Food and Agriculture Organization of the United Nations

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# **Transforming Challenges into Opportunities:** Field Success Stories on Drought Resilience and Sustainable Land Management in Central Asia and Türkiye

## CACILM-2

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# Foreword

Integrated and sustainable natural resources management in climate change conditions is crucial for food security, improving rural livelihoods and protecting the environment.

Between 2018 and 2025, FAO-GEF “Integrated natural resources management in drought-prone and salt-affected agricultural production landscapes in Central Asia and Türkiye” (CACILM2) has worked tirelessly supporting rural communities across Central Asian and Republic of Türkiye to introduce both innovative and sustainable agricultural practices.

As a result, thousands of rural farmers, including women, have significantly increased their productivity, become economically independent and resilient to climate change.

This collection of success stories highlights the results of our partnership. The true heroes of these stories are rural women and men who enthusiastically take advantage of the knowledge gained from the project, implement advanced agricultural technologies and generously share their experiences with others. Their efforts are now inspiring broader communities and contributing significantly to environmental sustainability and improved livelihoods.

We express our sincere gratitude to our international, national and local partners, whose unwavering support and collaboration were crucial to our shared achievements. Our deep appreciation also extends to the Global Environment Facility for its continued commitment and financial support, which made possible the success stories presented.

We hope these inspiring stories will encourage greater investment in sustainable agriculture and natural resource management, benefiting current and future generations in Central Asia and beyond.

**Ekrem Yazici**

Secretary of the FAO European Commission on Forestry

Lead Technical Officer of FAO-GEF CACILM2 project

# Introduction

The FAO-GEF project "Integrated natural resources management in drought-prone and salt- affected agricultural landscapes of Central Asia and Türkiye", launched in 2018 under the regional Central Asian Countries Initiative for Sustainable Land Management (CACILM2) was formulated with a clear vision – to empower rural communities in Central Asia and Turkey to sustainably manage land, water and biological resources, increase agricultural productivity and resilience to the challenges of climate change.

Over seven years, the project has adapted and widely replicated successful practices and innovations that resulted in significant changes in people's livelihoods and environmental awareness.

Key to the project's success were Farmer Field Schools and specialized trainings, where thousands farmers, including women, acquired practical skills in sustainable farming, conservation' and climate-smart agriculture and efficient water management.

The project contributed to the introduction and adaptation of drought-tolerant crops and advanced technologies, significantly increasing farmers' yields and incomes while preserving natural resources.

In this publication, you will meet amazing people from Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan and Türkiye whose stories represent shining examples of resilience, determination and the transformative power of knowledge and innovation.

These short stories vividly demonstrate the positive changes that can occur in the lives of villagers and the environment if people, armed with knowledge, are empowered to practice sustainable and efficient agricultural practices.

The experiences presented here reflect the collective efforts of local communities, FAO and GEF specialists and national partners. Together, we have laid a solid foundation for sustainable rural development and environmental stewardship in Central Asia and Türkiye.

May these stories serve as inspiration and guidance for further development of sustainable agriculture and environmental management across the region.

**Bakyt Ainebekova, candidate of agricultural sciences**
Kazakhstan



# Kazakhstan

## **“There are several ways to grow a garden: the best is to entrust it to a professional gardener”**, by Bakyt Ainebekova, candidate of agricultural sciences

“As a child, my dream was to become a lawyer, she says. I thought I would grow up and protect people. But it turned out that I was protecting our land! Heredity probably played a role here: my parents worked as agronomists all their lives. And I followed in their footsteps. I work as the head of the forage production department at the Kazakh Research Institute of Animal Husbandry and Forage Production. And I understand very well that it is impossible to engage in agriculture if you do not love your business and the land on which you work.

For me, careful and efficient use of natural resources is not just a global and very important issue. We are all responsible for what we leave behind. The practical application of technologies that do not destroy the environment, the production of organic food, a careful and competent attitude to chemicals in agriculture should become the norm. The Earth must be protected, otherwise it will be very difficult for future generations to live.

For me and for our department, where mostly employed women, participating in the CACILM-2 project is, first of all, a great responsibility and an opportunity for growth. The project is in its first year, but a lot has already been done.

Professionals should work on the land, because it is no wonder that they say: there are several ways to grow gardens, the best of which is to entrust this work to a gardener. And when we held “Field Days”, farmers participated in them with pleasure, because they studied, learned new things, communicated, gave practical advice to each other. Everyone needs this so much!

We are currently studying 10 genotypes of drought-resistant crops. Mogar, sorghum, triticale, and wheatgrass are of great interest to livestock farmers. Everything new attracts us, for example, we have never grown African millet before, but now, thanks to FAO experts, we have learned that this crop can be successfully grown in our region.

I have a large family: sisters and brothers, nephews, who rejoice at my successes and always support me in difficult situations. But we do not see each other as often as we would like, as from early spring to late autumn I am in the field, because every day counts for an agronomist. My loved ones understand that the work requires complete dedication. We have big tasks ahead and we are ready to fulfill them.”


**Dina Genzhegarayeva, farmer**
Kazakhstan



## **“A man without a dream is like a bird with-out wings”**, says Dina Genzhegarayeva, successful farmer together with her husband

“I’m sixty. When I was young, I graduated from the Polytechnic Institute, but it so happened that I work on the ground. And I don’t even think about a well-deserved rest! My husband and I started growing vegetables. We became real farmers. I say this with pride.

It’s no secret that farmers’ work is difficult, not easy. The earth requires special attention, great love, painstaking care in any weather. It is hot outside – we are on the ground, it rains – we work, because the crops that we have planted cannot wait. But how happy the heart is when people thank us for the fresh and top-quality products that we supply!

We really want to grow vegetables without chemical fertilizers. Organic tomatoes, cucumbers, potatoes, onions are the future we are striving for. But this is impossible without knowledge. Therefore, we are very grateful to the FAO project whose specialists help us learn about latest technologies and modern farming practices. This is so important to succeed!

The project consultants told us about a new crop of sorghum. It turns out that this is an amazing crop that can give good harvests. In addition, it is resilient to cold weather, and in our changeable climate this is important. My husband and I decided to plant sorghum. We shouldn’t be afraid to experiment!

We also learned a lot when we started sharing experiences with other farmers. Field day has become a vital necessity for us.

Recently, I have been reading books on self-development, psy-chology and I learned from them: where you put your energy – there you will expect prosperity. And we direct all our energy to work!

My husband and I raised six children. Unfortunately, our family lost one son. And we survived largely thanks to the work! There are a lot of things to do – you need to have time to cook food, help children with their studies, and take care of many household chores. But everything can be done, you only need a great desire.

A man without a dream is like a bird without wings. Our dream now is to support our children, see them marry. I also dream of traveling. My husband and I would like to see the world, new places. But the main thing for us is to live in our home country in peace and prosperity.”


**Professor Laura Tokhetova is a plant breeder renowned in Kazakhstan and beyond.**
Kazakhstan



# The woman changing the world

**Professor Laura Tokhetova is a plant breeder renowned in Kazakhstan and beyond. Her work is of singular importance and has helped change the world. Indeed, food security and the development of any country depends largely on the success of plant breeders.**

In academia, plant breeders are evaluated largely on the basis of the volume of their published scientific articles, rather than the number and varieties of plant varieties they develop and introduce.

Professor Laura Tokhetova is the author of over 200 scientific papers as well as three catalogues of Kazakhstan's genetic resources. She has a 4 Hirsch index in the Scopus database and has published eight articles in high-rated international journals, which have received positive reviews from leading scientists in her field. However, her greatest satisfaction comes from seeing new varieties created by her own efforts growing in the fields of her native Kazakhstan.

As an Associate Professor of the Department of Agrarian Technologies at Korkyt Ata Kyzylorda University (NJSC), Professor Laura Tokhetova has developed 18 varieties of barley and wheat over more than 20 years. She has also holds nine patents for breeding and two for inventions.

Her journey towards Agricultural Science was not a direct or immediate one. In 1992, 18-year-old Laura graduated with honours from Kyzylorda Medical School and entered the Faculty of Natural Sciences at NJSC, choosing to study Chemistry and Biology. In 1996, she graduated with honours, and over the following two years worked as a teacher. Then she met the mentors who were to accompany her on what would become her life's work. This necessitated a return to academia.

"In order to work in my field I had to complete a postgraduate course of study in Almaty", she explains. "But my husband supported the move, even though we had a small child."

