Central Asian Countries Initiative for Land Management

Sustainable Land Management Information Systems

Assessment of Institutional Capacity

Prepared by

CACILM Multicountry Secretariat

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CONTENTS

ABBREVIATIONS

ADB	-	Asian Development Bank
CAC	-	Central Asian country
CACILM	-	Central Asian Countries Initiative for Sustainable Land Management
CIDA	-	Canadian International Development Agency
CMPF	-	CACILM Multicountry Partnership Framework
FAO	-	Food and Agriculture Organization
GEF	-	Global Environment Facility
GIS	-	Geographic Information System
GM	-	Global Mechanism
GTZ	-	German Agency for Technical Cooperation
ICARDA	-	International Center for Agricultural Research in Dry Areas
IFAD	-	International Fund for Agricultural Development
KAZ	-	Republic of Kazakhstan
KYR	-	Kyrgyz Republic
KYRM	-	ADB Resident Mission in the Kyrgyz Republic
LADA	-	Land degradation assessment in Drylands
LOA	-	Letter of Agreement between ADB and CACs
MSEC	-	CACILM Multicountry Secretariat
NAP	-	National Action Plan
NCC	-	National Coordination Council
NPF	-	National Program Framework for Sustainable Land Management
NSEC	-	National Secretariat
PIU	-	Project Implementation Unit
SDC	-	Swiss Agency for Development and Cooperation
SLM	-	Sustainable Land Management
SLM-CB	-	Sustainable Land Management Capacity Building
SLM-IS	-	Sustainable Land Management Information System
SLM-KM	-	Sustainable Land Management Knowledge Management
SLM-R	-	Sustainable Land Management Research
TAJ	-	Republic of Uzbekistan
TUK	-	Republic of Turkmenistan
UNCCD	-	United Nations Convention to Combat Desertification
UNDP	-	United Nations Development Program
UNEP	-	United Nations Environment Programme
UZB	-	Republic of Uzbekistan

Central Asian Countries Initiative for Land Management
Sustainable Land Management Information System (SLMIS)

Assessment of Institutions to Host SLMIS

I. BACKGROUND AND INTRODUCTION

1. The CACILM Multicountry Partnership Framework Support Project (CMPF-SP) provides support to the implementation of CACILM at regional and national levels. The CMPF-SP Sustainable Land Management Information System (SLMIS) multicountry projects will assist the five Central Asian Countries (CACs) develop and information system to support an integrated approach to land use planning and management. One institution in each country is to host the information system and report to National Consultative Councils (NCC) of each CAC.

2. Missions to Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan were carried out for the following purposes:

a. to assess institutional capacities of CACILM partner agencies in providing up to date information for decision making support in sustained land management practices,

b. to identify an institution in each country that is capable of hosting the SLMIS,

c. to assess the needs of the institution so identified for each country to efficiently host and maintain the SLMIS, and

d. to identify and assess the capacities of potential training organizations.

3. Members of the Mission were Mr. C. Y. Ji, SLM-IS consultant to Asian Development Bank (ADB), Dr. Kanysh Nurymgereyev, Deputy Head of the CACILM Multi-Country Secretariat (MSEC) and Dr. Jamal Annaklycheva, MSEC Monitoring and Evaluation Specialist. Reports completed are based on the findings of capacity and needs assessment missions to Kazakhstan, Uzbekistan and Kyrgyz Republic[1], to Tajikistan[2], and to Turkmenistan[i3].

4. The activities undertaken during and following the Missions to the Central Asian Countries included the following. :

a. Meetings were conducted with the CACILM National Coordination Council (NCC) Chairman, National Institution and CACILM National Secretariats (NSEC) for discussion of the following:

(i) clarify the process of the CACs to identify and task a lead institution in each country to host and operate the system (SLM/IS administrative agency) and a national SLMIS coordinator in that institution to form and lead a multi-agency technical task force to work on designing, testing, and deploying the national SLM/IS;

(ii) define expectations of CAC from CACILM SLM/IS, including importance of SLM/IS to the strategic planning system of CAC;

[1] Capacity Assessment of Sustainable Land Management Information Systems in Kazakhstan, Kyrgyzstan, and the Republic of Uzbekistan. Dr C. Y. Ji. CACILM Multicountry Secretariat, December, 2007.
[2] Capacity Assessment of Sustainable Land Management Information Systems in Tajikistan. Dr. K. Nurymgereyev, CACILM Multicountry Secretariat, December, 2007.
[3] Capacity Assessment of Sustainable Land Management Information Systems in Turkmenistan. Dr. J. Annaklycheva, CACILM Multicountry Secretariat, January, 2008.

(iii) define roles and responsibilities of NCC, National Institution and NSEC in improvement of SLM IS in the central Asian countries

b. Meetings and discussions were conducted with the ministries and state agencies in the CACs on the following:
   (i) identify system of decision making in CAC of relevance to the National Program Frameworks and for SLM in general and particular;
   (ii) identify current problems and weaknesses in development and implementation of Information Systems;
   (iii) assess system of information sharing among state agencies;
   (iv) define the existence of any interstate agreements regarding data sharing among ministries, departments or agencies of the government.

c. Meetings and discussions were conducted with the scientific institutions of the CACs on the following:
   (i) define the status of state and donors projects that are implementing on SLM.
   (ii) specify capability of the national research institutions and expecting impact to establishing of SLM IS.

