the widespread use of climate services.

Training-of-Trainers (ToT) programme and farmer seminars. The project will develop a program - a training-of-trainers programme - to train AKIS extension specialists and regional Uzhydromet staff to become master trainers on the Climate Services System. They will then conduct seminars with groups of farmers at the sub-district level to raise awareness and guide farmers and other agri-food chain actors in using the services.

The project will develop a comprehensive curriculum and set of materials based on the experience of other projects (e.g. Bangladesh, Laos and Mali). Master trainers can use these in their training sessions with farmers. The content of the training will be relevant to farmers, easy to understand and practical, explaining how the services work and where the data comes from, and giving practical examples of how a farmer can use climate services to inform their decision making, both in the short and long term.

Seminars at the sub-district level will target farmers, dekhan farmers, smallholders, agribusinesses, and other stakeholders such as beneficiaries of other rural development projects.

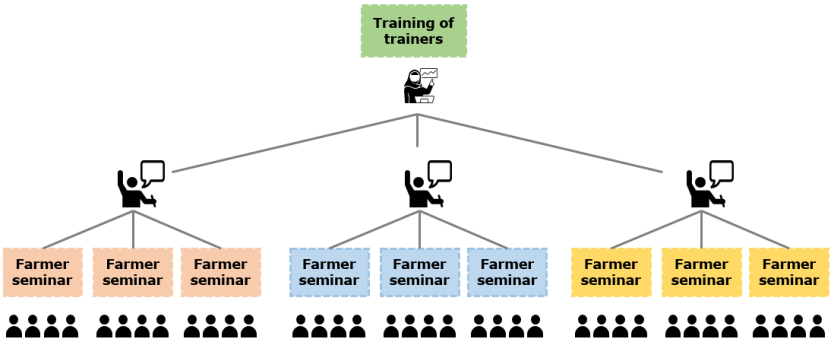

***Figure 16**. Concept of the training of trainers approach*

Communication campaign. The project will conduct a communication campaign to raise awareness of the Climate Services System. Communication channels will include social media such as Telegram and YouTube, as well as traditional media such as radio. The project will identify innovative ways to reach its audience through videos, infographics, and success stories (e.g. short videos where a farmer presents important weather forecasts and gives recommendations on what to do). Organizing the campaign involves the following steps:

1. Define objectives, target audiences, and communication channels
2. Planning the campaign (e.g., timeline, budget, roles and responsibilities)
3. Create and publish compelling content
4. Monitor audience feedback and gather feedback to improve the system.

This activity will be carried out together with Uzhydromet's Communications Department.

Output 3.1.4. Participatory assessment of app usability and impact on crop decision and productivity

Under this activity the project will organize the following activity:

- Conduct a participatory assessment of the Climate Services System

The evaluation will be conducted by an independent evaluation agency in the final year of the project. The evaluation will provide insights into the accessibility, relevance, trustworthiness and practical impact of the Climate Services System. It will assess the effectiveness and user-friendliness of the system for farmers, and provide advice on how to tailor and refine the information system and its impact on crop management decisions and productivity.

The evaluation will use mixed methods to assess the impact of the project. These will include a treatment and control group impact survey, key informant interviews, focus group discussions, and econometric analysis of costs and benefits in some cases. The evaluation will estimate the total outreach of the climate services system. It will aggregate all outreach figures, including the number of people receiving climate service messages in telegram groups, the number of app users, and the number of users visiting the website.

The assessment will measure resilience. It will use IFAD's Resilience Design and Monitoring Tool and use standard survey approaches to measure resilience recommend by IFAD's impact assessments guidelines.

The assessment will conduct cost-benefit analyses in cases where farmers have been affected by a climate shock. The assessment will identify cases and estimate how much losses were avoided, how investment decisions were influenced, and how much chemicals were saved.

B. Economic, social and environmental benefits

Describe how the project provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations.

An accurate weather forecast can have a significant impact on farm management and mitigation of weather-related risks. By anticipating the impact of weather patterns, farmers can mitigate the risks and reduce their impact. This approach is often more cost-effective than post-facto losses.

Economic benefits

A near real-time system for agro-meteorology offers significant economic benefits to farmers. It **improves decision-making and risk management**, enabling farmers to make more informed decisions regarding crop diversification, planting time, irrigation, fertilization, and pest management. This leads to optimized resource allocation and improved agricultural practices, ultimately enhancing productivity and profitability. Furthermore, farmers can make informed decisions regarding insurance coverage or other adaptation strategies, reducing the economic impact of extreme weather events and crop failures.

In addition, a more **efficient resource utilization** is also possible. A near real-time system allows farmers to utilize resources more efficiently. By aligning their farming activities with weather patterns and forecasts, they can optimize water usage, reduce energy consumption, and minimize input costs. This improves cost-effectiveness and reduces waste, resulting in economic benefits.

Agrometeorology also increases **productivity and economic profitability**. Numerous studies have demonstrated that access to accurate weather and climate data enables farmers to make informed decisions, leading to improved crop management. For instance, a study by Mendes et al.[25] showed that aligning irrigation schedules with weather forecasts increased water use efficiency by 20% and boosted crop yields by 15% in a semi-arid region. Similarly, research conducted by Smith et al.[26] demonstrated that pest and disease forecasting based on agrometeorological models reduced pesticide use by up to 30%, while crop losses due to pests decreased by 25%. Moreover, agrometeorology facilitates precision agriculture, as indicated by a study conducted by Li et al.[27], which reported a 25% reduction in fertilizer application and a 10% increase in grain yields through targeted nutrient management based on weather-informed soil data. Furthermore, the implementation of agrometeorological strategies has been associated by Wang et al.[28] with enhanced climate risk management and improved market timing, resulting in reduced financial losses and higher profits.

Increased resilience is also foreseen. Farmers can build resilience to climate variability and change by using a near real-time system. They can adapt their farming practices and make informed decisions based on the latest weather and climate information. This reduces the vulnerability of their agricultural operations and ensures a more sustainable and economically viable farming enterprise.

[25] Mendes, V. R., Silva, M. A., Pereira, J. P., & Vieira, J. L. (2019). Aligning irrigation schedules with weather forecasts increased water use efficiency and crop yields in a semi-arid region. Agricultural Water Management, 215, 105641

[26] Smith, D., Schilling, M., & Vieira, J. L. (2020). Pest and disease forecasting based on agrometeorological models reduced pesticide use by up to 30%, while crop losses due to pests decreased by 25%. Successful Farming, 28330.

[27] Li, J., Zhang, C., Wang, Z., Liu, H., & Wang, Y. (2021). Targeted nutrient management based on weather-informed soil data reduced fertilizer application by 25% and increased grain yields by 10%. Scientific Reports, 11, 18411.

[28] Wang, X., Li, J., Zhang, C., Liu, H., & Wang, Y. (2022). The implementation of agrometeorological strategies has been associated with enhanced climate risk management and improved market timing, resulting in reduced financial losses and higher profits. Agricultural and Forest Meteorology, 304, 108447.

It is estimated that 30% of rural households located in horticulture and fruit production areas would benefit indirectly from the broad project's interventions. A significant portion of the target population will be reached through the use of improved crop technology and more resilient activities, which will be disseminated via social media, mass media, training, and technical assistance. The benefits to the primary target population will be reflected in productive physical assets and built knowledge capacities.

The economic benefits of using climate scenarios for agricultural planning include **climate smart investments and improved resource allocation**. By considering climate scenarios, agricultural planning can optimize the allocation of resources such as land, water, and inputs. This reduces waste, enhances efficiency, and improves cost-effectiveness, leading to economic benefits. Agricultural planning based on climate scenarios allows farmers to align their production with future market trends and demands while using more climate-resilient crops. This enables them to take advantage of emerging market opportunities, negotiate better prices over the long term, and establish stronger market connections, resulting in increased profitability.

Also, the use of climate scenarios allows for **investment long-term sustainability**. By considering climate scenarios, agricultural planning can promote sustainable practices such as conservation agriculture, agroforestry, and water management. These practices enhance soil health, conserve natural resources, and promote long-term economic viability.

Social benefits

Agro-meteorology is vital in **enhancing food security** by providing farmers with timely and accurate weather and climate information. Access to agro-meteorological information allows communities to manage risks better and adapt to climate variability, ultimately ensuring a more secure food supply for society. Climatological information, sometimes in conjunction with other data, can significantly reduce disease, injury and death and improve health and health care. The relationship between agro-climate and human health is documented in a large volume of literature. The use of agro-meteorology might, in theory, allow for reduced and more targeted use of pesticides, therefore improving population health. WMO has reported that there is scarce data on the value of this type of information even in terms of lives saved, reductions in morbidity or, e.g. numbers of properties built with the improved local environment. Indirectly, the project will contribute to **tackling the underlying causes of malnutrition** by increasing agricultural production, promoting sustainable natural resource management and supporting income-generating opportunities for women and youth.

Agro-meteorological information plays a crucial role in ensuring **community safety and disaster preparedness**. Early warning systems based on agro-meteorology help predict and respond to extreme weather events, such as storms, floods, and droughts. Timely alerts enable communities to take preventive measures, evacuate if necessary, and protect lives, assets, and infrastructure. Agro-meteorology contributes to communities' overall resilience and safety by providing vital information for preparedness and response to weather-related hazards.

With respect to the climate-resilient value chain, the project will specifically target horticulture which is especially important for women, therefore **addressing existing gender inequalities** with respect to access to and benefit from value chains. Particular attention will be given to female youth who face higher unemployment and who are not in employment, education or training. Women and girls with disabilities suffer more from discrimination, violence, extreme poverty and poor health services. Though the project will not explicitly target people with disabilities, it aims to encourage the inclusion of people with disabilities through its climate services.

Environmental benefits

Agrometeorology and climate scenarios enable farmers and decision-makers to optimize **natural resources** such as water, soil, and energy. By providing timely information on weather patterns, precipitation, and evapotranspiration rates, farmers can manage irrigation schedules more efficiently, reducing water waste and promoting sustainable

water management practices. Also, agricultural investments might be tailored to specific zones that are more climate resilient. This leads to a more responsible and efficient use of resources, minimizing environmental impact.

Through the preparation of regular bulletins and policy briefs, agrometeorology and climate scenarios promote sustainable agricultural practices. By aligning farming activities with weather conditions, farmers can reduce the use of agrochemicals, optimize planting and harvesting schedules, and adopt conservation practices. This reduces pollution, soil erosion, and ecosystem degradation, contributing to long-term environmental sustainability.

Agrometeorology and the use of agro-climatic scenarios play a vital role in **climate change mitigation and adaptation efforts**. Farmers can adapt their practices to changing conditions by understanding climate patterns and forecasts, such as shifting planting dates or diversifying crops. Additionally, agrometeorology helps identify climate-related risks and vulnerabilities, allowing farmers to implement measures to mitigate these risks, such as agroforestry or soil conservation practices. These actions contribute to reducing greenhouse gas emissions, enhancing carbon sequestration, and building resilience to climate change.

In addition to the above economic, social and environmental benefits, the project is being designed to avoid or mitigate adverse impacts in compliance with the Environmental and Social Policy of the Adaptation Fund, including in relation to aggravating gender inequalities. The Environmental and Social Management Plan (ESMP) spells this out in detail. As a start, the following measures will ensure that project activities are designed and implemented in a way that does not cause negative social or environmental impacts:

- Inclusive and representative community involvement in planning and implementing the project field activities, including monitoring project activities; consultation and engagement with beneficiary communities, including vulnerable groups;
- Strong collaboration between relevant ministries, both in activity design and implementation, including the preparation of a Standard Operating Procedure for multiple ministries;
- Implementation in accordance with national standards and safeguards articulated in various strategies and guidance documents; and
- Complaints and feedback mechanisms were established to get feedback from communities on the project, with established protocols for the resolution of complaints.

C. Cost-effectiveness

Describe or provide an analysis of the cost-effectiveness of the proposed project/programme.

The cost-effectiveness of interventions will be ensured by building them upon Uzhydromet's existing infrastructure and capacities, gradually renovating, replacing and expanding them, and relying on sustainable, cost-efficient and, where possible, locally-sourced technological solutions. In addition, the project will reduce existing duplications within the present government structure by developing a reporting system that will benefit the Plant Quarantine system, the MWR, and the entire structure of the MoA. The project will rely on the best available expertise within and outside of the UN system, as well as the world's best practices in the field of agrometeorology through the application of highly competitive procurement procedures and relying on collaboration with partners such as the WMO, which strongly supports the project rationale and is willing to extend technical and operational support to its implementation.

The above-described strong focus on user needs will ensure project effectiveness. In fact, agrometeorological services will be designed and delivered so that users can receive precisely the information they need and use in the formats and through channels they can

access and understand. Consequently, project results will be directly linked to the actual production needs and outputs of fruit and vegetable growers and other players up the agricultural value chain. Agrometeorology mitigates economic losses by countering projected seasonal weather vagaries impacts on productivity through regular bulletins offering weather forecasts, disease warnings, and optimal planting/harvesting periods. Informed decisions optimize resource use, reduce crop failure risks, and enhance productivity, safeguarding farmers' incomes and agricultural sustainability.

The UNDP project "Developing climate resilience of farming communities in the drought prone parts of Uzbekistan" developed an "Economic Feasibility Evaluation for installation of the automatic hydrometeorological equipment for the modernization of the observational network in the Republic of Karakalpakstan". Assessment of the economic effectiveness of improved hydrometeorological services resulted in identifying financial and intangible unquantifiable benefits. Total annual benefits from the modernization of meteorological services and the introduction of early warning systems can range from USD 11.5 - 109.6 million.

As an initial comparative analysis of agrometeorology cost benefits is presented in the table below. Any comparison between agrometeorology and other methods should take into consideration the scale of operations, which is generally national, while other intervention are normally localized, unless related to scientific research such as improving crop varieties.

***Table 8**. Comparison between different potential interventions*

Adaptation Strategy	**Scale**	**Costs**	**Benefits**	**Short-Term Benefits**	**Long-Term Benefits**
Agrometeorology	Local to national depending on project	Moderate to high costs, depending on the infrastructure needs	Improved decision-making	Immediate weather forecasting for crop management	Enhanced resilience through informed decision-making, improved planning
Improved Crop Varieties	National	High R&D costs	Increased yields, reduced losses	Immediate resilience to climate extremes	Sustained productivity, adaptation to changing climate conditions
Water Management Practices	Local	High implementation costs	Improved water-use efficiency	Immediate water savings, reduced water stress	Enhanced water-use efficiency, increased resilience to droughts
Agroforestry	Local	Moderate upfront costs	Increased biodiversity, soil health	Immediate benefits from tree products, improved microclimates	Soil health improvement, carbon sequestration, diversified income sources
Soil Conservation Techniques	Local	Moderate implementation costs	Sustained soil fertility	Immediate reduction in soil erosion, improved water retention	Reduced land degradation, increased resilience to extreme weather events
Climate-Smart Agricultural Practices	Local	Moderate adoption costs	Resource use efficiency	Immediate improved resource use efficiency, reduced costs	Sustained productivity, resilience to climate variability, sustainability
Insurance Schemes for Farmers	Local to national depending on project	Administrative and transaction costs	Financial protection	Immediate protection against climate-related losses	Sustained economic stability, increased confidence in investment

The costs and benefits of agrometeorology can vary depending on factors such as the level of technology adopted, the quality of data, and the integration of meteorological

information into agricultural practices. An estimate of the cost per beneficiary in interventions held in other countries by other agencies is presented in the table below. Although a scientific consensus related to the estimated yield or revenue increase of agrometeorology has not been reach yet, agrometeorological interventions have appeared to:

- Increase the farmers resilience by providing timely weather information crucial for decision-making. By understanding weather patterns, farmers can optimize crop planning, irrigation, and pest control, mitigating risks and improving yields. This knowledge enables proactive adaptation to climate variations, fostering agricultural sustainability and resilience to environmental challenges.
- By enhancing decision-making, agrometeorology increase the capacities of farmers to take decisions based in their own technical knowledge. Various interventions have demonstrated that farmers have a strong pickup of agrometeorology. For example, in Laos FAO has found that 85% of farmers that listen to the agrometeorological forecast change their farming practices[29].
- Increase the cost-effectiveness of project intervention compared to other types of interventions, reaching a wider number of beneficiaries with the same amount. Although it is possible to implement projects related to seeds, irrigation, water management, etc., these are generally localized and rarely at a national scale.
- The present project cost effectiveness is in line with other similar interventions. As per the table below given the scope and the number of indirect beneficiaries, the cost per beneficiary is extremely low and sums up to approximately $50 per beneficiary.
- While agrometeorology is quite innovative, other type of support in agriculture is already being provided by other donors and the presence of the private sector there is strong, while in agrometeorology services there is a strong need for grant money as there is a need to start from the public sector.
- Integrating traditional interventions like improved seed systems, farmer trainings, and irrigation projects with agrometeorology enhances the testing of the national agrometeorological programme itself. This synergy improves real time testing and monitoring of the newly created application in the face of multiple project conditions.
- Countries are increasingly requesting integrated approaches that combine traditional interventions with agrometeorology in agriculture. Recognizing the benefits in resilience and productivity, they seek comprehensive solutions. Failure to meet this demand in the present project will lead to other non-agricultural entities offering these integrated services, potentially leaving agricultural practices less efficient and adaptive.

***Table 9**. Cost per beneficiary in ongoing agrometeorology efforts in other countries*

Donor	Agency	Country	Title	Budget ($m)	Beneficiaries	Status	Cost per bnf ($)
GCF	UNDP	Vietnam	Strengthening the resilience of smallholder agriculture to climate change-induced water insecurity in the Central Highlands and South-Central Coast regions	30	139,416	approved	215
GCF	FAO	Cambodia	Public-Social-Private Partnerships for Ecologically-Sound Agriculture and Resilient Livelihood in Northern Tonle Sap Basin (PEARL)	36	450,000	approved	80
GCF	FAO	Philippines	Adapting Philippine Agriculture to Climate Change (APA)	26	3,300,000	approved	8
GEF	FAO	Lao PDR	Strengthening agro-climatic monitoring and information systems to improve adaptation to climate change and food security	5.5	111,000	finalized	50

[29] Delivery of climate services to last mile users: challenges and opportunities for scaling (fao.org)

AF	Kemitraan	Indonesia	Increasing the resilience of smallholders from climate impacts through Smart Agriculture based on Livelihood Diversification in Indonesia	1	66,000	approved	15
AF	UNDP	Uzbekistan	Developing climate resilience of farming communities in the drought prone areas	5.4	50,000	finalized	108
GCF	UNDP	Uzbekistan	Enhancing Multi-Hazard Early Warning System to increase resilience of Uzbekistan communities to climate change induced hazards	40	11,000,000	started	4
GCF	AfDB	Liberia	Enhancing Climate Information Systems for Resilient Development in Liberia	11	1,200,000	started	9
GCF	ADB	Tajikistan	Institutional Development of the State Agency for Hydrometeorology of Tajikistan	5	8,700,000	started	1
GCF	WB	Burkina Faso	Africa Hydromet Program	23	3,500,000	started	7
GCF	LandBank	Philippines	Multi-Hazard Impact-Based Forecasting and Early Warning System	19	500,000	started	38
UNDP	UNDP	Georgia	Scaling-up Multi-Hazard Early Warning System and the Use of Climate Information	27	200,000	started	135
UNDP	UNDP	Malawi	Scaling up the use of Modernized Climate information and Early Warning Systems	12	700,000	started	17

The efficiency and effectiveness will be further increased by building on and complementing other existing or starting projects (Table below) or making the most of lessons learned from past completed projects. Most of the organisations listed in the Table will be contacted for cooperation about the distribution of climate services for farmers and pastoralists, the specific modalities of which will be discussed and agreed upon during the development of the full project framework.

***Table 10**. List of projects that will be contacted for distribution of climate services*

Donor	Agency	Implementing entity	Title	Status	Timing
AF	UNDP	Uzhydromet	Developing climate resilience of farming communities in the drought prone parts of Uzbekistan	complete	2017-22
GCF	UNDP	Uzhydromet	Enhancing Multi-Hazard Early Warning System to increase resilience of Uzbekistan communities to climate change induced hazards	started	2021-28
ADB	ADB	Indorama	Indorama Climate-Resilient Farmer Livelihood and COVID-19 Recovery Project	approved	2022-29
GEF	UNDP	State Committee on Ecology and Environment Protection	Conservation and sustainable management of lakes, wetlands, and riparian corridors as pillars of a resilient and land degradation neutral Aral basin landscape supporting sustainable livelihoods	ongoing	2022-28
GEF	FAO	State Committee on Forestry; State Committee on land resources, geodesy, cartography and state cadaster	Sustainable Forest and Rangelands Management in the Dryland Ecosystems of Uzbekistan	ongoing	2022-27
GEF	FAO	Ministry of Agriculture, State Committee on Ecology and Environmental Protection	Food System, Land Use and Restoration Impact Program in Uzbekistan	ongoing	2020-26
GEF	FAO	Uzhydromet	Capacity-building to establish an integrated and enhanced transparency framework in Uzbekistan to track the national climate actions and support measures received	ongoing	2021-25
JICA	FAO	Uzagrokimyohimoya Joint Stock Company	Project for Improvement of Locust Management	ongoing	2020-25

WB	Min Fin	State Committee of Veterinary and Livestock Development	Second Livestock Sector Development Project (P177825)	approved	2023-28
IFAD	IFAD	Rural Restructuring Agency	Agriculture Diversification and Modernization Project	ongoing	2017-25
IFAD	IFAD	MOA	Dairy Value Chains Development Project II (DVCDP II)	planned	tbd

D. Strategic alignment

Describe how the project is consistent with national or sub-national sustainable development strategies, including, where appropriate, national adaptation plan (NAP), national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

Uzbekistan ratified the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement in 2018. It submitted its updated (Intended) Nationally Determined Contribution in 2021. The project is aligned with the (I)NDC focused on Climate adaptation of the social sphere, including:

- raise awareness and improve access to information on climate change for all population groups;
- develop early warning systems for hydrometeorological hazards and manage climate risks;
- increase participation of public, scientific institutions, women and local communities in planning and management, mainstreaming gender approaches and practices

The project will contribute to the draft "Sectoral Adaptation Plan for the Agricultural Sector" of the National Adaptation Plan (NAP) currently being developed by UNDP with funding from the Green Climate Fund. The project will contribute to the following objectives of the draft plan.

***Table 11**. Relevant goals, initiatives, and responsibilities of the draft Sectoral Adaptation Plan for the agricultural sector for 2023-2030 (Source: Draft Sectoral Adaptation Plan for Agricultural Sector)*

No.	Goals	Implementation mechanism (initiatives)	Indicators	Time span or term	Responsible executors
13	Monitor and reduce climate-related multiplication of pests	13.1. Design local and nation level pest – monitoring agencies including: equipment purchase, mechanism for collecting the data, data processing centre. Coordination mechanism to deal with pests.	Area of agricultural land under pest control, ha	2023-2025, Centre created, 2026-2030, 10% increase of agricultural land under pest control mechanism	Ministry of Agriculture, Agency on Innovative Development under Ministry of Higher Education, Science and Innovations, Academy of Sciences, Council of Farmers, Regional laboratories under the Agency for Hydrometeorological Service (Uzhydromet) under Ministry of Ecology, Environmental Protection and Climate Change

28	Improve the availability of hydro-meteorological and climate change information to farmers and the scientific community	28.1. Monitor existing and design new mechanisms for the provision of relevant hydrometeorological information to farmers, ideally free of charge via a centralised web page and SMS services	Number of farmers using this service Web page with relevant information for researchers	2023-2030 Yearly, 5% increase in number of farmers per year	Agency for Hydrometeorological Service (Uzhydromet) under Ministry of Ecology, Environmental Protection and Climate Change, Ministry of Agriculture, Universities, Academy of Sciences
29	Improve the availability of information on agricultural production to the scientific community	29.1. Publish the relevant data on the existing statistical web pages in time series and on a regional basis	Data published	2026 Yearly. Data published and yearly updated	Ministry of Agriculture, Agency for Hydrometeorological Service (Uzhydromet) under Ministry of Ecology, Environmental Protection and Climate Change, Universities, Academy of Sciences
32	Raising awareness and access of the rural population, farmers and other agricultural entities to information on climate change and its effects on agriculture	32.1. Improve dissemination on internet level: making environmental information publicly available via internet sources	Designing relevant web pages. Constructing a system of collecting and disseminating relevant data through the web page. Make farmers, national and international community aware of this page	2023-2030, Web page created and monthly updated	Ministry of Agriculture, Agency for Hydrometeorological Service (Uzhydromet) under Ministry of Ecology, Environmental Protection and Climate Change Statistics Agency under President of Uzbekistan Ministry of Digital Technologies, Information and Mass Communications Agency Ministry of Higher Education, Science and Innovations

The project aligns with key policies reported in the table below.

