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Land Capability of Some Soils Representing Western Limestone Plateau at Assiut

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Abstract

This study aims to evaluate the land capability of some soils located on the western limestone plateau, Assiut governorate, Egypt. The study area is bounded by longitudes 30° 37′ 00″ and 31° 17′ 00″ E and latitudes 26° 48′ 00″ and 27° 38′ 00″ N. Nineteen soil profiles were selected to represent the soils of the study area using the topography status and the surface field observations.

The elevation of the studied area varied from 116 to 283 m above the sea level. The studied soil profiles showed mainly sand, sandy loam and loamy sand texture with different gravel contents. They were shallow to deep. The soil organic matter content was low and decreased with depth. The studied soils ranged from non-saline to very strongly saline with EC_e values that varied from 1.7 to 89.7 dS/m. They were moderately alkaline to very strongly alkaline as the soil pH ranged from 7.9 to 9.3. The calcium carbonate content of these soils varied from 13.1 to 89.4% with a calcareous parent material while the gypsum content was low (0.02-3.03%). Low values of the cation exchange capacity (CEC) were recorded for these soils reflecting their coarse texture. Most of the studied soils are non-sodic, with an ESP value less than 15%.

The land capability of these soils was achieved using both the modified Storie index and the applied system of land evaluation (ASLE) program for arid and semi-arid regions. The rating of the studied soil profiles according to modified Storie index was between 13.0 and 50.0% (grade 3 to grade 5) that ranged from fair for agricultural use to non-use for agriculture. Moreover, these soil profiles showed an ASLE rating that varied from 4.9 to 26.6% (class 4 to class 6). According to this program, the studied soils ranged from poor for agricultural use to non suitable for agriculture. The main limitations for these soils were the soil texture, calcium carbonate and salinity.

Keywords: *Land capability, Western desert, Limestone Plateau.*

Introduction

The cultivated area in Assiut governorate is a narrow strip of alluvial soils extends along the Nile stream on both sides. Agricultural production from these soils is limited and does not match the continuous and rapid increase of population. Therefore, needs for additional land resources are necessary.

A limestone plateau surrounds Assiut governorate from east and west. The western plateau is characterized by almost flat wide areas in many regions. During the last five years, some investors started digging groundwater wells and cultivate some of these soils, while others just put their hands on the land as a sort of confirming positioning. This action is considered as promising means for agricultural expansion.

Land evaluation is a part of land use planning process. It provides information about the opportunities and constraints for the use of lands as a basis for making decisions on its use and management (FAO, 1983). Land capability evaluation refers to a range of major kinds of land uses, such as agriculture, forestry, livestock production, and recreation. The most widely used categorical systems for evaluating agricultural land is termed land capability classification. It implies three major categories of soil grouping including class, subclass and unit (Dent and Young, 1981).

Remote sensing (RS) and geographic information system (GIS) techniques have proved to be effective and successful tools for studying, mapping and presenting certain problems. Moreover, using these techniques for land and water resources seems to be more accurate and economic (Abdel- Motaleb, 1997). Remote sensing (RS) allows to collect and analyze information about resources and land use over large areas, whereas geographic information system (GIS) enables resource managers to process geographically referenced data from multiple sources. Such data can be integrated to produce maps, monitor changes in resources and model the impacts of management decisions (UNESCO, 2002).

The present study aims to evaluate some soils that represent those of the western limestone plateau in Assiut governorate using by the applied system of land evaluation (ASLE) program and the modified Storie index.

Materials and Methods

Limestone plateau surrounds Assiut governorate from east and west. This plateau is characterized by hills and wadis. Wadis are characterized by flat and almost flat wide areas. The study area is a part of the western limestone plateau. It is bounded by longitudes 30° 37′ 00″ and 31° 17′ 00″ E and latitudes 26° 48′ 00″ and 27◦ 38′ 00″ N. Based on the climatological data of Egypt at Assiut station, the soil moisture regime is aridic, while the soil temperature regime is hyperthermic.

The geology of limestone plateau at Assiut area is described by Minia and Thebes formations (Figure 1). Minia formation is characterized by well-bedded white to gray alveolinid lagoonal to marine limestone. frumentiformis, local patchreefs and ease grades in the south and east into nummulitic lower Eocene limestone. However, Thebes formation (Drunka Formation) is characterized by dense, thickly platform limestone, locally reefalor lagoonal, with characteristic concretions and local flint bands.

