Knowledge Management in CACILM Phase II

On-the-job training workshop "Development of similarity maps to promote selected SLM packages in Central Asia"

September 16-20, 2014
Bishkek, Kyrgyzstan

Knowledge Management in CACILM Phase II

On-the-job training workshop
"Development of similarity maps to promote selected SLM packages in Central Asia"

MINUTES

Date: September 16-18, 2014
Venue: Conference Hall, Hotel Ak-Keme, Bishkek, Kyrgyzstan.

Knowledge Management project in CACILM Phase II in collaboration with the Ministry of Agriculture and Melioration of Kyrgyz Republic organized on-the-job training workshop on "Development of similarity maps to promote selected SLM packages in Central Asia".

The objective of this workshop was to share the methodology and results of the similarity analysis conducted by ICARDA – IWLMP team, identify data collection constraints, obtain the participant reflection on the results and expert based verification of similarity maps, map generation and formulation of recommended approaches, and agree on standard similarity criteria for each target agro-ecosystem.

Purpose and objectives:

- Presentation and discussion of data collection and similarity analysis results at regional level;
- Obtain participants reflection of the similarity results based on their national experience and preliminary comparison with data;
- Identification of the needed analysis at national level;
- Discuss and endorse standard similarity criteria for the four agro-ecosystems (irrigated, mountain, rainfed, and rangeland);
- Propose to establish CACs database for collecting, sharing, and archiving different data such as data used in the similarity analysis as well as the SLM technologies and approaches.

Day 1. September 16, 2014

The event was opened by Dr. Malik Bekenov, representative of the Ministry of Agriculture and Melioration, who greeted all participants of the workshop and wished a successful work. Dr. Feras Ziadat introduced the main purpose of this training workshop - to generate similarity maps (based on climate, soil texture, etc.) to apply new/existing technologies and approaches to other regions of Central Asia. There are four agro-ecosystems (irrigated, rainfed, rangeland and mountain) that were analyzed.

Dr. Azimbai Otarov said that these type of workshops are necessary not only at regional level, but also at national level. Moreover most of maps outdated in CA (not updated since Soviet Union period). Currently international organizations, donor community, and government are paying more attention on mapping of soil conditions (degradation, soil salinity, etc.).

Mrs. Mira Haddad (Research Assistant, ICARDA) presented data collection and similarity analysis results at regional level. She mentioned that different data sources could be used for similarity analysis. Text further below shows some examples of maps and figures presented during the training. Full report of the similarity analysis will be presented separately after receiving comments.

Dr. Feras noted that the data used from above mentioned sources is good for the preliminary results. Similarity analysis requires expert's feedback and reflection. In addition participants of the workshop brought the data on different agro-ecosystems.

Most of the data available is in raster format with different resolutions, and to conduct the similarity analysis the layers should be in the same pixel size (Table 2).

Mrs. Mira explained the Digital Elevation Model (DEM). The DEM was downloaded from the CGIAR CSI website. The CGIAR CSI geo-portal provides shuttle radar topography mission (SRTM) 90 m digital elevation data for the entire world. This data is provided in an effort to promote the use of geospatial science and applications for sustainable development and resource conservation in the developing world. The SRTM 90 m DEM's have a resolution of 90 m at the equator, and are provided in mosaicked 5° x 5° tiles for easy download and use. These are available in both ArcInfo ASCII and GeoTiff format to facilitate their ease of use in a variety of image processing and GIS applications.

