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DIALOGUE

FAO/GEF Project "Integrated natural resource management in drought-prone and saline agricultural production landscapes of Central Asia and Turkey (CACILM2)"

The woman who changes the world

Laura Tokhetova is a breeder, her name is well known not only in Kazakhstan, but also far beyond its borders. Laura Anuarovna believes that she is lucky because she helps to change the world. This is not high-flown talk: food security and development of any country largely depend on the successful work of breeders.

Breeders are most often evaluated by higher reaches of academic life by the number of published scientific articles rather than by the number and variety developed and introduced into production.

Laura Tokhetova is the author of over 200 scientific papers, as well as three catalogs of Kazakhstan's genetic resources. She has a 4 Hirsch index in the Scopus database. 8 articles have been published in high-rated international journals. Her monograph received positive reviews from scientific leaders. However, the greatest satisfaction for Laura Anuarovna is to see high-quality new varieties created by her own efforts in the fields of her native Kazakhstan.

Laura Tokhetova, Associate Professor of the Department "Agrarian Technologies" of the NJSC "Korkyt Ata Kyzylorda University", Doctor of Agricultural Sciences, has developed 18 varieties of barley and wheat over 20+ years of her activity, she owns 9 patents for breeding and 2 patents for inventions.

Her journey to Big Science was long. In 1992, eighteen-year-old Laura graduated with honors from the Kyzylorda Medical School and entered the Korkyt Ata Kyzylorda State University, the Faculty of Natural Sciences, choosing the specialty "Chemistry and Biology". In 1996, she graduated with honors. For two years after graduation she was teaching, but later, she met her mentors who accompanied her to a lifetime project.

"In order to work in science, I had to study further, take part in postgraduate study," says Laura. It is good that my husband supported the move to Almaty, although we had a little child."

The postgraduate training program was completed with excellent marks and upon returning home Laura planned to combine scientific research with teaching. However, she failed to get a job as a teacher, and therefore, the young researcher devoted herself entirely to academic work, taking up the selection of barley, wheat and oats. For many years Kyzylorda region specialized in rice cultivation, but this resulted in a shortage of water resources. The young researcher wanted to change this system and develop crops in the region that could be smoothly introduced into the crop rotation on a par with traditional rice, and at the same time they could bring a similar income to farmers. Laura Tokhetova appealed to the Research Institute of Rice Cultivation, where she was carefully listened to and immediately accepted - the Research institute badly needed changes and, first of all, a diversified crop rotation.
"I was adamant that I will create new varieties based on local selection, because Kyzylorda has its own climatic features and one needs to adapt to what the land dictates," says Laura. Colleagues from Almaty helped to start prasctical work and supported her ideas. Laura applied for funding and received support from the Ministry of Agriculture of the Republic of Kazakhstan.

«The team included employees of the Research institute, i.e. laboratory assistants, for whom all this work on diversification turned out to be new, thus, they had to learn a lot. It took a lot of effort to achieve coordinated actions," recalls Laura Anuarovna. Today we generate 10 varieties of locally bred barley and 1 variety of wheat, which have already been patented. Now we have moved on to another stage, we are introducing them to the farms. True, putting into operation has its pitfalls. Nevertheless, who told you that starting from scratch is easy?".

Laura Tokhetova took part in various academic conferences as she had to gain experience. Traditionally, her colleagues returned home after such forums with presents, gifts and souvenirs, however, Laura Anuarovna was bringing a sack of new varieties. Her husband who met her, had to carry bags with precious collectible samples ...

Today, it is fair to say that Professor Laura Tokhetova made a real breakthrough in barley breeding. It is known that development of a new crop variety takes many years, sometimes at least 12-15 years.

Long-term experiments to develop new varieties of spring barley "Syr Aruy" and "Inkar" specifically for saline soils of the region have recently come to an end.

“It was a very difficult job, because there is a reduction in the protein content in the grain in the saline lands, says the researcher. 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 centimeters, in other varieties it is no higher than 50 cm. Our barley tolerates well the late spring frosts 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. With a shortage of irrigation water, it is good for business, it sprouts quickly, matures and makes room early for tillage for subsequent crops.”

The author of new varieties is convinced that barley is a unique crop, it is indispensable for feeding poultry and calves, it is an excellent concentrated feed. Namely, fodder production serves as a link between crop and livestock production. There is no standing still: developing a new variety is an endless work. There is no such thing as developing an ideal variety and relax. New varieties are required to increase overall adaptivity, crop sustainability and stabilization of gross harvests. Here, intuition is of great importance, because breeders predict decades ahead, they need to understand what will happen to the crop down the years.

Laura Tokhetova worked twenty years for the Rice Research Institute. However, she had to quit this job: paper routine interfered with academic research. She was offered to become an official, but she could not quit with science. Today, Professor teaches students at the university, she has projects at the Rice Research Institute. She collaborates with FAO and continues to learn. Thanks to the international organization, Laura Tokhetova has the opportunity to communicate with experts from Japan, Turkey and gain new knowledge.

The researcher received many awards, she holds scholarship granted by Akim of Kyzylorda region, government letter of recognition “Kurmet” by the Ministry of Agriculture of the Republic of Kazakhstan, medal “80 years to Kazakh Research Institute of Agriculture and Crop Production.” She received a departmental badge of the Ministry of Agriculture of the Republic of Kazakhstan “Auylsharuashylykysalasyzdigi”, the State award of the Republic of Kazakhstan “For Distinguished Labor” (Eren enbegi ushin).

What’s most important is that there is hope for the future. The youngest son Sanzhar is interested in breeding grain crops since his childhood. Recently, he took part in the city Olympiad, and his research project won the first place. Sanzhar independently sets up laboratory experiments, knows the principles of their setting, and actively participates in the preparation of breeding material. The boy dreams of becoming a geneticist, and the dynasty will continue!

Help came in time

Small farms in the Kyzylorda region of Kazahstan received wheat seeds

Amid the COVID-19 pandemic, farmers around the world face limited access to resources, labor and farmland, resulting in lost production, lower household incomes and disruption in nutrition quality.

