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FAO-GEF project

Integrated natural resources management in drought-prone and salt-affected agricultural production landscapes in Central Asia and Turkey (CACILM-2)

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INVESTING IN OUR PLANET

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In this issue:

Makhmud Shaumarov, FAO/GEF CACILM-2 Regional Coordinator

Interview with Makhmud Shaumarov, FAO/GEF CACILM-2 Regional Coordinator

The CACILM-2 project is completed. What lessons have we learned?

Over the years of working on the project, we have become convinced that sustainable management of natural resources is not so much about technology or available finances, but about people and trust between them.

CACILM-2 united six countries, and each had its own characteristics - climate, approaches, and level of involvement. Nevertheless, one thing worked everywhere: if a farmer sees a result from a neighbor, he is also ready to try. For example, in Uzbekistan, farmer Fakhriddin Zaripov successfully applies no-till technology in the Bukhara region, which has become an inspiring example for other farmers in the region. Therefore, the most important lesson is to demonstrate the result in practice, and not just in reports and presentations.

We have also become convinced that you cannot move only "from the top" or only "from the bottom". The combination works - when on the one hand there is support from policy and partners, including government agencies, and on the other - work at the community level.

In addition, we realized that there are no universal solutions. Each country has its own characteristics and approaches must be adapted to local conditions. Flexibility and readiness for change were key factors in the successful implementation of the project.

What do you think are the most important achievements of the project?

To put it simply, we have given the regions real, working tools to conserve soil and water in conditions where the climate is changing literally before our eyes.

First, we have helped farmers implement practices that were previously viewed with caution - for example, no-till farming. Today, it is obviously visible: the soil is being restored, the yield is stable, and the costs of fuel and equipment are significantly reduced.

Second, we have shown that even in complex landscapes, where drought and salinization are widespread phenomena, it is possible to manage resources effectively. We have very good examples in Turkmenistan, Uzbekistan, Kazakhstan, where they used integrated approaches to land management in combination with traditional knowledge and modern solutions.

Moreover, we have managed to create a sustainable platform for exchanging experience between countries based on the global WOCAT database. This international network and knowledge platform on conservation agriculture methods collects, systematizes, analyzes and disseminates best practices in sustainable natural resource management. Before the CACILM-2 project, everyone worked in their own reality. Now there is a common understanding, there is an exchange of technologies, there is a network of experts - and this is one of the most valuable legacies of the project.

What can be considered failures?

Despite the successes achieved, the project faced a number of difficulties. In some countries, the introduction of new technologies was difficult due to limited access to funding and insufficient institutional support.

Sometimes we overestimated the readiness of individual areas to implement new approaches. For example, there were places where we started working on disseminating technologies, but local communities were not involved from the very beginning, and as a result, the project did not work there.

It was also not always possible to get sufficient support from national institutions. In some places, there was a change of personnel, in other places, priorities shifted, and it was already difficult to promote certain initiatives. There was also a problem with scaling: we wanted to cover large areas at once, but in some cases, we had to focus on pilot areas and move in stages.

What challenges did you face and how did you find solutions?

One of the biggest challenges was to find a balance between regional coordination and local realities. What works well in Kazakhstan is not always applicable in Tajikistan or Turkmenistan. That is why we chose the path of adaptation: the general framework was uniform, but within each country, we developed our own approaches together with our partners.

There were also organizational difficulties, especially during the pandemic. The project is regional; we are used to constant exchange, visits, and field meetings. When everything went online, we had to revise the formats. Nevertheless, even in such conditions, we conducted dozens of trainings, trained thousands of practitioners, created online platforms and did not lose contact with the participants.

Solutions were found through dialogue. We constantly maintained feedback, adjusted approaches, looked for “locomotives” in each country who helped promote the initiative.

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Will the dissemination of best practices and initiatives of the project continue?

Yes, the dissemination of best practices and initiatives developed within the framework of the CACILM-2 project will continue. National programs and other international projects have already picked many of our developments up. We have created detailed guidelines, training videos, and made a platform where all materials can be found. The created information platforms and training materials will be used to further disseminate effective methods of natural resource management in the region.

In addition, a number of countries have already begun work on institutionalizing the approaches of the CACILM-2 project, that is, they are included in state programs, national codes and strategies. For example, sustainable land management strategies based on the experience of the CACILM-2 project are being implemented in Uzbekistan and Kazakhstan.

In fact, we see a steady interest in the topics that we have developed: climate adaptation, sustainable land use, water conservation, remote monitoring of water resources. In addition, this means that the project will live on - through people, through practices, through policy.

In Central Asian countries, CACILM-2 is successfully completed

Over five years, effective cultivation technologies for drought-resistant crops and soil salinity reduction were introduced across thousands of hectares of marginal farmland in the region. Plans for the sustainable management of invaluable natural resources, particularly pastures, were developed and remain active. The productivity and condition of these pastures are vital to the livelihoods of millions in Central Asia.

Amid the challenging circumstances of the COVID-19 pandemic, CACILM-2 significantly strengthened collaboration with government institutions managing natural resources, research institutions, and various partner organizations across the region. Through remote access, and with the support of renowned international experts, the project provided training to thousands of farmers and agricultural specialists on modern techniques and approaches for the efficient and sustainable use of land, water, and pasture resources. The project also responded effectively to emerging challenges, including providing urgent assistance to farmers in high-risk zones in Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.

Educational guides, manuals, and other instructional materials on transitioning to agro-technologies that conserve water resources, including the adoption of closed-environment farming and drip irrigation systems, have been widely distributed.

In Kazakhstan, approximately 250,000 hectares were covered by sustainable land management practices, including pasture management. Partners received 37 tons of drought- and salt-resistant crop seeds, including fodder crops, and 19 types of specialized equipment. Seven soil condition maps, created with project support, are now used regularly by partners. International and national experts trained 64 “soil doctors” who can diagnose soil health


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issues that affect crop yields and provide recommendations for soil fertility restoration.

