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DIALOGUE

FAO/GEF Project

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

In this issue:

Central Asian experts discuss the use of conservation approaches and technologies

A webinar on the use of WOCAT (the World Overview of Conservation Approaches and Technologies) tools and methods gathered relevant Central Asian experts from five countries on the World Day to Combat Desertification and Drought.

Every day during ten days, more than eighty experts participated in a 2,5-hour training, which was conducted in real time, connecting Latin America, Western Europe and Central Asia.

The webinar aimed to build experts' capacity to use effective sustainable land management tools and methodologies.

Collecting and processing data with the help of Geographic Information Systems (GIS), as well as using modern *Watershed* and *Trends.Earth* tools, experts could develop skills of mapping land management, land degradation and land sustainable management, as well as evaluating the driving forces, the state of the soil and the impact of various factors on it both in the selected area and beyond (within the landscape, water catchment or region).

The gained skills will help experts in all Central Asian countries to make informed decisions related to public and private investment in agriculture in the face of climate change.

The training was held by Hanspeter Liniger, Cesar Garcia and Ingrid Teich, international experts from the World Overview of Conservation Approaches and Technologies (WOCAT).

WOCAT is a global network that has developed standardized tools for documenting, monitoring, evaluating, and sharing know-how on sustainable land management, as well as for disseminating this know-how around the globe.

Scaling up Integrated Natural Resource Management (*INRM*) in drought- and salinization-prone agricultural production systems of Central Asia and Turkey to improve land conditions and mitigate climate change is being achieved by multi-country cooperation, integrating best practices of *INRM* into policy, legal and institutional mechanisms to increase countries' interest in climate-smart agricultural practices and their scale-up.

The World Day to Combat Desertification and Drought is celebrated every year on June 17 to promote public awareness of international efforts to combat desertification. The day is a unique moment to remind everyone that land degradation neutrality is achievable through problem-solving, strong community involvement and co-operation at all levels. It is even more relevant these times, considering the **COVID-19** situation. Strengthening the resilience of our food and water systems can help reduce the effects of the pandemic on global poverty and food insecurity. Today, the motto ***"healthy land = healthy people"*** promoted by the Convention to Combat Desertification, is more true than ever.

To effectively manage soil, one needs to have information about it

A series of webinars on soil salinity mapping, as well as restoring soil fertility were held in Central Asia.

Nearly 60 percent of Central Asia's population depends on agriculture for food and income, with soil fertility being a guarantee for food security and well-being for the entire population of the region.

Meanwhile, 40 to 60 percent of irrigated land in Central Asia is subject to salinization or waterlogging, with the most affected soils located in Turkmenistan (68% of the total area), Uzbekistan (51%); Kazakhstan and Turkey also experience this problem.

Saline soils in Kazakhstan are roughly estimated to take up more than 110 million hectares, or 41% of the entire territory. Kyzylorda region alone, which suffers from the consequences of the Aral Sea drying, has more than 73 thousand hectares of irrigated land exposed to severe salinization.

Most of irrigated land in Central Asia need to be significantly improved, therefore, the use of modern approaches to agricultural production and the return of reclassified agricultural lands back to agricultural production are among priorities on the agenda.

CACILM-2 project in Central Asia has been holding interactive trainings on soil salinity mapping and innovative approaches and biotechnologies to restore soil fertility.

"In order to effectively manage soil, one needs to have information about it," emphasized Konstantin Vyatkin, International Soil Information Consultant, FAO Global Soil Partnership, who conducted one of the trainings for Central Asian experts from Rome.

The new training format and ways to disseminate successful experience attracts not only project partners from metropolitan research institutes and private centers, ministries and subordinate institutions, but also partners on the ground in all countries of the region who are interested in the latest technologies.

"During these interactive workshops, soil scientists mastered modern methods of modeling and mapping various soil properties, in particular salinity, while the practitioners received an impetus to use successful agricultural practices to restore the fertility of saline soils in Central Asia," said Makhmud Shaumarov, Regional Project Coordinator.

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Digital technologies to benefit agriculture

Central Asian experts obtain new knowledge without leaving home

New challenges call for new solutions and innovations.
COVID-19 has led to global social isolation and restricted international movement.

Meanwhile, the FAO / GEF CACILM-2 project continues its activities.

Its objectives, including the dissemination and scaling of the most effective integrated natural resource management technologies and approaches, coincide with the national priorities of the participating countries.

It is widely known that the UN Food and Agriculture Organization (FAO) is an organization that provides deepest knowledge in all agricultural sectors.

Those who work in agriculture understand that it is impossible to achieve success without knowledge, technologies and the latest tools, including digital ones.

This is especially true now when climate change is undermining the productivity of agricultural lands and pastures in all Central Asian countries.

Pastures are at risk of desertification due to rising temperatures and declining rainfall, which directly affects livestock productivity. Another challenge is that pastures, which account for 77 to 95 percent of all agricultural land in the region, are not properly managed and are therefore subject to degradation. More than 88 percent of arable land in Kyrgyzstan and 97 percent of agricultural land in Tajikistan are prone to erosion. In Kazakhstan, 66 percent of arable land was affected, while in Turkmenistan and Uzbekistan this figure reaches 80 percent.

In addition, global changes in agriculture and land use are responsible for about a third of all greenhouse gas (GHG) emissions. There are, therefore, significant opportunities for GHG mitigation by changing the way we use and manage our soil.

“Agriculture is the only economic sector that is both a source of the problem and a way to solve it,” say global climate change experts.

That is why, for the first time during the period of Project implementation, almost 100 scientists, land use and climate change experts, researchers, representatives of state agencies and the non-governmental sector, universities and associations from Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan participated in the training organized under the Project.

Held by professor Eleanor Milne (Colorado State University, USA), the training aimed to help the participants master Carbon Benefits Project (CBP) Tool to calculate greenhouse gas emissions in agriculture.

Soil carbon is critical to soil health, fertility and ecosystem services, including food production. However, deforestation, soil degradation and poor agricultural practices result in soil carbon losses and GHG emissions.

Welcoming the online training participants, Makhmud Shaumarov, Regional Project Coordinator, said: “Approved by the Global Environment Facility and the United Nations Framework Convention on Climate Change, the tool allows making accurate calculations of greenhouse gas emissions in agriculture”. The tool can give critical accurate data on the dynamics of the CO2 balance thus allowing Central Asian countries to evaluate, monitor and take the necessary measures to reduce its emissions in the near future.

“Accurate data on greenhouse gas emissions play a key role in effective decision-making in agriculture, including public investment in the sustainable management of land, water, biological and forest resources. Therefore, we consider the Carbon Benefits Project to be an essential, affordable and useful tool,” he stressed.

Calculating GHG emissions from agriculture, forestry and land use has always been a very complex, costly and time-consuming task. Therefore, Colorado State University has developed online tools to help professionals do this.