Farms located in the risky natural areas of the Aral Sea region are especially vulnerable to such shocks. Already suffering from droughts, water shortage and salinity, in the context of the pandemic, farmers in the southern regions of Kazakhstan faced insurmountable difficulties, lack of financial resources and lack of seeds.

Makhmud Shaumarov, CACILM2 Coordinator, noted: “The pandemic should not put farmers on the brink of survival, so we continue to provide timely assistance to rural residents of Kazakhstan."

In response to an appeal from the Government, the FAO/GEF project “Integrated Natural Resource Management in Drought-Prone and Saline Agricultural Production Landscapes of Central Asia and Turkey” (CACILM-2) purchased four tons of elite “Kazakhstanskaya 10” wheat, which will allow to avoid a decline in production in small-scale farms and stabilize local food security.

The variety has a good yield, high drought and salt resistance, responsive to watering and fertilization, practically is not affected by diseases and pests and is recommended by breeders for sowing in the southern regions of Kazakhstan.

“It often happens that due to lack of funds small farms buy low-quality seeds without any supporting documents. Sometimes the price of such poor quality seeds sold without any certificate is half the market price. However, in the end, this may have a detrimental effect on the quality of the future harvest,” said Zhasulan Serikov, Head of Agro-industrial facility of the Kyzylorda Regional Chamber of Entrepreneurs, at the seed transfer ceremony today.

The local commission, which included representatives of local authorities and the Atameken National Chamber of Entrepreneurs, enlisted five farms from the Zhanakorgan region and the village of Karaultobe, Kyzylorda, which have today received 800 kg of high-quality wheat seeds free of charge.

Abdugappar Hanseit, Head of the Hansate Farm, emphasized: “I am an agronomist by education and know firsthand about the sowing qualities of seeds. We have all been convinced that seeds of the variety “Kazakhstanskaya-10”, purchased by the project, is beyond praise and we are very grateful to you for your timely assistance.”

Rational management of Kazakhstan's natural wealth, the pastures, contributes to improving the well-being of households and keeping this resource for future generations

Within the framework of the agreement with the FAO/GEF regional project "Integrated Natural Resource Management in Drought-prone and Saline Agricultural Production Landscapes in Central Asia and Turkey" (CACILM-2), the Agriculturists Union of Kazakhstan started consultations with farmers and local executive bodies on effective pastures management.

The agreement provides for an assessment of the use of pastures in two districts of Kazakhstan, the Petrovsky rural area of Bukhar-Zhyraisky district of the Karaganda region, where preliminary meetings took place on May 26 and 27, 2021, and the Talapsky rural area of the Zhambyl district of the Almaty region, which FAO partners will visit in the near future.

These pilot districts represent different ecosystems and climate zones and were defined in the course of cooperation with the Committee of land management of the Ministry of Agriculture of the Republic of Kazakhstan.

The Agriculturists Union of the Republic of Kazakhstan will conduct a series of studies, including:

- analysis of local regulations on the use and management of pastures, including rotation schemes and pasture management plan developed by local municipalities;

analysis of the structure and forms of ownership of agricultural land of the selected sites;

environmental evaluation of pastures;

analysis of existing grazing patterns by zones, including the study of vegetation cover, areas and productivity of pastures based on field studies and laboratory analyzes;

needs analysis of the animal feed;

analysis of available pasture infrastructure (wells, cattle paths, etc.) as well as a general gender-sensitive methodology for extending existing pasture rotation and schemes to sustainable pasture management plans.

Based on results of the consultations, recommendations will be developed on the technical and institutional aspects of natural resource management aimed at improving pasture management plans, taking into account local plant species, seasonal changes in biomass, access to water resources, seasonal climate, number and type of animals per hectare, living conditions, mobility of farmers and animals.

Moreover, partners will conduct two training seminars on improving pasture crop rotation schemes with the participation of representatives of regional and district authorities, regional and district land services, NGOs, key land users, landowners and natural resource users in pilot areas.

The recommendations, supplemented and improved during training seminars, will be presented to all stakeholders, i.e. farmers, local municipalities, the Government of the Republic of Kazakhstan and other organizations and individuals.

In 2017, Kazakhstan adopted the Law of the Republic of Kazakhstan “On pastures, whereunder all functions related to pasture management, including the development of pasture management plans, were transferred to local authorities (akimats). The country is currently in the process of developing these plans, and the FAO/GEF CACILM-2 project provides methodological assistance to local governments in this important process.

Improving local pasture management, including the rational distribution and rotation of areas designated for grazing with a competent calculation of the number of livestock per square kilometer of pastures, as well as mobilizing public and private investments in the restoration of pasture infrastructure will make a significant contribution to improving the condition of the natural resource , contribute to its productivity, the development of animal husbandry and the solution of a number of social issues, thereby contributing to the scale expansion of sustainable land management (SLM) practices in Kazakhstan.

To prepare for natural disasters is to minimize the damage.

FAO helps Kazakhstan identify bottlenecks and better prepare for disasters related to climate change

In April 2021, Kazakhstan presented a Comprehensive Analysis of the System of the Agricultural Disaster Risk Reduction in the Republic of Kazakhstan.

Natural disasters around the world become more frequent and more complex, and this phenomenon is generally referred to as climate change

Never before in the history of mankind agriculture and agri-food systems in general have faced such a number of unprecedented threats: droughts, hurricanes, floods, snow storms, as well as large-scale outbreaks of the desert locust, large fires and such previously unknown biological threats as pandemic COVID-19.

According to experts, agriculture always takes the first, most powerful blow and suffers the heaviest losses all over the world. Natural disasters undermine food security and deprive rural residents of their livelihoods.

“More than 80 percent of losses from drought accrue to agriculture, in particular, livestock and crop production, which negatively affects food security,” Kairat Nazhmidenov, FAO Representative in Kazakhstan, noted in his greeting to the meeting participants. “This issue is especially relevant for Kazakhstan with most of the sown area located in non-irrigated zons and, therefore, the yield directly depends on precipitation,” he said.

In this regard, studies are conducted all over the world on the impact of climate change processes on agri-food systems and the level of countries’ preparedness for natural disasters.