Table 12. *Policy frameworks relevant for the project*

Policy	**Provisions**
New Uzbekistan 2022-2026 Development Strategy	Strategy 3 "to develop a robust national economy that ensures rapid growth", goal "intensive development of agriculture", mainly supporting the following goals: export-oriented products through developing fruits and vegetable production, protect soil fertility, improving the system of agricultural services based on science and innovation, and deepening the integration of science and practice in agriculture. Strategy 1 "to build a people's state by elevating human dignity and the furtherance of a civil society" goal "adapt the institutional framework of local public authorities to modern processes and procedures", which include "Introduction of IT among local governance bodies"

Agriculture Development Strategy of Uzbekistan for 2020-2030[30]	priorities reported on the Strategy information page[31]: priority 5, development of a modern public administration system; priority 6, gradual diversification of public expenditures on network support; priority 7, development of research, education and system of information and advisory services in agriculture, and priority 9, creating transparent network statistics and data collection systems
Decree No. 501 of the Cabinet of Ministers validating the Regulation on the provision of specialized services in the field of hydrometeorology and environmental pollution monitoring[32]	(a) the procedure for providing general government operational and forecasting information to governmental agencies and organizations on the basis of joint programs for mutual data exchange, to natural and legal persons through the Open Data Portal of the Republic of Uzbekistan or the official website of Uzhydromet; (b) the procedure for providing specialized hydrometeorological information and services to all consumers using hydrometeorological data; and (c) the procedure for providing emergency hydrometeorological information in the form of information and notifications to the relevant government agencies and organizations through telecommunications, the official website of Uzhydromet and social media pages. The following main concepts are used in this Regulation: (a) general purpose data - the hydrometeorological data intended for general use, provided to state bodies and the organizations, physical persons and legal entities according to these Regulations; (b) specialized data - information on targeted hydrometeorological and environmental pollution, which requires additional work and costs for storage, analysis, processing and presentation at the request of consumers; and (c) emergency (operational) information - information provided immediately on the occurrence of extremely dangerous hydrometeorological events that may endanger life and health of the population and (or) damage the environment and sectors of the economy and economic entities, the causes of their occurrence.
Presidential Decree No. PP-5185 "On the establishment of the Agency for Quarantine and Plant Protection of the Republic of Uzbekistan[33]"	improving state management in the field of reliable plant protection against, pests, diseases, weeds and other harmful organisms, decrees to set up Agency for Plant Quarantine and Protection, entitling it with the following tasks: improving the forecasting system in the field of quarantine and plant protection, defining coordinated effective methods of combating pests, as well as monitoring their implementation, preventing the penetration and spread of pests in the territory of the country and the destruction of pests that can cause economic damage; and development of scientific, methodological and educational potential in ensuring phytosanitary safety, introduction of modern innovative solutions, planning and management methods, expansion of international cooperation in the introduction of advanced technologies and work methods, organization of systematic retraining and advanced training of the field staff.
Decree No. 573 of the Cabinet of Ministers, "On improvement of the operation of the Ministry of Water Management[34]."	Establishment of the main tasks of the Ministry of Water Management, including water resources management, water accounting, reporting and balance, and protection of the population and national economy against flooding
The Land Code (1998)	Establishes basic rules and regulations for all land use types
The law on water and water use (1993).	Legal document for water resource management

[30] Agriculture Development Strategy of Uzbekistan for 2020-2030.
[31] https://2030.serio.uz/en/
[32] Decree No. 501 of the Cabinet of Ministers validating the Regulation on the provision of specialized services in the field of hydrometeorology and environmental pollution monitoring.
[33] Presidential Decree No. PP-5185 "On the establishment of the Agency for Quarantine and Plant Protection of the Republic of Uzbekistan."
[34] Decree No. 573 of the Cabinet of Ministers "On improvement of the operation of the Ministry of Water Management."

Vision of Uzbekistan-2030	Strengthen the adaptive capacity by at least 40% in the most vulnerable areas affected by drought, water scarcity, salinization and degradation; 2) increase the efficiency of water use, the water metering system and save water up to 25%; 3) create early warning and risk management systems at all levels; 4) expand the area of forest restoration and agroforestry of agricultural land by 30% of the total need; 5) ensure further diversification of the agricultural food production.
Law on "Guarantees of Equal Rights and Opportunities for Women and Men" in 2019	which represents a firm stance against gender-based discrimination and ensures equal rights for both sexes. Among other provisions, the law confirms that women and men have equal access to economic resources, including movable and immovable property, land, financial assets, loans, public funds and freely chosen types of business activity.
Labor Code	guarantees gender equality in employment and ensures adequate working conditions, pay and promotion.

E. Standards

Describe how the project meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

Project activities will be carried out in full compliance with national environmental, labour and health and safety regulations and standards.

The **technical requirements** for the installation of meteorological equipment shall follow the standards of the World Meteorological Organisation (WMO), in particular the Guide to Instruments and Methods of Observation (WMO-No. 8).

The following resolutions and decrees provide regulation and institutional mandates for National Center for Climate Change and Uzhydromet to carry out activities of this project.

Resolution No. PP-4896 from 17.11.2020, on measures to further improve the activities of the Center of Hydrometeorological Service of the Republic of Uzbekistan (view) sets out objectives and measures for transforming the National Hydrometeorological Service into a highly efficient, innovative service that ensures the fulfilment of the tasks assigned to it at the level of world standards. Uzhydromet's agro-meteorological stations are established on government land in consultation with local residents and in coordination with the MoA and other ministries.

Decree No. UP-106 dated 23.07.2024 on the establishment of the Climate Council under the President of the Republic of Uzbekistan (view) establishes the National Centre for Climate Change as the highest advisory body under the President of the Republic of Uzbekistan on climate change mitigation and adaptation. It is mandated to prepare and implement sectoral action plans and programmes of ministries and agencies in the field of climate change. It also leads the coordination of activities to create a single information-analytical database on climate change based on the monitoring of projects of ministries and agencies.

Decree No. PQ-4975 dated 02.03.2021 on the establishment of the National Center for Knowledge and Innovation in Agriculture under the Ministry of Agriculture of the Republic of Uzbekistan (view) establishes AKIS as the main institution for agricultural extension and describes its mandate and organizational structure.

The **Land Code** from 1998 and the **Law on Water and Water Use** from 1993 establish the regulation for land and water use.

F. Measures to avoid duplication

Describe if there is duplication of project with other funding sources, if any.

Several climate change-related projects and programs are underway or planned in Uzbekistan, so it is important to find synergies and avoid duplication. At the same time, the project is the only one planned on near real-time climate information systems for farmers.

The project will seek to collaborate with ongoing and future interventions of the World Bank (WB), United Nations Development Programme (UNDP), and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), amongst other. Find a list of collaboration and coordination mechanisms below.

***Table 13**. Collaboration and coordination mechanisms with partner projects*

Project and agencies	Description	Complimentary potential
Enhancing Multi-Hazard Early Warning System to increase resilience of Uzbekistan communities to climate change induced hazards (2021-27) *Green Climate Fund (GCF)* *UNDP* *Uzhydromet* More	The UNDP project is piloting a multi-hazard alert system for drought, floods, mudflows and avalanches. **Target areas**: Mainly the eastern mountainous areas, including the districts Qoichirchik, Bostanlik, Sirdarya, Saihunabad, S. Rashidov, Gallaaral, Bulungur, Jambai, Koshrabad, Kitab, Yakkabag, Dehkanabad, Chust, Turakurgan, and Dangarin	**Synergies**: It will be checked whether alerts on drought, floods, and mudflows can be integrated into the project's Climate Services System. UNDP will be invited as observer at the Steering Committee and will be consulted as appropriate during the project implementation. **Avoiding duplication of efforts**: The proposed project targets cropland areas, not mountainous areas, as is the case with the UNDP project. Target groups are slightly different. The two projects work on different types of climate services.
Agriculture Diversification and Modernization Project (ADMP) (2019-25) *IFAD* *ISCAD* More	The IFAD loan project aims to increase the inclusiveness and profitability of selected value chains through enhanced productivity and market access as well as improved natural resource management. **Target areas**: Fergana, Andijan and Namangan provinces.	**Synergies**: The IFAD loan project will close before the proposed project will begin. ADMP financed 5 privately operated agro-met stations and their geo-coordinates are known.
Dairy Value Chains Development Project II (DVCDP II) (2025-29) *IFAD* *MoA* More	The IFAD loan project aims to reduce poverty level among small scale dairy producers and mitigate the impacts of climate change in the subsector. **Target areas**: Surkhandarya, Sirdarya, Jizzakh, Samarkand and Kashkadarya	**Synergies**: The AF/IFAD project can use the targeting mechanisms of DVCDPII to reach farmers. Climate information services will be of particular interest for livestock feed production. A technical committee between the two IFAD project teams will be set up to establish collaboration on the use of the climate services products.
FUME (2022-24) *Finnish Meteorological Institute (FMI)* *Uzhydromet* More	The project aims to strengthening weather and air quality services of Uzbek hydrometeorological services at national level.	**Synergies**: The IFAD/AF project aims to build on the weather forecasting and alert software (SMART Met and Alert) for the agricultural sector as a follow up activity after FUME ends. FMI is a technical implementation partner of the project. **Avoiding duplication of efforts**: A capacity assessment of met services and further setup and calibration of SmartMet and SmartMet Alert software will be carried out in the first year of the

		project (see budget item).
Green Central Asia II (2024-28) *GIZ* *BMZ* *PIK* More	The regional policy and research imitative aims to have a political dialogue and consequently create better access to information and data in order to assess the impact of climate change more accurately and to develop cooperative preventive measures.	**Synergies**: The IFAD/AF will expand research and knowledge transfer on adapting regional climate modeling to the Uzbek context. PKI is a technical implementation partner of the project. **Avoiding duplication of efforts**: The scope of work will be defined during implementation expanding PIK's work, but not replicating it.
Climate Adaptation and Mitigation Program for Aral Sea Basin (CAMP4ASB) (2016-24) *World Bank* More	The World Bank project's objective was to enhance regionally coordinated access to improved climate change knowledge services for key stakeholders. It established the Central Asia Climate Information Portal (CACIP).	**Synergies**: The proposed project will engage with CACIP to support policy action at regional level under Output 2.2.2.
Central Asia Hydrometeorology Modernization Project (CAHMP) (2011-23) *World Bank* More	The World Bank project's objective was to improve the accuracy and timeliness of hydromet services in Central Asia, in particular Tajikistan and Kyrgyzstan.	**No synergies**, as the project is now closed and its main activities were not in Uzbekistan.

G. Learning and knowledge management

If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

Developing and delivering climate services is a very knowledge intensive process. This section lays out the approach that connects resources and processes related to knowledge in order to achieve desired impacts and outcomes. The M&E and KM expert of the project management unit will lead the overall knowledge management efforts.

A. Sourcing the knowledge to design climate services. In the first year of the project, project staff have to make a number of important decisions, such as the software architecture. Wrong decisions at the beginning can be costly in the long run. In order to make the most informed decisions, Component 1 of the project provides two mechanisms for acquiring and accessing the knowledge needed to build the services system:

- **Training packages to design the Climate Services System**. The project will organize training on 12 different themes (listed in table 7) for around 70 staff from national implementing partners. The packages cover a range of topics that are important for the design of the Climate Services System.
- **International expertise**. The project will secure the services of internationally renowned agencies that are leaders in their respective fields. Importing the necessary knowledge and state-of-the-art solutions is key to building the Climate Services System.

B. Building talent for climate change modelling in Uzbekistan. Component 2 of the project aims to build the talent pool in Uzbekistan for scientists to model climate, its change and impacts:

- **Training on climate impact modeling**. The project will organize training for professionals in Uzbekistan how to model and assess the impact of climate change on agriculture.
- **Scientific exchange programme**. The project will fund three-month stays in Potsdam, Germany, at the Potsdam Institute for Climate Impact Research (PIK) for three people to learn about the latest climate research and methods.

C. Generating new knowledge on the impacts of climate change. Component 2 of the project will make climate data available and generate new insights on the effects of climate change on agriculture. The project will work closely together with Uzhydromet's Research Institute of Hydrometeorology (NIGMI) to carry out the following activities:

- **Digitizing climate records**. The project will provide further resources to the Uzhydromet Climate Records Digitization Initiative to continue digitizing climate records.
- **Adapting and running climatic, hydrological and crop suitability modules**. This activity aims to calibrate regional climate models for Uzbekistan and calculate the necessary data on climate trends and projections.
- **Climate change impact and adaptation studies in agriculture**. The overarching theme of the studies is the future of Uzbekistan's agriculture in the context of climate change. The objective of the studies is to use climate projection data to understand how climate change will affect the agricultural sector and food security in Uzbekistan.
- **Gender assessment for climate change adaptation in agriculture**. The project will commission an assessment to look specifically at ways to protect women from the impacts of climate change and help them adapt.

D. Promoting knowledge for climate action at policy level. Component 2 will store, promote and share generated knowledge through the following actions:

- **Storing knowledge products**. The project will place studies and other knowledge products on the web-portal. In addition, the project will seek to integrate the products into other relevant platforms, such as the Central Asia Climate Information Portal (CACIP).
- **Training with journalists**. The project will organize trainings with journalists to raise awareness about the impact of climate change on agriculture, water and food security.
- **Climate adaptation seminars at local level**. The project will use a training of trainers approach to train regional MoA extension experts and Uzhydromet experts on the impacts of climate change on agriculture.
- **Informing policies and regulations on climate change adaptation**. The project will identify ways to incorporate study findings and recommendations into national and provincial policies and regulations to promote and enforce resilience measures.

E. Delivering weather information and knowledge on climate action to last-mile users. The main objective of Component 3 is to inform the agricultural sector on weather and climate services. The services will promoted through communication campaigns, including social media such as Telegram and YouTube, as well as traditional media such as radio.

F. Transfer of knowledge to keep the CSS running after completion. The project will to conduct trainings on how to operate the Climate Services System in the final year of the project under Component 1 to ensure the sustainability and continued operation of the information systems.

H. Consultative process

Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.

The design of this project, including its consultative process, occurred in two phases. In 2023 was the design of the concept note. The design of the full proposal took place in 2024. The design team visited and met with stakeholder in three country visits. In-person and virtual meetings were held in the time periods around the three country visits. In total, over one hundred government officials, famers, business people and international experts (of which at least 27 were women) were consulted for the project formulation. Their names and contact details are listed in annex 2. They are associated to the following agencies:

- Ministry of Ecology, Environmental Protection and Climate Change
- Uzhydromet, including the following departments and related agencies:
    - Department of Agrometeorological Observations and Forecasts
    - Research Institute of Hydrometeorology (NIGMI)
    - Regional Telecom Center
    - METEOINFOCOM
    - IT Department
    - Hydrometeorological Support Department
    - Department of dangerous hydrometeorological phenomena
    - Information Service
    - Climate Services/Monitoring Department
    - Short-Range Forecast Group
- Ministry of Agriculture of the Republic of Uzbekistan, including the following departments:
    - Agriculture, Knowledge and Innovation Services (AKIS) department
    - Land Degradation department
    - Horticulture and Greenhouse Development Agency
    - Climate Change Department
    - Department for Digitalization
    - Department of Chemicalization, Plant Protection and Quarantine (PPQD)
- Ministry of Water Resources (MWR)
- United Nations Development Programme (UNDP)
- Farmer Federation
- Potsdam Institute for Climate Impact Research (PIK)
- Finnish Meteorological Institute (FMI)
- Regional Environmental Centre for Central Asia (CAREC)
- Amudario

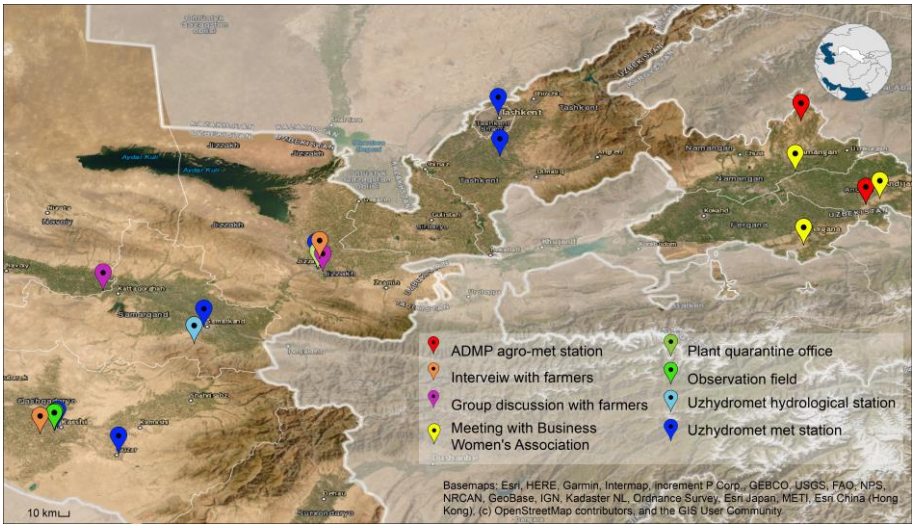

***Figure 17**. Map of fields visits of the design team*

The aim of the consultation processes carried out during project development was to present the proposed objectives, interventions and rationale of the project and to validate them after integrating their feedback. Consultations with potential beneficiaries took place in person and remotely, and interactions were both individual and collective. Consultation methods were chosen taking into account the size of the group to be involved, the purpose of the consultation, and the time and resources available.

A summary description of the consultation methods and techniques is given below. The summary presents a variety of approaches to facilitate the processes of participation and consultation.

Target stakeholders	**Purposes of consultation**	**Tools of engagement**
- Government officials (management and field technical staff) - Famers and farmers' organizations - Women and women's organizations - Business people - Research institutes - International experts	Defining and validating: - Project scope and objectives - Project activities and implementation - Participatory planning process - Service delivery - Grievance mechanisms	- Consultative meetings - Community level meetings - Workshops - Hybrid face-to-face and virtual meetings with select audiences

Consultation methods. A variety of mechanisms were adopted to incorporate and promote stakeholder engagement:

Information sharing. In order to generate awareness and to prepare the stakeholders, elected representatives and other stakeholders, project information was shared at beginning of each consultation and interaction.

Consultation. Consultative meetings with the stakeholders were undertaken at different stages of the project design cycle. Project objectives, activities, and related rationale as well as delivery mechanisms were discussed with the community, beneficiaries, elected

representatives, local civil society groups and other stakeholders to get their perspectives included in the designing of the interventions, and thereby increasing the chances of ownership among various stakeholders. Such consultations were undertaken both online as well as face to face.

Consultation mechanisms	
Formal meetings	- Present the project information to stakeholders - Allow group to comment – opinions and views - Establish linkages with high level stakeholders - Disseminate technical information
Focus group meetings	- Present project information to a group of stakeholders - Validate assumptions - Build relationships with communities - Maximise inclusivity and mitigate the risk that people who don't feel comfortable in taking the floor in large group spacing would have been missed out
Hybrid face-to-face and virtual meetings with select audiences	- Hold conversations on specific topics - Seek more in-depth information
One-on-one meetings	- Seek views and opinions - Enable stakeholders to speak freely about sensitive issues - Build personal relationships

Consultation during the design of the 2023 Concept Note

Drafting the concept note involved the following consultations.

Bilateral in-country meetings in June 2023. The design team conducted in-country consultations from June 12-17, 2023. Stakeholder consultations consisted mainly of bilateral meetings with government agencies, projects, and research institutes, with whom the design team discussed various issues related to project objectives, activities, and implementation. The list of stakeholders consulted is provided in the annexes. In addition, the project visited an agro-meteorological weather station in Tashkent Province and met with the staff operating the station.

Farmer and agribusiness consultations in November 2023. The mid-term review of IFAD's Agriculture Diversification and Modernization Project (ADMP) included consultations with farmers and agribusinesses. The team visited two Amudario agro-meteorological stations recently installed by ADMP in the Andijan and Namangan regions. The field visits were aimed at assessing the initial results of the implementation of the meteorological stations. The IFAD ADMP project installed five modern solar-powered stations to monitor meteorological data, soil moisture, estimate crop water requirements and manage irrigation over 500 hectares (100 hectares per station). Farmers with greenhouses reported that sudden frosts, high winds, and heavy rains are the main weather challenges they must respond to protect their crops and greenhouses. Receiving weather warnings would allow them to mitigate production and income losses.

***Figure 18**. Focus group discussions held with farmers from Jizzakh on 14/05/2024 (left) and Navoi on13/05/2024 (right)*

Community consultations included women groups and individual women. The objective was to promote and engage people in project-supported services. Considering the specificity of the project, direct contact with women is expected to help finetune activities, for needs assessment, service delivery, and information and overall consultation activities. Their feedback informed early development of the Concept Note and informed subsequent development of the full-fledged proposal. Full details on content discussed during the consultations are presented in Annex 3 "Gender assessment and gender mainstreaming strategy and action plan" and in table 15 below.

Consultations during the full proposal design in 2024

The full proposal of this project was designed from April to June 2024. A design mission to Uzbekistan was conducted from May 5 to 16. The following consultations were held.

Meetings with management and technical staff. From 6 to 8 May, the design team held meetings in Tashkent with senior management, department heads and technical staff of the Ministry of Ecology, Environmental Protection and Climate Change, Uzhydromet and the MoA. The mission met with the Deputy Minister of the MoA, the Director of Uzhydromet and the Advisor to the Minister of the Ministry of Ecology, Environmental Protection and Climate Change, who welcomed the development of the full proposal and identified staff to facilitate the mission and contribute to the design of the full proposal. The mission team also presented the proposed project at the UNDP climate conference on 7 May and have engaged with stakeholders during the conference.

Consultations with farmers and Uzhydromet and MoA field staff. From 10 to 14 May, the mission team held meetings with government departments and farmers in Qarshi, Guzar, Samarkand, Navoi and Jizzakh. The team met with farmers growing horticulture, orchards, cotton and wheat. They held interviews with individual farmers and conducted two focus group discussions. The team visited four meteorological stations and one hydrological station of Uzhydroment. The mission team met with AKIS branches and the Department of Chemicalisation, Plant Protection and Quarantine (PPQD) of the Ministry of Agriculture. The mission learnt how Uzhydromet collects information and what staff and infrastructure they have in the regions. The mission learned about the weather and climate-related challenges farmers face and how they access and use weather forecasts.

***Table 14**. Outcomes of the field level consultations with farmers*

Consultation outcome	Implications for the project design
Weather information is extremely important to farmers. Most farmers use their smartphones to check the weather forecast every day. They plan their farming activities based on the weather forecast. Farmers were most interested in accurate weather forecasts and warnings, and seasonal forecasts.	Farmers needs climate information services to plan their activities. There is a great demand for tailored and accurate weather information services.
Farmers are affected by weather extremes. The design team met a family farmer who lost his entire vineyard to a cold snap in the winter of 2022/23. The team heard similar reports of damage to orchards in the Fergana Valley. Due to heavy rains during the cherry blossom season, a family farm in the Navoi region lost most of its cherry production for the year. The director of the regional branch of PPQD explained that due to higher temperatures, the reproduction rate of some pests has increased dramatically (e.g. from 18 times a year to 22-23 times a year). Depending on the area, the availability of irrigation water was identified as a major problem.	Farmers face weather-related challenges that can cause severe damage and threaten their livelihoods. Climate information services for farmers need to warn farmers of potential extreme weather events. The services should inform farmers about short-term measures to protect their crops (e.g., securing greenhouses against strong winds) and long-term adaptations (e.g., switching to drip irrigation to use water efficiently in a hotter climate with less irrigation water; or installing shade nets to protect against heavy rain and hail).

Farmers google the weather or use weather apps on their phones that display forecasts from global weather models. Farmers are not aware of Uzhydromet's current information services and do not use them. Many did not know about the regional Uzhydromet offices and meteorological stations. Some farmers received weather forecasts and warnings through telegram groups set up by the MoA.	The services that are freely available on the Internet are limited and not location-specific. Nevertheless, the project is essentially competing with free and easily accessible information services. This means that the services developed by the project must be different. For example, they need to be location-specific, more accurate and user-friendly. They need to meet the needs of farmers. They must be easily accessible, understandable and actionable.
MoA has established strong social networks of farmers. AKIS and other MoA departments have established a system of farmer representatives and communication channels. Farmers are organized in groups of 10-20 farmers and elect a "chief" farmer to represent their interests and disseminate information. Most farmers communicate with each other, their buyers and MoA staff via Telegram groups. These groups exist for most areas.	The project can use or improve established networks and communication channels with farmers. It does not need to build them to promote/provide climate information services.

Consultations with women stakeholders. The design team consulted with women stakeholder operating in rural areas, such as the Business Women's Association (BWA), which have been identified among the most active government and nongovernment institutions in supporting women employment creation and business development. Moreover, the design team organized a follow-up virtual meeting with the management committee of the BWA led by its Manager, Mrs Gulruh Davatova on the 25th of July for more targeted discussion on implementation arrangements. Participants underlined how climate change is a critical concern for rural women in Uzbekistan, as it has significant implications for their livelihoods and work, particularly in the agricultural sector. In fact, rural women have very limited opportunities for employment outside of agricultural work (for example, work in the public sector or off-farm income-generating activities) and are often offered informal employment. Table 15 below summaries key issues emerged during the consultation and relevant areas of actions that have been identified by the project accordingly.

Table 15. *Outcomes of consultations with women stakeholders*

Consultation outcome	Implications for the project design
Uzbekistan has different agro-ecological zones and land quality, owing to different resource endowments of land and water, level of development of infrastructures, agriculture, and availability of skillful labor force. Among the project areas, the Andijan, Namangan, and Fergana districts (Fergana Valley region) are specialized on horticulture, orchards, and fruits and vegetables. Surkhandarya and Sirdarya are more specialized on livestock and dairy production. **Women's vulnerability context is highly conditioned by their livelihood activities.**	The collection and analysis of contextualized, information is of outmost importance to identify gendered vulnerability contexts, and therefore critical for assessing women's and men's integration of weather and climate information into their adaptive strategies. To this end, the project will carry out an assessment to identify climate change adaptation strategies adopted by women in agriculture. By 1st year of project implementation, women will be also involved in consultation activities and demand analysis and training on gender-sensitive consultation, data collection, and assessment will be provided to AKIS and Uzhydromet staff.
Women are mostly engaged as temporary work and family business workers. While the farm is usually owned by the man, women	Gender roles, preferences, access to farm resources, land ownership, access to labor, access to information, and financial resources are influential in determining whether or not

need contribute as informal family business workers. Moreover, even when rural women are the ones running the business, their ability to cultivate land as independent farmers on a commercial basis is still limited owing to persistent social stereotypes that directly affect rural women's status and empowerment. This translates in their dependence on husbands or men family members who need to stay on the frontline. Notwithstanding the major and upward trend of women's contribution to labour force in rural areas, their work still remain mostly hidden and informal. The following key challenges were also mentioned: limited decision-making roles and limited access to opportunities owing to cultural norms.	someone will access and use climate information. By the 1st of the project implementation, a need assessment and analysis will be carried out on the following dimensions: (1) identification of perceived shocks and stresses in the context of women's livelihoods; (2) assessment of decision-making dynamics; (3) identification of the most relevant and actionable climate information needs
Typology of climate services/information. Women mentioned that key needs in terms of typology of climate information related to: **weather forecast**, **time of planting**, **time of harvesting**, frequency of **unexpected** and/or **extreme events.** They also stressed the importance of receiving information **on a timely basis** and pointed as the most compelling challenge in terms of quality of information collected and disseminated to its **relevance** and **accuracy**. During the consultations, women also underlined the necessity of investing on **robust M&E systems** to systematically track and evaluate the relevance and usefulness of information collected and disseminated.	The project will precisely focus on improving the quality of information collected and disseminated on areas identified by rural women. By applying a gender lens to all climate smart advisory, the project also aims at improving the relevance of such climate information services. One of the key features of the Climate Services System the project will contribute to develop is precisely its ***feedback mechanism***, which will allow users to provide feedback on how to improve the services throughout (on *accessibility*, *usability*, if *content is understandable* and what actions they think they should take based on the information provided) the development phase, including the pretotyping and prototyping phases.
Access to CIS. Women acknowledged the importance of smart phones to access CIS but several factors act as major constraint to the acquisition and use of the device: (i) low-income levels; (ii) poor connection quality; (iii) gender stereotypes and cultural norms often hinder women's access to digital technologies. This inhibits women's access to CIS. While men are more likely to have smartphones, with mobile Internet and other applications, women's phones usually only have calling and texting capacities. Women mentioned the importance of telegram groups but also underlined that information provided through such platforms are not always relevant or accurate. Telegram should therefore not be the only platform to use; there should also be mobile apps. **Women Committee in the Mahalla** are important actors at the local level and	Gender-specific needs for climate change adaptation will be mainstreamed into the design of climate information services to improve their equity and effectiveness for both men and women farmers. Various dissemination channels of CIS will be explored to ensure women have easy access to this important decision support service. Consultation for selecting the most relevant and appropriate communication tools and channels will involve women. Options such as SMS messages, telegram groups, mobile apps, web portals, information bulletins through the mahalla committees will be considered and adopted in a flexible manner considering the specific socio-economic profile of the groups targeted. For women experiencing challenges in accessing and using smartphones, the project

represents key entry points for the collection and dissemination of information. They are the one-stop shop and it would be critical to involve and consult with them, leveraging on the key role they play at the community level in combination with a wider range of dissemination tools and channels.	will consider providing internet subscription packages as relevant.
Low digital skills. Women mentioned the low level digital literacy in rural areas and underlined the importance of training on how to use and interpret the information received	The project will develop a **Training-of-Trainers (ToT) programme** to train AKIS extension specialists and regional Uzhydromet staff to become master trainers on the Climate Services System. **They will then conduct seminars with groups of farmers at the sub-district level** to raise awareness and guide farmers and other agri-food chain actors in using the services, where at least 30 percent of farmer beneficiaries will be women. A comprehensive curriculum and set of materials will also be developed and based on the experience of other projects. The content of the training will be relevant to women, easy to understand and giving practical examples of how a farmer can use climate services to inform their decision making, both in the short and long term.

