Challenges of land conservation in dry areas – Central Asia and the Caucasus

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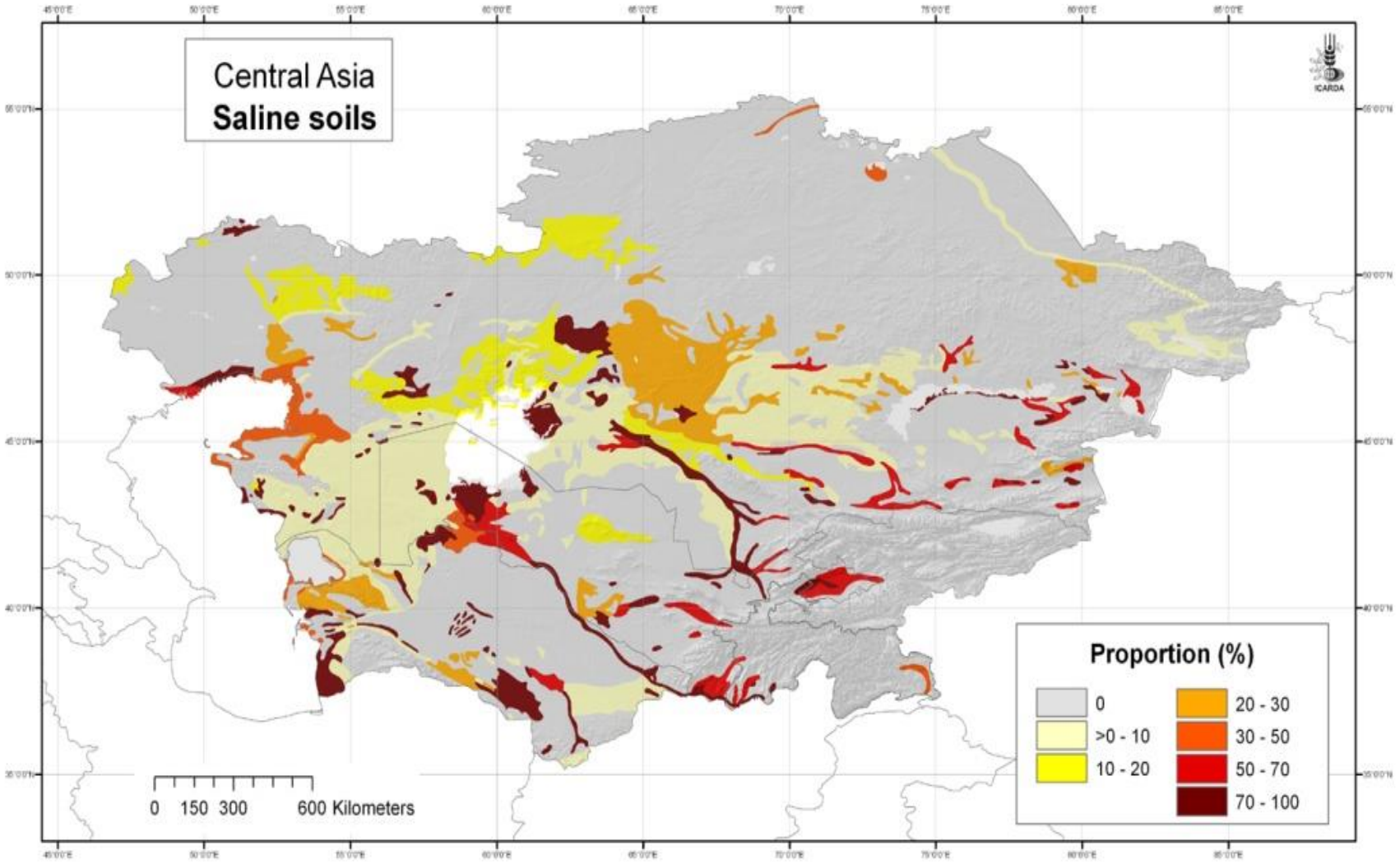
Land and water degradation



(E. De Pauw et al., ICARDA 2009)

