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Dialogue

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FAO-GEF Project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Landscapes of Central Asia and Turkey (CACILM-2)"

Fifth meeting of the CACILM-2 Steering Committee

The Fifth meeting of the Steering Committee was held online from February 28 to March 1, 2022, under the chairmanship of Serdar Yegül, UNCCD National Focal Point, General Directorate of Combating Desertification and Erosion, Turkish Ministry of Agriculture and Forestry.

"The soil quality in Central Asia has been dramatically deteriorating for two decades, and desertification trends are going up," said Viorel Gutu, FAO Sub-Regional Coordinator for Central Asia and Turkey, in his welcoming remarks.

"Climate change and inefficient use of valuable natural resources spur these processes having a negative impact on the standard of living and food security of the population, as well as the state of ecosystems in the region," he emphasized.

The Regional Coordinator and national project managers spoke at the meeting of the Steering Committee about the measures taken in 2021 to reduce the impact of climate change processes on natural resources in the countries of the region during the reporting period.

In close partnership with the Kazakh Research Institute of Animal Husbandry and Forage Production, Zhakhayev Kazakh Research Institute of Rice Growing, Union of Growers of Kazakhstan and the Center for Applied Research
"Talap", works on testing drought-resistant crops continued in the project's pilot areas to provide farms with fodder and restore degraded pastures, technologies for reclamation and desalination of degraded irrigated lands were introduced, pasture management plans were developed, and the efficiency analysis was finalized for practices of integrated management of natural resources, sustainable land, and value chains management.

Additionally, the project has completed a comprehensive analysis of disaster risk reduction systems (including early warning systems) in Kazakhstani agriculture; it assisted the Ministry of Agriculture in developing the Concept of the National Project for the Development of the Agro-industrial Complex of the Republic of Kazakhstan for 2021-2025 in the field of sustainable land management, analyzed legislation in the field of pasture management, developed and presented relevant recommendations to all stakeholders. In addition, a Manual on Salinization Management, and a methodological guide on data collection for medium and small agricultural producers have been developed to account for expenses and analyze farm operations.

In cooperation with the Committee for Land Management of the Ministry of Agriculture of the Republic of Kazakhstan, a national geoportal was created using GIS technologies. At stage 1, it included maps of land productivity, soil salinity, vulnerability to agricultural drought, and potential carbon stock. In early December 2021, this innovative tool was presented to the public at a conference dedicated to World Soil Day. It should be noted that salinization maps have not been updated in Kazakhstan since the 1980s.

With the project's assistance, areas of application of technologies and methods of integrated management of natural resources and climate-smart agriculture are expanding in Kazakhstan. The introduction, demonstration, and scaling of salt- and drought-resistant forage crops in land reclamation is carried out across more than 450 hectares in Almaty and Kyzylorda regions; the restoration of degraded pasture lands is carried out in the Almaty region on 100 hectares, while plans for sustainable pasture management cover the territory of about 128 thousand hectares.

The project actively cooperates with the Global Soil Partnership introducing the Soil Doctors programme in Kazakhstan, having established basis for farmers' field schools to combat salinization and purchased special equipment for conducting trainings.

As a demonstration of efficient agricultural technologies in mountainous areas, the project helped to install hydraulic ram pumps for pasture users to irrigate degraded pastures during the dry season. The knowledge and skills of specialists and pasture users in the development of pasture management plans are being improved. Highly efficient drought-resistant seeds of forage crops were tested on seven demonstration sites in various climatic zones of the pilot area leading to very good results. The entire grown seed harvest was distributed among other farms to scale up productive practices. The project has provided robust technical support in digitalization of the country's land use and geobotany maps.

In Tajikistan, the project operates in four pilot areas in partnership with the NGO "Women of Khatlon", the Committee for Environmental Protection under the Government of the Republic of Tajikistan, and local authorities, . Strengthening knowledge is one of the most

Within the framework of the project, training sessions for national and local specialists in the field of water and agriculture are continuing, and dedicated accounting software has been developed for irrigation water in close partnership with the National Association of Pasture Users, the Public Foundation "Kemp Ala-Too", the Ministry of Agriculture of the Kyrgyz Republic and other partners in Kyrgyzstan. Associations of water users of the pilot Kochkor district received computer equipment from the project to regulate irrigation of agricultural land in one of the driest regions of Kyrgyzstan. Farmers, members of Associations, obtained access to information about optimal irrigation regimes, thus, disputes and conflicts over irrigation water were terminated at the level of local communities. In addition, automatic water metering devices have been installed at the main water utility in cooperation with the District Water Management Department. Their data is sent to the Department's computers ensuring more efficient regulation of the valuable resource's distribution.

important components of the project. Farmers in pilot villages took part in a series of trainings on pest control, plant diseases, crop rotation system for legumes, soil protection measures, and the use of organic fertilizers. Farmers were trained to create fruit nurseries on household plots and use techniques for grafting fruit trees to obtain more sustainable harvests. Trainings on gender equality and leadership were also held in the pilot villages. In 2021, activities on testing drought- and salt-resistant crops (quinoa, amaranth, sugar sorghum, millet, and others) continued at five demonstration fields, for which three demonstration nurseries were arranged in two pilot districts. The area under high-performance drought-resistant crops increased almost fourfold in 2021 and amounted to 408 hectares. The project started researching the value chains of drought-resistant crops (unabi and capers) and completed a baseline assessment of the early warning system and disaster risk management including the operations of agrometeorological services.

