

Adaptation of Soil Judging to Libya

H.A. Zurqani, E.A. Mikhailova, and C.J. Post

Departments of Forestry and Environmental Conservation (FEC)

Clemson University, SC 29634-0359



ABSTRACT

Soil Judging teaches field identification of soil types, their properties, and interpretations for use and it can be beneficial to students as well as government agencies and the private sector in Libya. Soil judging focuses on determining the soil characteristics of soil profiles and making interpretations based on observation. The objective of this study was to adapt Soil Judging (Evaluation) to Libya by a graduate student from Libya. Libya has six soil orders according to the U.S Soil Taxonomy; (Entisols, Aridisols, Alfisols, Inceptisols, Vertisols, and Mollisols) the most common soil orders are Entisols and Aridisols because Libya is located in an arid and/or semi-arid area. Various soil judging handbooks from the United States (US) were used to develop teaching materials for Libya (including tables of soil physical and chemical properties, topographic maps, and scorecards). The soil judging scorecard was enhanced by making it more specific to Libya and its agricultural and environmental needs (e.g. soil salinity, calcium carbonate etc.).

INTRODUCTION

Soil judging can educate students and planners about important soil properties related to land use in Libya (Fig. 1a): such as soil infiltration rate, hydraulic conductivity, available water, soil wetness class, suitability for dwellings with (without) basements, septic tank absorption fields, slope, erosion potential, and position of site.



The colors represent the three major regions of the country: red stands for Fezzan, black symbolizes Cyrenaica, and green denotes Tripolitania; the crescent and star represent Islam (Fig. 1b).

Figure 1a. Location of Libya in North Africa (Source: Google, 2015).
Figure 1b. Flag of Libya (Source: Google, 2015).

OBJECTIVES

- Conduct soil inventory of Libya;
- Develop a scorecard and recommendations for potential future Soil Judging competitions in Libya;
- Estimate the cost of soil judging equipment per person and cost in Libya.

MATERIALS AND METHODS

Study Site and Land Use History

- Libya is situated in the north of African continent and covers 1,759,540 million km² (Fig. 2). The desert covers more than 95% of the country. The cultivated area is slightly over 2%.
- The population is about 5,673,031 (Bureau of Statistics and Census Libya, 2012), including some 0.8 million non-Libyans. Of the total population only 13% is rural.
- There are 4 administrative territories in Libya (Fig. 2).