Additionally, extensive work was done to strengthen legal and institutional frameworks, including in pasture management, disaster risk reduction, and soil fertility restoration for 2024-2030. Optimal solutions for Kazakhstan's drought monitoring and forecasting were developed, institutional and legal analyses for salinity management were conducted, and a "Salinity Management Guide" was published on the FAO portal in Kazakh, Russian, and English. Several other key studies were carried out to promote effective approaches to sustainable natural resource management adapted to Kazakhstan's climatic conditions.

In close collaboration with the Kyrgyz Institute of Irrigation, the project supported the development of an innovative remote water monitoring system. This included pilot sensors, a specialized software program, and the installation of the technology at six water posts in the arid Kochkor district of Naryn Province, Kyrgyzstan. This economical and highly effective solution allowed Kochkor District Water Management to reduce resource use for water management significantly. Water user associations now receive real-time water distribution information, and farmer conflicts over irrigation water have ceased.

In 2024, the project provided the Kyrgyz government with policy recommendations for automating water basin monitoring nationwide. This led to a government decision to mobilize significant resources from various sources and expand the irrigation water control system across the country, which is critical amid climate change and decreasing water availability in Central Asia.

Moreover, the project demonstrated energy-efficient "green technologies" for water delivery, including hydraulic rams and artificial glaciers. Training sessions on sustainable pasture management were organized, supporting the transition to drought-resistant fodder crops, improving pasture access for farmers, and advancing the digitization of land use maps in Kyrgyzstan.

In Tajikistan, the program focused on promoting water-saving technologies, such as drip irrigation systems, and the dissemination of drought- and salt-resistant crop varieties. The project recommended high-quality safflower seeds, resulting in nearly a tenfold increase in cultivation areas—from 150 to 1,350 hectares—in just two years.

Hundreds of farmers received training on cultivating drought-resistant crops, implementing drip irrigation systems, and creating nurseries for productive crops suited to Tajikistan's climate. During COVID-19 restrictions, farmers received crucial support from the project: over four tons of legume and vegetable seeds, 25 tons of fertilizers, modern

equipment for processing vegetables, fruits, and oil crops, and 16 greenhouses. Beneficiaries also received cash grants, aiding vulnerable households during a challenging period of isolation.

One of the most effective project directions in Turkmenistan involved constructing desert sardobas and wells, establishing nurseries with drip irrigation systems, and providing 75,000 drought- and salt-resistant seedlings in pilot areas. Fourteen greenhouses for winter seedling cultivation and resource-efficient agricultural equipment (mini-tractors, cultivators, seed drills, etc.) were provided. Achievements included integrating "sustainable desert pasture management" into the curriculum of Turkmen State University and developing a comprehensive desert pasture management plan in Central Karakum.

In Uzbekistan, the project established twelve agrometeorological stations in arid areas that provide real-time data on soil temperature and moisture. A rotational pasture management plan was developed for the 83,000-hectare "Guzor" Karakul farm, three GIS laboratories were set up, and 100 "soil doctors" were trained. Farmers in pilot areas received over 100 tons of salt- and drought-resistant seeds, 128 greenhouses were installed, and 13,500 seedlings and 100,000 grape cuttings were distributed. Additionally, two zero-tillage seeders, laser leveling equipment, 41 two-wheel tractors, 61 water pumps, and other essential farming equipment were provided. In Kamashi district, a 1,200-hectare pistachio plantation was established, and three nurseries for fruit trees adapted to the climate of the Aral Sea region were created under the "Million Fruit Trees" campaign in Karakalpakstan.

Launched in May 2018, the project aimed to broadly disseminate and scale up best practices for integrated natural resource management in marginal agricultural lands challenged by water scarcity and salinity.

"CACILM-2 provided a unique platform to promote sustainable natural resource management practices and mitigate climate change impacts," said Mahmud Shaumarov, Regional Coordinator of CACILM-2. "The project has built the capacity of both institutions and local communities to manage droughts and combat land degradation, paving the way for further actions toward achieving land degradation neutrality in Central Asia," he added.

Final meeting of the project in Bukhara

At the final meeting in Bukhara, attended by representatives of relevant ministries and departments, the results of the project in the field of land and water management, as well as opportunities and ways to scale up successful practices in the countries of the region to combat desertification, land degradation and threats to food security were discussed.

Launched in 2018 by the Food and Agriculture Organization of the United Nations (FAO) jointly with the Global Environment Facility (GEF), the CACILM-2 project aimed at mitigating the effects of climate change and land degradation in Central Asia and Turkey.

The main focus was on the introduction of sustainable agricultural practices and effective land management strategies. The project provided assistance to the countries most affected by desertification and soil salinization in all countries of the region - Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

"The Bukhara and Kashkadarya regions became the pilot regions of the project in Uzbekistan," said Sherzod Umarov, FAO Deputy Representative in Uzbekistan, at the meeting. "Efforts were made to develop the most effective solutions to the problems of soil degradation and land affected by drought.

Speaking about the achieved results, it is worth noting that within the framework of the project, the necessary equipment was transferred to partner organizations and a method of planting crops without tillage was used. This method is a new technology for preventing climate change. Moreover, specialists demonstrated in practice how to obtain high yields of agricultural crops on arid and saline lands."

Against the backdrop of rapid population growth in the region and the aggravating effects of climate change, the countries of Central Asia are facing serious challenges - depletion of water resources, desertification of pastures and land erosion.

Over the past 30 years, agricultural productivity in these countries has significantly decreased, and the yield of some crops has fallen by 30%. These factors have increased food security risks, especially for vulnerable communities.

"We have been implementing risk mitigation approaches, including improved irrigation methods, as well as agricultural technologies aimed at protecting natural ecosystems and increasing agricultural productivity. Rational use of water resources is the most important task in the region today," noted the national coordinator of the project in Uzbekistan, Muhammadjon Kosimov.

The meeting participants were able to see the results of the application of sustainable agricultural technologies in practice by visiting the Zarif Ota farm, where the no-till technology is successfully implemented in the process of cultivating agricultural crops.