The Carbon Benefits Project model uses comprehensive data and approaches developed by the Intergovernmental Panel on Climate Change (IPCC), which summarized and analyzed global research on how land management affects climate change. It studied all the international experience accumulated and developed programs, making it possible to estimate greenhouse gas emissions online and free of charge.

Estimations can be made based on global digital maps and available data. The tools are flexible enough to make them affordable for any particular country, region, landscape, or even an individual farm.

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Pasture shortage in Kazakhstan despite ranking fifth in the world in terms of pasture quantity and ranking first in terms of stocking ratio.

An interview with Nurlan Tlevlesov, Acting Director General of the Kazakh Scientific Research Institute of Animal Husbandry and Forage Production

- In June 2020, the Oversight Committee of the Nur Otan Party held the meeting to discuss the issue of efficient pasture resource use in the country and why, given the sufficiency of pasture lands, one of the pressing problems in many country’s regions is the lack of pastures. In your opinion, what is the main cause?

Despite the fact that Kazakhstan ranks fifth in the world in terms of pasture quantity and takes the first place in terms of stocking ratio, we still face this problem.

Of the available 187 million hectares of pasture lands, today in Kazakhstan only about 82 million hectares of pastures are used, of which 61 million hectares are agricultural land and 20 million hectares are lands near settlements.

However, only half of the total livestock in the country graze on specially designated agricultural lands whereas the rest (45-50%) graze on pastures near settlements. In addition, the country is characterized by uneven distribution of pastures in rural settlements.

In contrast to the central and northern regions, the southern regions face acute shortage of pasture land, due to the high density of the rural population and, accordingly, the number of livestock, especially in private farmsteads. Therefore, it is these lands that suffer most from overgrazing.

Until now, the country has taken a number of legal, socio-economic, institutional and technical measures to address the issue. In 2017, Kazakhstan adopted the law "On Pastures", which established the procedure for the pasture use.

One of the main changes brought by the law is that each rural district now should develop its own pasture management plan, taking into account local climatic conditions and established cattle grazing practices.

However, still only certain pastures are used and there is no clear system for that, which not only leads to pasture degradation, but in general negatively affects the development of animal husbandry in the country.

There are still a number of other unresolved issues, including insufficient interdepartmental coordination on pasture management, poorly developed infrastructure (roads, bridges, livestock paths, watering points) and the need for investment to restore it, as well as a shortage of qualified personnel. All these hold back the development of sustainable pastoralism in the country.

- In your view, what solutions to pasture shortage can the Institute offer under the agreement with FAO?

Under the agreement with the FAO/GEF CACILM-2 project, the Institute is working to identify degraded pasture areas and restore them. This will allow using these areas for grazing in future. The Institute will present practical approaches to rehabilitating degraded pastures to all interested parties throughout the country.
In addition, as part of the agreement, the Institute will compile pasture degradation maps (of selected demonstration plots) that can be used by farmers.

- The agreement with FAO was signed in early 2020. What has been done since then?

Despite the introduction of a state of emergency caused by the COVID-19 coronavirus pandemic during the time of spring field work, the Institute staff implemented all planned activities on time. It prepared all project sites for sowing, sowed fodder and pasture crops, and is carrying out all necessary agrotechnical activities.

In the spring, degraded areas of 10 hectares in the selected farms of two regions (Almaty and East Kazakhstan regions) were planted with wheatgrass and elm saplings.

The Institute collected cartographic information and on the basis of analyzed satellite images carried out a spring geobotanical research study of pastures to identify foci of degradation for their subsequent radical improvement.

- What innovations does the Institute introduce to meet the objectives set under the agreement?

To irrigate plots for seed production of forage crops, we use a modern cost-effective irrigation system OSMIS (Italy), which was purchased with the support of the Ministry of Agriculture of the Republic of Kazakhstan

We are also introducing soil and resource conservation technologies of zero tillage (No-till) using direct drill seeders.

To examine pasture lands, identify and localize degraded areas, we use modern unmanned aerial vehicles (drones), as well as digital and GIS technologies.

-Recently, the group of Institute's staff, responsible for the implementation of objectives set under the agreement, went to the pilot sites. What did they see there and did the state of the crops meet their expectations?

At the pilot sites in Karasai and Zhambyl districts in Almaty region, we had made all preparations to hold the field seminar for farmers. We had planned to invite farmers and local authorities. Due to the epidemiological situation, unfortunately, the seminars were postponed to a later date. A small group of the Institute's staff, however, was still able to go to the field.

The inspection showed that all fodder crops (sorghum, millet, Sudan grass, moxtail millet, triticale, sainfoin, etc.) are in good condition in accordance with the development stages. Pearl millet, which is uncommon for our region, is developing well as well.

With regard to the site under zero till technologies, here the development of plants is slightly delayed. In our opinion, this is mainly due to the peculiarity of this technology (in particular, the fact that it takes 5-7 years to reach its full potential), and the weather conditions of this year: sharp drops in daytime (28-35° C) and nighttime (12 -15 ° C) temperatures. However, we hope that the influence of these negative factors will decrease, which will have a positive effect on further growth and development.

- In general, how do you evaluate the cooperation of the Institute with FAO?

Since our mission is to provide scientific support for the effective development of livestock and forage industries in Kazakhstan, for us, the signing of the agreement with the CACILM-2 project was very important and timely.

Within the agreement, we have identified many problems, relevant not only for Kazakhstan, but also for the entire Central Asian region, taking into account the increasing climate aridity and the need to adapt to its change.

One of the objectives identified is the introduction of soil conservation and resource-saving technologies, which are becoming increasingly used all over the world, since they contribute to the restoration and preservation of soil fertility, reduce production costs and minimize risks, especially in dry years.

We are highly interested in the introduction and production of drought- and salt-tolerant crops, including the introduction of crops unconventional for our region. Since the Institute aims to develop animal husbandry throughout the country, coarse and juicy feed, as well as green forage chains for stall dairy and meat cattle are of particular interest to us.

One of the important tasks under the agreement is to improve pasture management, including to identify and localize degraded pastures lands, improve and restore them, as well as support seed production systems for drought-tolerant forages.

Another area of mutual interest is work with farmers, transfer of knowledge, scientific approaches and new technologies.

We hope to have fruitful, mutually beneficial and long-term cooperation with the FAO / GEF project.

Field Days in Almaty region

On September 15 and 17, 2020 the Kazakh Scientific Research Institute of Animal Husbandry and Forage Production organized field workshops (Field Days) at the pilot sites of Ontustik agropark, Koldi village, Almaty region, and Zengibaba LLP, Kapshagai town.

The workshops aimed to disseminate knowledge about resource-saving technologies, production and distribution of adapted varieties of drought- and salt-tolerant fodder and pasture crops, methods for improving degraded pastures by sowing drought-tolerant crops and technologies for creating pilot demonstration sylvopastoral systems.