Design workshop. On the 15 and 16 May, the mission held a workshop with over 20 representatives of MWR, Ministry of Ecology, Environmental Protection and Climate Change, Uzhydromet and the MoA in Tashkent. The aim of the workshop was to define the scope of activities under each of the project components.

Wrap up meeting. The mission team held a wrap-up meeting with Uzhydromet management on May 16, 2024 to discuss and agree on key findings and next steps for proposal development.

Review of proposal. The draft proposal underwent internal review at IFAD and was presented to and commented on by Uzhydromet technical staff and management in June 2023.

***Figure 19**. On the left: Picture of the telegram group "Farmers of Jizzakh" with 190 members, where information about agriculture is exchanged; Centre: Picture of a weather application used by a farmer; Right: Pictures of the Uzhydromet design workshop on May 15-16, 2024.*

The formulation of the project proposal builds on the following reports:

- WMO (2012): Guide to Agricultural Meteorological Practices (GAMP) 2010 Edition (WMO-No.134) – access here
- FAO (2022): Managing risks to build climate-smart and resilient agrifood value chains. The role of climate services – access here
- FAO (2021): Global outlook on climate services in agriculture. Investment opportunities to reach the last mile – access here
- UNDP (2021): Enhancing the adaptation and strengthening the resilience of farming to Climate Change Risks in Fergana Valley – Final evaluation report – access here

I. Justification and adaptation reasoning

Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Component 1. Development of near real time farm advisory informational system

Baseline scenario:

Currently, there are certain limitations on the current capacities for, and practices of, the production and publication of analytical agrometeorological information:

- a database for real time data collected by automatic weather stations is in place, but data are not harmonized, are not integrated into a single database, and are stored in separate servers;
- at the moment, agrometeorological forecasts are produced manually, with no use of modern automated analytical systems or software;
- pest and disease forecasts are available at the MoA; there is no digitized information on historical P&D infestation;
- information and forecasts are not sufficiently modernized;
- a large array of retroactive agronomical and agrometeorological data which could be used to calibrate models, improve forecasting techniques and analyse longer-term trends are still stored on paper and are at risk of eventually being lost.

Additionality:

The additional value of component 1 lies in its ability to provide crucial climate information and services tailored specifically for the agricultural sector in Uzbekistan. Some of the key additionalities include:

1. Climate information access: the additional agrometeorological station as well as the information system developed by the project, will offer easy access to reliable and localized climate information, including weather data, forecasts, and agronomical risk information. This enables farmers and stakeholders to make informed decisions regarding agricultural activities and adapt to local climate variability.
2. Decision support tools for farmers: the system provides decision support tools that utilize climate data and models to assist farmers in making informed choices. These tools help optimize resource allocation, crop selection, and timing of agricultural operations, leading to improved productivity and resource efficiency.
3. Risk assessment and early warning: the IT system incorporates risk assessment and early warning systems, enabling farmers to anticipate and mitigate climate-related risks. Farmers can take preventive measures to protect crops, livestock, and livelihoods by receiving timely alerts and information about extreme weather events.

4. Climate resilient crop and livestock practices: by being near real time, the information system will promote adopting climate-smart agricultural practices through its software and IT system. It will provide guidance and recommendations based on climate information, helping farmers implement sustainable and resilient farming techniques that enhance productivity, conserve natural resources, and reduce climate impacts.
5. Capacity development at the central and decentralized level: the development of the information system includes capacity-building components, such as training programs and workshops, to enhance the knowledge and skills of government stakeholders responsible for the system's day-by-day management. It empowers them to effectively utilize the software and IT system, manage the server, use the web page back-end, and actively use the app for data sharing.

The additional financing by the AF will be used to upgrade agro-meteorological station networks by adding new ones, replacing old stations with new ones or rehabilitation of existing stations with both conventional and automatic weather stations to increase coverage in the major agricultural production areas. Improved data coding and communication facilities must be established to enhance the connectivity of the national offices with regional-level sub-units. Similarly, investments are also required to improve facilities to access and analyse agro-meteorological information at the national level. A geospatial analysis facility will be established to receive, process, and analyze nearly real-time weather data and agronomical information collected from various centres. Hardware and specialized software for collecting, archiving, processing and analysing data will be installed and tested. A near real time agro-climatological database will be developed. The monitoring and communication infrastructure investment targets the agro-meteorology division. However, the overall requirement for strengthening early warning and climate information services will be considered in close collaboration with other projects and technical divisions of Uzhydromet (e.g., forecasting, hydrology, meteorology, and network maintenance).

The technical assistance outcome aims to strengthen Institutional and technical capacity to facilitate data sharing, archiving, and analysis to provide improved agro-meteorological information products. The additional activities include preparing and operationalizing the Standard Operating Procedures (SOPs) for the climatology and agro-meteorology division of Uzhydromet and the inter-ministerial collaboration with the Ministry of Rural Development. This outcome will also outline institutional coordination mechanisms between the technical divisions that facilitate sharing and communication of agro-meteorological data and information for the agricultural sector and the national early warning system.

To sustain the technical assistance, training curricula in climatology (including seasonal forecasts), agro-meteorology, remote sensing, GIS, crop-yield forecasting, preparation of improved crop bulletins, and information communications will be developed and integrated into Uzhydromet regular activities in collaboration with MWR and MoA. The project will build on AF's previous interventions to strengthen actions to make crop monitoring and yield forecasting operational. A series of training programmes to improve technical capacities of the climatological and agro-meteorological division at central and regional centers organized for the development of value-added forecast and information products and services

Component 2: Modeling the impact of climate change on agriculture to improve decision-making and planning

Baseline scenario:

The lack of climatic, bio-physical, and socio-economic data currently constrains vulnerability and impact assessments, reducing the capacity for adaptation planning, especially at local level. Several projects and programmes focus on impact assessment. Still, they are highly fragmented and focus on pilots in one or two provinces. Developing a country-wide impact and vulnerability assessment system could guide policymakers to

develop climate-responsive agricultural policies and plans and provide farmers with relevant, location-appropriate adaptation options.

Although at least another project has been working in climate services (UNDP AF project) currently in Uzbekistan, there is limited knowledge on the possibilities for climate services to unlock climate-resilient productivity in rural areas. In addition, there is insufficient knowledge on the possibility of using climate services for developing climate-resilient policies and plans. This is related to the limited concrete project action in this regard and the lack of attention paid to documenting and disseminating lessons learned from innovative actions. The result is that stakeholders at different levels across the country lack the knowledge of how to use climate services for resilient rural livelihoods.

Additionality:

The additional AF funding will support the establishment of national information portals on climate scenarios for agricultural planning. The outputs of this component will be achieved by closely collaborating with other initiatives (e.g., GEF, GCF and other initiatives focusing on a national long-term information system for flooding and drought-related hazards and land-use planning in drought- and flood-prone areas). A customized application will be designed to assess climate-change impacts and decision-support products for the development of adaptation strategies. The project funds will be used to assess (i) national climate-change impacts on crop yields and the agricultural economy and (ii) current and potential future risks to food security. The available crop models of the FAO-AEZ portal will be calibrated and validated using the python package for agro-ecological Zoning (AEZ), also called pyAEZ[35] software, developed by FAO. Assessments will also focus on impact scenarios of water availability for all major agro-ecological zones and crops and a national framework for analysis of vulnerabilities, impacts, and responses. This will integrate stakeholder meetings and feedback to determine appropriate indicators and calibrate the vulnerability assessments.

To sustain these efforts and ensure sustainable use of introduced tools and methods, customized training programmes will be provided for selected staff from MNR and MRD, especially on database management, downscaling of high-resolution climate change scenarios, impact assessment, AEZ, and rural development. The project will help integrate data and information on the impacts of climate change into national agriculture policies, plans, and programmes (consultation workshops at national, regional, and local levels organized). It will integrate stakeholder meetings and feedback to determine appropriate indicators, collect and validate the relevant natural resources information and calibrate the vulnerability assessments. It will also include detailed consultation among the ministries involved in the activity during the systems and model establishing stage, prepare a strategy/policy concerning the use of the systems/models, and share and disseminate the information and products among the relevant ministries.

The project will apply a comprehensive framework for knowledge-sharing and packaging of lessons learned and experiences. Agro-climatic monitoring and information systems to promote crop and livestock cycle adaptation will be disseminated for broader use at all levels. The use of agricultural climate scenarios and climate risk assessment based on agro-climatic information systems will promote climate-informed planning and decision making. It will be disseminated for wider use at the government level at all scales. The funds will disseminate good practices and lessons learned through publications and organize policy advocacy and knowledge-sharing workshops. The adaptation strategies and practices developed based on the advanced agro-climatic information systems will be delivered through mass media and social media.

Component 3. Reaching the last mile and getting climate services to farmers

Baseline scenario:

[35] https://github.com/gicait/PyAEZ

In Uzbekistan, agrometeorological (and, at large, climate and hydrometeorological) services have been traditionally oriented towards state and regional authorities, with little experience and infrastructure to carry information down to agricultural end-users and to integrate with it directly usable agronomic and agroecological advice. There is also little experience in the country in using climate-change knowledge to support long-term agricultural planning at all levels: from the central government to small and individual farms. Therefore, while Uzbekistan strongly promotes expanding horticulture, it has so far invested little in improving the effectiveness and sustainability of its agrometeorological system.

According to legislation and Uzbekistan's practice, agrometeorological publications, like other weather-related and hydrological information and forecasts, are routinely provided to the President's Administration, the Cabinet of Ministers, the Prosecutor-General's Office and central governmental agencies. These are also sent to regional administrations (Khokimiyats) and central authorities and regional branches (e.g., agricultural departments). Both paper and electronic copies are distributed, the latter by electronic mail.

Noteworthy, the World Bank noticed the first limitation of Uzbekistan's capacity for adaptation in agriculture: "The ability to collect, generate, and provide meteorological data to farmers appears to be high, but the provision of those data to farmers for decision-making appears mixed. Uzhydromet appears to have good infrastructure and well-trained staff able to collect and provide agriculturally relevant meteorological data to farmers… however farmers noted that the agricultural extension service is not oriented toward ameliorating risks from climate, and could provide better integration with hydrometeorological data provision…" [36]

Agricultural producers, including small-scale farmers, are keen to use meteorological and agrometeorological information too and do so to the possible extent. Yet the local reach of such information is at present minimal. Most information products from Uzhydromet are intended for higher management levels or not actionable by end users that often do not get the information contained at all. However, some of it is available online or in other ways by regional and district authorities. And even if they do, they do not necessarily have sufficient knowledge of how to use it effectively.

Small privately-owned weather stations for real-time monitoring of local meteorological conditions also gradually become a reality. Some are being set up through international technical assistance[37]; others are a result of private investments[38]. There is no formal interaction between the owners and operators of such private installations on one side and Uzhydromet on the other. However, the fact that there exists tangible demand for such information and its analysis points to new economic opportunities for providers of weather and agrometeorological information and very targeted services – and to the need to strengthen the coordination of data flows and, eventually, the exchange of data.

Additionality:

Activities under Component 3 will communicate information generated from Component 1 to the different national, regional, and local stakeholders, with a particular focus on farmers and smallholder producers. It provides knowledge management and dissemination of information and lessons learned for planning, monitoring and evaluation. The weather, climate, land resources, and climate change impact information will be disseminated to farmer groups at the local level. This activity will be closely linked to other projects that are under implementation and will function as testing sites. Though all provinces will

[36] Sutton W. R., Srivastava J. P., Neumann J. E., Droogers P., Boehlert B. B. Reducing the vulnerability of Uzbekistan's agricultural systems to climate change. Impact assessment and adaptation options. World Bank: Washington DC, 2013

[37] "Business Forum for Uzbekistan" project of UNDP and the Chamber of Commerce of Uzbekistan http://www.uz.undp.org/content/uzbekistan/en/home/presscenter/articles/2017/10/27/meteorological-stations-installed-to-help-farmers-in-the-tashken.html

[38] For instance, private horticultural enterprise 'Leo Garden' https://www.facebook.com/pg/OOO-Leo-garden--578072395704831/posts/?ref=page_internal in the Tashkent oblast operates a set of small weather stations which generate data then processed and analysed in France to produce recommendations: Meeting with Mirzayev (Schröder) Research Institute of Gardening, Viticulture and Winemaking, September 2018.

benefit from improved agro-advisory services, specific attention will be given to testing several methods of providing information in order to test farmers' preferences. Such testing will allow evaluation of the effectiveness of agrometeorology in the uptake of information at the local level. The project will ensure that women participate in training programs and that their needs are reflected in the training curriculum.

Gender equality lies at the core of all processes of the project. The project will integrate the gender issue in all its aspects and components, including technical assistance and capacity building, and will ensure the high participation of women in the implementation of the project activities. It estimates at least 30-40% of the participants in the training, workshops and project implementation activities to be covered by women. It will also ensure that gender participation and mainstreaming become standard practice during the project's life. Traditionally, cultural norms have influenced gender roles in agriculture, where men typically handle field cultivation and women focus on tasks such as crop processing and animal husbandry. During the consultations (see the list of persons met in Annexes 1, 2 and 3), it became evident that a more widespread and systematic dissemination of the project's services is still necessary for women. This dissemination requires specific plans and targets to ensure comprehensive coverage in the target regions. Changing climate patterns affecting crop cycles and water availability may exacerbate gender roles in the cropping sector. Therefore, it is crucial for women to have continued and tailored access to agro-meteorological information. A gender action plan must address specific needs for crop recommendations and bulletins aligned with the project's requirements. The beneficiary targeting strategy should focus on: (i) developing an agro-meteorological system that recognizes the critical role of women in the rural household economy, specifically in crop cultivation, cattle husbandry, and dairy product processing and marketing; and (ii) ongoing development of institutional and human technical capital at the provincial and national levels to enhance opportunities for women. While creating access to information along the value chain for women, project monitoring must disaggregate data by gender to measure the economic empowerment of women involved in project activities. As the project raises awareness about the meteorological system, capturing the outreach of interventions per target group. It is necessary to ensure that the monitoring and evaluation system captures outreach in terms of the number of women reached and increased productivity, along with systematic data collection for all relevant project-specific key indicators.

TV, radio, and social media will also be crucial for the diffusion of agro-meteorological information among farmers. TV broadcasts will allow for widespread reach and visual representation of climate services for farmers. Radio facilitated communication in remote areas, while social media platforms enabled quick dissemination of updates and engagement with farmers with good web connections and mobile phones.

J. Sustainability

Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project/programme.

The sustainability of the project outcomes is linked to the Uzhydromet mandate to maintain and develop the network of agrometeorological observations and to provide information about current and future agrometeorological conditions, including weather-related risks, to Uzbekistan's agricultural sector, authorities and organisations. With agricultural producers and Uzhydromet being an integral part of the design, the project will establish strong long-term connections between the various data producers and users at all levels and Uzhydromet as the provider of agrometeorological services. These linkages will remain once the project is completed, and users will continue to interact with Uzhydromet to receive the necessary information. With mechanisms for user interaction and monitoring project results and user satisfaction built through the project, external demand will strongly push the continuity of services and project results.

In particular, Uzhydromet will take ownership of the assets established by the project (e.g. the automated observation network, the databases, the servers) and fully ensure their operation and maintenance during and after the project implementation period with its own resources. The detailed operation and management plan will be elaborated during the development of the full project proposal.

The integration of climate services in key policies, strategies, plans and budgets supported by this project will provide a foundation for the uptake of climate information in decision-making and facilitate sustainable service provision in the long term. In accordance with Uzbekistan's INDC, the recent decree № 3281 of September 2017 by the President of the Republic of Uzbekistan requests the modernized placement of agricultural crops, in particular, intensive cucurbit plantations, gardens and vineyards, accounting for soil and climate conditions, the availability of water, regional modernization, yields and other factors; thus confirming the need and demand for systematically integrating climate-change information in long-term agricultural planning.

Identifying funding modalities for climate information products, including integration into the national budget, will contribute to sustainability. Similarly, climate information increasingly interests potential investors in agricultural business. This highlights the potential for bringing climate knowledge into business planning. It may bring new economic opportunities to Uzbekistan's agrometeorological network and services, thus ensuring its long-term sustainability and replicability.

In summary, in line with national policies, the project will provide a long-term vision for agrometeorological services in Uzbekistan, including user interaction and feedback mechanisms as well as legal and business model changes at Uzhydromet to create a sustainable and replicable service to protect the vulnerable through their enhanced ability to adapt to climate change. The project will result in automated stations installed at multiple locations and soil analysis equipment modernized at 23 laboratories, as well as delivering the facilities for data collection, exchange and knowledge management, thereby complementing and upgrading the existing basic infrastructure. This will be supported by providing extension services for horticultural end users and capacity building and training of some 150-200 Uzhydromet staff. Through these capacity development activities, awareness raising and a dedicated knowledge management component, their capacity will be enhanced and the sustainability of results facilitated. The holistic approach to climate services is tailored to Uzbekistan's circumstances and, therefore, is more likely to lead to sustainability rather than focusing on the provision of technical infrastructure alone.

Uzhydromet is committed to fully integrating project results into its daily operations. The project will not only help modernizee the agrometeorological network and service capacities but will also assist Uzhydromet in making legal and operational changes necessary to make the transformation sustainable. Among other elements, it will help adopt a new business model of cost-recovery that will provide a more reliable foundation for the sustainability of Uzhydromet and its services.

The project strategy for delivering weather and climate services also identifies social sustainability as one of the key qualities these services must have to be effective. More in particular, it will do that through the following actions:

- **Tailored products and services**: The project aims to specifically tailor products and services to meet the needs and preferences of women, as well as other socioeconomically disadvantaged and vulnerable groups. These groups have unique requirements that must be addressed through a composite and differentiated mix of distribution and communication channels. To this end, the project will explore various methods to ensure that women can easily access and use this crucial decision-making support. Options such as SMS messages, telegram groups, mobile apps, web portals, information bulletins through the mahalla committees will be considered and adopted in a flexible manner considering the specific socio-economic profile of the groups targeted. For women experiencing challenges in accessing and using smartphones, the project will consider providing internet subscription packages as relevant.
- **Formalised, inclusive partnerships**: Moreover, to ensure effective and equitable access to weather and climate information for women and other marginalized groups,

partnerships will be established with Mahalla Women Committees and key NGOs, including Women Business Associations and community-based women's organizations in targeted districts. Many rural women still rely on traditional information sources such as radio and local media and often accessing information through mahalla committees and local groups. The Women's Committees in the Mahalla play a vital role in collecting and disseminating information, serving as essential access points for rural women. Thus, it is critical to engage and consult with these committees, leveraging their influence in the community while employing a diverse array of dissemination tools and channels.

- **Skills development:** through a wide range of training packages for both extension delivery teams and users, the project will develop skills needed to sustain service delivery and usage.
- **Quality and effectiveness of services**: one of the key features of the Climate Services System (CSS) the project will contribute to develop is its feedback mechanism. This will maintain the relationships and knowledge exchange between service providers and users beyond the end of a project's life, so as to infuse new ideas, insights and responsiveness into climate services and keep climate services providers up to date on changing user requirements.

The project will therefore work collaboratively with communities to adapt technology to their specific livelihoods, enhancing relevance, accessibility, and utilization within rural agricultural communities. Climate services will therefore be robustly designed for effectiveness and shown to achieve measurable benefit for target beneficiaries during the project's lifetime. The engagement of endogenous rural institutions coupled with the participatory approach in co-designing products and services will contribute to ensure social sustainability as well as inclusivity, reliability, robustness and continued enhancement of the CSS.

K. Environmental and social impacts and risks

Provide an overview of the environmental and social impacts and risks identified as being relevant to the project/programme.

The project is not expected to have significant adverse environmental or social impacts. The project is therefore regarded to have a **low risk (Category C)** according to the Adaptation Fund's Environmental and Social Policy. According to IFAD's Environmental and Social Safeguards Screening Checklist, the project has a "**Low Environmental and Social Risk**" and a "**Moderate Climate Risk**". This means the project is not expected to have any adverse environmental or social impacts.

The checklist and IFAD's risk categorization of projects have been updated with the revision of IFAD's Social, Environmental and Climate Assessment Procedures (SECAP) in 2021. A project's risk to adversely impact people and the environment, as well its vulnerability to climate change are assessed and categorized into four different risk levels (low, moderate, substantial and high) in order to identify all possible risks as well as measures to mitigate them. The updated SECAP is aligned with the Adaptation Fund's Environmental and Social Policy, and its 15 safeguard areas and Gender Policy.

The entire project was screened for environmental and social risks against the 15 principles outlined in the Adaptation Fund Environmental and Social Policy. Under Component 2, there are no foreseen environmental and social risks. Under Component 1 and 3, the following three risks have been identified:

- Risk of vulnerable groups and women not having access to climate information services
- Risk of vulnerable groups and women not being consulted in the design of climate services

- Risk of misleading advisory (e.g. leading to wrong application of chemicals)

Appropriate measures to mitigate these risks have been identified and are described in Section K of Part III and are included in the project's Environmental and Social Assessment and Management Plan.

Environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the law	X	**Low/no risk**. Relevant national, regional and district authorities have been identified during project formulation to ensure compliance with all relevant laws. The project will be implemented in accordance with the relevant agricultural, digital technology and data sharing policies listed in Chapter D in Part II.
Access and equity		**Low risk**. This project targets vulnerable agricultural stakeholders, but their exclusion to climate services is a potential risk. This project will promote equitable access to climate services.
Marginalized and vulnerable groups		**Low risk**. Insufficient consultation of vulnerable groups in the design of the climate services is a potential risk. Vulnerable groups will be targeted and involved in the design of the climate services to ensure that the services are tailored to their needs.
Human rights	X	**No risk**. No risks of human rights violations have been identified. The project will not tolerate any human rights violations.
Gender equity and women's empowerment		**Low risk**. Insufficient consultation of women in the design of the climate services is a potential risk. The project has a Gender Action Plan. Women will be targeted and involved in the design of the climate services to ensure that the services are tailored to their needs.
Core labour rights	X	**No risk**. No risks have been identified.
Indigenous Peoples	X	**No risk**. No risks were identified.
Involuntary resettlement	X	**Not applicable**. This principle does not apply, as the project does not involve resettlement. No further assessment of potential impacts and risks has been carried out.
Protection of natural habitats	X	**Low/no risk**. No risks were identified. This project does not target protected areas.
Conservation of biological diversity	X	**Low/no risk**. No risks were identified. The project's digital information services are not expected to have a negative impact on biological diversity.
Climate change	X	**No/low risk**. The risk of the project being impacted by climate change impacts is low. The risk of the project substantially increasing greenhouse gas emissions is low.
Pollution prevention and resource efficiency		**Low risk**. Advisory on fertilizer application and pest and disease risk will be provided through the Climate Services System. The climate service will refer to the local PPQD extension officer to provide advice on pest and disease measures.
Public health	X	**No/low risk**. No risks were identified. The project will not have any negative effect on public health.
Physical and cultural	X	**No risk**. No risks were identified. The project's digital information services are not expected to have any impact

heritage		on cultural heritage.
Lands and soil conservation	X	**No/low risk**. No risks have been identified. The project will not promote or recommend unsustainable practices that will lead to land degradation.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Project implementation

Describe the arrangements for project implementation.

The figure below shows the implementation arrangements of the project. They are described in the following.

Ministry of Finance. The ministry will act as the official representative of Uzbekistan as the recipient, fulfilling the government fiduciary oversight and management responsibilities.

IFAD. The Fund is an accredited Multilateral Implementing Entity (MIE) for the Adaptation Fund. IFAD will be responsible for project cycle management, overseeing overall project progress, including financial oversight, monitoring and evaluation support, and technical backstopping and reporting to the Adaptation Fund. IFAD will also provide oversight and quality control of the proposed project, ensuring compliance with gender, environmental and social policies through its SECAP.

Inter-ministerial Steering Committee. The project will establish an inter-ministerial Steering Committee chaired by the Ministry of Ecology, Environmental Protection, and Climate Change (MoE). The committee will include key staff from Uzhydromet, the Ministry of Agriculture (MoA), and the Ministry of Water Resources (MWR). They will oversee the project and review annual work plans and budgets (AWPBs). The committee will ensure cooperation between departments of different ministries.

Project management unit (PMU). A unit will be established under the National Center for Climate Change of the Ministry of Ecology, Environmental Protection, and Climate Change (MoE) in Tashkent. The PMU will be responsible for the day-to-day management and execution of project activities, including overall administration, fiduciary aspects, procurement, monitoring and evaluation. The project management unit will work closely with government agencies, especially with Uzhydromet, MoA and MWR.