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From hardship to harvest in Kazakhstan

The eyes of Aishagul Duganova, a 48-year-old mother of three, light up as she talks about her new greenhouse, which is bringing with it a new stability amidst her family's health problems and money troubles.

In the village of Koram, around 150 kilometers east of Almaty in Kazakhstan, Aishagul's life has been marked by her husband's debilitating injury and the severe illnesses of her elderly parents-in-law.

With her family completely reliant on her, Aishagul was caught between the demanding care they required and the necessity to earn money; yet she was unable to take advantage of work opportunities too far from home.

Before her husband's accident, Aishagul worked with him in the field, and they sold their produce in local markets. But as his condition worsened, she could no longer leave him alone, pushing the family into a cycle of debt to cover medical expenses and sustain their children.

"Every day, I had to make a choice— care for my sick family or leave them behind to work. It was a choice no one should have to make," Aishagul shares, her voice tinged with the fatigue of years of caregiving.

A turning point came when Aishagul's sister-in-law, aware of her dire situation, introduced her to a greenhouse harvesting training programme. This initiative was part of the broader Food and Agriculture Organization of the United Nations (FAO) project, known as CACILM-2, and funded by the Global Environmental Facility (GEF).

Among its objectives, the project equips rural women in Kazakhstan with the skills and resources to adopt sustainable farming practices and make a living from agriculture.

Thanks to the training course provided by FAO's partner, the Local Community Foundation of Enbekshikazakh District, Aishagul has improved her vegetables and produce-growing skills, allowing her to independently cultivate food.

Pavel Kavunov, an agronomist working at the Foundation, explained the training offered by the project: "We focused on practical, climate-smart agriculture techniques that ensure these women can produce quickly and sustainably."

He imparted information on the characteristics of seedlings, their root systems and important aspects to consider during planting. "It's about giving them the tools and the knowledge to succeed on their own terms," he added.

This local expert presence ensures that the women farmers are not only trained but also have continual access to advice and problem-solving techniques, which is vital for the sustainability of their agricultural activities.
FAO also worked with Aishagul and nine other women to install 100 square metre, tunnel greenhouses on their lands. This collaboration has empowered them to cultivate vegetables all year-round in their backyards, opening the door to economic independence and lasting stability.

As the women learn to manage their micro-farms, they are supported by a network of agronomists and coordinators, such as Bakytgul Yelchibayeva, who assist them in connecting with local markets and buyers. "Our goal is to go beyond providing initial support by creating a lasting infrastructure that enables these women to thrive independently," she explains.

Aishagul is now making the most of her new greenhouse, growing cucumbers and other vegetables to support her family. "This greenhouse has changed everything. It allows me to be with my family when they need me and still provide for them," she explains. Encouraged by her success, Aishagul hopes to build a sustainable farm that also helps other women in her community learn and grow together.

In addition to the greenhouse, the project supported women farmers with tillage materials and cucumber seeds. Together, the women sold 3 992 kilograms of produce, earning roughly double what they would typically make. The boost in income from this extra produce helped improve the lives of 64 people, strengthening their community's farming efforts.

The CACILM-2 project is providing targeted training, resources and coaching to rural communities in Central Asia, addressing several critical barriers such as inadequate job opportunities and lack of information. Moreover, through partnerships with local foundations and experts, participants forge connections with local markets and introduce their products to potential buyers, ensuring a reliable outlet for their produce.

By empowering rural women with the tools and knowledge to undertake agricultural ventures, FAO is promoting equality of opportunity, enhancing their economic stability and independence.

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Laboratory equipment for soil monitoring received from FAO by the Ministry of Agriculture of the Republic of Kazakhstan (Shymkent)

The South Kazakhstan Hydrogeological and Meliorative Expedition of the Ministry of Agriculture of the Republic of Kazakhstan (Shymkent) received a set of modern equipment for soil analysis from FAO.

Soil analysis in Kazakhstan is carried out by three state institutions within the structure of the Ministry of Agriculture of the Republic of Kazakhstan, including the South Kazakhstan Hydrogeological and Meliorative Expedition in Shymkent.

This activity includes agro-meliorative survey of irrigated lands, hydrogeological monitoring of the level and salinity of groundwater, hydrological survey of the flow of collector-drainage waters, monitoring of soil-meliorative processes and laboratory studies of water and soil.

In addition, soil monitoring includes a quantitative and qualitative assessment of soil changes over time, control over the entry and content of all types of harmful substances in

soils: heavy metals, radionuclides, nitrates, pesticide residues, and other chemical pollutants of inorganic and organic origin.

Based on the research, recommendations are developed to improve the condition of irrigated lands, which can be used by agricultural producers when planning agro-reclamation and water management measures.

Within the framework of the project, "soil doctors" have been operating in Kazakhstan for the second year - trained specialists who, in addition to knowledge, also received special kits for conducting soil analysis on the ground. In total, the project purchased one hundred such kits and distributed them among partners in the pilot territories of CACILM-2.

In addition, the project actively promotes strengthening cooperation between Kazakhstan and the Global Soil Partnership, in particular, with GLOSALAN (Global Soil Laboratory Network).

"Continuous monitoring of water and soil conditions is a very important component of the transition to sustainable use of natural resources and development of national plans," said Mahmud Shaumarov, Regional Coordinator of the FAO/GEF Integrated Natural Resources Management in Drought- and Salinity-Prone Agricultural Landscapes of Central Asia and Turkey (CACILM-2) project. "We hope that the equipment received by the partners will contribute to this process," he said.

Encouraging farmers in Kyzylorda to shift to drought- and salt-tolerant crops

Kazakhstan faces significant challenges of desertification, land degradation and drought due to both climate change and human activities. These processes already affect 66 percent of Kazakhstan's arable land. In addition, 40 to 80 percent of irrigated land in the region suffers from salinization and waterlogging.

Poorly managed pastures, which make up 77 to 95 percent of agricultural land, further exacerbate these problems.

To address these challenges, the project in Kazakhstan focuses on scaling up integrated natural resource management (INRM). This involves expanding sustainable land use practices that reduce environmental pressures and increase the resilience of rural communities to drought and salinization.