The participants were able exchange views, knowledge and experience, identifying the urgent issues experienced by the livestock industry in Kazakhstan in the face of climate change, increased droughts, pasture degradation, and ways to solve these problems.

In 2020, the Kazakh Scientific Research Institute of Animal Husbandry and Forage Production and the FAO / GEF CACILM-2 project signed an agreement on joint activities to introduce, produce and distribute drought-tolerant crops, improve pasture management, introduce resource-saving technologies, and support seed production systems and local propagation of improved varieties of forage and pasture crops in Kazakhstan.

The workshop was attended by representatives of farms, peasant farms and government authorities of Almaty region, Institute's staff in charge, Regional Project Coordinator Makhmud Shaumarov, representatives of the International Maize and Wheat Improvement Center (CIMMYT) and others.

"New reality, new living and working conditions put forward new requirements, - said Talgat Karymsakov, Deputy General Director for Science of the Institute at the workshop opening.
"We need to get out of our comfort zone, change, look for new approaches and solutions, and act together," he added.

The workshop was held under written permission of the Department for Quality Control and Safety of Goods and Services of Almaty Region under the Committee for Quality Control and Safety of Goods and Services of the Ministry of Health of the Republic of Kazakhstan. The participants were wearing masks and keeping social distance.

FAO international training webinar on sustainable management of pasture resources in Kazakhstan

Sustainable pasture management in Kazakhstan, including the basics of animal husbandry and forage production in dry conditions, the introduction of field school approaches for livestock farmers, and many other aspects were discussed during FAO's recent virtual training "Sustainable management of pasture resource in Kazakhstan" held on October 2, 2020.

"In Kazakhstan, the issue of rational pasture management is quite acute," stated Marat Uzbayev, department head of the Land Management Committee under the Ministry of Agriculture.

"We are particularly concerned about the degradation of pastures around villages; therefore, we are very happy that FAO in Kazakhstan is paying attention to this problem and taking steps to resolve it."

Held within the framework of FAO/GEF Project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey" (CACILM-2), the webinar gathered international participants to discuss current issues on the conservation and restoration of Central Asia's most valuable natural resource – pastures.

"Pastures are a very valuable resource, both in terms of biodiversity conservation and mitigation of climate change risks and the well-being of the population," said Makhmud Shaumarov, CACILM-2 Regional Project Coordinator. "Therefore, FAO/GEF project pays great attention to training, as well as the introduction of effective approaches and agricultural technologies for the conservation and restoration of pastures in Central Asia."

Pastures make up more than 186 million hectares, or 84.1 percent of all farmland in Kazakhstan, putting the country in fifth place in the world in terms of pasture area. However, over the past hundred years, 48 million hectares of land have been degraded in the country, including pasture land.

Two factors hinder the sustainable pasture management: excessive pressure and trampling affect fields around settlements and grazing areas, while more remote pastures are inaccessible due to the lack of water sources and infrastructure (roads, bridges, housing, communications, and many more).

To effectively tackle the issue, it is also necessary to improve the legislative and institutional framework in the field of land resources and improve knowledge in the field of sustainable pasture management.

Pasture degradation has serious consequences: low livestock productivity and increased rural poverty, which in turn makes villagers more vulnerable to external stresses, such as climate change. In addition, abandoned remote pastures become overgrown with aggressive weeds with low quality nutrient content for animals, which also negatively affects biodiversity.

"The need for effective pasture management in Kazakhstan is inextricably linked to the development of family farming, which is especially relevant in the context of the UN Decade of Family Farming 2019–2028," said Kairat Nazhmidenov, FAO Representative in Kazakhstan, in his welcoming words to the participants. "By efficiently managing pastureland resources, we also contribute to the achievement of the Sustainable Development Goals."

The webinar brought together more than 80 agricultural experts from all Central Asian countries, as well as from Australia, Armenia, Azerbaijan, Germany, Georgia, Italy, Mongolia and Turkey. The training sessions were held by Dr. Eran Raizman, FAO Senior Livestock and Veterinary Officer, Jurien Dreyer, FAO Consultant for Farmers' Field Schools and Feed Production, Prof. Christina Toderic, FAO Consultant for Salinity and Drought Management, and Almasbek Sadyrbaev, Chairman of the Board of the National Association of Sheep Breeders

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Time to sum up results

For farmers, autumn is high time to sum up the results, analyze what has been done, what needs to be changed, what has to go and where additional efforts are needed.

Agriculture in general is the area where one should not rush: before introducing any new crops and approaches, scientists have to test them on the ground, pilot sites, for a whole crop year (and sometimes several years).

Since the beginning of 2020, the FAO/GEF Project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey" (CACILM-2) has been working closely with the National Agrarian Science and Educational Center (NASEC) and other leading scientific and public organizations in the field of agriculture: Kazakh Scientific Research Institute of Animal Husbandry and Forage Production, Kazakh Research Institute of Soil Science and Agricultural Chemistry named after U.Uspanov, Kazakh Scientific Research Institute of Rice Growing named after I. Zhakhaev, the Union of field crop growers of Kazakhstan and others.

The partnership aims to implement, test and disseminate knowledge about high-yielding crops, practices and methods of sustainable management of land, water and forest resources, as well as ensure efficient agricultural production, including animal feed under the conditions of climate change, drought and salinity.

To develop scientific approaches, test new crops and advanced agricultural technologies in five regions of Kazakhstan, with the support of the Ministry of Agriculture of the Republic of Kazakhstan, the Project selected pilot sites and started to introduce salt and drought-tolerant crops, resource-saving technologies, reclaim saline soils, as well as produce pasture and fodder crops, restore and ensure sustainable management of pasture resources.

In order to sum up the results, at present, all FAO/GEF Project partners in Kazakhstan, are conducting field (offsite) seminars in the pilot sites in order to demonstrate to farmers the most successful practices and approaches of efficient farming and pasture management. The seminars are held with all sanitary requirements complied.

On September 14, 2020 in Kyzylorda region, the Kazakh Research Institute of Soil Science and Agricultural Chemistry named after U.Uspanov held a field seminar on innovative technologies for growing rice on saline soils, and on September 29, 2020, the same Institute organized a field seminar on innovative technologies for growing corn on saline soils of Kyzylorda region.

On September 15-17, 2020, in Almaty region, the Kazakh Scientific Research Institute of Animal Husbandry and Forage Production held field days on the introduction, production and distribution of drought-tolerant crops and resource-saving farming practices. On October 2, 2020, the same Institute held a visiting seminar on the seed production of drought- and salt-tolerant crops in Almaty region, and today–a field seminar on evidence-based approaches to the restoration of degraded pastures in East Kazakhstan region.

On September 18-19, 2020, National Agrarian Science and Educational Center (NASEC), together with the Kazakh Scientific Research Institute of Rice Growing named after I. Zhakhaev, held field seminars on approaches and technologies used for the restoration of saline and degraded irrigated soils of Kyzylorda region.