In Turkmenistan, the project continues activities in three pilot areas in different landscape and climatic zones of the country in partnership with the Ministry of Agriculture and the Environment, the State Committee for Water Management and the National Institute of Deserts, Flora, and Fauna of Turkmenistan, as well as agricultural institutes, research and educational institutions, and representatives of local authorities. Legislation and national programs in the field of sustainable pasture management, forests and protected natural territories were reviewed; recommendations were prepared, and presentations were arranged on the inclusion of integrated and sustainable management provisions into national programs and strategies.

The project assessed the early warning system, disaster risk management and agrometeorology services in the context of climate change, and a review of national policy and institutional implementation mechanisms

for the country's commitments under the UN Conventions on Combating Drought, Desertification and Climate Change. The recommendations developed during this work formed the basis for the concept of a new edition of the National Action Programme to Combat Desertification. To assist in conducting a neutral land balance survey, the project supported ICSD RIC in creating a mini-GIS laboratory by purchasing a set of high-performance computing equipment and funded the engagement of a GIS expert who works on degraded lands mapping in the project pilot areas.

To encourage farmers to switch to climate-smart agrotechnologies and restoration of degraded areas, the project helped in arranging an irrigated nursery, purchased seedlings of salt- and drought-resistant fruit trees and windbreak trees in the Gurbansoltan-Eje etrap, as well as seedlings for a new 5-hectare cherry orchard in Nohur district. The Karrykul Research Station of the National Institute of Deserts, Flora and Fauna received a generator and

a photovoltaic station for drawing very deep fresh water to care for seedlings capable of impeding the sand movements. The project partners were provided with greenhouses, drip irrigation systems and equipment for rapid analysis of soil, water, and agricultural plants to be further used in educational and scientific practice. At field schools, the farmers were introduced to technologies for increasing yields and watering desert pastures, boosting the efficiency of grain-growing on irrigated and rain-fed soils, efficient gardening, and viticulture in drought conditions in mountainous areas, as well as modern methods and technologies to combat soil salinization. More than 300 specialists have been trained in the field of climate-smart and water-saving agropractices.

In Uzbekistan, the project is being implemented in partnership with the Ministry of Agriculture, the State Forestry Committee and the State Committee for Ecology and Environmental Protection of the Republic of Uzbekistan,

research institutions, local authorities, and other partners. The 24 trainings and workshops held in 2021 were dedicated to soil protection and sustainable agriculture, water-saving technologies, advantages of using salt- and drought-resistant crops, seed production, vegetable growing, and fruit growing at pilot sites.

Salinity tolerant varieties of crops were grown on 4,300 hectares at project sites in Kashkadarya and Bukhara provinces. The practices of soil-protective and resource-saving agriculture were introduced on 5,420 hectares with the use of no-till drills in 2020-21, and 800 hectares were sown with double crops in Kashkadarya province.

The project supported the development of a National Action Programme to Combat Desertification and Drought and preparation of recommendations to improve the relevant approaches in the short-term prospects. The project completed a comprehensive analysis of the disaster risk reduction system (including early warning) in agriculture and presented

the report at a national workshop that summarized the participants' feedback for further improvement of this activity. A well was restored at a pilot site, a pasture rotation plan was developed for 84 thousand hectares of the "Guzor" karakul-growing farm, and strip seeding of fodder crops was arranged on 80 hectares in Guzor and Karavulbozor districts for natural restoration of pastures.

The project has installed 12 agrometeostations to enhance the operations of agrometeorological services at the pilot sites. As part of assistance to vulnerable households during the pandemic, the project purchased and handed over to farmers 20 water pumps, 20 power tillers, 108 greenhouses, 10 soil augers, and 20 backpack sprayers. A GIS laboratory was commissioned at the Tashkent Agricultural University with the project's assistance. Across 233 hectares of the pilot sites, 478 tons of winter wheat, barley, triticale

and rye seeds, over 5 tons of flax seeds, over 4 tons of safflower, about 1.5 tons of chickpeas, and 5 tons of alfalfa were produced. The areas seeded with drought- and salt-resistant crops at the pilot sites of Kashkadarya and Bukhara provinces amounted to 277 hectares. In Kamashi district, 1,200 hectares of pistachio plantations have been arranged .

Makhmud Shaumarov, project's Regional Coordinator, noted that the main task of the multi-country large-scale FAO-GEF project is the widespread dissemination and scaling of the best technologies and approaches for integrated management of natural resources in the risky farming zones of Central Asia and Turkey. Therefore, one of the most important areas of activity is the strengthening of partnership at all levels and dissemination of knowledge in the field of sustainable management of natural resources - land, pasture, and water.