As part of the FAO/GEF regional Project “Integrated Natural Resource Management in Drought-Prone and Saline Agricultural Production Landscapes of Central Asia and Turkey” (CACILM-2), such studies are carried out in all Central Asian countries, including Kazakhstan.

The report is part of a series of country baseline studies on assessing climate change-related disaster risk reduction systems (DRR), early warning systems and agrometeorological services in the agricultural sector.

In the course of the study, it was stated that the country has a coordinating governing body of the public system of civil protection. A number of committees under the Ministry of Agriculture of the Republic of Kazakhstan oversee epizootic and phytosanitary safety and control the condition of agricultural land.

Meanwhile, the agricultural sector is not fully covered in terms of preventing and reducing the likelihood of disaster risk in agriculture, and the current public programs in Kazakhstan do not focus on disaster risk reduction and adaptation to climate change.

Moreover, the analysis of legislation showed that the current legislation of the Republic of Kazakhstan lacks special provisions and norms for adaptation to the impacts of climate change, and the Environmental Code of the Republic of Kazakhstan regulates only issues related to mitigating the impact on the climate by limiting greenhouse gas emissions.

The report includes a number of recommendations. Among them are the development of an algorithm of actions for storm warnings both for local authorities and for agricultural producers, adoption at the legislative level of acts on disaster risk management, development of sectoral programs and plans to reduce disaster risks in the agricultural sector, modernization and quality assurance of affordable agrometeorological support of the agricultural sector, as well as a number of other recommendations that will allow the country to more effectively respond to threats of natural disasters and reduce the losses of the agricultural and food sectors to a minimum.

The virtual event was attended by specialists from agricultural sectors, experts in the field of emergencies, representatives of government bodies, heads of the ministries’ divisions and departments, as well as researchers and scientists from Kazakhstan, as well as from other countries of Central Asia

Kazakhstan completed works on salinity mapping of the Kyzylorda region

Kazakhstan completed works on salinity mapping in Kyzylorda region late in June.

Maps reflect the current state of soils in one of the largest agricultural regions of Kazakhstan, where almost 85% (20.3 million hectares) of the total lands (22.6 million hectares) is currently saline. The water resources area was not taken into account in the development of this map. Salinity maps of the Kazakhstan landscape were developed in the 80s of the last century, they are outdated and do not reflect the current situation.

In the Kyzylorda region, suffering from the consequences of the Aral Sea desiccation, agricultural lands require close attention, investments in radical improvement, putting back the abandoned territories, as well as transition to modern approaches towards agricultural production.

The maps presented to local divisions of the Ministry of Agriculture of the Republic of Kazakhstan, local authorities and specialized research institutes allow them to understand the real situation of soil conditions and, accordingly, allocate resources and efforts aimed at restoring a vital national resource.

Since May 2018, the FAO/GEF Project "Integrated management of natural resources in drought and salinization prone areas of Central Asia and Turkey" (CACILM-2 / CACILM-2) has been implementing a set of measures to combat salinization in Kazakhstan.

The online trainings are conducted in partnership with local authorities, research institutes and divisions of the Ministry of Agriculture of the Republic of Kazakhstan on mapping saline areas and the application of innovative approaches and biotechnologies to restore the fertility of agricultural lands, areas under salt- and drought-resistant crops. In 2020, 5 hectares were occupied under such crops, then in 2021 the area increased to 100 hectares.

The level of soil salinity is closely monitored using special equipment provided by FAO. In 2020, the Guide "Innovative approaches and technologies to combat salinization of marginal lands in Central Asia" was published, which is available in electronic format and can be used both in research and in practice. In 2020, works on salinity map of the Zhambyl region have been completed, while this year the salinity area of the Pavlodar region will also be mapped.

"FAO provides technical assistance to national partners in mapping natural resources using satellite and terrestrial data," said Zhanyl Bozaeva, Project Manager in Kazakhstan. "Salinity maps can provide researchers, decision-makers at all levels and farmers with valuable and timely information about the condition of natural resources and environment."

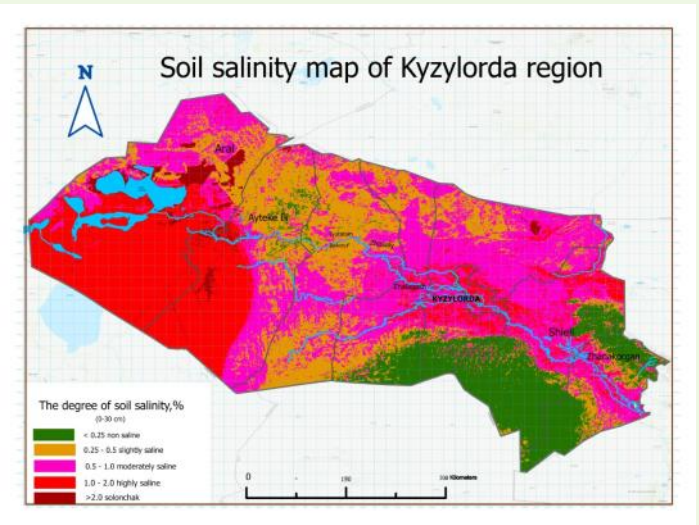
Note: Soil salinization is an excessive accumulation of dissolved or absorbed salt in the soil root layer, thereby oppressing agricultural plants, reducing quality and quantity of the crop. Salinization is a worldwide issue, especially in semiarid areas.

This is the main factor that reduces the productivity of the agricultural sector worldwide, affecting about 20% (or almost 300 million hectares) of irrigated agricultural land in the world. Since the 1990s, the amount of land subject to salinization has increased 2.4 times, which resulted in a 25-30% decline in agricultural yields.

The maps were compiled by FAO specialists in cooperation with the Land Management Committee of the Ministry of Agriculture of the Republic of Kazakhstan and the Land Monitoring Survey Department of Public Corporation "Government for People" of the Ministry of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan according to the FAO methodology:

http://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1269946/

The input data on the soil of the Kyzylorda region included 2.a600 profile areas that were surveyed from 2004 to 2019 when compiling maps at soil depths ranging from 0 to 30 cm, while soil-forming data includes multispectral remote sensing images, remote sensing using digital elevation model (DEM), maps of land cover types, geology and average annual precipitation.



