MONTHLY REPORT

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| Month Covered in this Report: | June 2017 (Period: 1st – 30 June 2017) |
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| Date: | 05 July 2017 |
| Title: | Impact evaluation of SLM options to achieve land degradation neutrality in Tunisia |

## A. OBJECTIVES COMPLETED FOR LAST MONTH - OVERVIEW

In the context of the project "Impact evaluation of SLM options to achieve land degradation neutrality in Tunisia", ddifferent tasks were performed for the period 1st – 30th June 2017. Given that the objectives on mapping SLM are uncompleted during the last month (May 2017), the main tasks for this month (June 2017) were:

- Clean the SLM database and finalise the online uploading
- Finalise the technical report on the SLM mapping
- Raster uploading, removal and change processes in the WebGIS
- Checking the validity of the retrievable raster data to the appropriate cells in the SLM online form.

These activities are conducted with the supervision of Dr. Quang Bao Le (Systems- and GIS-based Sustainable Land Management – SLM, at ICARDA Amman), Mr. Enrico Bonaiuti (Monitoring, Evaluation and Learning – MEL, ICARDA Amman) and Mr. Victor Kimathi (iMMAP, Jordan Office).

In line with the project activities, other parallel tasks were achieved along this month of June. These tasks are also reported, even though they are not related to the planned objectives for the months.

## B. OVERVIEW OF PROGRESS IN GIS-BASED SLM OxC DATA DEVELOPMENT

Table 1 below provides an overview of the SLM being mapped in the two sites. The site of Zaghouan is covered by the Socio-Agricultural Ecological Zones (SAEZ) 2, 3 and 5 whereas the Medenine site in the south covers SAEZs 8 and 9. For the Excel templates, the percentage of progress is provided relatively to reference data source as provided in WOCAT database and LADA report of Tunisia. These databases are the most well documented literature available on SLM technologies in Tunisia. Table 2 gives the number of SLMs per level of completeness, and their repartition per SAEZ and ALUS as well. The uncompleted SLM technologies will be gradually improved according to data availability.