The project team conducted a series of training sessions in several villages in the Kyzylorda region, including the Shieli, Zhalagash, Kazalinsky districts and the city of Kyzylorda.

The workshops covered a number of key issues, including the introduction of drought- and salt-tolerant crops into rice crop rotation; the introduction of sugar beet into rice crop rotation with an emphasis on forage and seed production; soil fertility management and assessment methods, and the use of Soil Doctor approaches to assess soil health.

The workshops focused on crop diversification and the use of summer and winter crops to increase resilience to climate change and eliminate forage shortages. In addition, the importance of expanding afforestation, especially native species, on saline marginal lands was emphasized, which will help ensure the production of valuable products while helping to lower groundwater levels through biodrainage. The aim of these initiatives is to provide farmers with the knowledge and tools needed to adapt to changing environmental conditions and improve the sustainability of agriculture in the region.

IT equipment for the needs of the new Ministry of Environmental Protection of Turkmenistan

In order to radically reform the agricultural and environmental protection sectors, further improve the efficiency of operations and improve management, the President of Turkmenistan Serdar Berdimuhamedov made very important decisions in the structures of the agro-industrial sector of Turkmenistan.

On July 14, 2023, the President of Turkmenistan signed Resolution No. 240 "On the establishment of the Ministry of Agriculture of Turkmenistan and the Ministry of Environmental Protection of Turkmenistan".

In this regard, the Ministry of Agriculture and Environmental Protection of Turkmenistan (MAEPT) was reorganized and the Ministry of Agriculture of Turkmenistan and the Ministry of Environmental Protection of Turkmenistan were created on its basis.

In connection with the establishment of the new Ministry of Environmental Protection of Turkmenistan, the main national implementing partner of the project, there was a need to strengthen its material and technical base and provide the staff of the central office of the Ministry and subordinate units with computer equipment for the effective implementation of assigned tasks related to the effective implementation of state environmental policy.

Therefore, the project purchased a set of modern equipment (15 computers, 15 laptops, 2 servers with associated data storage equipment, 2 multifunctional color printers, and a plotter (color inkjet printer) for printing cartographic information) for the needs of the new Ministry and handed it over to the Ministry of Environmental Protection of Turkmenistan and its subordinate structures (Forestry Department, National Institute of Deserts, Flora and Fauna (NIDFFA) for use in scientific and practical activities.

Modern equipment will help improve the material and technical potential of the Ministry and contribute to the implementation of the Concept for the Development of the Digital Economy of Turkmenistan for 2019-2025, adopted by the President of Turkmenistan.

This will allow more successfully addressing the issues of using the wide potential of digital systems for combating drought, desertification, land degradation, as well as mapping agricultural production landscapes using GIS technologies.


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Study Tour to Turkey

Turkey's agricultural sector plays a significant role in the country's economy, accounting for 25% of all employment, 6.4% of GDP and 3% of exports. The country is a world leader in the production of certain fruits, vegetables, figs, lemons, lentils, pistachios and hazelnuts.

According to FAO, Turkey also ranks sixth in the world in annual forest growth, which amounted to 118 thousand hectares from 2015 to 2020 alone. Thanks to the successful implementation of the sustainable forest management plans developed by the Directorate General of Forestry of Turkey and through afforestation of abandoned lands, the forest area in the country has increased from 19.8 million hectares in 1990 to 22.2 million hectares in 2020.

To improve soil fertility, rationally use irrigation water and combat erosion, farmers receive state support to integrate tree crops into agricultural systems. To ensure the sustainability of agriculture, the country has introduced methods that promote rational use of soil and water (crop rotation, cover crops and composting).

Turkey also invests heavily in FAO's agricultural development programmes in Central Asia and is an active participant and member of the FAO/GEF project. All these were the reasons for organizing a study tour to Turkey for representatives of government partner organizations of the project in Turkmenistan, including employees of the Ministry of Environmental Protection, the Ministry of Agriculture, as well as specialists from agricultural and environmental departments of velayat administrations.

The program of the study tour started at the FAO Subregional Office for Central Asia, where the delegation was welcomed by the leadership of the FAO Subregional Office and the FAO/GEF CACILM-2 Regional Project.

Then a meeting was held at the Ministry of Environment, Urbanization and Climate Change of Turkey, where the focus of discussions with Turkish specialists was on combating desertification, introducing rational land use practices and water resources management. The parties expressed mutual interest in further cooperation aimed at solving common environmental problems and ensuring sustainable development in the region.

In addition to official meetings, the participants of the trip visited those sites where they could see with their own eyes how initiatives to

combat desertification and restore degraded lands are being implemented in Turkey. During the seven days, the delegation visited a number of greenhouses and nurseries where plants are grown for afforestation of desert areas, fixing sand dunes, and replenishing city and national parks.

The tour program included a visit to the production complex of the Torku brand, a subsidiary of the Konya Sugar production cooperative, which in addition to producing confectionery, meat and dairy products, also has a laboratory for the study of plant fibers and the production of potato seeds in unique climate-controlled greenhouses.

The forested area around the Altınapa reservoir, located in the Selçuklu district of Konya Province, is an excellent example of sustainable natural resource management. The Altınapa reservoir, with a surface area of 2.20 km^2 at full capacity and an altitude of 1,250 m above sea level, was created by building a dam. Since 1980, the area around the reservoir has been planted with forests. Currently, the forest area has reached 9,900 hectares. The main species used in afforestation are the cedar of Lebanon and the pine tree. Oak, acacia, rose hips and juniper are also planted - all of these species not only decorate the landscape, but also play an important role in preserving the fertile soil layer and strengthening the slopes.

The "Hacıalan" site was of particular interest to the participants of the study tour. This open-air training site serves as a training center for technical personnel of the country's forestry. Here, forestry engineers from various regional forestry directorates are trained in effective erosion control practices. The site presents various examples of soil restoration, which allows preserving valuable land resources and making the region more resilient to drought.

