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Eurasian Food Security Network and Eurasian Soil Partnership

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Soil Research in Uzbekistan

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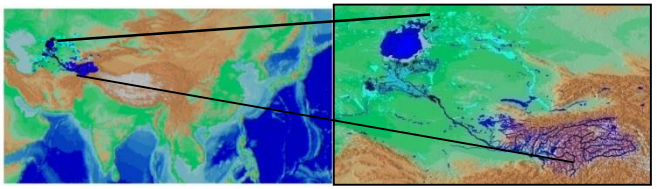
Outline:

- Background
- Challenges
- Activities and Collaboration
- Experience and Learned Lessons in the country

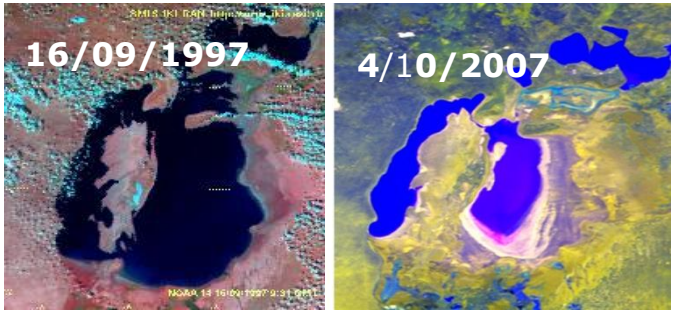
BACKGROUND



Location:	Central Eurasia
Total area	447.800 km2, incl. agricultural land - 25.25 mln.ha
Irrigated land	4.3 mln.ha
Population	30 mln, inl. 49 % rural
Agriculture (% of GDP)	17,6%
Human Development Index	0.702 (UNDP)

According to the UNEP aridity index (from 0.05-0.20 to 0.65) the territory of Uzbekistan (with the exception of the piedmont and highland areas) is classified as an arid zone which is subject to air and soil drought and is therefore susceptible to degradation and desertification.

Challenges



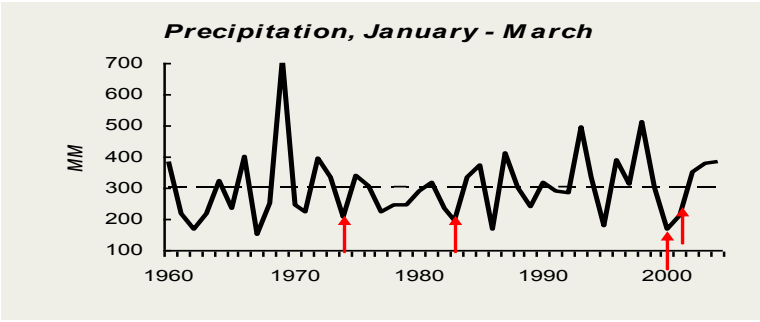
- Land degradation & desertification, and scarcity of water is major environmental challenges, threatening the country's natural resources and socio-economic development. Current water and environmental problems disturbing the structure and functions of ecosystems and biogeochemical cycles crucial for the life support systems and social stability.

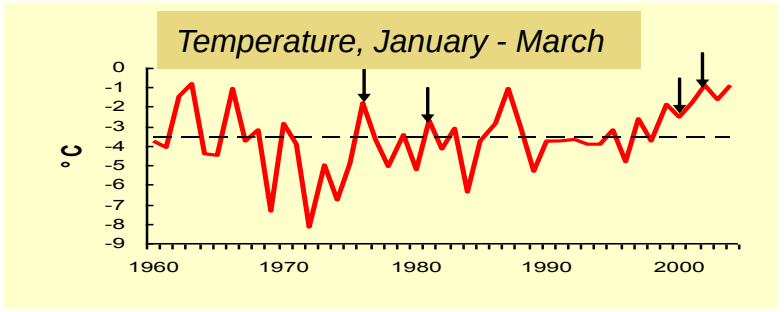
- Stable warming tendency is observed today in Uzbekistan and other Central Asian countries. Average rates of warming since 1950 along the territory of the Republic have been 0.29°C per decade, which is more than twice the world average.

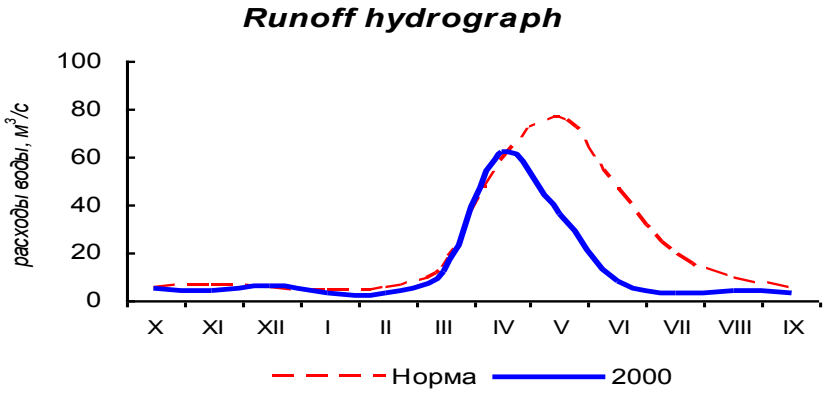
- There is a broad agreement [WB, 2005, ADB IFPRI, 2009] that Uzbekistan most vulnerable to climate change due to high sensitivity of its arid arable lands, high density of population and growing concern about food security and threaten rural livelihoods.

Challenges: Droughts

Increase of drought periodicity is observed in the last decade, it becomes more frequent during summer and autumn periods. Extreme drought were fixed 4 times - in 2000, 2001, 2008 and 2011.







- The severe drought of 2000-2001 became especially dangerous according to the scales of its distribution, impacts and consequences:

(i) precipitation rates reached only 40%-60% from the norm that lead to extraordinary reduction of river flow (for 35%-40% of average level);

(ii) yield losses of grain crops have made 14-17 %, on other crops - on the average from 45-52 % up to 75 % (downstream of Amudarya).

- Total losses caused by drought of 2000-2001 in Uzbekistan were USD 130 million or 2.4% of agricultural GDP [WB, 2005].

Activities

- Government of the Republic of Uzbekistan makes significant efforts for addressing land degradation issues and improving of living standards of the country population.

- By Decree of the President of the Republic of Uzbekistan dated October, 2007, the most important priorities for agriculture development, state program on ameliorative improvement and coordinating mechanism – Republican Fund of Irrigated Lands Ameliorative Improvement in Uzbekistan had been approved.

- During 2007-2012 Republican Fund has allocated more than $455 mln for ameliorative improvement of the 1,200 mln.ha of irrigated lands.

Activities

Organization	Responsibility
State committee on nature protection (Goskompriroda)	Monitoring of sources pollution of ecosystems
Center on Hydrometeorology of the Republic of Uzbekistan (Uzhydromet)	Meteorological and climatic monitoring; monitoring of air, surface water and agricultural land pollution; baseline monitoring, agro meteorological forecasts, etc.
Ministry of Agriculture and Water Resources	Monitoring of soil salinity and water logging, quantity and quality of I&D water; technical condition of I&D infrastructure; control of forestry and pasture.
State Committee on land resources, geodesy, mapping and state cadastre	Monitoring of land quality, soil bonitet and land registration issues
State Committee of the Republic of Uzbekistan on geology and mineral resources	Monitoring of groundwater pollution and dangerous geological processes
Ministry of Health	Sanitary-hygienically monitoring of natural environment.