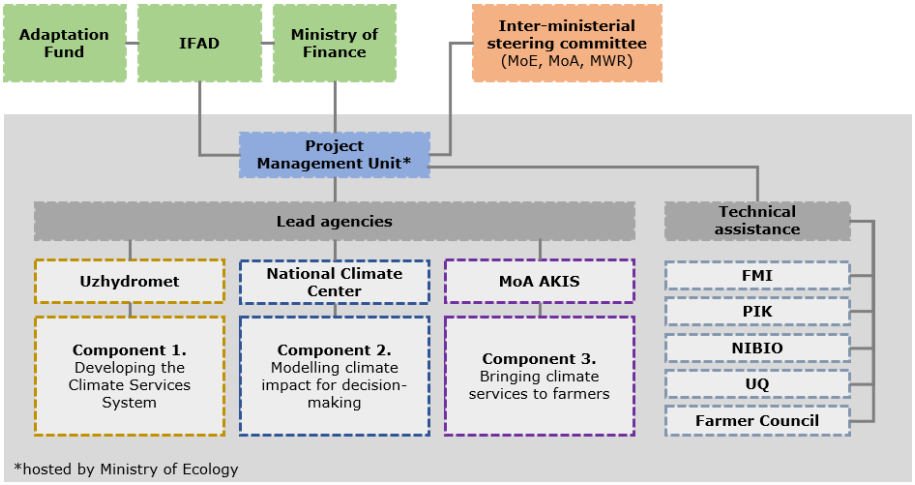

***Figure 20**. Implementation arrangements of the project*

Project delivery. The Project management unit (PMU) under the National Center for Climate Change has the overall responsibility for the project implementing and coordination. There will be a lead agency for each of the components.

- Component 1 will be implemented by *Uzhydromet* as the meteorological data collector and provider. Uzhydromet will work in close cooperation with the Ministry of Water Resources (MWR) and the Ministry of Agriculture (MoA), and can draw on international technical assistance to develop climate services.
- Component 2 will be led by the *National Center for Climate Change* under the MoE in its mandate to increase knowledge and awareness of the impacts of climate change on agriculture.
- Component 3 will be led by the *Agriculture, Knowledge and Innovation Services (AKIS)* under the MoA to provide climate services to farmers. The extension service will be supported by the Council of Farmers, Dekhan Farms and Landowners of Uzbekistan (Farmer Council) and staff from regional and district branches of AKIS and Uzhydromet, as well as other organization such as the Women's Business Association.

Each of the government implementing partners - namely Uzhydromet, the Ministry of Agriculture (MoA) and the Ministry of Water Resources (MWR) - will appoint focal points to coordinate project activities within the respective departments of their ministries, whose staff will implement the activities within their existing capacities.

International Technical Assistance. This project aims to introduce and adapt new knowledge and digital technologies in Uzbekistan. The following institutions were identified during the design phase to provide technical assistance to the project:

- The *Finnish Meteorological Institute (FMI)* will support the development and adaptation of meteorological services for the agricultural sector. They will help Uzhydromet to adapt the open source forecasting software SmartMet, which they have introduced to Uzhydromet.
- The *Potsdam Institute for Climate Impact Research (PIK)* will strengthen climate modeling capacity and provide models and climate projects for the Climate Services System based on their prior research they have undertaken in Central Asia (see their Climate Atlas for Central Asia).
- The *Norwegian Institute of Bioeconomy Research (NIBIO)* will support the Department of Chemicalisation, Plant Protection and Quarantine (PPQD) to test, validate and implement pest and disease models using weather forecasts using their digital pest prediction platform, called VIPS.
- The *University of Queensland (UQ)* one of the main institutions leading the *APSIM initiative (AI)* has been identified as the preferred provider for crop simulation modeling using the Agricultural Production Systems sIMulator (APSIM).

All technical assistance partners have software packages, data and models that can be adapted to the Uzbek context. FMI and PIK have existing collaborations with Uzhydromet through the FUME project and Green Central Asia initiative (see the section "F. Measures to avoid duplication" in Part II).

	Lead institution	Supporting institution	Technical assistance
Met services	Uzhydromet Met Department		Finnish Meteorological Institute
Agro-met services	Uzhydromet Agromet Department	AKIS	The University of Queensland
Climate modelling	Uzhydromet Met Department	Uzhydromet Hydro and Agromet	Potsdam Institute for Climate Impact Research
Pest/disease services	PPQD	Uzhydromet Agromet Department	Norwegian Institute of Bioeconomy Research
Hydrological services	Ministry of Water Resources	Uzhydromet Hydrological Department	
Extension services	AKIS		Farmer Council

***Figure 21**. Responsible institutions for each of the functional areas of the project*

Multidisciplinary teams to develop climate services. The design and delivery of climate services involves multiple disciplines. The project will establish multidisciplinary working groups – so called task forces – to bring together technical experts from different fields to develop a climate service. Each task force is made up of the following roles:

- *Met, agro-met and/or hydrological experts*
- *Agricultural experts* (e.g. agronomists, agricultural researchers, entomologists, or plant pathologists)
- *IT experts*
- *International experts* from FMI, PIK, NIBIO or UQ.

IT development. The IT experts will use agile software development, which means they will work very closely with users.

Co-design of the Climate Services System with test users. The development of the services will go through several phases. The end users, the farmers and those working with them, will be involved in all phases of the system service design. AKIS will mobilize their engagement with the support of the Council of Farmers, Dekhan Farms and Landowners of Uzbekistan (Farmer Council).

Gender focal point. The PMU will hire a social mobilization, targeting, gender, and social inclusion expert who will be responsible for overseeing the implementation of the Gender Action Plan. The expert will ensure that gender issues are integrated into the design and delivery of services. He/she will join task force meetings and review project implementation processes to provide feedback and suggestions on how to achieve the best possible project outcomes with respect to targeting, gender equality and women's empowerment. He/She will also establish partnership with key institutional actors, such as the Mahalla and the Business Women's Association. He/She will ensure that activities of the targeting and gender strategies are reflected in the following: (i) Preparation of the annual work plan and budget; (ii) Project progress reports; (iii) Project supervision. He/She will participate in the development of detailed TORs and tender documents of national and local service providers to various project components to ensure that target groups will be able to participate effectively in all components and meet the project's targets. He/She will also carry out regular field visits to supervise and support gender/targeting and social inclusion activities and detect potential targeting errors as well as adverse impact on women. Together with M&E and knowledge management staff the expert will also ensure gender considerations are respected in monitoring and evaluation, including the collection of sex-disaggregated data.

B. Financial and risk management

Describe the measures for financial and project/programme risk management.

Financial management arrangements. The project management unit includes a finance officer and an administrative assistant who will report directly to the project director. All staff are or will be trained on IFAD anticorruption policies. Project risk level and the adequacy of these arrangements will be monitored and assessed by IFAD's financial management division on an on-going basis and throughout the implementation of the project during supervision missions (see more here).

Budgeting. The project will prepare an annual workplan, budget and procurement plan every year. The procurement plan will be recorded in the project's accounting software, which will be able to generate timely and reliable reports on budget implementation by components, activities and financing categories as well as financiers and geographical area.

Flow of funds and disbursement arrangements. One designated account will be opened at a commercial bank to receive proceeds exclusively from the Adaptation Fund grant and will follow the revolving fund mechanism. The project will generate, approve and submit to IFAD its withdrawal applications through an online application that facilitates the approval and submission of WAs and provides the project with timely financial information and reports generated directly from the IFAD accounting system, further facilitating financial management at project level.

External audit. The project will submit an external audit report to IFAD within six months of the end of each financial year. The terms of reference for the audit will be reviewed and approved by IFAD prior to submission to the audit firm (to be selected through a competitive process in accordance with IFAD's auditing standards). IFAD will review the quality and timeliness of each audit report and ensure proper follow-up of audit recommendations contained in the mandatory Management Letter. Re-engagement of the audit firm will only be possible for a maximum of four consecutive years and will be subject to the outcome of IFAD's annual assessments. During project implementation, IFAD will also assess the possibility of assigning the role of external auditor for the project to the Supreme Audit Institution, depending on its capacity and availability.

Procurement. All procurement will be under the oversight of the project management unit. The procurement officer will oversee and carry out procurement activities in coordination with technical staff. The procurement of goods, works and services shall be carried out in accordance to IFAD's Project Procurement Guidelines (see more here). Each procurement plan will include the proposed contracts, methods of procurement and related IFAD review procedures. All contracts will be listed in the register of contracts, which will be updated and submitted to the IFAD country director on a quarterly basis. IFAD's review of and no-objection to a procurement plan is compulsory.

Fraud prevention. Fraud risks will be addressed in accordance with the Revised IFAD Policy on Preventing Fraud and Corruption in its Activities and Operations (see more here). IFAD's Anti-Corruption Policy establishes zero tolerance for prohibited practices, such as fraud and corruption, in IFAD-financed or managed operations and activities.

***Table 16**. Main potential risks to programme success and mitigation strategies. Note that social and environmental risk are addressed in the project's environmental and social management plan.*

Risk	Assessment	Mitigation measures
Changes in government reduce the ownership and slow down implementation	Low	Implementation will be carried out by the same project management unit under National Center for Climate Change. The unit will continue to operate regardless of changes in government.

Lack of collaboration and data sharing between ministries	High	The project structure foresees an inter-ministerial steering committee of MoE, MWR and MoA to govern the project. The project management unit will be located in the National Centre for Climate Change - the highest advisory body to the President of the Republic of Uzbekistan on climate change mitigation and adaptation issues - whose mandate is to facilitate cooperation between government institutions. The project structure foresees that different agencies led on the implementation of components. The project aims to establish Standard Operational Procedures (SOPs), rules that govern what and how data is shared between ministries for various purposes. IFAD recommends that the Ministry of Environment request a presidential decree that would pave the way for ministries to collaborate on data sharing.
Conflicting interests among stakeholders	Moderate	The project will mitigate potential conflicting interests among stakeholders through the establishment of an inclusive consultation and coordination mechanism for the development and delivery of agrometeorological services.
Climate data will not be made freely available (open source)	High	The project will find solutions and explore regulatory ways to make agro-meteorological data open source.
Restructuring of AKIS limiting outreach to farmers	High	The project will engage the Council of Farmers, Dekhan Farms and Landowners of Uzbekistan (Farmer Council) to assist AKIS in mobilizing and reaching out to farmers. The project will also explore outreach mechanisms with the Women's Business Association.
Risk of insufficient national expertise to design and provide climate services	High	The project will involve international technical assistance from renowned institutes that are leaders in their respective fields. These institutes will transfer know-how, models, and data to Uzbek institutions.
Delays in implementation because key activities are not carried out in time	Moderate	The project will follow a phased approach. Different service components of the Climate Services System can be developed separately. Component 2 can be implemented independently of the other two components.
Operation and maintenance of infrastructure and equipment	Moderate	Infrastructure development, such as the establishment of new weather stations, will take place within the existing Uzhydromet network, for which maintenance procedures already exist. These procedures will be extended to new stations and equipment.
International instability due to the war in Ukraine	Low	Implementation is unlikely to be linked to regional instability.
Exchange rate. The USD-UZS exchange rate evolves unfavourably thus reducing available budget for implementation	Moderate	The proposed exchange rate is in line with forecasts for the next two years, and price contingencies (inflation) have been included in the budget. Payments will be done in tranches at different times to mitigate exchange rate fluctuations.

C. Environmental and social risk management

Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy and Gender Policy of the Adaptation Fund.

During the project formulation the following activities were carried out to meet the requirements of the Adaptation Fund's Environmental and Social Policy and IFAD's environmental and climate assessment procedures (SECAP):

- Screening of all project activities against the Adaptation Fund's 15 environmental and social principles to determine the project's risk category, and applying IFAD's environmental and social safeguards screening checklist (Section K in Part II);
- Developing an environmental and social management plan (see annex)
- Developing a gender action plan (see annex)
- Laying out a grievance redress mechanism.

Environment and social management plan (ESMP). The project management unit will implement the plan found in annex 5. It lists environmental and social risks, lays out measures how to mitigate them, and specifies how the measures will be verified.

The entire project was screened for environmental and social risks against the 15 principles outlined in the Adaptation Fund Environmental and Social Policy. Environmental and social risks were identified for Principles 2 (access and equity), 3 (marginalized groups), 5 (gender), and 8 (pollutants). As shown in the table in Section K of Part II, no risks were identified for the other principles. Under Component 2, there are no foreseen environmental and social risks. Under Component 1 and 3, the following three risks have been identified:

- Risk of vulnerable groups and women not having access to climate information services
- Risk of vulnerable groups and women not being consulted in the design of climate services
- Risk of misleading advisory (e.g. leading to wrong application of chemicals)

The project will apply the following measures to mitigate these risks:

- Climate services will be freely available and easily accessible.
- A user assessment in the first year of the project will identify and describe all user types and needs, making sure no vulnerable group or community is left out.
- A gender assessment will specifically look into female user types and their needs.
- The provision of advisory will be location and user specific, taking into account the needs of different users.
- The selection of test users for the design of the climate services will ensure that all user types are represented, including vulnerable groups and women.
- A communication campaign will be carried out to widely promote climate services.
- Farmer seminars to promote climate service will target all user types, including vulnerable groups and women.
- Forecasts clearly communicate the likelihood of weather phenomena to occur.
- No digital advice is given on the type and amount of pesticide to be applied. The advice will refer to local extension officers from AKIS and/or PPQD on pest control measures.
- The climate services system will include a grievance redress mechanism to capture complaints and feedback that will be used to resolve complaints and improve the overall quality of service delivery.

The costs for implementing the plan are fully embedded in the project's execution and implementation budget. Costs for mitigation measures are part of the project cost. As most of the risks are social in nature, the social mobilisation and gender expert of the PMU will have the main responsibility for the implementation of mitigation measures.

IFAD will conduct an in-country supervision mission at least once a year in accordance with its supervision framework and guidelines, which will include a review of the implementation of the ESMP and the performance of the grievance redress mechanism.

Gender action plan. A plan has been developed that mainstreams gender throughout project. Consultation activities and demands analysis will be carried out in the first year of the project to (i) refine information needs and priorities; (ii) tailor functional uses of the selected communication channels to women specific livelihoods; (iii) tailor climate smart advisory to women's expressed interests.

Grievance and redress mechanism. The project will establish a complaints resolution procedure according to IFAD's social and environmental policies and its Social, Environmental and Climate Assessment Procedures (SECAP) that aims to prevent and mitigate undue harm to people and the environment.

Those who believe that they are or can potentially be adversely affected by the project can submit a formal complaint and raise concerns that the project is not complying with its social and environmental policies or commitments. Action will be taken on all submitted grievances.

Any national can use the mechanism to submit complaints without undue access restrictions or conditions.

The project aims to prevent grievances by consulting stakeholders from the start, by providing them with sufficient and timely information, and by responding to their concerns.

Complaints may be made orally, in writing, or electronically. The project will embed a grievance redress mechanism into the Climate Services System. Users will be able to submit feedback and complaints through the web portal and mobile application. They will also have the opportunity to submit feedback/complaints to local Uzhydromet and AKIS staff. All feedback/complaints submitted through the web portal and mobile application will be stored in a database.

The Project Management Unit will designate a staff member as the Complaint Manager, most likely the social mobilization and gender expert with support of the M&E and KM officer. This person will manage the complaint database and coordinate the project's response to the feedback/complaint. The costs for addressing complaints are fully embedded in the project's execution and implementation budget.

Information on the existence and functioning of the project's complaints mechanism will be shared with communities and other stakeholders during end-user and stakeholder meetings.

The mechanism has several levels for dealing with grievances and complaints. The first is at the field level where field staff try to resolve the complaint. If the grievance is not resolved at this level, it will be escalated to the project management unit – the second level of the mechanism. A resolution will be sought by the project management unit. Complaints may be further escalated to the management of MoE or to the Steering Committee of the project. All complaints submitted at the level of the project management unit and above, as well as all digitally submitted complaints, will be included in progress reports to IFAD. IFAD will review these during supervision.

Reporting complaints to IFAD. In cases where the project does not adequately respond or if the complainants feel they might be subject to retaliation, the issue may be brought straight to IFAD following a separate complaint's procedure. More information can be found on the website of IFAD's accountability and complaints procedures, including IFAD's Complaints Procedure and the Enhanced Complaints Procedure.

D. Monitoring and evaluation

Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan, in compliance with the ESP and the Gender Policy of the Adaptation Fund.

Project monitoring and evaluation (M&E) will be responsibility of the Project Management Unit. The unit will develop a monitoring and evaluation system and manual in the first year to capture M&E requirements of the new project. The project will establish a monitoring and evaluation system with dashboards. Data collected in the field will be ingested into the system. The M&E and KM officer will manage the system, work closely with implementing partners and train them on how to collect M&E data. The M&E system will:

- produce, organize and disseminate the information needed for the strategic management of the project
- document the results and lessons learned for internal use and public dissemination
- respond to the information needs of the Adaptation Fund, IFAD and the Government on the activities, immediate outcomes and impact of the project.

Day to day monitoring of implementation progress will be the responsibility of the project team, based on the project's annual work plan and its indicators. During the first months of the project, the project team will complete and fine-tune baseline data for each indicator, and will define and fine-tune performance. Specific targets for the first year of implementation, progress indicators, and their means of verification will be developed at the inception workshop.

Project inception workshop. Within four months of project start, a workshop will be held with the project team, relevant government counterparts and IFAD. The inception workshop is critical to build ownership and plan the annual work plan for the first year. The Project Management Unit will present the modalities of project implementation and execution, and assist the project team in understanding and taking ownership of the project objectives. A project inception report is prepared immediately after the inception workshop. It will include:

- An annual work plan and budget for the first year of implementation, divided into quarterly timeframes, detailing activities and targets
- An M&E plan for the duration of the project
- A description of the institutional roles and responsibilities and feedback mechanisms of project-related partners
- the outline and scope of the baseline study
- A section on progress to date on project establishment and start-up activities, and an update on any changes in external conditions that may affect project implementation.

Baseline study. A baseline study will be conducted within the first year to collect data and serve as the basis for the assessment of how efficiently the activity has been implemented and results achieved. The survey will follow IFAD's core outcome indicators measurement guidelines (read more here).

Quarterly progress reports. Project implementing partners in the field will submit these reports to the project management unit to ensure continuous monitoring of project activities and identify challenges to adopt necessary corrective measures in due time.

Annual project performance report of the Adaptation Fund. The project will submit a project performance report each year using the Adaptation Fund template. This report includes information on finance, procurement, risk assessment, rating, indicators, results, and lessons learned. The project will be reviewed and completed by IFAD, which will forward the report to the Adaptation Fund.

Supervision. IFAD will undertake an in-country supervision mission at least once per year following its supervision framework and guidelines. Additional implementation support from IFAD on specific identified issues will be mobilized if considered necessary by the Government and IFAD. The supervision report will highlight, in addition to the routine supervision tasks (fiduciary, safeguard compliance and programme implementation), the main thematic or performance areas that require strengthening and would imply deployment of additional inputs for capacity building, in-depth analytical studies or review of existing policies.

Mid-term review. This will be carried out in the third year of the project by an independent party. It will assess operational aspects such as program management and implementation of activities, as well as the extent to which objectives are being met. Corrective actions will be decided to ensure that the program achieves impact. The study will include the target group and a control group, which is essential to determine the attribution of results to program activities.

Final evaluation. This will take place three months before the end of the project and will include a project completion survey. It will be conducted by an independent party. The survey will include the same set of questions used at baseline to allow comparison with baseline results. In addition, a panel of households will be interviewed to provide a qualitative analysis of program impacts. Analysis will also be conducted by type of beneficiary, region and gender of household head.

***Table 17**. M&E budget*

M&E item	Responsibility	Timing	Total available budget in USD
M&E and KM officer	Project coordinator	Continuous	108,000
Baseline study	External consultants	Year 1	50,000
Inception workshop and M&E plan development	Project coordinator and M&E officer	Year 1	20,000
Mid-term evaluation	IFAD	Year 3	50,000
Final evaluation	External consultants	Year 5	50,000
Technical support and supervision	IFAD	Continuous	370,000

E. Results framework

Include a results framework for the project proposal, including milestones, targets and indicators, including one or more core outcome indicators of the Adaptation Fund Results Framework, and in compliance with the Gender Policy of the Adaptation Fund.

Objective	Indicator	Target	Verification
Improve the resilience of the horticulture sector to climate change	Number of people targeted by the project in order to increase their resilience to the impacts of climate change	**Total**: 541,000 beneficiaries (women: 264,300) in 100,000 households **Direct**: 31,000 people (women: 9,300) in 30,000 households **Indirect**: 510,000 beneficiaries (women: 255,000) in 70,000 households	Baseline, mid-term evaluation and completion survey, as per methodologies for reporting Adaptation Fund core impact indicators
Component 1. Development of a near real-time farm advisory information			
Outcome 1.1. Climate services system for agriculture developed	Number of agricultural sector services developed to meet evolving needs from changing and variable climate	8 services (10-day forecast, weather warnings, seasonal forecast, climate projections, crop forecasts, resilience advisory, pest forecasts, water risk forecasts)	Project M&E and progress reports
Output 1.1.1. Agro-meteorological station networks improved with automatic weather stations	Number of automated agricultural weather stations installed	40 stations	Project M&E and progress reports
	Number of regional and district Uzhydromet facilities equipped with modern equipment	80 facilities	Project M&E and progress reports
Output 1.1.2. Development of agrometeorological climate services	Number of weather alerts customized for the agricultural sector	10 weather alerts customized	Project M&E and progress reports
	Establishment of seasonal forecast service	1 long range weather forecast	Project M&E and progress reports
	Number of crops for which forecast advice is given	8 crops	Project M&E and progress reports
	Number of pests for which forecasts are provided	7 pests	Project M&E and progress reports
	Number of hydrological services developed	1 hydrological service	Project M&E and progress reports

Output 1.1.3. Development of IT infrastructure	Number of Climate Services System interfaces	2 interfaces (web-portal and mobile app)	Interfaces published on the web
Outcome 1.2. Institutional and technical capacity strengthened to facilitate data sharing, analysis and usage of climate information to users at all levels	Number of staff whose capacity to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	400 staff (130 women)	Project M&E and progress reports
Output 1.2.1. Inter-ministerial Standard Operating Procedures (SOPs) for climatology and agro-meteorology	Number of ministries sharing climate data through Standard Operating Procedures	3 ministries (MoE, MRW, MoA)	Project M&E and progress reports
Output 1.2.2. Training packages for the development and operation of the climate services system	Number of staff trained to design the Climate Services System	70 staff (30 women)	Project M&E and progress reports
	Number of staff trained to operate the Climate Services System	350 staff (100 women)	Project M&E and progress reports
Component 2. Modeling the impact of climate change on agriculture to improve decision-making and planning			
Outcome 2.1. Long term scenario and geospatial data access integrated within the government system	Number of policies and regulations that promote and enforce resilience measures	3 policies and regulations	Project M&E and progress reports
Output 2.1.1. Available data collated and agro-climate impact models developed	Number of climate records digitized	10 million records	Project M&E and progress reports
	Number of modules for climatic, hydrological and crop suitability modelling	3 modules (1 climate, 1 hydrology, 1 crop suitability)	Project M&E and progress reports
Output 2.1.2. Climate change impacts and adaptation studies in agriculture	Number of climate studies produced	4 studies	Project M&E and progress reports
	Number of gender assessments carried out	1 gender assessment	Project M&E and progress reports
Outcome 2.2. Strengthened capacity to deliver agro-climatological information products to policy makers	Percent of rural population aware of predicted adverse impacts of climate change in agriculture, and of appropriate responses	30% of rural population	Mid-term evaluation and completion survey
Output 2.2.1. Training programme for climate modelling and scenario development	Number of people trained on climate modeling	50 people trained (30 women)	Project M&E and progress reports
Output 2.2.2. Training on impact	Number of climate conferences organized or	5 conferences	Project M&E and progress reports

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scenarios and adaptation strategies for policymakers and community representatives	contributed to		
	Number of staff trained as trainers on climate change impacts on ag	350 staff (100 women)	Project M&E and progress reports
	Number of local policy makers and community representatives trained on climate change impacts on ag	1,000 people (30% women)	Project M&E and progress reports
Component 3. Reaching the last mile and getting climate services to farmers			
Outcome 3.1. Rural population aware of predicted adverse impacts of climate change in agriculture, and of appropriate responses	Percent of households reporting adoption of environmentally sustainable and climate-resilient technologies and practices	30%	IFAD core outcome indicator CI 3.2.2. to be measured through baseline mid-term evaluation and completion surveys
	Percentage of households satisfied with project-supported climate services	75%	IFAD core outcome indicator CI SF.2.1. to be measured through baseline mid-term evaluation and completion surveys
Output 3.1.1. Capacity of extension services strengthened to deliver climate services	Number of extension offices strengthened to integrate agro-meteorological services into their operations	80 AKIS branches	Project M&E and progress reports
Output 3.1.2. Mobilization of end-users for the co-design of climate services	Number of farmers engaged in the design of climate information services	1,000 farmers (30% women)	Project M&E and progress reports
Output 3.1.3. Training of trainers and a communication campaign for promotion of climate services	Number of field staff trained as trainers	350 staff (100 women)	Project M&E and progress reports
	Number of end-users trained on using climate information services	30,000 end-users (30% women)	Project M&E and progress reports
	Number of persons provided with climate information services	100,000 end-users	Project M&E and progress reports
Output 3.1.4. Participatory assessment of app usability and impact on crop decision and productivity	Number of impact assessments carried out	1 impact assessment	Impact assessment

F. Alignment with the results framework of the Adaptation Fund

Demonstrate how the project aligns with the Results Framework of the Adaptation Fund.

