

# CACILM II

Knowledge Sharing Platform [www.cacilm.org](http://www.cacilm.org)

## Sustainable Land Management in Central Asia

### Achievements at a glance



Knowledge Management  
in Central Asian Countries Initiative  
for Land Management, Phase II



## Copyright and Fair Use

© ICARDA 2016



This publication is licensed for use under the Creative Commons Attribution–Noncommercial–Share Alike 3.0 Unported Licence. To view this licence, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>.

Unless otherwise noted, you are free to copy, duplicate, or reproduce and distribute, display, or transmit any part of this publication or portions thereof without permission and to make translations, adaptations, or other derivative works under the following conditions:



**Attribution:** The work must be attributed, but not in any way that suggests endorsement by the publisher or the author(s).



**Non-commercial:** This work may not be used for commercial purposes.



**Share Alike:** If this work is altered, transformed, or built upon, the resulting work must be distributed only under the same or similar license to this one.

## Acknowledgements

This magazine summarizes the key activities and achievement of the IFAD-funded regional project Knowledge Management in “Central Asian Countries Initiative for Land Management” Phase II (CACILM II), initiated and led by ICARDA within the frame of CGIAR Research Program on Dryland Systems in 2013-2016. The work of many researchers and regional partners contributed to the success and achievements of the project in Central Asia. Special thanks for continued support to project focal points Prof. Nurali Asozoda (President of Tajik Academy of Agricultural Sciences), Dr. Nurlan Duysheev (State Secretary of Kyrgyz Ministry of Agriculture and Melioration), Allamyrat Geldiev (Deputy Director for Research of Turkmen State Water Management Scientific Production and Design Institute), Prof. Ramazon Kuziev (Director of the Institute of Soil Science and Agrochemistry of Uzbekistan), Prof. Abdulla Saparov (Director General of Kazakh Research Institute of Soil Science and Agrochemistry), Acad. Izzatullo Sattori (Minister of Agriculture of Tajikistan).

Below are those who contributed to the project's work listed in alphabetical order within each activity:

**Knowledge Synthesis and Generation:** Dr. Gulmira Elemanova (Chief Specialist, Ministry of Agriculture and Melioration of Kyrgyzstan), Dr. Tosh Nazrulloev (Deputy Director of Tajik Research Institute of Farming), Dr. Ashyrmuhammet Saparmyratov (Chief Expert of Academy of Sciences of Turkmenistan), Prof. Maruf Tashkuziev (Head of Department of Uzbek Research Institute of Soil Science and Agrochemistry), Dr. Gulnara Tokseyitova (Head of Department of Kazakh Research Institute of Soil Science and Agrochemistry).

**Knowledge Packaging and Dissemination:** Dr. Nodir Abdurakhmanov (Head of Department of Uzbek Research Institute of Soil Science and Agrochemistry), Dr. Amanjol Atakanov (Deputy Director of Kyrgyz Research Institute of Irrigation), Dr. Dovlet Kadyrov (Head of Laboratory of Turkmen State Water Management Scientific Production and Design Institute), Acad. Davlatjon Komilzoda (Chief Scientific Secretary of Tajik Academy of Agricultural Sciences), Prof. Dossymbek Sydyk (Head of Unit of Kazakh Southwestern Research Institute of Livestock and Plant Science).

**Using Knowledge in Policy Dialogue:** Dr. Myrzabek Batyrkanov (Dean of Faculty, Kyrgyz National Agrarian University), Akmal Kosimov (Uzbekistan), Kamoliddin Kurbonov (Head of Department of Tajik Ministry of Agriculture), Dr. Azimbai Otarov (Head of Unit of Kazakh Research Institute of Soil Science and Agrochemistry), Dr. Charyyar Taganov (Head of Laboratory of Turkmen State Water Management Scientific Production and Design Institute).

**CACILM II Management Team:** Dr. Akmal Akramkhanov, Project Coordinator; Timur Ibragimov, Project Research Assistant, Narimon Nishanov, Field Research Coordinator, Sanobar Khudaybergenova, Communications Specialist.

**CACILM II Partners:** Central Asian NARS, GIZ, FAO, WOCAT, World Bank.

**Design and Layout:** Sherzod Kosimov (CGIAR Program Facilitation Unit), Sanobar Khudaybergenova, Azamat Atadjanov.

**Photographs:** All photographs by CACILM II team unless otherwise credited.

**Feedback:** CACILM II welcomes comment and feedback on this publication: [A.Akramkhanov@cgiar.org](mailto:A.Akramkhanov@cgiar.org) [www.cacilm.org](http://www.cacilm.org)



# Contents

## Synthesis of SLM for farmers



**8** More than 90 sustainable land management practices, systematized and tested in all five countries of the region.

## Winter chickpea in rainfed areas



**10** Cultivation of winter chickpea is a new practice in Uzbekistan.

## A source of income and a tool for land-improvement



**12** Pistachio tree can serve as an alternative source of income for farmers in rural drylands.

## Efficient fodder production in rangelands



**15** Some 40 percent of desert rangelands in Uzbekistan are degraded to varying degrees.

## Raised bed planting in irrigated lands



**16** The raised-bed technology has been implemented in Southern Kazakhstan since 2003 mainly in seed producing farms.

## New equipment to help farmers



**17** New technologies are helping farmers in Central Asia reduce manual labor, cut fuel costs and application of seeds.

## Similarity analysis helps



**19** Similarity maps are a tool to decide the relative importance of each agro-ecosystem and technologies to be out-scaled with high potential of being adopted.

## Adapting regional agriculture to climate change



**21** Central Asia is expected to experience significant levels of climatic changes over coming decades.

## Rural advisory services in Central Asia



**24** Knowledge Management project works on exploring and developing the best ways to channel agricultural innovations to farming community.

## Law on rangelands is an urgent necessity



**26** Unsystematic and excessive load on rangelands has led to strong processes of land degradation and put pressure on rangeland resources in Uzbekistan.

# Foreword



Land degradation is a serious threat that is being exacerbated by climate change in the transition economies of Central Asia. It directly affects the livelihoods of the rural population by reducing the productivity of land resources, and adversely affects the stability, functions, and services derived from natural resources.

In 2013, the International Fund for Agricultural Development endorsed a three-year regional grant to the International Center for Agricultural Research in the Dry Areas (ICARDA), to support the second phase of Central Asian Countries Initiative for Land Management (CACILM) by building a knowledge platform to consolidate knowledge and for scaling-up sustainable land management (SLM) interventions.

By focusing on the synthesis, packaging and dissemination of knowledge on SLM practices in Central Asian countries, the project has been facilitating widespread uptake by a diverse group of stakeholders, in particular farmers and other land users, as well as policy makers.

The main aim of CACILM II project was to improve rural livelihoods dependent on natural resources, contribute to reducing land degradation and restoring productivity in the region, deliver solutions to help communities adapt to climate change, as well as facilitate the scaling-out of proven technologies across similar agroecosystems of the region.

CACILM II targeted four main agroecosystems in the region – rainfed cropland, irrigated agriculture, mountain ecosystems and rangelands – and produced recommendations on how SLM interventions can best be scaled up. Researchers worked with target groups, including policy makers, responsible for SLM in each country, rural-development agencies, farmers' organizations and international donor community active in Central Asia.

The CACILM II experience positively influenced all those involved and we hope that these relationships continue. On behalf of ICARDA, I would like to express great appreciation to IFAD for financial support and to all partners for their valuable contribution in making CACILM II a success.

**Dr. Mahmoud Solh**  
**Director-General, ICARDA**



# An efficient platform for knowledge sharing



## Regional challenges

**L**and degradation is a serious economic, social and environmental problem in the transition economies of Central Asia countries of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. It directly affects the livelihood of the rural population by reducing the productivity of land resources and adversely affecting the stability, functions and services derived from natural systems.

Agricultural yields are reported to have declined by 20-30 percent across the region since these countries achieved independence two and a half decades ago, annual losses of agricultural production from soil salinization alone are estimated at USD 2 billion. The causes of land degradation are multiple, complex and vary across these countries, but are largely attributable to the abuse and over-exploitation of the natural resource base, particularly through inappropriate and unsustainable agricultural practices, overgrazing, deforestation, forest degradation and natural disasters.