In 2021, a mid-term review of the project's activities and outcomes was conducted, which subsequently inspired the decision of the Project Steering Committee to extend the project's activities until October 2024 without additional

funding. The basic achievements were the socio-economic analysis of technologies for sustainable natural resource management, regional maps of land salinization and degradation, a review of early drought warning systems and agrometeorological services, as well as carbon stock changes analysis at the project's pilot sites in Central Asian countries. A regional platform for knowledge dissemination has been built based on the VOCAT portal; strategies for effective communication and gender equality have been developed.

Naoko Sakai, Field Operations Coordinator of the FAO Sub-Regional Office for Central Asia, informed the members of the Steering Committee about the financial aspects of the project's activities until 2024 and the planned costs for 2022 for each country, then the country project managers presented plans for 2022 to the Committee members.

In Kazakhstan, the project plans to spread efficient conservation practices in drought-prone northern regions of the country in 2022. Plans for sustainable pasture management will be implemented, recommendations will be developed for building a system to combat salinization. The Soil Doctors programme will be implemented via the farmers' field schools, and Field Days will be held regularly at the pilot sites.

In Kyrgyzstan, in 2022, the plans are to expand water-saving technologies including those based on hydraulic rams and remote sensors for freshwater metering. "Artificial glaciers" are to be created at the pilot site in the arid Kochkor district of Naryn province to mitigate the shortage of irrigation water during the dry season. The number of farmers using highly productive seeds of drought-resistant forage crops will grow. Farmers, local specialists of the Ministry of Agriculture and the Water Resources Service of the Kyrgyz Republic will master water-saving technologies, approaches to digitalization of water metering, sustainable land and pasture management, as well as the SHARP and ASIS tools. Activities will be carried out to institutionalize the project results in the post-project period and to expand the scale of proven climate-smart technologies and agricultural practices.

In Tajikistan, farmers' field schools and training of agricultural producers on sustainable land management methods will be further arranged. To incentivize farmers at the pilot sites, the project will procure high-quality seeds of highly productive drought- and salt-resistant crops, greenhouses, drip irrigation systems and other equipment to ensure consistently high yields in under extremely arid climate. National trainings for project stakeholders will help to disseminate and implement FAO's efficient tools and technologies in practice.

In Turkmenistan, support will be provided in the development of the draft Law "On Soils." The project will assist in the development of the new edition of the National Action Programme to Combat Desertification (NAPCD), and work will be underway on recommendations for new regulations in the light of updated NAPCD. A review of the existing mechanisms of financial support for agriculture will be conducted, as well as an analysis of the economic and financial efficiency of integrated natural resource management technologies application. The plan is to continue supporting smallholders at the pilot sites in the utilization of efficient methods and technologies to combat salinization and improve soil fertility.

In 2022, farmers' field schools will continue their activities at the pilot sites, and so will training programs for all interested partners in the field of combating soil degradation and restoring fertility. The project will procure seeds and seedlings, mini-incubators, wool processing equipment, measuring devices for soil monitoring, continue arrangement of wells and dew mounds in Karakum

for collecting and storing water, restore dams and reservoirs, and contribute to the cleaning of a 30-kilometer on-farm drain collector on saline lands. Efficient integrated natural resources management technologies will be further scaled up through procurement of resource-saving and water-saving technologies and agricultural equipment for partners.

Training programs on various issues of sustainable management of natural resources will continue in Uzbekistan; 20 field days for farmers have been scheduled to disseminate efficient technologies. A draft National Strategy of Resource-saving Agriculture will be developed and submitted to the Government of Uzbekistan for consideration; a curriculum with integrated natural resources management approaches will be developed for the of Soil Science Department of Tashkent State Agrarian University. The areas seeded with drought- and salt-resistant crops will expand, while resource-saving farming technologies will be implemented. A model farm for seed production will be established in the pilot Kamashi district. Approaches to efficient pasture management will be introduced and the production of pasture plant seeds will grow, which will contribute to reversing pasture degradation at the pilot sites. In addition, the "Million Fruit Trees" campaign will continue.

Following the meeting, the Steering Committee decided to approve the project's work plan for 2022 including the results of the mid-term review and considering the comments and proposals received. The Committee agreed with the proposal to transfer the PSC chairmanship from Turkey to Turkmenistan starting July 1, 2022, and to hold the next meeting of the PSC meeting on January 31, 2023, in Ankara.