**Table 1. Overview of the mapping SLM technologies and SLM OxC data**

| **SLM ID** | **Technique** | **References** | **Socio-Agricultural Ecological Zone (SAEZ)** (if the SLM is selected, then write the relevant code in ANNEX 1a) | **Land Use System (LUS)** (if the SLM is selected, then write the relevant code in ANNEX 1b) | **Name of documented of the SLM OxC template** (syntax: <technique>_<SAEZ code>_<ALUS code>_<short name of documenter>.xlsm) | **Name of visual file of the SLM OxC** (syntax: <technique>_<SAEZ code>_<ALUS code>_<short name of documenter>.zip; zip file includes: 5 files of GIS shape + a Google Earth image of an example site in jpg + 1-2 field photos in jpg + a technical sketch of the technique in jpg) |
|---|---|---|---|---|---|---|
| **1. Techniques targeting specifically water and soil conservation** | | | | | | |
| 1.1. | Jessours | Tunisian LADA Report 2010; WOCAT Database 2017 | SAEZ8 | ALUS2 | Jessours_SAEZ8_ALUS2_BD.xlsm (1st version completed) | Jessours_SAEZ8_ALUS2_BD.zip (1st version completed) |
| | | | ZAEZ9 | ALUS2 | Jessours_SAEZ9_ALUS2_BD.xlsm (1st version completed) | Jessours_SAEZ9_ALUS2_BD.zip (1st version completed) |
| 1.2. | Tabia | Tunisian LADA Report 2010; WOCAT Database 2017 | SAEZ8 | ALUS2 | Tabias_SAEZ8_ALUS2_BD.xlsm (1st version completed) | Tabias_SAEZ8_ALUS2_BD.zip (1st version completed) |
| | | | SAEZ8 | ALUS5 | Tabias_SAEZ8_ALUS5_BD.xlsm | Tabias_SAEZ8_ALUS5_BD.zip (1st version completed) |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | (1st version completed) | |
| | | | SAEZ9 | ALUS2 | Tabias_SAEZ9_ALUS2_BD.xlsm<br>(1st version completed) | Tabias_SAEZ9_ALUS2_BD.zip<br>(1st version completed) |
| | | | SAEZ9 | ALUS5 | Tabias_SAEZ9_ALUS5_BD.xlsm<br>(1st version completed) | Tabias_SAEZ9_ALUS5_BD.zip<br>(1st version completed) |
| 1.3. | Mechanical bench terraces | Roose E. (2002)<br><br>Roose E. (2005) | SAEZ2 | ALUS1 | Mechanised_terraces_SAEZ2_ALUS1_BD.xlsm<br>(1st version completed) | Mechanised_terraces_SAEZ2_ALUS1_BD.zip<br>(75% completed) |
| | | | SAEZ2 | ALUS2 | Mechanised_terraces_SAEZ2_ALUS2_BD.xlsm<br>(1st version completed) | Mechanised_terraces_SAEZ2_ALUS2_BD.zip<br>(1st version completed) |
| | | | SAEZ2 | ALUS3 | Mechanised_terraces_SAEZ2_ALUS3_BD.xlsm<br>(1st version completed) | Mechanised_terraces_SAEZ2_ALUS3_BD.zip<br>(1st version completed) |
| | | | SAEZ3 | ALUS1 | Mechanised_terraces_SAEZ3_ALUS1_BD.xlsm<br>(1st version completed) | Mechanised_terraces_SAEZ3_ALUS1_BD.zip<br>(1st version completed) |
| | | | SAEZ3 | ALUS2 | Mechanised_terraces_SAEZ3_ALUS2_BD.xlsm<br>(1st version completed) | Mechanised_terraces_SAEZ3_ALUS2_BD.zip<br>(1st version completed) |
| 1.4. | Manual bench terraces | Tunisian LADA Report 2010 | SAEZ2 | ALUS2 | Manual_terraces_SAEZ2_ALUS2_BD.xlsm<br>(1st version completed) | Manual_terraces_SAEZ2_ALUS2_BD.zip<br>(100% completed) |
| 1.5. | Stone bund terraces | Tunisian LADA Report 2010 | SAEZ2 | ALUS2 | Stone_bunds_SAEZ2_ALUS2_BD.xlsm<br>(1st version completed) | Stone_bunds_SAEZ2_ALUS2_BD.zip<br>(100% completed) |
| | | | SAEZ9 | ALUS7 | Stone_bunds_SAEZ9_ALU | Stone_bunds_SAEZ9_ALUS7_BD. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | S7_BD.xlsm<br>(1st version completed) | zip<br>(100 % completed) |
| 1.6. | Gabion check dams | Tunisian LADA Report 2010<br><br>WOCAT Database 2017 | SAEZ8<br><br>SAEZ9<br><br>SAEZ2<br><br>SAEZ3 | ALUS1<br><br>ALUS1<br><br>ALUS2<br><br>ALUS2 | Gabions_SAEZ8_ALUS1_BD.xlsm<br>(1st version completed)<br><br>Gabions_SAEZ9_ALUS1_BD.xlsm<br>(1st version completed)<br><br>Gabions_SAEZ2_ALUS2_BD.xlsm<br>(1st version completed)<br><br>Gabions_SAEZ3_ALUS2_BD.xlsm<br>(1st version completed) | Gabions_SAEZ8_ALUS1_BD.zip<br>(1st version completed)<br><br>Gabions_SAEZ9_ALUS1_BD.zip<br>(1st version completed)<br><br>Gabions_SAEZ2_ALUS2_BD.zip<br>(1st version completed)<br><br>Gabions_SAEZ3_ALUS2_BD.zip<br>(1st version completed) |
| 1.7. | Individual micro-catchment | | SAEZ2 | ALUS2 | Micro-catchment_SAEZ2_ALUS2_BD.xlsm<br>(1st version completed) | micro-catchment_SAEZ2xALUS2_BD.zip<br>(1st version completed) |
| **2. Techniques for controlling sand dune mobility** | | | | | | |
| 2.1. | Usage of palm leaves for sand dune stabilisation | Tunisian LADA Report 2010; WOCAT Database 2017 | SAEZ8<br><br>SAEZ8<br><br>SAEZ9<br><br>SAEZ9 | ALUS1<br><br>ALUS3<br><br>ALUS1<br><br>ALUS3 | Palm_fences_SAEZ8_ALUS1_BD.xlsm<br>(1st version completed)<br>Palm_fences_SAEZ8_ALUS3_BD.xlsm<br>(1st version completed)<br>Palm_fences_SAEZ9_ALUS1_BD.xlsm<br>(1st version completed)<br>Palm_fences_SAEZ9_ALUS3_BD.xlsm<br>(1st version completed) | Palm_fences_SAEZ8_ALUS1_BD.zip<br>(1st version completed)<br>Palm_fences_SAEZ8_ALUS3_BD.zip<br>(1st version completed)<br>Palm_fences_SAEZ9_ALUS1_BD.zip<br>(1st version completed)<br>Palm_fences_SAEZ9_ALUS3_BD.zip<br>(1st version completed) |
| 2.2. | Biological stabilisation of | Tunisian LADA Report 2010; | SAEZ9 | ALUS6 | Biological_fixation_dunes_SAEZ9_ALUS6_BD.xlsm | Biological_fixation_dunes_SAEZ9_ALUS6_BD.zip |