The principal forms and causes of land degradation currently experienced across the Central Asian countries include: (i) erosion, salinization and water logging; (ii) deteriorating productivity of rangelands; (iii) decrease in fertility of the arable drylands of the steppes; (iv) decreased area and productivity of forests; (v) on-site and off-site impacts of mining operations; (vi) exacerbated risks from landslides and flooding due to poor watershed management; (vii) reduced stability and functioning of desert, mountain, wetland and riparian ecosystems; and (viii) inadequate and incorrect assessment and monitoring of land degradation.

## Knowledge for sustainable land management

The Knowledge Management in CACILM II (Central Asian Countries Initiative for Land Management) project, initiated in 2013 with the support of IFAD, has been contributing to building a knowledge platform in the region to consolidate knowledge created for up-scaling and out-scaling sustainable land management (SLM).

Target areas for the project are four agro-ecosystems present in all five countries that represent important environments for human livelihoods. These agro-ecosystems comprise: (i) irrigated agriculture, covering a relatively small area of about eight million hectares, but at the same time providing most of the agricultural products in the region; (ii) mountains, constituting over 90% of the area of Kyrgyzstan and Tajikistan; (iii) rangelands, constituting the largest portion of land resources in Kazakhstan, Turkmenistan, and Uzbekistan; and (iv) rainfed.

Demonstration sites continue to be the major part for SLM validation and knowledge dissemination. A total of three-four sites per country were maintained and used to demonstrate advantages of selected SLM to producers, local authorities and mass media (see map).

To date, the project has gathered and systematized more than 90 SLM practices applicable to four main agro-ecosystems of the region: rainfed, irrigated, mountains and rangelands (see pages ...). Most of these practices have been tested at demonstration sites in each of the five countries.

The project has also prepared and disseminated recommendations on cultivation of cereal crops using zero tillage and winter wheat using raised-bed technology, as well as factsheets on these technologies. All of these resources are available on the project website.



## Partners

### Collaborating Institutions in Central Asia

- < **Kazakhstan** – Kazakh Research Institute of Soil Science and Agrochemistry; Southwestern Research Institute of Livestock and Plant Science
- < **Kyrgyzstan** – Ministry of Agriculture and Melioration; Kyrgyz Research Institute of Irrigation; Kyrgyz National Agrarian University
- < **Tajikistan** – Tajik Academy of Agricultural Sciences; Research Institute of Farming
- < **Turkmenistan** – Academy of Sciences; Turkmen State Water Management Scientific Production and Design Institute
- < **Uzbekistan** – Research Institute of Soil Science and Agrochemistry

### International Partners

- < GIZ
- < FAO
- < WOCAT
- < World Bank

## CACILM II key results

### SLM knowledge base

- < 10 technologies complemented
- < 90 compiled (75 technologies, 15 approaches)
- < Knowledge platform [www.cacilm.org](http://www.cacilm.org) re-launched

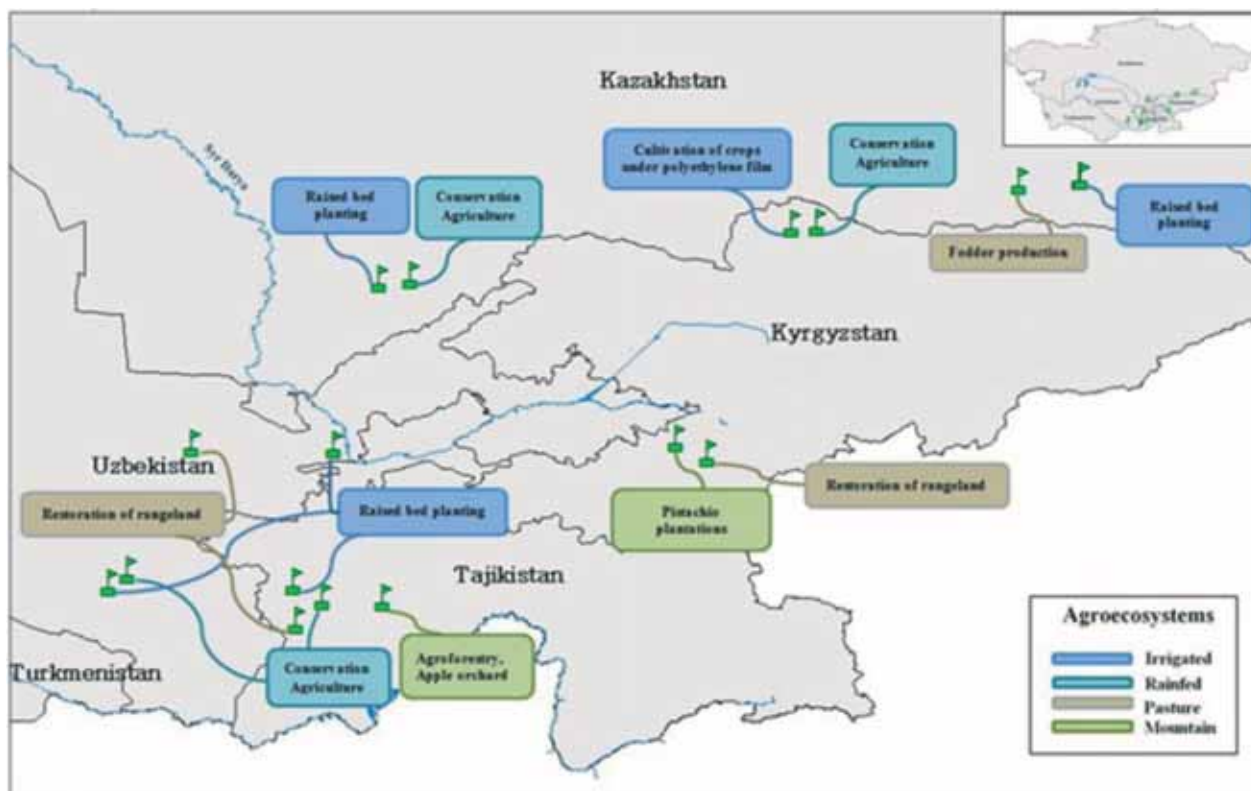
### Capacity building

- < 24 field days – 810 attendants
- < 12 workshops – 591 participants
- < 5 regional trainings – 80 staff engaged across partner institutions
- < 29 publications – English, Russian, Kyrgyz, Tajik, Uzbek
- < 40 videos – over 10 of which shown on Kazakhstan, Tajikistan, Uzbekistan TV channels

### Socioeconomic assessment

#### Policy-briefs on:

- < Repositioning agricultural innovation systems in Central Asia
- < Agrarian reform in modern Uzbekistan: how to support paradigm shifts to SLM practices
- < Economics of land degradation in Uzbekistan
- < Impacts of climate change on Central Asian agriculture
- < Addressing land degradation in Central Asia: challenges and opportunities



Project demonstration sites

## Selected Agroecosystems

- < **Irrigated agroecosystems:** focused on raised-bed technologies for improved irrigation and water saving, soil fertility and reduced soil salinity;
- < **Rainfed agroecosystems:** focused on minimum and zero-tillage to improve productivity, optimize the use of resources, reduce erosion and initiate crop diversification;
- < **Mountain agroecosystems:** focused on agro-forestry and afforestation through the implementation of structural interventions such as terraces and stone bunds and the inter-cropping of orchard crops with cover crops;
- < **Rangeland agroecosystems:** focused on pasture improvement for improved vegetation cover and reduced degradation and geo-informatics to monitor the status and improvement of rangelands.

## Project Activities

- < Disseminating information via a specially-created website – [www.cacilm.org](http://www.cacilm.org) – which promotes innovations, shares data and synthesizes findings
- < Involving and training target groups to use, and contribute to, CACILM knowledge platform
- < Promoting proven solutions, technologies and policies
- < Informing and engaging user groups through strategic outreach campaigns



# Best SLM practices for farmers



Land degradation in Central Asian countries is a serious threat, particularly considering the sizeable share of agriculture in these countries' GDP. Causes of land degradation are not only in irrational use of water resources, but also in the legacy of the pre-independence (pre-1991) system of land management when maintenance of soil health was considered least. Among different types of degradation soil salinization, erosion, and desertification are prevalent in Central Asia from such causes as high water losses from irrigation networks and overgrazing.