Laura Tokhetova completed the postgraduate training programme with excellent marks and upon returning home planned to combine scientific research with teaching. However, she was unable to find employment as a teacher and decided to devoted herself entirely to academic research, focusing on barley, wheat and oats.

For many years, the Kyzylorda region had specialized in rice cultivation, but the result was a shortage of water resources. The young researcher wanted to change this system by developing crops that could be introduced into crop rotation on a par with traditional rice, while affording a similar income to farmers. Laura Tokhetova appealed to the Research Institute of Rice Cultivation, who listened carefully and then accepted her proposal to diversify crop rotation.

"I was adamant about the need to create new varieties based on local selection", she explains. "Kyzylorda has its own climatic features, so you need to adapt to the dictates of the land." Colleagues from Almaty helped Tokhetova to initiate the practical work and supported her ideas. She then applied for funding and received support from the Ministry of Agriculture.

**Professor Laura Tokhetova has developed 18 varieties of barley and wheat over more than 20 years.**
Kazakhstan

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"The team included employees from the Research institute (i.e. laboratory assistants), for whom this work on diversification was entirely new. Consequently, there was a steep learning curve, and much effort was needed to coordinate our efforts", recalled Laura Tokhetova. "Today, we generate ten varieties of locally bred barley and one variety of wheat, all of which have been patented. At present, we are introducing them into farms. Any such operation has its pitfalls, but whoever said that starting from scratch is easy?" When Laura Tokhetova took part in academic conferences, unlike her colleagues who returned home with gifts and souvenirs, she returned with sacks containing samples of new varieties for her husband to carry.

Today, it is fair to say that Professor Laura Tokhetova has achieved a real breakthrough in the breeding of barley. The development of a new crop variety takes a long time – sometimes at least 12-15 years. Long-term experiments carried out by Laura Tokhetova to develop two new varieties of spring barley, Syr Aruy and Inkar, bred specifically for the region's saline soils, have recently come to an end.

"It was a very difficult job because there has been a reduction in the protein content of the grain in saline soils", she explains. "A distinctive feature of new varieties is early maturity; their growing season lasts no more than 75 days, which is 5-10 days shorter than that of others. The height of the plant is 65 cm; in other varieties it is no higher than 50 cm. Our barley tolerates late spring frosts well – and is drought tolerant. It is also very important that it has a high yield, and the protein content is 14 percent higher than that of other varieties. When there is a shortage of irrigation water, it sprouts quickly, matures and makes room early for tillage for subsequent crops."

The author of these new varieties is convinced the barley is a unique crop indispensable for feeding poultry and calves, and makes an excellent concentrated feed. Fodder production therefore serves as a link between crop and livestock production. However, developing a new variety is endless work. There is no such thing as an ideal variety. New varieties are required to increase overall adaptivity, crop sustainability and stabilization of gross harvests. Intuition is of great importance here, because breeders have to predict decades ahead; they need to understand what will happen to the crop down through the years

Laura Tokhetova worked for 20 years for the Rice Research Institute. Today, she teaches students at the university, while maintaining projects at the Rice Research Institute. She also collaborates with FAO which has given her the opportunity to communicate with experts from Japan and Turkey, and gain new knowledge.

Professor Laura Tokhetova has received many awards, including a scholarship granted by the Kyzylorda region, a government letter of recognition awarded by the Ministry of Agriculture, and a medal "80 years to Kazakh Research Institute of Agriculture and Crop Production." She has also received a departmental badge froma the Ministry of Agriculture and is a recipient of the State award of the Republic of Kazakhstan "For Distinguished Labour".

Looking towards the future, her youngest son Sanzhar is also interested in breeding grain crops. Recently, he took part in the city's Olympiad competition, winning first prize for his research project. Sanzhar independently sets up laboratory experiments, understands the underlying principles and actively participates in the preparation of breeding material. He dreams of becoming a geneticist, and continuing the work that has made his mother famous.

**Almas Tasbatyrov, farmer**
Kazakhstan



## **“Without modern knowledge in the agricultural sector, you will not achieve success”,** says Almas Tasbatyrov, farmer from Kazakhstan

Like in all countries in Central Asia, climate change has diminished the productivity of farmland and pasture in Kazakhstan, where Almas Tasbytyrov runs a cattle breeding farm on 500 hectares near Almaty.

The young farmer rents the land, which is a mix of pasture for grazing and arable land where he grows fodder crops for his animals. Almas started his agribusiness after university, where he studied economics of agronomy to be well prepared.

“I studied for five years and constantly use the knowledge I gained on my farm,” he says.

But while this knowledge has served him well over the years, changing climate conditions and population pressures require farmers like Almas to learn new skills to adapt in ways that protect the environment and their business.

In the last half century, the population of Central Asia has tripled, which is putting significant pressure on water resources and food security. Climate change, meanwhile, is adding pressure by increasing droughts and desertification and causing soils to retain more salt.

Irrigation water for fields and pastures is often short in Almas’ part of Kazakhstan, which means less food for his animals.

Always eager to find solutions, Almas connected with FAO and the Global Environmental Facility to learn more about plants that do not require much water and can grow even in salt-affected soil, while still producing plenty of fodder for his cows.

After fist attending an educational field day, Almas in 2021 received five tons of seeds of various drought-resistant forage crops, including Sudanese grass, sugar sorghum, sainfoin, mogar, alfalfa, wheatgrass, oats and barley.

“Despite the fact that that year was extremely unfavorable both for pastures and for all agriculture, I managed to get very good results from new crops,” Almas recalls.

He also received advice in how to manage his pastures and fields, so they get used fully without negatively affecting local ecologies. This addresses the fact that lands in the region are not always managed well and sometimes overgrazed, which can lead to more soil degradation, poor water retention, and loss of biodiversity.

To Almas, managing his natural resources in a climate smart way is another tool in his toolbox. “Without modern knowledge in the agricultural sector, you will not achieve success,” he stresses.


**Aishagul Duganova, participant in the CACILM-2 training programme**
Kazakhstan



# 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.

**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.**
Kazakhstan



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.

**Satkyn is the only woman regulating the water distribution hub in the entire country.**
Kyrgyzstan



# Kyrgyzstan

## The only female water traffic controller in Kyrgyzstan

Approaching the water distribution hub at the Zhon-Aryk River in the Kochkor district of Naryn region of the Kyrgyz Republic, we expected to see a big, strong woman regulating the river water traffic; depending on the water level, she raises and lowers dampers weighing several tonnes. It was believed that significant strength is required to cope with such a structure.

It was a total surprise then when a seemingly fragile, short woman accompanied by her faithful dog, exited a modest, whitewashed house on the river bank to meet us.

Satkyn Ozubekova has lived here all her life. She is the only woman regulating the water distribution hub in the entire country.

**Despite the abundance of water resources (about 50.0 km3 per year), Kyrgyzstan periodically faces water shortages for agriculture, energy sectors and for drinking needs. Due to the irrational use and pollution of water resources, river ecosystems are degraded and there has been a decrease in the hydrobiological diversity of water bodies.**

Satkyn's father, Sabyr Ozybekov, participated in the construction of the Zhon-Aryk hub in 1978 and was a water distribution regulator for the rest of his life. He was nearly 90 when his daughter took over the role.

The rather complex and powerful structure divides the Zhon-Aryk River almost into two. Half of the water goes into the Orto-Tokoy reservoir, from where it feeds the Chuy River and enters the fertile Chuy valley; the other half goes to the fields of Kochkor farmers downstream, allotted through a special agreement.

**Until 1992, the monitoring system of the Hydrometeorological Service consisted of 148 river gauging stations with a further 7 at lakes and a reservoir, and 78 meteorological stations. Today, 78 (53 percent) gauging stations are in operation at rivers, with a further 5 at lakes and a reservoir. Of the 78 hydrological posts located at rivers, 8 (10 percent) require full restoration. The security facilities and equipment of 20 hydrometric posts (26 percent) require urgent work, and about 30 percent of service premises require full restoration.**

"This is not an easy job. It carries significant responsibility", says Matraim Zhusupov, National Project Manager for FAO/GEF CACILM-2 in Kyrgyzstan. "The proportions of the running water must be strictly observed. Try to open a damper that discharges water into the Orto-Tokoy reservoir by slightly more, and farmers downstream in Kochkor will be deprived of vital water supplies that constitute their 'life blood'.