| | | | | | | |
|---|---|---|---|---|---|---|
| | sand dunes | WOCAT Database 2017 | | | (1st version completed) | (1st version completed) |
| **3. Techniques for rangelands management and improvement** | | | | | | |
| 3.1. | Rangeland fallow cropping (rangeland resting) | Tunisian LADA Report 2010; WOCAT Database 2017 | SAEZ9 | ALUS6 | Rangeland resting_SAEZ9_ALUS6_BD.xlsm (1st version completed) | Rangeland resting_SAEZ9_ALUS6_BD.zip (1st version completed) |
| 3.2. | Area enclosure | | SAEZ9 | ALUS7 | Area enclosure_SAEZ9_ALUS7_BD.xlsm (75 % 1st version completed) | Area enclosure_SAEZ9_ALUS7_BD.zip (1st version completed) |
| **4. Techniques targeting specifically water harvesting** | | | | | | |
| 4.1. | Hill dams | Technical reports (DGACTA, 2005) | SAEZ2 | ALUS1 | Hill_dam_SAEZ2_ALUS1_BD.xlsm (1st version completed) | Hill_dam_SAEZ2_ALUS1_BD.zip (1st version completed) |
| | | | SAEZ3 | ALUS1 | Hill_dam_SAEZ3_ALUS1_BD.xlsm (50 % 1st version completed) | Hill_dam_SAEZ3_ALUS1_BD.zip (1st version completed) |
| 4.2. | Hill lakes | Technical reports (DGACTA, 2005) | SAEZ2 | ALUS1 | Hill_lake_SAEZ2_ALUS1_BD.xlsm (1st version completed) | Hill_lake_SAEZ2_ALUS1_BD.zip (1st version completed) |
| | | | SAEZ3 | ALUS1 | Hill_lake_SAEZ3_ALUS1_BD.xlsm (1st version completed) | Hill_lake_SAEZ3_ALUS1_BD.zip (1st version completed) |
| | | | SAEZ5 | ALUS1 | Hill_lake_SAEZ5_ALUS1_BD.xlsm (1st version completed) | Hill_lake_SAEZ5_ALUS1_BD.zip (1st version completed) |
| 4.3. | Cisterns | Tunisian LADA Report 2010 | SAEZ8 | ALUS3 | Citerns_SAEZ8_ALUS3_BD.xlsm (1st version completed) | Citerns_SAEZ8_ALUS3_BD.zip (1st version completed) |
| | | | SAEZ9 | ALUS3 | Citerns_SAEZ9_ALUS3_B | Citerns_SAEZ9_ALUS3_BD.zip |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | D.xlsm<br>(1st version completed) | (1st version completed) |
| 4.4. | Wells in desert | | SAEZ8 | ALUS5 | Wells in desert_SAEZ8_ALUS5_BD.xlsm<br>(1st version completed) | Wells in desert_SAEZ8xALUS5_BD.zip<br>(1st version completed) |
| 4.5. | Oasis in desert | | SAEZ8 | ALUS3 | Oasis_SAEZ8_ALUS3_BD.xlsm<br>(1st version completed) | Oasis_SAEZ8_ALUS3_BD.zip<br>(1st version completed) |
| | | | SAEZ9 | ALUS3 | Oasis_SAEZ9_ALUS3_BD.xlsm<br>(1st version completed) | Oasis_SAEZ9_ALUS3_BD.zip<br>(1st version completed) |
| 4.6. | Artesian well | | SAEZ8 | ALUS4 | Artesian_well_SAEZ8_ALUS4_BD.xlsm<br>(1st version completed) | Artesian_well_SAEZ8_ALUS4_BD.zip<br>(1st version completed) |
| 4.7. | Recharge wells | WOCAT database | SAEZ9 | ALUS1 | Recharge well_SAEZ9xALUS1_BD.xlsm<br>(1st version completed) | Recharge well_SAEZ9xALUS1_BD.zip<br>(1st version completed) |
| **5. Tree-based techniques** | | | | | | |
| 5.1. | Reforestation/tree plantation | | SAEZ3 | ALUS7 | Tree_plantation_SAEZ3_ALUS7_BD.xlsm<br>(1st version completed) | Tree_plantation_SAEZ3_ALUS7_BD.zip<br>(1st version completed) |
| | | | SAEZ8 | ALUS7 | Tree_plantation_SAEZ8_ALUS7_BD.xlsm<br>(1st version completed) | Tree_plantation_SAEZ8_ALUS7_BD.xlsm<br>(1st version completed) |