At the same meeting, the Concept of the new FAO-GEF project "Landscape Restoration in the Aral Sea Basin", which will continue CACILM-2 in the region, was presented to the Steering Committee. This programme's objectives include restoration of healthy ecosystems functions in the most relevant landscapes of the Aral Sea basin; integrated management of micro-catchment basins at the plots of various users; establishment of a land use system resilient to climate risks; capacity-building for monitoring land degradation neutrality indicators (LDN) and nationally determined contributions (NDC) to the implementation of the Paris Agreement; support for vital initiatives at the level of rural communities and landscapes. It is expected that the Programme supports all the required lines of action for degraded lands stabilization, combatting drought and desertification, the efforts of each country to reduce greenhouse gas emissions and adapt to climate change impacts, as well as diversification of agricultural production and development of rural areas, which will eventually have a positive impact on the socio-economic status of the population (higher incomes, jobs created, better health).

Hernan Gonzalez, a GEF staff member at FAO headquarters, presented a brief report on the mechanisms for allocating GEF funds to projects in the field of sustainable natural resources management within the framework of the implementation of UN Environmental Conventions.

The Steering Committee includes representatives of the ministries of agriculture, environment, and other public agencies from all Central Asian countries and Turkey. The head and staff of the FAO Sub-Regional Office, FAO representatives in Central Asia, regional GEF programme coordinators, technical director, regional coordinator, and national project managers in the countries, as well as a member of GEF Department at FAO headquarters took active part in the Committee work.

Soil Doctors for soils to farmers in restoring saline and degraded lands in Kazakhstan

A two-day practical for soil research and restoration specialists was held on May 4 and 5, 2022, within the framework of and in cooperation between the FAO-GEF CACILM-2 project and the Global Soil Partnership.

The *hybrid* format of the training allowed FAO specialists from both Rome and Kazakhstan to participate in its activities in Kyzylorda and remain in contact. Thanks to this, the participants could immediately receive replies to all questions arising in the process of that complex technical training.

Carolina Olivera Sanchez, soil fertility consultant, and Silvia Pioli, sustainable soil management specialist, spoke about the causes of soil salinization and a sharp decline in yields, as well as ways to increase the content of organic substances in the soil.

Vladimir Zabolotskikh, consultant on drought and salinization risk management at FAO in Kazakhstan, conducted practical field classes where participants learned how to do soil analysis using special tools and instruments.

The Global Soil Doctors Programme operates in many countries based on the "peer-to-peer" approach, that is, the knowledge gained by a small group of farmers spreads further like ripples on water.

The programme's key objective is to build the capacity of farmers in the field of sustainable management of soil including measures to restore eroded sites.

To conduct the trainings, the project purchased sets of instruments necessary for determining the soil composition, which, upon the training completion, were transferred to the trainers for further use: regular soil analyses, soil condition monitoring and data comparison.

Tool sets will be handed over to 100 farmers of Kyzylorda and Almaty regions, who will be trained by specialists.

In addition, the project contributed to the translation of methodological posters into Russian and Kazakh, as well as their registration for practical use by organizations disseminating agricultural knowledge among farmers.

The event was organized on the premises of Zhakhaev Kazakh Rice Research Institute in Kyzylorda.

Earth Day celebrated in Nur-Sultan

On April 23, 2022, the Food and Agriculture Organization of the United Nations (FAO), within the framework of the FAO-GEF CACILM-2 project, held an environmental event in the capital of Kazakhstan dedicated to the International Earth Day.

The Earth Day is designed to draw public attention to environmental issues. On this day, environmental scientific conferences and exhibitions are held in different countries, automobile traffic is closed on the busy streets of large cities, subbotniks are held and trees are planted.

Representatives of UN agencies, agronomists, experts, and partners of the FAO-GEF project aimed at spreading sustainable agricultural practices and approaches to efficient and environmentally friendly management of natural resources, as well as parents, educators and other interested capital residents will gather at the Balapan Pre-School to participate in an important event dedicated to creating a microclimate for the younger generation in the kindergarten.

"Earth Day reminds us of the importance of harmony between humans and nature," said Makhmud Shaumarov, CACILM-2 Regional Coordinator. "Each of us should strive to adhere to a more environmentally friendly lifestyle, try to preserve and protect natural resources and ecosystems. With this event, we want to draw public attention to climate change, as well as the need for landscaping and careful attitude to nature," he said.

Trees in the city are not only a green decoration of streets and squares. They provide shelter from scorching sun rays, retain water in the soil, capture carbon and harmful emissions, saturate urban air with oxygen and support biodiversity as birds settle in their branches; bees and other pollinators visit them in bloom; and roots and leaves falling in autumn improve and enrich the soil with living organisms.

Eighty seedlings, including pyramidal poplar, ash-leaved and Tatar maples, small-leaved linden, red willow, ash tree, rowan, Hungarian lilac and juneberry, for more than 880 thousand tenge were planted on the kindergarten area.

International Mother Earth Day celebrated in the field

On April 22, the whole world celebrated the International Mother Earth Day, while the monitoring mission of CACILM-2 spent this day in Kochkor district of Naryn province in Kyrgyzstan, where the project helps farmers and partners to introduce new and "green" agricultural technologies that do not harm the Planet still bringing farmers tangible income and helping partners transition to modern high-performance digital technologies.