**The rather complex and powerful structure divides the Zhon-Aryk River almost into two.**
Kyrgyzstan



In the arid climate of the Kochkor valley, which experiences constant winds – drylands – nothing will grow without irrigation, and this means that without water farms will suffer irreparable losses."

In addition to this important work, Satkyn also manages her farm. Her cows graze in the mountains during the summer season and come down to the Kochkor valley in winter.

Satkyn makes delicious cheese from cow's milk, and to prevent her cattle starving in winter, she has sowed 2 hectares with fodder crops. In addition to the field, she also owns a young apple orchard.

Therefore, the project decided to help her, and with the assistance of water specialists took on the task of providing irrigation water to the farm of the only female water traffic controller.

It is important to note that for the purpose of improving water resources management in the Kochkor region, the project is purchasing computer equipment, and a transition to digitalization of the activities of two Water Users Associations (WUAs) of the Kochkor regions takes place through development of special software. Based on information about farmers, the crops they cultivate and the area of cultivated land, the software will automatically generate an electronic database.

In addition to information on farmers and water users, this database will contain data on the required volumes of irrigation water, taking into account the mode of irrigation. It will also be possible to obtain information on payment and forms of contracts between the Water Users Association (WUA) and farmers, as well as data for the entire WUA, enabling users to become acquainted with the general plan of water consumption, the total area of actual irrigation, the total volume of water and the amount of payment to the district department of water resources.

All of this data will allow Satkyn to manage the water traffic of the Zhon-Aryk River more efficiently.

While we were talking with Satkyn by the river bank, her dog pricked up its ears, peering into the thickets on the opposite bank. We looked and saw the muzzle of a jackal in the dense underbrush.

"Aren't you scared to live here alone?" - we asked her. "No", she replied. "I have a faithful assistant." Satkyn patted her dog behind the ear. "As long as he is with me, they will not dare to come close. And if necessary, I can shoot into the air to scare the animals away."

**Strawberries in a sunken greenhouse**
Kyrgyzstan



# 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 amazing device was created in Karasuu rural area. 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. "The globalization is in place here," the farmer laughs. "The soil we use is from Russia, the water tanks were produced in Kyrgyzstan, while 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 two 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?" – was our next question. "In winter, Mother Earth will warm and keep 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.

**Remote water metering sensors were installed in Kochkor district.**
Kyrgyzstan



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 in agriculture aimed at rational natural resources usage

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.

**Urmat Omurbekov successfully cooperated with the CACILM project from its first phase.**
Kyrgyzstan



## "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.

"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." 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 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 country.

**Several projects, including CACILM-2, plan to create 10 artificial glaciers.**
Kyrgyzstan



# **“Artificial glaciers creation is one of the most effective approach to supply agriculture with water in climate change contest”,** by Abdimalik Yegemberdiyev, Director General of Kyrgyz Pasture Users Association

**The technology for creating artificial glaciers is not new - it is already used in some countries in Southeast Asia. However, so far it is only used for small highland settlements, while the maximum irrigation area from a single glacier is no more than 155 hectares. This technology is being introduced for the first time in our country and in Central Asia as a whole. In your opinion, how can these technologies be used in Kyrgyzstan to maximize their benefits to the population?**

Due to the lack of water for livestock, watering vegetation, and domestic needs, vast areas of summer pastures in Kyrgyzstan remain abandoned. Pasture users have to use more comfortable areas of nearby pastures for grazing and living, thereby increasing pressure on resources, and disrupting the rotation system necessary for effective and uniform grass regeneration.

Thus, a need emerged to regulate the water balance in remote pastures and to ensure conditions for seasonal rotation of pastures throughout the year. For this purpose, Kyrgyz Zhayity proposes to implement an innovative approach of creating artificial glaciers in remote, arid areas and in those areas of pastures that lack water for grazing livestock.

There are mountain springs and streams with varying volumes of water in the highland pastures, which tend to dry up in the spring and summer season. Therefore, engineers of the Pasture Users Association have developed an easy to implement and inexpensive, yet effective way to accumulate fresh water during the fall and winter.

We are talking about creating artificial glaciers, an engineering structure for transporting water from a natural source over a short distance for freezing in the fall and winter and further use in the spring and summer. This can be a salvation for settlements located far from natural reservoirs and riverbeds. It also represents an opportunity to create comfortable habitat for farm animals and pasture users, and one of the practical approaches to climate change adaptation and mitigation.

**Key advantages:**

1. Access to potable water

These devices will allow shepherds to use clean, fresh water for their domestic needs and for watering livestock. Consequently, more and more pasture users will be able live comfortably and let their livestock graze on remote pastures, thereby not disturbing the natural regeneration processes of the pastures close to the villages.

2. Irrigation of arid territory

This mountain water can be used to restore drought-prone and degraded pastures, improve their grass cover, and rehabilitate soil fertility.Creating

**Engineers of the Pasture Users Association have developed an easy to implement and inexpensive, yet effective way to accumulate fresh water during the fall and winter.**
Kyrgyzstan



opportunities for planting trees and other vegetation.

Water from the glacier melting under the rays of the sun during the spring and summer allows for other uses of these areas. For example, shrubs and trees that can be eaten by animals can be planted in these areas along with fruit and berry crops using the agroforestry system.

### 3. Conservation of biodiversity and microclimate of the territory

As experience shows, the number of animals and birds decreases in arid areas, so providing access to water can contribute to the gradual restoration of the natural balance of the territory, improving biodiversity and preserving the quality microclimate for animals.

### 4. Climate change adaptation

Artificial glaciers are one of the most cost-effective and uncomplicated approaches to mitigating climate change in mountain regions and are proven by the experience of other countries and several pilot projects on the territory of Kyrgyzstan. This method's advantage is its simple design, low cost of construction, possibility of creating glaciers in hardly accessible areas, and the fact that no special training is needed. The project can easily be implemented by the local community itself, under the coordination of the pasture users' association.

### 5. How many structures will be built as part of the CACILM-2 project and where will they be located?

Several projects, including CACILM-2, plan to create 10 artificial glaciers, tentatively one in each region of the country and an additional three in remote and arid territories. To date, such glaciers already operate in Naryn, Issyk-Kul, Chu and Osh oblasts, and the experience of these communities will be tapped to improve the technical characteristics of new glaciers.

### 6. How stable/reliable is the equipment that is already used in the construction?

This structure is stable and reliable, because the main principle of its creation was the participation of residents themselves, who undertook most of the field work, contributed to the construction, commissioning and maintenance of this structure.

To ensure the stability of the vertical pipe during spouting, this pipe is attached to a pre-installed vertical reinforced concrete post on a concrete base. To improve the stability, the main pressure pole of the fountain, if necessary, should be supported by wooden sloping beams on different sides. Branches of caragana (a thorny shrub that is inedible to animals, grows quickly in pastures and forms a barrier for animals) or any other branched shrub plant are placed around the original structure (and approximately every 50-60 cm of thickness at various stages of ice accumulation, if possible) to provide additional surfaces for icing.

In addition, to protect the structure from cattle or other possible damage, several rows of barbed wire can be placed around the glacier, which would also serve as a base for ice accumulation. Since the creation of the first glacier in the village of Zhergetal to the present day, the very principle of glacier building has not changed, but the climate and geographical features were accounted for, as well as various engineering additions and technical improvements proposed by the residents, engineers, and users of this structure.

### 7. Who will monitor the condition of the installations on the ground?

The National Association of Pasture Users Kyrgyz Jayity is the primary implementer responsible for the operation and protection of the created artificial glaciers, while locally the responsibility is assigned to pasture committees (members of the Kyrgyz Jayity Association).

### 8. What would be the amount of the project that the CACILM-2 could support?

The average cost per glacier ranges from USD 4,000 to USD 10,000, depending on the geographic and climatic features of the area, the amount of water supply and the number of vertical pipes for spouting, as well as the contribution of the local communities.

**“We were able to learn all farming secrets thanks to the FAO project.”**
Tajikistan



# Tajikistan

## **“We hold up well thanks to mutual assistance”,** say Latofat Aminova, a member of the farming group in Iftikhor jamoat, A. Jomi district

“I grew up in the village of Obi Oshik in a large family. We lived in harmony and always treated each other with respect and love. Parents worked the land, and in the childhood we had to help them. I dreamed of becoming a nurse to help people. Unfortunately, I had no opportunity to go to study, but I still turned out to help others.