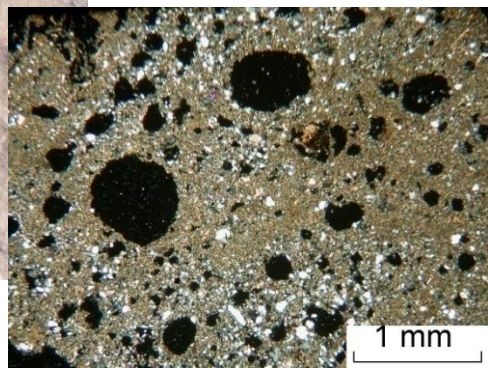
Soil salinity in selected areas

Total Area, 000 ha	Non-saline	Slight	Moderate	Severe
FAO SMU	32 666.76	8 929.8	3 755.39	8 822.59
including:				
Uzbekistan				
Syrdarya region	86.6	144.6	105.8	76.6
Kashkadarya	2 086.8	566.4	146.6	59.7
Khoresm region	102.0	197.4	194.9	100.7
Karakalpakstan	75.4	175.7	141.3	168.2
Turkmenistan				
Northern region (including Dashauz province)	162.1	335.4	281.7	195.0
Kazakhstan				
Kyzylorda region	29.1	105.8	117.3	32.9

(from K. Toderich, ICBA, 2011)

Difficult soils to be managed

- Low organic matter (<1.0%), high salt contents and poor water holding capacity
- *Solonchak* salt accumulation on the surface (dissolvable salts NaCl) – salt depression
- *Solonetz s*odium alkaline soil (Fergana Valley)
- *Takyr* formed in a shallow depressed area with a heavy clay soil



Degradation of pastures and forests

(Photo M. Turdieva, Bioversity, 2011)

Precipitation change projections in Central Asia and Xinjiang Province in 2080/2099, according to the average of 21 GCM models under greenhouse gas emission scenario A1b

(IPCC, 2007)

Andervash Glacier melting in Tajikistan (Photo S. Christmann, ICARDA, 2012)

Existing partnership

- CGIAR Regional Program for Sustainable Agricultural Development in Central Asia and the Caucasus
- Food security, poverty alleviation, environment
- Each Center has own mandate and expertise – transfer, testing and development of technologies
- Strong partnerships with national research organizations, policy makers, universities, farmers' associations
- Operational since 1998
- Financing and governance by the participating Centers – Steering Committee
- Program Facilitation Unit in Tashkent
- CGIAR Research Programs


Kazakhstan


Kyrgyzstan


Tajikistan


Turkmenistan


Uzbekistan

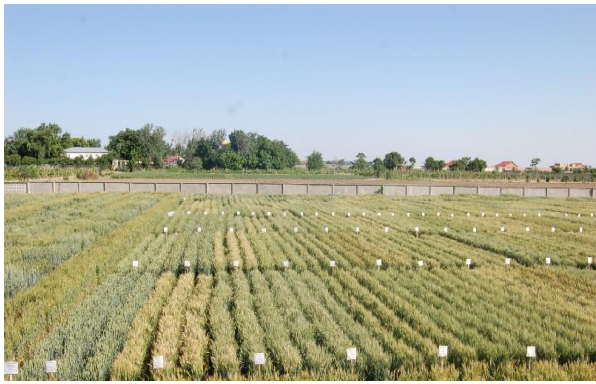

Armenia


Azerbaijan


Georgia

Increased knowledge, enhanced capacities and influenced policies

- Germplasm enhancement and crop improvement
- Improving water management
- Rehabilitation and agricultural diversification
- Promoting conservation agriculture
- Climate change adaptation research
- Livestock productivity and value added processing
- Conservation of genetic resources
- Strengthening local institutions, training
- Wider policy linkages – CACAARI, CACILM