In its effort to consolidate existing (indigenous) knowledge and practices on sustainable land management (SLM) used by local agricultural producers, as well as promote their outscaling, Knowledge Management in CACILM II project has gathered and systematized more than 90 practices. Most of these practices, applicable to four main agro-ecosystems of the region: rainfed, irrigated, mountains and rangelands, have been tested at demonstration sites in each of the five countries: Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

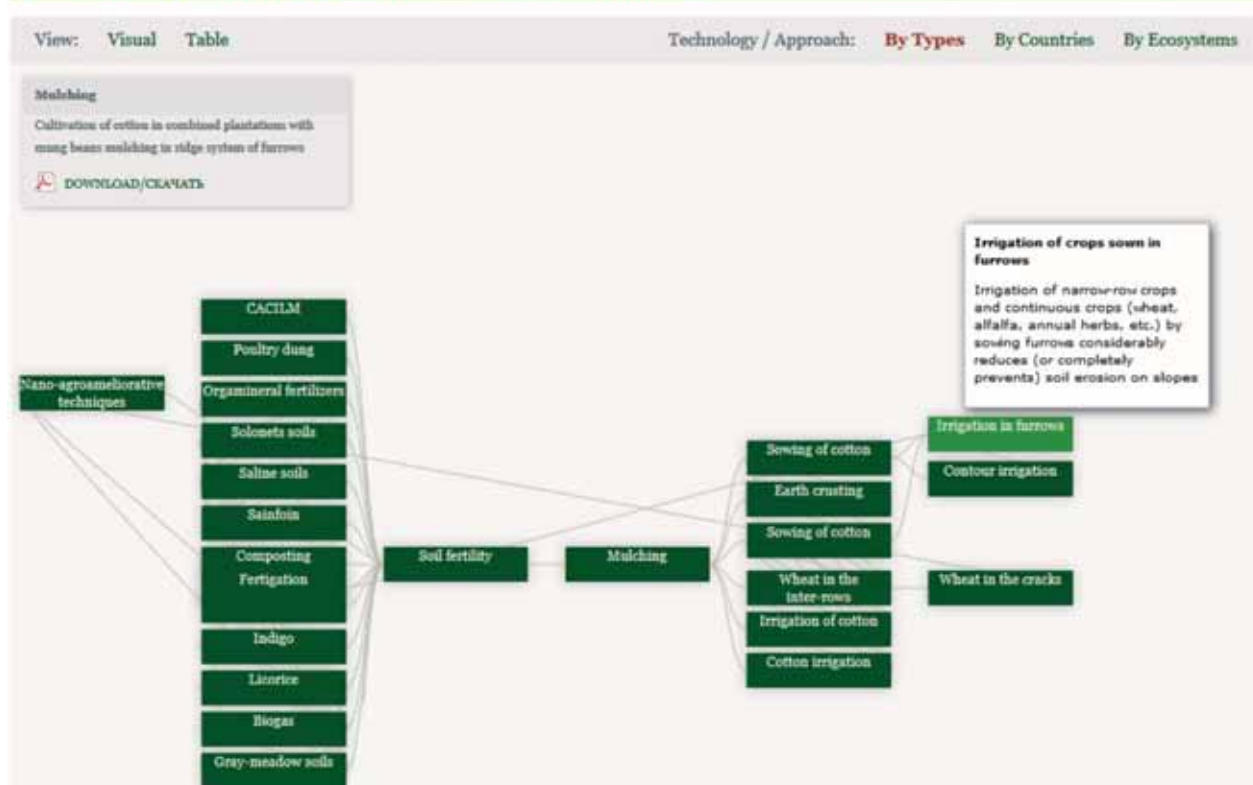
In Kazakhstan, the project team approached research institutes within the Ministry of Agriculture, and organized meetings with heads of farms. General observation was that majority of small- and large-scale producers in the country use crop production techniques

developed for particular agriculture zone (termed as zonal system), originating or developed mainly during the Soviet period. The national team identified and described two technologies which were developed or adapted by farmers: cultivation of maize and soybeans that have potential to reduce land degradation through effective use of inputs. These described technologies include seed treatment with 'adaptogens' that increase crop yields by 25-30% and have very high irrigation water saving potential when combined with drip irrigation. These technologies are applicable to the other regions of Central Asia.

In Kyrgyzstan, national team visited farms in the north and south regions of the country. Farmers use traditional agricultural technologies for crop production leaving large scope for diffusion of innovation and SLM. Majority of those new SLM practices known and used among producers were essentially introduced by donor-supported projects carried out by variety of international organizations. Extension service organizations established and operating in the country continue spreading introduced SLM practices. The national team identified several additional technologies that looked promising for SLM: (i) cultivation of melon crops (watermelon) under polyethylene film, which protects seedlings from spring frosts, creates an optimum temperature for development of plants and ensures early, high yields; (ii) irrigation using plastic bottles, which



## VISUALIZATION OF TECHNOLOGIES DATABASE



Database is available on [CACILM.ORG](http://CACILM.ORG)

helps save water and reduce soil erosion on bare lands; and (iii) growing crops on shallow rocky sandy soils, where fruit trees are planted in holes filled with fertile soils (sapropels) brought from organic sediments of lakes, ponds and reservoirs.

Synthesized SLM practices consisting of 75 technologies and 15 approaches were compiled into a book aggregated by seven main areas they address.

Uzbekistan country team also explored different approaches to identify traditional technologies adapted or developed by producers, with more emphasis on those farming larger areas. Based on interactions with farmers, the following technologies were proposed: (i) growing winter legumes (chickpea, soybean) in rainfed areas using direct seeding, which increases crop diversity and enriches soil health; (ii) cultivation of artichoke in low fertile irrigated soils, which helps improve soil condition,

while producing artichoke flour for pharmaceutical industry; and (iii) production of biomineralizer, which strengthens plants' immune system, intensifies photosynthesis and reduces vegetative period by 1.5-2 weeks.

Collected SLM practices from available sources and those analyzed and selected by national teams have been described in a simplified template (simplified WOCAT template). Resulting synthesized SLM practices consisting of 75 technologies and 15 approaches were compiled into a book aggregated by dominant issues they address, such as soil fertility increase, soil tillage and crop cultivation, agroforestry and vegetation cover improvement, erosion control and working on slopes, water management at field level, fodder production and rangeland improvement, capacity enhancement of land users and environmental education. The book in English and Russian languages is available on [www.cacilm.org](http://www.cacilm.org) website.

### SLM practices collected by countries

SLM	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan	TOTAL
Approaches	2	2	8	0	3	15
Technologies	10	16	13	16	20	75
TOTAL	12	18	21	16	23	90



# Winter chickpea introduced in rainfed areas



Cultivation of winter chickpea is a new practice in Uzbekistan. It became possible thanks to research for cold-resistant varieties for arid lands.

Deep plowing of soil for sowing legumes and cereal crops has traditionally been used in rainfed areas of Kamashi district, Kashqadarya Region of Uzbekistan. In the fall of 2014, Knowledge Management in CACILM II project set up a demonstration plot on 3 hectares of Abror Shoymurodov's farm in a rainfed land in Navruz village to test the technology package on conservation agriculture and cultivation of winter wheat and winter chickpea using a direct-sowing seeder. The main type of farming activity of the 27-year-old's family of six is livestock breeding. They gain additional income from cultivating cotton and cereal crops.

Chickpea has been cultivated in Uzbekistan since old times. However, cultivation of winter chickpea is a new practice, which became possible as a result of research and field works that identified cold-resistant varieties suitable for arid lands.

Previously, Shoymurodov used to cultivate chickpea using traditional technologies. "At first, we'd plow the soil, and in March, depending on weather conditions, we'd seed the peas," he says. By mid-April, peas would sprout, but because of hot weather and lack of rain in Kashkadarya, the crop wouldn't receive enough moisture, which is why harvest was poor.

In November 2014, he was introduced to no-till technology and planted 20 kg of winter chickpea seeds provided by CACILM II on 0.3 hectares of land using direct sowing at the depth of 7-8 cm. By February, peas sprouted, having survived cold winter, and produced over 210 kg of yield, which is notably more compared to traditionally sowed crops.

Winter chickpea is suitable to climatic conditions of Kashkadarya province and ripens by the time to cultivate the following crops, providing farmers with possibility to use the land more than once a year and increasing their income. "Using the traditional method, we were unaware of this opportunity, since chickpea used to mature late, and sowing other plants would be carried out in the following year only," Abror notes.

Chickpea is an excellent precursor for most agricultural crops. It improves soil fertility and increases crop yield.

Chickpea is an excellent precursor for most agricultural crops. Yields of winter wheat after chickpea increase like they would from a fallow field, given the main conditions are ensured: the level of development of nodules of bacteria, required moisture and soil aeration.



