

FINAL REPORT

Uzbekistan

Climate resilient livelihoods of horticultural producers in Fergana Valley in Uzbekistan (under “Leveraging Nationally Determined Contributions (NDCs) to achieve net-zero emissions and climate-resilient development, in response to the climate emergency”)

31 October 2023



Handover ceremony of agro-meteo stations provided within the JSB project support to national partners

Reporting Period	16 months
Start Date - End Date	March 2022 – July 2023
Implementing Partner(s)	UNDP in Uzbekistan
Total Contribution	USD 954,147 (including levy \$9,447)
Project Location	Fergana Valley (Andijan, Fergana, Namangan regions)
Project Beneficiaries	<p>Direct beneficiaries: 174,050 people (50% of rural population engaged in horticultural production, and 30% of them are youth) in 3 regions of Fergana Valley in Uzbekistan</p> <p>Indirect beneficiaries: 10,296,560 people living in Fergana Valley of Uzbekistan strengthen their livelihoods and food security; and 1.4 mln dehkans and farmers</p>

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I. Executive Summary

The project outcomes contributed to strengthening Uzbekistan’s climate adaptation efforts indicated in its NDC2¹ (2021) committed under the Paris Agreement ratified by the country, which states that a key priority in meeting the rapidly-growing population’s demand for food products is to increase climate resilience of agriculture sector. The project achievements are in line with the COP26/COP27 outcomes and decisions such as Global Goal on Adaptation and safeguarding food security through addressing the needs in financial support in the adaptation loss and damage and technological assistance in strengthening early warning systems that communities can better protect themselves from climate effects. Adaptation priorities in NDC2 combines the sectoral and regional (Aral Sea focused) approach. **Project successfully managed contributing to increasing climate resilience of 174,050 people (50% of rural population engaged in horticultural production, and 30% are youth) in another climate change vulnerable region of Uzbekistan – Fergana Valley, who benefit now with more timely and credible early warning/weather forecast information provided by the expanded (55 stations) weather² and agrometeo³ observation network.**

- **40 (8 female) agrometeorologists** from Uzhydromet’s regional subdivisions trained in operation and maintenance of the digitalized collection and visualization (video-walls) of the meteo and agro information in **3 Situational Centers** established in the regions of Fergana Valley.
- **174,050 (49% female) farmers, and rural households, or 32% of private producers** engaged in horticultural production in Fergana Valley increased their climate resilience thanks to access and use of agrometeo data and early warning/weather forecast produced by the automated and solar energy powered **40 small agrometeo and 15 big weather stations.**
- **454,933 people** have access to agrometeo information services as the expanded (55 vs previously available 10 stations) agrometeo and weather observation network covers the bigger territory (**4,315.5 km² or 23%** of 3 provinces of Fergana Valley, where those people are living in.
- **32 surveyors** in the three regional subdivisions of Uzhydromet in Fergana Valley equipped with **18 ‘Agroclimatologists cases’** (set of instruments) and **32 tablets** to do required measurements at the farming/private households’ sites that they access the agrometeorological information and are resilient to climate variability and risks and extreme weather events.
- Capacity on processing the meteo and agro data for modelling climate risks (using the regional numerical weather forecasting system COSMO-6-CA version) has been strengthened up to 50% by equipping with advanced IT/server and integrating new 55 stations installed in Fergana Valley into the national Uzhydromet’s informational platform: temperature forecast for Fergana Valley can be issued with **2 weeks lead time** that can reduce at least **10%** of yield losses. Moreover, the modelling now includes **climate-induced plant disease and pest risk forecasted that can be issued with 14 day-lead time and up to 75-80% accuracy.**

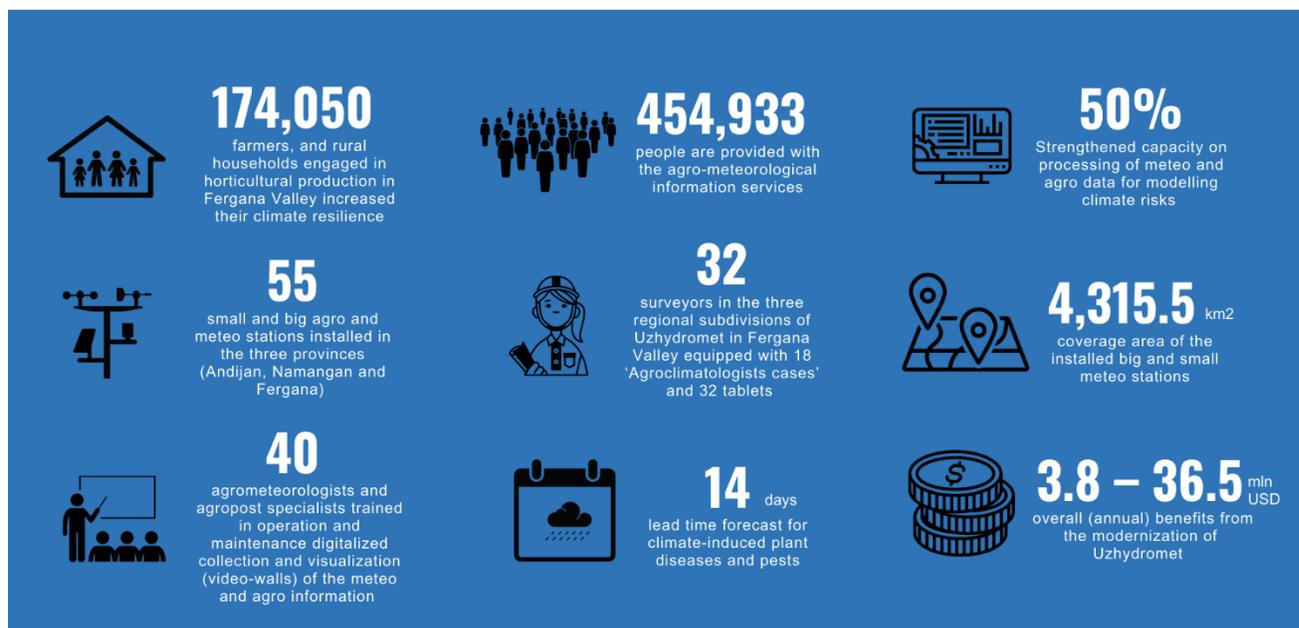
¹ https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uzbekistan%20First/Uzbekistan_Updated%20NDC_2021_EN.pdf

² The meteo (weather) station takes measurements using special meteorological instruments that can determine level of solar radiation; air temperature; air and soil humidity; atmospheric pressure; wind direction and speed; amount of precipitation; snow level. It consists of multiple meteorological sensors, power supply systems, data collectors, and cloud platforms. It is a complete system integrating measurement, transmission, recording and analysis.