II. APPROACH AND ASSESSMENT OF GIS/RS/IS CAPACITY OF NATIONAL INSTITUTIONS

A. Capacity Assessment Approach

5. A desired result of the CACILM Multicountry Program Framework Support Project (CMPF-SP) is to design and develop a Sustainable Land Management Information System (SLMIS) to assist the five CACs in adopting an integrated approach to land use planning and management. Therefore assessment of the institutional capacities for information systems technologies in each of the agencies visited was carried out. National institutions with the potential to host the SLM-IS system were to be identified and recommendations for their capacity needs established and reported

6. The criteria for assessing the institutional capacities was based on a set of indicators thought to best reflect the abilities of an individual institution for conducting monitoring and research studies in land resources. These include, for example, expertise in land resources, knowledge and skills of GIS, remote sensing, databases, equipments, so on. For governmental institutions the focus is placed mainly on the projects closely related land degradation, capacities in GIS/RS/IS as well as availability of data and maps archives. For educational institutions, the capacity of providing training in GIS/RS (e.g., courses offered, qualification of staff members, and equipments in the labs) is a priority, whereas the experiences in land degradation monitoring are only of secondary importance.

B. Assessment of Expertise

7. Expertise and local knowledge in land degradation are vitally important for an institution to maintain and to host the SLMIS. Local knowledge and expertise are accumulated from years of research studies in disciplines such as soil research, pasture management, land use planning, hydrology, agriculture, environment, and so on. The expertise is reflected among

several items listed in the inventory sheet such as major projects conducted in land degradation, databases developed, and maps and reports produced. In addition, international collaborations and participation in the projects financed by the international donor agencies such as ADB, the World Bank, FAO, UNEP and UNDP, are also indicative of possession of expertise in the institution.

a. *Projects:*

(i) Projects that are related to methodological development, measurements, and monitoring of land degradation and environment. For instance, studies of soil salinity, pastureland biomass production, soil water regime, ground water monitoring, and so on are all closely related to sustainable land management practices. Of particular interests are the projects financed by the World Bank, UNEP, UNDP, FAO, and ADB.

(ii) The component of remote sensing and GIS in the projects is noted. Because of the tight time frame given, the team is only able to record partial information of each of the projects described to us. Should there be detailed information needed, the respective institutions may be approached through the assistance of the NSEC.

b. Databases, Maps and Data Archives, and existing information systems:

(i) Digital databases on soil, water, vegetation, and other environmental parameters would be very useful for establishing baseline information.

(ii) Maps at various scales for various regions are of paramount importance for establishing baseline information. Existing soil salinity maps for example, are useful for establishing baseline information and provide ground truth data for establishing methodologies of monitoring and mapping land degradation due to salinization from satellite remote sensing imageries. Soil maps are commonly found in each country. Agri-Ecological Zoning (AEZ) maps may or may not available. Maps depicting levels of severity and types of degradation may be available at the oblast level or at rayon level. Other maps may also exist such as maps showing seasonal variations of water table and so on should also be noted in the inventory sheet.

c. GIS, Remote Sensing, and IT Specialists

(i) The number of professionals who are specialized in GIS and remote sensing is a direct indicator of capacity and skills in hosting and maintaining the SLMIS. The level of education should be noted.

(ii) Those who qualify as GIS/RS specialists usually have obtained a high degree education (such as Ph.D and Ms.C). Those who received training for more than 3 months can also be characterized as GIS specialists. However, for those whose job is to digitize maps should not be counted as IT specialists.

C. Equipment

8. Equipment assessment is divided into 2 categories: GIS/RS/IS related, and non GIS/RS/IS related equipment. Equipment related to GIS/RS/IS are sub-divided into two groups: hardware and software.

a. Hardware includes number of labs, computers, scanners, map plotters, GPS, satellite receiving stations, digitizing tables, and so on.

b. Mainstream software packages of GIS and remote sensing are: ESRI products (ArcInfo, ArcView, ArcGIS), MapInfo, and Idrisi. Internet GIS systems mainly include ArcSDE, and MapServer.

c. Common remote sensing image processing packages include: ENVI, Erdas Imagine, PCI, and ERMapper. Main database systems are Oracle, MySQL, PostGreSQL, MS Access, MS Excel, etc.

D. Overall Assessment – Definition of the Grade System

9. The overall capacity of an institution is made by examining all aspects detailed in the inventory sheet. A grade level ranging from 0 to 3 is given to each institution.

Level 0	Indicates that the institution is new to the concepts of GIS and remote sensing. No GIS specialist, no GIS labs.
Level 1	Indicates that the institution has minimal capacity in GIS/RS and land degradation expertise. GIS may be used for data storage, but does not possess capacities in spatial data analysis. Typically, there would be 1 GIS specialist (usually received a short training) in the institute.
Level 2	Level 2 indicates that the institution has capacities of both GIS and remote sensing. GIS is used routinely, and remote sensing capacity may be rudimentary (e.g., visual interpretation using images already being processed), and a rather limited capacity in processing raw data. Some experiences in land degradation assessment and monitoring, and some data archives. 1 or more GIS labs, several GIS specialists.
Level 3	Indicates the ability to carry out land degradation assessment, monitoring, and mapping independently. GIS labs are well equipped, and GIS databases have been built. Numerous GIS specialists. A lot of experiences in satellite remote sensing, and capable of processing raw data (e.g., geometric correction & ortho-rectification, image mosaic, and computer classification). May be capable of developing software systems.

10. The information garnered from the meeting, interviews, and site visits was organized and structured into a standardized reporting format of the inventory sheet. An example is shown for Uzbekistan in Annex 1.