Additionally, winter chickpea enriches soil with nitrogen by accumulating it. Therefore, soil fertility increases and the crop yield increases significantly.

"Winter chickpea, unlike ordinary pea, has a strong root system, which is important for further survival of the crop," says Tolib Berdiyev, fellow researcher of Uzbek Soil Science and Agrochemistry Institute in Tashkent. "In addition, two seedlings grow from one seed, which results in double yield."

It perfectly winters with late-autumn sowing maintaining short-term drop in temperature to minus 25 degrees Celsius. After thawing, spring

sprouts withstand snow and freezing down to minus 16. Adult plant does not die at minus 8.

One year later, in November 2015, Abror continued his experiment with chickpea and increased the area to 2 hectares to cultivate the crop, planting over 120 kg of seeds. Despite the difficulties with direct seeder, and heavy precipitation in spring, which caused intensive growth of insects and weeds, the farmer was able to collect over 1 ton of harvest, or 8 centners per hectare. He plans to use part of his yield to plant more hectares next season and sell the other part for seeding to farmers in the region.

### Kashkadarya province

Kashkadarya province is located in the south-eastern part of Uzbekistan in the basin of the Kashkadarya river and on the western slopes of the Pamir-Alay mountains, covering the area of 28,400 sq. km. The population is estimated to be over 2 million, with 73% living in rural areas. The climate is typically arid continental and partly semi-tropical. Major agricultural activities include growing cotton and other crops, as well as livestock breeding.





# Pistachios: a source of income and a tool for land-improvement



Pistachio tree, known for its strong root system and role in soil and water protection, can serve as an alternative source of income for farmers in rural drylands.

Since ancient times, mountainous and hilly areas of Central Asia had served home for pistachio, *Pistacia vera*, dumetous specie, known for its high-calorie fruit. At present, Central Asia hosts about 300,000 ha of wild pistachio forest, 10% of which is preserved in south Uzbekistan and 33% in Kyrgyzstan.

Foothills, ideally suitable for planting pistachio in Uzbekistan, occupy about 400,000 hectares. They are located in Tashkent, Samarkand, Navoi, Jizzakh, Kashkadarya and Surkhandarya regions, as well as and Ferghana valley. Soils in these areas are usually typical or dark gray with potential high fertility.

Rainfed agroecosystem of Uzbekistan is mainly used for cultivation of grains and oilseeds, and also as rangelands. Grain harvest in these areas depends mainly on moisture content of a particular year, which rarely exceeds 8-10 kg per hectare; such harvest happens every 3 to 5 years. In other years, yields only make up the cost of the seed or the crop is completely absent. Due to increasing number of livestock in rural households and uncontrolled grazing, vegetation cover is gone, including below-ground phytomass, at large mountain foothills, and this initiates serious soil erosion

processes. Soils suffer from induration, destruction of surface layer and soil structure, wind erosion, increasing surface flow and decreasing interflow.

Another natural threat to the existing land use in rainfed foothill is climate change, which is reflected in increased annual air temperature up to 4-6 degrees with the same amount of precipitation, leading to further arid climate: moisture content is reduced, consequently decreasing probability of obtaining acceptable yields without irrigation, as well as forage biomass in pastures.

Growing aridity combined with overgrazing is increasing pressure on natural pastures and their further degradation, thus yield of rainfed lands from economic circulation and grain crops on non-irrigated arable land will become completely unprofitable.

Creation of industrial pistachio plantations is an alternative to the existing foothill rainfed land use system – such plantations in many countries, sometimes located very far from the natural range pistachio, bring huge profits. For example, in the US, the industry annually generates about half a billion dollars. At



the same time, in the homeland of pistachios, only meager amount from this perspective is gained.

Due to its enormous adaptive capacity, pistachio, the main forest-forming species in arid lands of the region, is resistant to hot winds, drought and cold weather. The most favorable altitude for the growth and fruiting of pistachio nuts ranges from 800 to 1300 meters above the sea level.

Cultivation of pistachio can be an investment in the future: trees do not require special care and watering, but crop yields are not expected soon.

Cultivation of pistachio can be an investment in the future: trees do not require special care and watering, but crop yields are not expected soon. After 10 years, each tree can harvest 1 kg of pistachio, and by 20th year it will produce 5-6 kg.

The yield for plantation of 200 trees in 15-17 years can approximately make 1 ton, proving that this business is profitable. Additional profits can be gained from forage product to feed livestock.

Besides, almond trees can be intercropped between pistachio trees, to make profit before pistachios reach the age of stable fruiting.

The root system of pistachios does not allow to transplant them to another location, as roots reach up to 1.5 meters within one year. Therefore, researchers introduced a container planting method.

Using highlands to build on high-grade industrial pistachio plantations can be viewed as a natural resource to create new jobs and improve the welfare of the population, effective involvement of low-productive lands in agricultural use, as well as restoration of degraded land and thus adaptation to climate change.







## Pistachio plantations expand in the region

### Uzbekistan

Knowledge Management in CACILM II project has held a number of pistachio tree planting events in Uzbekistan. The latest one took place on 23 April in Bostanlyk district of Tashkent region and was dedicated to the World Earth Day.

Over 60 participants including farmers, parliament deputies, NGOs, young people and mass media participated in planting over 300 seedlings of pistachios on 1.5 hectares of land in a local farm at the altitude of 650-1200 m above sea level, where the climate allows suitable conditions for creating industrial plantations of this crop.

The event followed the round table held earlier in Tashkent on perspectives of development of pistachio plantations in Uzbekistan, which attracted over 100 farmers, researchers, students and other stakeholders.

### Kyrgyzstan

The tract of Achy in Kyrgyzstan has more than 600 hectares of grazing land. In 2009, Rasuljan Khaitov, a local farmer began subduing 5 hectares of land by planting 7,600 seedlings of Akbari variety pistachio, almond and peach, and fenced the territory using 6 km of barbed wire.

It usually takes six years before the pistachio tree gives its first yield. For cost recovery Rasuljan sowed wheat, barley, peas, tomatoes and melons between the rows with an initial investment of 391 USD. To overcome irrigation-related difficulties, in 2015 Rasuljan began developing drip irrigation system to save water and schedule watering. For this he received assistance from the CACILM project.

That year, Rasuljan implemented drip irrigation on part of his garden. A well was drilled to water melons, vegetables and trees. From intercropped wheat Rasuljan gained 106 USD per ha. His profitability rate reached 22 percent. Within four years there was total cost recovery. Rasuljan's Akbari variety plantation, fixed by a 4x8 scheme, is expected to provide approximately 6,240 kg of harvest per ha worth approximately 40,000 USD income by 2019.

Rasuljan now wants to spread his experience among farmers of Southern Kyrgyzstan. Within CACILM project, Rasuljan Khaitov's experiences have been published in Uzbek and Russian languages and distributed among farmers on field day workshops.



# Efficient fodder production in rangelands



Some 40 percent of desert rangelands in Uzbekistan are degraded to varying degrees, which has led to decrease of their average yield by more than 20 percent in recent years.

**H**ouseholds in Uzbekistan are increasingly investing in livestock as a secure way of savings. However, this puts much pressure on the existing rangeland resources.

Degradation in the infrastructure of watering points in remote areas leads to overgrazing. Limited flock mobility adds to the difficulties due to overuse of natural resources. This is reflected in the decrease of herbaceous forage cover, changes in the composition of biodiversity, reforestation and reduced soil fertility which leads to desertification, changes in hydrological regime, and soil erosion and landslides in the foothills of mountain zones.

About 40 percent of desert rangelands in Uzbekistan are degraded to varying degrees, and their average yield in recent years has decreased by more than 20 percent.

Due to rangeland forage deficit, procurement of forage and feeds adds to 45-50% of the total cost, bringing down the profitability rate. The live weight loss per sheep amounts to 12-15% less meat and 8-10% less wool produced.

Reliable food supply and sustainable use of fodder resources is very important for improving the livelihoods of local people because they directly affect animal productivity and production of Karakul (Astrakhan sheep). CACILM project works toward improving the nutritional value of feed that is available as one way of coping with increased pressure on pastures. Preparation of forage for feeding improves taste, palatability and enhances the absorption of nutrients.

Simple mechanical methods like milling, wetting, steaming and self-heating can improve the taste and increase palatability by 50%.