“This job is not for women”

Approaching the water distribution hub at the Zhon-Aryk river in the Kochkor district of Naryn region, 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 tons. Well, it was believed that to cope with such a complex technical structure, strength is required.

It was a total surprise when a fragile, short woman accompanied by a faithful dog, came out from a modest whitewashed house on the bank of river to meet us.

Satkyn Ozubekova lives here all her life, and she is the only woman in the country regulating the water distribution hub.

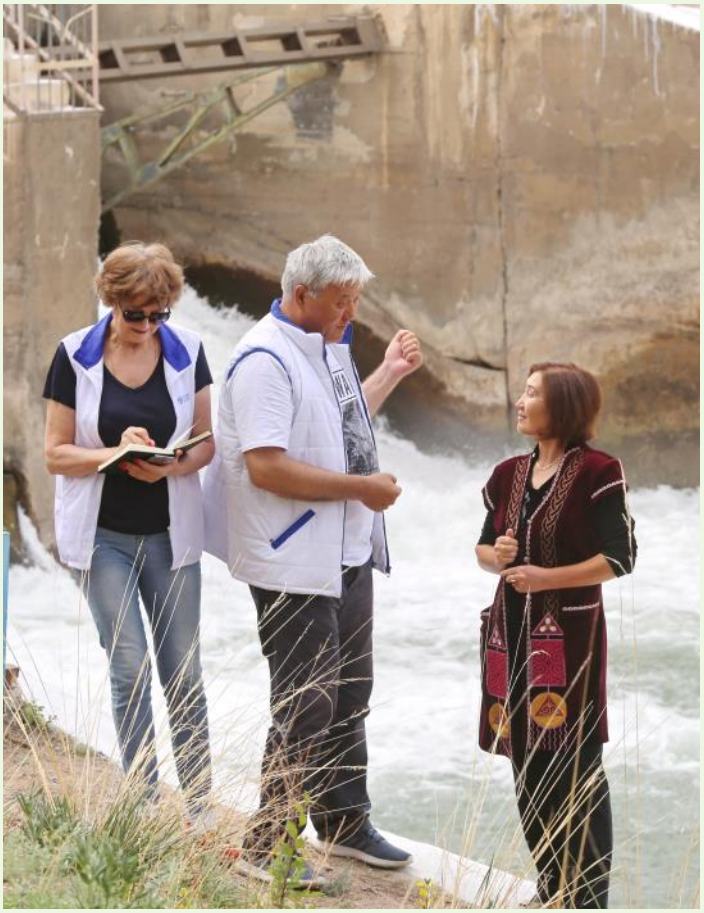
Despite the abundance of water resources (about 50.0 km³ per year), Kyrgyzstan periodically faces a shortage of water for agricultural, energy sectors and for drinking needs, and due to the irrational use and pollution of water resources, there is a degradation of river ecosystems and a decrease in the hydrobiological diversity of water bodies.

Her father Sabyr Ozybekov, participated in the construction of Zhon-Aryk hub in 1978 and was a water distribution regulator for the rest of his life. He was nearly 90 when he handed his daughter the reins of power.

A rather complex and powerful structure divides the Zhon-Aryk River almost in half, and half of water goes into the Orto-Tokoi reservoir, from where it feeds river Chuy and enters the fertile Chuy valley, while the other half goes to the fields of Kochkor farmers downstream through a special allotment.

The monitoring system of the Hydrometeorological Service consisted of 148 river gauging stations until 1992 with 7 at lakes and a reservoir, and 78 meteorological stations. To date, 78 (53%) gauging stations are in operation at rivers; 5 at lakes and a reservoir, out of 78 hydrological posts located at rivers, 8 (10%) require full restoration; security facilities and equipment of 20 hydrometric posts (26%) are in an emergency condition, about 30% of service premises require full restoration.

“This is not an easy and very responsible job,” 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 slightly more, and farmers downstream in Kochkor will be left without “life blood”.

In the arid climate of the Kochkor valley, and under constant winds - drylands, nothing will grow without irrigation, and this means that farms will suffer irreparable losses.”

In addition to this important and extremely responsible work, Satkyn manages to keep his farm: cows that graze in the mountains in the summer season and descend to the Kochkor valley in winter.

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

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

It is important to mention 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, water users, this database will also contain data on the required volumes of irrigation water, taking into account the irrigation mode. It will also be possible to obtain information on payment and forms of contracts between the Water Users Association (WUA) and farmers, data for the entire WUA, to get 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 this will allow Satkyn to manage water traffic of the Zhon-Aryk River even more efficiently.

While we were talking with Satkyn at the river bank, the dog suddenly pricked up his ears, carefully peering into the thickets on the opposite bank. We looked there and saw the muzzle of a jackal flashed in the dense underbrush.

“Aren't you scared to live here alone?” - we asked her. Children are in Bishkek, sister is rather far away, she is managing Orto-Tokoy reservoir.

“No,” she says. “I have a faithful assistant”, Satkyn pats the 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 away the animals.”

Well, there are women in Kyrgyz villages...

Water for pastures: Project helps to provide fresh feed for cattle.

An extremely efficient device for irrigating pastures and watering animals has been installed in the pastures of the Cholpon ayil aimak, the Kochkor district of the Naryn region.

It is a so-called hydraulic ram pump operating without electricity or fuel, able to lift water to a height of up to 50 meters, a type of "green" technology that is now more relevant than ever.

Neither polluting the environment, nor using any energy other than the own water energy, various types of hydraulic ram pipes have served people since the 18th century in various areas, including contribution to the development of hilly and foothill territories.

The capacity of the installed hydraulic ram (GT-300) is about 1000 m3 / day. Taking into account that the hydraulic ram pipe works continuously, with the help of this device, it is possible to provide irrigation of 50 hectares of degraded pastures in 25 days, while simultaneously solving the issue of watering all agricultural animals in the Cholpon ayil aimak.