III. SUMMARY OF FINDINGS

A. Kazakhstan

11. Based on the overall assessment of institutional capacities by the Needs Assessment Mission team, and supported by Mr. Bulat Bekniyaz, NCC Chairman and UNCCD Focal Point for Kazakhstan, the Institute of Geography is recommended to host the SLMIS. The Institute of Geography is associated with the Ministry of Education Science.

12. Established in 1938, the Institute of Geography has been engaged in research in glacier, mountain ecosystems, soil, and desertification. The institute has academic exchange programs with numerous countries (e.g., U.K., China, and Germany), and has been a local partner for UNESCO and GEF funded projects. Several projects have been completed in the Aral Sea and the Caspian Sea regions on desertification. Databases have been developed on soil and socio-economic data. Soil maps at 1: 500,000 for the entire country have been compiled, and the Soil

Atlas has been published in 2007 by the institute. Three GIS and remote sensing labs are all well equipped with the latest software systems. A total of 19 young professionals are specialized in GIS and remote sensing.

13. Institutions that might contribute supporting data for the SLMIS system, and who benefit from the training and capacity building activities of the SLMIS implementation in Kazakhstan are KAZNIEK (Institute of Ecology & Climate); The Center of Information System, Ministry of Environmental Protection; Institute of Soil Research; and Hydromet Institute. The Institute of Livestock and Pasture Research does not have GIS capability but would likely benefit from participation. TERRA, a private consulting company has the capacity to provide mid-level training on GIS and remote sensing systems, (ArcGIS, Erdas). Institute of Geography is also capable of providing training in ArcGIS as it is a certified ESRI training center.

14. Institutional capabilities to facilitate land degradation assessment and monitoring in the country have clearly been demonstrated. The institutions collectively are capable of performing basic tasks of land degradation assessment. In terms of technologies and expertise of RS/GIS applications, Kazakhstan possesses a moderate level of capabilities compared with other developing nations such as China, India, and Brazil. GIS technologies are used in many of the institutions for storing, retrieving, visualizing, and processing geospatial data in their daily activities. Among the 6 institutions, 5 have GIS labs. The capacity for employing remote sensing technologies is however weak. Only 3 agencies have capacities of computer analysis of remote sensing images.

B. Summary of Findings: Kyrgyzstan

15. In the Kyrgyz Republic, the institute with the most potential to host and operationalized the SLM-IS, the Institute of Land Use Planning (GIPROZEM). The institute has 5 departments: land use, cadastre, pasture research, agrarian soil research, and soil agro-chemical stations. The head of the Department of Pasture Research, Madam Lyudmila, has a history of contributions of CACILM and is a member of the GEF national steering committee. For the last 40 years, this department has been conducting continuous monitoring of pastureland on some 475 observation sites for 87 types of pasture. Data prior to 1997 are archived on papers and data collected since 1997 are already in digital form. Currently there is a GIS lab hosted in 3 adjacent rooms. There are 5 IT workers, and 1 GIS specialist who had 6 months training. The GIS system has numerous thematic layers including, administrative boundaries, soil maps, pasture types, and for selected areas, land use.

16. Institutions that might contribute supporting data for the SLMIS system, and who benefit from the training and capacity building activities of the SLMIS implementation in Kyrgyz Republic are the Ministry of Emergency Situations, Institute of Irrigation Research, Institute of Soil Research, Pasture Institute, and Department of Geography, Kyrgyz National University and Institute of Natural Resources, Agrarian University.

17. As usual, all government entities are under-funded. Equipments in the labs are not well maintained and upgraded. In terms of geospatial data and information systems technologies, Kyrgyzstan has the lowest level of capacity compared with Kazakhstan and Uzbekistan. GIS technologies have received little attention from the government institutions. Although there have been international donor agency funded projects with components of capacity building in GIS technologies, the capacities could not be sustained. The geospatial information services industry is still in its infancy. There are only 2 small private GIS companies in the Republic with a short history. Ironically, GIS software systems have not been used, AUTOCAD (a computer aided design system) is used instead to handle geographical information.

C. Summary of Findings: Tajikistan

18. Assessment of institutional capacities in Tajikistan identified two local organizations suitable for hosting of the SLMIS. Institute "FAZO" under the Agency for Land Management, Geodesy and Cartography is the leading organization in Tajikistan for GIS and GPS activity. Since 2003 it has produced vector maps for 32 rayons (supported by a World Bank project). The Institute "FAZO" Institution can process satellite images has experience in conducting training courses for staff and partner organizations and with the training center of the Ministry of agriculture with involving of foreign trainers. Staff is more than 100 people including a GIS lab (14 people) and GPS lab (7 people) producing of maps on a) delimitation of rayons, b) state registration of agricultural lands, and c) state registration of settlements lands. The Institute has an archive of air photos of Tajikistan (1968-1990); delimitation of rayons (1960-1990); and materials related to state registration of agricultural lands (1989-2006). There is digital data base and maps.

19. The Public Institution "Implementation Center of the Land Registration and Cadastre System for Sustainable Agriculture Project" (World Bank Project) is a project unit registered as a local organization and can enter into contractual arrangements. It was created by the internal Coordination Council for Projects under the Agency for Land Management, Geodesy and Cartography. Chairman of Council is Mr. A. Khabirov, Deputy Director of the Agency for Land Management, Geodesy and Cartography. The World Bank Project covers 36 administrative districts (rayon) of Tajikistan (it is around 300 farms). All number of districts is 62. Institution has high capacity including GIS trained staff, equipment, satellite images and support from World Bank. It plans creation of 7 Cadastre centers in different rayons. With support of WB it has organized trainings, purchased equipment and satellite images from SovZond (Russia).