Biological treatment methods are based on roughage enrichment with yeast and application of enzyme preparations. These are efficient ways that significantly increase the performance of digestible protein, fiber and all the organic matter.

Chemical treatment of coarse forage (as explained in the box) also increases its digestibility and nutritional value.

These treatments reduce forage expenses by 30-35%, which is 9-12 USD/ha and increases profitability by 12-15%. Improving forage supply has a big impact on saving land degradation.

## Chemical treatment of coarse forage

### Addition of:

- < 1.5-2% caustic soda solution;
- < 5% soda ash;
- < 1.5-2% quick lime.

### Benefits:

- < 20-25% improvement in nutritional value of rough pasture feed;
- < 25-30% weight gain in sheep fed on treated forage;
- < 18-25% reduction in feed consumption per kg of weight gain.



# Raised bed planting in irrigated lands



The raised-bed technology has been implemented in Southern Kazakhstan since 2003 mainly in seed producing farms.

Winter wheat cultivated on irrigated lands occupies 110,500 hectares of a total 1,144,1000 hectares of irrigated land in the South and South-East Kazakhstan. Duration of the warm period, amount of rainfall in autumn, winter and early spring, abundance of sunlight and heat allow receiving high harvest of winter crops. However, in recent years, the yield of winter wheat under irrigation has fallen to 25-30 kg per hectare. The main reason for low yields is the failure to comply with a range of recommended agricultural technologies of crop cultivation and lack of resource-saving cultivation technologies that take into account soil and climatic peculiarities of the region.

In 2014, farmer Saidazim Eraliyev from Sayram district of Southern Kazakhstan started testing raised-bed planting of winter wheat on 10 ha of his farm's land in Yassaviy village. The use of this technology has led to considerable reduction of technological operations for his family of seven, notably reducing manual labor during sowing periods, as well as crop care during vegetation. Moreover, norms of seed application compared to traditional sowing were cut twice.

According to the farmer, ridge and furrow method has improved distribution of irrigation water in the fields and reduced the amount of water by 25-28%. Also, he has been able to use the ridges to plant a subtle crop and gain second yield per season. At present, farmer Eraliyev expanded the area under raised-bed technology to 126 ha and his neighbors have adopted the raised-bed technology, too.

CACILM II project jointly with Southwestern scientific research institute of animal husbandry and crop production of Southern Kazakhstan province developed recommendation on cultivation of winter wheat using raised-bed technology in irrigated lands of Southern Kazakhstan.





# New equipment to help farmers in sustainable land management



New technologies are helping farmers in Central Asia reduce manual labor, cut fuel costs and application of seeds. Modern planters and seeders will serve farmers for sustainable land use practices that also decrease expenses.

Efforts to combat land degradation in five Central Asian countries of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan have received a new impetus with the establishment of a platform to consolidate knowledge and promote sustainable land management approaches and technologies that have been devised by researchers as well as farmers.

Among these practices are zero and minimum tillage, raised-bed planting, use of improved crop varieties and intercropping practices, water-saving technologies and non-traditional fertilizers, rotational grazing in desert regions, agro-forestry melioration for rehabilitation of degraded irrigated lands and others.

Two zero-tillage seeders and two raised-bed planters were provided to national partners in Central Asia in the framework of Knowledge Management in CACILM II project for further implementation of packages on demonstration sites.

In May 2016, CACILM II project jointly with Farming Institute of the Tajik Academy of Agricultural Sciences, organized a field day in farmer Nematullo Khushvakhtov's land in Gissar district, Central Tajikistan, about 30

kilometers west of Dushanbe, to demonstrate cultivation of maize using newly-handed raised bed seeder.

Farmer Khushvakhtov first used raised-bed planting under zero tillage when he sowed winter wheat two years ago. He witnessed how the technology reduced manual labor, fuel and energy costs, and cut application of seeds from 200 kg/ha to 150 kg/ha. After he received a good harvest, neighboring farmers began using the same technology in their fields. The raised-bed planter, provided by Knowledge Management in CACILM II project, will serve farmers in the area for sustainable land use practices that also decrease labor expenses.

Also in May, during a field day seminar in Alamudun district, Chuy Province of Kyrgyzstan, zero-tillage seeder provided to the Ministry of Agriculture and Melioration was field-tested in the farm of Kamal Rashidov for further use on his demonstration plot. The farmer has 60 ha of land, half of which is located on rainfed area. He was introduced to no-till by Knowledge Management in CACILM II project team in 2013 and then expanded the demonstration site for the tested technology from 20 ha to 30 ha in 2014. He believes that no-till technology is of great importance for Chuy Province, where over 260,000 ha



of land are used for cereals, leguminous crops, making about 40% of total land in Kyrgyzstan occupied by these crops.

Earlier in April, another zero-tillage seeder was presented to administration of Karauzyak district, located in northeastern part of Karakalpakstan, Uzbekistan. According to Esbosyn Sydykov, director of Karakalpakstan Research Institute of Farming, the role of resource- and water-saving technologies is essential in the area, where climate is sharply continental with severe winters and hot summers, making crop productivity low. Thanks to crop rotation while using no-till, the farmers in the district can collect harvest twice a year, he noted during the seminar. Over 50 participants including Karauzyak district administration

officials were demonstrated the sowing of maize using the newly-handed machine.

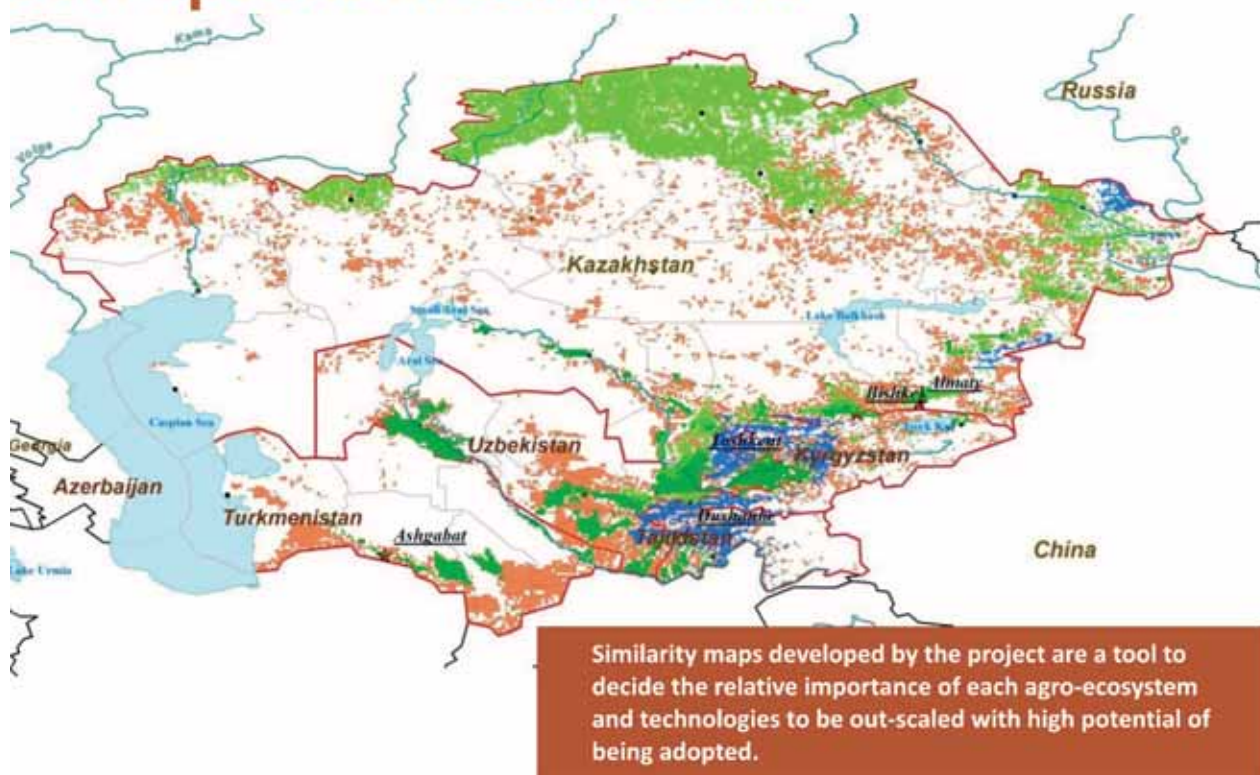
The same month, CACILM II project team jointly with Kazakh Research Institute of Soil Science and Agrochemistry presented raised-bed planter to farmer Karim Khudayberdiyev, for testing raised bed technology on irrigated lands of Almaty Region.