"The FAO/GEF Regional Project supports such field events as they play a very important role in disseminating practical knowledge and effective methods of sustainable natural resource management," said Makhmud Shaumarov, Regional Project Coordinator. They allow demonstrating sustainable agricultural technologies for growing drought- and salt-tolerant crops, ways to restore degraded and saline irrigated soils and pastures, as well as discuss the results of the work carried out during the year with local farmers, representatives of akimats (local administration) and agro-producers."

Demonstration activities to improve the practice of combating salinization and rehabilitating degraded irrigated lands in Kyzylorda region

On September 18-19, 2020, within the framework of the FAO/GEF Project “Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey” (CACILM-2), the Kazakh Scientific Research Institute of Rice Growing named after I. Zhakhaev in partnership with the Food and Agriculture Organization of the United Nations (FAO) and National Agrarian Science and Educational Center (NASEC) organized the Field Days.

The Project held demonstration activities to improve the practices of combating salinization and rehabilitating degraded irrigated lands at the pilot sites in Kyzylorda region. Innovative technologies were introduced at three demonstration plots with a total area of 15 hectares: Er Ali farm, in Makpalkol village of Zhalagash district, ZhanaZhol LLP in Dur Ongar village of Karmakshi district and the research and production site of the Kazakh Scientific Research Institute of Rice Growing named after I. Zhakhaev in the village of Karauyltobe.

The events aimed to inform farmers, scientists, researchers and decision-makers about effective agricultural practices, as well as to widely disseminate practices and technologies for the restoration of highly and moderately saline lands in the farms of Kyzylorda region.

Field Days were attended by representatives of the Department of Agriculture of Kyzylorda region, the Department of Agriculture of Kyzylorda city, heads and specialists of rice farms.

During the events, scientists from the Kazakh Scientific Research Institute of Rice Growing named after I. Zhakhaev presented the technology of regulating the salinity of areas planted with rice based on deep chiseling and special soil treatment before rice sowing. Deep chiseling to a depth of 40-45 cm destroys the plow sole, thereby ensuring the salt leaching and improving its physical properties. It should be noted that the scientists' expectations were met: the results of tests carried out by a portable pH meter and salt-conductivity meter provided by FAO on soils showed that soil salinity was reduced by 3 times compared to the level of salinity of the soil treated conventionally.

The event participants also had the opportunity to get acquainted with the technology of growing dwarf apples in Kyzylorda region (Qurmanbai Ata farm). The magnificent apple orchard takes an area of 5 hectares. The head of the farm told guests about the peculiarities of growing fruit trees on saline and low-fertile soils of Aral Sea region.

On the second day, the participants discussed and replicated the results of the cultivation of non-traditional, salt-tolerant fodder grain and forage crops capable of generating a high yield under stressful conditions (diversification of crop production). Local melilot varieties “Alaula” and sweet sorghum varieties "Kazakhstan-16" and "Kazakhstan-20" were selected for this.

Scientists also presented the technology of irrigated soil desalinization by cultivating a highly productive variety of dentated melilot "Alaula", which facilitates toxic salt withdrawal. The proposed crop is an excellent phytoameliorant helping in the fight against secondary salinization and enriching the soil with biological nitrogen. Moreover, the technology of growing sweet sorghum in rice crop rotations was presented. It ensures salt withdrawal with the vegetative mass and yield, and also helps to reduce salt entering the soil by changing the irrigation water requirement. Sweet sorghum is cultivated in arid zones and saline soils as a diversification crop. It has great prospects as a reserve crop for sugar production and has a high feed value.

Finally, the participants were presented the innovative technologies of the Kazakh Research Institute of Rice Growing, including water saving techniques during irrigation.

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Field Days in Turkestan region

On September 29, 2020, within the framework of cooperation between the CACILM-2 and the Kazakh Research Institute of Soil Science and Agricultural Chemistry named after U.Uspanov, the Field Day was held at the pilot site of Kenzhegara farm, Otyrar district, Turkestan region.

The field workshop aimed to demonstrate the results of joint work to increase soil fertility, reduce its salinity and, consequently, increase the agricultural productivity of crops cultivated in the area.

In the spring of 2020, to determine the level of fertility and salinity of 20 hectares of arable land at Kenzhegara farm, large-scale soil studies and its mapping were carried out. The plots on the maps handed out to farmers were classified depending on the quantity of nutrients in the soil. Then the amount of mineral fertilizers required to significantly increase soil productivity, while saving mineral fertilizers was calculated.

Farmers were also given soil salinity maps to a depth of one meter. Based on the degree and chemical components of soil salinization, it was decided to apply an innovative technology to increase soil fertility and productivity.

To introduce innovative technology, the peasant farms were provided with bioameliorants and devices for pre-sowing seed treatment; farmers were taught to use differentiated technologies for saline soil reclamation and were given practical lessons on the innovative technology; Institute experts participated and controlled the practical use of innovative technology in each farm at the initial stage; corn plants of the 3-5 and 7-8 leaf growth stages were sprayed with a biological product developed by the Institute.

During the field workshop, Mukhtar Tursynbayev, the head of Kenzhegara farm, confirmed that new technologies allowed increasing traditionally low corn yields on saline soils by 20-25%. In his view, the treatment of corn seeds and spraying them with a special solution has resulted in faster growth of young shoots and allowed well-rooted plants to give high yields.

The field workshop was attended by Batyrbek Syzdyk, the head of the Department of Agriculture of Otyrar district, Zhanyl Bozaeva, the FAO/GEF CACILM-2 National Project Manager, as well as farmers of Otyrar district.

Note: Kazakh Scientific Research Institute of Soil Science and Agrochemistry named after U. U. Uspanov is the country's leading institution in fundamental and applied research in the field of soil and agrochemical sciences. The Institute aims to provide scientific basis for food security by increasing soil fertility, rational use of soil resources and agricultural lands.

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FAO and GEF contribute to strengthening interagency and intersectoral collaboration aimed at sustainable management of natural resources in Kyrgyzstan

National climate change mitigation measures and national adaptation plans (NAPs) are essential national policy instruments to mobilize both national and international resources, therefore integrating climate change measures into sectoral planning and budgeting and efforts to strengthen intersectoral collaboration at all levels are essential to successfully tackling climate change.

Kyrgyz people have from the dawn of time been engaged in animal husbandry. During Soviet times, animal husbandry was a key agricultural sector. Seed production, feed production, veterinary medicine, research institutes and laboratories all worked to support the livestock sector.

In Soviet times, substantial financial, scientific, technical and human resources were poured into the Kyrgyz livestock sector. The funds went to research, breeding activities to improve livestock breeds and to maintain the infrastructure of more than nine million hectares of pasture, accounting for 88 percent of all agricultural land in the country. The pastures used to be regularly examined and the necessary measures used to be taken to restore the degraded areas. Roads, bridges and water points for livestock used to be created and effectively maintained.