20. Therefore the Agency for Land Management, Geodesy and Cartography is recommended as the host agency for SLMIS, with the division of authorities and responsibilities between FAZO Institute and the "Implementation Center of the Land Registration and Cadastre System for Sustainable Agriculture Project" to be resolved and agreed by National Coordination Council of Tajikistan. Other Institutions that might contribute supporting data for the SLMIS system, and who benefit from the training and capacity building activities are Soil Science Institute of Tajikistan under the Tajik Academy of Agricultural Sciences and TajikGiproZem under the Agency for Land Management, Geodesy and Cartography.

21. Most of organizations and institutions in the country that are facilitating land degradation assessment and monitoring are connected to the Agency for Land Management, Geodesy and Cartography.

D. Summary of Findings: Turkmenistan

22. The National Coordination Council of Turkmenistan has identified the Land Resources Service of the Ministry of Agriculture as the most suitable organization to be responsible for the SLM-IS project. The Land Resources Service (LRS) was established in 2000 within the Ministry of Agriculture (MoA) with the main function to implement land cadastre, mapping and registration. LRS has representation at each administrative level (national, regional, district) and totals all together about 180 employees. At the national level, it has 4 departments: economic, land cadastre, protection and use of land, land resources. Presently, LRS through its local representation implements inventory of homestead land and individual housing. Last year, LRS

accomplished inventory of irrigated arable lands which included the information on area of plots and cultivated crops. Land productivity was measured visually. Based on the inventory findings the schematic maps for farm units and districts were designed. At the regional level the data were presented in table. The data were presented to the Cabinet of Minister which took decision to decrease the area under cotton and wheat by about 35%. The excluded lands are to be rehabilitated by the departments of the Ministry of Water Economy. By the request of the President of the country the LRS has prepared a concept of development of automatic system of land cadastre and information systems which is still not submitted due to lack of administrative mechanism (no Prime Minister who is in charge of agriculture).

23. The development of SLMIS capacity within the Land Resource Services of the Ministry of Agriculture aligns with the current orientation and possibly the future development of this unit, although there is very limited capacity and personnel with computer based information technology and geographic information systems skills and knowledge within this organization. Other Institutions that might contribute supporting data for the SLMIS system, and who benefit from the training and capacity building activities are Water Project Design Institute of the Ministry of Water Economy and National Institute of Deserts, Flora and Fauna of the Ministry of Nature Protection of Turkmenistan.

24. The organization and functions of ministries and agencies, and the system of information management in Turkmenistan is relatively unchanged from during the Soviet era. There have been some developments in the institutional settings and functions of the state organizations following independence related to information systems in general and the management of natural resources and in particular land resources. It will be necessary to facilitate land degradation assessment and monitoring in the country by raising awareness and demonstrating the application of these approaches and GIS technologies for information management in the country. Substantial capacity development and training will be required to establish GIS based information management systems in general and for sustainable land management monitoring in particular in Turkmenistan.

E. Summary of Findings: Uzbekistan

25. The National Coordination Council of Uzbekistan has identified UZGIP Institute – Ministry of Agriculture and Water Resources (UZGIP) as the most suitable organization to be responsible for the SLM-IS project. Technically, the center is one of the best institutions in Uzbekistan in terms of both information systems technologies and expertise in land degradation research. The Information Systems department is led by Ms. Gulchekhra Khasankhanova who serves as the Project Implementation Specialist for the CACILM National Secretariat. The institute was established around 1920 under the Ministry of Agriculture and Water Resources. The expertise in land degradation assessment and monitoring is substantial. The institute has developed several databases (e.g. WARIS), and has collaborated with numerous international donor agencies (FAO LADA, UNDP, ESCAP, ADB, etc) on a wide range of activities such as integrated land and water resources management in the Aral Sea region, biosphere reserve, land improvement, land use, soil salinity, and so on and so forth. Technically, the center has capacities of both GIS and remote sensing technologies. A large quantity of information and data is available to facilitate the baseline information for land degradation assessment and monitoring. It is expected that the institute will lead the 5 nations in the successful implementation of the CACILM SLMIS.

26. Other Institutions that might contribute supporting data for the SLMIS system, and who benefit from the training and capacity building activities should be identified and their roles and responsibilities and participation in the SLMIS project documented by the National Coordination

Council of Uzbekistan. Such organizations may include HydroEngeo–Institute of Hydrogeology & Engineering Geology; UzHydroMet – Center for Hydro-meteorological Services; Inter-State Committee for Sustainable Development; GIS Lab: Project "Enhancement of the Environmental Indicators"; Institute of Soil & Agro-chemistry and ECOGIS Center; Institute of Land use as a potential trainer in GIS basic and mid level applications.

27. In general, Uzbekistan also has a moderate level of capacities in terms of GIS, remote sensing, and information systems technologies, and is comparable with that of Kazakhstan. This is mainly reflected from the general applications of these technologies in various practices of land use and land resources inventory, monitoring, and mapping. In fact, a lot of these capacities are attributed to collaborations with international organizations such as UNEP, UNDP, ADB, and the World Bank. Among the 8 institutions surveyed, 4 are labeled as capacity level 2 and above.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. General Conclusions

28. In summary, Kazakhstan has the highest capacities among the five countries assessed, followed by the Republic of Uzbekistan. Among eight potential training centers, five of potential have been found in these two countries. The Information systems technologies in these two countries are only moderately developed compared with that of other developing nations such as China, India, and Brazil. Nevertheless, both countries are potentially capable of maintaining the SLMIS through capacity building to enhance the existing capabilities.