Today, I am a mother of seven children, a homemaker. However, this is not the only achievement: five years ago, our big family organized the Latofati Ramazon farm on an area of 3 hectares of rainfed lands. If you manage them properly and use a scientific approach, you can get good harvests. In the first year, we grew mainly wheat, a little land was allotted for barley, chickpeas, melons and gourds. Ordinary seeds were not good – you need ones that would yield crops in an arid climate like ours.

We were able to learn all farming secrets thanks to the FAO project. Experts advised planting safflower and helped to get the seeds – it turns out that it can significantly improve soil quality. This is important in our area and we hope that we can get good harvests. Under the agreement, our farm will share seeds with other farmers. So gradually we will improve the condition of our main resource – the land.

At the seminars and trainings, which were held and continue to be held within the Project, we learned other farming secrets. Now I am sharing the knowledge I gained not only with the inhabitants of our village, but also with residents of neighboring villages. Today, many young women want to be engaged in agriculture and work the land. I give advice to everyone who turns to me for help. I believe that we all should help each other to live in the modern world. So my childhood dream to help others has come true! We not only help each other with advice, but also plant or harvest. It is much easier to work together!

We dream to have a kindergarten at the jamoat, so that young women can do farm work in their fields. We hope that this idea will come true.

In the future, I want to spread the field farming school methods in our community in order for us to become real professionals.”

**Hotam Sohibov, a resident of Obi oshik village**
Tajikistan



# Hotam Sohibov on how he achieved good results: **“Luck is a readiness to use your chance”**

Hotam Sohibov, a resident of Obi oshik village, Jomi district, Khatlon region, has been for many years working the land. As a child, he began helping his parents who worked on the collective farm land. In the mid-1980s, Hotam graduated from high school, served in the army, and when he returned home two years later, he did not think much about what to do: you have to do what you can do, what you feel is yours.

He began to work in the collective cotton fields and grew vegetables in his garden plot. However, when he started a family, Hotam realized that the amount of money he earned was not enough. Hotam has seven children, so to provide them he went to work as a gardener at a local school. However, this did not help either.

The years passed. In the nineties, following the example of many neighbors, Hotam rented land, began to grow wheat, chickpeas, flax, and immediately felt how difficult it was to be responsible for the whole process, especially with limited knowledge and experience. He moved forward despite difficulties. Hotam never complained and instead just worked harder.

The sons grew up, and two of them decided to follow in the footsteps of their father. Work became much easier this way, and three years ago, the family made a decision: to organize their own farm. However, even with their vast experience, it was not easy: the lands in their area are dry, depleted, saline, requiring a special approach and, most importantly, knowledge.

FAO came to the rescue. CACILM-2 experts gave professional advice on how to properly grow drought-tolerant crops on rainfed lands. Trainings, meetings, seminars became an important part of the life of rural farmers. The Sohibovs learned a lot in the field farm school: how to properly manage the land, what seeds to use, what are the features of growing crops adapted to drought, and much more. They also studied one more important thing – the method of crop analysis.

The help, however, was not limited to knowledge provision: within the framework of the Project, the Sokhibovs received safflower seeds, which they planted on an area of one hectare. The result exceeded all expectations: the harvest turned out to be great. According to the agreement, Hotam gave part of the seeds to two other farmers, his neighbors.

The villagers consider the Sohibov family to be lucky. “In fact, luck is a readiness to use your chance,” believes Hotam Sohibov. “Hard work and desire to learn definitely help us as well.”

The Project has significantly changed life in Obi oshik village. The knowledge gained has become, one might say, the key to new heights.

**Nurbi Niyazova, a farmer from Yakkatut village**
Tajikistan



## Nurbi Niyazova, a farmer from Yakkatut village (A. Jomi district) on her achievements: **“Hard work and patience are the weapons of the strong”**

“If in my youth someone told me that in the future I would be a professional farmer, I would be very surprised. In 1996, I entered the technical school No. 37 and received a certificate in Sewing. I thought that I would always do that.

However, life is unpredictable: soon it became clear that my husband and I needed to raise two children, and sewing was not as lucrative as we wanted it to be. For this reason, in 2005 I decided to take a chance and start a Nasimjon farm.

It was not easy at first, the unknown was frightening, but I knew that one should not be afraid of difficulties. After all, I grew up in a family where my parents have worked the land all their life and know that the main thing is work and patience.

First, I worked on 4.5 hectares of arable land. The first few years I planted only cotton, which brought a good income. However, the market situation suddenly changed: it became difficult to sell cotton. Nevertheless, 2017 turned out to be very successful: we got high yields and were able to sell it at profit, so we even decided to expand production. We bought three cows. My husband and sons helped me very much. We now have ten cows. A whole farm, one might say!

The years 2018 and 2019, however, were not easy: the cotton harvest decreased due to hot weather, and we could not cover our costs. Last year we changed our strategy: we planted two hectares with cotton and the rest of the area– wheat, safflower and vegetables.

In our region, the soils are highly saline, therefore it is necessary to use crop rotation, only high-quality seeds and mineral fertilizers. Thanks to the FAO project, we were able to obtain high-quality safflower seeds, and what is very important for us – valuable knowledge.

We organized a field farmer school and I attended all the seminars that FAO specialists conducted for us. We learned a lot about the technologies for growing crops that can grow on our saline soils, got acquainted with the features of composting, and knowledge on how to grow vegetables in our climate.

I also shared what I had learned over the years of farming with the neighbors. Today, mostly women work in the fields, and they do their work not worse than men. We can say that the farming school has become a second family for us: we solve the arising problems together, helping each other out, helping not only in the field, but also in household chores. Just imagine how harmonious and happy our country would be if every person, young or old, shared with others what he or she does best.

I can say for sure that the FAO project has made our life more full, brighter, richer – and not only in material terms. We are constantly learning, making decisions together, and my dream is to create an advisory center to support and train young farmers at the jamoat. This way, many more people could know what we know today. We have many plans, which, I believe, will all be achieved. ”

**Khuroson Kurbanova, head of the Gulbarg farm**
Tajikistan



## **“For some, work is a punishment while for me, it’s an honor”**, by Khuroson Kurbanova from Tajikistan

Khuroson Kurbanova was born in a large, very friendly and hardworking family in the Bokhtar district of the Khatlon re-gion. Every family member worked on the land, and since she was a child Khuroson was accustomed to taking care of the backyard, where greens and vegetables were grown.

The girl studied well at school and dreamed of being a dress-maker. But the dream had to be postponed, because her par-ents did not have the opportunity to educate Khuroson. The dream came true when Khuroson married and found herself in a similar large family, where she was very well received and always supported in everything, including in obtaining new knowledge.

She gave birth to three children and learned to sew, but the land would not let her go. Then, along with sewing, the girl also decided to create a farm. So, in 2014 in Istiklol Jamoat of Kushoniyon district a farm named “Gulbarg” came into exist-ence.

On three hectares in the arid zone, the farm tried to grow cotton and wheat, but hard work did not bring good harvests. There was a lack of knowledge, it was difficult to get suitable fertilizers and quality seeds.

This changed in 2019, when CACILM-2 came to the village and started educating villagers on how to work successfully on arid and saline soil. Khuroson not only became an active member of a group of 26 fellow villagers who face the same difficulties, but she was also unanimously elected as a leader of the group.

Things went better, the Gulbarg farm switched to safflower cultivation and received good harvests of this crop. A friendly group of villagers is actively involved in all trainings and practi-cal classes, and uses the knowledge and successful practices on the ground, including weed control, sound use of fertilizers. Villagers were happy to accept the project’s proposal to learn the basics of gender equality and leadership.

Now Khuroson looks to the future with confidence. “We were not only taught to grow new crops that do not deplete, but rather enrich the soil, we also learned the technologies of dry-ing apricots and we are going to apply them this summer”, says Khuroson Kurbanova, a tireless activist, hard worker and head of the Gulbarg farm.

**“We will grow seedlings of early vegetables and provide them for our fellow villagers”, says Bobonazar.**
Tajikistan



# When knowledge falls into the right hands
## - the success story of Bobonazar Ismoilov

Bobonazar was born, raised and has lived all his life in the Garav village of the Dahan Jamoat, Yavan District, Tajikistan. His parents were farmers who worked hard on the collective farm fields all their lives, and Bobonazar helped them after school ever since he was little.

The Ismoilov family has always been large and every pair of hands was appreciated. Naturally, parents wanted Bobonazar, the eldest child in the family, to continue his education after school graduation, but the young man did not want to leave his native village and continued to work on the land.