Due to slow transition to settled life in villages, the population gradually stopped moving around, but the cattle continued to move.

A radical change happened with the collapse of the Soviet Union in 1990. After gaining independence, Kyrgyzstan undertook significant reforms in the agricultural sector. All collective and state farm property – land, livestock, equipment and machinery– was distributed among the peasants.

However, the volumes of public, private and foreign investments in the agricultural sector did not reach the level of investment in the Soviet time. Practically disused roads, bridges and artificial sources of water supply were destroyed and closed access to remote pastures, therefore, nearby pastures were rapidly degraded due to overgrazing. Today, climate change further aggravates the issue of pasture degradation in the country.

The Law of the Kyrgyz Republic "On Pastures", adopted in 2009, established that all pastures in the country are national property and will never be transferred to private ownership, and the rights and powers to manage pastures were legally assigned to the Association of Pasture Users and local pasture committees − public organizations, which include the farmers themselves.

Donor organizations support members of pasture committees who take parts in trainings; however, lack of knowledge and experience in sustainable pasture management, as well as interdepartmental coordination, remains acute and requires urgent steps.

“One of the key activities under the Project in the Kyrgyz Republic is strengthening intersectoral coordination mechanisms at the national level, including the integration of the National Action Plan into national sectoral budgeting and investment aimed at moving towards integrated natural resource management,” said Makhmud Shaumarov, Regional Project Coordinator.

With the assistance of the FAO/GEF Project, as well as Camp Alatoo Public Fund (with which the Project signed a long-term cooperation agreement), the activities started to be implemented in the pilot Kochkor district of Naryn region, where land resources experts from the district administration, agricultural development departments, water and forestry, water users associations, pasture committees and agricultural cooperatives developed a Regulation on the creation of a district commission and regulations for its activities on interdepartmental cooperation.

During interactive meetings and roundtable discussions, these documents were adopted and approved by a separate order of the head of Kochkor district administration. Further, this Regulation will be presented and considered at the national level in Bishkek (in the Ministry of Agriculture) and will become the basis for further development and strengthening of intersectoral coordination mechanisms in Kyrgyzstan.

"Unless we take urgent steps, the problem of climate change and flora and fauna in the country will further deteriorate," said Adnan Quereshi, FAO Representative in Kyrgyzstan. "We need to pay particular attention to these aspects, monitor trends and work to improve communication between all stakeholders."

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Digital future: Kyrgyzstan digitizes farmland maps

Since April 2020, Kyrgyzstan has been digitizing maps of the country's agricultural land, including pasture resources.

During the recent meeting, Project experts and experts of the Kyrgyzgiprozem State Design Institute for Land Management in Bishkek discussed various aspects of digitization, including standardization, preservation of integrity and a new structure of the geodatabase, automation of a number of functions, increasing the speed and quality of data entry, as well as the use of special tools to control the quality of this process.

"The consistency and continuity of digital data in land use maps in the Kyrgyz Republic will be ensured by FAO-GEF software," said Adnan Qereshi, FAO Representative in Kyrgyzstan.

In accordance with the support plan, the Project is simultaneously training specialists from Kyrgyzgiprozem.

Until now, land use maps in Kyrgyzstan were only paper-based. Upon completion of the digitization process, which is scheduled for the end of 2020, agricultural experts, researchers, authorities, ayil aimaks (village districts), land and water user associations, as well as farmers will be able to use digital maps and in real time monitor the use and condition of agricultural land, as well as monitor the state of agricultural infrastructure.

Unified database with up-to-date and reliable information on agricultural land, including information on the location, condition and actual use of land in Kyrgyzstan will also allow more efficient planning of agricultural production and more accurate forecasts of yield.

With the financial support of an FAO/ GEF project, these activities are carried out in line with the Taza Koom initiative (Digital Transformation Program), which will facilitate the transition of Kyrgyzstan from a natural resource-based economy to a knowledge-based economy in 2040, to improve people's lives through the power of technology, digital infrastructure and data.

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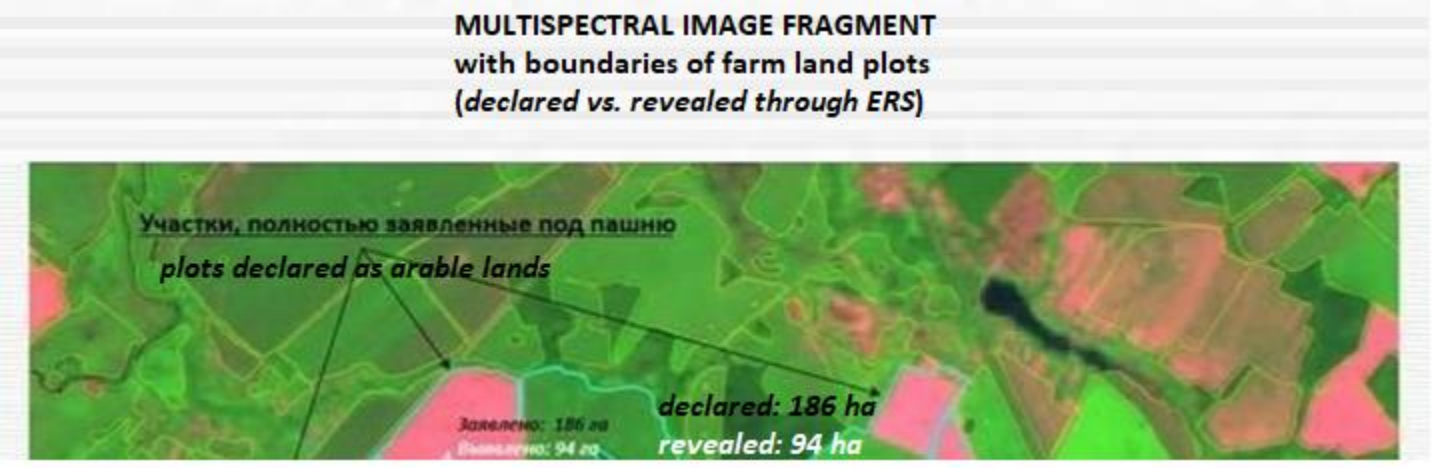

Emergency assistance to Tajik farmers affected by COVID-19

More than four tons of seeds of legumes and vegetables, twenty-five tons of fertilizers, modern equipment for processing vegetables, fruits and oilseeds, as well as sixteen greenhouses were distributed among Tajik farmers and rural households in the pilot areas of the FAO / GEF CACILM-2 Project.

In addition, chicks and poultry feed were provided to vulnerable households in the pilot villages to increase family incomes and provide a nutritious diet.

The Project also provided support to vulnerable rural households through a grant program totaling over 400 thousand somoni.

The first group included smallholders. Ten small projects were supported to install inexpensive modern vegetables and fruits processing lines, greenhouses and drip irrigation systems and other income-generating activities with 20 to 30% of the recipients' contributions.