29. The capacities of the existing GIS technologies in Kazakhstan are sufficient for hosting the SLMIS. However, the existing capacities in remote sensing techniques need to be enhanced to facilitate the functioning and maintenance of the SLMIS.

30. The capacity of information systems in Tajikistan is lower than Kazakhstan and Uzbekistan but the Land Administration Agency has sufficient capacity upon which to further develop the skills and knowledge required for the SLM-IS system.

31. For Kazakhstan, Uzbekistan and Tajikistan, capacity building and training in provided remote sensing image processing and land degradation assessments; land cover mapping with computer classification of remotely sensed imageries; change detection using remotely sensed imageries; and monitoring vegetation activities with remote sensing and radar and thermal image processing. Uzbekistan and Tajikistan require training on the use of ArcGIS software.

32. In Kyrgyzstan there is basic capacity in land management information systems, and strong interest in the development of a SLM-IS system, particularly for range and pasture management issues.

33. Turkmenistan has the lowest capacity among the five nations in GIS, remote sensing, and the lowest data availability. In Turkmenistan, capacity development requires training in GIS software and remote sensing applications, and there are limitations on the processing and dissemination of information this country.

34. For Turkmenistan and Kyrgyzstan capacity building and training should be provided in the following areas: basic image manipulations using GIS software, and introductory level remote sensing and land cover mapping with computer classification of remotely sensed imageries.

B. Leading Candidate Institutions by Country

35. In summary, the following National Institutes are have been assessed as the leading candidates for implementing the CMPF-SP Sustainable Land Management information System component in their country:

a. Kazakhstan – Institute of Geography of Ministry of Science and Education.

b. Kyrgyz Republic – GIPROZEM Institute of Land Use Planning

c. Tajikistan – FAZO Institute of the Land Management Agency

d. Turkmenistan – Land Resource Service of Ministry of Agriculture

e. Uzbekistan – UZGIP of Ministry of Agriculture.

36. The inventory sheet providing full details on the institutions listed above is provided in ANNEX 1. Leading Candidate Institutions of CACS for SLM-IS Implementation.

37. Data on all of the institutes and organizations assessed is presented in Annex 2. CAC Institutions Assessed for SLMIS Capacity.

ANNEX 1. Leading Candidate Institutions of CACS for SLM-IS Implementation

Kazakhstan: Institute of Geography

Category	
1. Institutional Setting	**Institute of Geography**
1). General Information	Government funded, Est. 1938.
2). Number of Personnel	127 in total, 88 scientists, 19 experts in RS & GIS all trained in Moscow.
3).Labs	1) Glacier Research. 2). CEP – Caspian Sea Region. On soil and sands. 10 persons assigned/year. (Not fully functioning). 3). GIS Lab. 14 scientists (all Ph.D candidates) 4). Mountain Ecosystems 5).Geomorphology Lab, 10 scientists
4). Experimental Stations	3 stations
2. Major Projects Completed/Ongoing	A lot of projects are conducted in the regions of Aral Sea and the Caspian Sea.
3. International Collaborations	UNESCO (6 years) GEF, Japanese Government, McArthur Foundation, Volks Wagon, etc. Exchanges programs with England, Germany, China, etc.
4. Maps Produced	Soil Maps of Kazakhstan Scale: 1:5,000,000, 1:7,500,000 (the list of maps have been obtained) 3 Reports on the mapping Exercises
5. Databases Developed	Socio-economic Data, Soil, etc. A list of databases is obtained (in Russian).
6. Remote Sensing Data Archive	AVHRR– From Institute of Space Technology of Kazakhstan MODIS – From Institute of Space Technology of Kazakhstan Landsat – 1990, 2000, 2001, 2002, 2007. ASTER – Used for soil mapping together with Landsat. Quickbird - some
7. GIS Data Archive	Many commonly used layers such as administrative boundaries, urban centers, etc.
8. Hardware	Lab Space – 3 rooms Map Plotter – 6 (HP, and other brands) PCs - about 20 located in the GIS lab and the Geomorphology Lab GPS
9. Software	GIS – ArcGIS 9.2 (latest). MapInfo. RS – Erdas Imagine (latest) Databases:
10. Training Courses Provided	**Certified ESRI ArcGIS Training Center**. Courses are usually offered at the end of the year and also the beginning of the year when less busy.
11. Publications/Reports	Soil Atlas of Kazakhstan (available from the State Library), 3 reports associated with the compilation of the atlas.
12. Needs	1). Licensed software. Erdas Imagine is installed on 5 PC computers, 7 more are needed on PCs (estimated cost: roughly $18,000). More licenses for ArcGIS are also needed 2). Capacity on analysis of Radar and Thermal images is needed. Training should be provided. 3). Funding. Currently 3 sources of funds: i) Ministry of Nature, ii) Oblasts, iii) Contracts from private companies (oil companies). Most of the scientists are not well compensated. Since GIS specialists are in high demand in the private companies, the young scientists can easily find a job elsewhere. 4). Lab space. The two labs (GIS and Geomorphology) are very crowded.
13. Major Shortcomings	1). Lacks experiences in vegetation degradation research and mapping. 2). Information sharing among government bodies is problematic (Dr. Kanysh will provide more detailed information on this).
14. Remarks	The Institute is well funded and well equipped. Numerous research programs and projects have been completed and/or are ongoing. Most of the scientists are well trained in Moscow. Capable of conducting mapping activities in soil, desert, ecology, water resources, and so on. Remote Sensing

	image processing is conducted in the lab of Geomorphology. The methodologies used for various mapping practices are through visual interpretation (on-screen digitization). The Institute is a center of excellence in mapping practices in Kazakhstan. Capacity building on advanced tasks such as automated computer classification and change detection may be desirable.
15. Capacity	• Capable of conducting mapping of soil/sand, water resources, ecology, landforms, etc. • Capable of providing training on GIS and RS.
16. Materials Gathered	Electronic copy of a presentation. Several reports in Russian, 1 in English. A list of maps produced (in Russian) A list of databases (in Russian)
17. Overall Assessment	**Level 3**