Strawberries will ripen in a sunken greenhouse. Next to it, an apple orchard will grow

An unprecedented device has appeared in Karasuu rural county. Previously, people used electric or fuel pumps and other devices to fill a large tank with fresh water, thus consuming a lot of energy and financial resources; now, the village has a hydraulic ram pump that operates without either electricity or fuel.

The device uses exclusively the water flow energy and is capable of lifting water to a height of up to 50 meters.

"With this pump, we fill these two huge tanks with water," says Marat Kozhaliyev, a local farmer. "The tanks then feed the drip irrigation system for our strawberries."

The plantation is in an underground greenhouse that takes up almost a hectare.

"It is globalization here," the farmer laughs. "The soil is from Russia, the water tanks are made in Kyrgyzstan, the drip irrigation system and berry seedlings are from Turkey."

"How did this work out?" we wondered. It turns out that one of Marat's sons is studying and working in Turkey, and the other is in Russia, and both help his father in arranging the land plot. It has really taken many efforts. Digging a huge hole 2 meters deep in stony soil, laying out the walls with the same stones strengthening them is hard work.

"Why would you sink so deep into the ground?" we asked. "In winter, Mother Earth will warm the plants, and in summer it will give coolness," he explained.

But persistent Marat Kozhaliyev seems to have even more plans.
"My plot is 1.6 hectares. The greenhouse occupied half of it, and we will plant a garden on the rest of the land," the farmer said.

"The soil is all solid stones!" we gasped. "No worries," Marat is convinced. "We know a way to come to terms with stones now. We will dig holes, pour in imported soil with organic fertilizers, plant seedlings of apple and pear trees, and lay tubes with water and nozzles to each tree and let them all grow. The stones will become a fence so that dry winds do not interfere with the developing seedlings," the farmer smiles.

"These are the people we must support!" said Abdimalik Egemberdiev, Director General of the Kyrgyz National Association of Pasture Users, an organization that promotes the project implementation in Kyrgyzstan. "They will move mountains to achieve the goal they set!" he added.

So, one family farm already uses two varieties of "green" agricultural technologies at once – drip irrigation and a water pumping system

to ensure the smooth operation of irrigation.

"Come back in a month, I'll treat you to fresh Kochkor strawberries" the farmer invited. Delicious potatoes from Kochkor can be found in Bishkek markets, apples are less common, but we hear about Kochkor strawberries for the first time.

Digital technologies for rational management of water resources

Remote water metering sensors were installed in Kochkor district leading to numerous benefits: rational use of irrigation water, advantages of digital technologies enjoyed at all levels, zero water-related conflicts between farmers, and admiration of all neighboring districts. The installation will continue across the district waterways. The Topon-Aryk pumping canal takes water from the Zhon-Aryk River flowing in the Kochkor Valley a hundred meters below.

The canal was built back in the 1980s, when villagers from the arid upper zone appealed to the first secretary of the Communist Party of Kyrgyzstan Turdakun Usubaliyev and the government promptly decided to provide the villagers with water. Three powerful pumps were installed on the Zhon-Aryk, and two pipes were laid on the mountain to conduct water to the canal allowing farmers to water cattle, cultivate land, and use water for other needs.

"Depending on the season and demand, either one or all three pumps operate on the big river," says Aydarkan Sydykov, chief of the repair and construction unit of the Kochkor District Department of Water Management. "Previously, in order to eliminate all grounds for disputes about who consumes more water and who consumes less, our employees had to go out to this remote village periodically, climb up the pumping canal and make manual measurements using the so-called "impellers." Only after that, we could decide on either turning on additional pumps, or turning off the extra ones to avoid wasting precious electricity in vain."

On the day we were visiting Kochkor district, an automated water metering sensor was installed on the Topon-Aryk. It was the sixth sensor installed on rivers and canals in the arid Kochkor Valley.

The autonomous device that runs on batteries will use a SIM-card to automatically transmit information about the volume of water passing through the pumping canal to a computer at the District Water Management Department. This data will inform properly formulated contracts with water users and define a fee for water supply services between users.

"The system of irrigation water metering implemented with the help of the project, and digitalization of water user associations at the local level has eventually ended conflicts over water between farmers. And colleagues from neighboring districts keep calling us more and more often asking to share experience," says Melis Abakirov, head of the Kochkor District Water Management Department.

"Green" technologies for pastures

Cholpon village authority were anticipating us. Urmat Omurbekov, when he chaired the Association of Pasture Users of Cholpon county, successfully cooperated with the CACILM project in Kyrgyzstan from its first phase. He knows firsthand what a threat the degradation of pastures poses to the well-being of farmers.

Here, in the Kochkor Valley in the north of the country, extremely windy and arid in summer, and very dry and frosty in winter, people relied more on cattle breeding than on crop cultivation even in Soviet times.

Livestock dramatically reduced after the collapse of the Soviet Union but recovered gradually over thirty years even exceeding the previous values. Meanwhile, the grazing practice has changed too.