The second group included the more vulnerable members–female-headed households, migrants without income, their family members and unemployed youth. More than 40 small grants were awarded without conditions of co-financing and community contributions.

The total amount of grant aid distributed among farmers within the framework of the FAO / GEF CACILM-2 Project amounted to 1 million 742 thousand somoni (170 thousand USD).

"The decision to provide emergency assistance was made in response to the current situation caused by COVID-19 in Tajikistan and around the world, "said Makhmud Shaumarov, Regional Project Coordinator.

"This will allow maintaining the stability of households in such a difficult time, creating economic preconditions and continuing to introduce effective technologies for sustainable management of natural resources in the country," he added.

According to experts, remittances from labor migrants covered almost 80% of the needs of the poorest rural households in Tajikistan, including the provision of agricultural production.

According to the Central Bank of the Russian Federation, the volume of remittances from Russia, which accounts for 90% of all transactions to Tajikistan, in 2017 amounted to 2.5 billion USD; this figure does not reflect the real picture, since it does not take into account the export of significant cash funds.

However, the coronavirus pandemic has led to a significant reduction in production and, accordingly, to a sharp decrease or a halt in remittances from labor migrants, which has immediately affected the well-being of villagers and their agricultural plans.

As part of support activities, farmers were provided with training and video materials on how to effectively manage agricultural production and process agricultural products, as well as printed materials and short videos.

The Project also gave Tajik farmers free access to online platforms and markets for agricultural products.

The production resources were distributed over the pilot arid zones of four districts, where the CACILM-2 Project helps the local population to implement sustainable methods of using water and land resources under drought and salinization conditions: Yovon district (Oksanglokh village, Norin jamoat [rural community], and Dahana village, Dahan jamoat), Jomi district (Lermontov village, Yakkatut jamoat, and Obi Oshik village, Istiklol jamoat), Vakhsh district (Javonon village of Rudaki jamoat, and Tomchi village of Mashal jamoat) and Kushoniyon district (2 groups of farmers in Kuchar Gulov village of Sarvati Istiklol jamoat).

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"Working together is easier!": success stories from Tajikistan

With steadily shrinking water resources and the need to provide food for growing populations, Central Asian countries face major challenges to food security and the sustainable land and water use, while climate change is undermining agricultural lands and pasture productivity across the region.

Uzbekistan and Kyrgyzstan have the highest share of agriculture in GDP (about 28% and 27%, respectively). In Tajikistan, this share is 22.4%, in Turkmenistan−18.9%, and the lowest share is in Kazakhstan, at 6.8%.

In Central Asia, 58% of the population lives in rural areas and, although this figure varies from country to country and the region is experiencing rapid urbanization, in Tajikistan the share of the rural population is 73.5%.

At the same time, the number of households headed by women is 26.3%, and the female share of the economically active population in agriculture is 41%.

Female-headed households are more vulnerable to poverty, that is, the poor female share is significantly higher compared to men. These households are poorer because of bigger number of dependents. In other words, the share of non-working family members in these farms is higher than the share of those working. This is all the more true in rural areas, where dependency ratios tend to be higher than in urban areas.

Women living in small and very remote villages with high unemployment and limited gas and water supplies spend 90-100% of their time on household chores, including collecting, transporting and purifying water (for example, washing, bathing, cooking, drinking and livestock), as well as collecting fuel to heat the house. Poor infrastructure means that women and people with disabilities have little time for other activities, such as earning income, accessing health care, public services and education.

In addition, female heads of households tend to have lower incomes, fewer assets and less access to paid work and productive resources than male heads of households.

"That is why, CACILM-2 makes great efforts to involve rural women in Project activities on the ground, helping to build their capacity, increase the sustainability and economic well-being of their farms," says Makhmud Shaumarov, Regional Project Coordinator.

The Project actively engages rural women in locally established farmer field schools, and ensures equal participation of women in local planning processes, selecting innovative practices that are accessible to both women and men, and takes measures to remove any obstacles faced by female farmers when accessing information and advisory services.

According to Daler Domullodzhanov, National Technical Officer for Land and Water Resources, the number of Tajik women participating in the Project is growing and is already more than 50%.

Below are the success stories of female and male farmers from Tajikistan, whose lives have changed with the arrival of the Project in their jamoats.

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

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.

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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.

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Nurbi Niyazova, a farmer of Yakkatut jaomat (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.

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FAO/GEF Project officially registered in Turkmenistan

The Project team has already started implementing activities

In accordance with the requirements and procedures established at the state level, the Ministry of Finance and Economy of Turkmenistan officially registered the CACILM-2 FAO / GEF Regional Project.

"We are highly pleased with this constructive step taken by the Government of Turkmenistan," said Makhmud Shaumarov, Regional Project Coordinator. "We are confident that this will allow implementing all the activities aimed at increasing the level of climate change adaptation in the agricultural sector of Turkmenistan," he added.

To expand the scale of natural resource integrated management in Turkmenistan, the Project will provide technical assistance in the stabilization and reduction of soil salinization processes, reducing the impact of wind erosion, increasing the efficiency of water resources use, and reducing agricultural losses ,biodiversity and the negative impact of desertification.

In close cooperation with national institutions, scientific organizations, local authorities, farmers and other partners, the Project will carry out activities for the sustainable use of land and water resources and effective management of natural pastures both at the national level and in pilot areas: Nokhur region, Yenish village, Baharden district, Ahal province (mountainous zone); Karakum region, Erbent village, Ak Bugday district, Ahal province (desert zone), and Gurbansoltan eje region, Gurbansoltan eje district, Dashoguz province (irrigated zone).

In the mountainous region of Nokhur, the Project will facilitate the creation of an irrigated nursery for growing seedlings of fruit trees, conifers, ornamental and wild fruit (almond) trees, train farmers and expand agroforestry practices by increasing the number of orchards, almond, juniper and other plants adapted to local conditions.

The Project will introduce both traditional and modern approaches of drip and other forms of irrigation of vegetable and fruit crops in mountainous areas.

The Project will work closely with local communities, partners from environmental and forestry organizations, as well as local self-government bodies, to build the capacity of farmers in the field of new technologies for efficient management of water, land and forest resources, to help restore springs and wells with fresh water, analyze value chains and help farmers enter the markets.

In Karakum desert zone, the Project helpы to create seed plots for perennial shrub and semi-shrubs, nurseries for growing psammophytes – plants adapted to sand and able to withstand wind blowing and being under sand.

The Project will also work to introduce the latest efficient technologies for growing pasture crops in desert conditions to increase the productivity of desert pastures, expand approaches to pasture rotation, build wells and use other technologies to provide pastures with irrigation and drinking water, as well train local communities to bind the loose sand to restore indigenous desert ecosystems.