Soil Science and Agro Chemistry Institute

Tashkent Agrarian University, State Tashkent University. etc
Design and Research UZGIP Institute and other

Activities and Collaboration

- Soil investigation in the country is implemented according to the standards and demands, accepted in former Soviet Union. Before the USSR collapse the development of pedology in Uzbekistan was characterized by intensive accumulation of the empirical soil-mapping knowledge and classification of fundamental issues (genesis, diagnostic, classification, cartography, etc).

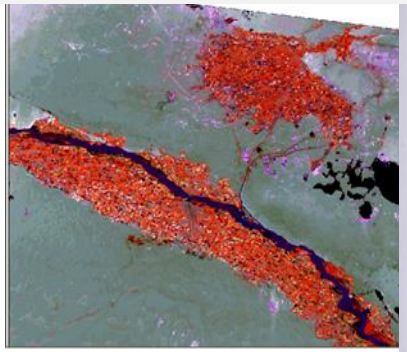
- These achievements are based on the approaches and methods of the soviet pedology school (V.Kovda, N. Rozov, B.Egorov, A.Rode, N. Minashina, E.Pankova, N. Kimberg, B. Gorbunov, M.Umarov and many other).

Activities and Collaboration

- From the end of the last century multi year investigation of landscape genesis of the Pre Aral and salt accumulation on the dry bed of the Aral sea (Popov, Sektimenko, 1997) and monitoring of environment quality, including salt migration and toxicants in Pre-Aral (Razakov, 1998) has a huge scientific and practical interest.

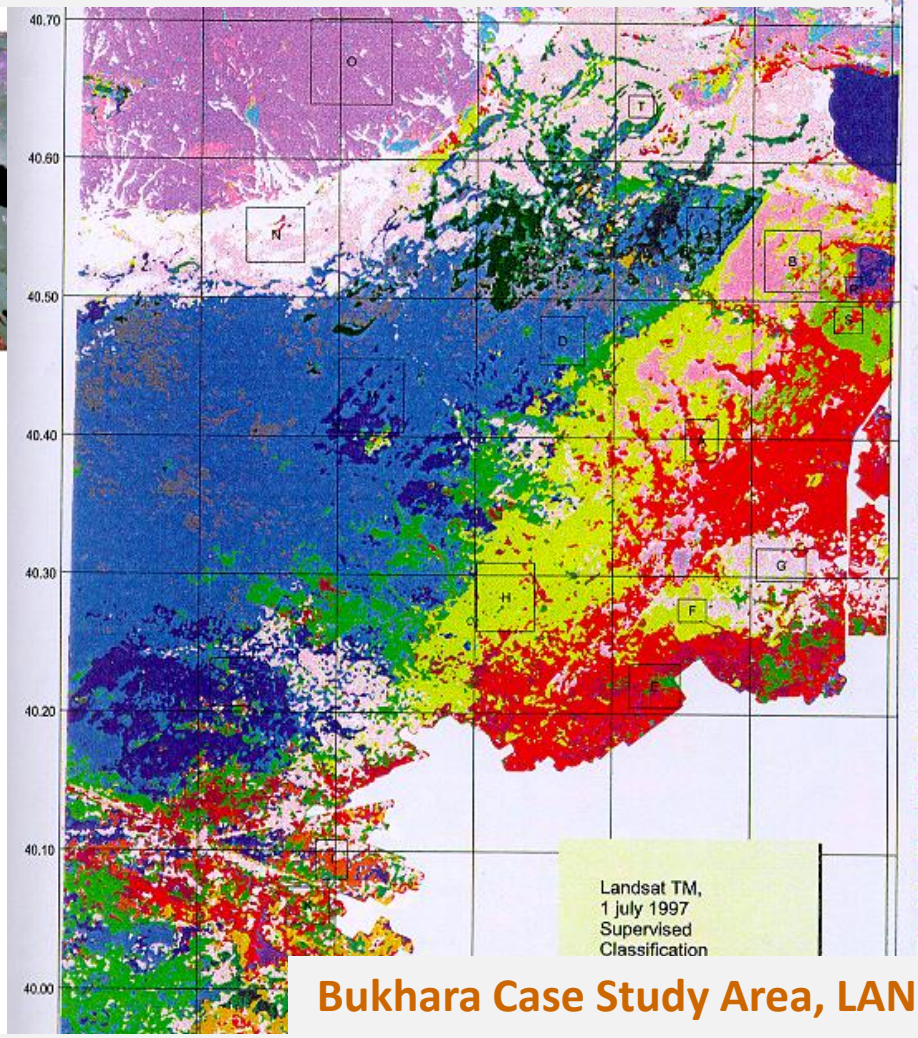
- Since 1996 the introduction of RS and GIS technology was started on regional and national levels by WARMIS-WARMAP (EC-TACIS), ISEAM and other projects.
- The various investment projects and sectoral programs and initiatives that are being implemented in the field of land improvement and rehabilitation of the I&D infrastructure demonstrate SLM practices and technologies and land use planning and management, with using the advanced RS & GIS techniques and tools.

Experience and Learned Lessons: The WB Uzbekistan Drainage Project, EIA, 1996-1999