A few years ago, in the spring, there was a lot of grass in the Kyrgyz mountains, because at this time of the year it often rained, the snow melted and fed the springs, and all the water not only abundantly irrigated pastures and arable land, but also flowed into the streams and rivers carrying fresh water into the fertile valleys downstream.

However, climate change, a phenomenon faced by the entire planet, is already noticeable in Kyrgyzstan as well. The amount of precipitation is decreasing and farms not only in the southern regions, but also in the north of the country are increasingly experiencing a shortage of irrigation water. Not only crops, orchards and forests, but also pastures struggle with water shortages.

In Kochkor district of Naryn region, this phenomenon is aggravated by dry winds constantly blowing there, further drying up the soil. This was the main reason why the area was selected as a pilot one in the FAO/ GEF project.

“We work in close cooperation with the Ministry of Agriculture of the Kyrgyz Republic, research institutions and numerous national partners, local authorities and pasture committees, so that to contribute to the transition of farmers to sustainable approaches in management of natural resources,” said Mahmud Shaumarov, Regional Project Coordinator.

““With the support of the project, interdepartmental cooperation in the pasture and water use sector is being strengthened, effective approaches of climate-smart agriculture are being introduced, and the capacity of pasture committees is being built up,” he said.

The project is helping to build bridges that provide the shortest path for livestock to distant pastures, and to build dams that can help villagers regulate water supplies, including protection of their fields and communities from seasonal flooding.

In cooperation with pasture committees, fences have to be installed in pastures to prevent cattle from descending into the valley and destroying crops in the fields. Active work continues with pasture users on the rational use of natural resources and the return of the practices of traditional pasture turnover, which were used in the country from ancient times until the collapse of the Union.

FAO is also encouraging farmers to gradually switch to high-yield livestock breeds, which will significantly reduce their number while increasing agricultural production, which will largely reduce the rate of animal trampling.

“At FAO, we fully support the use of alternative energy sources, replacement of non-renewable energy sources with renewable ones, thus contributing to the rational use of water resources and the socio-economic development of the regions, preservation of ecosystems and biological resources”, stressed Adnan Qureshi, FAO Representative in Kyrgyzstan.

Natural hazards should not escalate into full-scale disasters, while disaster risks can be reduced

In Tajikistan, FAO presented a study on disaster risk reduction in agriculture

April 28, 2021, Dushanbe, Tajikistan. Results of a comprehensive analysis of disaster risk reduction in agriculture in Tajikistan were presented to the public last week.

The event was hosted by the Food and Agriculture Organization of the United Nations (FAO) in partnership with the Committee for Environmental Protection under the Government of the Republic of Tajikistan, FAO's national partner in the country.

Mountains cover 93% of the country's territory, exposing Tajikistan to numerous threats of natural disasters and catastrophes. Mudflows, avalanches, flow slides, earthquakes, landslides and floods severely damage agriculture, depriving farmers of their livelihoods from year to year and endangering food security, nutrition and ecosystems of the country.

According to experts, the frequency and intensity of these phenomena will only increase under the influence of a changing climate. Authors of the study emphasize that accounting for almost 20% of the country's GDP, the agricultural sector of Tajikistan can be largely affected by climate change, including due to the degradation of fertile soil, increased droughts, a reduction in fresh water and accelerated desertification.

Agriculture faces a number of problems and obstacles even now, such as erosion, deforestation, waterlogging and salinization, as well as inefficient use of water resources. Rising temperatures also result in uncontrolled hatching of the gregarious locust, presenting a serious danger for Tajikistan's agriculture.

Authors of the study also emphasize that notwithstanding that Tajikistan has a unified public system of preparedness for emergencies, and drills and training sessions are conducted on a regular basis, the country does not yet have an early warning system aimed at rural economy, that is, no government agency in the country is directly responsible for assessing and reducing disaster risks in one of the key sectors of the Tajikistan economy.

The document suggests a number of recommendations aimed at improving the early warning system and response to emergency situations in agriculture, including in the field of the regulatory/legal framework, institutional system and coordination mechanisms, improving agrometeorological services and mechanisms to reduce risks of natural disasters.

“Hazardous natural phenomena should not develop into full-scale disasters, while disaster risks can be reduced and managed,” said Daler Domullojanov, Project Manager in Tajikistan, during the presentation of the report.

"An effective evidence base on the impact of natural phenomena on agriculture and food security, efficient early warning systems and substantial public investment can be key to ensuring sustainable agricultural development in the context of climate change, he said.

online as well as coordinators of CACILM2 Project in Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan. The report was prepared in cooperation with FAO/GEF Project ""Integrated Natural Resource Management in Drought-Prone and Saline Agricultural Production Landscapes of Central Asia and Turkey" (CACILM-2). Similar reports and activities related to discussion of results of a comprehensive analy-

Representatives of major ministries and departmental agencies associated in their activities with disaster risk reduction in the agricultural sector of Tajikistan, took part in the presentation of report; representatives of the FAO Regional Office in Budapest also participated

sis are conducted in other countries of Central Asia and FAO publishes them pending agreement with stakeholders.

To make life better: the story of Manzura Khodzhaeva from the Rudaki jaomat of the Vakhsh region

Notwithstanding her youth, Manzura enjoys well-deserved respect among her fellow villagers in the Rudaki jaomat of the Vakhsh region.

She was born in a large family, where everyone worked hard in order to provide food. Therefore, even during her studies, together with other children, Manzura helped parents in the field.

After graduating from school, on the advice of her elders, Manzura entered a medical school as her parents considered that to be a nurse is respectful, and a doctor in the family will always be an advantage.

While attending medical school, the girl married a fellow villager Jumanazar, whose family was even larger. Being a nurse in a rural dispensary, she also had to work with the rest of her husband's family in the field.

At the family council, which brought together parents from both sides, as well as Manzura and Jumanazar, it was decided to set up a farm "Abdullo" for the young couple.

At first, they grew cotton on 3 hectares having a good harvest and receiving income. However, over time, the harvest was declining and it became increasingly difficult to recoup the costs of growing a labor-intensive crop. Together with her husband, Manzura thought more frequently that it was necessary to quit with monocrop and grow various vegetables and legumes, which are in good demand, but they lacked knowledge and experience.