The example of the Agyatan sand stabilization site, carried out by the Adana Forestry Directorate in the Karataş district, was used to study the practice of combating desertification. The project was originally planned to be implemented over three years – from 2015 to 2018, but this work continues to this day.

The total area of the project is 445.6 hectares. The goal was to stabilize shifting sands and counteract wind erosion along the Mediterranean coastline stretching for 80 km. Sand stabilization works included the installation of a reed curtain in the form of 20x20 meter cells, with a strip width of 200 meters.


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Above there is a hedge of forest plantations, the main crops being Mediterranean pine and Cyprus acacia. The successful operation of the project has already led to the stabilization of the erosion situation by 2020, which allowed specialists to begin planting economically viable plantations of mulberry, almond, pomegranate, olives and other fruit crops. Turkey also ranks 3rd in the world in terms of pistachio production after the United States and Iran. 19 percent of the world's production of this nut is widely used for both domestic production and export. Therefore, the visit to the Pistachio Research Institute in Gaziantep aroused keen interest among the delegation members. This is one of the leading institutions conducting research and development in the field of improving pistachio species. The participants got acquainted with various varieties of pistachios, the work of nurseries and greenhouses for the production of planting material, and also visited pistachio fields.

"The project attaches great importance to such study tours," noted Regional Coordinator Mahmud Shaumarov. "You can tell people a lot about best practices in natural resource management, but when a delegation meets with specialists from another country in a field, greenhouse or nursery, where they receive knowledge first-hand, this is an invaluable practice that promotes the use of effective technologies in their countries."

The study tour was held with the support of CACILM-2 and the GEF/UNDP Aral project in Turkmenistan.


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In Turkmenistan, with the assistance of the project, the discussion of the new version of the Forest Code is being completed

Specialists from the forestry and environmental sectors, together with lawyers and international experts, have prepared a draft Forest Code of Turkmenistan that meets today's requirements. It also takes into account the problems of climate change on the planet and was presented to the participants of the meeting in Ashgabat.

The most important aspects of careful and sustainable management of forest resources, the legal and institutional foundations of this management, improving the legal framework for forest restoration, promoting sustainable livelihoods in forest areas and improving governance mechanisms that ensure long-term ecological balance, taking into account international experience in the process of developing a new version of the Forest Code, as well as subsequent steps and actions to improve forest legislation and the industry as a whole - these and other issues were discussed at a two-day meeting in the capital of Turkmenistan.

All comments and suggestions received during the discussions at the meeting will be taken into account in the process of finalizing the Code before the draft law is submitted to the Cabinet of Ministers and then to the Mejlis, the highest legislative body of Turkmenistan.

A FAO and GEF mission arrived in Ashgabat to participate in the meeting, consisting of Ekrem Yazici, Technical Director of the FAO/GEF Project "Integrated Natural Resources Management in Drought- and Salinity-Prone Agricultural Landscapes of Central Asia and Turkey" and Mahmud Shaumarov, Regional Coordinator of the project.

"Our task is to discuss further steps in the process of finalizing this important document," Mahmud Shaumarov noted in his speech. "We strive to ensure that the proposed amendments reflect not only the needs of today, but also take into account the environmental challenges that may arise in the future. I am pleased to report that we are at an important stage - the draft amendments are ready for consideration by the Cabinet of Ministers," he said.

In addition to participating in the important discussion, the project management also held a meeting with the management and key personnel of the main national partner of the project – the Ministry of Environment of Turkmenistan.


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Construction of desert wells completed

The FAO/GEF Regional Project CACILM-2 has completed the construction of new wells in different regions of Turkmenistan to provide better access to water for farmers using desert pastures.

Of the 10 wells built, three will be used by the Erbent livestock farm in the Ak Bugday district of the Ahal province, two by the Dowardarchylyk farm in the Shabat district of the Dashoguz province, four by the Engish farm in the Takhtabazar district of the Mary province, and one by the Garagum farm in the Khalach district of the Lebap province.

People have built desert wells in different deserts around the world, but the Karakum ones are the deepest. Since ancient times, people have been able to protect wells from collapses and destruction, and have been able to find water in deep layers of the earth without any equipment.

During the construction process, the project used both traditional methods that people have used for centuries to irrigate the desert, and modern approaches that allow for the efficient collection, accumulation and storage of valuable moisture.

A significant part of the territory of Turkmenistan is used as natural pastures. 84% of the total territory of the country (41.5 million hectares), or 95.9%, or 38.34 million hectares of agricultural land, are occupied by flat pastures, mainly located in the desert zone.

Cattle are usually grazed near watering points, but due to the insufficiently developed network of wells, this leads to uneven use of desert pastures and their degradation.

The wells built with the assistance of the CACILM-2 project will allow for uniform irrigation and reduce the scale of degradation of desert pastures, since one watering point supplies water to about 0.7-1.0 thousand hectares of pastures and a flock of 700-800 sheep can graze around one well.

“The availability of water in remote pastures will contribute to increased productivity of pastures and livestock farming, as well as to improving the socio-economic conditions of livestock breeders and their families,” noted the Regional Coordinator of CACILM-2, Makhmud Shaumarov.

“Proven effective irrigation technologies and methods for improving the productivity of arid pastures will allow for their wider promotion and implementation, using the approaches of integrated natural resource management (INRM) and sustainable land management (SLM) in the context of increasing drought,” he said.


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"It is impossible to create a garden city in the desert, but it is possible and necessary to turn the desert into a productive pasture", - says Sultan Veysov, CACILM-2 consultant.

Sultan Veysov is the author of a course on rational management of natural pastures in desert conditions, which has been taught at the Turkmen State University named after Magtymguly since 2024.

Among other aspects of sustainable management of the country's vital natural resource, the new 56-hour course includes such important issues as the current state of Turkmenistan's natural pastures, the specifics of transhumance in the country, the existing environmental and climatic conditions on the territory of Turkmenistan's natural pastures, as well as various issues of using natural pastures.