LANDSAT TM Supervised Classification of the low land area

Bands used for classification: 2.3.4.5 and 7

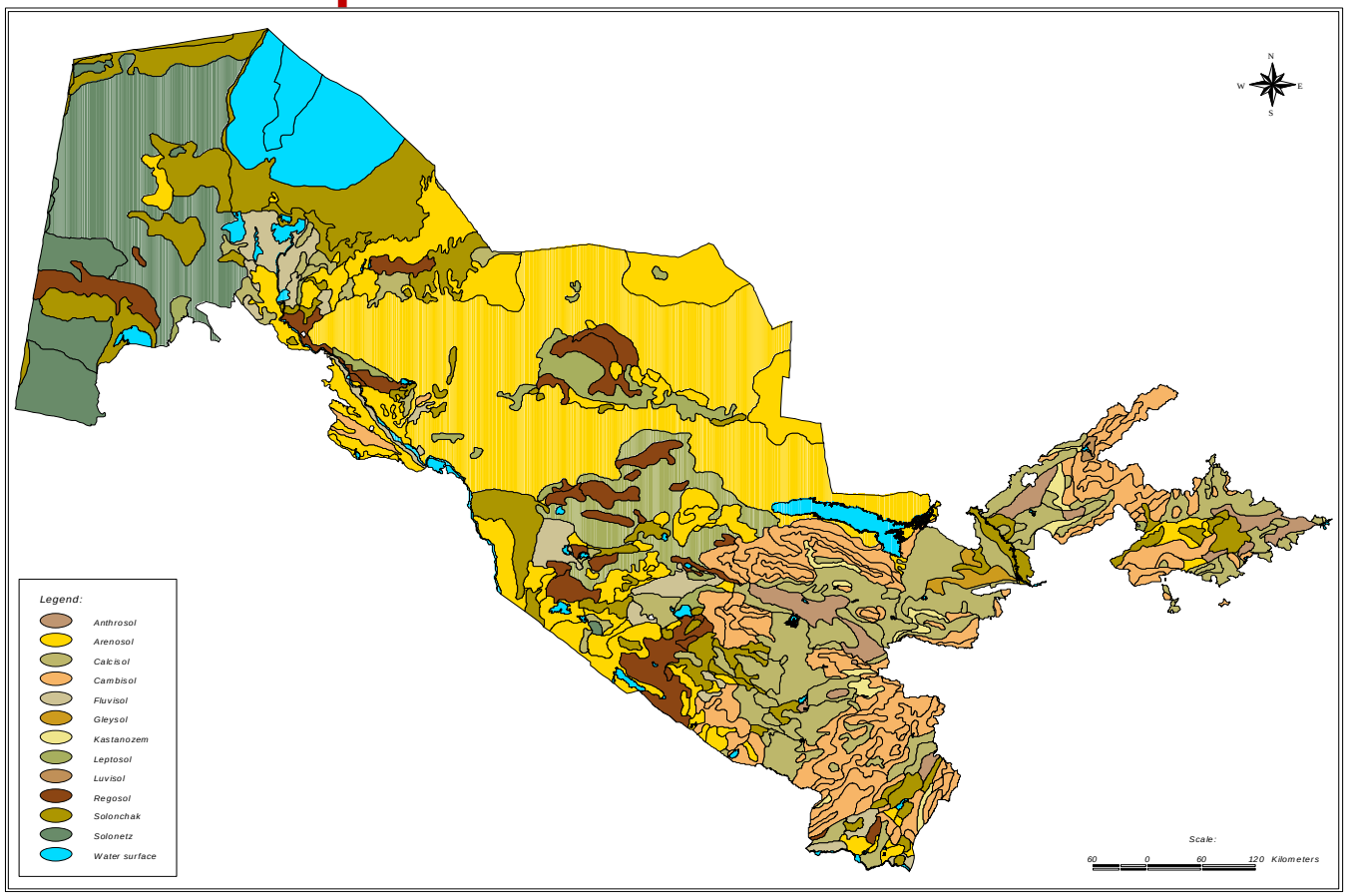


Bukhara Case Study Area, LANDSAT TM, 1998

Source: NRSP-2 BCRS /IWACO, K&M, Veen Ecology /UZB (1999) Land Use in relation to economic changes in Uzbekistan, 1999; Uzbekistan Drainage Project, EIA, 1998-1999, etc.