KYRGYZ REPUBLIC: GIPROZEM – State Committee on Land Use Planning

Category	**Date of Inventory**:					
1. Institution	**GIPROZEM – State Committee on Land use planning**					
2. Funding Agency						
3. Employment / Workspace	**No. Employees**	**IS Specialists**	**Office Space**	**Labs**	**Exp. Stations**	
		6 IT, 1 had 6 months training in GIS		1 GIS Lab (3 rms)	3 GPS stations in the country	
4. Mandates/ Major Projects	Departments: Land use, Cadastre, Pasture research, Agrarian soil research, Soil agro-chemical station.					
5. International Collaborations						
6. Maps Produced	Land use maps at 1:10,000 compiled in 1993-1994. Topographic maps are available at 1:10,000, 1:50,000, 1:200,000.					
7. Databases	475 pastureland observation sites. 87 types of pasture are monitored. Yield (or biomass production) collected. Data prior to 1997 are archived on papers. Data collected since 1997 are stored in computers.					
8. Remote Sensing Data Archive	Some 250 true color air photos (1:2,000, resolution 0.2m) for Issyk Kul, Chui River valley. The air campaign was conducted by Japanese in 2005.					
9. GIS Data Archive	Administrative boundary, soil, land use, pasture types, etc.					
10. Hardware	**Plotters**	**Digitizer**	**Workstations**	**PCs**	**Scanner**	**GPS**
	A0 -1 A1 -1			10	Color A3, B/W, A0	
11. Software	**GIS**	**Remote Sensing**		**Database**	**Others**	
	MapInfo, EasyTrace, GeoDraw, ArcView 3.2	None		None		
12. Training Courses						
13. Major Reports						
14. Needs	Capacity building in basics of remote sensing, basic and mid-level training in GIS (e.g. spatial analysis).					
15. Major Shortcomings	No experience in assessing and monitoring pastureland with remote sensing.					
16. Remarks	• Collection of 40 years' data on pastureland. Some findings: 1). a general trend of decrease in biomass production since 1997; 2). Increases in unpalatable species, weed, and shrubs; 3). Degradation by overgrazing and under grazing; 4). Landslide; 5). Biomass burning. • The chief of the GIS Lab is trained in Kazakhstan together with another 3 persons during a project on pasture management in 2002 financed by the World Bank. He is the only one who chose to stay.					
17. Capacity						
18. Materials & Reports Gathered:	Electronic copy of a presentation in Russian.					
19. Overall	**Level 1**					

Tajikistan – 'FAZO' Institute of the Land Management Agency

Category	
1. Institution	Design Institute "FAZO" Financing Agency: Land management , geodesy and cartography agency under Tajik Republic Government Number of workers: 100
2. Major projects	
3. Maps produces	Type of maps, year of issue: agricultural maps 2004-2007 on the territory of 32 regions of Tajikistan
4. Data archive	Aero photo images of 70-80-90-years
5. Remote data archive collection	There are 1 KONOS and Onickbird photographs at present moment
6. GIS information archive	Satellite imagery from a World Bank funded project.
7. Equipment	3 laboratories, 2 plotters, 2 scanners, 1 plate scanner, 20 PCs, 2 complexes of GPS
8. Software	Photoshop, Skipro, Anitokod, Corel DRAW, AcrView, ArcGIS
9. Trainings, teachings	2-year trainings are conducted by EU project, executive agency – Finnmap (Finland), GIS specialists and photogrammetrists on map creating

Turkmenistan: Land Resources Service of the Ministry of Agriculture

Category	
1. Institutional Setting	**Land Resources Service of the Ministry of Agriculture**
1). General Information	Government funded, Est. 2000., has license to work and produce GIS materials
2). Number of Personnel	180 in total, representation at district and regional levels, 15 employees are short trained to GIS (2 experts at the national level), most are not using the skills
3).Labs	Four departments 1) Economic 2) Land Cadastre 3) Protection and Use of Land 4) Land Resources
4). Experimental Stations	One research institute
2. Major Projects Completed/Ongoing	Major activity: inventory of homestead land and individual housing, registration and providing of passports of owners of arable lands
3. International Collaborations	None noted.
4. Maps Produced	Schematic maps (not GIS based) of agricultural use of land at the level of farms (1: 10.000) district 1: 20-25.000 region 1: 200-300.000
5. Databases Developed	None noted.
6. Remote Sensing Data Archive	Should be provided by the Cartography Department of Ministry of Defense
7. GIS Data Archive	No GIS products
8. Hardware	Lab Space – 1 room 2 PCs (Pentium II), color printer
9. Software	GIS – ArcGIS 3.2, MapInfo.
10. Training Courses Provided	Certified 15 days training organized by the LRS funded by USAID Training to GIS-technologies for workers of LRS (very detailed)
11. Publications/Reports	none
12. Needs	1). Licensed software