- We all in Turkmenistan know very well what climate change is, says Sultan Kerimovich. Droughts are not uncommon here, but the last one was unusual even for us. The severe drought lasted since 2017 and only got worse every year, and this could not but affect the state of the environment. And only in 2024, for the first time in seven years, the relative norm of precipitation fell.

Given that the country does not have the practice of stall feeding of livestock and 84% of the country's total territory (41.5 million hectares) is occupied by year-round pastures, it is becoming increasingly clear that without

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the practical application of technologies for the careful and effective management of natural resources, the well-being of farmers in the context of climate change is at risk.

In conditions where the amount of precipitation is sharply decreasing and, accordingly, the productivity of pastures is falling, there is an urgent need to move towards sustainable use of available natural resources.

It was these factors that made me sit down to develop this course for young specialists in the field of ecology. This course is intended for senior students in ecology.
After graduating from university, some of the students will engage in scientific research, some will teach, but the majority will be involved in practical work on issues of combating desertification, as well as preserving and restoring pasture resources and reversing the degradation of desert pastures.

Holder of a red diploma from the Turkmen State University named after Magtymguly , leading researcher at the National Institute of Deserts, Flora and Fauna of the State Committee for Environmental Protection and Land Resources of Turkmenistan (currently the Ministry of Environmental Protection of Turkmenistan), candidate of geographical sciences Sultan Veysov has been working in the field of natural resource protection for 44 years. He is the author of more than 120 scientific papers.

- It is necessary to coexist in harmony with the fragile ecosystem of the desert, and the “Gumly”, the people living in the Karakum Desert, know this very well, - says the scientist. And recently we have been increasingly talking about the careful and competent use of the natural resources that are available in Turkmenistan. The National Institute of Deserts, Flora and Fauna has a huge volume of research, important and necessary information to support the Karakum desert ecosystem. At the same time, all practical recommendations have a scientific basis and the project provides great assistance in this work.

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As a consultant to FAO and GEF, Sultan Veysov is responsible for the development and implementation of best practices for sustainable natural resource management in the face of increasing drought impacts. He constantly works with local communities, land users and farmers, helping them to master the practices of careful and efficient land use, promotes the dissemination of effective technologies and approaches to the restoration of desert pastures, the development of agroforestry in mountainous regions and the improvement of the melioration state of irrigated lands based on the experience of FAO and the National Institute of Deserts, Flora and Fauna.

All CACILM-2 initiatives are treated with great attention in Turkmenistan, so the idea of introducing a course on sustainable use of natural pastures in desert conditions in a higher educational institution was supported and approved at all levels - both at the University itself and at the Ministry of Education of Turkmenistan.

Moreover, - says Sultan Kerimovich , - we have already started teaching this course to our students, future environment protection specialists, and we also rely on the course when we conduct meetings and trainings for project partners in pilot areas - local government employees, specialists and farmers.

When asked about his future plans, the scientist said that he dreams of passing on as much experience and knowledge as possible to the next generation while he has health and strength, so that a careful and caring attitude towards natural resources in Turkmenistan is passed on from generation to generation.

"You need to operate the equipment correctly and repair it on time, then it will serve you for a long time and will never let you down", - says Dovran Iskenderov, water technician of the Daihan association Andalyp

History of Dovran Iskenderov from the Turkmen village of Andalyp is an inspiring example of how one person can change the life of an entire community. His enthusiasm, professionalism and commitment to innovation have enabled the entire Andalyp Daihan Association to become an example of rational farming and careful use of natural resources.

Dovran was born and has lived his entire life in Andalyp village of the Akdepe district (former Yilanly). He is the youngest in the family, his parents and brothers worked on the land. His father worked as a tractor driver all his life, his mother also worked on a collective farm.

Since childhood, Dovran traveled with his parents to the fields and learned the basics of farming from them. From an early age, the boy loved watering the plants most of all. Sometimes he guarded the dams all night long and controlled the water flow so that it would not wash away the crops. Since then, managing water became his favorite pastime.

He has a high school and a road technical school behind him, specializing in "vehicle mechanic". But after graduating, Dovran returned to his childhood dream, became a mirab (water technician) in the Andalyp Daihan Association

and has been involved in water resource management for 20 years.

Dovran's main task is to ensure timely irrigation so that farmers can have abundant harvest. Considering that water is becoming an increasingly valuable resource, especially in dry years, he considers the fair and timely distribution of irrigation water a top priority.

The year 2021 was a special year for specialists of the Andalyp Daikhan Association. The association became a pilot project, and large-scale activities to improve the skills and awareness of farmers and farm specialists began in the framework of the project. Seminars, field schools and trainings dedicated to combating soil salinization, rational use of water and land resources have become a commonplace in the association.

And Dovran, an active and proactive farmer, became the main face of these events. His enthusiasm inspired colleagues to open dialogue and search for new solutions. Working closely with the project experts, Mirab made a number of valuable suggestions that significantly influenced the course of the project.

One of the brightest ideas of a concerned employee of the Association – the purchase of mobile pumps – has fully justified itself. Thanks to this equipment, farmers were able to water even the most remote areas in a timely manner, which led to a 20% increase in crop yields and the restoration of 29 hectares of previously abandoned land. The success of this approach demonstrated that even small innovations can bring great benefits.

But Dovran didn't stop there. Realizing that any equipment requires careful handling, he began training young farmers and tenants in how to properly operate and repair pumps. «Only in this way, agricultural equipment will serve for a long time and reliably ", - says Dovran.

Dovran and his colleagues plan to build 15 water-regulating structures. This large-scale task will allow for even more efficient management of water resources, ensuring an even and fair distribution of water among all farmers.

The Soil Doctors Programme has been launched in Turkmenistan

Soil is the basis for food production and agriculture. 95 percent of the world's food is produced in soil. That is why the FAO/GEF Integrated Natural Resources Management in Drought- and Salinity-Prone Agricultural Landscapes of Central Asia and Turkey (CACILM-2) project, together with the Global Soil Partnership (GSP), attaches great importance to the conservation and improvement of soil health in Central Asian countries.