³ Agro-meteorological stations, as the name implies, are designed specifically for agriculture. They measure meteorological data such as temperature, rain, air humidity and are equipped with special sensors such as those for leaf wetness.

- The economic effect (in monetary terms and with consideration of accuracy of forecasts, elimination of hydrometeorological data loss, reduction of time spent on automated measurements, etc.) from investing approximately **USD1 million** of JSB funds in **expansion/modernization of agrometeo station network in Fergana Valley** could reach the range of **USD3.8-36.5 million** annually⁴ (estimated based on the previous assessment⁵ of economic effect from modernization of 10 hydrometeo station network in the Karakalpakstan, done within the UNDP project funded by the Adaptation Fund in 2021⁶).

Deliverables



II. Background

The NDC2 states that a key priority in meeting the rapidly-growing population's demand for food products is to increase climate resilience of agriculture sector through developing automated weather stations (AWS) for hydrometeorological hazards and manage climate risks; implementing crop diversification and breeding highly productive plant species (varieties) resistant to salinity, drought and other extreme weather events and climate risks; raising awareness and improving access to information on climate change for all population groups; attracting investments in production and processing, as well as creating value chains for agricultural and food products; Increasing participation of public, scientific institutions, women and local communities in planning and management, and mainstreaming gender approaches and practices.

The climate adaptation is and will be a highest priority for the country due to building up impacts of climate change such as increasing climate aridity that results in water stress and more frequent extreme weather events. In 2022-2023, the country faced severe heat and cold waves. The abnormal low temperatures in December 2022-January 2023 resulted in loss of 228,000 tons of onions.⁷ Such climate induced impacts pose

⁴ As per WMO data, every dollar invested in meteorological services brings often tenfold benefits or more

⁵ Economic feasibility evaluation for installation of the automatic hydrometeorological equipment for modernization of the observation network in the Republic of Karakalpakstan, UNDP Uzbekistan, 2017, p.29, see at [AMS efficiency report Arkelova eng.pdf](#)

⁶ <https://www.adaptation-fund.org/project/developing-climate-resilience-of-farming-communities-in-the-drought-prone-parts-of-uzbekistan/>

⁷ <https://uzreport.news/economy/uzbekistan-lost-228-thousand-tons-of-onions-due-to-abnormal-frosts>

serious challenges to human security, including economic, food and environmental risks, and calls for urgent, people-centred, prevention-oriented responses focused on the most climate change vulnerable sectors and the population groups.

Agriculture is an important sector of Uzbekistan economy employing 32% of the population. The horticultural sub-sector is a key source of both rural livelihoods (49% of total population are households) and high-value exports (up to 40%), with half of this production sourced from rural households and micro, small- and medium-size enterprises (MSMEs). Urgent and well-informed adaptation action in agriculture sector is required to prevent yield and productivity losses, secure livelihoods and food supply of the most vulnerable rural communities in the face of climate change. In 2020, the President of Uzbekistan prioritized the importance of improving hydrometeorological services, which cannot meet increasing demand for timely and credible climate information for agriculture and other sectors. Since 2022, The Government of Uzbekistan has initiated a very ambitious administrative and institutional reform, within which a new ministry responsible for climate change along with ecology and environmental protection has been established.

The UNDP JSB project “Climate resilient livelihoods of horticultural producers in Fergana valley in Uzbekistan” implemented in partnership with the Agency for Hydrometeorological Services (Uzhydromet) under the Ministry of Ecology, Environmental Protection, and Climate Change of the Republic of Uzbekistan aimed to strengthen agro-meteorological information services to meet the needs of the vulnerable agricultural communities, improve observation, forecasting, and extension services for farmers through sharing and promoting greater knowledge about managing climate risks and enabling adaptation to climate change with the focus on horticultural sector in the Fergana Valley of Uzbekistan.

III. Results

In 2015, the farmers, rural households, and agro-producers in Uzbekistan had lost 15-30% of fruit and vegetable production due to abnormal weather events and lack of early warnings and long-term climate risk and climate change impact forecast information. Only 10 non-automated stations agrometeo stations and post served the Fergana Valley region before the project operational start in March 2022. Though the farmers and rural households in Fergana Valley had realized the climate change impact induced increase of pest and plant diseases⁸, the corresponding early warnings and forecast adapted to local conditions were not available.

The Country Output 1: Resilience of climate-sensitive horticultural production and livelihoods of climate-affected rural communities in Fergana Valley in Uzbekistan strengthened through improved agrometeorological services has been achieved through producing the following results:

Activity Result 1: Agrometeorological services shaped, and early warnings produced

The first time a comprehensive analysis of the ground-based observations, remote sensing, and modern methods



⁸ Baseline assessment of risks and problems of agriculture associated with climate change in the Namangan and Fergana regions of Uzbekistan, UNDP Uzbekistan, 2015

of mathematical modelling has been conducted and its results were presented to the project stakeholders and international partners (Embassy of Japan, FAO, UNDP, and Qazaqstan Institute of Social Studies) within the Conference “Adapting Agriculture to Climate Change: Challenges and Solutions for Uzbekistan” conducted on 23 March 2023.

Three Agrometeorological Situational Centers established in each province of the Fergana Valley. They function as an intelligent digitalized system for online monitoring of agrometeo data and information generated by the automated weather stations and agrometeorological stations, which replaced an outdated mode of communication using landline phone or radio. The system allows to conduct video conference by the central office of Uzhydromet with its regional subdivisions visualizing automated agro and weather station locations and information they generate using the video-walls (LED panels, PTZ Cameras, microphones, sound system mounting frames for the panels provided within the project).