According to Dossymbek Syddyk, resource- and water-saving technologies expert of Southwestern Livestock and Crop Research Institute, Southern Kazakhstan has gained some experience on raised-bed technology since 2003. The technology is mostly used in seed production, as it provides a very high percentage of seed multiplication, he says.





# Similarity analysis helps disseminate SLM options in Central Asia



**K**nowledge Management in CACILM II project has collected and synthesized sustainable land management (SLM) technologies and approaches utilizing various sources that cover four target agro-ecosystems in Central Asia: irrigated, mountain, rainfed and rangeland. Since some SLM technologies in five countries have similarities (minimizing mechanical disturbance of soil, field level irrigation water saving, improvement of soil conditions, integration of agroforestry, pasture improvement, etc.), it was decided to form a package for each agro-ecosystem.

Each package has a core technology (i.e. raised bed in irrigated agro-ecosystem) and other technologies that could be associated with the core technologies, which help in adapting to local conditions within the context of the core technology. For example, seed treatment or soil additive, integration of plastic lining for irrigation in the furrow or placement of the seeding row can be integrated with the raised-bed technology to overcome damage from soil salinity accumulation.

As a result of consultation with national experts from five countries, a list of similarity criteria (see table) were identified for the four agro-ecosystems to develop similarity maps. The process was facilitated using previous experience of similarity analysis and criteria undertaken in

the West Asia and North Africa (WANA) region.

The similarity maps will be used to identify target areas to disseminate the SLM packages in the four agroecosystems. These areas will be also targeted for knowledge management and dissemination campaigns. In the future, this analysis can be reproduced by different stakeholders within and beyond the Central Asian region.

To conduct the similarity analysis, different spatial datasets were needed. Available online data sources were used to obtain spatial datasets. The digital elevation model (DEM) was downloaded from the CGIAR CSI website.

Similarity maps will be used to identify target areas to disseminate SLM packages in four agro-ecosystems.

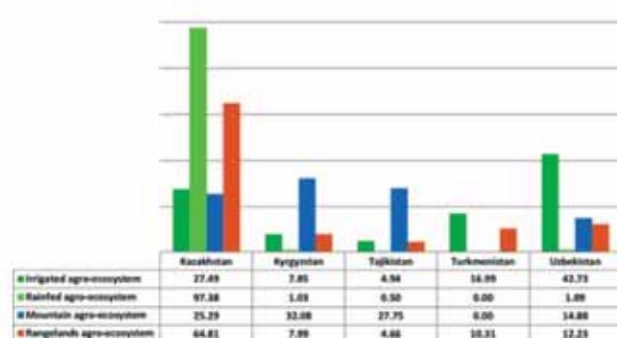
By overlaying various layers based on selected criteria, potential areas for out-scaling certain technologies for a given agro-ecosystem in Central Asia can be mapped. The resulting maps are useful for decision-makers at national level to decide the relative importance of each agro-ecosystem within their countries and accordingly the technologies to



be out-scaled with high potential of being adopted and used.

At regional level, donors and/or development programs can benefit from these results by identifying areas to put more efforts in out-scaling technologies that will lead for optimum impact. Investments could be directed based on these results to maximize the benefits and success of adopting different technologies. Furthermore, these results could help in identifying areas with similar environmental conditions where successful implementation of various technologies could be transferred to maximize the benefits of these programs.

At local level within different countries, farmers, land users and extension services can use these results to identify potential interventions that will maximize productivity and improve livelihoods. This will also help farmers and extension services to seek advice about introducing new technologies from similar areas where these technologies are already implemented. This will help in adapting these technologies for wider range of environmental conditions and better uptake. The participation of national experts in formulating the original similarity criteria and verifying and fine-tuning these maps benefited the whole process. On the one hand, there is more confidence of using these results because local experts indicated their satisfaction of the final results and because upon comparing the regional data with national, higher resolution data, a good level of agreement was concluded. On the other hand, participation of national experts will help in disseminating the results and foster the implementation by decision makers.



In general, these results could provide data to facilitate targeting areas for out-scaling of technologies in various agro-ecosystems. This should lead to more adoption by farmers and land users and therefore an obvious impact of implementing these technologies, which result in improved productivity and livelihood in the region.

Irrigated agro-ecosystem / Potential area for outscaling raised bed technology		Similarity criteria
Land use	Irrigated land	
Slope, degree	0-5	
Water availability/source	Sufficient water resources	
Soil (texture), clay content, %	10-75 physical clay	
Soil salinity, %	<8 dS m <sup>-1</sup>	

Rainfed agro-ecosystem / Potential area for outscaling conservation agriculture		Similarity criteria
Precipitation	300-600	
Slope, degree	<7	
Land use	Cropland	
Soil (texture), clay content, %	20-75 physical clay	

Mountain agro-ecosystem / Potential area for outscaling mountain agro-forestry		Similarity criteria
Slope, degree	>7	
Precipitation	>500	
Altitude, m	>800	
Land use	Exclude inconvenient areas (rocks, gullies etc)	
Soil depth, cm	>50	

Rangelands agro-ecosystem / Potential area for outscaling pasture improvement		Similarity criteria
Land use	Rangelands, pasture	
Slope, degree	>12	
Degradation degree	Areas with weak, medium to strong degradation as well as the Bareland areas	
Livestock density per ha	Areas with high and moderate livestock density	
Watering points/ha	Data not available	



# Adapting regional agriculture to climate change



Central Asia is expected to experience significant levels of climatic changes over coming decades, which may negatively impact crop yields and farming incomes.

Central Asia is predicted to experience a significant climate change and increased weather variability over the coming decades. Agriculture is the first and foremost sector sensitive to weather shocks and climate variability. Since agriculture is a key economic sector and a major source of livelihoods for Central Asia's predominantly rural population, especially for the poor, if no adaptive actions are taken, climate change may lead to significant losses in rural incomes and agricultural production.

## Climate change projections

According to projections on future climate change presented by the Intergovernmental Panel on Climate Change (IPCC) in 2014, temperatures in the region may be increasing under all scenarios, whereas direction and magnitudes of changes in precipitation and river water flows are less certain.

Downscaled maps of climate change forecasts for Central Asia prepared by ICARDA in 2012 indicate that there may be increases in the average annual mean, minimum and maximum temperatures throughout the region, though temperature increases would be lower in the west near the Caspian Sea and higher in the north.

Summers may become hotter and winters colder. The projected median increase in temperature is estimated to be about 3.7°C on average by the end of the century, with most of the increase to occur during summers.

In general, precipitation may increase in the region, with higher increases in the north, and possibly some very slight decreases in the south. Spring and fall precipitations are likely to increase while summer precipitation may decrease. Wetter winters are expected to be more frequent, as well as drier springs, summers and autumns.

Irrigated agriculture in Central Asia depends strongly on the river flow of the Amudarya and Syrdarya rivers, which are predominantly fed by glaciers of the Pamir and Tien Shan mountain ranges. Over the last 50 years, the extent of glaciers was reduced in these mountain ranges by 30% and 14%, respectively. Although intensified glacier melting could provide additional water at early stages of melting, once glaciers have melted this could lead to severe water shortages.

## Impacts on agriculture

An increasing number of studies looking into the potential economic impacts of climate change in Central



Asia demonstrate that it is likely to have differentiated impacts on various crops and regions, with possible yield gains, especially for rainfed wheat, irrigated maize and potato, whereas the cotton yields may be impacted more negatively, especially in the long-term (2040-2070).

Some studies find that wheat yields may grow on average by 12% across Central Asia, ranging from -3% to +27%. Others project that potato yields in mountainous areas of Tajikistan may increase by 10 to 70%, depending on crop management practices, and may decrease by 8% in the plain areas of Kazakhstan. By 2050, climate change may lead to higher rainfed wheat yields in Kazakhstan and Kyrgyzstan (by 0-11%), while in Tajikistan, Turkmenistan and Uzbekistan rainfed wheat yields may decline (by 8-18%). According to some estimates, in most areas of Uzbekistan, yields of cotton may increase by 10-15% and of cereals by 7-15%.