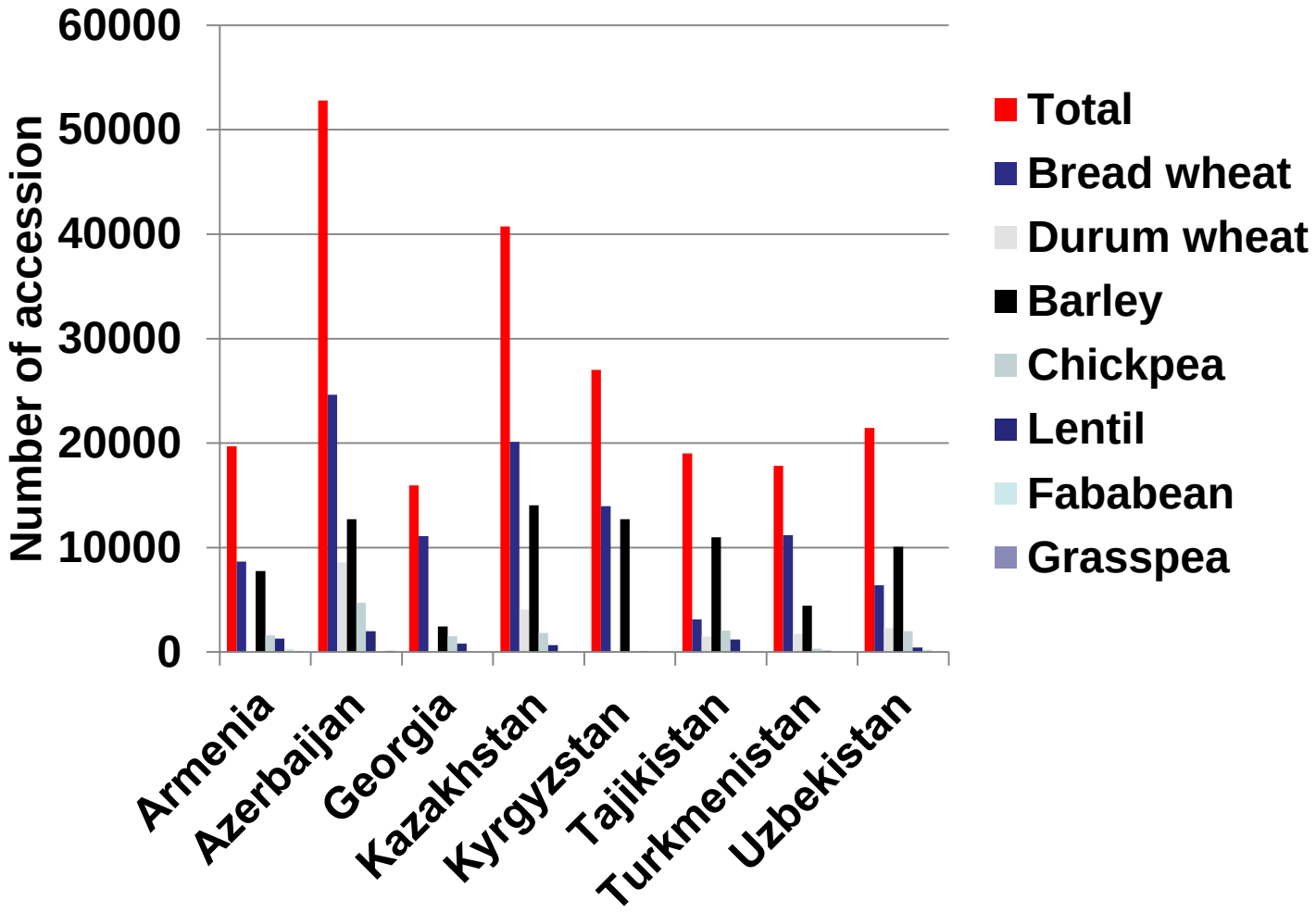


Salinity tolerant and susceptible varieties in winter wheat, Khorezm, Uzbekistan (*R.C. Sharma, ICARDA, 2011*)

Demonstration and dissemination of technologies for more efficient use of irrigation water (*WPI-PL Project, IWMI, 2011*)

www.cac-program.org

Wheat germplasm received in CAC Region from 1995 to 2011



Salinity and frost tolerant improved winter wheat line in Turkmenistan

Seed multiplication 2014

DS CRP

135U 6.1/5/CNDO/R143//ENTE/MEXI75/3/AE.SQ/4/2*OCI, CMSW01WM00832S: -030YE-30E-1E-0E-4E-0E

Capacity building support

Application of modern conventional tools in Plant Genetic Resources (PGR) characterization, pre-breeding and breeding

16-22 June 2011
Genetic Resource Institute, Baku
Trainer: Ram Sharma

DNA marker applications for Crops improvement

25-29 April 2011
Genetic Resource Institute, Baku
Trainers: Aladdin Hamwieh & Fida Alo