To reverse the pastures' degradation, the project and its supporters attached enormous efforts to raise awareness locally on the need to return to the ancestors' traditions and rotate pastures. Urmat even organized a folklore festival at one of the pastures that had already been massively trampled and needed a rest period.

With those efforts, Urmat managed to convince people to rotate grazing plots and to pay for pastures use on time.

As a result, he both earned respect in the rural county and was appointed the county's head.

Urmat remained committed to advanced conservation and resource-efficient technologies. Across his county, several hydraulic ram pumps for watering pastures and filling water troughs in summer

"People do not drive cattle to distant summer pastures anymore," says Urmat. This was widely practiced in Soviet times because collective farms and state farms enjoyed sufficient resources from the union budget both for livestock movement and maintenance of the entire infrastructure – bridges, roads, and water wells for livestock. Now, it is time-consuming and expensive for private owners, moreover, the infrastructure – bridges, roads, and water wells - have mostly collapsed. Therefore, the nearby pastures degrade from overgrazing."

have already been installed and are successfully used; the project and its proponents from the county's associations of pasture users have supported construction of bridges for livestock, and dams to regulate water supply, fencing of some pastures, and by the autumn of 2022 artificial glaciers, which are becoming increasingly popular in Kyrgyzstan, will be available in the county.

National project managers in Kyrgyzstan and Tajikistan presented sustainable agricultural technologies at the International Scientific and Practical Conference of the Interstate Commission for Water Coordination in Central Asia (ICWC) in Turkestan

Matraim Zhusupov, National Project Manager in Kyrgyzstan, and Daler Domullozhanov, National Technical Coordinator for Land and Water Resources, spoke at the International Scientific and Practical Conference "30 years of Water Cooperation in Central Asia: Facing the Future" and the 82nd

meeting of the Interstate Commission for Water Coordination in Central Asia (ICWC) held in Turkestan (Republic of Kazakhstan) on April 26-27, 2022.

Within the framework of the round table "Water conservation and rational use of water resources in the context of climate change. Aquatic ecosystems: state and needs", the CACILM-2 representatives elaborated on the experience and technologies implemented by the project in Kyrgyzstan and Tajikistan to scale up rational water management in view of climate change.

Matraim Zhusupov focused on advanced digital agricultural technologies and operational digitalization of water user associations actively implemented in the project's target area in Kyrgyzstan.

He shared experience in automating and digitalizing the water metering system at both district and local levels. Remote automatic sensors installed on the main waterways of the Kochkor Valley transmits real-time data on the amounts of water supplied to consumers to the computer network of the Kochkor District Water Management Department , which helps specialists make prompt and effective decisions on rational water management, while local disputes and conflicts about irrigation water cease. It is important to note that these automatic sensors are manufactured in Kyrgyzstan.

He also talked about the application of an autonomous hydraulic ram capable of lifting water to a height of up to 50 meters without any additional energy sources like electricity or fuel. This device that operates exclusively on the energy of the water flow enables farmers in Kyrgyzstan to irrigate their greenhouses and young gardens, trampled pasture plots, and arrange watering holes for animals.

In addition, Matraim mentioned artificial glaciers – another advanced agricultural technology gaining acknowledgement in Kyrgyzstan, particularly relevant in the context of climate change.

Artificial glaciers are arranged in winter to cover the farmers' demand for fresh water by the spring irrigation season. All it takes to form an artificial glacier is the installation of an underground pipeline (at 2-3 km from the source, most often a mountain spring that dries up in the summer) with a natural water flow and a vertical pipe 15-20 meters high.

Relatively warm underground water gushing from the pipe freezes quickly in the cold and shapes a huge block of ice up to several thousand cubic meters and can be regulated depending on the water pressure, the planned irrigation area, as well as the needs of the community. The ice accumulated over the winter begins to melt early in the spring-summer season providing residents with constant access to fresh water. As a result, irrigation is available for farmers' land plots, and water for livestock and moisture for pastures are provided without additional efforts and costs.

Daler Domullodzhanov began his presentation with the fact that 93 percent of Tajikistan's territory is occupied by mountain systems, and according to the World Bank, Tajikistan is a country most vulnerable to climate change, where most affected are water resources, agriculture, energy, and transport sectors.

Then Daler presented the trends of increasing ambient temperature and decreasing precipitation based on observations that date back to 1936 and spoke about the introduction of the practice of precipitation harvesting by farms to further use water for crops irrigation and household needs.

The presentation emphasized the dissemination of water-saving technologies across the project's pilot sites drip irrigation that enables farmers, even in the driest years, to obtain richer harvest and ensure food security for their families

Daler also spoke about FAO's experience in Tajikistan on the use of solar water supply systems for the restoration of degraded pastures and rehabilitation of rain-fed lands eroded to varying degrees; training of local specialists in innovative methods of calculating the water demand of agricultural crops and their modeling under various scenarios of climate change, and their introduction into the curriculum of Shirinsho Shotemur Tajik Agrarian University, as well as the preparation of several publications in a user-friendly format.