Now he has the largest family, he is the father of six children and still continues to work on the land. Now he is not only the head of the family, but also the head of the Shaikh Ismoil farm, where the family grows wheat, potatoes, chickpeas and other important agricultural crops on three hectares.

“We have a difficult piece of land”, says Bobonazar. We had a hard time without special knowledge. With the CACILM-2 specialists coming to our area, we have hope. Now there is a permanent farm school where we are taught a lot. How to get a good harvest on rainfed land, how to grow crops that are not afraid of saline and dry soil and much more”.

Now the farmer knows how to select the right seeds, analyze the harvest, prepare compost and control pests and weeds. In addition to the fact that Bobonazar himself replenishes his collection of knowledge, he shares it with all the workers in his farm and fellow villagers.

And the knowledge gained is already yielding results. For example, the Shaikh Ismoil household received the highest harvests of safflower and mung bean in the village. The farmer sold the crop and is now building a greenhouse on his farm. “We will grow seedlings of early vegetables and provide them for our fellow villagers”, says Bobonazar.

Thanks to cooperation with the project, in 2020 groups of active farmers in the Yavan region received free high-quality safflower seeds, a drought-resistant safflower of the zonal Shifo variety, bred by the Agricultural Research Institute of the Tajik Academy of Agricultural Sciences, and sowed the crop on an area of 75 hectares.. In the fall, farmers harvested and distributed the seeds of this highly efficient crop to other farmers for 2 hectares of crops each. As a result, in the spring of 2021, safflower will be sown in the Dahan Jamoat on an area of 225 hectares. Thus, the positive experience of the efficient use of natural resources is spreading to the arid territories of Tajikistan.

**Manzura Khodzhaeva, nurse and farmer**
Tajikistan



## **Making life better: Manzura Khodzhaeva, nurse and farmer** from the Rudaki village of the Vakhsh district

Notwithstanding her youth, Manzura Khodzhaeva enjoys well-deserved respect among her fellow villagers.

She was born into a large family, where everyone worked hard to ensure that there was always bread on the table. Therefore, even as a schoolgirl, Manzura helped her parents in the field along with other children. After finishing school, on the advice of her elders, Manzura entered a medical school, - her parents considered that the work of a nurse was worthy of respect, and a doctor in the family would never hurt.

While still a college student, the girl married a fellow villager, Jumanazar, whose family was even larger. And already working as a nurse in a rural outpatient clinic, she also had to work in the field with the rest of her husband's family.

At a family council, which brought together Manzura and Jumanazar and parents from both sides, a decision was taken to set up an "Abdullo" farm for the young couple.

At first, the couple grew cotton on 3 hectares and enjoyed a good harvest, which brought them an income. However, over time, the harvest declined and it became increasingly difficult to recoup the costs of such a labour-intensive crop. Together with her husband, Manzura reached a decision to transition from growing a single crop towards producing a variety of vegetables and legumes to meet demand. However, they lacked the necessary knowledge and experience.

The launch of the FAO/GEF Project "Integrated natural resource management in drought and salinization prone agricultural production landscapes of Central Asia and Turkey" proved timely for the Manzura family as well as many other households in her village.

**“I also want to share my knowledge with others so that their lives become better.”**
Tajikistan



Since the outset, Manzura had involved herself in the project, participating in all the seminars and training sessions, which explored ways to address vital issues of farming and how to take care of land, and discussed which crops bring the greatest income. Manzura also learned about gender equality and at one of the meetings was unanimously elected the leader of a women’s farming group, whose numbers included 26 rural women.

The wish of the owners of the farm “Abdullo” has finally been fulfilled, because for the third year now, the farm has been growing safflower, which is in great demand on the market, as well as a variety of vegetables and legumes. Manzura continues to work as a nurse in a rural outpatient clinic and works with her family on a farm.

As the leader of a women’s group, Manzura often gathers her fellow villagers in the field, teaching them how to achieve better harvests, how to care for different crops, and how to make women’s voices heard – both within the family and in the community. The FAO project supported Manzura’s group by providing safflower seeds for two hectares and mung bean seeds for three hectares.

Using the advice and recommendations of the project specialists in growing crops, each family from the young farmer’s group increased their income from the harvest by an average of 30%.

Now there is a permanent farmer field school in the village, where more and more farmers are coming, because people have seen what useful knowledge they can get here. The villagers began to help each other more, to solve social problems and tasks together.

“My goal is to become an even more successful farmer”, - says Manzura. “I also want to share my knowledge with others so that their lives become better”.

**Safarmukhamad Yusupov, an experienced gardener and master of his craft**
Tajikistan



**“Forty crafts are not enough for a worthy man,” the wise say.** This proverb is a motto for the hero of our story, Safarmukhamad Yusupov, an experienced gardener and master of his craft.

Safarmukhamad lives in Mushkrud village, Jomi district of Yakkatut jamoat in Tajikistan. As both his father and grandfather were gardeners, gardening has been an important part of Safarmukhamad’s life since his early childhood. He was the eldest child in the family, so he always helped his parents in the fields and in the garden.

In this area and throughout Central Asia, it has always been customary for children to help their parents in their households as much as they can as soon as they are old enough. No one interferes with schoolwork and homework, and there is free time for reading books and playing with other children, but no one refuses to help the adults, and the children know from an early age how difficult it is to grow food.

Growing a tree and looking after seedlings requires a lot of hard work, as well as a considerable knowledge and experience.

More knowledge and harder work are needed to get good harvests in arid and saline soils.

CACILM-2 has been running in Jomi district since 2019. The main goal of the project is to educate the community on practices in difficult climate conditions and introduce drought- and salinity-adapted crops that will allow the community to produce sustainable crops, increase farmers’ incomes, and improve their families’ livelihoods.

One of the project objectives was to establish a nursery to grow and distribute seedlings of crops adapted to drought and salinity in the pilot region and beyond. The nursery would test methods of seedling production and grafting best suited to local climatic conditions.

With his extensive horticultural experience, Safarmukhamad was the best person for the job, so he set up the nursery in his garden with the help of the project’s experts. Apricot,

**CACILM-2 has been running in Jomi district since 2019.**
Tajikistan

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peach and almond seedlings, resistant to drought and salinity, are so far growing on an area of 0.2 hectares.

Following FAO experts' advice and recommendations, the farmer planted the drought-tolerant seedlings at a certain depth and filled the planting holes with a 40/60 mixture of soil and sand. He also added compost to each hole so the plants will grow and thrive, and now he makes sure the soil in the holes doesn't dry out, otherwise the weak roots could dry out eventually causing the plants to die.

Safarmukhamad now has 5,100 seedlings in his nursery. Each seedling is like a child to him, and the farmer takes caring for each one as a nurturing process. When other interested farmers come to his nursery, he says "these are my nurslings."

He shows his fellow villagers how to plant trees correctly and how to take care of them in conditions of drought and salinity, so that each tree would give a good harvest soon. The doors to Safarmukhamad's farm are always open to farmers from Mushkrud and surrounding settlements.

In addition to the garden and nursery, the farmer also grows chickpeas, safflower and flax in his farm getting good harvests thanks to the advice and recommendations of the project specialists.

In the coming years, Safarmukhamad plans to significantly expand the nursery area to provide more grafted quality seedlings and to continue educating people on how to grow highly productive plants in very difficult climate conditions.

**“You have to love your land and work hard. I learned all of this through my participation in the Women’s Farmer Field School.”**
Tajikistan

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## **“To be successful in farming, you need to choose the right plant varieties and know how to take care of them”**, say Zainab Khudoynazarova

Zainab Khudoynazarova from Dusti village, Rudaki Jamoat, Vakhsh District, Tajikistan, is now one of the most enthusiastic members of the Women’s Farmer Field School, established in the village with the support of CACILM-2.

Zainab was born into the family of a botany teacher. Her father worked at school, and her mother was a housewife raising five children and taking care of the garden plot.

The girl was a diligent student, her favorite subject was botany, and she dreamed of graduating from college and following her father’s footsteps. But life had other plans.

The two older sisters and brother grew up and started their own families, while her mother fell ill and passed away. Zainab and her younger brother stayed with their father and began working on the family land. They grew vegetables, corn and legumes on 1.5 hectares.