From challenges to solutions…

To maintain soil productivity…

To recover soil productivity…

To use marginal lands effectively…

To use marginal water

a.Alternative resources of water
Drainage water
Thermal/Artesian water
Saline and alkaline/Sodic water

b.Waste-Water
Oil polluted water
Non-Food chain agriculture

…as a great potential source for biomass production/ non-traditional agriculture use

to decrease pressure on natural resources through efficient utilization of marginal resources

(from K. Toderich, ICBA, 2011)

Salt and drought tolerant Pearl millet and Sorghum varieties

Pearl millet
IP19586
Green biomass
53 t/ha

Sorghum
ICSV25274
Green biomass
80 t/ha

Farmers Day, Shortanbay (Uzbekistan), July 2013



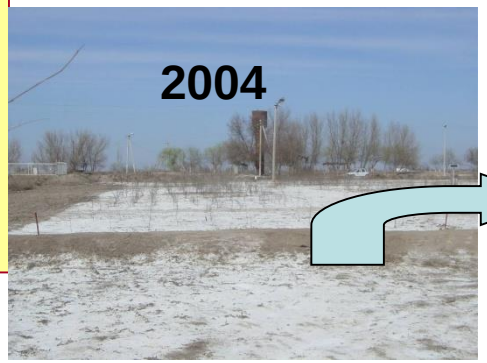






Agroforestry and afforestation of degraded lands

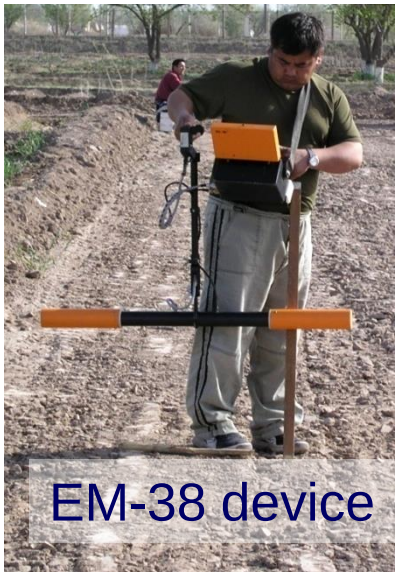
- Multipurpose tree/ shrub species combine high survival rate, quick root establishment and growth rate, halophytic and xerophytic characteristics, high utility value
- Mitigate the problem of waterlogging and salt accumulation at the root zone
- Re-introduction of desert and riparian trees and shrubs
- Rehabilitation and protection of natural wetlands
- Options for large scale afforestation on alluvial sandy loamy soils are available

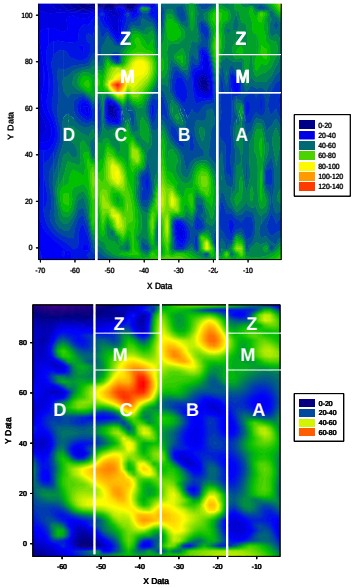


Research on agronomic practices

Laser leveling

- **Water saving up to 25-35%** (500-600 m^3ha^{-1} per irrigation)
- Even crop germination and moisture distribution
- Expensive, training requirements





Raised-bed seeding

- Seeding rate up to 40% reduced
- **Yield increased 7-22%**
- **Irrigation savings 15-20%**
- Net profit doubled due to reduced fuel costs
- Intercropping and direct seeding possible
- Not available locally

Residue retention

- Reduced evapotranspiration
- Organic matter input
- Erosion control
- New paradigm
- Availability

(K. Kienzler, T. Yuldashev, ICARDA, unpublished data)

Promoting conservation agriculture

- First conservation tillage practices in Kazakhstan in the 1960s
- Now more than 1,600,000 ha under conservation agriculture mostly in rainfed North Kazakhstan
- Recognized in state policy with subsidies, support by CIMMYT
- Research and demonstration efforts ongoing in irrigated areas in Kazakhstan, Azerbaijan, Uzbekistan, now also Tajikistan