These centers are operated by over 40 agrometeorologists and agropost specialists from the Uzhydromet subdivisions in Fergana Valley: 22 people (4 women) in Andijan region, 8 people (2 women) in Namangan region, and 10 people (2 women) in Fergana region, who trained in operation of the handed over IT equipment within 3 technical trainings conducted in Fergana, Namangan and Andijan regions in May 2023. The trained staff have access to real-time agrometeorological data. Before the project intervention, the information about climate risks and weather conditions was received in hard copies from Uzhydromet central office in Tashkent. Now, it is continuously available in online mode that enables timely analysis of the agrometeo situation and issuing early warnings allowing undertaking/coordination of required response actions by the end-users.



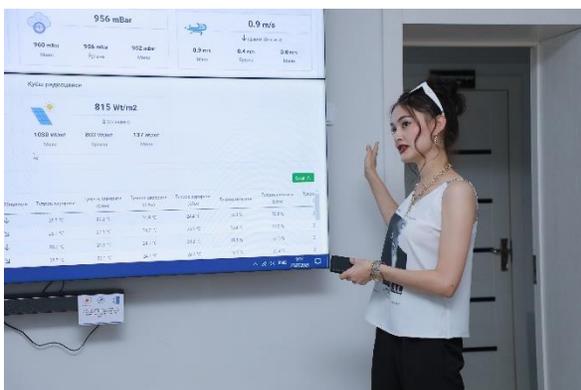
Expansion (by 55 automated agrometeo stations) of the ground-based agrometeo monitoring network resulted in greater (by 4,315.5 km²) coverage of territory in the Fergana Valley. This significantly strengthened the existing hydrometeo observation capacity of Uzhydromet, including at the national scale. It also makes possible adapting the current approach on long-term assessment of irrigation water deficiency risk and drought in the Syrdarya river basin with a lead time of 6 months or more forecast. Data generated by the installed stations allow more detailed and accurate verification of impact of numerical weather forecasts produced by the regional modeling COSMO-6-CA that that will be used for development of a multimodule system for assessing drought, floods, snowfalls and landslides risk.

Activity Result 2: Agrometeorological observation networks modernised

Before the project start in March 2022, only 10 manually handled agrometeo stations served the Fergana Valley region. The project experts carefully selected locations for installation of new automated agrometeo stations to ensure that their service radius does not overlap but allows covering the largest possible area of

Fergana Valley. Each automated weather station provides a coverage area of 30-35 km² for meteo data collection but each small agrometeorological station covers 5 km² around its installation point. 15 automated weather stations were procured and installed at the selected locations in the three target regions (35 districts) in Fergana Valley:

- **Andijan region:** 5 automated weather stations (in Asaka, Izboskan, Balikchi, Bulokboshi, and Oltinkul districts)
- **Fergana region:** 4 automated weather stations (in Dasht, Mezon, Rishton, and Vuadil districts)
- **Namangan region:** 6 automated weather stations (in Gova, Turakurgan, Uchkurgan, Chust, and Yangikurgan districts, and in Namangan city)



Also, 40 small automated agrometeo stations were installed in Fergana Valley at the farmers and rural households' plots:



- **Andijan region:** 12 small agrometeorological stations (in Xo'jaobod, Paxtaobod, Oltinko'l, Jalaquduq, Ulug'nor, Andijan, Izboskan, Boston, Baliqchi, Qorgontepa, Bulokboshi, and in Andijan city);
- **Fergana region:** 15 small agrometeorological stations (in Beshariq, Bag'dod, Buvayda, Quva (2), Toshloq, Fergana, Furqat (2), Yozyovon, Qoshtepa, Oltiariq, Rishton, Uchkoprik, and Uzbekistan districts);
- **Namangan region:** 13 small agrometeorological stations (in Uychi (2), Chortoq, Yangiqo'rg'on (2), Mingbuloq (2), Namangan, Chust (2), Norin, Pop districts, and Namangan city)

All installed stations are powered by PVs that generate electricity using solar energy. This off-grid solution ensures stable power supply that avoids the collected agrometeo data loss due to black-outs. Moreover, using renewable energy reduces GHG emissions and is climate and environment friendly.

Currently, the stations generate agrometeoro data for horticultural producers enabling the climate-informed planning by the farmers and rural households engaged in horticultural business, reducing farming costs, and improving their horticultural production quality. This also mitigates climate change impact on agriculture sector, farmers' financial well-being, and the country's economy in general.



Activity Result 3: Data processing and user services improved

The quality and promptness of agrometeorological data processing depends on the technical capacity of Uzhydromet and competencies of the specialists in charge. To improve data processing and agrometeo services provided by Uzhydromet, IT capacities were upgraded by provision of modern IT equipment such as 2 servers (1 main and one for backup), 2 switches, 2 uninterruptible power supplies and a server cabinet. Licenses for virtualization and operating systems have been provided for both new and existing servers. This with the proper server virtualization by 5 responsible server-administrators from the Center for Development of Information Technologies in Hydrometeorology (Meteoinfocom) helps in strengthening capacity of the server infrastructure by up to 50% for processing meteo and agro data for modelling climate risks (COSMO-6-CA version that allows 120 hours weather forecast lead-time and 2x2 km grid spatial coverage), including the first time modelling of the climate-induced plant diseases and pests risks. It is possible now to produce a temperature forecast for Fergana Valley with 2 weeks lead-time that facilitates reduction yield losses from extreme weather events by at least 10%. Delivery of argometeo information to the end-users is done on the web-based platforms, to which the users have an access.

32 specialists from Uzhydromet's regional subdivisions provided with PCs and uninterruptible power supply devices (10 for each region and 3 for Uzhydromet Central Office in Tashkent) along with 32 tablets handed over to surveyors (10-11 per each regional department) to do the required agrometeo measurements at the farming/private households' sites that they have an access the agrometeorological information at the spot to be more resilient to climate variability and risks and extreme weather events.