Food and Agriculture Organization (FAO) and the Global Environment Facility (GEF) introduce effective resource-saving agrotechnologies in Turkmenistan

Modern greenhouses were put into operation in early February 2022, at the Educational Experimental Farm of Turkmen Agricultural Institute, at the Forestry Department of Dashoguz Velayat, as well as at the Daykhan association "Yerbent", Bokurdak village, Central Karakum.

Both traditional and innovative materials were used in the construction. Greenhouses are equipped with modern technical equipment to ensure temperature control, oxygen saturation, drip irrigation, and other important systems providing production efficiency in extreme conditions.

Turkmen regions with hot, dry summers and cold winters experience great difficulties in growing planting material for subsequent planting in farmers' fields and gardens, as well as on forest protection strips and forest plots.

Climate change experts note that global agriculture is becoming increasingly vulnerable to the impact of climate change. Shortage of land and water resources suitable for agricultural production aggravates, and desertification and drought trends are among the most acute challenges that can cause large-scale famine and food insecurity of entire countries.

"Reiterating its commitment to the UN Conventions on Climate Change and Combating Desertification, the FAO-GEF project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey" (CACILM-2) introduces approaches to sustainable natural resources use in Turkmenistan, through the development, among others, of agricultural production under coverage," said Makhmud Shaumarov, Project Regional Coordinator.

Seedlings of fruit and non-fruit trees, as well as other crops, will be grown in greenhouses built at the Forestry and TAI in Dashoguz region. They will be distributed subsequently among local farms and forestry enterprises, educational organizations, and other beneficiaries.

Seedlings of desert plants and shrubs will be grown in the greenhouse built at the "Karakum" pilot site. They will be further planted in this desert area as part of measures for reforestation and improvement of desert pastures. Practical classes are planned for local communities, specialists, students, and schoolchildren; technology demonstrations will be conducted at farmers' field schools and other events.

This contributes to environmental education, obtaining skills and knowledge in the cultivation of planting material and agricultural products in local arid conditions. In addition to seedlings, greenhouses are to be used for the cultivation of vegetables and other crops to produce agricultural products, which will contribute to the development of food chains.

Water means life for desert: success story of Charymukhammet Redzhepov

"I have been living in Bukri village for many years, and work as a teacher at the local secondary school currently," says Charymukhammet Redzhepov. "I am retired, but I continue to teach children.

People living in Karakum are called ***gumly***, which literally means "sand dwellers". In fact, our village is located far away in the Karakum desert, where there is very little, almost no drinking water.

Relatives visit us rarely, guests come even less often as our place is very hot, the sand is heated to 70 degrees! But what's worst is acute shortage of fresh water. Of course, all the village residents dreamed to have plenty of water that would be enough for a long time. No wonder people say:
"A drop of water is a grain of gold!"

Our dream has come true now because the FAO-GEF CACILM-2 project found out about our need and provided us with real help in building a small *sardoba* (dew mound) in the courtyard of our school. The reservoir volume is only 60 m^3 but it seems huge to us as it stores cool fresh water, and **water in the desert means life**!

We use water from *sardoba* for the school's household needs, and we are also expanding saxaul shrubs and other plantations around the school to weaken the impact of hot and drying winds.

But there is more! My students and I also started gardening the village.

The children receive very vivid practical environmental education. I am glad that schoolchildren are now rushing to biology and labor lessons because they know they would be engaged in a very good and useful activities - planting trees and watering them from *sardoba*.

We do our best to explain to the students how much environment and desert plants protection means, how important they are for the life of people in the desert.

We are also planning to start collecting medicinal plants in the Karakum desert as now we believe we will succeed too!"

FAO and the Global Soil Partnership train Turkmen specialists to map saline agricultural lands

On April 26-28, 2022, an online training on mapping saline lands of Turkmenistan was held in Ashgabat.

Current trends in climate change and more frequent and intense droughts in Central Asia pose a serious threat and multiple risks to fragile ecosystems in the arid and semi-arid landscapes of the region. Drought increases accumulation of salts in the upper horizons of soil and activates salinization processes in them.

More frequent atmospheric droughts with extremely high temperatures and low humidity are especially dangerous in combination with shortage of water for irrigated agriculture - crop depression, crops shortfall and/or loss occur in large areas subject to soil salinization. For example, grain losses in the years of severe drought (2000-2001) amounted to 14-17%, for other crops - from 45 - 52% to 75% on average.

Orchards and vineyards are particularly susceptible to yield declines due to soil salinization and water scarcity. Lack of water has a complex effect on the productivity of livestock, from a decrease in the nutritional value of forage to a sharp loss of animal weight.

"Efforts to prevent soil salinization should be aimed at changing land use and management practices that will reduce the risks of this type of degradation

for fragile agricultural landscapes. In order to make timely decisions and attract investments in programs for desalinization and reclamation of degraded agricultural land, including pastures, it is important to have a general picture of salinization in the country," said Makhmud Shaumarov, CACILM-2 Regional Coordinator.