Wheat yield response to planting method, two different farms in Azerbaijan (2011)

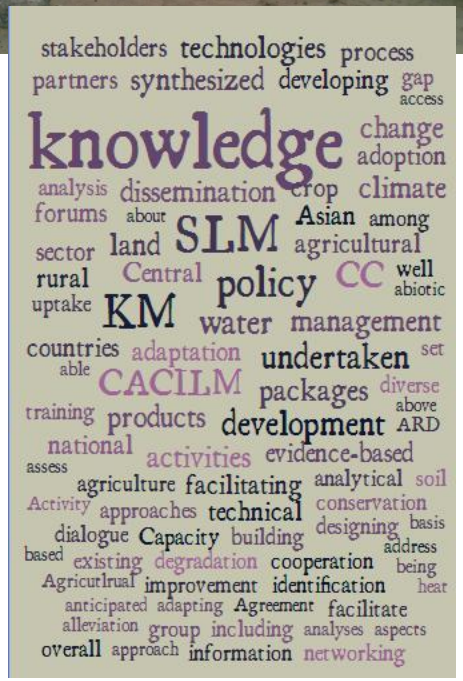
Planting method	**Wheat grain yield,** t/ha		**Saved water**, %	
	Jumshudov	Babaev	Jumshudov	Babaev
Bed planted	**5.37**	**4.53**	**36%**	**36%**
Broadcasted	**3.52**	**3.25**		

(A. Nurbekov et al., ICARDA, 2012)

Residue retention

Knowledge Management in CACILM II

- Central Asian Countries Initiative for Land Management
- Partnership to address Sustainable Land Management in Central Asia
  - Policy process linked to UNCCD
  - Collaborative initiative of ICARDA-CAC and GIZ to promote SLM in the region, developed into a three-year project supported by IFAD
  - Inputs from earlier SLM-research and other projects conducted within CACILM I



IFAD
Enabling poor rural people to overcome poverty

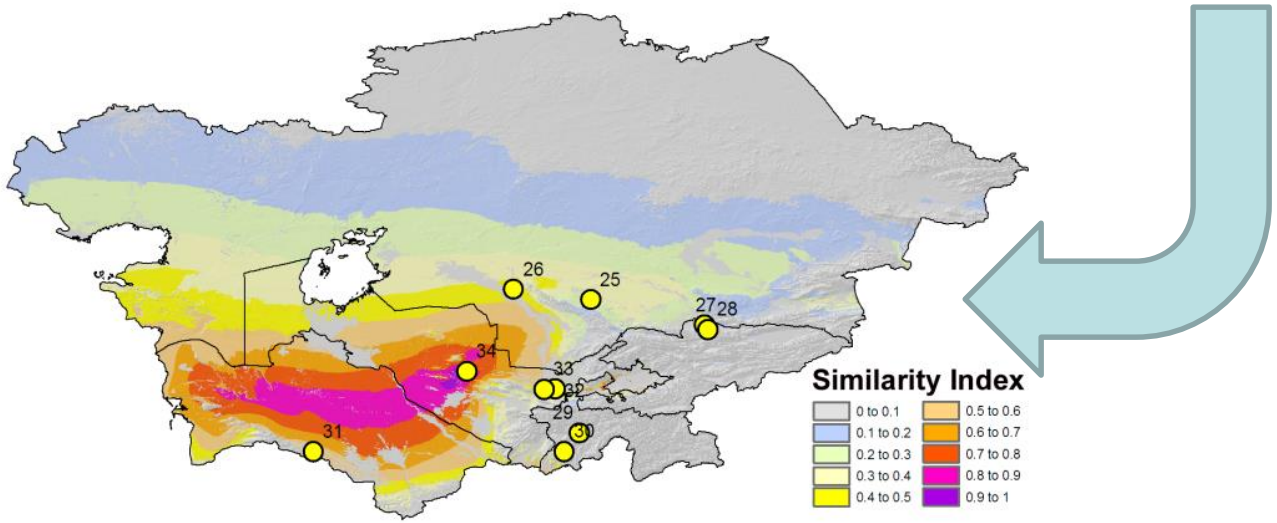
ICARDA

giz

Central Asian Countries Initiative for Land Management (CACILM)