Experience and Learned Lessons: EU Tacis ISEAM, 2000-2001

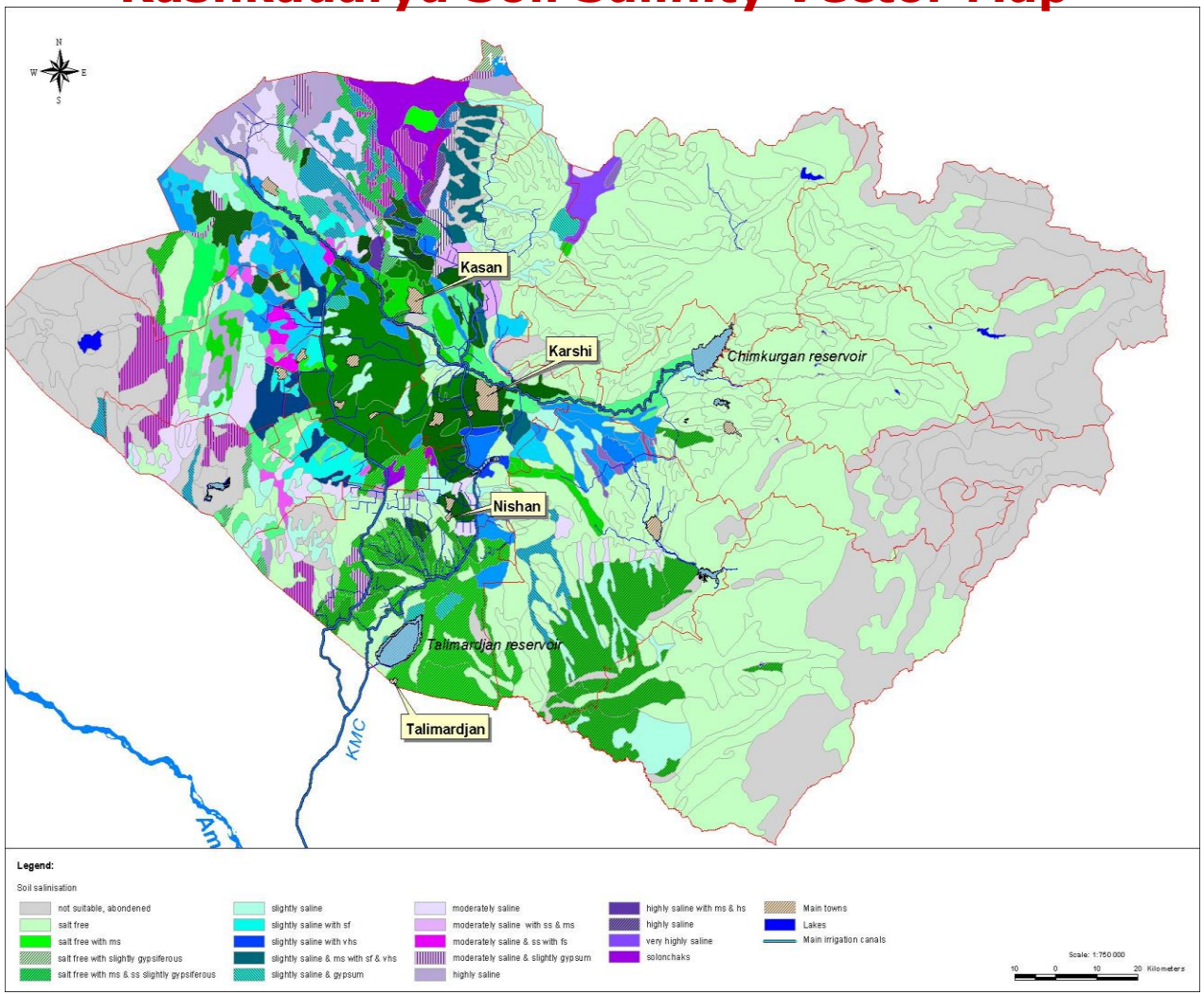
FAO Soil Map of Uzbekistan



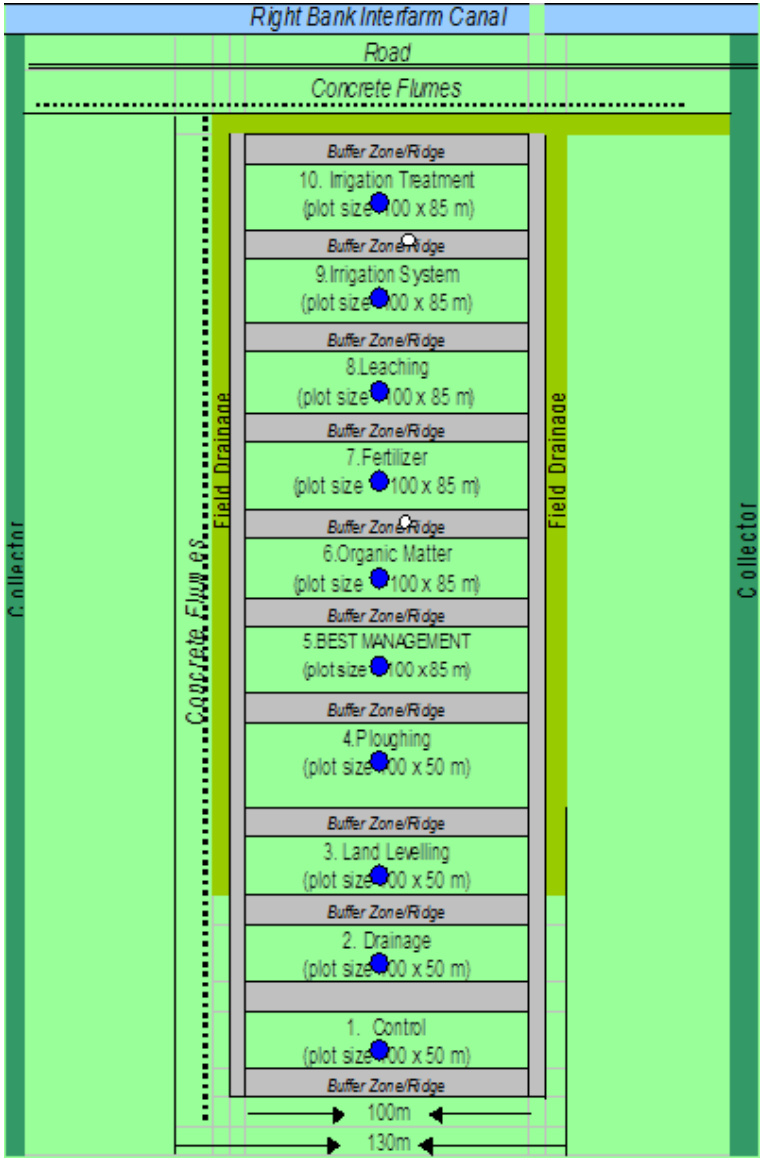
The first introduction of the *World Reference Base for Soil Resources* in Central Asia was started in the framework of the EC Tacis ISEAM Project

Experience and Learned Lessons: CBRS, 2001-2002

Kashkadarya Soil Salinity Vector Map



FAO TCP/UZB Project on Integrated Management for Sustainable Use of Salt Affected and Gypsiferous Soils in Uzbekistan (2002-2005)



Scheme of Demonstration Options
Project Site 2. Salt Affected soils in Syrdarya region

Experience and Learned Lessons: CACILM

CACILM - a multi-country and multi-donor partnership program aimed at restoring, maintaining and enhancing productive functions of land in the five Central Asia countries leading to improved economic and social well-being, while preserving the ecological functions of these lands in the spirit of the UNCCD.

National and multi-country SLM projects had been implemented in Uzbekistan during CACILM Phase 1 (2007-2010):

Recently completed **mid-scale GEF/UNDP SLM project** (2008-2012) in Karakalpakstan and Kyzylkum desert and ongoing **full-scale GEF/ADB «Land Improvement Project»** (2010-2014) in the Bukhara, Kashkadarya and Navoiy regions, located along the Great Silk Road;
Components of the CACILM Multicountry Partnership Framework Support Project (CMPF), such as:

-SLM-Research (ICARDA);
-SLM-Information System (SLM-IS)
-SLM-Knowledge management (SLM-KM)
-SLM-Capacity building (SLM-CB)

GEF/ADB/FAO CACILM SLM–Information System. Uzbekistan

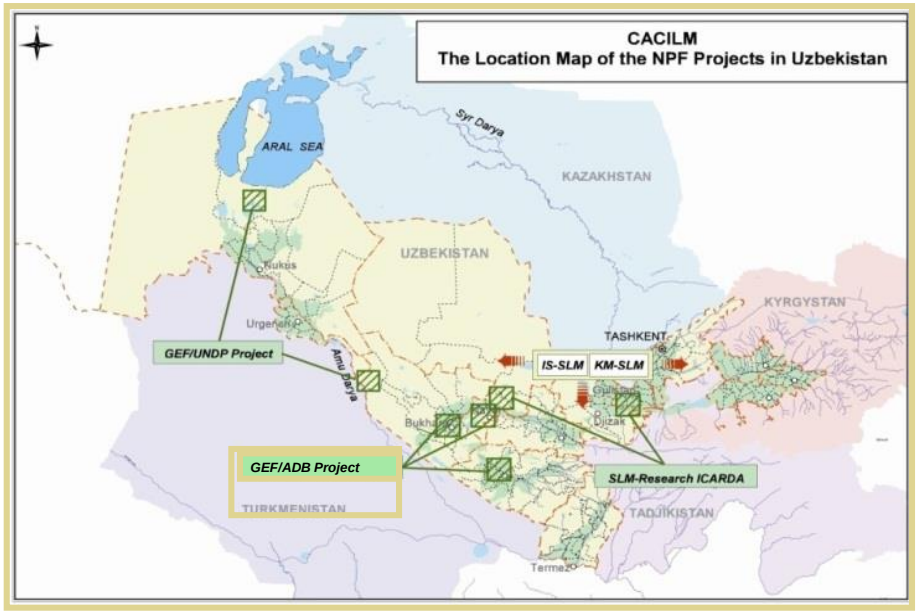
Objective:

Project objective is to enhance the countries' institutional capacity to assess and monitor land degradation and to adopt integrated land use planning and management in support of SLM.

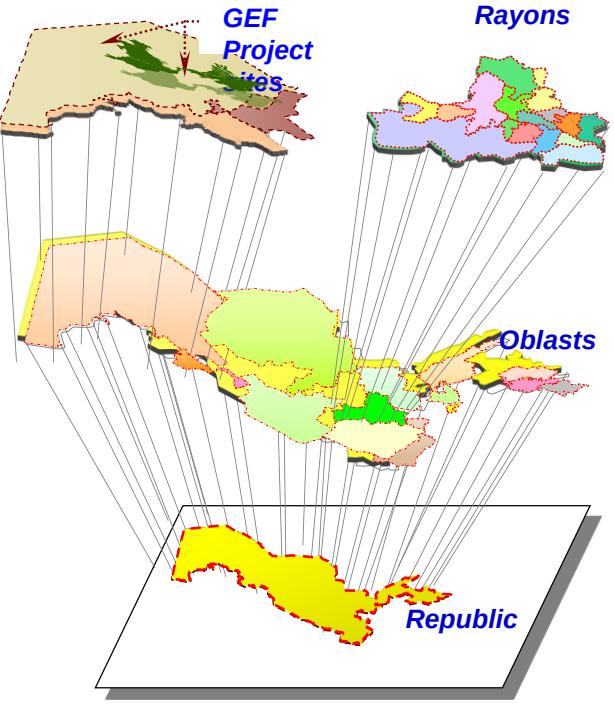
Specific objective is an application of FAO LADA approach and methodology for design and development of SLM-Information system in assessment and mitigation of land degradation and climate change impact.