In the irrigated zone of Gurbansoltan eje, the Project will test and implement a system of rational use of water resources according to the FAO *Aqua Crop* methodology. The Project will apply the experience of returning abandoned saline areas to agricultural use, rehabilitating saline soils using drought- and salt-tolerant crops.

It is planned to create demonstration plots for testing approaches of arable farming and rational use of water resources, including a pilot plot of an agricultural institute in Dashoguz, with the Project providing partners with equipment (special seeders, laser leveling systems), as well as planting materials.

As in the country as a whole, the Project will train farmers and partners in the latest technologies for effective natural resource management, create nurseries for growing seedlings of plants that can easily adapt to conditions of increased salinity and drought, provide seeds and help strengthen the gene pool of drought- and salt-tolerant plant species in Turkmenistan.

Since mid-2018, the Central Asian countries and Turkey have embarked on a regional FAO / GEF Project with a total cost of about USD 76 million over a five-year period.

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Legal science to help agricultural producers

On September 5, 2020, the participants of FAO/GEF Project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey" (CACILM-2), which in Turkmenistan is being implemented by the Ministry of Agriculture and Environmental Protection of Turkmenistan with the support of FAO and GEF, gathered at the National Institute of Deserts, Flora and Wildlife (NIDFW).

The Institute aims to support integrated land use, reclamation and desalinization measures, conservation of water resources, reduction in losses of agrobiodiversity, application of technologies in the agro-industrial complex that promote carbon sequestration. The pilot areas are Nokhur village, Yenish, Bakharden district, Ahal province (mountainous zone); Yerbent, Ak Bugday district, Ahal province (desert zone); Gurbansoltan eje district, Dashoguz province (irrigated area). The meeting was attended by legal experts from subdivisions of the agroecological department, the State Committee for Water Resources, Turkmen State University named after Makhtumkuli, and related projects with the participation of UNDP and Regional Environmental Centre for Central Asia.

According to the National Project Manager Rahman Hanekov, the meeting was devoted to reports, planning based on the analysis of state programs and strategies, legal and institutional framework for natural resource management with emphasis on agriculture and Project activities for the near future.

The speakers were the national projects consultants. Yolbars Kepbanov gave a presentation on improving the institutional and legal framework for environmental management, measures to combat desertification. In particular, he spoke about the prepared recommendations in the field of land use, suggesting to create:

- Land resources management service with separate units for nature management and nature protection, which will ensure control independence in the field of nature protection;
- National land resources monitoring system under the Land resources management service to ensure long-term planning and sustainable land management using GIS technologies;
- A unit responsible for the general condition and improvement of natural pastures as part of the Ministry of Agriculture and Environmental Protection;
- Commissions regulating the use of pastures in accordance with the Law on Pastures–under local authorities;
- Party responsible for organizing and carrying out pasture inventories as part of Turkmenertaslama Institute of the Ministry of Agriculture and Environmental Protection, (This will make it possible to monitor pasture land degradation and have information to take measures to improve them and supply them with water)
- Local pasture users' associations (unions) (chekene - Collective herding groups);
- National plan for the introduction of integrated water resources management (IWRM) and increasing water use efficiency;
- Service (agency) to supervise water resource use;

Enhance the powers of the State Committee for Water Resources, give it powers to coordinate water resource use.

Sultan Veisov presented a review of the integration of agricultural resilience to droughts and land salinization in an arid climate, the priority areas to combat desertification. He told about the need to develop strategies and guidelines for response preparedness plans based on monitoring and early warning systems. Such a system is based on forecasting precipitation, and, first of all,– on legal harmonization.

In this regard, it was emphasized that the National Action Plan for the implementation of the UN global Convention on Biological Diversity, which Turkmenistan signed in 1996, may be revised, and the national legislative framework on soils and irrigated lands may be further strengthened. The speaker emphasized the importance of coordinating synergic projects related to analytics and practical measures for the use of water and land resources, as well as on the exchange of climate data between projects at the national and subnational levels, and on the need for a coordination mechanism for the implementation of agricultural advisory services, which require a regulatory framework to be developed.

There is also a need among agricultural producers to exchange experience and information on drought- and salt-tolerant crops for arid and saline agricultural production systems, water-saving technologies for high-value crops (for example, drip irrigation systems for orchards), as well as creating connected supply chains (from breeding – to seed distribution, from producers – to suppliers, from retailers of water-saving technologies – to consumers).

Among other issues presented for discussion by the Project consultants Gurbanmyrat Ovezmuradov and others, were the issues of introducing integrated approaches to the management of natural resources, low-carbon development in water use, agricultural innovations. The participants talked about plastic film mulching, enriching the soil with organic matter during irrigated crop rotation "cotton–winter wheat", creating a nursery for growing protection forest species, publishing methodological literature on combating soil salinization. Finally, the scientists of the NIDFW presented their scientific developments and practical recommendations for curbing desertification, land degradation, and improving the productivity of desert pastures.

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Uzbekistan to create a new Agricultural Knowledge and Innovations System

In the face of climate change and increasing competition, farmers need modern knowledge, technology and innovation more than ever. These are the two main elements that currently determine the level of competence of rural producers and their competitiveness.

As the experience of advanced economies shows, knowledge-based technologies, including digitalization, innovation and agricultural extension, combining research, education and advisory services with production, are a driving force in the agricultural sector and contribute to its significant progress, including agricultural production, improved product quality and success in world markets.

In addition, agricultural research and the latest developments provide one of the highest rates of return of any investment in rural development.

The Decree of the President of the Republic of Uzbekistan "On Approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030" dated September 13, 2019, determines the development of agricultural science, education, information and consulting services, including an effective system for the dissemination of agricultural knowledge and information, as one of the key directions and tasks for the development of the agricultural sector for 2020-2030.

That is why, Uzbekistan pays such a great attention to a new Agricultural Knowledge and Innovations System (AKIS), which is being developed with the assistance of the Food and Agriculture Organization of the United Nations (FAO) and the Global Environment Facility (GEF) within the framework of Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030.

Taking into account that FAO has the best knowledge base, the Ministry of Agriculture of Uzbekistan asked the Organization to give recommendations on the creation of a system for the dissemination of agricultural knowledge and information.

Under the agreement with FAO, the task was taken over by the Wageningen Research Center (Netherlands), which for over a century has remained the leading educational and research center in the fields of crop and livestock production, environmental sciences, technical and socio-economic sciences. In recent decades, the University of Wageningen has been one of the world's leading centers for the natural sciences and natural resource management.

Several months of intensive consultations of the Wageningen Research Center with the working group of the Ministry of Agriculture of Uzbekistan have resulted in the development of a strategy, the creation of a Center of Excellence in Agricultural Sciences, Innovation and Training, and the implementation of other tasks outlined in the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030.

The creation of the *AKIS* system requires broad participation of various stakeholders, therefore, in cooperation with the Center, a Roadmap for cooperation with government agencies, the business community, research institutes and a number of universities, training centers, service providers and mass media, was developed.