	2). Capacity 3). Funding. 4). Lab space.
13. Major Shortcomings	
14. Remarks	
15. Capacity	Collection of ground information, development of schematic maps
16. Materials Gathered	Examples of schematic maps produced
17. Overall Assessment	**Level 1**

Uzbekistan: UZGIP Institute – Ministry of Agriculture and Water Resources

Category	**Date of Inventory**:				
1. Institution	**Name**: UZGIP Institute – Ministry of Agriculture and Water Resources				
	Funding Agency	**Employees**	**IS Specialists**	**Labs**	**Stations**
	Gov UZB. Est. 80 years ago.	245	1 GIS (short training) 2 MSc. in RS	1 room	3
2. Major Projects	Design of hydro projects in Central Asia. **WARIS**: 1). Soil maps at 1:100,000 for 12 oblasts 2). Database in Excel: • Soil potential productivity, cultural land state, soil types, soil properties, level of ground water. • Natural ameliorative map: climate zone, geomorphology, hydro geology, etc. • Map of predictive changes of existing and designed hydro module zoning, soil productivity. **ISEAM FAO:** Soil Map of Uzbekistan at 1:500,000. **FAO LADA:** • LADA technical report of Uzbekistan • Maps at 1:100,000 for 8 oblasts on: rivers, water ponds, irrigation and drainage networks, road networks, railways, settlements, gardens, location of wells. **UNDP:** • Nuratau-Kyzylkum Biosphere Reserve Project **ESCAP:** Integrated Land & Water Resources Management in Arid Areas Using Remote Sensing & GIS: Pilot project in Karshi Steppe. **Akaltin: (Syr Darya) TA-4343-UZB** Maps at 1:25,000 of topography, soil fertility, land classification, landuse, soil salinity, etc. **ADB & MAWR RUs: (Land Improvement Project)** Some maps and drawings on irrigation & drainage systems.				
3. International Collaborations	Institute of Remote Sensing, Chinese Academy of Sciences.				
4. Maps Produced	Numerous.				
5. Databases	Database on Biodiversity.				
6. Remote Sensing Data Archive	Landsat images for Karshi (given by the Institute of Remote Sensing of China). LISS images. Landsat ETM+ Mosaic for the entire Uzbekistan (from Global Land Cover Facility).				
7. GIS Data Archive	ArcView Databases on soil, salinity, land use, etc.				

8. Hardware	**Plotters**	**Digitizer**	**Workstations**	**PC**	**Scanner**	**GPS**
GIS Labs = 1	3	1	1 Intel Xeon	4	HP A3	6

9. Software	**GIS**	**RS Image Processing**	**Database**	**Others**
	ArcGIS 8.2 ArcView 3.2	None	MS Excel	

10. Training Courses	None
11. Publications	Refer to 16.
12. Needs	1. Upgrading existing GIS software packages. 2. Remote Sensing Image Processing Software packages.

	3. Upgrade hardware equipments. 4. Training of remote sensing and advanced GIS tools is needed.
13. Major Shortcomings	
14. Remarks	The Institute is the major host agency for many international land degradation and environment projects in Uzbekistan. In general GIS capacity is moderate, and the capacity of remote sensing applications is weak. The UNDP project on Nature Reserves Design seems to be the only project by which the capacity of remote sensing is demonstrated (refer to the report listed in 16). A 4-day training course had been provided to the local consultants. Although there have been some other projects that involved remote sensing, this technology however, is usually provided by partners. • The Institute has already been chosen to host the Information System by NCC. In this regard, capacity building in terms of training should be provided.
15. Capacity	**Level 3**
16. Materials & Reports Gathered	1. FAO Gateway to Land and Water Information. 2. FAO LADA Technical Report. 3. UNDP Establishment of Nuratau-Kyzylkum Biosphere Reserve Project – GIS & RS Services Final Report. 4. A list of projects, equipments and software systems. 5. Integrated Land and Water Resources Management in Arid Areas Using Remote Sensing and GIS: Pilot Project in Karshi Steppe in Uzbekistan.

ANNEX 2. CAC INSTITUTIONS ASSESSED FOR SLMIS CAPACITY
Kazakhstan

Mandate	Data available	GIS trained staff	GIS lab	Projects underaken	Training capacity	Contact person
The Institute of Geography, Ministry of Education & Science						
Research in glacier, mountain ecosystems, soil, and desertification	Databases have been developed on soil and socio-economic data. Soil maps at 1: 500,000 for the entire country have been compiled, and the Soil Atlas has been published in 2007 by the institute	19 experts are specialized in GIS and remote sensing, trained in Moscow, Russia	Three GIS/remote sensing labs are all well equipped with the latest software systems	The institute has been a local partner for UNESCO and GEF funded projects. Several projects have been completed in the Aral Sea and the Caspian Sea regions on desertification.	The institute is capable of providing training in ArcGIS as it is a certified ESRI training center	Ms. Farida Akiyanova, research officer (office: 8-7272-918102)
The Institute of Soil Research						
Soil survey	Soil samples for the ICARDA project on two sites. Database on soil samples developed in Excel.	5 IS specialists	One GIS/RS lab	1. World Bank/GEF, Dryland management 2. EU project in Syr Darya region 3. UNDP, “Protection of biodiversity of West Tian Shan”	Capable of providing training on soil sample collection and analysis	Ms. Gulnar Aidarkhanova, Deputy Director (office: 8-7272-694733)
The Center of Information System, Ministry of Environmental Protection						
Environmental information and monitoring.	Four separate databases have been constructed: 1). Protected Areas, 2). Forestry, 3). Fishery, and 4). Fauna. Base-maps are at 1:1,000,000 and 1:200,000. There are 32 GIS layers at 1:1million, and 585 layers at 1:200,000.	2 GIS specialists, 3 computer programmers	GIS labs are hosted in 6 rooms	information was not provided	5-day training courses on: 1). Environmental Auditing, 2). Land use planning, 3). Environmental insurance, 4). IT for decision making.	Ms. Lyudmila Shabanova, Deputy General Director (office: 8-7172-740809)