**Table 2. Summary of SLM OxC data per level of completeness and the numbers of technology and context considered (Note: Concrete name and file names of SLM OxC data listed in Table 1).**

| *Degree of completeness (overall / Excel form / Shape file)* | *No. of SLM OxC data* | *No. of SLM technology considered* | *Number of SAE-LUS Contexts considered* |
|---|---|---|---|
| Overall well documented [1]/ Excel form completed / Shape file completed | 20 | 09 | 12 |
| Overall partially documented [2] / Excel form partially completed / Shape file completed | 14 | 06 | 7 |
| Overall poorly documented [3] / Excel form poorly completed / Shape file completed | 6 | 04 | 6 |
| Overall partially documented [4] / Excel form completed / None shape file | unknown | 06 | unknown |
| Total | 40 | 19 (but 25 if the last 6 included) | 25 |

[1.] *the data package (Excel OxC form + ESRI Shapefile + Visual data + Technical draws) is fully documented in relation with the level of completed based on WOCAT reference database. Those SLMs are: "Jessour", "Tabia", "Palm leaves for dune fixation", "Biological fixation sand dunes", "Rangeland resting", "Recharge wells", "Cisterns", "Gabion dams" and "Area enclosure".*

[2]*. the SLM OxC forms are not sufficiently documented as above, because no reference data exist on the SLM practices. Those SLMs are: "Hill lakes", "Hill dams", "Manual benches", "Mechanical benches", "Individual micro-catchment", and "Stone bunds".*

[3]*. the level of completeness of the Excel OxC forms is very low. However, the geodata is fully available. Those SLMs are: "Oasis", "Wells in desert", "Artesian well" and "Tree plantation".*

[4]*. the SLM OxC forms are well documented but no ESRI shapefile is provided because of the lack of information on exact locations. Those SLMs are:"Meskats", "Mgouds",*

*"Irrigation with salted water", "Minimum tillage", "Plantation of forage species", and "Replanting of local forage species".*

## C. FURTHER DETAILS IN ASSOCIATED OUTCOMES OF COMPLETED OBJECTIVES

### C1. (Objective 1). mapping of the SLM technologies and clean the geodatabase and produce the metadata files

- Clean the SLM database and finalise the online uploading

The most important task during this month is related to the development of the GIS-based SLM OxC data. Basically, the reported data during previous months (please refer to monthly reports of April and May) were improved. The organization of the database was done per socio-agro-ecological zones (SAEZ) (Annex 1a) and aggregated land use systems (ALUS) (Annex 1b) as given in the overview table above. As mentioned in previous reports, the updated and full database of the SLM technologies contains the following:

- GIS shapefile data (ESRI format) for each SLM technology
- Google Earth image (.jpg format) for showing the patterns of each SLM technology. The images are described by a short title, the location, the scale
- 1 to 2 field photos (.jpg format) of the SLM technologies. Each field photo is described by providing a short caption, the source and the date taken.
- Filled in standardised SLM OxC form (.xlsm format) for each SLM technology;
- Technical sketch (.jpg format) for some SLM technologies (based on the availability). The source and some technical specifications (if available) of the sketch are mentionned.