FAO/GEF Project “Integrated natural resource management in drought and salinization prone agricultural production landscapes of Central Asia and Turkey” was a great piece of luck for both the Manzura family and many other households in her village.

Since the first days, Manzura got involved in the work on the project, participated in all seminars and trainings, because they always talked there about solving vital issues of farming, how to take care of land, which crops will bring the greatest income. There, Manzura learned about gender equality, and at one of the meetings she was unanimously elected the leader of a women's farming group, which included 26 rural women.

The wishes of the owners of the "Abdullo" farm have finally became a reality, because for the third year, the farm has been growing safflower, which is in great demand in the market, as well as a variety of vegetables and legumes. Manzura continues working as a nurse in a rural out-patient clinic and farming together with her family.

As a leader of a women's group, Manzura often meets with other women in the field, teaching them how to obtain better harvests, care for different crops and make women's voices heard both in the family and in the community. The FAO project supported Manzura's team with 2 hectares of safflower seeds and 3 hectares of mung bean seeds.

Using the advice and recommendations of the project specialists in growing crops in a real-case situation, each household belonging to this group of a young farmer increased the income from the harvest by an average of 30%.

Now there is a field farm school in the village, which includes many farmers, because people saw what useful knowledge can be obtained by participating in school activities. The villagers began to help each other spending more efforts to jointly solve social issues and tasks.

“My goal is to become an even more successful farmer,” says Manzura. I also want to share my knowledge with other people, so that to make life better”.

Modern knowledge and technologies help to increase productivity of desert pastures

Turkmen researches received equipment that will help them to pursue science more effectively

Throughout their history, the human race has faced the onslaught of the sands and is learning to resist the processes of desolation.

In the context of climate change, when familiar and predictable natural phenomena, including drought, salinity and freshwater deficit, become more acute and their impact threatens the well-being and food security of the population, scientists' accumulated knowledge and modern technology come to the rescue.

Researchers at the Karykul station of the National Institute of Deserts, Flora and Fauna of the Ministry of Agriculture and Environmental Protection of Turkmenistan, observing natural phenomena and conducting a huge amount of scientific and experimental research, received a powerful electric generator and a photovoltaic system in June 2021.

This equipment helps them care for and monitor the development and adaptation of dozens of thousands of seedlings of various desert plant species. It will also be used to help them more successfully conducting comprehensive activities to identify effective methods of fixing shifting sands, including through phytomelioration.

It is envisaged to develop technology to increase the yield of desert pastures, including through artificial irrigation, i.e., the equipment obtained by the station will make it possible to lift fresh water from great depths and use it to irrigate grazing areas.

The equipment obtained by the facility will make it possible to lift fresh water from great depths and use it for irrigation of grazing areas.

In addition, modern equipment will help to carry out a number of scientific and experimental studies to determine the mechanical and mineralogical composition of sands, study of samples and fractions of sand and seeds of psammophytes (plants adapted to life on moving sands), establish an independent power supply for houses, laboratories, utility rooms and other facilities of the Karrykul station to ensure its effective operation.

The equipment was delivered in cooperation with the Ministry of Agriculture and Environmental Protection of Turkmenistan.

Close cooperation of the project with the Karrykul facility will allow to expand planting and preparation of psammophyte plants, white and black saxaul, cherkez, kandym, sand acacia for fixation of shifting and technogenic sands and increasing the productivity of degraded desert pastures, creating protective forest belts around wells and settlements.

This planting stock will be used for landscaping territories around houses, administrative buildings and schools. In addition, it is planned to conduct practical training sessions at Karrakyl facility and train local communities to do phytomelioration works, methods of fixing shifting sands and desert planting technologies for restoration of degraded desert pastures. One of the Farmer Field Schools (FFS) in Turkmenistan will also be established there.

Sustainable land management and methods to combat land salinization: webinar held in Ashgabat

The aim of the webinar was to introduce various technologies and methods of combating salinization of irrigated lands to specialists working in the agricultural sector. The webinar was attended by about thirty representatives of state organizations and departments of Turkmenistan, including representatives of subordinate organizations of the Ministry of Agriculture and Environmental Protection, the State Committee for Water Resources of Turkmenistan, the Turkmen Agricultural University named after S.A. Niyazov, the Union of Industrialists and Entrepreneurs, as well as representatives of international projects of the Ministry of Agriculture and Environmental Protection of Turkmenistan, jointly implemented with international organizations.

The national seminar was opened by Mergen Yusupov, National Project Coordinator, Deputy Head of the Department for Coordination of International Cooperation and Projects of the Ministry of Agriculture and Environmental Protection of Turkmenistan, who thanked the participants for their attendance and briefly spoke about the goals and objectives of the regional CACILM2 project and activities planned at the national level.

Rakhmanberdi Khanekov, National Project Manager, introduced webinar participants to the goals and objectives of this event, followed by A.Agadzhanov, National Project Expert on combatting land salinization, who delivered a presentation “Methods to reduce the salinity of agricultural lands.”

K.Ovezmuradov, National Project Expert on sustainable management of water resources spoke about effective methods and technologies in management of water resources on irrigated lands to prevent and reduce impacts of draught and salinization.

Then, A.Agadzhanov, National Project Expert on combatting land salinization, spoke about methods and benefits of GIS technologies for mapping the indicator of lands salination. Participants were introduced to effective methods and technologies for combating land salinization and best practices in this area. The problem of salinization/ degradation of irrigated lands is very acute for Turkmenistan due to agricultural specialization and the priority of ensuring the country's food security. In this respect, Turkmenistan is actively working to reduce the harmful effects of climate change processes by introducing technologies and innovations for sustainable management of water and land resources.

Representatives of Turkmen Agricultural University in Ashgabat and Turkmen Agricultural Institute in Dashoguz expressed their high interest towards activities aimed to implement goals of the project and suggested close cooperation with the project on different methods of combatting lands degradation, especially in the field of mapping agricultural saline lands using GIS technologies and experience gained in this field.

National Coordinator and National Project Manager underlined the importance of cooperation with the abovementioned Universities in order to organize mutual activities on extension of knowledge related to methods and technologies to combat salinization of lands, training employees for agricultural sector and providing consultative assistance to agricultural producers.