CACILM-2 joined by the Global Soil Partnership invited more than 40 representatives of public bodies and agencies of Turkmenistan, as well as representatives of local government bodies and the Union of Industrialists and Entrepreneurs of Turkmenistan for training.

The purpose of the three-day event was to present to the participants the methods of mapping saline lands using GIS technologies (Geographic Information Systems). The participants assisted by the Global Soil Partnership specialists learned about the implementation of modern methods and

remote sensing to assess soil salinity in real time.

The first day was devoted to the introduction to the mapping of saline lands. The main drivers of salinization, mapping methods and FAO approaches to mapping were considered with the relevant case studies from different countries.

On day two, the input data requirements for mapping the salt pans of Turkmenistan were considered. Various aspects of data collection for mapping purposes were considered during the theoretical and practical parts of the training.

The final, third day was devoted to the methods of preliminary information processing using data obtained with the help of Geographical Information Systems. The training participants actively worked with remote sensing data and information, as well as digital terrain models.

Participants, including specialists of the Ministry of Agriculture and Environmental Protection of Turkmenistan, State Committee for Water Management of Turkmenistan, Turkmen Hydrometeorological Institute, Niyazov Turkmen Agricultural University, Turkmen Agricultural Institute, *hyakimlik* of Dashoguz Velayat, Union of Industrialists and Entrepreneurs of Turkmenistan, as well as the CACILM-2 team showed great interest in the application of work methods using geographical information systems in their activities.

The practical skills demonstrated by the experts of the Global Soil Partnership turned out to be very helpful and valuable. The acquired knowledge will be successfully applied in the specialists' practice and in the educational process of agricultural universities.

CACILM-2 implementation continues successfully in Turkmenistan implementing measures aimed at promoting and applying advanced methods and technologies for sustainable land and water management. Their implementation will contribute to the improvement of the socio-economic conditions in local rural communities.

The project regularly holds various training sessions, workshops and working meetings on the application of modern technologies and methods of integrated natural resources management (INRM) and sustainable land management (SLM) to strengthen the knowledge of local specialists of ministries and agencies, faculties, university students, teachers, scientists, as well as members of local communities engaged in this field.

Turkmen Agricultural University receives devices for rapid soil analysis

Turkmen Agricultural Institute in Dashoguz and its structural agricultural research and production center based in Annau received equipment for determining the level of salinity, nutrient elements, and soil composition, as well as for evaluating the effectiveness of measures for land desalinization and reclamation.

Soil scientists and university faculty received a set of various devices for conducting rapid analysis of soil, water, and plants (11 items total). It is a mobile agricultural laboratory complex in a case, a backpack soil laboratory, a pH meter, an anemometer, a manual nitrogen sensor, a soil thermometer, grain and soil moisture meters, a penetrometer, a lysimeter, a tensiometer – 1-3 pieces of each.

Mobile devices are designed to conduct research directly in the field when organizing soil, agrochemical, land reclamation surveys, monitoring the state of the salt regime of soils, assessing the fertile layer, and conducting research.

The equipment was procured within the framework of the CACILM-2 regional project, the key partner of which is the Ministry of Agriculture and Environmental Protection of Turkmenistan.

Within the framework of CACILM-2, a set of measures aimed at reducing the level of salinization of agricultural land and introducing salt-resistant crops into crop rotation are being implemented in Dashoguz Velayat.

FAO assists in facilitating a training course on seed production in Tashkent

On March 2 and 3, 2022, CACILM-2 held trainings on the production and quality control of seeds in Tashkent.

The event was attended by representatives of the Center for Seed Production Development, State Center for Certification and Control of Seed Quality, State Commission for Variety Testing of Agricultural Crops, Ministry of Agriculture of the Republic of Uzbekistan, as well as other interested participants involved in the activities of the seed production sector.

"For further improvement of this branch of agriculture, it is important to develop human resources, strengthen their knowledge and skills. We would like to share our experience with representatives of the private sector that is currently actively involved in the seed industry. During the trainings, we tried to fill in the gaps in such topics as business planning, enterprise management and seed marketing," said Muhammadjon Kosimov, CACILM-2 National Project Manager in Uzbekistan.

Being a key factor in ensuring food security, seed production covers activities related to the production, harvesting, processing, storage, sale, and transportation of seeds of agricultural and forest plants, as well as varietal and seed control. Production of seeds of new and commercially available varieties while preserving

varietal properties, genetic purity and resistance to pests play a very important role in increasing yields, improving quality of agricultural products, and boosting incomes of agricultural producers.

As practice shows, private sector development is an important factor in increasing productivity and developing seed production.

During the trainings, an overview of the current national legislation and international provisions regulating the seed industry was presented. Information was provided on seed projects implemented by FAO.

In addition, the principles of quality assurance of seed products, methodology of field inspections and its application to ensure seed quality, standards of the International Seed Testing Association (ISTA), and other topical issues were discussed.

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