***Table 18**. Outcome-level alignment of the project's results framework with the Adaptation Fund framework*

Project outcomes	Project outcome indicators	Adaptation Fund outcome	Adaptation Fund outcome indicator	Grant amount (USD)
Component 1. Development of a near real-time farm advisory information system				
Outcome 1.1. Climate services for agriculture developed	Number of agricultural sector services developed to meet evolving needs from changing and variable climate	Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	4.1. Responsiveness of development sector services to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	4,140,500
Outcome 1.2. Institutional and technical capacity strengthened to facilitate data sharing, analysis and usage of climate information to users at all levels	Number of staff whose capacity to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	460,500
Component 2. Modeling the impact of climate change on agriculture to improve decision-making and planning				
Outcome 2.1. Long term scenario and geospatial data access integrated within the government system	Number of policies and regulations that promote and enforce resilience measures	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy	1,075,000
Outcome 2.2. Strengthened capacity to deliver agro-climatological information products to policy makers	Percent of rural population aware of predicted adverse impacts of climate change in agriculture, and of appropriate responses	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	900,000
Component 3. Reaching the last mile and getting climate services to farmers				

Outcome 3.1. Rural population aware of predicted adverse impacts of climate change in agriculture, and of appropriate responses	• Percent of households reporting adoption of environmentally sustainable and climate-resilient technologies and practices • Percentage of households satisfied with project-supported climate services	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	1,784,000

Table 19. *Output-level alignment of the project's results framework with the Adaptation Fund framework*

Project outputs	**Project output indicators**	**Adaptation Fund output**	**Adaptation Fund output indicator**	**Grant amount (USD)**
Component 1. Development of a near real-time farm advisory information system				
Output 1.1.1. Agro-meteorological station networks improved with automatic weather stations	Number of automated agricultural weather stations installed	Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change	1,519,500
Output 1.1.2. Development of agrometeorological climate services	• Number of weather alerts customized for the agricultural sector • Establishment of seasonal forecast service • Number of crops for which forecast advice is given • Number of pests for which forecasts are provided • Number of hydrological services developed	Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.1. No. and type of development sector services modified to respond to new conditions resulting from climate variability and change	1,821,000
Output 1.1.3. Development of IT infrastructure	Number of Climate Services System interfaces	Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.1. No. and type of development sector services modified to respond to new conditions resulting from climate variability and change	800,000

Output 1.2.1. Inter-ministerial Standard Operating Procedures (SOPs) for climatology and agro-meteorology	Number of ministries sharing climate data through Standard Operating Procedures	Output 2.1: Strengthened capacity of national and sub-national centers and networks to respond rapidly to extreme weather events	2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks	80,000
Output 1.2.2. Training packages for the development and operation of the climate services system	• Number of staff trained to design the Climate Services System • Number of staff trained to operate the Climate Services System	Output 2.1: Strengthened capacity of national and sub-national centers and networks to respond rapidly to extreme weather events	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events (by gender)	380,500
Component 2. Modeling the impact of climate change on agriculture to improve decision-making and planning				
Output 2.1.1. Available data collated and agro-climate impact models developed	• Number of climate records digitized • Climate projections from 1 regional model	Not applicable	Not applicable	725,000
Output 2.1.2. Climate change impacts and adaptation studies in agriculture	• Number of climate studies produced • Number of gender assessments carried out	Output 7: Improved integration of climate-resilience strategies into country development plans	7.1. No. of policies introduced or adjusted to address climate change risks	350,000
Output 2.2.1. Training programme for climate modelling and scenario development	Number of people trained on climate modelling	Output 2.1: Strengthened capacity of national and sub-national centers and networks to respond rapidly to extreme weather events	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events (by gender)	80,000
Output 2.2.2. Training on impact scenarios and adaptation strategies for policymakers and community representatives	• Number of climate conferences organized or contributed to • Number of staff trained as trainers on climate change impacts on agriculture • Number of local policy makers and community representatives trained on climate change impacts on agriculture	Output 3.2: Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.2 No. of tools and guidelines developed (thematic, sectoral, institutional) and shared with relevant stakeholders	820,000
Component 3. Reaching the last mile and getting climate services to farmers				
Output 3.1.1. Capacity of extension services strengthened to deliver	Number of extension offices strengthened to integrate agro-meteorological services into their	Output 3.2: Strengthened capacity of national and subnational stakeholders and	3.2.1 No. of technical committees/associations formed to ensure transfer of	258,000

climate services	operations	entities to capture and disseminate knowledge and learning	knowledge	
Output 3.1.2. Mobilization of end-users for the co-design of climate services	Number of farmers engaged in the design of climate information services	Output 3.2: Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.1 No. of technical committees/associations formed to ensure transfer of knowledge	340,000
Output 3.1.3. Training of trainers and a communication campaign for promotion of climate services	• Number of field staff trained as trainers • Number of end-users trained on using climate information services • Number of persons provided with climate information services	Output 3.2: Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.2 No. of tools and guidelines developed (thematic, sectoral, institutional) and shared with relevant stakeholders	1,154,000
Output 3.1.4. Participatory assessment of app usability and impact on crop decision and productivity	Number of impact assessments carried out	Not applicable	Not applicable	32,000

G. Budget

Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

***Table 20**. Detailed budget of the project per activity*

Project components	Project outcome	Project output	Activities	Unit	No. of units	Unit cost (in $)	Total cost (in $)
Component 1. Development of a near real-time farm advisory information system	Outcome 1.1. Climate services for agriculture developed	Output 1.1.1. Agro-meteorological station networks improved with automatic weather stations	Inventory, feasibility study, participatory site selection, procurement, installation and calibration of equipment	Person-days	250	200	50000
			International systems integration and meteorological expert	Lump sum/year	5	20000	100000
			Climate lab	Lump sum/year	1	440000	440000
			Agro-met stations	Number of devices	40	17800	712000
			Smart pheromone traps	Number of devices	40	500	20000
			Tablets	Number of devices	100	800	80000
			Multi-functional printers	Number of devices	15	500	7500
			Mobile soil temperature and moisture instruments	Number of devices	80	1000	80000
			Computers	Number of devices	20	1500	30000
		Output 1.1.2. Development of agrometeorological climate services	Capacity assessment of met services and further setup and calibration of SmartMet and SmartMet Alert software and weather forecast models	Person-days	500	300	150000
			Technical support from the Finnish Meteorological Institute (FMI)	Lump sum/year	4	60000	240000

			Establishment of seasonal forecast service for agriculture	Person-days	300	300	90000
			Technical assistance by e.g. Copernicus Climate Change Service (C3S)	Lump sum/year	4	10000	40000
			Installing crop simulation framework software	Person-days	10	300	3000
			Crop simulation model development by a modeler, agronomist, agro-meteorologist, etc.	Crop model	8	40000	320000
			Technical assistance by crop simulation framework software provider such as The University of Queensland for APSIM	Lump sum/year	4	50000	200000
			Develop digital field data collection protocols	Person-days	80	200	16000
			Develop a database for adaptation measures for climate-related hazards	Person-days	100	200	20000
			Develop operational guidelines for agro-met services	Person-days	20	200	4000
			Installing the VIPS Platform	Person-days	10	300	3000
			Pest forecast model development by a modeler, entomologist, plant pathologist, agro-meteorologist, etc.	Pest model	6	60000	360000
			Technical assistance by Norwegian Institute of Bioeconomy Research (NIBIO)	Lump sum/year	4	60000	240000
			IT app integration for “Agroko'makchi” Agro Helper	Person-days	50	300	15000
			Development of hydrological service	Lump sum	1	120000	120000

		Output 1.1.3. Development of IT infrastructure	All IT related developments of the Climate Services System	Person-days	1500	250	375000
			Full time IT coordinator overseeing the development of climate services	Person-days	1000	250	250000
			Data storage system	Data storage	1	65000	65000
			Server	Server	1	110000	110000
	Outcome 1.2. Institutional and technical capacity strengthened to facilitate data sharing, analysis and usage of climate information to users at all levels	Output 1.2.1. Inter-ministerial Standard Operating Procedures (SOPs) for climatology and agro-meteorology	Assessment of providers and users and infrastructure, drafting workflows and standards, testing and evaluating procedures	Person-days	200	200	40000
			Inter-ministerial consultations on the design of the standard operating procedures	Meetings	10	4000	40000
		Output 1.2.2. Training packages for the development and operation of the climate services system	Field trips of Uzhydromet experts to farmers	Meetings	15	1500	22500
			Training needs assessment	Person-days	20	200	4000
			Organizing first phase trainings and training evaluation	Person-days	50	200	10000
			Training packages to design the Climate Services System	Training	11	15000	180000
			Organizing second phase trainings and training evaluation	Person-days	20	200	4000
			Trainings on how to operate the Climate Services System	Training	16	10000	160000
Sub-total Component 1							4601000
Component 2. Modeling the impact of climate change on agriculture	Outcome 2.1. Long term scenario and geospatial data access	Output 2.1.1. Available data collated and agro-climate impact models developed	Digitalization of climate records	Lump sum/year	5	48000	225000
			Adapting regional climate models and production of climate projections	Person-days	1000	200	200000

to improve decision-making and planning	integrated within the government system		Technical assistance from Potsdam Institute for Climate Impact Research (PIK) to adapt regional climate models and production of climate projections	Lump sum/year	3	100000	300000
		Output 2.1.2. Climate change impacts and adaptation studies in agriculture	Studies on crop suitability, water, crop pests, and horticulture	Study	4	70000	280000
			Knowledge management coordination	Lump sum/year	5	5800	29000
			Gender in agriculture and climate change study	Study	1	41000	41000
	Outcome 2.2. Strengthened capacity to deliver agro-climatological information products to policy makers	Output 2.2.1. Training programme for climate modelling and scenario development	Training on climate impact modeling	Training	1	20000	20000
			Scientific exchange programme with the Potsdam Institute for Climate Impact Research (PIK)	3-month exchange	3	20000	60000
		Output 2.2.2. Training on impact scenarios and adaptation strategies for policymakers and community representatives	Climate conferences	Lump sum/year	5	100000	500000
			Training with journalists for climate impacts on ag for local decision makers	Lump sum/year	2	10000	20000
			Development of curriculum for training of trainers for climate impacts on ag for local decision makers	Person-days	1	50000	50000
			Training of trainers programme for climate impacts on ag for local decision makers	Workshop	500	500	250000
Sub-total Component 2							1975000
Component 3. Reaching the last mile and getting climate services to farmers	Outcome 3.1. Rural population aware of predicted adverse	Output 3.1.1. Capacity of extension services strengthened to deliver climate services	Capacity needs assessment of extension services	Person-days	30	600	18000
			Provision of equipment and training to AKIS regional and district branches	Extension branches	80	3000	240000

	impacts of climate change in agriculture, and of appropriate responses	Output 3.1.2. Mobilization of end-users for the co-design of climate services	User assessment for climate information services	Person-days	200	200	40000
			Social mobilization, gender and inclusion expert	Person-month	60	1800	108000
			User engagement with 100 farmers in the pretotyping phase in 40 districts	Meeting	200	100	20000
			User engagement with 1,000 farmers in the prototyping phase in 40 districts	Meeting	120	100	12000
			Time compensation and incentives for test users in pretotype phase	User	300	200	60000
			Time compensation and incentives for test users in prototype phase	User	1000	100	100000
		Output 3.1.3. Training of trainers and a communication campaign for promotion of climate services	Development of curriculum for training of trainers for climate information services	Person-days	50	200	10000
			Gender-responsive activities such as internet subscriptions	Lump sum/year	4	15000	60000
			Training of trainers programme for climate information services	Workshop	2	50000	100000
			Facilitation of outreach by the Farmer Council	Lump sum/year	5	60000	300000
			Farmer seminars in 40 districts	Meeting	1000	300	300000
			Communication Specialist (full-time consultant, including travel)	Person-days	420	200	84000
			Communication materials	Lump sum/year	2	150000	300000
		Output 3.1.4. Participatory assessment of app usability and impact on crop decision	Participatory impact assessment	Lump sum/year	1	32000	32000

		and productivity					
Sub-total Component 3							1784000
Total							**8360000**
Project Management Unit (Project Execution Cost)			Project manager	Person-month	60	2000	120000
			Technical lead for agrometeorology	Person-month	60	1800	108000
			Finance manager	Person-month	60	1800	108000
			M&E and KM officer	Person-month	60	1800	108000
			Procurement specialist	Person-month	56	1800	100800
			Office administrator	Person-month	30	900	27000
			Baseline study	Study	1	50000	50000
			Inception workshop	Workshop	1	20000	20000
			Final evaluation	Evaluation	1	50000	50000
			Annual audit	Per year	5	10000	50000
			Office equipment for staff	Lump sum	1	58200	58200
			Office operating expenses and staff travel	Lump sum/year	5	14000	70000
Project Execution Cost (9.5%)							**870,000**
Total Project Cost							**9,230,000**
Operational and Financial Management							150,000
Project Development and implementation support							250,000
Technical support and supervision							370,000
Project Cycle Management Fee Charged by the Implementing Entity (8.5%)							**770000**
Amount of Financing Requested							**10,000,000**

Footnote: The project funds will not be used to cover the taxes (VAT/duties). These will be an in-kind contribution in the form of exemptions from the Government of Uzbekistan as in all other IFAD projects in the country.

H. Disbursement schedule

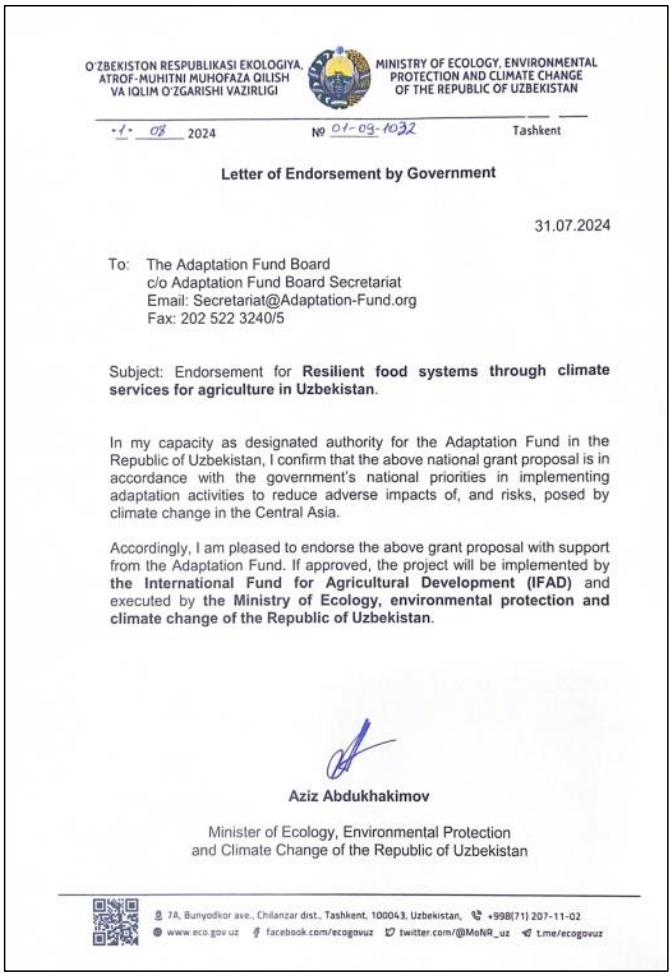
Include a disbursement schedule with time-bound milestones.

Disbursement type (in USD)	Year 1 2025-26	Year 2 2026-27	Year 3 2027-28	Year 4 2028-29	Year 5 2029-30	Total (USD)
Total project cost	2,003,700	2,012,200	2,348,700	1,611,200	1,254,200	9,230,000
Implementing entity fees	154,000	154,000	154,000	154,000	154,000	770,000
Total	2,157,700	2,166,200	2,502,700	1,765,200	1,408,200	10,000,000

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement by designated government authority

H.E. Mr. Aziz Abdukhakimov *Ministry of Ecology, Environment Protection and Climate Change* *Chilanzar district, Bunyodkor ave., 7-A, Tashkent Uzbekistan* *Republic of Uzbekistan*	*Date: 31 July 2024*



O'ZBEKISTON RESPUBLIKASI EKOLOGIYA, ATROF-MUHITNI MUHOFAZA QILISH VA IQLIM O'ZGARISHI VAZIRLIGI

MINISTRY OF ECOLOGY, ENVIRONMENTAL PROTECTION AND CLIMATE CHANGE OF THE REPUBLIC OF UZBEKISTAN

01.08 2024 № 01-09-1032 Tashkent

Letter of Endorsement by Government

31.07.2024

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement for **Resilient food systems through climate services for agriculture in Uzbekistan**.

In my capacity as designated authority for the Adaptation Fund in the Republic of Uzbekistan, I confirm that the above national grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Central Asia.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by **the International Fund for Agricultural Development (IFAD)** and executed by **the Ministry of Ecology, environmental protection and climate change of the Republic of Uzbekistan**.

Aziz Abdukhakimov

Minister of Ecology, Environmental Protection and Climate Change of the Republic of Uzbekistan

7A, Bunyodkor ave., Chilanzar dist., Tashkent, 100043, Uzbekistan, +998(71) 207-11-02
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B. Implementing entity certification

Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
Implementing Entity coordinator: Pierre-Yves Guedez Lead Multilateral Climate & Environmental Funds (AF, GCF, GEF), IFAD 	e-mail: p.guedez@ifad.org
Mr Juan Carlos Mendoza Casadiegos Director Environment, Climate, Gender and Social Inclusion Division	
Date: 7 August 2024	**Email**: ecgmailbox@ifad.org
Project contact person	
Mr Walid Nasr Regional Lead Climate and Environment Specialist	**Email**: w.nasr@ifad.org
Ms Laura Mattioli IFAD Country Director in Uzbekistan	**Email**: l.mattioli@ifad.org

Field Code Changed

ANNEXES

Annex 1. People and organizations met

1. People and organizations met during the design missions in June 2023 and May 2024

Name	Sex	Position	Organization	Contacts	Meeting date	Type of meeting
Abduqahhor	M	Main specialist of the Hydromet centre in Karshqadarya	Uzhydromet	.	10/05/2024	Field visit
Abdurasul Sobirov	M	Head of department	Uzhydromet	uzhymet.int@gmail.com	Multiple meetings	Various
Abduvakhobov Shavkat	M	Agrometeorologist Tuyabuguz station	Uzhydromet	.	17/06/2023	Field visit
Abror Tadjibayev	M	Specialist	Meteoinfocom	.	15-16/05/2024	Workshop
Abrorjon Qosimov	M	Specialist	Ministry of agriculture of the republic of Uzbekistan (MoA)	abrorkasimov41@gmail.com	06/05/2024	In-person
Akroro Normatov	M	Engineer agrometeorologist	Uzhydromet	.	13/05/2024	Field visit
Aleksandr Soloveychik	M	Specialist	Uzhydromet	.	07/05/2024	In-person
Alena Vdovenko	F	Head of Unit	Uzhydromet	.	08/05/2024	In-person
Alexander Merkushkin	M	Task Manager for the UNDP/Adaptation Fund project to develop an early warning system	UNDP	aleksandr.merkushkin@undp.org	06/2023 and 08/05/2024	In-person
Andries Potgieter	M	Associate Professor	The University of Queensland (QU)	a.potgieter@uq.edu.au	03/07/2024	In-person

Anonymous	M	Horticulture farmer	.	.	14/05/2024	Field visit
Anonymous	M	Horticulture farmer	.	.	14/05/2024	Field visit
Anonymous	F	Horticulture farmer	.	.	14/05/2024	Field visit
Arziqulov Sodigjou	M	Horticulture farmer	.	.	14/05/2024	Field visit
Azim Narzullaev	M	Head of Hydrometeorological Support Department	Uzhydromet	.	06/2023	In-person
Baffarov Alam	M	Hydrologist	Uzhydromet	.	13/05/2024	Field visit
Barno Karabayeva	F	Specialist	Uzhydromet	hydrouzhymet@gmail.com	07/05/2024	In-person
BaxtiyorQahhorov	M	Head of Department of geoengineering systems	Limited Liability Company "Center for digitization of agrosanoate"	.	15-16/05/2024	Workshop
Begim Eshbekov	M	Horticulture farmer	.	.	14/05/2024	Field visit
Berit Nordskog	F	Researcher	Norwegian Institute of Bioeconomy Research (NIBIO)	berit.nordskog@nibio.no	06/06/2024	Virtual
Bobomirzo Razoqov	M	Chief expert	Ministry of agriculture of the republic of Uzbekistan (MoA)	.	15-16/05/2024	Workshop
Bobomurod Maxsudov	M	Head of Department	Ministry of agriculture of the republic of Uzbekistan (MoA)	b.maxsudov@agro.uz	15-16/05/2024	Workshop
Dilafruz Akhundjanova	F	Specialist	Uzhydromet	dilafruzjaxongirqizi@gmail.com	Multiple meetings	In-person
Dilafruz Muminova	F	Specialist	Uzhydromet	agro@meteo.uz	07/05/2024	In-person
Djurayeva Almira	F	Head of the agro-group in the Hydromet centre in Karshqadarya	Uzhydromet	.	10/05/2024	Field visit
Ekaterina Petrova	F	Lead Engineer, Short-Range Forecast Group	Uzhydromet	.	06/2023	In-person
Eshonaulov Sundar	M	Lead agronomist	Ministry of	.	14/05/2024	Field visit

			agriculture of the republic of Uzbekistan (MoA)			
Faizulla Agzamov	M	Director of the Research Hydrometeorological Institute (NIGMI)	NIGMI	.	06/2023	In-person
Farhod Zuboyev	M	Head of agrometeorology unit	Uzhydromet	.	13/05/2024	Field visit
Farida Qodirxo'jayeva	F	Chief Specialist	Ministry of Water resources of the republic of Uzbekistan (MWR)	.	15-16/05/2024	Workshop
Farkhod Nurmatov	M	Deputy head of Director	AKIS, MoA	.	15-16/05/2024	Workshop
Firuz Safarov		Deputy Director	Uzhydromet	.	06/2023	In-person
Fred Hattermann	M	Deputy Head of Research Department	Potsdam Institute for Climate Impact Research (PIK)	hattermann@pik-potsdam.de	28/05/2024	Virtual
Gafurov Tokhir	M	Chief specialist of the hydrometeorological center in the Tashkent region	Uzhydromet	.	17/06/2023	Field visit
Gulruh Davatova	F	Manager	Business Women Association	.	25/07/2024	In-person
Irina Dergacheva	F	Head Laboratory of Dangerous Phenomena	NIGMI	.	06/2023	In-person
Irina Zaitseva	F	Lead Specialist, Climate Services Department	Uzhydromet	.	06/2023	In-person
Islomjon Rasuljonov	M	Deputy head of department	Plant Quarantine and Protection Agency	.	15-16/05/2024	Workshop
Iulii Didovets	M	Project Lead	Potsdam Institute for Climate Impact Research (PIK)	didovets@pik-potsdam.de	28/05/2024	Virtual
Izzatilla Ikramov	M	Head of Department	Ministry of agriculture of the republic of	i.ikramov@agro.uz	15-16/05/2024	Workshop

			Uzbekistan (MoA)			
Jaxshixkov Alisher	M	Horticulture farmer	.	.	14/05/2024	Field visit
Karimov Khamza	M	Leader Tuyabuguz station	Uzhydromet	.	17/06/2023	Field visit
Khamrayeva Ramuza	F	Agrometeorologist Tuyabuguz station	Uzhydromet	.	17/06/2023	Field visit
Kholtojiyeva Oyjamol	F	Engineer agrometeorologist of the hydrometeorological center in the Tashkent region	Uzhydromet	.	17/06/2023	Field visit
Larisa Feldman	F	Specialist	Uzhydromet	agro@meteo.uz	07/05/2024	In-person
Muktor Tursunov	M	Smallscale grape producer	.	.	14/05/2024	Field visit
Munisa Asilkhojaeva	F	Head of Information Service	Uzhydromet	.	06/2023	In-person
Munisa Tutiyeva	F	Specialist	Uzhydromet	agro@meteo.uz	07/05/2024	In-person
Murtazoyev Mirzaolim	M	Leader of the hydrometeorological center in the Tashkent region	Uzhydromet	.	17/06/2023	Field visit
Musurmonov Sharzod	M	Extension officer	AKIS	.	14/05/2024	Field visit
Nadezhda Gavrilenko	F	UNDP/Uzhydromet/GCF project manager for the preparation of the National Adaptation Plan	UNDP	nadejda.gavrilenko@undp.org	06/2023 and 08/05/2024	In-person
Natalia Agaltseva	F	Head of unit	Uzhydromet	natalya.agaltseva@gmail.com	Multiple meetings	In-person
Nataliya Straxova	F	Specialist	Uzhydromet	hydrouzhymet@gmail.com	07/05/2024	In-person
Nigora Sulaymonova	F	Head of the laboratory	Hydrometeorological Scientific Research Institute	ufo789@mail.ru	15-16/05/2024	Workshop
Nigora Tashxodjayeva	F	Adviser to the director on information policy issues-press secretary	Uzhydromet	is@meteo.uz	08/05/2024	In-person
Nizamov Sirozhiddin	M	chief expert	Ministry of	s.nizamov@agro.uz	06/05/2024	In-person

			agriculture of the republic of Uzbekistan (MoA)			
ObidjonSalimov	M	Chief expert	Republican Agro-Services Center	.	15-16/05/2024	Workshop
Omonov Nurmukhammad	M	Junior Scientific worker	Hydrometeorological Scientific Research Institute	.	06/05/2024	In-person
Pietarila Harri	M	Director Expert Services	Finnish Meteorological Institute (FMI)	Harri.Pietarila@fmi.fi	13/06/2024	Virtual
Prof Scott Chapman	M	Professor Crop Physiology	The University of Queensland (UQ)	scott.chapman@uq.edu.au	03/07/2024	In-person
Rima	M	Technical Agrometerologist in the Hydromet centre in Karshqadarya	Uzhydromet	.	10/05/2024	Field visit
Sa'dulla Zaynabudinov	M	Head of Department	Ministry of agriculture of the republic of Uzbekistan (MoA)	uzterra@mail.ru	15-16/05/2024	Workshop
Salohiddin Ergashev	M	Head of the Guzor meteorological station	Uzhydromet	.	11/05/2024	Field visit
Sardor Kadyrov	M	UNDP/Uzhydromet/Japanese Foreign Ministry project manager to support climate change adaptation measures in Uzbekistan	.	.	06/2023	In-person
Sardorbek Fahriddinov	M	Ex-AKIS employee	AKIS	.	10/05/2024	Field visit
Sarvar Abdullayev	M	Founder	amudar io	INFO@AMUDAR.IO	08/05/2024	In-person
Sergei Myagkov	M	Head Laboratory for Mathematical Modeling of Hydrometeorological Processes	NIGMI	.	06/2023	In-person
Shavkat Kadyrov	M	Head of Department of dangerous	Uzhydromet	.	06/2023	In-person

		hydrometeorological phenomena				
Shavkat Qodirov	M	Head of unit	Uzhydromet	.	15-16/05/2024	Workshop
Shermukhamedov Ulugbek	M	doctoral student	Hydrometeorological Scientific Research Institute	shermukhamedov89@gmail.com	06/05/2024	In-person
Sherzod Gulomsher	M	Cotton and wheat farmer	.	.	10/05/2024	Field visit
ShohhusanSuvanqulov	M	Chief expert	Ministry of agriculture of the republic of Uzbekistan (MoA)	.	15-16/05/2024	Workshop
Shomiddinov Komvonbek	M	Hydrologist	Uzhydromet	.	13/05/2024	Field visit
Sirojiddin Nizamov	M	Chief expert	Ministry of agriculture of the republic of Uzbekistan (MoA)	s.nizamov@agro.uz	15-16/05/2024	Workshop
Sobir Choriyev	M	Lead agro-meteorologist of the Guzor meteorological station	Uzhydromet	.	11/05/2024	Field visit
Suleymanova Nigora	F	head of the laboratory	Hydrometeorological Scientific Research Institute	ufo789@mail.ru	06/05/2024	In-person
Sultanmurod Mixridinov	M	Proceedings officer	Ministry of agriculture of the republic of Uzbekistan (MoA)	.	15-16/05/2024	Workshop
Sultonov Anorboy	M	Horticulture farmer	.	.	14/05/2024	Field visit
Svetlana Juravleva Aleksandrovna	F	Agro-meteorologist of the Guzor meteorological station	Uzhydromet	.	11/05/2024	Field visit
Temir Hudoyberdiyev	M	Cotton and wheat farmer	.	.	10/05/2024	Field visit
Teshurodov Sunnotbek	M	Horticulture farmer	.	.	14/05/2024	Field visit
Tillyakhodjaeva	F	Scientific secretary	Hydrometeorologic	.	15-	Workshop