To increase expertise of Uzhydromet's specialists, 6 workshops were conducted for national specialist represented the various organizations/departments that enabled discussions on climate change impact, knowledge exchange with international specialists and upgrading skills in operation and maintenance of the automated agrometeo stations:

- 29 participants (27% female) shared experiences and consulted on oh potential solutions and opportunities for collaboration with academia, the public sector, and international organizations involved in climate change adaptation in Uzbekistan (September 2022);
- 50 (22% female) specialists represented Uzhydromet, Agency for Plant Quarantine and Protection, and horticultural producers familiarized with agrometeo stations; learnt the ways of its processing and associated climate adaptation solutions, e.g. agricultural techniques that are important to be undertaken in the winter season (October 2022); and 30 (20%) specialist and horticultural producers trained in fruit and vegetables protection and nutrition programmes (November 2022);

- 17 Uzhydromet specialists (35% female) trained on operation and maintenance of small automated agrometeo stations (May 2023).
- In February 2023, jointly with Japanese experts from the Uzbekistan-Japan Centre for Human Development, the project trained 70 farmers (25% female) who represented the regional subdivisions of Uzhydromet and Agency for Plant Quarantine and Protection in Fergana Valley on how to implement Kaizen methodology in their businesses. The training sessions were designed to introduce participants to the key principles of this philosophy and to share best practices of kaizen implementation in agriculture. This helps them to increase productivity, improve the quality of their products and reduce the production cost.

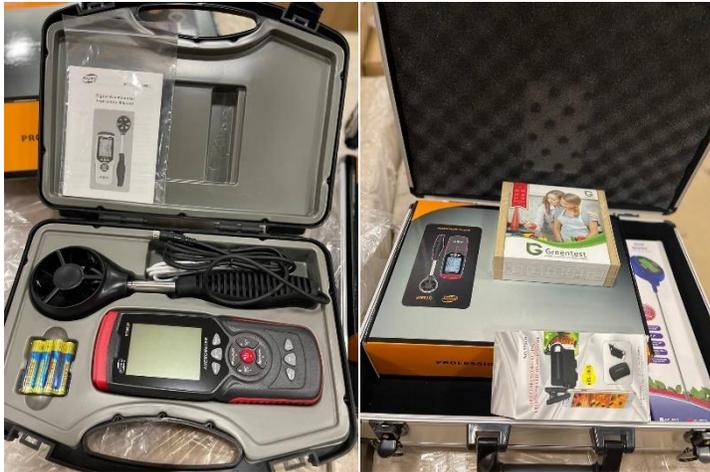


A series of communications materials have been produced by the project that aimed at raising public awareness about climate change impact on agriculture and benefits from receiving timely and quality weather and climate risk forecast using data generated by automated agrometeo stations to enable climate-resilient horticultural production.

Activity Result 4: Climate-informed planning introduced

A major factor affecting agricultural yields production in Uzbekistan is the inter-seasonal weather variation. Access to agrometeorological information enables farmers to implement climate-informed planning, reduce farming costs, and improve agricultural product quality. 27 fruit and vegetable producers trained on how to apply agrotechnical activities in specific weather conditions and learned on how agrometeo data and its proper processing help to protect grape, apricot, and cherry gardens from the pests and diseases induced by climate change impact (March 2023).

Furthermore, 32 Uzhydromet’s specialists in Fergana Valley are equipped with “Agroclimatologists cases” – sets of tools, including anemometer, pH, temperature, and conductivity in water and soil meter, soil Sampling, etc. Farmers and private households are now able to obtain a service that measures agrometeo indicators at the spot and provides recommendations for further agrotechnical activities.



The analytical paper ⁹ on Advancing Agroclimatology published. It informs about international best practices on climate change adaptation and environmental sustainability in agriculture, reviews international best practices on agroclimatology and agrometeorological data exchange and proposes the most workable options that can be adopted in Fergana Valley region. It also contains practical advice on how to improve data exchange and analysis.

The instruction booklet ¹⁰ focused on Generating NDVI and EVI from MODIS/Terra MOD13Q1 16-day vegetation indices in Google

Earth Engine produced. It aims at professionals and includes best practice on access, process, and visualize MOD13Q1 data as an animated distribution map and time series chart for Uzbekistan in Google Earth Engine (GEE) developed by the project Climate, Remote Sensing and Modelling Specialist. It also includes information on how to download these visualizations.

88 participants (incl. 86% woman) in the 3 regions of Fergana Valley trained on how climate change affects the lives of women-farmers and the associated gender aspects: increasing the role of women in informing and educating about the efficient and rational use of energy resources and water conservation, and their role in the climate resilient farming (July 2023).

○ **Contribution to NDC targets:**

The project outcomes contributed to strengthening Uzbekistan’s climate adaptation efforts indicated in its NDC¹¹ (2021), which states that a key priority in meeting the rapidly-growing population’s demand for food products is to increase climate resilience of agriculture sector. The project achievements are in line with the COP26/COP27 outcomes and decisions such as Global Goal on Adaptation and safeguarding food security through addressing the needs in financial support in the adaptation loss and damage and technological assistance in strengthening early warning systems that communities can better protect themselves from climate effects. Adaptation priorities in NDC2 combines the sectoral and regional (Aral Sea focused) approach.

○ **COVID-Response/recovery:**

In the project operational start in March 2022, the Government of the Republic of Uzbekistan has been taking important steps to remediate effects of the COVID-19 crisis on the national economy. It is envisaged that the GovUz’s post-COVID19 investment decisions and actions over the next three to five years will define the long-term development trajectory to build resilience of the nation to various risks, including climatic and non-climatic shocks in the foreseeable future. The project was focused on adaptation sectoral support to agriculture (horticultural production) with the regional approach (Fergana Valley). It contributed to the greater *Resilience to future shocks* by improved agrometeo services to cope with and recover from COVID-19 impacts on the national economy and people’s well-being.

○ **Partnerships:**

⁹ [Policy brief UNDP Uzbekistan.ver2.pdf](#)

¹⁰ [Google Earth Engine.Ver1- NDVI.pdf](#)

¹¹ https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Uzbekistan%20First/Uzbekistan_Updated%20NDC_2021_EN.pdf

- **Japanese government program Science and Technology Research Partnership for Sustainable Development (SATREPS):**

- On 27 September 2022, the joint workshop on climate change issues in Uzbekistan conducted with participation of the Japanese experts of SATREPS project and representatives of UNDP and Uzhydromet to exchange experience on climate change challenge in Uzbekistan.