In total, 40 SLM options-by-context (SLM OxC) data (See Table 1) were mapped and documented in the database. They are categorized in 19 SLM techniques distributed into 5 technological groups (Table 1). They are spread in 5 SAEZs and 7 ALUS all over the two sites. In Zaghouan site, the following SAEZs and ALUS were mapped: SAEZ2 with 3 ALUS (ALUS1, ALUS2, and ALUS3); SAEZ3 with 3 ALUS (ALUS1, ALUS2,

ALUS7), SEAZ5 with 1 ALUS (ALUS1), SAEZ8 with 6 ALUS (ALUS1, ALUS2, ALUS3, ALUS4, ALUS5, ALUS7), and SAEZ9 with 6 ALUS (ALUS1, ALUS2, ALUS3, ALUS5, ALUS6, ALUS7). Six (06) other SLM technologies (without ESRI shapefiles but Excel forms were filled) are mentioned as part of the potential list to be improved (in case their exact locations become available). Those 06 SLMs are mentioned in the footnote of Table 2.

The database cleaning is fully performed but still can be modified or improved if needed, especially during data uploading in the GeOC system. A "Readme" file is created as an information file on the SLM database.

Due to the GeOC system instability, no further data upload was undertaken. This task might be effective during the month of July, in case all the system functionalities become operational and stable.

**C2. (Objective 2).** Writing a technical report on the mapping of the SLM practices.

This objective mainly concerned on the writing technical report on the mapping SLM. A first draft of this report is available (in word or pdf formats) and still needs inputs for improvement.

**C3. (Objective 3).** Raster uploading, removal and change processes in the WebGIS

All the raster files needing improvements have been revised accordingly. Their respective legend files were revised as well. The revised raster files are the 7 layers of "Soil Quality Constraints (SQC)" and the layer of "protected areas".
These 7 raster layers (SQC1-NUTAVA, SQC2-NUTRCAP, SQC3-ROOTCOD, SQC4-OXYGEN, SQC5-SALT, SQC6-TOXICITY, and SQC7-WORKCAP) were reclassified from 8 classes into 5 ordinary classes. For the "Protected areas" layer, it was reclassified into a raster of dummy scale (0 = not protected/ and 1 = protected) to ensure more clarity in the system. In total, there is a need to affect changes to the following raster layers in the WebGIS domain (Table 3):

Table 3. List of raster layers to be updated in the WebGIS

| | **Layer names in WebGIS** | **Full names of raster layers** | **Action** |
|---|---|---|---|
| 1 | SQC1-NUTAVA | Soil quality constraint regarding nutrient availability (Fischer et al., 2008) | Update |
| 2 | SQC2-NUTRCAP | Soil quality constraint regarding nutrient retention capacity (Fischer et al., 2008) | Update |
| 3 | SQC3-ROOTCOD | Soil quality constraint regarding rooting condition (Fischer et al., 2008) | Update |
| 4 | SQC4-OXYGEN | Soil quality constraint regarding soil oxygen (Fischer et al., 2008) | Update |
| 5 | SQC5-SALT | Soil quality constraint regarding salinity (Fischer et al., 2008) | Update |
| 6 | SQC6-TOXICITY | Soil quality constraint regarding toxicity (Fischer et al., 2008) | Update |
| 7 | SQC7-WORKCAP | Soil quality constraint regarding work capacity (Fischer et al., 2008) | Update |
| 8 | PROTECT-AREA | Protected area (1= protected, 0= otherwise) (IUCN world database of protected areas – WDPA) (UNEP-WCMC, 2016; https://protectedplanet.net/) | Update |
| 9 | TENURE-SEC | USAID's tenure security level (Mirzabaev et al., 2016) | Add |
| 10 | AGRI-POVERTY | ICARDA's index of agricultural resource poverty (ICARDA, 2016) | To be replaced by FOOD-SEC |
| 11 | FOOD-SEC | Global Food Security Index 2016 (Dupont; http://foodsecurityindex.eiu.com/) | To replace AGRI-POVERTY |

However, they were not uploaded into the WebGIS as planned. The main reason resides in the uploading process to the WebGIS (on production) should be mentored by the WebGIS developer.