The global datasets (GLC-2000, AgroMaps, SRTM data) and guidelines has been supported by FAO LADA.

MODIS Vegetation Indices Dataset (MOD13Q1, 250m) of 2007-2008 and LANDSAT TM has been the primary data source.



Overall SLM-Information System: National Level



FAO-LADA-LUS

National cut-outs from Global (1:5m) LUS layers & replacement with higher-resolution (1:1m) national layers): Soils; Land Use / Land Cover, etc.

National Coverages:

1: 500.000 - 1:1.500 000 (national)
1: 200.000 - 1:300 000 (oblast)
1: 50.000 - 1:100 000 (rayon)
1: 10.000 - 1:20 000 (municipality; irrigation schemes)
Point data: location of municipality and former kolkhoz / sovkhoz centres (old & new names), etc…

ECONET

(updating of Econet layers, particularly on protected areas, and correcting any errors….)

ICARDA

- agro-climatic layers, etc…
  (any updating, as necessary)

REMOTE SENSING IMAGES

- MODIS, LANDSAT ETM (particularly of higher-resolution coverages)
- *Google Earth* imagery updates, moderate resolution (1: 50.000 – 1:100 000) and high resolution (1:5.000 – 1:10.000) coverages, etc

SLMIS NSIU

National Statistics Agency Rayon and Municipalities Data

- Land Use, Crop Areas,
- Crop Yields, Crop Production
- Population, employment, income, poverty

Baseline Years: 1990, 2000, 2006; also other years over period 1987 – present.

GEF Project Area Coverages (NSIUs)

- 1:200.000 (Rayon + Oblast)
- 1:50.000
- 1:20.000, 1:10.000 (Municipalities)
  (updates & corrections…)

CACILM / MSEC / ADB Coverages (CAC-5)

- Major River Basin Boundaries
- Dams & Water Diversion Structures
- Hotspot / brightspot areas
- Met. & Hydromet Stations
- ADB, WB, EU, GTZ project locations

Current state of land degradation

Main indicators of land degradation:

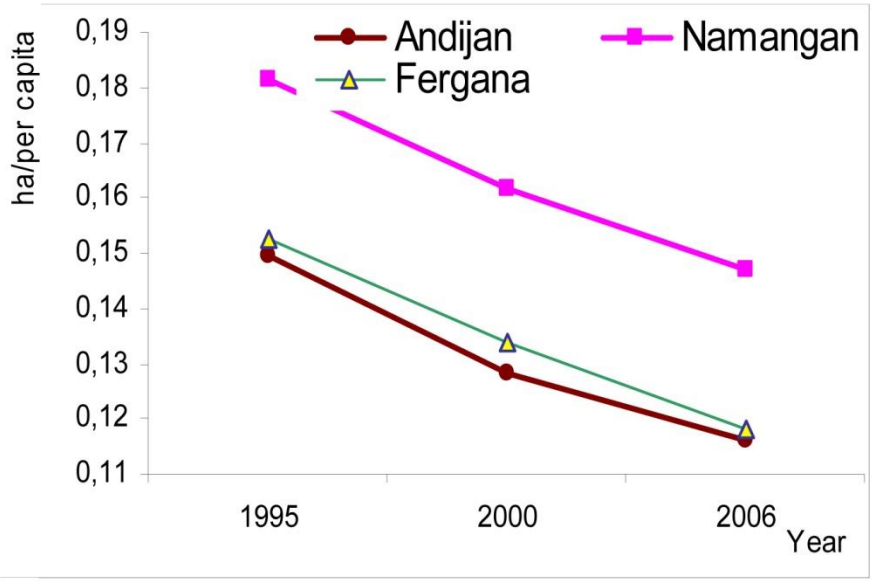
1. *Salinization and water logging;*
2. *Water and wind erosion;*
3. *Loss of organic matters and soil fertility;*
4. *Overgrazing;*
5. *Deforestation and loss of biodiversity and others.*

Socio-economical indicators:

1.Population density;
2.Living standards;
3.Land use system;
4.Quantity of cattle heads, area of arable land per capita

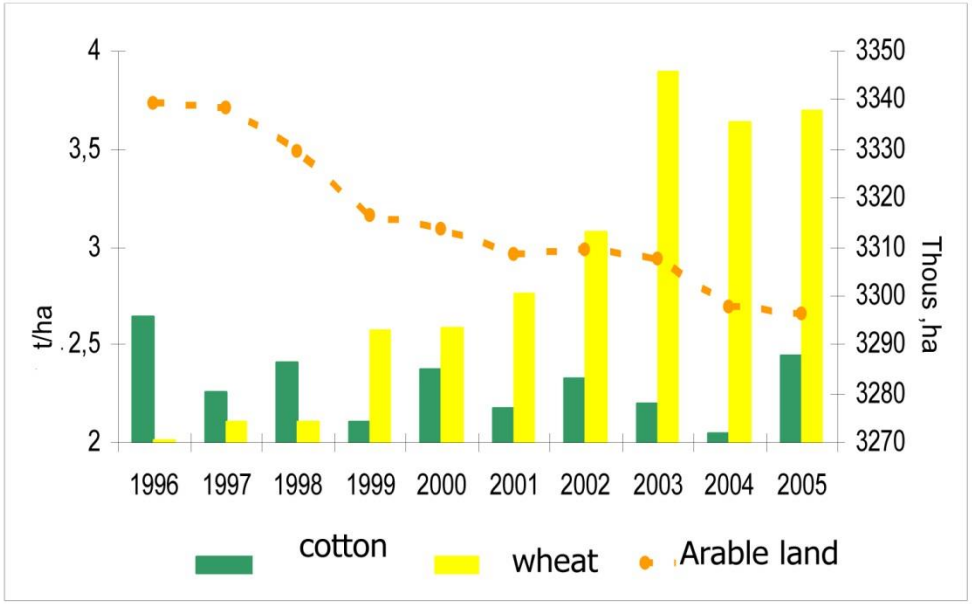
Socio-economic and livelihoods data

1. Increase of Arable Land per Capita in Fergana valley



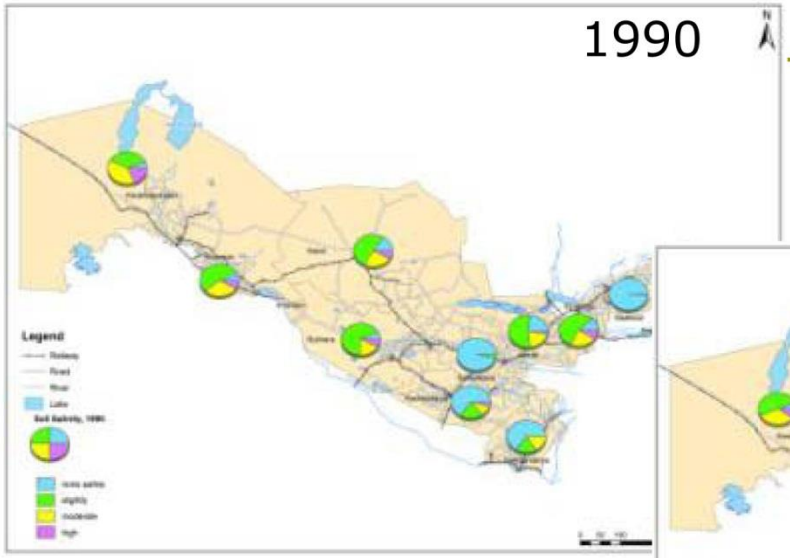
The most sharp decrease of arable lands per capita is typical for densely populated districts of the country