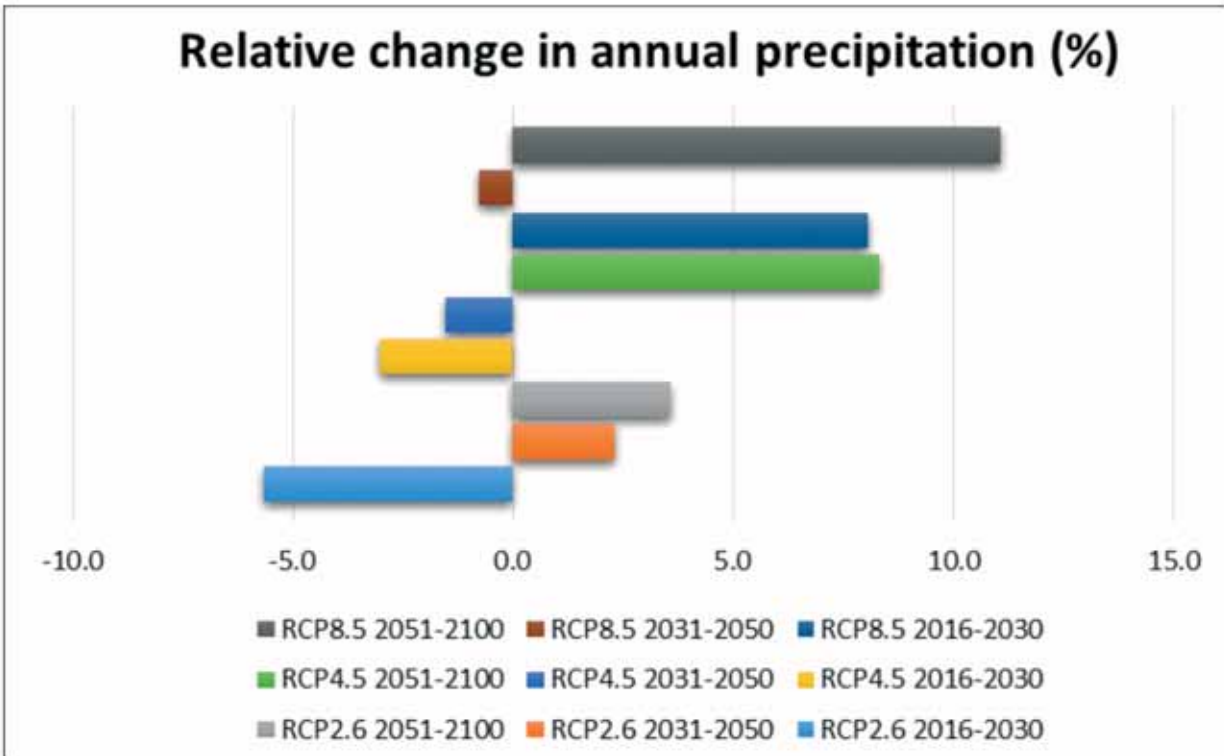
Without adaptation, yields of most crops in Uzbekistan could drop by 20-50% by 2050. Cotton yields may decrease by up to 40% across the region. The yields for irrigated wheat may decrease in all countries (by 7-14%), except in Uzbekistan (+1%).

More comprehensive bio-economic modelling finds that agricultural producers in Uzbekistan are likely to gain from climate change during the 2010-2040 period, but their revenues are projected to fall during the 2070-2100 period due to decreasing water availability. Similarly, climate change impacts in Kazakhstan and Kyrgyzstan are likely to lead to higher farming incomes, although this may be accompanied by increased variability of

these incomes. Studies also show that beyond the effect on crop production, climate change may have negative impacts on the livestock sector through lower pasture productivity and increased frequency of heatwaves in summers and frosts in winter.

Other studies for assessing climate change impacts apply econometric approaches, using past observations of climate impacts on agriculture in order to forecast potential future impacts. Such studies take into account, although implicitly, full adaptation to climate change at previously observed historical levels. The annual impacts of climate change on Central Asian agriculture may range between +1.21% to -1.43% of net crop production profits by 2040, which corresponds to +180 mln USD annually in the optimistic scenario, to -210 mln USD annually in the pessimistic scenario relative to 2010 levels.

Weather variability and fluctuations in the availability of irrigation water would have significant effects on wheat prices in Central Asia. Hydrological draughts could lead to substantially higher wheat prices in the region. A 30% decrease in the water flow of the Amudarya and Syrdarya rivers in the region could lead to at least 400 USD per ton of an additional increase in the wheat price. Hydrological draughts could encourage irrigation-dependent countries of the region to raise wheat stocks to face expected supply shortfalls thus leading to higher prices. This effect could be further aggravated by negative effects of draughts on wheat yields. Higher wheat prices will translate to higher flour and bread prices, thus negatively affecting access to food among the poorer households.





## Adaptation to climate change

As climate change is going to increase the frequency and magnitudes of weather extremes, agricultural households in Central Asia may be confronted by unprecedented weather shocks. Most of the recommended adaptation actions, such as more efficient water use, development of drought-resistant cultivars, adoption of sustainable land management practices and institutional reforms, are highly useful for agricultural development in the region with or without climate change. Thus, they could be implemented as no-regret options for adapting to climate change while reaping the benefits of these measures in terms of improved agricultural development in Central Asia even in the case of perfect mitigation. Moreover, estimates show that adoption of climate-smart and sustainable agricultural practices in the region may increase net agricultural profits among different categories agricultural producers by 20-50%.

There have been several institutional and technological shifts during the last 20 years that have contributed to increasing adaptive capacities in the region, such as agricultural individualization and privatization, reduction of price distortions in agricultural input and output markets, maintenance of open cross-border trade in agricultural products, or from the technological side: adoption of elements of conservation agriculture on quite massive areas in northern Kazakhstan, large-scale crop substitution from cotton to wheat in Uzbekistan, Turkmenistan and Tajikistan, significant gains in wheat productivity due to development of new wheat varieties in Uzbekistan. This puts the region on a better footing for adapting to climate change.

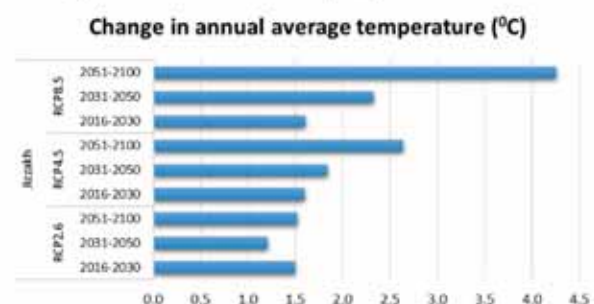
However, more needs to be done. Surveys of agricultural producers in Central Asia show that the majority of them have noticed changes in the climate, as manifested by changing temperature and precipitation amounts and patterns, even though the levels of adaptation in response to these changes remains relatively low. The surveys also show that 57% of agricultural producers perceived changes in the climate but did not adapt, implying that either they saw no need in adapting or were constrained in their adaptive actions.

Those households which adapted to climate change (26%) were influenced in their adaptation decisions by higher number and spread of weather shocks that they faced. This means that many adaptive actions undertaken by agricultural households are happening after weather shocks. Although better than inaction, it would be more optimal to mitigate the vulnerability to climate change by taking actions to increase the resilience of agricultural households in a pro-active manner, i.e. taking actions

before weather shocks. For example, better knowledge of sustainable land management technologies was found to increase adaptation. Similarly, more diversified cropping portfolios are found to increase adaptive capacities.

Many of the surveyed farming households do not yet perceive changes in the climate as a possible threat to their farming activities, because they have either not felt any negative impacts of climate change, or, in fact, feel that some of the on-going changes are positively influencing their crop and livestock productivity. As climate change is a "low signal" risk, raising public awareness and government support could be necessary for any ex ante pro-active actions. Given the uncertainties of climate change, an important criterion in selecting ex ante adaptation measures should be that these measures need to enable farmers to better cope both with current and future climate-related challenges, i.e. be so-called no-regret options. Fortunately, the past research reveals that several of the most important factors positively influencing adaptation decisions have effects which would be strongly beneficial even now irrespective of climate change.

The major role in promoting, supporting and implementing climate change adaptation measures needs to be played by the governments in the region. There are several key areas where public action is needed for adaptation. One of these areas is improving farmers' knowledge about sustainable land management practices, which would necessitate improving the quality and spread of extension services, also by making them more demand-driven. Many of the constraints on adaptation cited by the farmers involved lack of access to financial resources, hence there is a need for enabling policy environment to strengthen the role of rural financial institutions and of access to financial intermediation in the rural areas. Some studies also show that poorer farmers are less likely to adapt to climate change and take coping actions against weather shocks than richer farmers. This may be especially worrisome since poorer farmers depend more on climate-sensitive agriculture for their livelihoods. Future policy initiatives on improving adaptive capacities in the region should take into account these differences in adaptive capacities among farmers and institute pro-poor measures.