Table 1: Data sources

Criteria	Data Sources
Altitude, m and Slope, degree	***The Consultative Group on International Agricultural Research (CGIAR), Consortium for Spatial Information (CGIAR-CSI), SRTM 90 Digital Elevation Data*** http://srtm.csi.cgiar.org/
Degradation degree	**Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), Global Land Degradation Information System (GLADIS) - Simplified output, Classes of land degradation** http://www.fao.org/nr/lada/gladis/glad_ind/
Land use	**Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), Global Land Degradation Information System (GLADIS), Land use systems of the world - v1.1** http://www.fao.org/nr/lada/gladis/lus/ ***Food and Agriculture Organization* of the United Nation *(FAO), Effective Soil Depth (cm) Map, Class 10*** http://data.fao.org/map?entryId=c3bfc940-bdc3-11db-a0f6-000d939bc5d8
Livestock density per ha	**Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), GLADIS Global Land Degradation Information System - Beta version Livestock density** http://www.fao.org/nr/lada/gladis/lus/
Precipitation	***WorldClim – Global Climate Data*** http://www.worldclim.org/download
Soil Data Soil (texture), clay content, % Soil depth, cm Soil salinity, %	***Harmonized World Soil Database (HWSD) - (version 1.2)*** http://webarchive.iiasa.ac.at/Research/LUC/External-World-soil-database/HTML/ ***Food and Agriculture Organization – GeoNetwork, Digital Soil Map of the World*** http://www.fao.org/geonetwork/srv/en/metadata.show?id=14116
Water availability/source	***World Wide Fund for Nature (WWF), Conservation Science Data and Tools, Global Lakes and Wetlands Database*** Http://worldwildlife.org/pages/global-lakes-and-wetlands-database ***Food and Agriculture Organization* of the United Nation *(FAO), Global Water Information System AQUASTAT*** Http://www.fao.org/nr/water/aquastat/main/index.stm ***Economic and Social Research Institute (ESRI); World Water Bodies and World Linear Water*** http://www.arcgis.com/home/item.html?id=e750071279bf450cbd510454a80f2e63 and http://www.arcgis.com/home/item.html?id=273980c20bc74f94ac96c7892ec15aff
Watering points/ha	**data not available yet**

The DEM used to generate the altitude (m) which is needed for the mountain agro-ecosystem and the slope degree for the four agro-ecosystem, the DEM has a spatial reference of (GCS_WGS_1984) the raster was re-projected to a geographic coordinate system (WGS_1984_UTM_Zone_41N) to create the slope degrees for Central Asian countries (Figure 1).

Table 2: Raster data resoultions

Criteria	Data Source/s	Raster resolution Cell size(x, y)
Altitude, m and Slope, degree	The Consultative Group on International Agricultural Research (CGIAR), Consortium for Spatial Information (CGIAR-CSI), SRTM 90 Digital Elevation Data http://srtm.csi.cgiar.org/	(90, 90) m
Degradation degree	Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), GLADIS Global Land Degradation Information System - Beta version http://www.fao.org/nr/lada/gladis/glad_ind/	(9, 9) Km
Land use	Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), GLADIS Global Land Degradation Information System - Beta version, Land use systems http://www.fao.org/nr/lada/gladis/lus/	(9, 9) Km
Livestock density per ha	Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), GLADIS Global Land Degradation Information System - Beta version Livestock density http://www.fao.org/nr/lada/gladis/lus/	(9, 9) Km
Precipitation	WorldClim – Global Climate Data http://www.worldclim.org/download	(1, 1) Km
Soil data: texture (clay content %), salinity %	Harmonized World Soil Database (HWSD) - (version 1.2) http://webarchive.iiasa.ac.at/Research/LUC/External-World-soil-database/HTML/	(1, 1) Km

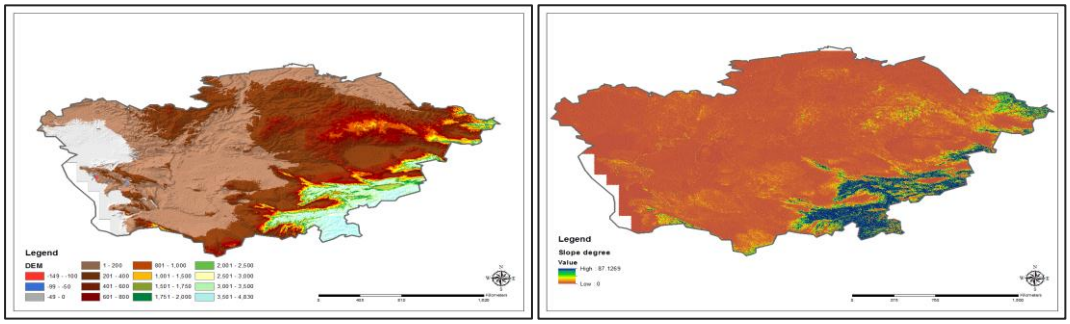

Figure 1. DEM and slope in CACs

Ms. Mira Haddad presented the results for each agro-ecosystem in CA and participants of the workshop discussed the results based on their national experience and comparison with the data. Dr. Azimbay Otarov mentioned that irrigated agro-ecosystem in Kazakhstan is located only in basins of the Syrdarya river and Almaty region, and South of Kazakhstan. Most of the lands are rainfed (north part of Kazakhstan). Also participants gave their feedbacks on the results.