2. Arable Lands and Cotton & Wheat Yields for 1996-2005

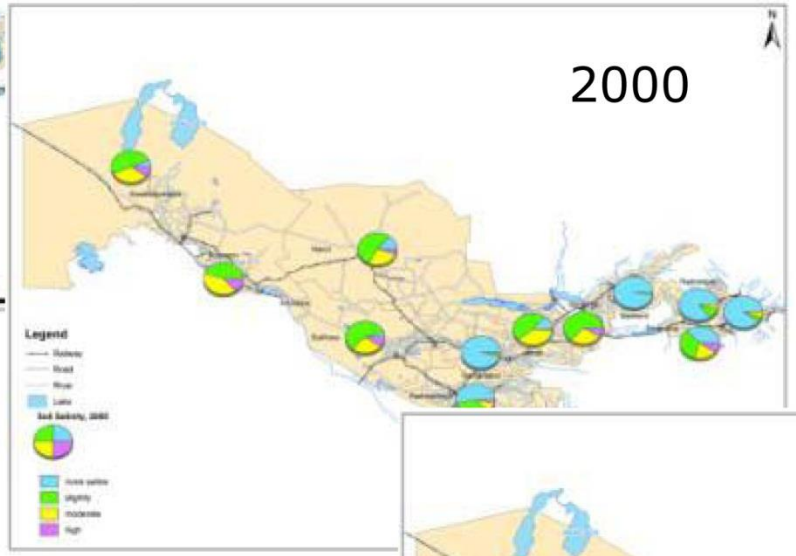


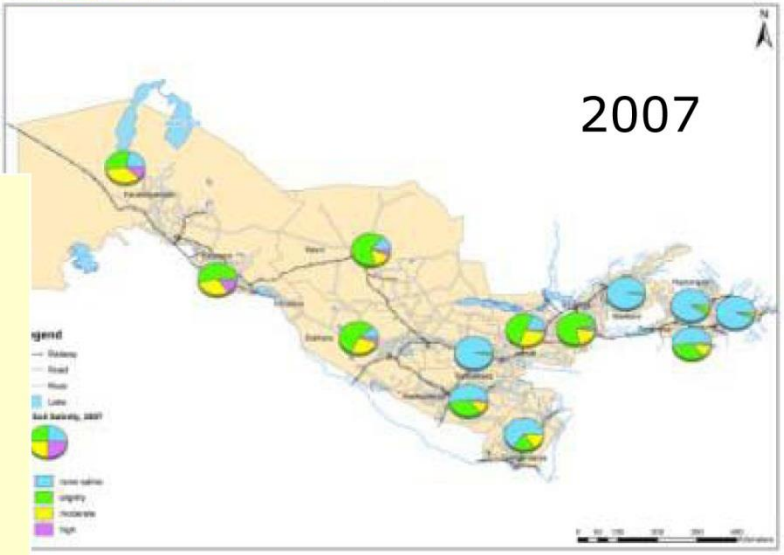
Since 1996 the arable area per capita of population on the whole decreased on the country to 8%.

Determination of the status of land degradation



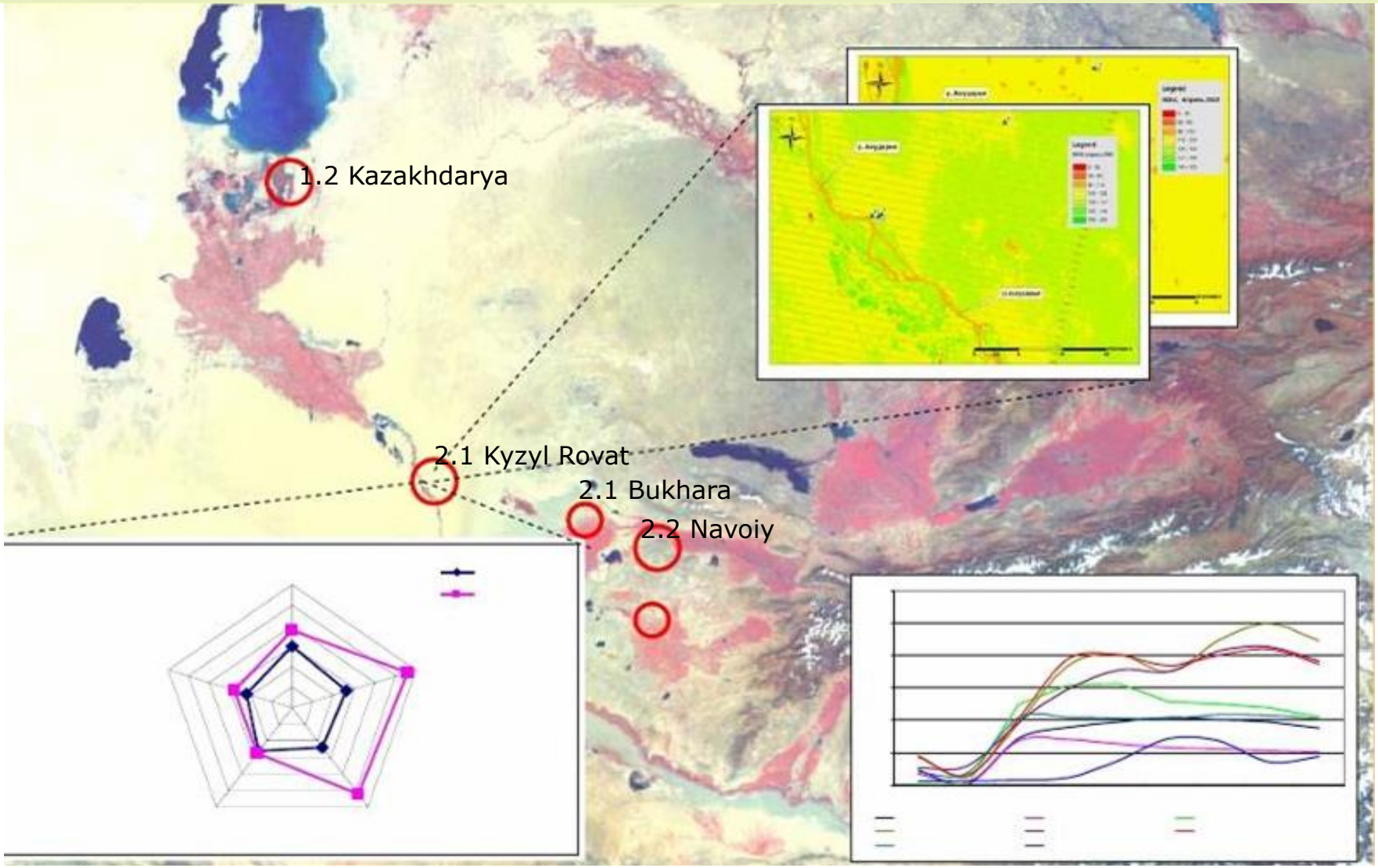
Trend of irrigated lands salinization change for the level 1990, 2000, 2007, in % of total irrigated area