GIS laboratory launched in the Tashkent State Agrarian University

The opening ceremony of a new laboratory of geoinformation systems (GIS), set up with the support of the project, was held at the Tashkent State Agrarian University. The new GIS laboratory is equipped with the most modern computers, server, data center, plotter and GPS equipment.

The opening ceremony was attended by Academician Botir Sulaimonov, Rector of Tashkent State Agrarian University, Alisher Shukurov, Advisor to the Minister of Agriculture of the Republic of Uzbekistan, and Mahmud Shaumarov, Regional Project Coordinator.

After the opening session, project experts delivered presentations on the goals and objectives of the new GIS laboratory, as well as on principles of its operations. Students, postgraduates and university staff were introduced to capacity of the new GIS laboratory equipped at the state-of-the-art level having software for mapping.

"The purpose of establishing a GIS laboratory at TSAU under the regional FAO-GEF project is to assist the University in the training of highly qualified personnel and specialists in the field of mapping lands, forests, water resources and climate change processes, contributing to the implementation of the state program on the development of an information and advisory service for the evolution of agriculture in the Republic, as well as support in the implementation of the UN Convention to Combat Desertification and the UN Framework Convention on Climate Change. We hope that teachers, postgraduates and students of the University, as well as our farmers and land users will actively study and use GIS technologies and widely apply them in practice for mapping and analysis of degradation of natural resources aimed to improve their sustainable management", said Mahmud Shaumarov, Regional Project Coordinator.

The GIS laboratory will also serve to monitor land use changes, apply tools to mapping land degradation trends in Uzbekistan, and facilitate the implementation of LDN projects.

Botyr Sulaimonov, Academician, Rector of Tashkent State Agrarian University, noted: "Introduction of innovative technologies is imperative. Modern geographic information systems are a powerful tool for all areas of research, both for scientific and industrial purposes. We are grateful to FAO for setting up a new GIS laboratory, which opens up great opportunities in this field, both for students, specialists and farmers."

Geographic information technologies make it possible to map land degradation processes, develop efficient and operational information systems for soil analysis, obtain fast and high-quality information about the analyzed area, open up a number of opportunities for conducting research on long-term monitoring, and will also contribute to Implementation of Land Degradation Neutralization (LDN) Projects.

Thus, GIS and spatial data analysis are indispensable tools for conducting research and practical works. In this regard, GIS laboratory will be used as a training center for students, practitioners and farmers, as well as in scientific research.

Partners of the Project in Uzbekistan are the following institutions: Ministry of Agriculture, Ministry of Water Resources, State Committee of Forestry of the Republic of Uzbekistan, as well as Center of Hydrometeorological Service of the Republic of Uzbekistan (Uzhydromet).

Skills to use geographic information systems (GIS) is a demand of time.

FAO organized a workshop on GIS technologies in TASU

The Tashkent State Agrarian University held a series of classes for master's students, postgraduates and teachers on the topic "Tools for monitoring and assessing the condition of land resources".

Training workshops were held in the recently opened laboratory of geographic information systems (GIS) at the university, which was set up with the support of the project.

The Geographic Information System is an impressive digitalized database. They are geographically detailed layers linked to a specific coordinate system.

Using GIS technologies, one can find any place in the world, track the movement of almost any object. One of the tasks that GIS technologies can perform is data visualization, whereby one can get maps, graphs, tables and even photographs of the specific area.

"These data are of great importance for scientific research, as well as for operations of individual organizations and companies. Therefore, participation in this seminar will increase the capacity of master' students, postgraduates and teachers of the Tashkent State Agrarian University to improve their work.

New GIS laboratory, set up with the support of FAO, is equipped with state-of-the-art computers, server, data center, plotter and GPS equipment. All this provides new opportunities for introducing innovative technologies in the agricultural sector," said Sherzod Umarov, Deputy FAO Representative in Uzbekistan.

During training, national and foreign experts provided general concepts about the tools of various geographic information systems. During practical sessions, the workshop participants learned to work with such innovative platforms and applications, such as Trends Earth for monitoring land degradation, Collect Earth for assessing deforestation and various forms of land use, Earth Map for visualizing, processing and analyzing data on climate, vegetation, fires, biodiversity and other geosocial topics.

Thus, GIS technology is not just a collection of systematized knowledge, it is a special viewpoint at the surrounding world. Nowadays, they are used everywhere, i.e. in woodworking, construction, cartography, ecology, seismology, etc.

Aziz Nurbekov, FAO expert on draught risk management, noted: "GIS technologies present an entire industry that today has an impact on almost all spheres of life. Their role is especially great in agriculture. Thus, for instance, with the help of GIS technologies it is possible to analyze the relations between the soil type, climate and yield of certain crops, thereby developing more efficient methods of work, saving sufficiently large funds."

“My family is happy, says Muzaffar Zhovkiev from Kamashinsky district of the Kash-kadarya region of Uzbekistan. Thanks to FAO, we have a lucrative business and we 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, accustomed to painstaking, often hard work, suddenly lost his job due to lockdown restrictions.

The company where he was employed as a construction worker suspended some of its activities indefinitely. Confidence in the future has wavered because of three minor children, the younger ones are still very small, and it will soon become very difficult to support the family.

All of a sudden, the usual way of life changed dramatically, schools were

closed, as if everything around froze for a while. Requirements

“Stay at home”, introduced to stop the spread of COVID-19, were certainly important for health of people, but for some it meant a loss of income and limited access to food.

Being an enterprising soul 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, social subsidies received by his household were sufficient only for emergency needs.

Muzaffar worked hard in the garden and in the fields before, earning a seasonal income. However, now that he lost his main job, the most important was the stability.

Muzaffar was once informed that he became one of the beneficiaries of a GEF/FAO project that supported rural people in response to the global crisis caused by the COVID-19 coronavirus pandemic.

Muzaffar and his family will remember for a long time that remarkable day when specialists came to their home and installed a new spacious greenhouse at their plot.