Land-use types for each agro-ecosystem were presented, data used to extract required information is presented in Table 3.

Average annual precipitation was also used in the mapping. Data from WorldClim websites was downloaded for two sections that cover Central Asian countries area. The used data is from the current conditions section which is interpolations of observed data, representative of 1950-2000. Data were generated through interpolation of average monthly climate data from weather stations. Data downloaded as a set of 12 raster for each section, a new raster created that represent the average yearly precipitations. Then the two sections where mosaicked and clipped into Central Asian countries area (Figure 2).

Table 3: **Sources of land use data**

Agro-ecosystem	Land use criteria	Data source
Irrigated	Irrigated land	**Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), Global Land Degradation Information System (GLADIS), Land use systems of the world - v1.1, irrigation intensity.** http://www.fao.org/nr/lada/gladis/lus/
Rainfed	Cropland	**Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), Global Land Degradation Information System (GLADIS), Land use systems of the world - v1.1, dominant crops** http://www.fao.org/nr/lada/gladis/lus/
Mountain	Exclude inconvenient areas (rocks, gullies etc.)	***Food and Agriculture Organization (FAO), Effective Soil Depth (cm) Map, Class 10*** http://data.fao.org/map?entryId=c3bfc940-bdc3-11db-a0f6-000d939bc5d8
Rangelands	Rangelands, pasture	**Food and Agriculture Organization of the United Nation (FAO), The Land Degradation Assessment in Drylands project (LADA), Global Land Degradation Information System (GLADIS), Land use systems of the world - v1.1, land use systems** http://www.fao.org/nr/lada/gladis/lus/

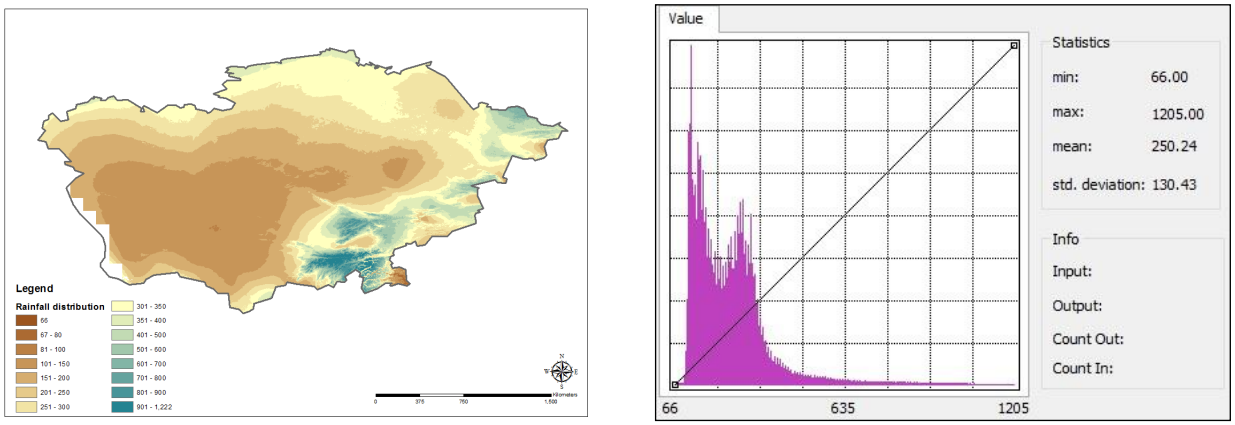

Figure 2. Precipitation distribution and histogram

Day 2. September 17, 2014

The following criteria were used to map the areas similar to the **irrigated** agro-ecosystem. The source of each criterion is indicated in the table below. Irrigated agro-ecosystem criteria included the availability of water sources; the result of the similarity analysis shows the irrigated areas close to the perennial water source. By overlaying the land-use, slope degree, soil texture, and soil salinity layers the areas similar to irrigated agro-ecosystem in Central Asia is shown below in Figure 3.

Land use	Irrigated land
Slope, degree	0-5
Water availability/source	Sufficient
Soil (texture), clay content, %	10-75 physical clay
Soil salinity, %	Non saline soil: Electrical Conductivity < 8

The following criteria were used to map the areas similar to the **rainfed** agro-ecosystem. The source of each criterion is indicated in the table below.