Zukhra			al Scientific Research Institute		16/05/2024	
Tillyakhodjaeva Zukhra	F	scientific secretary	Hydrometeorological Scientific Research Institute	.	06/05/2024	In-person
Timur Sobitov	M	Head of unit	Ministry of Ecology, Environmental Protection and Climate Change of The Republic of Uzbekistan	.	15-16/05/2024	Workshop
Turgunov Doniyor	M	deputy director	Hydrometeorological Scientific Research Institute	.	06/05/2024	In-person
Ulugbek Dadabayev	M	project manager	UNDP	ulugbek.dadabayev@undp.org	08/05/2024	In-person
Umid Umirzakov	M	METEOINFOCOM	Uzhydromet	.	06/2023	In-person
Usta Solih Bogbou	M	Horticulture farmer	.	.	14/05/2024	Field visit
Warley Julia	F	Project Manager	Finnish Meteorological Institute (FMI)	julia.warley@fmi.fi	13/06/2024	Virtual
Yuldoshov Komiljon	M	Horticulture farmer	.	.	14/05/2024	Field visit
Zukhra Tillyakhojaeva	F	Scientific Secretary	NIGMI	.	06/2023	In-person

2. Workshop participants 15/16 May 2024

Name	Gender	Position	Organization	Contacts
Abdurasul Sobirov	M	Head of department	Uzhydromet	uzhymet.int@gmail.com
Abror Tadjibayev	M	Specialist	Meteoinfocom	.
Baxtiyor Qahhorov	M	Head of Department of geoengineering systems	Center for digitization of agrosanoate"	.
Bobomirzo Razoqov	M	Chief expert	Ministry of agriculture of the republic of Uzbekistan (MoA)	.
Bobomurod Maxsudov	M	Head of Department	Ministry of agriculture of the republic of Uzbekistan (MoA)	b.maxsudov@agro.uz
Dilafruz Akhundjanova	F	Specialist	Uzhydromet	dilafruzjaxongirqizi@gmail.com
Farida Qodirxo'jayeva	F	Chief Specialist	Ministry of Water resources of the republic of Uzbekistan (MWR)	.
Farkhod Nurmatov	M	Deputy head of Director	AKIS, MoA	.
Irina Zaytseva	F	Specialist	Uzhydromet	.
Islomjon Rasuljonov	M	Deputy head of Department	Plant Quarantine and Protection Agency	.
Izzatilla Ikramov	M	Head of Department	Ministry of agriculture of the republic of Uzbekistan (MoA)	i.ikramov@agro.uz
Larisa Feldman	F	Specialist	Uzhydromet	agro@meteo.uz
Munisa Tutiyeva	F	Specialist	Uzhydromet	agro@meteo.uz
Nataliya Agaltseva	F	Head of unit	Uzhydromet	natalya.agaltseva@gmail.com
Nataliya Straxova	F	Specialist	Uzhydromet	hydrouzhymet@gmail.com
Nigora Sulaymonova	F	Head of the laboratory	Hydrometeorological Scientific Research Institute	ufo789@mail.ru
ObidjonSalimov	M	Chief expert	Republican Agro-Services Center	.
Sa'dulla Zaynabudinov	M	Head of Department	Ministry of agriculture of the republic of Uzbekistan (MoA)	uzterra@mail.ru
Shavkat Qodirov	M	Head of unit	Uzhydromet	.
Shermukhamedov	M	Doctoral student	Hydrometeorological	shermukhamedov89@gmail.com

Ulugbek			Scientific Research Institute	
ShohhusanSuvanqulov	M	Chief expert	Ministry of agriculture of the republic of Uzbekistan (MoA)	.
Sirojiddin Nizamov	M	Chief expert	Ministry of agriculture of the republic of Uzbekistan (MoA)	s.nizamov@agro.uz
SultanmurodMixridinov	M	Proceedings officer	Ministry of agriculture of the republic of Uzbekistan (MoA)	.
Tillyakhodjaeva Zukhra	F	Scientific secretary	Hydrometeorological Scientific Research Institute	.
Timur Sobitov	M	Head of unit	Ministry of Ecology, Environmental Protection and Climate Change of The Republic of Uzbekistan	.

3. List of people met during the ADMP Mid-term review field visits in October 2023

Fergana region

- Fergana province women association representative; Lord Dilrabo. Fergana province family, including women, administration chief specialist Umarova Nodirakhan.
- Participation in the opening ceremony of the veterinary clinic. Persons met: Head of Veterinary Department of Fargona Region, Ubaydullo Tursunov. Murodillo Kholmatov, Deputy Head of the Veterinary Department. Chief specialist Ibrahim Valiev. Chief specialist Nomatjon Yuldashev. Abdurakhim Joraev, Head of the veterinary department of Margilan, and a number of participants and veterans in the field of veterinary medicine.
- Kuva district. Persons met: Dolina Avto Tur LLC head of freezer warehouse, Mirzaev Elbek.
- Repair of Khayitboy pumping station, Toshloq district. Persons met: Hayitboy leader Tursunov.
- Toshloq district (Fergana) pumping station. Persons met: Father Abdukhamid Leader of f/x, Egamberdiev Abdukhamid
- Meeting at Agroprom with government representatives. Persons met: Head of the Deputy Secretariat of the Governor of Fergana Region for Agriculture and Water Management; Ataboev Vokhidjon, Head of the Deputy Head of the Regional Governor's Secretariat for Investment Issues; Nurmatov Azimjon
- Turon Mangu LLC is the head of the householder's organization. Persons met: Mavlanov Davronjon, KhilolaTojieva Ziyoda.

Namangan region

- Meeting with Dildora Farm. (Khamrakulova Parida Madrakhimovna)
- Meeting with deputy governors of Namangan region (Khakimov Anvarjon) and women who intend to do business (Makhkamova Zulaiho Bakhriddinovna)
- Meeting with the owner of Shiroq LLC cold storage (Sharapov Nizomidin Ikramovich)

Andijan region

- Inspection of the weather stations installed at "Sabo Hamkor" LLC (Enterprise Saidov Sherzod)
- Introduction to the honey packaging project organized by the "Beekeeping Future"
- Introduction to the greenhouse project organized by "MASK" LLC (Head of the enterprise Makhmudov Khabibullo Odilkhanovich)
- Interview was held with Cheki Hamkorbank. (Head of the Cooperative Customer Service Department Khaidarov Shavkat, Head of the Department Matyakubov Sokhibjon, Head of the Business Support Department Sadriddinov Oybek)
- First Deputy Head of Investments, Industry and Trade Department E.Karimov, Women's Department Abdullaaeva Dildora and Makhalla Department Dekhkanov Mukhammadali

4. List of members of the Business Women's Association met during the ADMP mid-term review field visits and supervision in October 2023 and 2024

No	BWA member name	Company name
1	Abduxalimova Lola	Pretsedatel Namanganskogo obl. Otd-ya MADJ "Tadbirkor ayol", trener proekta
2	Babnarova Gulzira	Trener proekta rukovoditel OOO "Today kids"
3	Olimova Dildora	Rukovoditel OOO "Adomax"
4	Axmadalieva Oydina	Trener proekta, rukovoditel kooperativa "Chortoq ECO fruit"
5	Ascarova Gulbaxor	Chastniy predprinimatel
6	Anvarbekova Iroda	Nachinayushiy predprinematel
7	Modumarova Mavjuda	Nachinayushiy predprinematel
8	Rustamova Toibabegim	Rukovoditel OOO "Xonbod Sardorbek trans"
9	Kayumova Muxabbat	Nachinayushiy predprinematel
10	Zokirova Muyassar	Rukovoditel OOO "La-shon"
11	Samixanova Maloxatxon	Nachinayushiy predprinematel

12	Roxatalieva Madinaxon	Rukovoditel OOO "Rustamjon Doston"
13	Egamova Saodat	Rukovoditel OOO "Qalqon"
14	Shergazieva Alfiya	Nachinayushiy predprinematel
15	Muxiddinova Dilfuza	Rukovoditel OOO "Davriya"
16	Gapparova Soxiba	Nachinayushiy predprinematel
17	Nuriddinova Qanoat	Nachinayushiy predprinematel
18	Anorqulova Rozigul	Predsidatel f/x "GupRus"
19	Soliyeva Xosiyatxon	Rukovoditel OOO "Anor Ziyo"
20	Abdullaeva Shoira	Rukovoditel "Benazir Sardor Gulnoza"
21	Axmedova Zarifahon	Trener proekta
22	Sodiqova Malohat	Tadbirkor
23	Djalolova Mahsuma	Tadbirkor
24	Maxkamova Jamila	Trening Ishtrokchisi
25	Gulamova Mahbuba	Trening Ishtrokchisi
26	Rustamova Anorahon	Trening Ishtrokchisi
27	Hasanova Begoyim	Trening Ishtrokchisi
28	Turdiyeva Madina	Trening Ishtrokchisi
29	Po'latova Hilola	Trening Ishtrokchisi
30	Alieva Momahon	Trening Ishtrokchisi
31	Begaileva Go'zaloy	Trening Ishtrokchisi
32	Rustamova Dilfuza	Trening Ishtrokchisi
33	Mirzaeva Bibizakhro	Trening Ishtrokchisi

Annex 2. Environmental and social safeguards screening checklist

Environmental and Social Safeguards Screening Checklist					
Environmental and Social Safeguards	**No, Yes, TBD**	**If Yes or TBD**		**If Relevant for Procurement (include action)**	**Risk Rating**
		Likelihood	**Consequence**		
General data sources provide national and site specific information to support project delivery teams in identifying overall risks associated with project locations and targeted value chains. These are: T**he Global Map of Environmental & Social Risk in Agro-commodity Production (GMAP)** enables users to conduct rapid environmental and social due diligence associated with trade and short-term finance, and to make responsible and strategic sourcing, financing, and risk management decisions. Tool link: https://gmaptool.org/ **INFORM,** a global, open-source risk assessment for humanitarian crises and disasters developed by a collaboration between the Inter-Agency Standing Committee Task Team for Preparedness and Resilience and the European Commission. It can support decisions about prevention, preparedness and response. Tool link: https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Results-and-data/moduleId/1782/id/419/controller/Admin/action/Results **Universal Human Rights Index (UHRI)** offers an overview of national commitments to international Human Rights, as well as up-to-date observations and recommendations from international human rights bodies to improve human rights protection. Tool link: https://uhri.ohchr.org/en/ The lists of sources provided are not exhaustive and other local databases/maps/tools may be available.					**E&S Category: Low**
Biodiversity				**Yes/no/manual trigger.**	**Risk Rating**

Biodiversity is essential for the maintenance of ecosystem services, such as the provision of water and food, as well as other services that are important to both the ecosystems themselves and human life. Diversity in agroecological systems is a key element in building resilience capacities of rural families and their farming systems. 3 dataset are proposed to support the identification of risks and opportunity in the project area, these are: **UN Biodiversity LAB** - a platform for building partnerships among data providers and data users to ensure that governments have access and capacity to use cutting-edge spatial data to make key conservation and development decisions. Tool link: https://unbiodiversitylab.org/en/about/ **World Resource Institute -** Resource Watch features hundreds of data sets all in one place on the state of the planet's resources and citizens. Users can visualize challenges facing people and the planet, from climate change to poverty, water risk to state instability, air pollution to human migration, and more. Tool link: https://resourcewatch.org/ **Global Forest Watch** is an online platform that provides data and tools for monitoring forests. By harnessing cutting-edge technology, this tool allows access to near real-time information about where and how forests are changing around the world. Tool link : https://www.globalforestwatch.org/					
1.1 Could the project involve or lead to conversion or degradation of biodiversity, habitats (including modified habitat, natural habitat and critical natural habitat) and/or ecosystems and ecosystem services?	No				
1.2 Could the project involve or lead to activities negatively impacting habitats that are legally protected, officially proposed for protection, or recognized as protected by traditional local communities and/or authoritative sources (e.g. National Park, Nature Conservancy, Indigenous Community Conserved Area, (ICCA), etc.)?	No				
1.3 Could the project involve or lead to an increase in the chance of human-wildlife encounters/conflict?	No			No	
1.4 Could the project involve or lead to risks to endangered species (e.g. reduction, encroachment on habitat)?	No			No	
1.5 Could the project involve or lead to negative impacts/risks to migratory wildlife?	No			No	
1.6 Could the project involve or lead to introduction or utilization of any invasive alien species of flora and fauna, whether accidental or intentional?	No				
1.7 Could the project involve or lead to the handling or utilization of genetically modified organisms?	No			Yes	
1.8 Will the project involve or lead to procurement through primary suppliers of natural resource materials (wood, gravel, sand, etc.)?	No	N/A		Yes	
Resource Effiiciency and Pollution Prevention				**Yes/no/manual trigger.**	**Risk Rating**

Resource efficiency is necessary to avoid, minimize and manage the risks and impacts associated with hazardous substances and materials, including pesticides, together with the project-related emissions of short- and long-lived climate pollutants. These questions shall also identify, where feasible, project-related opportunities for improvements in resource efficiency. **The World Resource Institute** provides hundreds of data sets all in one place on the state of the planet's resources and citizens. Users can visualize challenges facing people and the planet, from climate change to poverty, water risk to state instability, air pollution to human migration, and more. Tool link: https://resourcewatch.org/					**Low**
2.1 Could the project involve or lead to the release of pollutants to the environment (on and off farm) due to routine or non-routine circumstances with the potential for adverse local, regional, and/or transboundary impacts?	No			Yes	
2.2 Could the project be located in an area which is being, or has been, polluted by an external source (e.g. a mine, smelter, industry)?	No			No	
2.3 Will the project involve or lead to significant consumption of raw materials and energy?	No	N/A		Yes	
2.4 Will the project develop or rehabilitate irrigation schemes and/or involve or lead to significant extraction, diversion or containment of surface or ground water? (For example, construction of dams, reservoirs, river basin developments, groundwater extraction)	No	N/A			
2.5 Will the project involve the use of agrochemicals (pesticides, fertilizers, and other modifying agents) which have potential to pollute soils and water bodies or cause other negative impacts?	Yes	N/A	Minor	Yes	Low
2.6 Will the project involve or lead to primary production of living natural resources through cultivation or rearing of plants, annual and perennial crop farming, etc.?	Yes	N/A	Minor		Low
2.7 Will the project involve or lead to engagement in areas of forestry, including the harvesting of natural forests, plantation development, and/or reforestation?	No	N/A			
2.8 Will the project involve livestock and production of animal products (dairy, skins, meat, etc.)?	No	N/A			
2.9 Will the project involve marine or freshwater fisheries, at industrial or artisanal scale?	No	N/A			
2.10 Will the project involve inland or marine aquaculture?	No	N/A			
Cultural Heritage				**Yes/no/manual trigger.**	**Risk Rating**

Preserve and safeguard Cultural Heritage requires that effective and active measures are taken to prevent IFAD-supported projects from altering, damaging, or removing any tangible or intangible Cultural Heritage. In order to identify the presence of Cultural heritage the following tools are provided: **UNESCO World Heritage List -** The World Heritage Committee, the main body in charge of the implementation of the World Heritage Convention, has developed precise criteria for the inscription of properties on the World Heritage List and has mapped them in this tool, which could support the PDT to identify location and type of properties in the project affected area. Tool link: http://whc.unesco.org/en/list/ **UNESCO List of Intangible Cultural Heritage** and Register of good safeguarding practices provides an overview of (internationally) recognized intangible cultural heritage. Tool link: https://ich.unesco.org/en/lists					
3.1 Could the project involve or lead to adverse impacts to sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g. knowledge, innovations, practices)? (Note: projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	**No**			**Yes**	
3.2 Could the project involve or lead to excavations, demolitions, movement of earth, flooding or other environmental changes in an area that is considered to have archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values or intangible forms of culture (e.g. knowledge, innovations, practices) or contains features considered as critical cultural heritage? (See Annex 1 of the Cultural Heritage Guidance Note for further information)	**No**			**Yes**	
3.3 Could the project involve or lead to alterations to landscapes and natural features with cultural significance?	**No**				
3.4 Could the project involve or lead to utilization of tangible and/or intangible forms (e.g. practices, traditional knowledge) of Cultural Heritage for commercial or other purposes?	**No**			**Yes**	
Indigenous peoples				**Yes/no/manual trigger.**	**Risk Rating**

IFAD's comparative advantage in working with indigenous peoples lies in its core mission to empower poor rural people and in its targeting and people-centred approach, which takes into account the differentiated and context-specific conditions of poor rural people. In order to identify indigenous communities in the project affected area: **International Work Group for Indigenous Affairs:** Provides country specific information on the presence of Indigenous communities, together with the challenges and progress they are currently facing Tool link: https://www.iwgia.org/en/ **UN Special Rapporteur on the rights of IP:** Reports on the human rights situations of indigenous peoples around the world, including updates on new laws, agreements and international standards, and recommendations on appropriate measures to ensure the rights of indigenous peoples. Tool link: https://www.ohchr.org/EN/Issues/IPeoples/SRIndigenousPeoples/Pages/SRIPeoplesIndex.aspx					
4.1. Is the project sited in areas where indigenous Peoples are present? (Indigenous peoples' traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources).	**No**	**N/A**	**N/A**		
4.2 Could the project adversely affect indigenous people's rights to traditionally owned or otherwise occupied and used lands, territories, waters, coastal seas and other resources and/or livelihood systems?	**No**				
4.3 Could the project result in the utilization and/or commercial development of natural resources on lands and territories inhabited by indigenous peoples?	**No**				
Labour and Working Conditions				**Yes/no/manual trigger.**	**Risk Rating**
The pursuit of inclusive and sustainable economic growth, full and productive employment and decent work for all requires the protection of project workers' fundamental rights, their fair treatment, and the provision of safe and healthy working conditions. Two tools are suggested to appropriately identify labour risks: **ILO Statistics and Databases**: ILO's central portal to labour statistics, overview of labour laws, standards and policies, and country profiles. Tool link: https://www.ilo.org/global/statistics-and-databases/lang--en/index.htm **US Department of Labor Findings on the Worst Forms of Child Labour** : provides country specific findings on worst forms of child and forced labour, together with prevalence and sectoral distribution, legal framework, enforcement of laws and available social programs to address child labour. Tool link: https://www.dol.gov/agencies/ilab/resources/reports/child-labor/findings					
5.1 Could the project operate in sectors or value chains where there have been reports of discriminatory practices and the lack of equal opportunity (for disadvantaged and vulnerable workers, including women, children of working age, migrants and persons with disabilities), denial of freedom of association and collective bargaining, labour migrants?	**No**			**Yes**	

5.2 Could the project operate in a value chain where there have been reports of forced labour? Note: Risks of forced labour may be increased for projects located in remote places or where the status of migrant workers is uncertain	No			Yes	
5.3 Could the project involve children (a) below the nationally-defined minimum employment age (usually 15 years old) or (b) above the nationally-defined minimum employment age but below the age of 18 in supported activities or in value chains?	No			Yes	
5.4 Could the project: (a) operate in a sector, area or value chain where producers and other agricultural workers are typically exposed to significant occupational and safety risks, and/or (b) promote or use technologies or practices that pose occupational safety and health (OSH) risks for farmers, other rural workers or rural populations in general? (Note: OSH risks in agriculture might include: dangerous machinery and tools; hazardous chemicals; toxic or allergenic agents; carcinogenic substances or agents; parasitic diseases; transmissible animal diseases; confined spaces; ergonomic hazards; extreme temperatures; and contact with dangerous and poisonous animals, reptiles and insects. Psychosocial hazards might include violence and harassment.)	No			Yes	
Community Health and Safety				**Yes/no/manual trigger.**	**Risk Rating**
Community Health and Safety are crucial elements for consideration, particularly in low- to middle-income countries where there is a lack of knowledge about how farmers are affected by their exposure to the variety of health risks and impacts that they are confronted with every day. **INFORM,** the Hazard and exposure tab provides a detailed set of indexes for the most common health risks affecting rural communities at national level. Tool link: https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Results-and-data/moduleId/1782/id/419/controller/Admin/action/Results **UN Women Global database on violence against women:** provides easy access to comprehensive and up-to-date information on measures undertaken by United Nations Member States to address all forms of violence against women. Tool link: https://evaw-global-database.unwomen.org/en					
6.1 Could the project lead to and or be at risk from water-borne, zoonotic or vector-borne diseases (e.g. temporary breeding habitats), and/or communicable and non-communicable diseases?	No				
6.2 Could the project have unintended negative impacts on nutrition?	No			No	
6.3 Will the project involve the construction or rehabilitation of dams?	No	N/A			
6.4 Could the project involve or lead to transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g. explosives, fuel and other chemicals during construction and operation)?	No			Yes	

6.5 Could the project lead to the potential for gender-based violence, including sexual harassment, exploitation and abuse, as a result of labour influx, land redistribution, or other actions that alter community dynamics?	No			Yes	
6.6 Will the project construct, rehabilitate or upgrade rural roads and/or lead to increases in traffic or alteration in traffic flow?	No	N/A		Yes	
6.7 Could the project lead to an influx of project workers?	No			Yes	
6.8 Could the project involve or lead to the engagement of security personnel to protect facilities and property or to support project activities?	No			Yes	
Physical and Economic Resettlement				**Yes/no/manual trigger.**	**Risk Rating**
Resettlement is not only as the physical relocation of people but also as economic, social and cultural displacement causing restrictions on, or loss of access to, people's means of livelihoods and culturally important sites. Questions of this standard are very specific to project activities and thus do not require external sources					
7.1 Will the project result in temporary or permanent and full or partial physical displacement (including people without legally recognizable claims to land)?	No	N/A			
7.2 Will the project result in economic displacement (e.g. loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	No	N/A		No	
7.3 Could the project increase the risk of forced evictions?	No	N/A	N/A		
7.4 Could the project result in adverse impacts on or changes to land tenure arrangements and/or community-based property rights/customary rights to land, territories and/or resources?	No			Yes	
Financial Intermediaries and Direct Investments				**Yes/no/manual trigger.**	**Risk Rating**
Investments into financial intermediaries and private sector companies are a key instrument for promoting sustainable financial markets and provide financial products and services to farming businesses and to the rural micro, small and medium-sized enterprise sector. These questions are very specific to the selected private sector partner and thus do not require external sources					
8.1 Could the investment be granted to an institution that does not have an environmental and social policy and an associated environmental and social management system (ESMS) in place (transparent, publicly available)?	No			Yes	
8.2 Could the investment be granted to an institution with insufficient capacities (i.e. unqualified personnel e.g. ES Officer) to implement the ESMS?	No			Yes	

8.3 Could the investment be granted to an institution that does not have an Exclusion List?	No			No	
8.4 According to the institution's portfolio classification: Could the institution have potential high-risk projects in their portfolio?	No			No	
8.5 Could the institution not be providing a stable communication channel with stakeholders and local communities (e.g. a Grievance Redress Mechanism)?	No			No	
8.6 Could the institution not be providing auxiliary or capacity building support services?	No			No	

Annex 3. Environmental and social assessment and management plan

1. Screening and categorization

A screening of environmental and social risks was carried out according to the requirements of the Adaptation Fund's Environmental and Social Policy and IFAD's environmental and climate assessment procedures (SECAP). All project activities were screened against the 15 environmental and social principles of the Adaptation Fund, as well as against IFAD's environmental and social safeguards screening checklist.

The project has a **low environmental and social risk (Category C)** according to the Adaptation Fund's Environmental and Social Policy. According to IFAD's SECAP, the project has a "**low environmental and social risk**" and a "**moderate climate risk**". The checklist of environmental and social principles of the Adaptation Fund is found in Section K "Environmental and Social impacts" in Part II of the proposal.

The project will apply participatory methods to engage with farmers in order to mitigate social risks and impacts. Transboundary impacts are highly unlikely. Cumulative impacts are also unlikely.

The checklist and IFAD's risk categorization of projects have been updated with the revision of IFAD's SECAP in 2021. A project's risk to adversely impact people and the environment, as well its vulnerability to climate change are assessed and categorized into four different risk levels (low, moderate, substantial and high) in order to identify all possible risks as well as measures to mitigate them. The updated SECAP is aligned with the Adaptation Fund's Environmental and Social Policy, and its 15 safeguard areas and Gender Policy.

2. Environmental and social assessment

The project design team assessed all project activities against the Adaptation Fund's 15 environmental and social principles. The design team identified the most likely environmental or social risks, assessed the level of risk, and developed measures to avoid, minimize, or mitigate the risks.

Environmental and social risks were identified for Principles 2 (access and equity), 3 (marginalized groups), 5 (gender), and 8 (pollutants). The results of the assessment are presented below. As shown in the table in Section K of Part II, no risks were identified for the other principles.

Principle 2: Access and equity and Principle 3: Marginalized and vulnerable groups

Potential risks. The project design has identified the following risks:

- Risk of vulnerable groups and women not having access to climate information services
- Risk of vulnerable groups and women not being consulted in the design of climate services

Risk level. The level of risk is considered low as consultation and outreach mechanisms are in place.