Children looked with interest at the unusual blue house stretched out in the backyard, and Muzaffar was already making far-reaching plans,

preparing for sowing, cleaning the soil, applying fertilizers, choosing seedlings. True, there was a lot of work ahead, but now he had hope and the opportunity to receive a good, stable income.

His wife shared his enthusiasm and she already had experience in greenhouse farming in the past; when she was young, she helped her family working in the greenhouse, taking care of plants, controlling humidity, temperature, plant health and soil condition.

Indeed, she was very happy that she could use her knowledge and skills in practice. Together with her husband, they discussed the plan of actions and immediately got down to business. Work was boiling.

Currently, the family grows tomatoes, dill, spinach, coriander, radishes, green onions. The family received their first harvest of greenery already in mid-March. The products were successfully sold in the local market, since greenery occupies a special place in the national cuisine

In 2020, in support of the rural households, who faced certain challenges during the lockdown period, FAO donated 31 water pumps, 10 motor-cultivators, as well as 30.000 seedlings of tomatoes, cucumbers, eggplants, peppers and 10.750 kg of mineral fertilizers to the residents of Bukhara district of Bukhara region and Kamashin district of the Kashkadarya region. Currently, the project continues to provide assistance to rural people and contributes to ensuring food security.

The ongoing crisis clearly demonstrates that food security is a critical factor of proper living standards of the population, the viability of economic structure and public system of each country. FAO's support makes rural people more resilient to external shocks, while their own efforts and drive to succeed enable them to achieve more.

of Uzbekistan and is always in demand. It is impossible to imagine a traditional Uzbek table without greenery.

“I sell greenery in the market and receive about 100.000 soums a day. My family is happy, thanks to FAO project we are doing a profitable business and we can count on additional income for the household, which is very important in this difficult time. Moreover, we provide food for our family. Currently, we tend tomatoes and hope to get a good harvest,” says Muzaffar Zhovkiev.

The eldest Muzaffar’s daughter also actively helps her parents with the housework, especially now that there are so many new worries. In future, the girl dreams of becoming a seamstress, she is fond of sewing, national embroidery, ornaments. Now the family has the opportunity to support her hobby, to buy a sewing machine, fabrics and much more needed for this activity.

Muzaffar became the owner of one of 34 greenhouses donated in January this year to low-income households in the Bukhara and Kashkadarya regions of Uzbekistan and installed in their homestead plots under the FAO/GEF project.

The support provided to rural people is part of the socio-economic response to the global coronavirus crisis caused by the pandemic. Beneficiaries were identified in agreement with local authorities based on "Iron notebook", i.e. a list of people in need of social protection.

Greenhouse is a stable income in times of pandemic

The family of Khushvakt Khusinova living in the Bukhara district of the Bukhara region has five children. In rural areas, there are not so many sources of income, and moreover, lockdown restrictions were introduced with the onset of the pandemic.

Khushvakt's husband, Sanzhar Rakhimov, who had previously traveled to Russia to earn money, this time could not go. The family got into difficulties. Khushvakt once worked at a textile mill, but for many years she was a housewife with five children and housework taking up all her time. Unstable income of the spouse, who has now begun to take up seasonal work, teach local children the craft according to the principle

"ustoz-shogird" (teacher-student), did not allow to cover all needs.

This is how the family ended up in an "iron notebook" - a list of those who were unemployed during lockdown and in need of social protection, and then they became a beneficiary of the project. As part of the project, rural residents of Bukhara and Kashkadarya regions, who, due to lockdown, got into the "iron notebook", received 34 greenhouses free of charge. The aid has become part of the socio-economic response to the global crisis caused by the COVID-19 coronavirus pandemic.

"We were all very happy when people came to our house to install a large spacious greenhouse, saying that it would serve as a new source of income for us all year round," says Khushvakt. "I have not been involved in greenhouse management before, but nevertheless, I noticed that the construction is 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 only up to us to get as much benefit as possible from the new greenhouse."

As hardworking people, Khushvakt and her husband actively set to work. According to the recommendations of FAO experts, the first thing to do was to plant greens, i.e. spinach, coriander, dill. As newcomers to the greenhouse industry, they turned to more experienced neighbors, contacts, learned from practice, and when the first harvest ripened, they quickly and profitably sold the greens in the market. At first, it was at least a small but tangible help to the household, however, later, things went uphill. They planted the second batch: cucumbers, tomatoes, green onions. The profit from the sale has grown, and fresh vegetables, grown with their own hands, have been included in their nutrition.

"Stable income from the greenhouse allowed us to solve many problems. We have gained confidence in our future. Our daughters also need money to continue their education. The elder one is now preparing to enter the University and will be taking her entrance examinations this year. She dreams of becoming a doctor," says Khushvakt.

Meanwhile, in a neighboring 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 done.

"We got our first harvest back in the middle of March. By selling the greens grown in the greenhouse, we made about 5 million soums. This is a significant help to the household. In September, we hope to grow more greens and bell peppers.

What's most important is that there is a stable source of income. Every square foot of our land is priceless, and we work for our own welfare," says Feruza with confidence, for whom the dark time is in the past.

Indeed, there were plenty of difficulties. Due to health problems, Feruza's husband was granted the 1st degree disability. Having previously worked at a cotton mill, she had to leave her work to look after her husband. Of the three sons, 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 is no one else to look after the household.

Let alone restrictions that have avalanched due to the coronavirus pandemic. Therefore, the spouses received the news about the transfer of the greenhouse to their household with great pleasure. Now, having already mastered the greenhouse industry after gaining the necessary knowledge and skills, Feruza plans to get even more profit from her greenhouse and grow fresh vegetables all year round. Apparently, the difficulties did not break her, on the opposite, they gave resilience to this strong-willed woman. Optimism shines in her eyes, and her diligence leaves no doubt about the successful implementation of all the plans.

On the whole, the development of the greenhouse industry, the expansion of the range of vegetable products contribute to an increase in domestic production of vegetables, to meeting the needs of the country's population for high-quality products all year round. For many, due to circumstances, greenhouses have become the optimal solution for earning incomes. FAO and partner organizations make sure that no difficulties and life situations become an obstacle to the well-being and satisfaction of needs of rural people.

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