Rainfed agro-ecosystem	Similarity criteria
Precipitation	300-600
Slope, degree	<7
Land use	Cropland
Soil (texture), clay content, %	20-75 physical clay

By overlaying the above prepared layers the areas similar to rainfed agro-ecosystem in Central Asia is shown below in Figure 4.

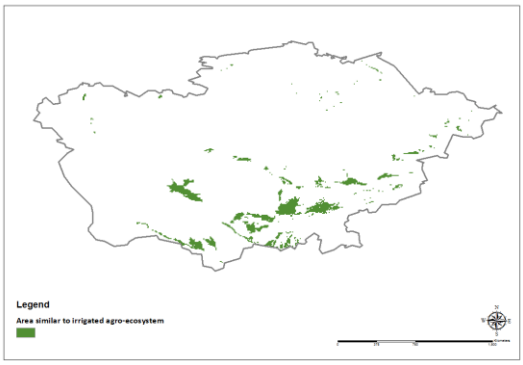

Figure 3: Area similar to irrigated agro-ecosystem

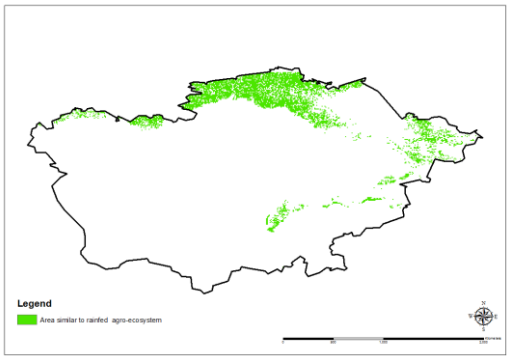

Figure 4. Area similar to rainfed agro-ecosystem

The following criteria were used to map the areas similar to the mountain agro-ecosystem. The source of each criterion is indicated in the table below.

Mountain agro-Ecosystem	Similarity criteria
Slope, degree	>7
Precipitation	>500
Altitude, m	>800
Land use	exclude inconvinient areas (rocks, gullies etc.)
Soil depth, cm	>50

By overlaying the above prepared layers the areas similar to mountain agro-ecosystem in Central Asia is shown below in Figure 5.

Rangelands agro-ecosystem

Rangelands agro-ecosystem	Similarity criteria
Land use	rangelands, pasture
Slope, degree	>12
Precipitation	
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

By overlaying the above prepared layers the areas similar to rangeland agro-ecosystem in Central Asia is shown below in Figure 6.

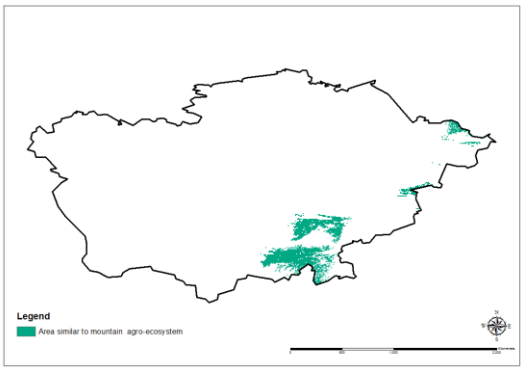

Figure 5. Area similar to mountain agro-ecosystem

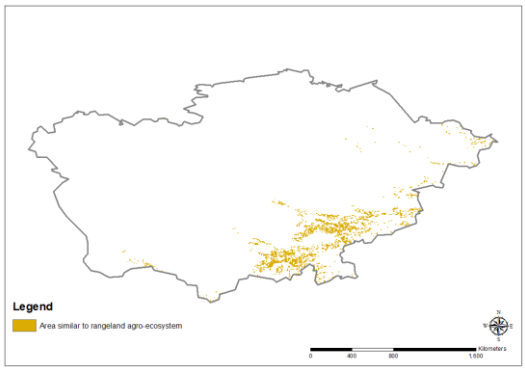

Figure 6. Area similar to rangeland agro-ecosystem with slope degree > 12

Further similarity analysis results were demonstrated. The maps below show the results of the similarity analysis for the four agro-ecosystems.