Mitigation measures. The project will implement the following activities. These will be supervised by the social mobilisation, gender and social inclusion expert::

- Climate services will be freely available and easily accessible.
- A user assessment in the first year of the project will identify and describe all user types and needs, making sure no vulnerable group or community is left out.
- A gender assessment will specifically look into female user types and their needs.
- The provision of advisory will be location and user specific, taking into account the needs of different users.
- The selection of test users for the design of the climate services will ensure that all user types are represented, including vulnerable groups and women.
- A communication campaign will be carried out to widely promote climate services.
- Farmer seminars to promote climate service will target all user types, including vulnerable groups and women.

Indicators. The project will monitor these risks and provide annual progress reports to IFAD featuring the following indicators:

- Number and percentage of test users being consulted disaggregated by type of user and gender
- Number of end-users disaggregated by type of user and gender
- Number of complaints/ grievances submitted and solved

Principle 5: Gender equity and women's empowerment

The project is designed and shall be implemented in such a way that both women and men (a) are able to participate fully and equitably; (b) receive comparable social and economic benefits; and (c) do not suffer disproportionate adverse effects during the development process.

Assessment. The design team carried out the following activities in accordance to the Gender Policy of the Adaptation Fund:

- A gender assessment was carried out by the social inclusion and gender expert
- A gender action plan with measures and indicators was developed.

Gender-responsive measures, results framework and indicators. See the gender assessment and action plan in annex 3. These activities will be supervised by the social mobilisation, gender and social inclusion expert.

Principle 12: Pollution prevention and resource efficiency

Potential risk. One risk has been identified:

- Risk of misleading advisory leading e.g. to the wrong application of chemicals.

Risk level. The level of risk is considered to be low.

Assessment. The project aims to provide advice on farm management (e.g. when to apply fertilizer or when to start a farm activity such as planting). The pest and disease forecasting service aims to inform farmers about the risk of pest infection for a crop. There is a risk that farmers may misapply pesticides in response to a risk warning.

Mitigation measures. Technical staff of the project will apply the following measures to mitigate the risk:

- Forecasts clearly communicate the likelihood of weather phenomena to occur.
- No digital advice is given on the type and amount of pesticide to be applied. The advice will refer to local extension officers from AKIS and/or PPQD on pest control measures.

Indicator. The project will monitor this risk through its grievance redress mechanism. The project will report to IFAD at least once a year on the number of feedback/ complaints/grievances submitted and resolved, categorized by type of complaint.

3. Environment and social management plan

Environmental & social risks	Mitigation measures	Indicators	Relevant outputs	Responsible	AF principles	Verification
Risk of vulnerable groups and women not having access to climate information services	• Climate services will be freely available • User assessment identifying and describing all user types and needs • Gender assessment describing all female user types and needs • Location and user-specific advisory • Communication campaign • Farmer seminars	• No. of complaints/ grievances submitted and solved • Number of users disaggregated by type of user and gender	Output 1.1.2. Output 3.1.2. Output 3.1.3.	PMU, mainly the social mobilisation and gender expert	2 (access and equity) 3 (vulnerable groups) 5 (gender equality)	Annual progress reports with user statistics (e.g. type and location of user)
Risk of vulnerable groups and women not being consulted in the design of climate services	• User assessment identifying and describing all user types and needs • Gender assessment describing all female user types and needs • Selection of test users representing all user types	• Number and percentage of test users being consulted disaggregated by type of user and gender	Output 1.1.2. Output 3.1.2. Output 3.1.3.	PMU, mainly the social mobilisation and gender expert	2 (access and equity) 3 (vulnerable groups) 5 (gender equality)	Annual progress reports with description and figures on participation
Risk of misleading advisory (e.g. leading to wrong application of chemicals)	• Climate services clearly communicate the likelihood of weather phenomena to occur • Referral to local	• No. of feedback/ complaints/ grievances submitted and solved categorized by	Output 1.1.2. Output 3.1.3.	PMU	3 (vulnerable groups) 12 (Pollution prevention)	Annual progress reports with figures on grievances

	extension staff from AKIS and/or PPQD on measures to combat pests	type of complaint				

Annex 4. Gender assessment and gender mainstreaming strategy and action plan

1. Gender assessment

Women represent about half of Uzbekistan's resident population, estimated at 37 million persons as of April 2024 (Statistics Agency). On the macro level, Uzbekistan has made progress on gender equality, but challenges remain. The country has ratified international commitments on women's rights and has a national machinery for the advancement of women, but its laws and policies still have gaps in addressing gender inequalities. Uzbekistan ranks 106 out of 189 countries in the global **Gender Development Index**, and scored just 70.6 on the Women, Business, and the Law index, indicating a weaker legal environment for women compared to the Europe and Central Asia region average[39].

Women-headed households. Data from the Listening to the Citizens of Uzbekistan (L2CU) survey reveals that one-fifth of all households in the country are headed by women. Among rural women in Uzbekistan, those living in women-headed households are even more vulnerable. Women-headed households tend to have lower monthly incomes, lower education levels, and are more likely to be headed by individuals with disabilities. Approximately half of women heads of household report having a disability, compared to only 30 percent of men-headed households (L2CU). These heightened vulnerabilities faced by women-headed rural households underscore the acute challenges confronting the most marginalized women in Uzbekistan.

Rural women livelihoods. Women play **a major role in agricultural work;** they are heavily involved in various agricultural tasks, including crop production, animal husbandry, and processing of agricultural products and in other forms of small-scale production, trade, and services in the informal sector. More in particular, 42 percent of women are employed in the informal agricultural sector, compared to 83 percent of men[40]; 35 percent are employed in agriculture, services and industry sectors, compared to 65 percent of men[41].

They play a **particularly important role in livestock production**, taking on traditionally gendered tasks (for example those that are less visible or involve less physical strength). Men are more involved in livestock sales, slaughter, and breeding, whereas women oversee grazing (close to the home) and feeding livestock, milking, and preparing dairy products, as well as the informal sale of excess products (for example, milk and eggs). Women have a small role in aquaculture (most formal employees on fish farms are men), and they are mostly involved in retail trade[42].

Rural women also undertake work **on individual household plots** ('kitchen gardens' or *tomorka*) which provide a substantial proportion of rural households' food and income. According to a qualitative study carried out by the WB[43], many rural households have **0.06 to 0.15 ha close to the house where women grow fruits**, **vegetables, flowers, and seedlings** sometime by installing greenhouses. While women mostly grow agricultural products for the household's consumption and everyday family subsistence, surplus products can be sold locally. Women are often responsible for tending the tomorkas and selling surplus products; a woman can earn around 3 million to 5 million UZS per season with 0.10 ha of land. However, access to irrigation water and proximity to markets are the two key factors that determine whether women can generate income from their tomorka activities. A significant proportion of rural women (around 25 percent) work at home, engaged in activities such as handicraft production, baking, and confectionery. Crucially,

[39] *Country Gender Assessment for Uzbekistan*, The International Bank for Reconstruction and Development/The World Bank, 2024.
[40] *Ibid*.
[41] *Ibid*.
[42] *Gender, Agriculture and Rural Development in Uzbekistan*. *Country Gender Assessment Series.* FAO, 2019.
[43] *Diagnostic Study of Barriers for Strengthening Livelihoods of Low-Income Rural Women in Uzbekistan*. World Bank, 2017.

women's income generation opportunities differ by class, education, and other contextual factors shaping their daily lives.

Figure 1. *Demand for goods produced by women in rural Uzbekistan*

Goods	Local Level (village)	*Raion* Level	Regional Level/ Country Level	International
Farm Sector				
Dairy	Low	High	High	Low
Vegetables	Medium	High	High	Low
Fruits	Medium	High	High	High

Source: Diagnostic Study of Barriers for Strengthening Livelihoods of Low-Income Rural Women in Uzbekistan, World Bank, 2016.

The specific mix of income-generating activities that rural women find most appealing and viable is heavily influenced by the **prevailing local conditions**, resources, and economic structures in each region[44]. Aligning livelihood opportunities with these contextual factors appears critical for effectively supporting rural women's entrepreneurship and employment. For instance, the strongest interest among rural women in horticultural production and dekhan farming was observed in areas with well-developed irrigation infrastructure, high levels of crop diversification, and dense population centers (which generate robust market demand for their products).

Project opportunities. For women, improved extension services in fruit and vegetable production are especially important as their role in cultivating fruits and vegetables has expanded in response to new markets and their need to diversify household income by farming on rented land as well as household plots. For instance, women constitute three-fourths of the sellers in local markets in Andijan where they sell vegetables and baked goods. A survey conducted by FAO in 2014 showed that, according to respondents, around 70 to 90 percent of women are involved in agricultural production and post-harvest of fruits and vegetables and to a lesser extent grapes. For women doing small scale farming as well as gardening at home pruning has been one of the activities which gave them more ownership and confidence over their farming businesses[45]. Moreover, at the raion and regional/national level, the demand for farm-sector products, such as dairy, vegetables, and above all fruits, is generally very high. Sometimes, traders purchase farm products from rural markets to sell to urban customers. At the international level, demand for Uzbek fruits can also be very high.

Women's labor force participation and related challenges. Economic inequality between men and women is stark in the labor market. According to ILO, women's labor force participation fell from 50 percent in 2010 to 45 percent in 2021, and the gender pay gap is 34 percent, much higher than the global average of 20 percent. While the unemployment rate for women has risen slightly over the past decade, increasing from 4.7 percent in 2007 to 5.7 percent in 2019, the more pressing challenge is the high rate of inactivity among women. In 2019, the inactivity rate for women was 48 percent - more than double the 22 percent inactivity rate for men[46].

Rural women from low-income households in Uzbekistan face a heightened risk of economic exclusion. This vulnerability is underscored by the fact that 79 percent of the country's poor population resides in rural areas (Statistics Agency) where the **gender disparities in labor participation and decision-making are even sharper**.

They have **limited ownership and management of farms**, which are predominantly controlled by men, despite women's significant contribution to agricultural activities, with

[44] *Ibid*.
[45] *Gender, Agriculture and Rural Development in Uzbekistan*. *Country Gender Assessment Series.* FAO, 2019.
[46] ILO, 2023. Women and the World of Work in Uzbekistan.

only 5 percent of farms in Uzbekistan being managed by women[47]. They also tend not to own farm **equipment** and machinery, which, whenever possible, are rent locally. This gender disparity in farm **ownership and decision-making power** limits women's ability to influence production decisions and benefit from the outputs of their labor.

They also face challenges in accessing **off-farm employment opportunities**. Existing analysis in the country suggests that even though male farmers may also encounter obstacles in accessing services and information**, women tend to have even less access to resources, agricultural information,** services and goods, which restricts women's ability to engage in non-agricultural income-generating activities.

More in particular, they have unequal access to productive resources such as land, water, livestock, agricultural inputs, seeds, extension services, agricultural technologies, and information and knowledge, as well as less access to the capital needed to purchase or lease machinery and markets compared to men. Reasons for limited access to financing include that borrowing is considered a risky activity, which is to be undertaken by men; and difficulties in producing collateral, due to limited land ownership and lease rights for women. Moreover, a survey has shown that while rural women would have liked to pursue entrepreneurial opportunities, they had concerns over their business skills, mobility, and knowledge of laws and regulations[48].

They are more likely to be employed in **informal, temporary, or seasonal work arrangements**, which tend to offer lower wages and fewer benefits, making their employment more precarious and vulnerable compared to men's. Crucially, the average wage earned by women is significantly lower than that of their male counterparts. In rural areas, the average salary for women is less than half of what women earn in urban areas. In 2019, the average wage for men was 4.3 million Uzbekistan som, while for women it was just 1.3 million som[49]. Data from the Listening to the Citizens of Uzbekistan (L2CU) survey reveals further gender disparities in employment: among those engaged in full-time work, women account for only 35 percent in urban areas and just 27 percent in rural areas.

Women in rural areas have also **lower rates of entrepreneurship and business ownership** compared to men. Only 32 percent of the self-employed are women, compared to 68 percent of men[50]. Factors like limited access to credit, information, and business development services, as well as social norms that discourage women's economic participation, inhibit rural women's ability to start and grow their own businesses.

While challenges remain, rural women exhibit higher rates of entrepreneurship compared to the general population, particularly in farming enterprises. In fact, 7.6 percent of rural female entrepreneurs have farming enterprises, higher than the general population of female entrepreneurs[51]. Moreover, recent government initiatives have aimed to increase women's access to land and participation in agriculture-related decision-making[52]. The share of women participating in the competitive allocation of land for farming has increased, reaching 47 percent in 2023[53].

A growing trend among rural women, which includes recent school graduates, mothers with young children, and elderly women, is also their participation in various types of casual labor as mardikors (typically male casual workers). These women are often hired individually or in small groups on a daily basis to perform tasks such as weeding, digging, harvesting, cleaning livestock shelters, milking cows, and other unskilled activities on private land and farms. Payment for these services is usually minimal and provided in cash, and the nature of the work remains informal. In fact, women usually have to work longer hours for a pay and in informal occupations given their meagre wages and the lack

[47] *Diagnostic Study of Barriers for Strengthening Livelihoods of Low-Income Rural Women in Uzbekistan*. World Bank, 2017.
[48] *Dairy Value Chains Development Programme*. IFAD, Project Design Report, 2015.
[49] Agri-Food Job Diagnostic, World Bank.
[50] *Diagnostic Study of Barriers for Strengthening Livelihoods of Low-Income Rural Women in Uzbekistan*. World Bank, 2017.
[51] *Ibid*.
[52] *Gender, Agriculture and Rural Development in Uzbekistan*. *Country Gender Assessment Series.* FAO, 2019.
[53] *Ibid*.

of opportunities for their husbands. In 2021, 38.7 per cent of men and 51.0 per cent of women were employed informally, with the total share of informal employment being significantly larger in agriculture than in non-agricultural sectors[54].

Education gap and the nexus with employment prospects. While 60 percent of rural women have attained at least a general secondary education, only 8 percent go on to achieve higher education[55]. This educational gap significantly constrains the employment prospects for many rural women. The link between educational attainment and the type of work women engage in is stark. Women who have completed vocational or tertiary education are more likely to secure formal, public-sector jobs with stable wages. In contrast, those with secondary education or less frequently end up in informal, low-paying, and labor-intensive occupations[56]. This disparity in educational outcomes and the resultant labor market segregation exacerbates the economic marginalization of rural women, particularly those from the poorest households.

Women's access to information, technology, innovation and knowledge

Most rural women still get information from the more traditional channels, such as radio and media outlets and access local information mainly through the mahalla committees and other local groups.

Gender stereotypes and cultural norms often hinder women's and girls' access to digital technologies57, which exacerbates economic inequalities. Uzbekistan's leadership has demonstrated its commitment on improving women's access to digital skills and services and as a result, women's use of the internet and smartphones is becoming a more acceptable norm.

Rural communities in Uzbekistan face a variety of barriers that constrain the uptake and effective utilization of various technologies, including digital technologies and internet-enabled services. These barriers span both supply-side and demand-side factors. On the supply side, these factors are mainly linked to availability, affordability, and reliability. On the demand-side, factors that inhibit the broader adoption and effective utilization of technologies in rural Uzbekistan, particularly older generations and those with lower levels of education, is lack of the necessary digital literacy and skills to comfortably and confidently use smartphones, access online services, and interpret the information they receive through these channels.

Women decision-making and agency

Most of the gender gap in employment is driven by cultural norms and social stereotypes**, which also affect rural women's status and empowerment.**

Uzbek society adheres to quite strict gender roles that stem from stereotypes about what is expected for women and men, with the former expected to be in charge of child rearing and housework, which acts as a deterrent for women to obtain formal employment or start a business. The UNDP report (2023) on Negative Impact of Gender Stereotypes and Patriarchal Norms on Gender Equality in Uzbekistan showed that: (i) 70 percent of respondents support the stereotype that women should spend more time with family, run the household and care for their children; (ii) 61 percent of men agree that only a man can be a successful entrepreneurial.

The **prevailing gender roles** and associated societal expectation dictate that women should prioritize household duties and childcare after marriage, in addition to their agricultural labor. On average, rural women spend over 5 hours per day on household tasks compared to just 2 hours for men[58]. This limits rural women's ability to engage in income-generating activities and constrains their career advancement. This results in a "double burden" for rural women, who have to balance both paid agricultural work and unpaid domestic responsibilities. About 75 percent of working age women who were not

[54] *Women and the World of Work in Uzbekistan.* ILO, 2023.
[55] *Enhancing the Livelihoods of Rural Women in Uzbekistan Background Paper*. World Bank. 2019.
[56] *Gender, Agriculture and Rural Development in Uzbekistan*. *Country Gender Assessment Series.* FAO, 2019.
[57] *Gender Digital Divide Assessment: Uzbekistan.* UNDP, 2022.
[58] *Gender, Agriculture and Rural Development in Uzbekistan*. *Country Gender Assessment Series.* FAO, 2019.

working in 2022 said it was due to homemaking and care responsibilities, and women were more than 30 times more likely to not work for these reasons than men. Lastly, nearly 100 percent of women and 90 percent of men in Uzbekistan believe that a woman should do household chores even if her husband is not working[59].

Owing to the gendered division of labour, men tend to undertake work that requires machinery and this creates an expectation that using such equipment is not 'women's work'. Similarly, irrigation is viewed as a 'male' responsibility, and as a result, women represent a small minority – and in some cases they are not present at all – of members of water users' associations. In a survey conducted by the WB, discriminatory attitudes and gender norms contribute to women's limited economic opportunities. Around 30 percent of respondents believe wives should earn less than husbands, and 75 percent believe women should work less to focus on household responsibilities. Women spend over 5 hours per day on household tasks compared to just 2 hours for men[60].

Discrimination and perceptions of women's work being less valuable also constrain women's participation. A survey experiment conducted by WB[61] found respondents were 13 percent more likely to say a woman's wages were too high, and 34 percent more likely to say a man's wages were too low, even when job descriptions were identical. As a consequence, women have **limited representation in formal decision-making bodies**, such as agricultural associations and political offices.

Recent rural transformation pathways and its implications on women

Over the past decade, rural transformation, migration dynamics as well as patterns in remittance flows in Uzbekistan are influencing these rigid dynamics, with implications on women's role in agriculture and their increasing presence in rural areas. Male outmigration has impacted women's opportunities, leading many women to take on responsibility for all domestic duties, including those that men are usually responsible for, including farming duties, like for instance water management for dehkan farms and kitchen gardens. They often face specific difficulties negotiating for their right to irrigation.

On the positive side, **there is also growing acknowledgement of a shift in traditional gender norms in rural Uzbekistan**. The acceptance and importance of women contributing income within households and society more broadly appears to be on the rise. The range of work options considered acceptable and desirable for women has expanded beyond their conventional roles in state organizations and tomorka activities. Increasingly, **small-scale entrepreneurial pursuits are viewed as suitable, respectable livelihoods for rural women**. These include operating retail shops, selling products at markets, working in private workshops, etc. Within the agricultural sector specifically, an increasing number of women have become engaged in **horticulture**, which is seen as an increasingly acceptable and desirable role. These evolving perceptions of appropriate work for women have served to increase their earning capacity and influence within the household. Women across different age groups and educational levels are actively seeking out and pursuing these newly expanded economic opportunities. The shift in social norms and attitudes appears to be creating more space for rural women to take on income-generating roles that were previously viewed as unsuitable or undesirable. This suggests a meaningful change is underway in how women's economic contributions are valued in Uzbekistan's rural communities.

Against this backdrop, the need to address gender inequalities in the agricultural sector is critical to empower rural women and enhance the sustainability and inclusiveness of Uzbekistan's rural development. Addressing gender gaps is critical for Uzbekistan's inclusive transformation. If women participated in the economy equally to men,

[59] *Life in transition survey, Uzbekistan country assessment*. European Bank for Reconstruction and Development, 2016.
[60] *Country Gender Assessment for Uzbekistan.* The International Bank for Reconstruction and Development/The World Bank, 2024.
[61] *Diagnostic Study of Barriers for Strengthening Livelihoods of Low-Income Rural Women in Uzbekistan*. World Bank, 2017.

Uzbekistan's national income could be 29 percent higher, and over 700,000 people could be lifted out of poverty[62].

Gender-based violence (GBV) is a serious challenge in Uzbekistan, but the full extent of the problem is unknown due to a lack of comprehensive administrative data and nationally representative survey information. Uzbekistan is one of the few countries in the world that does not have official statistics on the prevalence of GBV, making it the only country in Central Asia without such data.

Based on available qualitative evidence (United nations Population Fund (UNFPA), UN Women), the incidence of GBV appears to be high in Uzbekistan. The primary drivers seem to be deeply rooted social norms and gender stereotypes, as well as limited education and awareness among women and girls about their rights and how to access specialized support services if needed.

Despite these persistent challenges, Uzbekistan has made important strides in recent years in strengthening its legal and policy framework to protect women and girls from GBV. This includes the passage of the 2019 Law on Protection of Women from Harassment and Abuse. The responsibility for GBV prevention and the broader promotion of gender equality remains with the Committee for Women and Families. While these legislative and institutional advancements are encouraging, the lack of reliable data makes it difficult to fully understand the scale and dynamics of GBV in Uzbekistan. Addressing this critical evidence gap through improved data collection and monitoring will be essential for designing effective interventions to combat gender-based violence and advance women's safety and empowerment in the country.

Policy framework on gender equality and women's empowerment

Uzbekistan's agricultural sector is undergoing significant reforms, which presents opportunities for women's economic empowerment. **The government's Strategy for Agricultural Development 2020-2030** outlines an ambitious agenda to accelerate agricultural growth and utilize the sector as a driver of job creation. Key priorities in the strategy include: (i) Investing in high-quality public services such as advisory and extension services to enable small farmers to integrate into modern food value chains and adopt good agricultural and animal husbandry practices to improve productivity, protect the environment, and ensure food safety; (ii) job creation and gender inclusion are identified as important objectives within this agricultural development strategy. The strategy's emphasis on agri-food processing and support for smaller-scale dekhan (individual or family) farms presents opportunities to enhance the sector's gender responsiveness; (iii) Women farmers are more likely to operate these smaller dekhan plots rather than larger commercial farms. As such, the strategy's focus on these types of farms and on agri-food processing could increase female employment and participation in the agricultural value chain.

Equal rights and responsibilities for men and women are addressed in Uzbekistan's laws and policies, as well as in the Constitution and the Family Code. The legal framework includes other critical provisions that are sensitive to gender. Uzbekistan ratified the Convention on Elimination of All Forms of Discrimination against Women (CEDAW) in 1996.

The **Women's Committee of Uzbekistan** stands out as one of the most prominent national advocates for women's issues. It is a non-governmental, non-profit organization that is also deeply embedded within the executive power structure. The NGO status of the Women's Committee is maintained through an extensive network of "primary cells" established across various public institutions. This includes enterprises, local self-governing bodies, universities, vocational colleges, etc. The Committee also actively collaborates with other NGOs, national research centers and media outlets. The committee plays a key role in supporting and encouraging women's entrepreneurship, by providing concessional loans to women-led enterprises, opening up capacity building opportunities

[62] *Country Gender Assessment for Uzbekistan.* The International Bank for Reconstruction and Development/The World Bank, 2024.

for unemployed women, disseminating employment information, and carrying out awareness raising activities.

Several other government and nongovernment institutions are very active in supporting women employment creation and business development, such as the **Business Women's Association** (BWA) and the ***mahalla* committees** at the village level.

More in particular, the **Business Women's Association of Uzbekistan** was founded in 1991 and at present is one of the biggest women organizations in the country. It has its departments in each region of the country including Kashkadarya region (situated in the remote southern part of Uzbekistan). The mission of the BWA is to: (i) create conditions that enable active integration of women into labour market; (ii) support their entrepreneur's initiatives; (iii) defend the women-entrepreneur's rights and express the interests of members of Association.

Women and climate change

The agricultural systems in Uzbekistan face significant vulnerabilities to the impacts of climate change. The country is experiencing a range of climate-related challenges, including increased temperatures, more frequent extreme weather events, water shortages, and outbreaks of agricultural pests. Uzbekistan is also prone to various natural disasters, some of which are being exacerbated by the changing climate, such as landslides, dust storms, droughts, floods, and earthquakes. On the one hand, these climate-driven threats pose serious risks to agricultural production and food security in Uzbekistan. Disruptions to precipitation patterns, water availability, and growing conditions can severely undermine crop yields and livestock productivity. The increased frequency and intensity of extreme weather events, like droughts and floods, can further destabilize agricultural systems and livelihoods.

However, the impacts of climate change can also potentially create new opportunities within the agricultural sector. For instance, the projected rise in temperatures may potentially lead to longer growing seasons in some regions, potentially increasing the overall food production capacity. Farmers may be able to expand the range of crops they can cultivate or shift to more climate-resilient varieties. Importantly, the specific ways in which climate change will impact Uzbekistan's agriculture will likely vary across different geographic regions and agricultural subsectors. Some areas may face more severe disruptions, while others could see marginally improved conditions. Understanding these nuanced, localized effects will be critical for developing targeted adaptation strategies and leveraging any emerging opportunities. Ultimately, the agricultural transformation in Uzbekistan will need to grapple with the multifaceted challenges posed by climate change, while also identifying and capitalizing on potential avenues for enhancing the climate resilience and productivity of the sector. This will require integrating climate considerations into broader agricultural development policies, investments, and on-the-ground practices.

While addressing the climate-related vulnerabilities within Uzbekistan's agricultural systems is crucial, it is equally important that all measures for disaster risk reduction and climate change adaptation are guided by principles **of gender equality and women's empowerment**.

Gender considerations must be at the forefront of adaptation and mitigation strategies. Specifically, it is essential to understand the distinct roles that both women and men play within agricultural and rural livelihoods, as well as their unique needs and vulnerabilities that stem from prevailing gender imbalances. In the context of climate change adaptation in Uzbekistan, the following gender-specific issues require greater attention and integration:

1. Women's representation and decision-making power: Ensure that women are equitably represented in the planning and implementation of climate adaptation programs, so that their perspectives and priorities are reflected.
2. Access to productive resources: Address the disparities in women's access to critical agricultural inputs, technologies, land, and other resources, which can enhance their resilience to climate impacts.