- On March 2023, the SATREPS-UNDP Conference event on climate change adaptation of agriculture was held in Tashkent for the project stakeholders who familiarized with Japanese best practices on climate resilience in agriculture, as well as with the analytical research by the project partners and were updated on the progress in procurement of the equipment installed by the project in the Ferghana Valley.



- **Uzbek-Japanese Center**

- The project has partnered with the Uzbek-Japanese Centre to help farmers and specialists from Uzhydromet, Agency for Plant Quarantine and Protection introduce Kaizen methods to their work. On 20-24 February 2023, expert from Japan, **Mitsuo Tamada**, JICA expert, and **Marat Mirzadjanov**, Local Expert (business coach at UJC, one of the authors of the first manual on Kaizen business coach at UJC, one of the authors of the first manual on Kaizen implementation Uzbekistan) conducted trainings on "Kaizen basics" and "Kaizen and business process management". The methodology encourages all employees to implement small changes to eliminate waste and boost efficiency. The training sessions were designed to introduce participants to the key principles of this philosophy and shared best practices of kaizen implementation in agriculture.

- **Human Security (HS) approach:**

Based on the ‘no one is left behind’ principle as the people-centered approach, 40 small automated agrometeo stations were installed at the dekhkan and rural household plots to support the most climate vulnerable horticultural producers in Fergana Valley. Agrometeo stations help to mitigate the impact of droughts, floods and heat waves by providing early warning and enabling the horticultural producers to take proactive measures to protect their plants and crops. In the coming years, the owners of agro meteo stations will get data to monitor weather conditions and soil moisture that help them optimizing their irrigation schedules, adjusting planting and harvest times, applying fertilizers and pesticides more effectively, and preventing or being prepared to combat the climate-induced diseases and pest outbreaks. This can help increase yields, improve product quality, and reduce costs associated with wasted resources and crop damage.

- **South-south cooperation**

Project team jointly with the representative of Uzhydromet (Meteoinfocom) participated on the Global Exchange Workshop “Leveraging Nationally Determined Contributions (NDCs) to achieve net-zero emissions and climate-resilient development, in response to the climate emergency” which was held from 27 to 30 March 2023, in Nairobi, Kenya. The key achievements, lessons learned and further plans for the project results scaling-up were presented by representatives of 20 developing countries and territories engaged in climate change mitigation and adaptation projects implementation under the global UNDP initiative Climate Promise funded by the Government of Japan. Progress in project implemented in Uzbekistan in installation and commissioning weather stations and the associated expected impact, capacity building of project stakeholders and beneficiaries as well as cooperation with Japanese counterparts were shared. The representative of Uzhydromet informed participants about main achievements in improving the agrometeo data processing and user services by this government agency, including establishment of situational centres, modernization of server infrastructure, etc.

- **Digitalization**

Three Agrometeo Situational Centers established in the regions of Fergana Valley serve for digitalization of operational monitoring of data and information by online access to agrometeo information generated by the automated stations using video-walls that replaced the outdated practice of phone or radio-based communication.

- **Environment protection:**

All 55 stations installed are powered by PVs that generate electricity using solar energy. This off-grid solution ensures stable power supply that avoids the collected agrometeo data loss due to black-outs. Moreover, using renewable energy reduces GHG emissions, and reduced use of fossil fuel used for electrical energy generation, and is climate and environment friendly.

UNSDCF/CPD OUTCOME: *By 2025, most at-risk regions and communities of Uzbekistan are more resilient to climate change and disasters, and benefit from increasingly sustainable and gender-sensitive efficient management of natural resources and infrastructure, robust climate action, inclusive environmental governance and protection; and its **Output 4.1:** Innovative and sustainable climate change adaptation and mitigation initiatives designed and implemented:*

3 Agrometeo Situational Centres established in the regions of the Fergana Valley serve for digitalized online monitoring of the data/information generated by automated observation stations that replaced the outdated phone or radio-based communication. The video-walls (LED panels) visualize stations’ location and real-time agrometeo situation, and they are operated by **40 (8 female) agrometeorologists and apropos specialists** trained in digital equipment operation and maintenance. **32 surveyors** from regional subdivisions of

Uzhydromet in Fergana Valley equipped with **18** 'Agroclimatologists cases' (set of instruments) and **32** tablets and conduct agrometeo measurements at the farming/private households' sites.

UNDP STRATEGIC PLAN, 2018-2021, OUTCOME: Accelerate structural transformations for sustainable development; its development setting of *Build resilience to shocks and crisis*; and signature solution of *Enhance national prevention and recovery capacity for resilience societies*

174,050 (49% female) farmers, and rural households (32% of private producers engaged in horticultural production in Fergana Valley) increased their climate resilience thanks to access and use of agrometeo data and early warning/weather forecast produced by the automated and solar energy powered **40 small agrometeo and 15 big weather stations. 454,933 people** have access to agrometeo information services as the expanded agrometeo and weather observation network covers the bigger territory (**4,315.5 km² or 23%**) of Fergana Valley, where those people are living in.

Integrated Results and Resources Framework (IRRF) related indicator 1.1.2 *To what extent the country has policy measures in place to enable the enhancement and/or implementation of Nationally Determined Contributions under the Paris Agreement*

The project outcomes contributed to strengthening Uzbekistan's climate adaptation efforts in meeting the rapidly-growing population's demand for food products is to increase climate resilience of agriculture sector that indicated in its NDC2 (2021) committed by the country under the Paris Agreement. Adaptation priorities in NDC2 combines the sectoral and regional (Aral Sea focused) approach, while increasing climate resilience in Fergana Valley as another climate change vulnerable region of Uzbekistan through provision of more timely and credible early warning/weather forecast information for farming/rural households engaged in horticulture production was achieved.

Consistent with the UNDP Gender Equality Strategy, the project included the following gender dimension: development and dissemination of data in gender responsive, inclusive, and accessible approach for increasing climate resilience of horticultural production of direct project beneficiaries - rural households and small/medium-size agricultural businesses (gender sensitive), who have access to evidence-based information/recommendations. **77 women** living in the Fergana Valley learnt about how climate change affects the lives of women-farmers and role of women in informing and educating their families in efficient use of energy resources and water conservation.