The tasks were fulfilled by the Wageningen Research Center with the financial support of the FAO-GEF regional project (CACILM-2).

“There are no one-dimensional solutions when dealing with complex problems of reforming agriculture in Uzbekistan,” said Makhmud Shaumarov, Regional Project Coordinator. “The innovation process will require the participation of various stakeholders, including the government, the private sector and producers, knowledge centers, training centers and civil society, and we are pleased to assist the Ministry of Agriculture of Uzbekistan in achieving this goal,” he said.

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A farmer from Bukhara region has grown a 20-kg beet

A farmer from Bukhara region Shavkat Shodiev set an unusual record - he grew beets weighing almost 20 kilograms at his Zarafshon farm in Romitan district.

This is a new variety of salt-tolerant beets "Centaurus", which, despite the salinity inherent in the arid climate of the region, took root well and brought a rich harvest of quite impressive sizes.

The introduction of new promising salt-tolerant crops in saline areas of Bukhara region is carried out within the framework of FAO/GEF Project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey" (CACILM-2).

According to FAO, saline soils occupy vast areas in the world–about 25% of the entire land surface. FAO experts are confident that salinization is a global problem for humanity.

Secondary soil salinization is almost always the result of excessive irrigation, which increases the level of saline groundwater, or irrigation with highly mineralized water. Soil salinization, both natural and secondary under the conditions of irrigated agriculture, is one of the factors that enhance the desertification process. However, it is both a cause and a consequence of other agricultural problems.

Tackling soil salinization is now being considered in conjunction with other measures aimed at sustainable intensification of agriculture, which is one of the foundations of food security. The FAO Project aims specifically to ensure early warning and drought risk reduction. Experts are developing guidelines for salinization management, including on-site demonstration of innovative approaches and technologies to reduce salinity.

In Uzbekistan, the Project partners are the Ministry of Agriculture, the Ministry of Water Resources, the State Forestry Committee of the Republic of Uzbekistan, and Uzhydromet.

A significant part of the irrigated land in Uzbekistan is saline to one degree or another. In recent years, the share of saline soils under secondary salinization has increased from 48.2 to 64.4%. It should be noted that it is salinity that is one of the main factors in reducing yields.

As the National Project Coordinator Muhammadjon Kosimov noted, “A high yield can be obtained only from high quality seeds. Meanwhile, our farmers are experiencing difficulties in finding and breeding seeds of new varieties of salt-tolerant crops.

The introduction of new promising salt-tolerant crops in saline areas of the region will dramatically increase productivity. Thus, the new variety of salt-tolerant beets "Centaurus" is resistant to salinity and drought, and the yield of root crops is 1000-1500 centners per hectare, which is about 30-50% higher than that of local varieties. Another advantage of this variety is that the aerial part of the root is 60%, which makes it easy to harvest by hand.

Within the framework of FAO/GEF Project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey" (CACILM-2), this year the beet variety “Centaurus” will be grown on an area of 1 hectare, and in 2021 seed production and cultivation of this crop on farms will be launched. This will not only provide the fodder base for farms in saline areas, but also increase livestock production.

The Project also provided other crops for sowing and seed production. For example, in the same farm Zarafshon in Romitan district of Bukhara region, a new alfalfa variety "Emiliana" was sown on 10 hectares of saline soils; this variety is highly resistant to salinity, drought and cold weather. Its yield is 60-80% higher than that of local varieties. It was bred by specialists of the Serbian Institute of Field Cultivation and Vegetable Growing and is successfully grown on large areas in Europe.

Aziz Nurbekov, Consultant for Drought Risk Management, FAO Country Office in Uzbekistan, noted that “Sowing alfalfa on irrigated lands is one of the new directions in modern agriculture, increasing farmers’ incomes”.

In addition, within the framework of the FAO project, grape varieties that are resistant to drought and soil salinity are also now grown in Bukhara region. In the fall of 2019, 100 thousand pieces of selected grape cuttings were purchased for the Bukhara forestry enterprise. The cuttings adapted well on two plots with an area of more than 1 ha, with the survival rate being 75-80%.

Much work has been done in Kamashi district of Kashkadarya region. As is known, pistachio is one of the most drought-tolerant tree and shrub species, which lives up to 1000 years. Taking this into account and following the suggestion of the FAO expert, the khokimiyat (local administration) of Kamashi district allocated 2500 hectares of land to planting this crop on both sides of the road connecting the villages of Kyzyltepa and Kokbulak. The Project delivered 250 kg of pistachio seeds to the district. In total, in the spring of 2020, pistachios were planted on a total area of more than 800 hectares. It is planned that in 2021 these pistachio fields will be leased out to the local population on a long-term basis through an auction.

Thus, within the framework of the FAO project, a number of important steps have been taken towards combating drought and soil salinization in Uzbekistan.

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Farmers of Bukhara and Kashkadarya regions receive modern equipment

Within the framework of FAO/GEF Project "Integrated Natural Resources Management in Drought-prone and Salt-affected Agricultural Production Systems in Central Asia and Turkey" (CACILM-2) in order to ensure the efficient use of land and water resources, increase crop yields of agricultural crops, sustainable management of dry and saline

agricultural lands in Bukhara and Kashkadarya regions, demonstration sites have been created for the introduction of new agricultural technologies, crops and varieties.

The Project provided farmers of Bukhara region with the latest equipment–a direct seeding machine made in Brazil and an American-made laser planner, with a total value of over 35 thousand USD. During the events attended by experts from FAO Country Office in Uzbekistan, the participants were shown how the new equipment works. They were also presented with the methods of laser soil leveling as a measure to improve irrigation processes and crop rotations, suitable for conservation and resource conservation agriculture. It is expected that at the end of the Project, improved water and soil management practices will be fully implemented in the work of farmers in Bukhara region, and a program to disseminate information on these methods will be prepared for further large-scale implementation of conservation agriculture (CA).

CA is one of the most promising modern methods for tackling drought-related problems. It is based on three principles: minimal disturbance of the soil, the normal condition and productivity of which is the basis of each approach; permanent soil cover with plant residues or live (green) crops to reduce water loss, reduce erosion and protect soil from harsh extreme climatic conditions; diversification of crops (crop rotation). CA also has economic benefits for farmers such as immediate cost savings immediately after the introduction of CA technologies by reducing agronomic activities. This fact is a significant advantage for low-income farmers during a period of high growth in prices for fuel and lubricants. Saving fuel and lubricants also helps to improve the carbon balance from land use.

Laser leveling is a process in which the ground is leveled using laser-equipped dragline buckets to create a continuous 0 to 0.2% grade. This technique requires tractors and scrapers equipped with global positioning systems (GPS) and laser-guided instruments. The soil is moved by either cutting or filling so that the required slope / level is formed. Improved water availability can reduce water costs by 30% and 40% of plant populations, saving weeding time from 21 to 5 workdays per hectare. This, consequently, increases the yields.

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