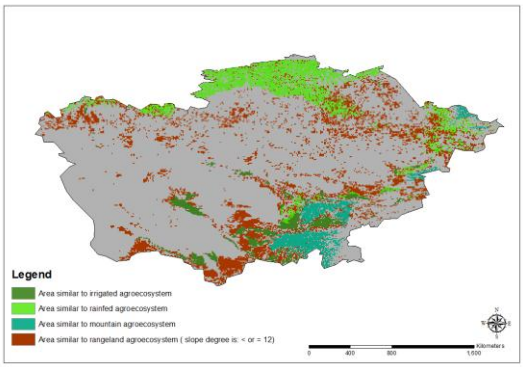

Figure 7: Simialr areas for the four agro-ecosystem (Option -1)

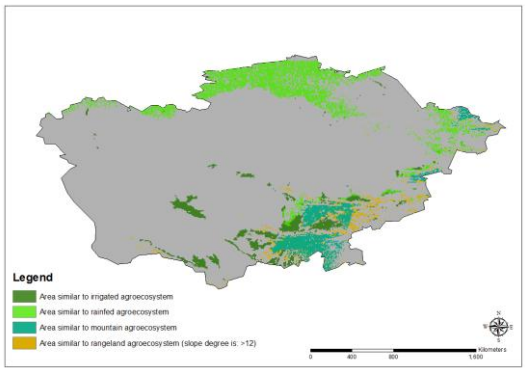

Figure 8: Similar areas for the four agro-ecosystem (Option -2)

Day 3. September 18, 2014

Ms. Olga Matushkina presented maps of rainfed agroecosystem in Kyrgyzstan. It was noted that it is better to use a local data in order to minimize inaccuracies. Further participants of the workshop practiced how to use the ArcGIS software and derive data for different agro-ecosystems.

Participants expressed that this on-the-job training workshop was very productive and informative. Knowledge and tools which were demonstrated would help them to understand similarity of ecosystems in Central Asia. The use of ArcGIS software on similarity mapping provided some additional information on important factors for agro-ecosytems.

The participants of the workshop agreed that they will find updated maps on four agro-ecosystems and converted them to ArcGIS layers and provide them to ICARDA-CAC office. Further on Ms. Mira Haddad will analyze and fine-tune the previous maps.

Annex 1

Knowledge Management in CACILM Phase II

On-the-job training workshop "Development of similarity maps to promote selected SLM packages in Central Asia"

September 16-18, 2014

Bishkek, Kyrgyzstan

AGENDA

Day-1, Tuesday, September 16, 2014

Presentation, discussion and preliminary verification of similarity results

08:30 – 09:00	Welcome and Opening Introduction of participants Introduction to the training course and expected outcomes	Dr. G. Elemanova Dr. F. Ziadat Dr. A. Akramkhanov
09:00 – 10:30	Presentation and discussion of data collection and similarity analysis results at regional level (Central Asia)	Dr. F. Ziadat Mrs. M. Haddad
10:30 – 11:00	Coffee break	
11:00 – 12:30	Participants reflection of the similarity results based on their national experience and preliminary comparison with data	All participants
12:30 – 13:30	Lunch	
13:30 – 15:00	Discussion and fine tuning of similarity criteria	All participants

Day-2, Wednesday, September 17, 2014

Spatial verification of similarity results using data from participating countries

09:00 – 10:30	GIS-based verification of similarity maps using data from different countries	Dr. F. Ziadat Mrs. M. Haddad
10:30 – 11:00	Coffee break	
11:00 – 12:30	Maps generation and formulation of recommended approaches	Dr. F. Ziadat Mrs. M. Haddad
12:30 – 13:30	Lunch	
13:30 – 15:00	Identification of the needed analysis at national level	Dr. A. Akramkhanov Dr. F. Ziadat

Day-3, Thursday, September 18, 2014

Presentation and comparative analysis of similarity results from the three benchmarks

09:00 – 10:30	Introduction, deriving slope map for the area and preparing field observations for analysis	Dr. F. Ziadat Mrs. M. Haddad
10:30 – 11:00	Coffee break	
11:00 – 12:30	Discuss and endorse standard similarity criteria for the three benchmarks (irrigated, rainfed, and rangeland)	All participants
12:30 – 13:30	Lunch	
13:30 – 15:00	What is next – what needs to be done at Benchmark, National and Regional levels, roles and responsibilities of all participant	All participants

Annex 2

Knowledge Management in CACILM Phase II

On-the-job training workshop "Development of similarity maps to promote selected SLM packages in Central Asia"

September 16-18, 2014

Bishkek, Kyrgyzstan

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