Thus, over time, Zeinab became a botanist in practice. She worked hard and studied the properties of plants by herself trying to get rich harvests. But she lacked knowledge. So, one day the girl received an invitation to the training of the Women’s Farmer Field School established in the village in 2019. FAO agronomists were telling and showing women in practice how to properly care for plants, how to deal with pests and diseases, what methods of protection are better to use - biological or chemical. In addition, all participants were given booklets on plant care and protection to keep the knowledge handy.

Since then, Zeinab has been one of the most committed participants of the Women’s Field School and uses the knowledge acquired from the experts in practice. She has been convinced that if you take care of your crops properly, take timely steps to protect plants from pests and diseases, you can constantly get good yields in your field.

Some young women in the village cannot participate in trainings because they have no one to leave their young children with, so our heroine took up the task of mentoring her fellow villagers passing on the knowledge gained from FAO’s experienced agronomists.

“To be successful, you need to know how to choose the right seed varieties for our conditions and use the right cultivation techniques,” says Zainab.

“You have to love your land and work hard. I learned all of this through my participation in the Women’s Farmer Field School.”

In the future, Zainab plans to become a plant care consultant. This is how her childhood dream of becoming a botany teacher will come true. Only she will teach adults, not children, and not in class, but in practice, in the field. And this is much more exciting, because you can see both the results of your work and the efforts of your students.


**Gavkharoy Khasanova's products were displayed at an exhibition dedicated to the World Food Day in Dushanbe.**
Tajikistan



# Gavkharoy Khasanova, an active participant of the project in Tajikistan

Gavkharoy Khasanova's products were displayed at an exhibition dedicated to the World Food Day in Dushanbe. Many visitors showed interest in the clean and quality product - dried tomatoes, apples, and plums.

Gavkharoy Khasanova is 53 years old and lives with her family in the village of Dusti, Vakhsh District. The family has eight people - two daughters, three sons, a daughter-in-law, and two grandchildren. Gavkharoy raised all her children being a role model of honesty and diligence. Gavkharoy's hard-working and friendly family has a 0.40-hectare garden plot, where they grow tomatoes, eggplants, legumes, and corn. In addition, fruit trees grow in the yard.

The head of the family is an active member of the Farmer's Field School. From the first days of the project, Gavkharoy joined the group and began to attend meetings. Both young and old farmers are in the group, while women make up more than a half of the group. Like many women in the village, Gavkharoy manages her own household.

Using their own skills and knowledge gained in the field school, the family works the land and selects quality seeds for the homestead plot, applies agronomic rotation and fertilizes the soil with compost. As a result, harvests grow, ensuring the food security of the family.

Every year the family enjoyed an abundant harvest of apricots, cherries, and plums, and made juices and jam for the winter. Occasionally fruit was dried under trees and on the barn roof, but it would get stale and ugly.

When the project specialists conducted a training session in the village on drying fruit and vegetables, Gavkharoy asked many questions and shared her experience and problems. After the training, 13 active farmers obtained solar dryers and Gavkharoy was one of the beneficiaries of this grant.

Gavkharoy really loved the modern and user-friendly fruit dryer. FAO specialists explained that these dryers can be used to dry fruit and vegetables all year round. This made Gavkharoy and the other group members very happy, as they had also been drying vegetables, but the dried vegetables were ugly and unpalatable.

When the dryers were delivered to the villages, autumn had already come, and it was time to process the harvest. Using the knowledge gained from the training, the energetic lady-farmer set to work. Eventually, apples, plums, quinces, as well as tomatoes, eggplants, peppers, and even corn were ready for sale and consumption in a short time. The family received 650 somoni of income from the sale of dried tomatoes alone.

As the solar dryer is large (14/6), Gavkharoy's neighbors use it as well. The woman also taught her neighbors to use the dryer, and they are ready to buy this valuable device for their households.

**“A drop of water is a grain of gold!”, say Charymukhammet Redzhepov.**
Turkmenistan



# Turkmenistan

## “The reservoir [...] stores cool fresh water, and water in the desert means life!”

Charymukhammet Redzhepov is officially retired, but it hasn’t stopped him from teaching at his local secondary school in Bükri, a village in central Turkmenistan.

Living here makes him a gumly, a term reserved for people in the Karakum desert, “which literally means ‘sand dwellers’”, he explains.

Wedged between Iran to the south, Uzbekistan to the north, and the Caspian sea to the west, the Karakum desert covers nearly three quarters of Turkmenistan, and Bükri lies at the heart of it.

“Relatives visit us rarely,” says Charymukhammet. “Guests come even less often as our place is very hot. The sand can heat up to 70 degrees!”

But what’s worse than the lack of visitors is the the acute shortage of fresh water, he says.

While villages in the southern Karakum benefit from a large canal system, those who live further noth, like Charymukhammet, largely rely on wells and whatever rainfall they can catch in winter and spring.

“A drop of water is a grain of gold!” he says, repeating a well-used local saying. “All the village residents dreamed of having plenty of water for a long time.”

They’ve come closer to that dream thanks to a new sardoba in the school’s courtyard, a covered water reservoir that catches both rainwater runoff and dew from the air. Dateing back to Silk-road times, the dome-like structures with a hole in the ceiling protect against heat and evaporation while allowing air and water to flow in.

“The reservoir volume is only 60 m3 but it seems huge to us as it stores cool fresh water,” he says. “And water in the desert means life!”

The sardoba now covers most of the school’s day-to-day water needs. Additionally, it allows them to plant more plants around the school that protect against the hot, drying winds.

His student now garden the village too,” he says, making their environmental education more practical.

“We explain to the students how much proteting the environment and desert plants means for the life of people in the desert,” he says.

“Schoolchildren are now rushing to biology lessons because they know they’ll be engaged in useful activities - planting trees and watering them from the sardoba.”

Charymukhammet’s school benefited from a water project implemented by FAO and the Global Environment Facility.

**Alybai eke from Bagban village**
Turkmenistan



## **“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. “Do you think I had any 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


**“Gardening is the path to harmonious coexistence with nature!”**
Turkmenistan



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.

**Dovran Iskenderov, water technician of the Daihan association Andalyp**
Turkmenistan



## **“The equipment should be operated correctly and maintained effectively, 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.

**Dovran and his colleagues plan to build 15 water-regulating structures.**
Turkmenistan

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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.

**Kakabay Baysahedov, a resident of the village of Bokurdak**
Turkmenistan



## **“Our aksakals and elders say 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!”.

**Khursant Masharipov from the Garamazy village of the Akdepe etrap of Dashoguz Province**
Turkmenistan



**“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 the 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.

**The yield of vegetable crops increased by 50 percent in 2024.**
Turkmenistan



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.


**Sultan Veysov, CACILM-2 consultant**
Turkmenistan



## **“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 keeping 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 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

**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.**
Turkmenistan



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.

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.

**Central Asia is a region with high risk and vulnerability to drought.**
Türkiye



# Türkiye

## It is impossible to stop climate change, but it is possible and necessary to combat drought

Drought has no boundaries and cannot be avoided or stopped, but with the accelerated introduction of modern and rapidly developing technologies in arid countries, this phenomenon can be predicted and farmers can be supported to prepare for this disaster.

Only with knowledge, well-designed sectoral policies and the right response approaches can the consequences of this phenomenon be mitigated and colossal losses avoided, - this is how the world's leading experts in this field speak about drought.

Central Asia is a region with high risk and vulnerability to drought, and therefore a threat to food security. It is evidenced that more than 70% of the damage this phenomenon causes to the agricultural sector.

At the same time, 58% of the population lives in rural areas of Central Asia region, and agriculture accounts for 10 to 38% of GDP and 18 to 65% of employment.

Therefore, experts, specialists and representatives of government agencies of Central Asian countries responsible for the implementation of the provisions of the UN Convention to Combat Desertification gathered in Istanbul (Türkiye) for an international practical seminar "Planning Integrated Drought Management in Central Asia".

"The ominous nature of droughts and their far-reaching consequences require careful planning that takes into account the multifaceted nature of this natural phenomenon, caused primarily by climate change, - Maher Salman, a senior FAO water and land officer, said at the seminar. "These plans must reflect a paradigm shift towards practical steps to actively manage risks, allowing adaptation to ever-changing environmental conditions", - he said.

Between 2000 and 2016, economic losses from droughts in Central Asia exceeded US$2 billion. According to the Intergovernmental group of experts, climate change is already increasing the frequency, intensity, and duration of droughts, which seriously impacts the development of many economic sectors, including food production and energy generation.