Collaboration with the Global Climate Promise Team

The Climate Promise JSB project team at UNDP Uzbekistan maintained regular communication with the Global Climate Promise team and received valuable assistance throughout the entire project implementation period. The Global Climate Promise team provided technical support and guidance as needed, which included but not limited to the preparation of a non-cost extension package for the project.

The Global team also provided clear instructions and guidance for reporting project results to the donor through quarterly reports and a mid-term progress report in a manga-style format. This assistance enabled the UNDP Uzbekistan team to present results and carry out project activities on schedule. Furthermore, the Global team enhanced the visibility efforts of the UNDP Uzbekistan team by promoting their work through social media channels and translating materials into Japanese for the Japanese audience. Additionally, the UNDP in Uzbekistan was assisted in organizing and completing travel arrangements for the CO and the Project partners' participants attending the Global JSB event in Kenya in March 2023.

Outputs	Activities	Indicators	Baseline	Target	Achievement	Remark
Output 1 Resilience of climate-sensitive horticultural production and livelihoods of climate-affected rural communities in Fergana Valley in Uzbekistan strengthened through improved agrometeorological services	To shape agrometeorological services, and produce early warnings through conducting a comprehensive analysis of ground-based observations, remote sensing, and modern methods of mathematical modelling; and developing an intelligent system for operational monitoring of agrometeorology	Lead time (week or months) of early warnings with warnings validity (%)	Lead time of 6 months and validity 70%	Lead time of 8 months and validity 75%	The risks of low water availability for irrigation needs of agriculture and drought for the Syrdarya river basins in Fergana Valley can be forecasted with 6 months or more lead time, climate-induced plant disease and pest risks are forecasted with 14 days lead time, temperature forecast for Fergana Valley is issued with 2 weeks lead time The accuracy (validity) is ranged from 75-80%.	Overachieved by modelling climate risks using the regional numerical weather forecasting system COSMO-6-CA version) and its capacity strengthening up to 50% by equipping with advanced IT/server.
	To modernise agrometeorological observation networks through Installing automated agrometeorological stations and posts infrastructure and develop their information and communication infrastructure; and installing small and inexpensive agrometeorological stations in target districts	Number of automated agrometeorological stations/posts for network, and small agrometeorological stations for districts installed	0	15 automated agrometeorological stations and post installed is part of network; and 10 small agrometeorological stations installed in target districts	In total 55 automated agrometeorological stations installed and are operational in 35 target districts in 3 regions in Fergana Valley: 15 big automated weather stations that integrated into the Fergana Valley observation network; and 40 small agrometeorological stations installed at farmers/rural household sites	Overachieved based on competitive basis and best value for money principle, the chosen local vendor offered a price that allowed procurement of more 30 stations within the project budget.
	Improve data processing and user services through	Status of phenological, pest and plant disease	No	Yes	Yes	Achieved by installation 40 small agrometeorological stations at the end-user plots,

	<p>upgrading and modernizing IT capacities and expertise of Uzhydromet for agrometeorological data processing and forecasting in new formats, including visualizations and use of web-based mobile applications; and improving delivery of and access to agrometeorological information for climate-resilient fruit and vegetable production; and developing and disseminating data in gender responsive, inclusive, and accessible approach</p>	<p>forecast adapted to local conditions (YES/NO)</p>				<p>which allows the climate-induced plant disease and pest risks forecast to undertake timely preparations and response action</p>
	<p>Introduce climate-informed planning through producing climate-change information and integrate it into planning of agricultural fruit and vegetable production with consideration of irrigation water availability and climate risk early warnings</p>	<p>Number of end-users (% of women-led) in Fergana Valley received long-term climate-change information and used it for strategic planning of agricultural fruit and vegetable production</p>	<p>Farmers, rural households, and agro-producers lost 15-30% of fruit and vegetable production due to abnormal weather events and lack of early warnings and long-term climate-information (2015)</p>	<p>At least 300 end-users (10% of women-led) in Fergana Valley received long-term climate-change information and used it for strategic planning of agricultural fruit and vegetable production</p>	<p>174,050 (49% female) farmers, and rural households (32% of private producers horticultural production) in Fergana Valley increased their climate resilience through using agrometeo data produced by automated 40 small agrometeo and 15 big weather stations. 30 (20% female) horticultural producers trained on development of fruits/vegetables protection and nutrition programmes and are familiar with agrotechnical methodologies on horticultural crops, with consideration of weather conditions.</p>	<p>Overachieved as 174,050 (49% female) farmers, and rural households (32% of private horticultural producers in Fergana Valley) have got an access to agrometeo data/early warning/weather forecast produced by new 55 observation stations.</p>

IV. Lessons Learned and way forward

1. Key project successes and factors which supported these successes

The key project success in implementation by UNDP CO in Uzbekistan resulted from:

- Involvement and support provided by the Japan Embassy in Uzbekistan to the project implementation was very instrumental and it is greatly contributed to the project success, including the assistance in linking the JICA's project staff and experts with project capacity building activities. Participation of the H.E. Ambassador and his First Secretary in the opening ceremony for the Climate Situational Center and visiting the newly opened weather radar posts in Fergana Valley with the project support was highly appreciated by the Government of Uzbekistan and posted in national mass media.¹²
- Cooperation with the Uzbek-Japanese Center was critical for the project stakeholders to learn about the science-based best practices, most advance knowledge about climate change adaptation of the agriculture sector, Kaizen, and business-focused process management.
- Cooperation between UNDP projects was instrumental to align with all required operational rules and regulations to apply a procurement approach that allowed avoiding duplication of procurement services due to the complementarity effect and reduced time for the equipment procurement and goods/services delivery process.
- Synergizing JSB project with the ongoing UNDP project funded by the Green Climate Fund, focusing on enhancing multi-hazard early warning system to increase resilience of Uzbekistan communities to climate change-induced hazards¹³, allowed to achieve greater project results compared to initially planned.
- Close cooperation and communication with the project stakeholders and beneficiaries ensure provision of timely and quality agrometeo services (weather forecast, early warnings about extreme weather events, irrigation water availability, climate-induced plant diseases and pests, etc.) rendered to the population and agrobusiness in the Fergana Valley region. Feedback received during the UNDP Country Office staff oversight/monitoring visits to project sites confirmed that the project efforts resulted in that the automated agrometeo observation network in the Fergana Valley is the most modernized one and consists of the biggest number of stations comparing to other regions.
- Scaling up of the results achieved within this project are ensured because they are integrated into the work of other ongoing UNDP projects on advancing medium- and long-term adaptation planning¹⁴ and enhancing multi-hazard early warning system.