Kyrgyzstan

Mandate	Data available	GIS trained staff	GIS lab	Projects undertaken	Training capacity	Contact person
Pasture Research Institute						
Livestock research	Some data have been collected at rayon level. But no digital databases are constructed, and no maps have been produced	none	none	1. WB: Sheep breeding 2. ICARDA: Integrated livestock production 3. Bio-pesticide development program. Funds from US and Canada	none	Mr. Rysbek Nurgaziev, Director (office: 996-312-214457)
Institute of Soil Research						
Soil survey	Limited data on organic matter content in Tian Shan Mountain.	none	none	ADB RETA: Regional corporation on sustainable development of mountain areas in Central Asia	none	Ms. Bakhyt Mamytova (office: 996-312-243-332)
The Institute of Land Use Planning (KyrgyzGIPROZEM)						
Land use, cadastre, pasture research, agrarian soil research	The GIS system has numerous thematic layers including administrative boundaries, soil maps, pasture types, and for selected areas, land use. Sample data have been collected for 475 permanent pasture observation sites (data prior to 1997 are archived on papers and data collected since 1997 are already in digital form).	5 IT workers, and 1 GIS specialist	GIS lab hosted in 3 adjacent rooms	collaboration with WB and ADB	Pasture assessment and sampling	Ms. Lyudmila Penkina, Department of pasture monitoring (office: 996-312-666642)

Tajikistan

Mandate	Data available	GIS trained staff	GIS lab	Projects undertaken	Training capacity	Contact person
The Institute "FAZO"						
Creating maps for agricultural needs	air photos of Tajikistan (1968-1990); delimitation of rayons (1960-1990); and materials related to state registration of agricultural lands (1989-2006)	GIS lab (14 people) and GPS lab (7 people)	GIS & GPS lab	collaboration with WB and EU	there is training capacity	Mr. Akbar Yatimov, Director (cell:918-62-56-94)
Soil Science Institute of Tajikistan						
soil survey	soil map of Tajikistan (1982) and Atlas (1983)	4 experts trained in Switzerland (Bern)	GIS lab	collaboration with ICARDA, IFAG, IAEA (International Atomic Energy Agency)	none	Mr. Sanginboy Sanginov, Director (office: 993-372-271979)
The Institute of Land Use Planning (TajikGiproZem)						
Land use management	database for land cadastre since 1968	4 PC experts	one room	none	none	Mr. Khaukerim Khakimov, Director

Turkmenistan

Mandate	Data available	GIS trained staff	GIS lab	Projects undertaken	Training capacity	Contact person
The Land Resources Service of the Ministry of Agriculture						
Implementation of land cadastre	Schematic maps (not GIS based) of agricultural use of land at the level of	15 employees are short trained to GIS (2 experts at the national level)	one room	none	Training to GIS-technologies for workers of LRS (very detailed)	Mr. Lado Mkrtchyan, Deputy Chair (office: (99 312) 353283)
The Hydraulic Project Design Institute						
Designing of water management objects	Data on depth of underground water, mineralization of underground water. No survey on soil salinity of irrigation lands has been conducted since 1990. GIS maps on the zones of construction of drainage canal of new Turkmen Lake, Karakum Canal and Turkmen-Iranian water reservoir	one GIS expert	one GIS lab	none	none	Mr. Kurban Ovezmuradov, Head of Department (office: (99312) 354614)
National Institute of Deserts, Flora and Fauna						
Desertification survey	paper map database			cooperation with the USA, Israel, and Germany. Has implemented USAID projects in area of desertification monitoring with applications of remote sensing and GIS	none	Mr. Mukhamed Nepesov, Head of Department (office: (99312) 357295)

Uzbekistan

Mandate	Data available	GIS trained staff	GIS lab	Projects undertaken	Training capacity	Contact person
UZGIP Institute						
Designing of technical projects and feasibility study of irrigated lands	GIS-Based Natural Resources Database Information System.	1 GIS (short training), 2 MSc. candidates in RS	one room	WARIS, ISEAM FAO, FAO LADA, UNDP, ADB, ESCAP	none	Mr. Umid Abdullaev, Director
The Institute of Soil & Agro-chemistry						
Soil survey	DBase (the old DOS version) to store data on soil bonitet of Karakalpakstan, and also sanility data for 8 oblasts	none	numerous soil labs	collaboration with China and neighboring Central Asian countries (on land degradation research)	none	Mr. Ramazan Kuziev, Director (office: 8-371-246-0950)
HydroEngeo–Institute of Hydrogeology & Engineering Geology						
Monitoring and cadastre of groundwater	Data on ground water monitoring from some 3000 wells at two depths (0-50m, 50-150m)	seven experts	seven labs	none	none	Mr. Aslon Mavlonov, Director (office: 998-71-162-4763)