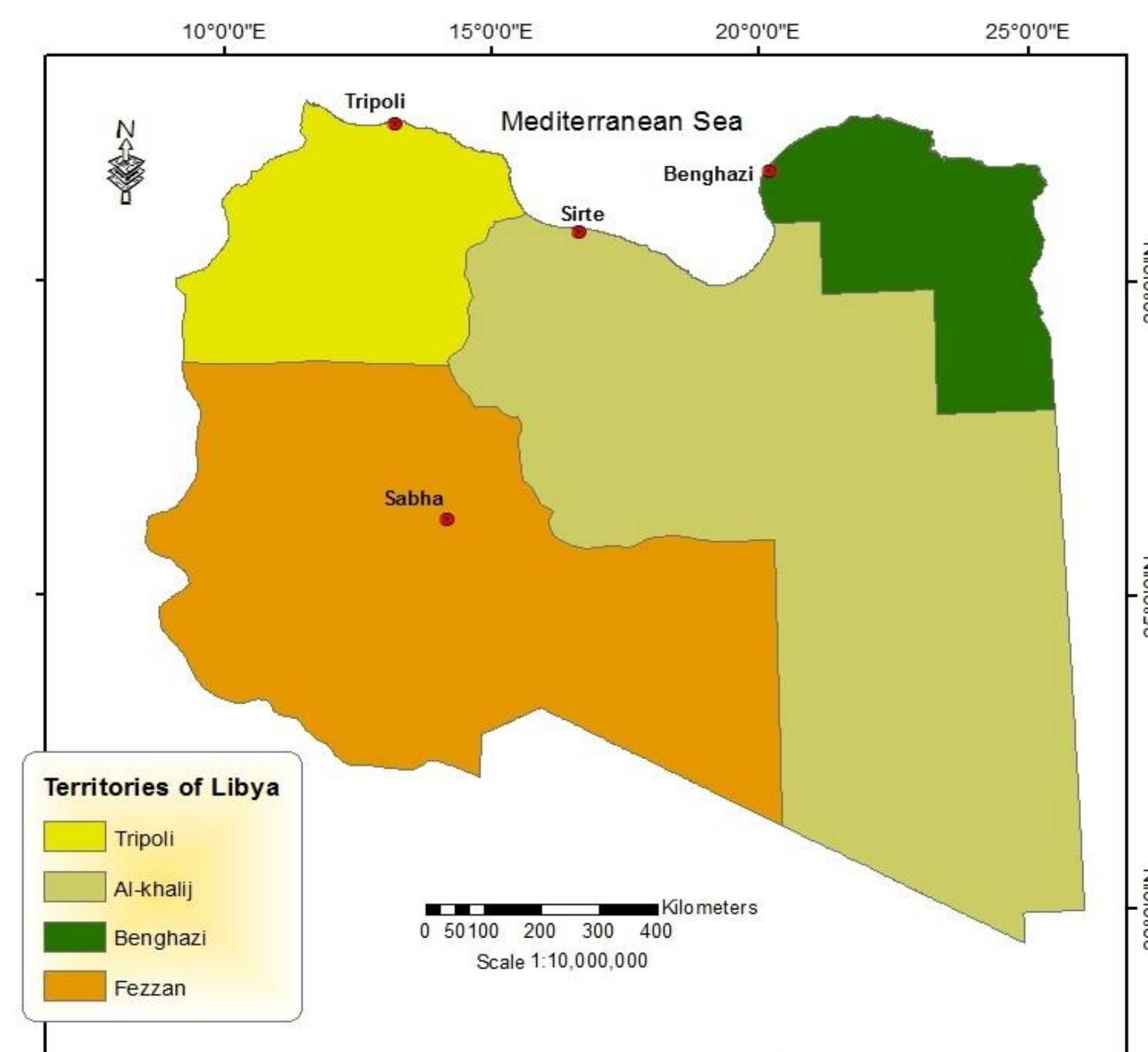


Figure 2. Map of Libya.

General information about regions in Libya

- There are 4 territories in Libya (Table 1).

Table 1. General information of the Libya (Source: Bureau of Statistics and Census Libya, 2012).

Territory	Capital	Population (2012)	Area (km ²)	Population density (people/km ²)	Agricultural land-use
Tripoli	Tripoli	3,333,577	191,955.95	17.37	Coastline: irrigated cultivation; Mountain: Rainfed cultivation
Al-Khij	Sirte	360,683	768,271.13	0.47	Coastline: irrigated cultivation
Benghazi	Benghazi	1,290,996	158,624.17	8.14	Scattered forests; Rainfed, irrigated agriculture
Fezzan	Sabha	378,113	563,837.51	0.67	Cultivation interfaces in Oases region, grazing (sheep, camels, goats)

Soil Inventory Tools

The following sources of information have been used to inventory the region:

- Atlas of Natural Resources for Agricultural Use in Libya, LIB/00/004 project;
- Soil Resources of Mediterranean and Caucasus Countries;
- Bureau of Statistics and Census Libya;
- Digital Soil Map of the World.

RESULTS AND DISCUSSION

Soils of Libya

- Entisols and Aridisols are the most important soil types in Libya (Table 2). Most soils require comprehensive fertilization program for acceptable rates of yield (Soil Resources of Mediterranean and Caucasus Countries, 2013).

Table 2. Soils of Libya (Source: Soil Resources of Mediterranean and Caucasus Countries, 2013).

Tripoli	Sirte	Benghazi	Fezzan
Entisols	Entisols	Entisols	Entisols
Aridisols	Aridisols	Aridisols	Aridisols
Inceptisols	-	Inceptisols	-
-	-	Alfisols	-
-	-	Mollisols	-
-	-	Vertisols	-

Proposed Soil Scorecard for Libya

- Scorecards are used during Soil Judging (Fig. 4, and 5).

Figure 4. Front side of scorecard for Libya (adapted from Karathanasis et al., 2011). Information in red is to aid students during the learning process.

Figure 5. Back side of scorecard for Libya (adapted from Karathanasis et al., 2011). Information in red is to aid students during the learning process.

RESULTS AND DISCUSSION

Soil Judging equipment costs in Libya

Table 3. Soil Judging equipment per person and cost in Libya.

No.	Equipment/supplies	Cost in US \$	Cost in CB of LY as of 1/20/15
1.	Abney level, clinometer, or other hand level	1	1.37
2.	Knife	3.5	4.795
3.	Water bottle	0.5	0.685
4.	Munsell Color Chart	150	205.5
5.	Scorecards and supplemental materials	0.5	0.685
6.	Calculator	2	2.74
7.	Mechanical pencil	0.5	0.685
8.	Measuring tape and nail	1	1.37
9.	Clip board	1	1.37
10.	Containers for soil samples	0.5	0.685
11.	Bucket	1	1.37
	Total	161.5	221.255

CONCLUSIONS

- Libya has 6 soil orders and some of them are similar to the soils in the U.S.
- The most arable land in Libya located in two places: Al-Jabal al Akhdar region around Benghazi, and Al Jifarah Plain near Tripoli.
- Soil Judging can be adapted in Libya, but it needs to be more specific to Libya.



Figure 6. Hamdi is using Soil Judging skills in the field.

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