2. Difficulties encountered and measures taken to overcome these difficulties:

- Externalities such as the geo-political situation (conflict in Ukraine) that affected global supply chain and logistics for the procured weather stations and IT equipment resulted in delays with of the associated project activities planned for the end of 2022. To mitigate their impact, the relevant capacity building activities (trainings and knowledge sharing) were re-scheduled and conducted that the national technical staff is well-prepared for the immediate start of

¹² <https://www.uzdaily.com/en/post/81207>

¹³ <https://www.greenclimate.fund/document/enhancing-multi-hazard-early-warning-system-increase-resilience-uzbekistan-communities>

¹⁴ <https://www.greenclimate.fund/document/adaptation-planning-support-uzbekistan-through-undp>

operation and maintenance of weather and agrometeo stations and IT equipment use as soon they are delivered and installed.

- The abnormal cold weather conditions and heavy snow (severe cold waves) that Uzbekistan faced in December 2022 - January 2023 provoked interruptions in electricity and gas supply for industries and housing resulted in slowed the pace of project activities in the regions of Fergana Valley. The project team was concentrated on the revisiting the work plan of activities for 2023 to update their implementation schedule.
- The transformation of the key project partner (Uzhydromet) into an agency under the new established Ministry of Ecology, Environment Protection and Climate Change under the ongoing national institutional reform initiated by the Government of Uzbekistan at the end-2022 required the project adjustment to the revised internal arrangements in Uzhydromet Agency and the Ministry with support of the UNDP Country Office senior management and its Environment and Climate Action staff.
- No-cost extension of the project implementation period by four months granted by the donor and supported by EoJ in Uzbekistan and the Global Climate Promise Team allowed was extremely helpful for overcoming the above indicated difficulties and achieve/overachieve all project targets.

3. Analysis on what could have been done differently / better to attain the project results
Recommendations to improve future programming

Climate adaptation action has a long-term nature. Adaptation projects can produce immediate results and associated impact assessment in the period range that could last a decade or more, when data and its analysis will perform. Climate adaptation impact comprises indications on how many people benefitted from avoiding/reducing the associated losses/damages (economic, environmental, and social) due to timely actions and investments. Programming of new project initiative, which based on the cooperation/synergy with the relevant on-going projects implemented within the Climate Change (adaptation-focused) and Disaster Risk Reduction areas (e.g. early warnings by weather stations for climate induced disasters such as droughts, floods, landslides, etc.) of the Environment and Climate Action Cluster and Inclusive Growth Cluster (economic valuation and impact modelling) in the Country Office is proved to be a best practice. Therefore, it would be useful, if the JSB project/programme design envisaged monitoring and evaluation beyond the project intervention period.

V. Financial Status¹⁵

Output	Budget	Expenditure	Delivery Rate (%)	Remark
Output 1	77,447.00	75,989.07	98.12%	
Output 2	470,447.00	465,151.38	98.87%	
Output 3	172,047.00	168,158.32	97.74%	
Output 4	106,948.00	101,032.19	94.47%	
DPC	47,833.00	47,832.98	100.0%	
GMS (8%)	69,978.00	68,666.70	98.13%	
UN Levy (1%)	9,447.00			
Total	954,147	926,830.64	97.14%	

¹⁵ Disclaimer: Data contained in this financial report section is an extract of UNDP financial records. All financial provided above is provisional.

VI. Visibility Achievements

Strategic communication with all relevant stakeholders, potential beneficiaries, and the general public was one of the project's priorities. A series of communications products were created and promoted through specific media channels to ensure that the target audiences have a clear picture of the project's performance and to keep them updated.

All project activities have been distributed via social media (Facebook, Instagram, Twitter, and Telegram) as well as the UNDP corporate website (Annex 1).



A brief informational video was produced as part of the project contribution to COP27 "NDC Implementation in Action - Innovation and Technology in Climate Promise Countries" held in the UNDP Corporate Pavilion in 2022. It depicts the problems that farmers and rural households face in their businesses, as well as the environmental and social benefits that the modernized/automated agrometeo station network in Fergana Valley can provide to them.

In total, three videos were produced, and they were promoted through a series of posts on social media channels.