Knowledge Management in CACILM II

- Multidisciplinary approach to disseminate SLM at different levels for enhanced productivity and climate change adaptation through:
  - Synthesis
  - Socio-economic assessment
  - Packaging and dissemination



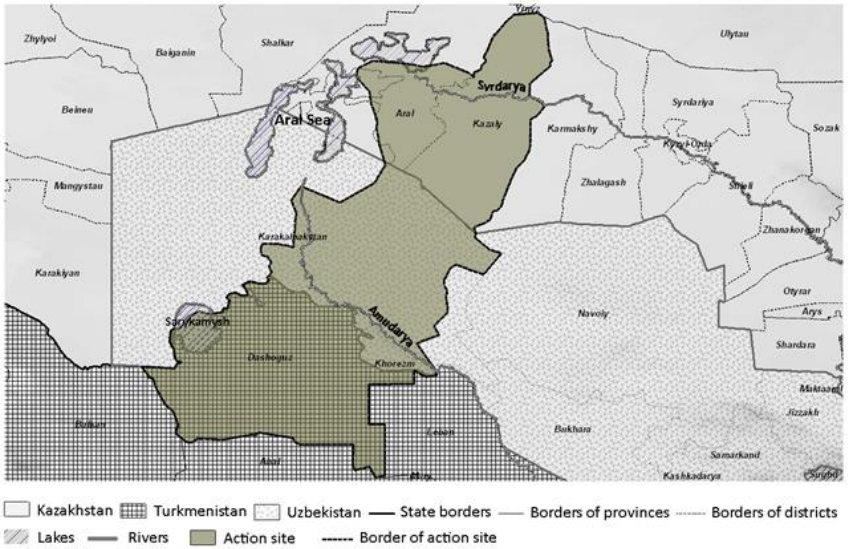
Knowledge Management in CACILM II

- Officially launched with inception workshop in June 2013
- Full involvement and support from national partners
  - Kazakhstan: Soil Research Institute
  - Kyrgyzstan: Ministry of Agriculture and Melioration
  - Tajikistan: Academy of Sciences
  - Turkmenistan: Ministry of Water Resources
  - Uzbekistan: Soil Research Institute
- Memoranda of Agreement
- International Coordinator recruited
- Country missions planned

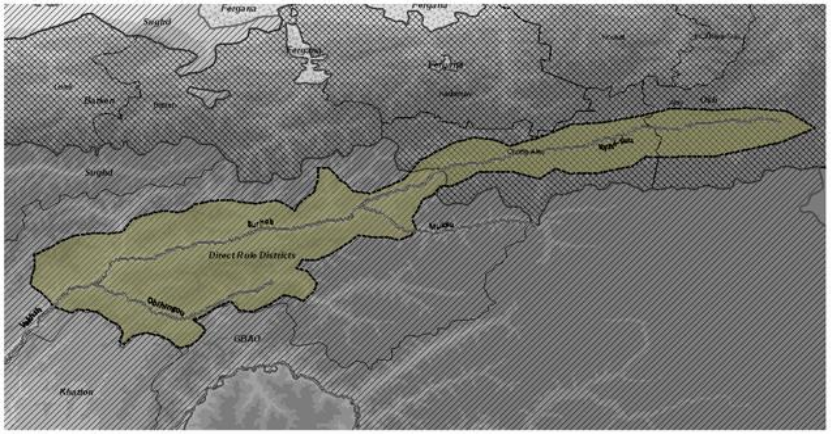
Dryland Systems CRP: What is new?

- Interdisciplinary approach combined with site-specific implementation plans
- provide options for reducing vulnerability, managing risk in production systems characterized by land degradation
- Increased stakeholder participation for improving acceptability of results
- Capacity building
- Opportunities for women an youth
- Five priority Activities agreed at Fergana Workshop, Aug. 2013

SRT2. Potential Action site 1: Aral Sea region



SRT 2. Action site 2: Rasht and Kyzyl-Suu valleys



Collaboration with ECFS/ MSU starting…

- Field work of MSU students in Aral Sea Action Site in Uzbekistan, October-November 2013
- Soil salinity mapping, classification of soils, plant cover assessment
- Dryland Systems CRP activity on marginal lands (ICARDA, ICBA, IWMI, ACRDC, Bioversity)