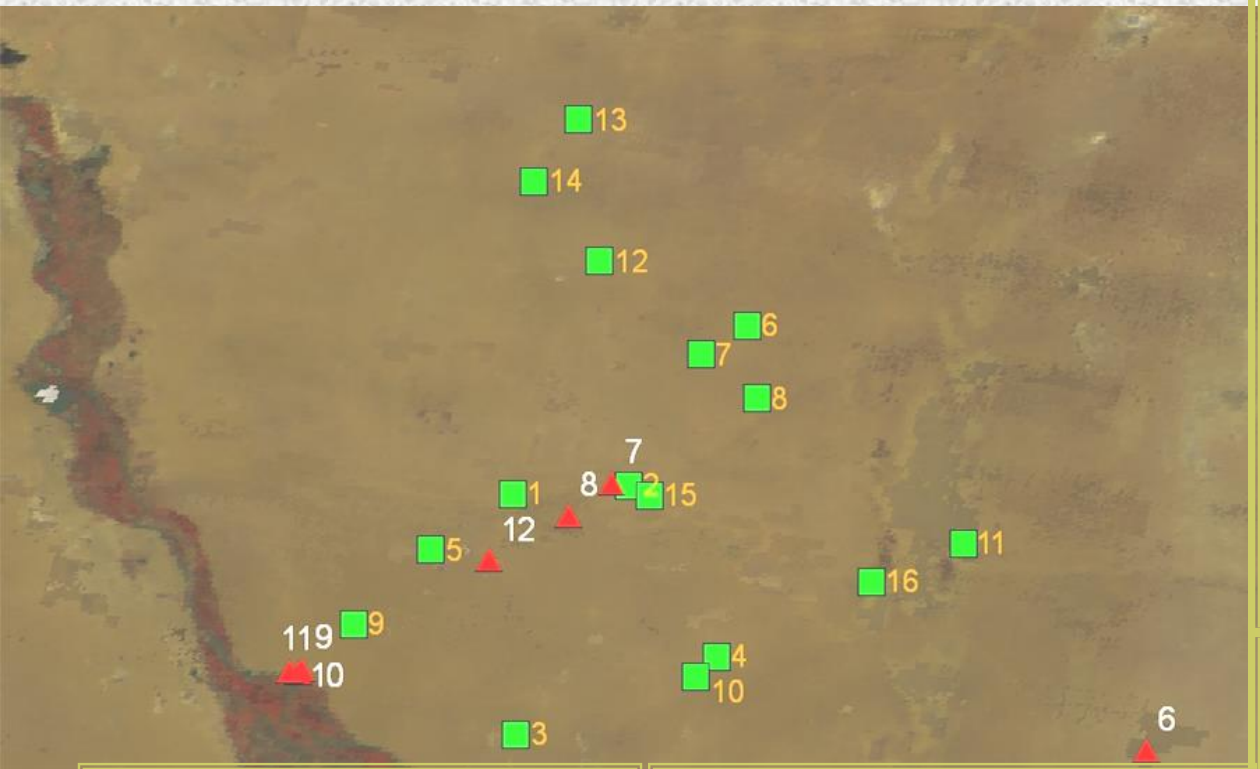
Secondary salinization cover 50.3% of irrigated lands (2155 thousand ha). The greatest area concentrated in Karakalpakstan, Khorezm, Syrdarya, Djizak, Navoi and Bukhara.
In this regions covers of salinization land from 50 to 100% of the existing irrigated land.

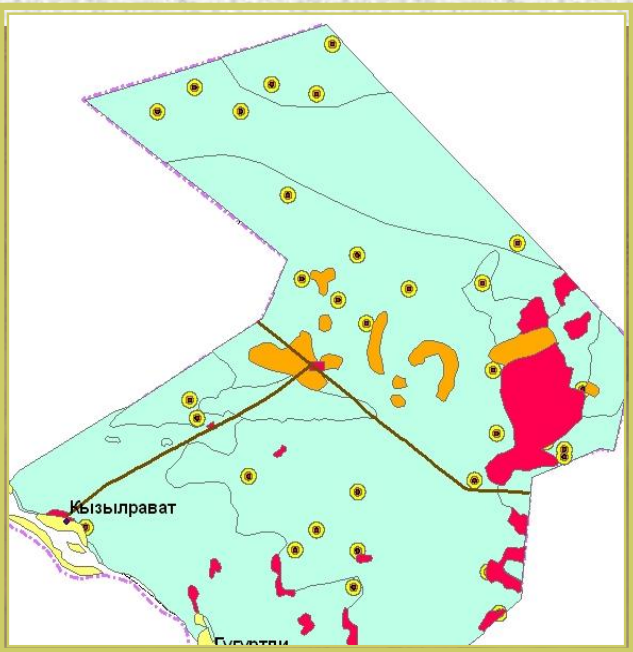
Hotspot Analysis: RS Interpretation of seasonal change of NDVI using MODIS, 2008