# Rural advisory and extension services in Central Asia



To address challenges like climate change and land degradation, Knowledge Management project works on exploring and developing the best ways to channel agricultural innovations to farming community.

**T**ransition to market economy after the break-up of the Soviet Union has brought about many changes. Agricultural production in Central Asia occupies a leading place in the region's economy and reflects its economic potential. The demand from agricultural producers for information on latest research and advanced experience, marketing, business planning and taxation has grown.

There is a need for rural advisory service (RAS) which would not only ensure timely delivery of scientific, market and technological information to agricultural producers, but also assist them in mastering innovative developments and best practices. An effectively operating rural advisory service would combine functions of education, knowledge dissemination and consulting.

To address challenges like changing climate and land degradation, CACILM project works on exploring and developing the best ways to channel and out-scale the agricultural innovations to farming community. The project conducted surveys among advisory service providers in the four countries of the region (Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan)

to identify problems hindering their development.

Data collected from 90 organizations, which included NGOs, state and private institutions revealed specific reasons for the poor performance of rural advisory services (see box). However, there is a general consensus that the quality of rural advisory services has improved as compared to those during the former Soviet Union. It has become more farmer-oriented and better adapted to new agricultural technologies.

According to the survey findings, the reach of public extension service providers in some countries is wider in comparison to the private RAS. These networks (e.g. Kazagroinnovation and Kazagromarketing in Kazakhstan and Rural Advisory Services in Kyrgyzstan) can be used for broader dissemination of promising SLM interventions.

Taking into account different capacities of public extension systems and donor-funded rural advisory services in each Central Asian country, the project is preparing recommendations for the best technology transfer scheme to ensure wider coverage of farmers.





## Why are rural advisory services inefficient?

### Kazakhstan

- < single-mission (non-repeated) advisory service provision
- < lack of transport

### Kyrgyzstan

- < low knowledge level of farmers
- < lack of large farms
- < limited funding

### Tajikistan

- < low paying capacity of farmers
- < shortage of funds
- < lack of qualified consultants and technical equipment

### Uzbekistan

- < insufficient funding
- < weak communication channels with farmers
- < limited knowledge on agricultural innovations





# Law on rangelands is an urgent necessity



Unsystematic and excessive load on rangelands has led to strong processes of land degradation and put pressure on rangeland resources in Uzbekistan.

Rural households in Uzbekistan customarily invest into livestock as a secure way of savings. Surroundings of settlements and accessible watering points are normally used as grazing areas. However, unsystematic and excessive load on rangelands has led to strong processes of land degradation and put pressure on rangeland resources.

Like the entire region of Central Asia, Uzbekistan's livestock production faces a number of challenges, despite support from the governments and attention paid to improving production of livestock. Constraining factors are mainly limited resources of pasture and arable land for fodder production, whose state is further exacerbated by erratic rainfall and growing summer temperatures in recent years.

Increased demand for meat products due to population growth and income of urban residents indicate the need to consider a more environmental resource-saving approach for feed and livestock systems. In recent years, once very productive livestock system and infrastructure has deteriorated as a result of intensive use of natural resources and looming negative impacts of climate change.

Rangelands in Uzbekistan are one of the most important life-supporting natural ecosystems. They occupy about half the country – nearly 25 million hectares, the bulk of which is located in the north – large parts of Karakalpakstan, Navoi and Bukhara region, as well as south – Kashkadarya region.

Eighty percent of rangelands are located in deserts, with average annual precipitation of 100 mm, mainly used for karakul sheep, camel and goat breeding. Karakul sheep, the most well-suited for desert rangelands, makes up about 4.5 to 5 million heads, mainly bred by shirkats (collective farms) and households.

Rangelands in Uzbekistan are one of the most important life-supporting natural ecosystems. They occupy about half the country – nearly 25 million hectares.

This spring, to address challenges like climate change and land degradation, ICARDA-led Knowledge Management in CACILM II project organized a round table with participation of rangelands experts, officials, members of the parliament, farmers and local population to discuss the state and prospects of rangelands development in Uzbekistan.

Dr. Akmal Akramkhanov, project coordinator, highlighted the importance of addressing legal issues related to improving the efficiency of pasture use, and formulating steps on further facilitation at the government level.

As stated by experts, about 40% of desert pastures are degraded in varying degrees and there is a tendency of increase of this phenomenon. The concentration of large



number of livestock causes shortage of green-fodder in foothill areas due to excessive grazing. Currently, over 3 million hectares of rangelands are subject to medium and 1 million hectares - to strong degrees of degradation.

Excessive use of land for grazing around settlements, lack of watering points for livestock in remote pastures, abandoned and poorly maintained water-wells, lack of transportation and roads to remote pastures, mismanagement of pastures led to the loss of forage capacity and disruption of natural regeneration of pasture productivity.

One of disturbing signs of rangelands degradation is the growing level of contamination with poisonous and inedible weeds. Developing in abundance, they cause poisoning of varying severity up to death, and damage the health of farm animals.

To date, there has been no law on rangelands in Uzbekistan. According to current legislation, most pastures are considered as land designated for agriculture, thus, issues related to pastures are regulated by the Land Code, which provides only limited measures such as obligations for improvement of their condition and compensation in the event of improper use.

Use of capacities of local communities, active participation of pasture users in decision-making, as well as in financing of management mechanisms and development of rangelands infrastructure are key components of sustainable solutions.

Household owners in Farish district of Jizzakh region believe that joint work is necessary to adopt a practical law on rangelands. In Farish, the greatest issue is to monitor vast areas of pastures to ensure sanctions against illegal resource loggers. According to local population, there's a need to raise awareness of residents about the necessity of the law, sustainable use of natural resources, and economy of livestock. Animal fodder is expensive and population does not have other sources of income besides livestock.

Moreover, the procedure in case of sanctioning with penalties is difficult as it requires a passport copy and registration certificate of the logger. These shortcomings are needed to be taken into account while preparing the draft law on rangelands.

The reflections on the round table held by CACILM II project have been submitted to the Center for Support of Entrepreneurship and Farming of Uzbekistan for further consideration. The center is a non-governmental, non-profit organization that works in cooperation with governmental bodies and regional authorities and assists farmers in improving sustainability of agriculture and agro-industry.

The project has prepared and disseminated among stakeholders several recommendations on sustainable use of semi desert rangelands in foothills, desert pasture livestock and feed resources, infographics on processing coarse forage before feeding and pasture degradation, as well a video on sustainable management of rangelands. All of these resources are available on CACILM







The International Center for Agricultural Research in the Dry Areas (ICARDA) is the global agricultural research organization working with countries in the world's dry and marginal areas to deliver sustainable systems solutions that increase productivity, improve rural nutrition, and strengthen national food security. ICARDA's integrated approach includes new crop varieties; agronomy; on-farm water productivity; natural resources management; rangeland and small ruminant production; and socio-economic and policy research to better target poverty issues and accelerate technology adoption. A member of CGIAR Consortium, ICARDA works closely with national agricultural research programs and other partners in more than 40 countries across North and Sub-Saharan Africa, and Central, South, and West Asia.



RESEARCH  
PROGRAM ON  
Dryland Systems

The CGIAR Research Program on Dryland Systems brings together eight CGIAR Centers and numerous international, regional and national partners to engage in integrated agricultural systems research and unique partnership platforms to ensure improved food security, equitable and sustainable natural resource management and better livelihoods in the world's dry areas. The program is led by the International Center for Agricultural Research in the Dry Areas (ICARDA), a member of the CGIAR Consortium. CGIAR is a global agriculture research partnership for a food secure future.



Investing in rural people

The International Fund for Agricultural Development (IFAD), a specialized agency of the United Nations, was established as an international financial institution in 1977 as one of the major outcomes of the 1974 World Food Conference. IFAD is dedicated to eradicating rural poverty in developing countries. Working with rural people, governments, donors, NGOs and other partners, IFAD focuses on country-specific solutions, which can involve increasing poor rural people's access to financial services, markets, technology, land and other natural resources.

Funded by:



Led By:



Partners:



[www.cacilm.org](http://www.cacilm.org)