Regarding the task on checking the correct properties of all the raster database in the WebGIS, it was done. The outcome was a list of raster layers to be revised, especially their legends is provided in order to correct the current WebGIS database:

***C4.*** Checking the validity of the retrievable raster data to the appropriate cells in the SLM online form.

All the raster data in the WebGIS domain were checked to ensure consistency with the SLM web form. The revised list of raster and their correct corresponding boxes is provided in the same Excel file as above. All the raster data to be automatically retrieved to the appropriate boxes in the SLM online form were provided for appropriate coding. Using the WebGIS button, the system can appropriately retrieve data from the WebGIS to the indicated boxes in SLM web form. This is sufficiently working for all continuous variables. It is important to mention that all categorical/discrete variables (raster layers with at least 2 options in their legend) are not retrieved to the boxes in the Web SLM form. The reason is the important revision required regarding the appropriate function to be used (correct function should be "Mode/Majority" rather than "Mean/Average") as it is currently provided in the system. The issue was reported to the WebGIS and SLM web form developers for appropriate actions.
As far as the "Upload file" and "URL" buttons in the SLM form are concerned, there is not yet a test of functionality since the buttons are still under improvement regarding their storage and link to WebGIS domain. IT developers are on task. Once completed, the test of data retrieval will be performed to ensure the function is sufficiently performing well.

**C5. (Other activities).** These tasks refer to the unplanned package performed during the month.

In line with objective 1, other tasks, especially the interactions with the IT Developer mainly on suggestions for improvement need of the GeOC. The details of some issues and improvement suggestions were for team discussion.

## D. ASSOCIATED CHALLENGES OF COMPLETED MONTHLY OBJECTIVES

- Challenges related to the coordination: there is no efficacy in the follow up of the programmer and developer as there are issues of communication, numerous tasks (prioritization), remote work and knowledge transfer to handle quickly the concerns

regarding the improvement and finalization of the GeOC. As this goes slowly and inefficiently, it affects some of the planned activities to be performed as expected.

- A challenge is related to the instability of the tool GeOC behaviour this does not facilitate a clear and clean list of suggestions and improvement needs. Consequently, the follow up of the improvements and performance of the tool is tremendous and inefficient. This challenge is also related to need of knwledge fundamentals for understanding the languages (Java, Python and Linux Ubuntu, GeoServer, etc.) used for developing the GeOC platform.

These two above-mentioned challenges induced unavoidable time-related challenge in terms of validating the tool, uploading SLM data and data retrieval for the next and decisive step of the project, which is the impact evaluation of the adoption of the SLM technologies. Once all these issues are fixed, the uploading data in the system will start in order to allow data retrieval from the system for impact evaluation of the adoption of the SLM technologies.

- A serious and remaining challenge that will be persistent is the data availability to fully document SLM database through the standardised SLM OxC Excel form. In the current report, the progression levels of the various SLM are not 100 % filled in. This assumes that, these first versions submitted are based on the data availability, to the best of our knowledge and searching capabilities. Improvement may come out if relevant information are retrieved or made available in any mechanisms. This was the fundamental reason for suggesting a dialogue mechanism between the “USER” and the “ADMINISTRATOR” for potential improvement of approved SLM data in the WebGIS.

## E. NARRATIVE & LESSONS LEARNED

In general, for the SLM mapping tasks, the difficulty and lack of accurate and concordant data sources lead to the conclusions on the needs of sound and extensive documentation of SLM practices, using appropriate methods and standards. The diversity of initiatives to combat land degradation and ensure sustainable lands implies the existence of national

and participatory efforts to combat land degradation. The tasks related to SLM mapping and documenting them using the standardized form, are close, even though not all the fields are filled in for all SLM OxC data. However, this database can be updated in case new information becomes accessible. Updates can also emerge during data upload in the GeOC system.