"Research by world-renowned scientists shows that the price of inaction in this area in the near future will be 10 times higher than the price of action today, that is, one dollar invested today in landscape

**“We must act urgently and collectively to reduce risks and strengthen the resilience of our communities and countries to drought”.**
Türkiye

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restoration and drought risk management programs will save 10 dollars in the future”, - said Makhmud Shaumarov, Regional Coordinator of the CACILM-2 project.

To ensure the resilience of agricultural sectors and reduce the risks of severe drought impacts, countries need to step up agricultural practices that improve water use efficiency, maintain soil moisture, shift to drought- and salinity-tolerant crops, and protect ecosystems.

Adequate financing, including through attracting foreign investment, as well as the provision of human and technical resources to implement drought management plans and ensure their sustainability, are essential.

“We must act urgently and collectively to reduce risks and strengthen the resilience of our communities and countries to drought, - said Viorel Gutu, FAO Assistant Director-General. “An integrated approach – science, early warning technologies, preparedness, mitigation, response and recovery – is needed to ensure sustainable food security for people in the region”, - he said.

The discussion was actively attended by representatives of government agencies responsible for natural resource management and technical experts from Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Turkey and Uzbekistan, as well as international experts on drought, combating desertification and rational use of natural resources from FAO, the UN Committee to Combat Desertification, the European Union and other international and regional organizations.

The knowledge and practical skills gained during the event will be used in the development of national drought management plans and will contribute to the implementation of the UN Convention to Combat Desertification.


**Study tour of the project team**
Turkmenistan



# **Study tour of the project team and key partners of the project in the provinces of Ankara, Konya and Mersin**, July 2023

The agricultural sector in Türkiye is well developed. The country is a world leader in the production of a wide variety of products - figs, tobacco, lemons, lentils, pistachios, hazelnuts.

According to the World Bank 2021 data, the value added of the agricultural sector increased from $ 27.5 billion in 2000 to $ 48.9 billion in 2019. And although the employment rate in agriculture has been declining (from 39.3% in 2000 to 18.4% in 2019), labor productivity in the sector has increased over the same period from $ 7,200 to $ 16,900.

The country has made serious efforts to overcome the threats of drought and deforestation and has accumulated vast experience in the rational use of natural resources. Türkiye also invests in FAO programmes to develop the agricultural sectors of Central Asian countries and is one of the participating countries of the CACILM-2 project and an active member of its Executive Committee.

This is why a study tour to Türkiye was planned for representatives of government partner institutions in Kazakhstan, Turkmenistan and Uzbekistan and key CACILM-2 staff.

The busy week-long visit to the country began with a visit to the FAO Subregional Office for Central Asia and a meeting with the head of the office and FAO Representative in Türkiye, Viorel Gutu. Then a meeting was held at the Ministry of Environment, Urbanization and Climate Change of Türkiye, where the heads of the General Directorate of Combating Desertification and Erosion, the General Directorate of Agricultural Research and Policy, the General Directorate of Forestry, the Central Research Institute of Soil, Fertilizer and Water Resources presented to the guests an overview and results of the activities of their departments in the field of combating desertification and rational management of natural resources.

Over the course of seven days, the project team and key partners visited greenhouses and nurseries where plants are grown for afforestation of desert areas and dune stabilization, an agricultural equipment manufacturing plant, agricultural packaging workshops, and a national food quality testing laboratory. Field visits included the afforestation strip around the Altınapa Reservoir located in the Selçuklu district of Konya Province. The surface area of the lake is 2.20 km² at full capacity. Afforestation work began here in 1990 and has now reached an area of 9,900 hectares. In addition to the main species, Lebanese cedar and pine cone, oak, acacia, rose hip and juniper are used in the afforestation process.

The group also visited the site of the “model Hacıalan”. This area is specially created for training technical personnel


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to demonstrate various erosion control methods. Forestry engineers from various regional forestry departments come here to learn about the most effective methods for erosion control.

As noted by the participants of the study tour, the program of the trip was extremely useful due to a number of aspects:

- Information on the structure and activities of the General Directorate to Combat Desertification and Erosion, as well as Türkiye's experience in sustainable land management, was a very timely example in anticipation of the reorganization of subordinate organizations of the Ministry of Agriculture of Kazakhstan that carry out soil research (soil, geobotanical, agrochemical, monitoring of irrigated lands, etc.). This will also help other Central Asian countries that are looking for more effective approaches in the field of control over the use of natural resources
- Türkiye's experience in achieving land degradation neutrality within the UNCCD framework, as well as the system and platforms used for monitoring and decision-making, can also be applied in practice by relevant government agencies in all Central Asian countries
- The use of agroforestry to combat desertification and soil erosion was very indicative
- Participants expressed interest in project financing mechanisms
- The activities carried out by the Turkish government to restore degraded lands inspired the participants of the tour and will also be proposed to the government, at least by developing incentive mechanisms to restore soil fertility
- The Forestry Committee of Kazakhstan shows great interest in gaining Türkiye's experience in matters of afforestation and extinguishing forest fires

"The trip was very useful for us, - noted Muhammadjon Kosimov, national project manager in Uzbekistan. "The scientific approach to propagation of seedlings should be especially noted. For example, out of 151 species of eucalyptus brought from Australia for introduction to Turkey, only 2 species passed the tests in the soil and climatic conditions of Türkiye. And they are now being disseminated in the country".

**34 greenhouse were donated to low-income households in the Bukhara and Kashkadarya regions.**
Uzbekistan



# Uzbekistan

## “My family is happy. Thanks to the project, we have a lucrative business and can count on extra profits.”

In rural areas where life is slow and uneventful, the pandemic has caught many by surprise. A resident of the Kamashinsky district of the Kashkadarya region of Uzbekistan, Muzaffar Zhovkiev is accustomed to painstaking, often hard work. But when the pandemic struck and the government imposed lockdown restrictions, the company where he was employed in construction suspended some activities indefinitely, and he lost his job.

The sudden change caused Muzaffar’s confidence in the future to waver. He had three children, the two youngest ones still very small, and he would soon struggle to support the family. Outside, life had also changed dramatically. Schools were closed, and new requirements to stay at home, while essential to stop the spread of COVID-19, meant a loss of income and limited access to food.

As an enterprising person and not used to giving in to difficulties, Muzaffar understood that making ends meet was now possible only if the agricultural capacity of his personal plot was fully utilized. Indeed, the social subsidies to which his household was entitled would only cover emergency needs. He had already worked as an agricultural seasonal worker and cultivated his own garden. Now, he would have to draw on these skills to ensure a stable source of food for his family.

Muzaffar was informed he had been selected as one of the beneficiaries of a GEF/FAO project that supported rural people in response to the global crisis triggered by the COVID-19 pandemic. Shortly thereafter, specialists came to their home and installed a new spacious greenhouse on their plot.

The children observed with interest the new, unusual house stretching out into the backyard. Muzaffar was already making far-reaching plans, preparing for sowing, cleaning the soil, applying fertilizers and choosing seedlings. There was a lot of work ahead, but now he had renewed confidence and the opportunity to gain a good, stable income.

His wife shared his enthusiasm. She had previous experience with greenhouse farming, having helping her family to take care of plants, and control humidity, temperature, plant health and soil condition. Now she was happy to have the opportunity to apply her knowledge and skills in practice. Together, she and

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her husband devised a plan of action and then put it into practice.

Currently, the family grows tomatoes, dill, spinach, coriander, radishes and green onions. The family gathered their first harvest in mid-March and sold the produce successfully on the local market. Greens in particular occupy a special place in the national cuisine of Uzbekistan and are always in demand. It is impossible to imagine a traditional Uzbek table without them.

Muzaffar elaborated: "For the produce we sell on the market we receive about 100 000 soums (about USD 9.5) a day. My family is happy, and thanks to the FAO project we are engaged in a profitable business and can count on additional income for the household – which is very important in this difficult time. Moreover, we can provide food for our family. At the moment we are growing tomatoes, and hope for a good harvest."

The eldest daughter also helps her parents by performing housework. She is fond of sewing and dreams of becoming a seamstress and producing traditional embroidery. Thanks to their new income, the family has the means to support her plans, buying her a sewing machine, fabric and all the other essentials needed for this activity.

The greenhouse given to the family was one of 34 donated in January this year to low-income households in the Bukhara and Kashkadarya regions of Uzbekistan, and installed in homestead plots under the FAO/GEF project.