Turkmenistan is already the third country where the Global Soil Doctors Programme is being implemented with the support of FAO and GEF. From 5 to 8 November 2024, a training of trainers event was held in Dashoguz velayat, covering various aspects of improving soil health.

The training programme for soil doctors included both theoretical and practical sessions. During the introductory sessions, the participants - specialists from local agricultural departments and employees of the regional agrochemical laboratory - were introduced to the basics of sustainable land management, learned about the factors contributing to soil salinization, as well as effective strategies for mitigating the effects of erosion and degradation of the most important natural resource.

The field segment included a study of salinity, the general condition of the soil, as well as mastering the methodology of monitoring and developing steps to restore the fertility of lands.

To carry out field experiments, each participant received a special set of devices and tools for assessing the condition of the soil.

Upon completion of the course, newly trained soil doctors held a practical seminar for local agricultural producers. At this field session, farmers were introduced to the methodology of soil assessment and effective approaches to sustainable land management, and also learned about ways to restore productivity in degraded areas.

As noted by the national manager of the CACILM-2 project Rakhmanberdi Khanekov, farmers play a critical role in maintaining soil health and increasing its fertility. By working their land wisely, using soil and irrigation water rationally, agricultural producers are able to have a significant impact on the environment.

Maria Konyushkova, an expert of the FAO Global Soil Partnership, also drew attention to the key role of farmers in achieving agricultural sustainability. «The goal of the program is to help farmers take care of soil health and thereby ensure the well-being and sustainability of their farms,» she said.

According to FAO, 33 percent of soils on the planet are already degraded, and by 2050 this figure may increase even more. The causes of land degradation are multiple, complex and varied in each country, but are largely due to overexploitation or unsustainable management of natural resources, including poor irrigation and agricultural practices (e.g. cotton monocultures, excessive use of fertilizers and pesticides, soil-damaging tillage practices, overgrazing), which are exacerbated by the increasing frequency and intensity of climate-related disasters (e.g. droughts, floods and landslides).

The Global Soil Doctors Programme is a farmer-training initiative that strengthens farmers' knowledge of sustainable soil management and supports them in meeting the needs of rural communities.

Participation in this initiative reflects Turkmenistan's commitment to achieving Sustainable Development Goals (SDGs) 2, 13 and 15 through the promotion of sustainable agricultural practices.

This is not the end of the Global Soil Doctors Programme's activities in the country. With the support of the Global Soil Partnership and other interested organisations, the programme will be financially supported and expanded to other regions of the country.

«Proven effective irrigation technologies and methods for improving the productivity of arid pastures will allow them to be promoted and implemented more widely, using integrated natural resource management (INRM) and sustainable land management (SLM) approaches in the context of increasing drought,» he said.

«Gardening is the path to harmonious coexistence with nature!» - says Alybai eke from Bagban village of the Shabat district of Dashoguz province

Alybai Abylyazov was born in the village of Bagban (Bagban in Turkmen means gardener) in a family of gardeners and foresters. “And do you think I had even one chance to avoid this profession?” - Alybai laughs. “That’s why I’ve been involved in gardening and forestry all my life”.

Alybai was born in a large family, he has eight brothers and sisters. His father worked as a site manager in the Dashoguz Province Forestry department, mother - an accountant there. Therefore, all the brothers and sisters from childhood were involved in the activities of the Forestry Department and our hero from an early age mastered and fell in love with the profession of a gardener.

“To do forestry and gardening is a very noble thing, - says the gardener. And most importantly, it leads to harmonious coexistence with the environment”. He worked on the farm for more than 15 years, most of that time as a grafting specialist.

In a country where 80 percent of the land is desert and only 8.8 percent is forested (as of 2021), the government is making serious efforts to expand forest and garden areas, which has multiple benefits - stabilizing shifting sands, fighting against the degradation of desert pastures and improving the well-being of people living in the sands.

According to the Decrees of the President of Turkmenistan, at least 3 million seedlings of coniferous, deciduous and fruit trees are planted in the country annually. Currently, with the assistance of CACILM-2 project, work on updating the Forestry Code of Turkmenistan is completed.

After the CACILM-2 project came to the village and helped create a nursery for growing drought- and salt-resistant plants, Alybai was rightfully appointed as a responsible specialist, and his entire large family - five children, as well as sisters, brothers and nephews - began working on the responsible site, receiving a stable income. Initially, the plantings occupied one hectare, but the hard-working family expanded the nursery territory twice. In the midst of seasonal work, the tireless gardener attracts fellow villagers to work.

Currently, the nursery grows more than 1,500 fruit trees, including 3 varieties of apricot trees, 2 varieties of plum and quince, 3 varieties of pears and apples, as well as cherries, sweet cherries and grapes.

More than 100 thousand seedlings of fruit trees of more than 10 species and five species of seedlings of ornamental trees (more than 20 thousand) grow between the rows.

In 2024, some of these seedlings will be distributed among rural residents or sold at nearby markets.

In addition, this year the family received a large harvest of melons and watermelons, as well as vegetables: tomatoes, cucumbers, peppers, greens, eggplants and other types.

The tireless gardener does not stop there. Alybai eke has plans – further expansion of the nursery, purchase of the necessary agricultural equipment for cultivating the soil between rows, harvesting and other labor-intensive work.

He also plans to continue training young gardeners. To do this, the extended family will build a shelter and furnish it so that participants can take important notes, participate in discussions, and complete tasks from an experienced gardener on the spot.

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"Our aksakals and elders say that if you put your soul into your work, then even a desert can be turned into a beautiful garden", - says Kakabay Baysahedov, a resident of the village of Bokurdak.

Kakabay has lived in the heart of the Karakum Desert for almost seventy years. He does not have a college degree, but he can rightfully be proud of the fact that throughout his life he has tried and succeeded in mastering the ancient practical knowledge and experience of survival in the desert.

This knowledge was always shared with Kakabay by the "gumly" - people born and living their entire lives in the desert - shepherds, teachers of local schools, farm managers, masters of building sardobas and wells in the desert, and many others whose lives are spent in the sands.