ANNEX 1: Some media highlights of the project initiatives	
<i>Workshop: “Exchange of experience with representatives of the SATREPS Project on Climate change issues in Uzbekistan”</i>	
Sept 27, 2022	How to help farmers adapt to climate change in Uzbekistan? United Nations Development Programme (undp.org) Как помочь фермерам адаптироваться к изменению климата? United Nations Development Programme (undp.org) Fermerlarning iqlim o'zgarishiga moslashishi uchun ko'maklashish United Nations Development Programme (undp.org) https://t.me/undpuzbekistan/83 (9) UNDP Uzbekistan – Posts Facebook https://twitter.com/UNDP_Uzbekistan/status/1574737186716622849?s=20&t=Nj8GakGZguX7SOgvR71fig https://www.instagram.com/p/CjAqcG3t8RN/?utm_source=ig_web_copy_link SATREPS - 中央アジア地域の #温暖化が、世界平均を上回るスピードで進行してると知ってる？ 環境 #ウズベキスタン... Facebook https://www.facebook.com/uzhydromet/posts/pfbid02MzpzivpgsrjH2dja5pZMd45TmitB1Bp1dzt3VKsgPZGghsTa4btEUXfRdJxUxnHtl
<i>Infographics about benefits of agrometeorological stations for farmers</i>	
Nov 18, 2022	https://www.facebook.com/UNDP Uzbekistan/posts/pfbid09WF7eBsqbNcTxZJc277ae9PGxCXeJ3rfHx14o4aNAR6iwJ69MtA2Nc2jetJmAio9l https://t.me/undpuzbekistan/399
<i>Video: We help horticultural producers adapt to climate change</i>	
Dec 2022	https://www.youtube.com/watch?v=tk3PrJu6NcY&t=2s
<i>Training sessions on KAIZEN Methodology</i>	
March 2, 2023	https://t.me/undpuzbekistan/868 https://m.facebook.com/story.php?story_fbid=pfbid0G3opwEiKjvRdiUqwWwVXqVujTYwrcpec9gQvPipfpi2FcWKjCcbZGsJ1e6LvDLril&id=100064337243345 https://twitter.com/UNDP_Uzbekistan/status/1631304354081783808?s=20
<i>News release about the installation of 20 small agrometeorological stations</i>	
March 13, 2023	ENG: https://www.undp.org/uzbekistan/news/now-farmers-fergana-valley-have-access-more-precise-agrometeorological-data RUS: https://www.undp.org/ru/uzbekistan/news/fermery-ferganskoy-doliny-smogut-poluchat-bolee-tochnye-agrometeorologicheskie-dannye UZB: https://www.undp.org/uz/uzbekistan/news/fargona-vodiysi-fermerlari-uchun-yanada-anig-agrometeorologiya-malumotlarini-olish-imkoniyati-yaratildi https://t.me/undpuzbekistan/945

	https://fb.watch/jfRMBVHd_q/ https://twitter.com/UNDP_Uzbekistan/status/1635242214602452994?s=20 https://www.instagram.com/reel/Cpuiz9Gg39m/?utm_source=ig_web_copy_link
Video: Installation of agrometeorological stations	
March, 2023	https://www.youtube.com/watch?v=ZdN4r3ZdUvU
Conference on agricultural adaptation to climate change	
March 24, 2023	Adapting Uzbekistan’s agriculture to climate change United Nations Development Programme (undp.org) Адаптация сельского хозяйства Узбекистана к изменениям климата United Nations Development Programme (undp.org) O‘zbekiston qishloq xo‘jaligini iqlim o‘zgarishlariga moslashtirish United Nations Development Programme (undp.org) https://t.me/undpuzbekistan/1024 https://www.facebook.com/UNDPUzbekistan/posts/pfbid02z5HjUMNCQZAHxpxGC9HziXmDSLgFQNDJyPk6vzh3B54sFjmzRYouxHiFH1LCKA3Jl
Project Newsletter	
March 30, 2023	English – https://www.undp.org/uzbekistan/publications/newsletter-1/2023-news-climate-resilient-development-horticultural-producers-uzbekistan Uzbek – https://www.undp.org/uz/uzbekistan/publications/axborot-byulleteni-1/2023-ozbekistonda-meva-sabzavot-mahsulotlari-yetishtiruvchilarining-iqlimga-chidamliligini-oshirish Russian – https://www.undp.org/ru/uzbekistan/publications/informacionnyy-byulleten-1/2023-novosti-o-deyatelnosti-v-sfere-povysheniya-klimatoustoychivosti-proizvoditeley-plodoovoschnoy https://t.me/undpuzbekistan/1057 https://www.facebook.com/UNDPUzbekistan/posts/pfbid0xcyoR7cM8zBwfgFp6gbv4GRc8bP6BSUcDPwJCZwrur7vHcQSUJNk3dSrMRsQFtXI https://twitter.com/UNDP_Uzbekistan/status/1641759979924275201?s=20 https://www.instagram.com/p/CqaKvJlI1kK/?utm_source=ig_web_copy_link https://www.linkedin.com/posts/undp-uzbekistan_agriculture-is-highly-affected-by-climate-activity-7047527963658993664-0m6y?utm_source=share&utm_medium=member_desktop
Training sessions on how to process agrometeorological data	
April 3, 2023	https://t.me/undpuzbekistan/1073 https://www.facebook.com/UNDPUzbekistan/posts/pfbid02Wd7dZf5uhxVfiNmzNmTTMpUhbXb3Non6g6SDYxGfjuHVNWkCUu5FVwvmvJkZy69jl https://twitter.com/UNDP_Uzbekistan/status/1642893253581107200?s=20 https://www.facebook.com/UNDPUzbekistan/posts/pfbid09WF7eBsqbNcTxZJc277ae9PGxCXeJ3rfHx14o4aNAR6iwJ69MtA2Nc2jetJmAio9l https://t.me/undpuzbekistan/399

Mission to Namangan region	
May 23, 2023	<p>(12) UNDP Uzbekistan - Farg'ona vodiysida uchta iqlim vaziyat markaz... Facebook</p> <p>(12) UNDP Uzbekistan - Fermerlarga iqlim o'zgarishiga moslashishga... Facebook</p> <p>https://twitter.com/MatildaDimovska/status/1661010690054979584?s=20</p> <p>https://twitter.com/UNDP_Uzbekistan/status/1660922055716421635?s=20</p> <p>https://twitter.com/UNDP_Uzbekistan/status/1660925485084205056?s=20</p> <p>https://twitter.com/UNDP_Uzbekistan/status/1660981472289759232?s=20</p> <p>https://www.linkedin.com/posts/undp-uzbekistan_uzbekistan-leavenoonebehind-activity-7066689788417851392-eV63?utm_source=share&utm_medium=member_desktop</p> <p>https://t.me/undpuzbekistan/1310</p> <p>https://t.me/undpuzbekistan/1313</p> <p>Eco blogger's Stories</p> <p>UNDP's stories</p> <p>TV https://t.me/NamTRK/12090</p>
Training sessions on gender aspects in agriculture	
July 19, 2023	<p>https://t.me/undpuzbekistan/1667</p> <p>https://www.facebook.com/watch/?v=120419794447956</p>
Youth training workshop about climate change issues	
July 28, 2023	<p>https://t.me/undpuzbekistan/1691</p> <p>https://www.facebook.com/watch/?v=590252169934021</p> <p>https://x.com/UNDP_Uzbekistan/status/1684877255972110336?s=20</p>