Site-specific analysis need to be conducted for each SLM practice to avoid over/under estimations of the mapped SLM regarding implementation and maintenance costs, impact assessment, cost-benefit analysis, etc. This is because, SLM practices have their characteristics to be site-dependent, and generalization attempt will alter information quality. This could avoid or reduce the risk and uncertainties that could emerge during their evaluation. In this sense, the wide adoption of some SLM practices does not substitute the need for developing site-specific data for each SLM implemented at field level. Therefore, there is a need for not only documenting but also developing an electronic SLM information system useful for updating and scaling promising practices. The development of management instruments and mechanisms identification to ensure data/information flow between all stakeholders (land users, policy makers, government, researchers, etc.) could be a promising option.

## F. OBJECTIVES PROJECTED FOR NEXT MONTH

- *Continue the follow up for the improvement of the GeOC system*
- *Write a working paper on "Analysis of land cover change and its impacts on ecosystem services in Tunisia" and other technical documents*
- *Start uploading and submitting the SLM data to the GeOC system, in case the performance level of the tool is sufficiently advanced.*

**LIST OF ANNEXES**

Annex 1a. List of Socio-agricultural ecological zones (SAEZ)

| Name of SAEZ | CODE of SAEZ | Key characterization | Reference |
|---|---|---|---|
| **Mogods and Kroumerie** | **SAEZ1** | **Area**: 319 518 ha<br>**Subdivisions**: none<br>**Climate**: humid;<br>**Vegetation/Tree density**: Forests/high<br>**Land use**: important silvo-pastoral potential<br>**Relief**: Hills and mountains<br>**Governorates**: Beja; Jendouba | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |
| **Nord Est Cap Bon** | **SAEZ2** | **Area**: 802 395 ha<br>**Subdivisions**: none<br>**Climate**: Humid, sub-humid, semi-arid<br>**Vegetation/Tree density**: Forest/medium<br>**Land use**: Tree and cereal crops<br>**Relief**: plains, hills (^200 m), large valleys, domes (^637 m)<br>**Governorates**: Bizerte, Ariana, Beja, Ben Arous, Nabeul, Zaghouan | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |
| **Dorsale et Tell** | **SAEZ3** | **Area**: 2 365 584 ha<br>**Climate**: Sub-humid to semi-arid (Pmm = 500 – 900 mm/yr)<br>**Vegetation/Tree density**: Forests/ Low (on top hills)<br>**Land use**: Tree and cereal crops<br>**Relief**: hills (>200 m) and mountains (up to 1300 m), vast plains<br>**Governorates**: Jendouba, Beja, Kef, Bizerte, Kairouan, Siliana, Sousse, Kasserine | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |
| **Basse steppe** | **SAEZ4** | **Area**: 1 866 494 ha<br>**Sub-divisions**: Sidi Mhaddeb; Sousse sahel, Sfax sahel, Basse steppe<br>**Climate**: Humid to subhumid<br>**Vegetation/Tree density**: | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable |

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|---|---|---|---|
| | | **Land use**: tree crops, cereal crops, rangelands<br>**Relief**: Plateau, plains, domes<br>**Governorates**: Sfax, Gabes, Mhadia, Sousse, Sidi BouZid, Kairouan, Monastir | des RN/Avril2007 |
| **Haute steppe** | **SAEZ5** | **Area**: 1 243 012 ha<br>**Subdivisions :** Hautes steppes agricoles ; Hautes steppes alfatières<br>**Climate**: Semi-arid<br>**Vegetation/Tree density**: Shrubs & herbaceous/Low<br>**Land use**: tree crops, cereal crops<br>**Relief**: plains, Plateaus (700 m), Mountains<br>**Governorates**: Kasserine, Siliana, Kairouan, Sidi BouZid, Sfax, Gafsa | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |
| **Chainons atlassiques** | **SAEZ6** | **Area**: 698 554 ha<br>**Subdivisions:** none<br>**Climate**: Arid<br>**Vegetation/Tree density**: Sparse shrubs/ Low<br>**Land use**: agriculture<br>**Relief**: Mountains (400 – 600 m)<br>**Governorates**: Gafsa, Sidi Bouzid, Kebili, Sfax, Gabes | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |
| **Chotts** | **SAEZ7** | **Area**: 1 964 074 ha<br>**Sub-divisions:** none<br>**Climate**: arid<br>**Vegetation/Tree density**: sparse steppe, psammophile<br>**Land use**: tree and cereal crops in oasis, Rangelands<br>**Relief**: Plains<br>**Governorates**: Kebili, Tozeur, Gafsa, Gabes | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |
| **Dahar et Matmata** | **SAEZ8** | **Area**: 1 879 603 ha<br>**Sub-divisions:** none<br>**Climate**: arid<br>**Vegetation/Tree density**: Mountain alfa and forest patches, sparse to dense low vegetation<br>**Land use**: rare crops, rare rangelands | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |

| | | | |
|---|---|---|---|
| | | **Relief**: hills, mountains<br>**Governorates**: Gabes, Kebeli, Medenine, Tatouine | |
| **Jeffara- El Ouara** | **SAEZ9** | **Area**: 1 591 197 ha<br>**Sub-divisions: El Ouara, Jeffara**<br>**Climate**: arid (Saharan Mediterranean)<br>**Vegetation/Tree density**: halophile steppe<br>**Land use**: Rangelands, tree crops, cereal crops<br>**Relief**: plains<br>**Governorates**: Medenine, Tatouine, Gabes | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |
| **Grand Erg** | **SAEZ10** | **Area**: 2 761 748 ha<br>**Subdivisions:** None<br>**Climate**: arid<br>**Vegetation/Tree density**: sparse vegetation<br>**Land use**: rare rangelands, parks and reserves<br>**Relief**: sand dunes<br>**Governorates**: Kebili, Gabes, Tataouine | CNEA/Elaboration d'une étude sur l'état de désertification pour une gestion durable des RN/Avril2007 |

Annex 1b. List of Aggregated Land Use Systems (ALUS). Sources: DGACTA- Tunisia (2008)

| Aggregated LUS (ALUS) | CODE for ALUS | Primary LUS in Tunisian LADA classification (multiple categories be separated by semicolon) | Code for primary LUS |
|---|---|---|---|
| **Irrigated Crops** | **ALUS1** | Citrus trees | Cr_irrig_citrus |
| | | Tree crops | Cr_irrig_tree |
| | | Garden market crops | Cr_irrig_gard |
| | | Palm trees | Cr_irrig_palm |
| | | Great crops | Cr_irrig_great |
| **Rainfed crops** | **ALUS2** | Citrus trees | Cr_rain_citrus |
| | | Garden market crops | Cr_rain_gard |
| | | Great crops | Cr_rain_great |
| | | Olive trees | Cr_rain_oliv |
| | | Palm trees | Cr_rain_palm |
| | | Orchards | Cr_rain_orch |
| | | Vineyard | Cr_rain_vine |
| **Non-irrigated agro-pastoralism** | **ALUS3** | Intensive breeding | No_irrig_agro_past_int |
| | | Semi-intensive breeding | No_irrig_agro_past_semi |
| | | Extensive breeding | No_irrig_agro_past_ext |
| **Irrigated agro-pastoralism** | **ALUS4** | Intensive breeding | Irrig_agro_past_int |
| | | Semi-intensive breeding | Irrig_agro_past_semi |
| | | Extensive breeding | Irrig_agro_past_ext |
| **Pastoralism on bare soils** | **ALUS5** | Extensive | Past_bare_ext |
| | | Semi-intensive | Past_bare_semi |
| | | Intensive | Past_bare_int |
| **Pastoralism on shrub lands** | **ALUS6** | Extensive | Past_sh_ext |
| | | Semi-intensive | Past_sh_semi |
| | | Intensive | Past_sh_int |
| **Natural zones** | **ALUS7** | Bare soils | Bare_ar |
| | | Water | Water |

| | | | |
|---|---|---|---|
| | | Forests | Forest |
| | | Shrubs- Mosaic of sparse shrubs herbaceous | Sh_h_ar |
| **Urban areas** | **ALUS8** | Excluded | Urb |
| **Parks and natural reserves** | **ALUS9** | Excluded | Protect_1 |
| **Ramsar sites** | **ALUS10** | Excluded | Protect_2 |