This assistance provided to rural people is part of the socio-economic response to the global crisis caused by the COVID-19 pandemic. Beneficiaries were identified in agreement with local authorities based on a list of people in need of social protection known as the "iron notebook".

**Khushvakt Khusinova and her family live in the Bukhara district of the Bukhara region.** Uzbekistan



# Greenhouse provides a stable income in times of crisis

Khushvakt Khusinova and her family live in the Bukhara district of the Bukhara region. She and her husband have five children. In rural areas, sources of income are limited – a situation that was exacerbated by the recent lockdown restrictions.

Khushvakt's husband, Sanzhar Rakhimov, often travelled to the Russian Federation for work, but the new restrictions removed this option, and the family found itself in difficulty. Khushvakt used to work in a textile mill, but in recent years had supported her family by raising the children and working as a housewife. The unstable income of the spouse, who now worked as a seasonal worker, teach local children the craft according to the principle "ustoz-shogird" (teacher-student), did not allow cover all the family's needs.

This is how the family ended up in the "iron notebook" – a list of those who were unemployed during lockdown and in need of social protection – and subsequently became a beneficiary of the project. As part of the project, 34 rural residents of the Bukhara and Kashkadarya regions in the "iron notebook" each received a greenhouse free of charge. This assistance formed part of the socio-economic response to the global crisis caused by the COVID-19 pandemic.

As Khushvakt explains, "We were very happy when they came to install a large spacious greenhouse – they said it would serve as a new source of income for us all year round. I had no previous experience in greenhouse management, but I noticed that the construction was of a very high quality, the structure is reliable and the material is durable. We were told that it retains cold well and is resistant to precipitation, moisture and temperature changes. Then it was up to us to get as much benefit as possible from the new greenhouse."

In 2020, during the lockdown period, FAO donated 31 water pumps, 10 motor-cultivators, 30 000 seedlings (tomato, cucumber, aubergine, peppers) and 10 750 kg of mineral fertilizers to rural households facing challenges in the Bukhara district of the Bukhara region and the Kamashin district of the Kashkadarya region. The project continues to provide assistance to rural people and contributes to ensuring food security.

The ongoing crisis clearly shows that food security is a critical factor in ensuring proper living standards for the population; it is also key to the viability of the economy and the public system of each country. FAO's assistance increases the resilience of rural people to external shocks, and

**“The stable income from the greenhouse has solved many problems.”**
Uzbekistan

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with this support, their own efforts and drive to succeed enable them to achieve more.

As hardworking people, Khushvakt and her husband set to work. According to the recommendations of FAO experts, the first step was to plant greens (i.e. spinach, coriander, dill). As newcomers to the greenhouse industry, they turned to more experienced neighbours and contacts, and learned from practice. When the first harvest ripened, they quickly and profitably sold the produce in the market. At first, this provided just a small albeit tangible contribution to the household budget; however, things began to improve. They planted the second batch: cucumbers, tomatoes and green onions. The profits from the sale increased, and fresh vegetables, grown with their own hands, have also been incorporated into their diet.

“The stable income from the greenhouse has solved many problems”, says Khushvakt. “We have gained confidence in our future. Our daughters will also need money to continue their education. The eldest is preparing to enter university and will take her entrance examinations this year. She dreams of becoming a doctor”.

Meanwhile, in a neighbouring settlement in Bukhara district, another crop is being harvested in another greenhouse provided by the project. Its owner, Feruza Ergasheva, talks enthusiastically about the work underway.

“Our first harvest was back in the middle of March”, she explains. “By selling the greens grown in the greenhouse, we made about 5 million soums (USD 470). This was a significant help to our household. In September, we hope to grow more greens and bell peppers.” Feruza continues: “What’s most important is the existence of a stable source of income. Every square foot of our land is priceless, and we work for our own welfare”.

The family has faced plenty of challenges. Due to health problems, Feruza’s husband was categorized as having a first degree disability. Previously a worker at a cotton mill, Feruza had to leave her work to look after her husband. Of their three sons, the two eldest work in other countries, and the youngest is studying at the Bukhara branch of the Tashkent Institute of Irrigation and Agricultural Mechanization. In short, there was no one else to look after the household.

This situation was compounded by the restrictions imposed during the coronavirus pandemic. The family was therefore very happy to receive the greenhouse. Having mastered the practicalities of greenhouse farming after acquiring the necessary knowledge and skills, Feruza now plans to maximize the profit and grow fresh vegetables all year round. The difficulties Feruza has had to overcome have strengthened her resilience. She is optimistic, and her diligence leaves no doubt about the success of her plans.

Overall, the development of the greenhouse farming industry, and the associated expansion in the range of available vegetable products, has contributed to growth in the domestic production of vegetables. This trend helps to meet the needs of the population for high-quality products all year round. For many in these challenging times, greenhouses have become the optimal solution for earning an income. In this way, FAO and its partner organizations are working to ensure that difficulties and life situations such as those outlined above do not represent an obstacle to the well-being of rural people.

**Zhamshid Zhumakulov, owner of the Bakhtiyor farm**
Uzbekistan



## **“If old methods of agro-technique fail, we need to open ourselves to new knowledge and adopt advanced agro-practices,”** says Zhamshid Zhumakulov, owner of the Bakhtiyor farm, Kamashi district, Kashkadarya province.

Three years ago, Zhamshid switched to no-tillage technology sowing the drought-resistant wheat variety ‘Kairok Tosh’ following the recommendation of the project specialists. The seeds were placed in the soil in such a way that the plants would obtain moisture in the deep layers. Throughout the growing season, the farmer had been watching the plants develop, and by the harvesting time, he was amazed to find that instead of the standard 400 kg of wheat per hectare, he had harvested a ton of wheat despite the lack of rainfall.

In addition to wheat, Zhamshid cultivates drought-resistant crops such as barley, millet, and safflower. The key success factor, according to the farmer, was the transition to no-tillage technologies.

Moreover, to take advantage of fall and winter precipitation, the farmer practices early sowing of crops and applies mulching, which helps to retain moisture in the soil and create optimal conditions for growth.

Smart technologies allow for precise depth and density of sowing, which ensures even plant growth. It also leads to more efficient consumption of resources and prevents soil erosion and compaction.

The transition to a new till technology was not easy. First of all, the established view of cultivation methods had to be disrupted. Meetings with CACILM-2 project specialists and trainings were helpful.

Zhamshid’s neighboring farmers face the same difficulties because the transition to a new system of working with soil is never easy. However, Zhamshid willingly shares his knowledge with his neighbors and shows them in practice what has to be done to get more sustainable harvests.

“We have always had droughts in Kashkadarya, especially in Kamashi,” says the farmer. “But now the climate is changing very quickly, so we, farmers, need to adapt just as quickly.”

The farmer started sowing with the new technology from an area of four hectares. In 2022, he expanded the area to 25 hectares, half of which he sowed with the seeds received from the project. The remaining 12 hectares were sown with his own seeds and the harvest from them sold, and he had to build his skills in dealing with buyers effectively. As a result, farming has become profitable with minimal land cultivation costs.


**The fields of Zhamshid and his neighbors have become a hub of learning and inspiration for many farmers.**
Uzbekistan

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The farmer estimated that the old tillage technology required impressive costs - UZS 500,000 per hectare, while zero tillage costs were UZS 50,000 per hectare, which is 10 times less (at 2021 prices).

In 2023, yields of Kamashi farmers doubled, and the crop area under the new technology is growing year after year.

The fields of Zhamshid and his neighbors have become a hub of learning and inspiration for many farmers who follow him and apply new technologies to their fields.

In 2022, the farmers united and formed the production cooperative 'Sara Urug Yangi Xayot'. Several female farm owners became active participants in the cooperative. With the assistance of the CACILM-2 project, the cooperative decided to purchase a seed sorting machine this year, and the tireless ladies plan to use it to produce oil from safflower, chickpea, and flax seeds.

"Before the project came to our area, I had never heard of plant varieties that are not afraid of drought and salt in the soil. Now, year after year, we are expanding the area of land cultivated with a technology that is effective for our climate zone and sowing plants that, despite the lack of rainfall, give good yields and bring us sustainable income," says Zhamshid.

Farmers plan to purchase special equipment for their cooperative for deep seeding and expansion of the new tillage technology to 500 hectares.

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# **Transforming Challenges into Opportunities:** Field Success Stories on Drought Resilience and Sustainable Land Management in Central Asia and Türkiye

## CACILM-2

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