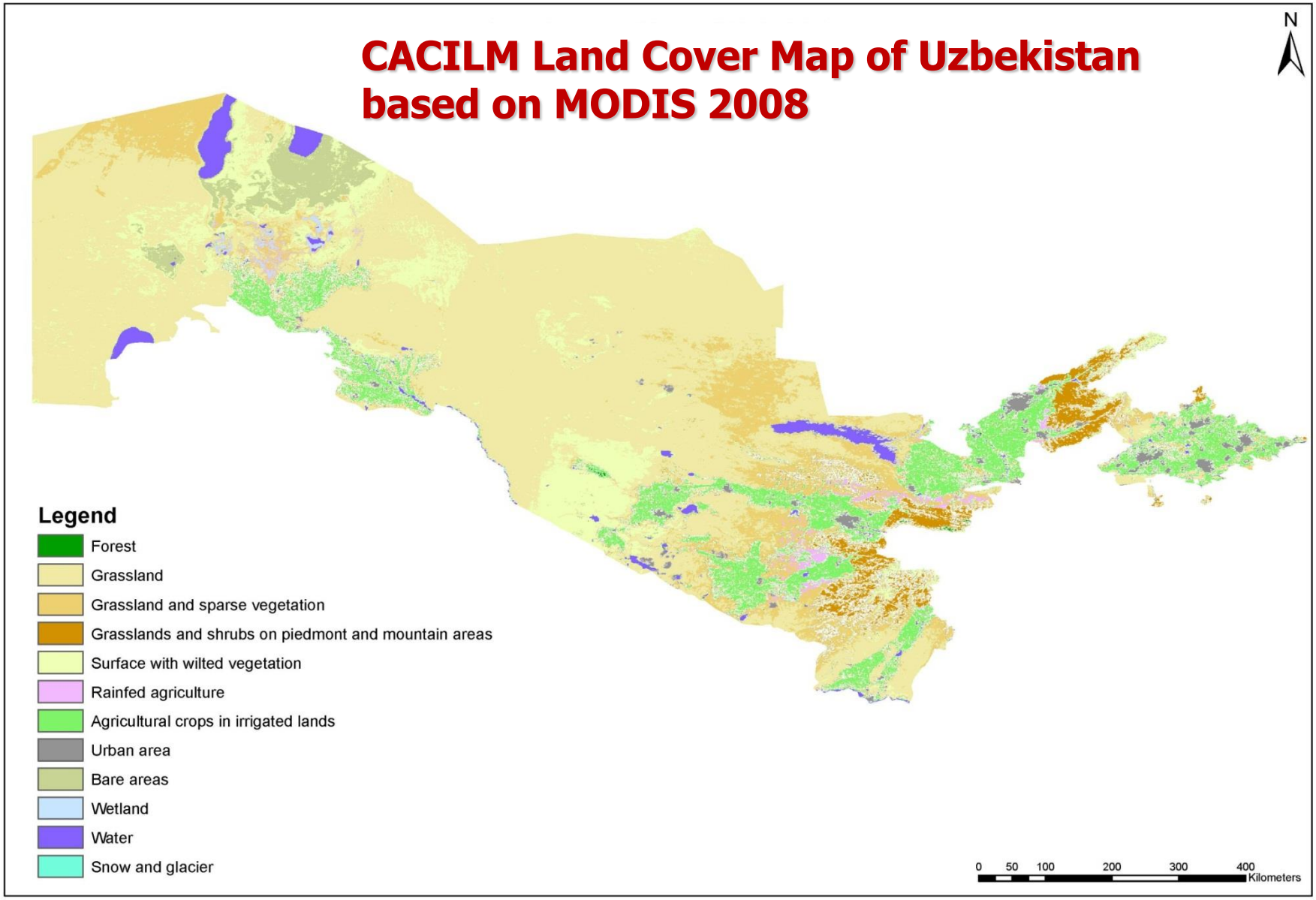
Kyzyl Ravat Site in Bukhara region (GEF/UNDP)

Desert soil and vegetation cover



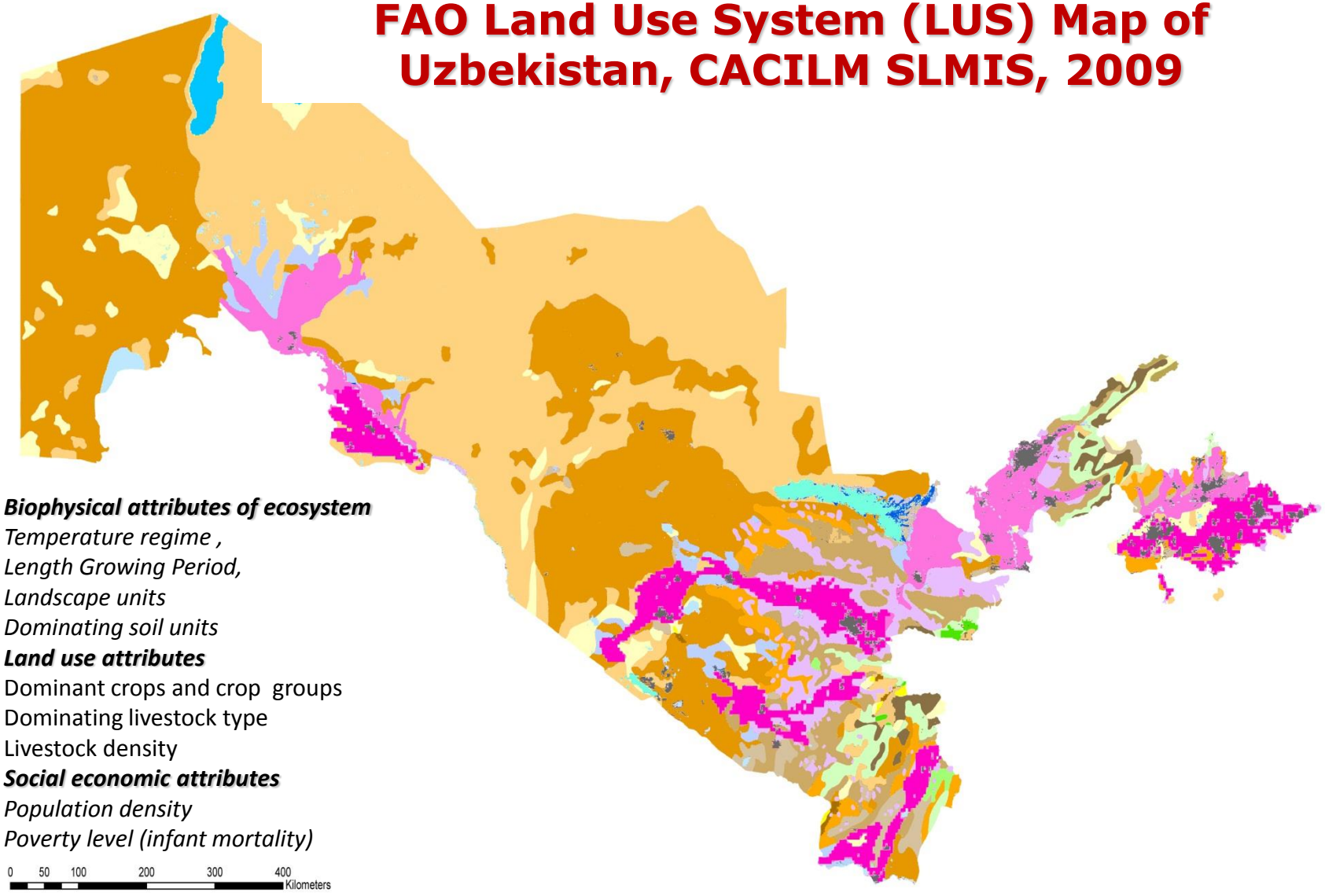


Desert sandy on aeolian deposits (Arenosol, aridic, calcaric)



Source: Based on compilation of national ecosystem and biophysical resource base with global system (GLCN,2000), 9 main classes of land cover were defined.

FAO Land Use System (LUS) Map of Uzbekistan, CACILM SLMIS, 2009



National Map of FAO Land Use System consists of 25 classes, each of them is divided into 3-4 sub classes depending on biophysical attributes of ecosystem, land use attributes and social economic features.

WOCAT-Uzbekistan:
SLM BEST PRACTICES AND APPROACHES

- Use of mineralized artesian water to organize irrigated crop farming in the Kyzylkum, CACILM SLM-Research (ICARDA) in Uzbekistan.
- Agroforestry reclamation of degraded arable lands ZEF Bonn/UNESCO demonstration plots.
- Improvement of land under arid conditions through creation of pistachio plantations, GEF Small Grants Programme.
- Pasture rotation in the desert areas of Uzbekistan, GEF/UNDP Project
- FAO Farmer Field School in irrigated zone, FAO/TCP/UZB/2901.
- Community based forestry in Karakalpakstan, GEF/UNDP Project.

Thank you for attention!