3. Unpaid care work: Recognize and address the disproportionate burden of household and caregiving responsibilities borne by women, which can limit their ability to adapt to climate stresses.
4. Vulnerability to climate-related risks: Understand how gender norms and inequalities exacerbate the vulnerability of women and girls to the health, economic, and social impacts of climate change.
5. Knowledge and information access: Improve women's access to climate information, agricultural extension, and skills training to empower them as active agents of adaptation.

The Uzbekistan's national climate change action plan submitted in 2017 does acknowledge the importance of increasing women's participation and promoting gender equity. However, this recognition is limited to the context of adaptation measures targeting the social sector, rather than being integrated more broadly across climate change policy and programming. This disconnection represents a significant gap, causing a scattered incorporation of women's participation, leadership, and specific needs into Uzbekistan's overarching approaches to tackling climate change and modernizing the agricultural sector. Addressing this policy disconnect and strengthening the gender-responsiveness of these overarching policy and programmatic efforts will be essential for ensuring that women are empowered to contribute to and benefit equitably from the country's efforts to build climate resilience and transform its agricultural systems. Elevating gender equality as a core principle within climate adaptation strategies coupled with the integration of gender considerations as a cross-cutting priority across agricultural policies programmatic interventions can help unlock the full potential of women as critical stakeholders in building climate resilience within the agricultural sector and rural communities and lead to more inclusive, effective, and sustainable outcomes.

Gender-disaggregated data on agricultural work is limited, making it difficult to fully capture the extent of women's contributions and the challenges they face. The collection and use of gender-disaggregated data need to be strengthened to better understand and address the specific challenges faced by rural women in Uzbekistan.

Gender-related issues raised during consultations with rural women and key stakeholder

During the both the concept note and design stage consultations have been organized with women groups, individual women farmers, and key women stakeholder. The design team also met with the management committee of the Business Women's Association (BWA) led by its Manager. Participants underlined how climate change is a critical concern for rural women in Uzbekistan, as it has significant implications for their livelihoods and work, particularly in the agricultural sector. In fact, rural women have very limited opportunities for employment outside of agricultural work (for example, work in the public sector or off-farm income-generating activities) and are often offered informal employment. Table 1 below summaries key issues emerged during the consultation and relevant areas of actions that have been identified by the project accordingly.

Table 1. *Outcomes of consultations with women stakeholders*

Consultation outcome	Implications for the project design
Uzbekistan has different agro-ecological zones and land quality, owing to different resource endowments of land and water, level of development of infrastructures, agriculture, and availability of skillful labor force. Among the project areas, the Andijan, Namangan, and Fergana districts (Fergana Valley region) are specialized on horticulture, orchards, and fruits and vegetables. Surkhandarya and Sirdarya are more specialized on livestock and dairy production. **Women's vulnerability context is highly**	The collection and analysis of contextualized information on women livelihood is of outmost importance to identify gendered vulnerability contexts, and therefore critical for assessing women's and men's integration of weather and climate information into their adaptive strategies. To this end, the project will carry out an assessment to identify women livelihood and related climate change adaptation strategies adopted by women in agriculture. By 1st year of project implementation, women

conditioned by their livelihood activities.	will be also involved in consultation activities and demand analysis and training on gender-sensitive consultation, data collection, and assessment will be provided to AKIS and Uzhydromet staff.
Women are mostly engaged as temporary work and family business workers. While the farm is usually owned by the man, women need contribute as informal family business workers. Moreover, even when rural women are the ones running the business, their ability to cultivate land as independent farmers on a commercial basis is still limited owing to persistent social stereotypes that directly affect rural women's status and empowerment. This translates in their dependence on husbands or men family members who need to stay on the frontline. Notwithstanding the major and upward trend of women's contribution to labour force in rural areas, their work still remain mostly hidden and informal. The following key challenges were also mentioned: limited decision-making roles and limited access to opportunities owing to cultural norms.	Gender roles, preferences, access to farm resources, land ownership, access to labor, access to information, and financial resources are influential in determining whether or not someone will access and use climate information. By the 1st of the project implementation, a need assessment and analysis will be carried out on the following dimensions: (1) identification of perceived shocks and stresses in the context of women's livelihoods; (2) assessment of decision-making dynamics; (3) identification of the most relevant and actionable climate information needs
Typology of climate services/information. Women mentioned that key needs in terms of typology of climate information related to: **weather forecast**, **time of planting**, **time of harvesting**, frequency of **unexpected** and/or **extreme events.** They also stressed the importance of receiving information **on a timely basis** and pointed as the most compelling challenge in terms of quality of information collected and disseminated to its **relevance** and **accuracy**. During the consultations, women also underlined the necessity of investing on **robust M&E systems** to systematically track and evaluate the relevance and usefulness of information collected and disseminated.	The project will precisely focus on improving the quality of information collected and disseminated on areas identified by rural women. By applying a gender lens to all climate smart advisory, the project also aims at improving the relevance of such climate information services. One of the key features of the Climate Services System the project will contribute to develop is precisely its ***feedback mechanism***, which will allow users to provide feedback on how to improve the services throughout (on *accessibility*, *usability*, if *content is understandable* and what actions they think they should take based on the information provided) the development phase, including the pretotyping and prototyping phases.
Access to CIS. Women acknowledged the importance of smart phones to access CIS but several factors act as major constraint to the acquisition and use of the device: (i) low-income levels; (ii) poor connection quality; (iii) gender stereotypes and cultural norms often hinder women's access to digital technologies. This inhibits women's access to CIS. While men are more likely to have smartphones, with mobile Internet and other applications, women's phones usually only have calling and texting capacities. Women mentioned the importance of telegram groups but also underlined that information provided through such platforms are not always relevant or accurate. Telegram should therefore not be the only platform to use;	Gender-specific needs for climate change adaptation will be mainstreamed into the design of climate information services to improve their equity and effectiveness for both men and women farmers. Various dissemination channels of CIS will be explored to ensure women have easy access to this important decision support service. Consultation for selecting the most relevant and appropriate communication tools and channels will involve women. Options such as SMS messages, telegram groups, mobile apps, web portals, information bulletins through the mahalla committees will be considered and adopted in a flexible

there should also be mobile apps. **Women Committee in the Mahalla** are important actors at the local level and represents key entry points for the collection and dissemination of information. They are the one-stop shop and it would be critical to involve and consult with them, leveraging on the key role they play at the community level in combination with a wider range of dissemination tools and channels.	manner considering the specific socio-economic profile of the groups targeted. For women experiencing challenges in accessing and using smartphones, the project will consider providing internet subscription packages as relevant.
Low digital skills. Women mentioned the low level digital literacy in rural areas and underlined the importance of training on how to use and interpret the information received	The project will develop a **Training-of-Trainers (ToT) programme** to train AKIS extension specialists and regional Uzhydromet staff to become master trainers on the Climate Services System. **They will then conduct seminars with groups of farmers at the sub-district level** to raise awareness and guide farmers and other agri-food chain actors in using the services, where at least 30 percent of farmer beneficiaries will be women. A comprehensive curriculum and set of materials will also be developed and based on the experience of other projects. The content of the training will be relevant to women, easy to understand and giving practical examples of how a farmer can use climate services to inform their decision making, both in the short and long term.

2. Gender mainstreaming strategy and action plan

The project is expected to mainstream gender issues in all activities and components. A 30 percent quota for women's participation has been established. In particular, the project's gender strategy aims to promote the design and delivery of gender-sensitive climate services that take into account women's different needs and priorities for climate and weather information, as well as their different capacities to act on this information. Failure to address women's concerns and challenges risks reinforcing gender bias. Indeed, women's empowerment through climate services can only be achieved if the information provided to them is relevant, actionable and relevant.

The project will take affirmative action to target rural women and ensure equitable distribution of benefits from investments in climate services, which will revolve around three main dimensions: (i) information typology, (ii) accessibility, and (iii) use. Project interventions would therefore adopt a "women-user lens" across the three dimensions, taking into account the social nuances present in different communities and then designing outreach, adaptation and risk management strategies based on these local needs.

Improving the quality and relevance of climate information will expand the range of options available to make rural women more resilient and prosperous in the face of climate risks. In an enabling environment, climate information and advice will enable women to better anticipate and cope with extreme events, take advantage of favorable climate conditions, and adapt to change.

Based on the gender assessment and situational analysis and on consultations held throughout the development of the project proposal, the following issues will be considered during project implementation, as detailed in the following sections.

***Table 2**. Relevant aspects to consider for gender-sensitive climate information services according to the three dimensions*

Women profiling and related challenges	Climate and advisory services
Typology of climate services/information	
Typology of crop production *What crops do women cultivate?*	Understanding the vulnerability context and the livelihoods of rural women is critical for the identification of the most relevant and actionable climate information needs and in ascertaining priorities, constraints and hence information needs. For instance, information on the duration of the season for the specific crops harvested by rural women, on the amount and timing of rainfall across the season, would further women's use of the advisories. Heat forecast can also inform their agricultural decisions about what to plant and at what cycle length.
Asset ownership *What assets do women have or have access to?*	For instance, if few small animals are owned, forecasts of e.g. extreme heat events, or likely protracted heat stress, might allow them to protect their livelihoods assets
Access to inputs *What inputs do women need to grow crops?*	Advisories on the length of the season and the amount and distribution of precipitation across that season might be more actionable for women with greater livelihoods assets These women would benefit from coupling weather and climate advisories with seed price and availability information as well as market price advisories
Access to climate-related information	
Women's ability to easily access and use ICTs, telephone devices, internet might be constrained by multiple factors: (i) gender control over assets; (ii) gender stereotypes and cultural norms This is because, since men may have access to more financial resources and control of household income, they might be better positioned to purchase mobile phones) *How do women access climate information?*	Various dissemination channels of CIS will be explored to ensure women have easy access to this important decision support service (Telegram group platforms, mobile apps, web portals, mahalla committees, etc.).
Use of climate-related information	
Women are often less confident in independently acquiring the digital skills required to use a mobile phone and are more concerned with the consequences of making mistakes *What knowledge do women need to use climate information?*	Digital skills Hybridization between traditional and modern methods of communication

Implementation steps

Consultation activities to assess information needs and priorities. Women, and women's organizations will be consulted in assessing perceived shocks and stresses in the context of their livelihoods. Understanding the vulnerability context and the livelihoods decision-making dynamics will pave the way in identifying the most relevant and actionable climate information needs and in ascertaining priorities – with further

disaggregation by male and female-headed households, age, and socioeconomic status where these may shape roles, constraints and hence information needs.

This will serve a twofold goal: (i) facilitating the 'uptake' of climate forecasts and (ii) understanding how climate information can interact with other resources and capabilities to empower women to make decisions and enact strategies that reduce their vulnerability to climate risk.

Menu of communication channels. Gender barriers in accessing communication channels available for climate services will be assessed. The final choice on the selection and/or development of information channels (website, app, etc.) will be done in consultation with local mahalla leaders, women's and community organizations. In recognizing which mediums of information sharing are comfortable for women, the project can work with communities to tailor functional uses of new technologies to their particular livelihoods, thus increasing relevance, accessibility, and utilization in rural agricultural communities.

Information usage and tailored advisory services. A range of information services tailored to women's expressed interests, in addition to climate information, will be provided with the objective of increasing the value of advisory services to women. This will include the introduction of climate information services in a way that decreases women's labour and time investment in agricultural and household tasks.

Implementation of project gender strategy will be guided by a Gender Action Plan (GAP), which summaries key measures, activities, expected outputs/outcomes, and responsibilities across main components. The action plan will help the project ensure that gender is not treated as an add-on or as a separate component from core activities related to climate services design and delivery.

Operational arrangements to implement the gender action plan

1. All measures and activities to be implemented are reflected in the project's budget
2. A social mobilization and gender expert will be the gender focal point who will guide and monitor the implementation of the strategy making sure all PMU staff and partners are aware and accountable to it
3. All staff and partners will be trained and sensitized on project gender strategy
4. Staff and service providers will also be sensitized on how to reach and benefit different categories of women
5. The results framework and gender action plan set targets for women inclusion.

The Business Women Association, together with other key stakeholder on the ground, will be consulted on the deliverable of activities included in the below Gender Action Plan (i.e. gender assessments, needs analysis, etc.).

3. Gender action plan

Objective	**To guide actions and measures towards the inclusion and empowerment of women**				
Activities	**Gender measures/activities**	**Output/outreach indicators**	**Target %**	**Roles & Resp.**	**Timeline**
Component 1. Development of near real time farm advisory informational system					
Training on digital inclusion of women in participatory manner for climate service designers	Training package on gender-sensitive design of digital solutions to PMU, AKIS staff and key partners and Uzhydromet staff, and Farmer Council	Number of staff trained on gender-sensitive design of digital services	20 staff	PMU gender focal point	By 1st year of implementation
Features of the Climate Services System	Gender sensitive climate smart advisory and climate risks management services will be provided	Gender lens applied for all climate smart advisory	100% of advisory screened through a gender lens	PMU and PMU gender focal point	Completed at mid-term
Training on operating the Climate Systems Services		Percent of staff trained on operating the Climate Services System are female	30%	PMU	Completed in year 4
Component 2. Improvement of the decision making and planning system for agricultural sector through climate change modelling					
Climate change impacts and adaptation studies in agriculture	An assessment is carried out by a service provider to identify climate change adaptation strategies adopted by women in agriculture	Study report identifing gender-sensitive approaches and tools for climate change adaptation in agriculture	1 gender assessment 4 studies featuring gender sections	PMU in consultation with MoA and MWR staff	By 1st year of implementation Studies to be completed in year 4
Capacity building on climate modeling	Training on climate modeling for Uzhydromet, MoA, and MWR staff	Number of women trained on climate modeling	30 women trained	PMU gender focal point	Completed in year 3

Capacity building for policymakers and community representatives	Conferences, climate information sessions, and seminars are organized to share knowledge on gender adaptation strategies ToT for Uzhydromet and MoA field staff are delivered on gender adaptation strategies	No. of conferences, climate information sessions, and seminars No. of ToT organized for Uzhydromet and MoA field staff on gender adaptation strategies		PMU	50% at mid-term – 100% at the end of the implementation period
Component 3. Reaching the last mile and getting climate services to farmers					
User assessment including participatory consultation, livelihoods analysis, and climate information needs identification	Women involved in consultation activities and demand analysis Training on gender-sensitive consultation, data collection, and assessment are provided to AKIS, and Uzhydromet staff The needs analysis report describes the following outcomes from consultations: (1) identification of perceived shocks and stresses in the context of women's livelihoods; (2) assessment of decision-making dynamics; (3) identification of the most relevant and actionable climate information needs	No. of women consulted No. of women organizations No. of local mahalla leaders	30% of test user consulted are women	PMU and AKIS staff	By 1st year of implementation
Digital dissemination tool and communication channels	Consultation for selecting the most relevant and appropriate communication tools involve women Dissemination tools improve access to climate information for women	No. of women consulted No. of women organizations No. of local mahalla leaders Reports includes outcomes from consultation activities with women	30% of end user consulted are women	PMU and AKIS staff	By 1st year of implementation
Information usage and tailored advisory services	A range of information services tailored to women's expressed interests is provided	Percent of end users have improved access to tailored climate smart advisory and climate risks management services	30% of the target group	PMU and AKIS staff	By end of the implementation period

Annex 5. Stakeholder engagement plan

This stakeholder engagement plan informs project implementers as to when, how and with whom consultations and exchanges should be undertaken throughout the life of the project.

1. Previous stakeholder engagement activities

A summary of the previous stakeholder engagement can be found in Part II Section H of this proposal.

2. Stakeholder identification and analysis

This project has the following two primary target groups:

- **End-users of the Climate System Service** (e.g. dekhan farmers, medium and large size farms, agricultural labourers, agribusinesses, farmer federations)
- **Policy makers and community leaders** (at national, regional and local levels)

Implementing stakeholders include:

- **Government agencies providing climate services** (MoE, Uzhydromet, MWR, MoA)
- **International technical assistance providers** (FIM, NIBIO, PIK, UQ)

The following table describes what the project's stakeholders are interested in and how the project will engage with them.

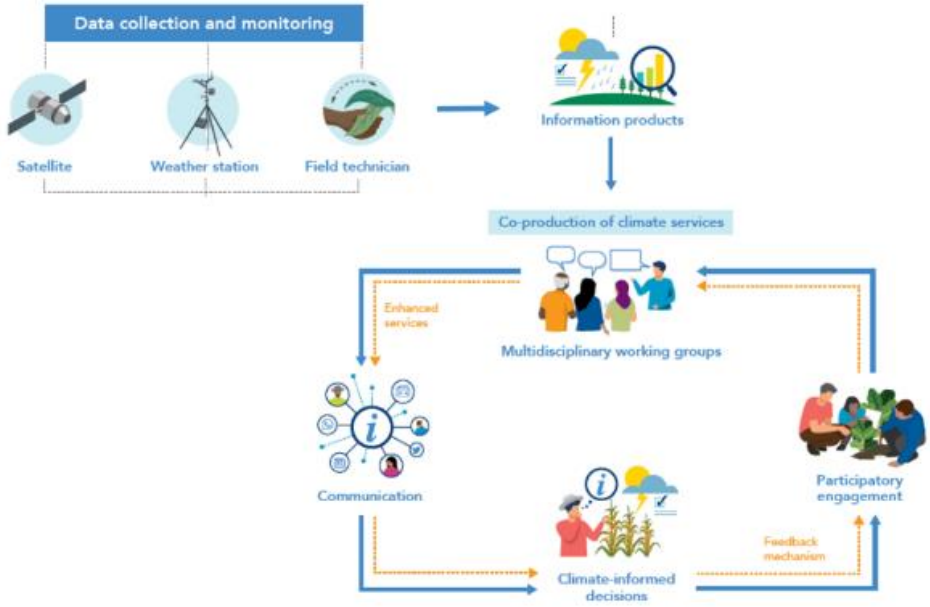
Stakeholders' areas of interest and engagement methods

Stakeholders	Area of interest	Engagement methods
End-users of the Climate System Service (e.g. dekhan farmers, medium and large size farms, agricultural labourers, agribusinesses, farmer federations – both men and women)	Receiving free, timely, relevant, and reliable information about weather, climate extremes, and their impact on agricultural operations, and what to do about it	• User assessment (1st year) • Detailed gender assessment (1st year) • Co-design of climate services 1. Pretotyping (2nd year) 2. Prototyping (3rd year) 3. Large-scale application (Training-of-Trainers (ToT) programme and farmer seminars) (4th year) 4. Full scale application (Communication campaign) 4th and 5th year) • Web-platform and mobile application with feedback mechanism • Participatory evaluation
Policy makers and community leaders (at national, regional and local levels)	Understanding how weather extremes and climate change is impacting their communities and what to do about it	• Climate conference • Training of trainers • Climate adaptation seminars at local level
Government agencies providing climate services (MoE, Uzhydromet, MWR, MoA)	Access to good data and collaboration to deliver good information services to agricultural end-users	• Inter-ministerial committee • Development of standard operating procedures (SOPs) • Climate conference

International technical assistance providers (FIM, NIBIO, PIK, UQ)	Transfer and application of their digital technologies to the benefit of the Uzbek society	• Provision of training seminar (1st year) • Technical assistance agreements
General public including e.g. journalists	Receiving free, timely, relevant, and reliable information about weather, climate extremes, and their impact	• Web-platform and mobile application • Climate conference • Training with journalists

3. Stakeholder engagement strategy

The project's engagement strategy will use an approach based on FAO 2021. It includes a series of feedback mechanisms to systematically engage producers and users of information in the co-design and co-production of climate services. The figure below shows the key steps for effective delivery of climate services. It highlights the importance of participatory engagement and feedback mechanisms. Meaningful feedback mechanisms between actors and users (indicated by the orange dotted lines) ensure that users' preferences, experiences and needs are taken into account and that climate services are continuously adapted and improved.



Framework for effective climate services provision (Source: FAO 2021)

4. Stakeholder engagement methods

The project will engage with **end-users of the Climate System Service** through the following methods:

User assessment for climate information services. This assessment will be conducted in the first year of the project. The goal is to gain a thorough understanding of who the audiences of the Climate Services System are in order to provide the right services to the right audiences. The assessment will be carried out in close cooperation with the multidisciplinary task force of Component 1.

The assessment process will be based on a participatory approach. Training and sensitization will be provided to all PMU and AKIS staff and key partners to ensure that they understand who the project target group is, how to identify them and how to reach them. Social consultation activities go to the last mile to ensure that the project target group is reached. Activities are tailored to the project's target group and informed by clear gender and youth inclusion messages; they are conducted in target communities and involve all representatives of the different target groups, including poor subsistence and semi-subsistence households, women and youth from different socio-economic groups. The results of consultation activities should be highlighted in a final report.

Gender assessment for climate change adaptation in agriculture. The project will commission an assessment to look specifically at ways to protect women from the impacts of climate change and help them adapt. Men and women have different roles on the farm. This varies according to the type of farm. The aim is to develop gender-sensitive approaches and tools for climate change adaptation in agriculture. Gender-sensitive adaptation extension will be integrated into Uzhydromet's Climate Services System.

Co-design and production of climate services. The project will use a phased approach consisting of the following four steps to develop its climate services in a user-centric manner:

1. *Pretotyping*. In the second year, the project will develop several pretotypes of the service system to test ideas quickly, easily, and inexpensively.
2. *Prototyping*. A first or preliminary version of the Climate Services System will be tested in the third year with about 1,000 farmers and people working with them.
3. *Large-scale application*. Services will be promoted widely in the fourth year of the project through a media campaign and training of trainers programme.
4. *Full scale application*. All climate services will be operational and widely promoted in the final year of the project. A participatory evaluation will capture the reach and impact of the system.

Organizing the pretotyping and prototyping. AKIS will be responsible for organizing user engagement in a participatory manner to co-design the format, messaging and content of the climate services. In the second year of the project, several pretotypes of the Climate Services System with limited functionality will be presented to 100 test users who will provide their feedback on how to improve the services. It is normal for pre-pretotypes to be exploratory. The idea is to eliminate 90% of the elements that are misleading. Only a small group of users is needed for this purpose. Test users will give feedback on accessibility, usability, if content is understandable and what actions they think they should take based on the information provided to them. In the third year, the same approach will be used with 1,000 test users to evaluate a more advanced prototype of the service system with more features.

AKIS will identify test users with different profiles, from dekhan farmers to large-scale farmers, and their workers, at least 30% of them women, to provide feedback on the first versions of the climate service. Users will be identified from all areas where the project

intervenes. Their farming operations need to be close to a met or agro-met station. These users will be compensated for their time and as an incentive to provide constructive feedback.

Training-of-Trainers (ToT) programme and farmer seminars. The project will develop a program - a training-of-trainers programme - to train AKIS extension specialists and regional Uzhydromet staff to become master trainers on the Climate Services System. They will then conduct seminars with groups of farmers at the sub-district level to raise awareness and guide farmers and other agri-food chain actors in using the services. Seminars at the sub-district level will target farmers, dekhan farmers, smallholders, agribusinesses, and other stakeholders such as beneficiaries of other rural development projects.

Communication campaign. The project will conduct a communication campaign to raise awareness of the Climate Services System. Communication channels will include social media such as Telegram and YouTube, as well as traditional media such as radio. The project will identify innovative ways to reach its audience through videos, infographics, and success stories (e.g. short videos where a farmer presents important weather forecasts and gives recommendations on what to do). Organizing the campaign involves the following steps: This activity will be carried out together with Uzhydromet's Communications Department.

Participatory assessment of app usability and impact on crop decision and productivity. The evaluation will be conducted by an independent evaluation agency in the final year of the project. The evaluation will provide insights into the accessibility, relevance, trustworthiness and practical impact of the Climate Services System. It will assess the effectiveness and user-friendliness of the system for farmers, and provide advice on how to tailor and refine the information system and its impact on crop management decisions and productivity.

The project will engage with **policy makers and community leaders end-users of the Climate System Service** through the following methods:

Climate conferences. The project will organize at least one conference on climate change impacts in the agricultural sector. It will also contribute to and participate in climate change networks and initiatives such as CAREC. The conference will bring together the MoE, MWR, MoA and other ministries concerned with agriculture and the impact of climate change on the sector. The project will present study findings and organize high-level dialogues in collaboration with universities/research institutions, multilateral agencies, NGOs and technical networks to ensure broad outreach. The high-level exchanges will also feature

Training with journalists. The project will organize trainings with journalists to raise awareness about the impact of climate change on agriculture, water and food security.

Climate adaptation seminars at local level. The project will use a training of trainers approach to train regional MoA extension experts and Uzhydromet experts on the impacts of climate change on agriculture. The trained experts will then hold seminars in their districts with local policy makers and community representatives. The goal is to have a dialogue about what climate change means in practice for the community and how the community can prepare for a future warmer climate.

Annex 6. ~~List of tables for r~~Reporting Adaptation Fund core impact indicators

Adaptation Fund Core Impact Indicator "Number of Beneficiaries"				
Date of Report	20/12/2024			
Project Title	Resilient food systems through climate services for agriculture in Uzbekistan			
Country	Uzbekistan			
Implementing Agency	IFAD			
Project Duration	2025-2030			
	Baseline *(absolute number)*	Target at project approval *(absolute number)*	Adjusted target first year of implementation *(absolute number)*	Actual at completion[63] *(absolute number)*
Direct beneficiaries supported by the project		31,000		
Female direct beneficiaries		9,300		
Youth direct beneficiaries		9,300		
Indirect beneficiaries supported by the project		510,000		
Female indirect beneficiaries		255,000		
Youth indirect beneficiaries		132,600		

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[63] At project completion, the proponent could report on % targeted population reached or successfully supported (the absolute numbers could then be deduced from that figure)

Adaptation Fund Core Impact Indicator “Early Warning Systems”				
Date of Report	07/12/2025			
Project Title	Resilient food systems through climate services for agriculture in Uzbekistan			
Country	Uzbekistan			
Implementing Agency	IFAD			
Project Duration	2025-2030			
	Baseline	Target at project approval	Adjusted target first year of implementation	Actual at completion
Adopted Early Warning Systems (Category targeted – 1, 2, 3, 4; and absolute number) (1) risk knowledge, (2) monitoring and warning service, (3) dissemination and communication, (4) response capability.		(1) risk knowledge (2) monitoring and warning service (3) dissemination and communication In total 3 categories		
Hazard		Extreme temperatures (high and low temperature) Severe storms Dust and sandstorms (wind) Winter weather hazards (hail, snow, hail)		
Geographical coverage (km2)		80,000 km2		
Number of municipalities (number)		107 administrative 2 level entities in 7 regions		