He has a large family, five children. One of the daughters is already married and works at the weather station in Bokurdak.

"I was lucky enough to gain even more knowledge when the CACILM project came to our sands", - says Kakabay.

With the support of project experts, we created a nursery for growing various species of desert plants, such as black and white saxaul, cherkez and kandym. The goal was to increase the productivity of desert pastures, as well as to help strengthen shifting and man-made sands.

Over four years, the nursery has grown more than ninety thousand seedlings of valuable plants and collected 304 kilograms of elite seeds. And thanks to the knowledge and experience received from experienced FAO specialists, the survival rate of the seedlings was from 75 to 85 percent.

With the help of these seedlings, the sand dunes around the villages of the Central Karakum are strengthened, and the areas of local schools are landscaped.

Thanks to this relatively small nursery, people managed to restore more than 70 hectares of desert pastures, and the experience of this work showed that in this way it is possible to restore sand massifs to their original productivity. At the same time, the productivity of these territories will be maintained from 15 to 20 years and in general the productivity increases from 3 to 8.5 centners per hectare.

“In the village of Bokurdak, where about five thousand people live, thanks to painstaking work on planting desert plants and tireless care of seedlings, we managed to prevent the sand from encroaching on buildings and roads, - says Kakabay. It will take a little more time, and the territory of productive pastures around the village will also expand”.

“I am happy with my job, - says our hero. It has allowed me to meet very interesting people: scientists, specialists, teachers, shepherds, local leaders and just good people”.

“And the main thing that I received as a result of meetings with them and conversations over a bowl of green tea is a huge amount of knowledge and practical experience that can be used in the fight against desertification and drought in the Central Karakums”.

“As our aksakals and elders taught me, if you put your soul into your work, then even in the desert you can create a beautiful garden!”.


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“For some reason, everyone thinks that laser equipment is easy to operate”, - says Khursant Masharipov from the Garamazy village of the Akdepe etrap of Dashoguz Province. «And to successfully work with modern technology, you need persistence and very deep knowledge».

Khursant Masharipov has big plans for the future. He has set a goal to open his own technology park, where several modern tractors and trailer mechanisms, including a laser leveler, will perform various agricultural work that meets all the needs of farmers. All services will be provided on credit and paid for only after the harvest.

Khursant was born in the village of Garamazy and has lived here all his life. Everyone in his family works in agriculture. His father drove a caterpillar tractor until his retirement, and his mother still works as a tenant in the fields of the Andalyp daikhan association, a brother and two sisters - everyone found work on the farm.

“During school holidays, - recalls Khursant, my father would take me to the fields with him. I would wake up at five in the morning, go to the tractor and often fall asleep in the cabin, waiting for my father”.

While they were working in the field, his father told the boy a lot about the machinery, each of its components and mechanisms. Therefore, by the age of 16, Khursant knew every screw in the tractor and could independently repair any complex mechanism. Since childhood, he could not imagine any other profession except a tractor driver.

According to him, technology is his vocation and element. Therefore, after finishing school,

the young man entered a specialized vocational school in Akdepe district and received the profession of a mechanic.

For more than 10 years, Khursant has been flawlessly performing the duties of a tractor driver-mechanic, which is why the maintenance and operation of the laser leveler purchased in early spring 2024 in the framework of the CACILM-2 project were assigned to young mechanic.

Thanks to modern equipment, operated by an experienced and well-trained machine operator within the framework of the project, laser leveling of irrigated lands was carried out on an area of more than 200 hectares in the pilot area of the Andalyp village, and more than 60 hectares were also processed in neighboring areas.

Thanks to this, the yield of vegetable crops increased by 50 percent in 2024. The yield growth for all other agricultural crops on the farm was 60 percent, and the cotton yield increased by 100 percent.

On the lands processed with the laser planner, the saving of irrigation water amounted to 35 to 40 percent. Previously, it was possible to water 6 hectares of agricultural land per day, now 10 are being watered. At the same time, not only the time for irrigation has been halved, but there is also a significant saving of labor and energy. The area of saline soils has decreased by 5 percent in a short period, in 2025 a decrease of 15-20 percent is expected due to the fact that water does not stagnate on uneven areas and salt is not carried to the soil surface.

And as an indicator of the high efficiency of laser leveling technology, five farms are already planning to purchase laser levelers for their farms in the near future.

Khursant has his own family, two children, his wife works as a tenant of the Andalyp farm. The family rents 2 hectares, where wheat, cotton, potatoes, carrots, onions and legumes grow.

And Khursant, like his father, takes his son to the fields with him during the holidays. And he also teaches him the skills of a machine operator. “When I take my son to work, I worry a little about him, because it is still heavy equipment, - says Khursant . However, I remember my childhood and calm down, because thanks to the care of the state, now we work on qualitatively different equipment, which is very different from what was in my childhood. Now the tractor has a sealed cabin that protects from dust and noise, air conditioning and a heating system. And I am calm for my son. My son is proud that I drive such a big tractor and calls my tractor an airplane. I hope that when he grows up, he will become the same machine operator, maybe even better”.

But Khursant is teaching not only his son, 9 young machine operators have already mastered the basics of the latest technology. One of his students, Dovlet Ashirov became a shiftworker and knows laser technology no worse than the teacher.

“For some reason, everyone thinks that operating the equipment is easy, that you attach a laser scraper to a tractor and it will do everything itself, - says Khursant. “But this is not true. To work effectively, you need to know the technology of topographic surveying, prepare a field map in advance and designate a tractor movement pattern. With this knowledge, with little tractor movement, you can achieve ideal soil planning and evenness, without spoiling the soil or disrupting its structure. Plus, we must save fuel and time.”

Khursant closely cooperates with CACILM-2 experts, consults with the slightest changes in the indications of laser equipment, and consults on issues of optimal and effective use of laser equipment in the fields. In addition, he also consults with interested private machine operators and farmers who are planning to purchase laser leveler for their farms.

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International center for agricultural research in drylands (ICARDA)

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