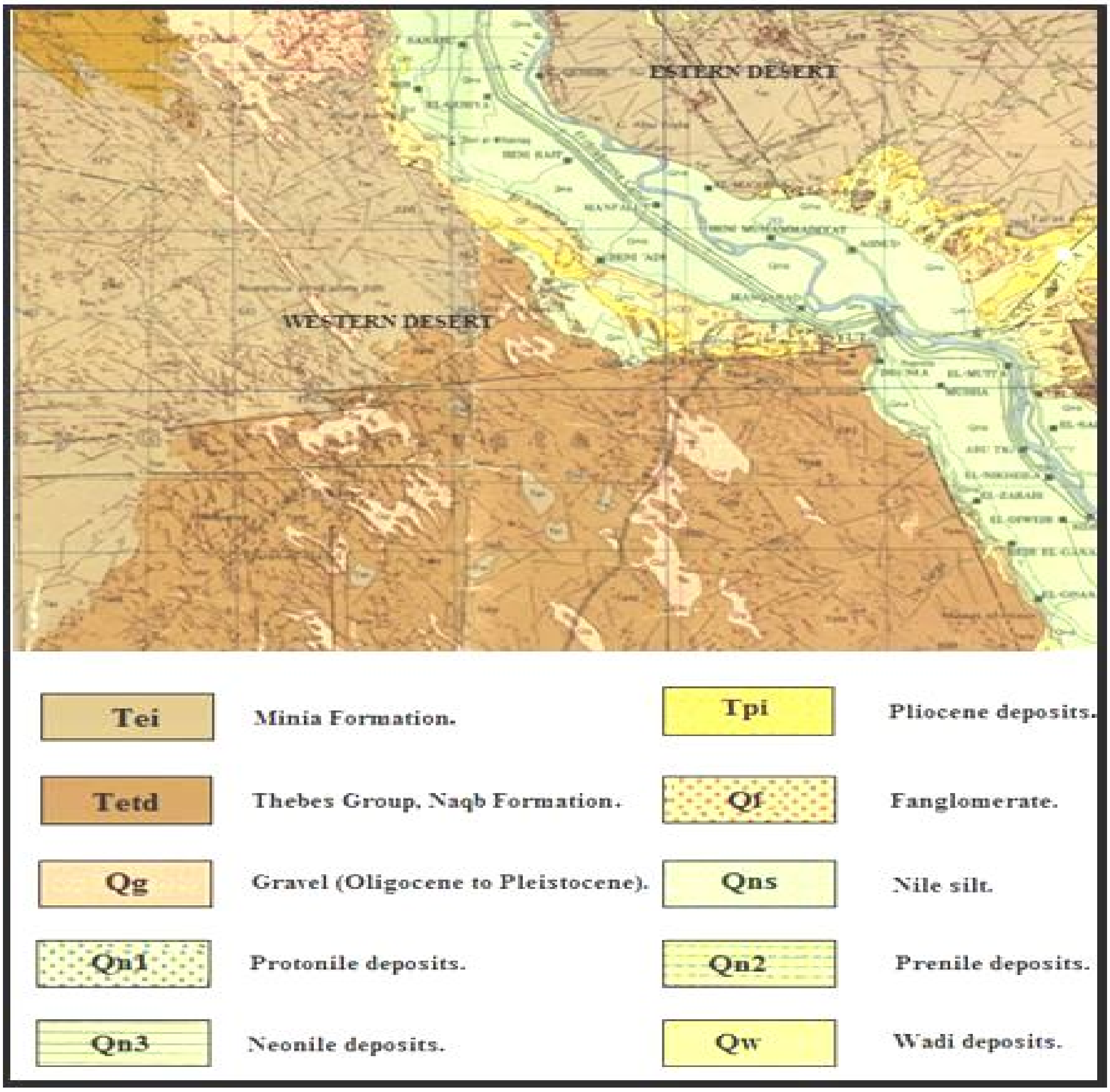

Figure 1. The geological map of the studied area (after CONCO, 1987).

The study area was divided into two transects, according to the map of the Google earth, topography of land surface (Figures 2 and 3) and the field observations in order to evaluate the land capability of its soils for agriculture using the applied system of land evaluation (ASLE) program and the modified Storie index rating. The first transect represents almost flat soils around the western desert highway of Assiut-Cairo and extends 25 km northward parallel to this highway. The second transect expresses almost flat soils that are located around the western desert highway of Assiut-Aswan and extends 28 km southward parallel to this highway. Nineteen soil profiles were selected to represent the current study area, eleven profiles (1-11) representing the first transect and eight profiles (12-19) representing the second one (Figure 4).

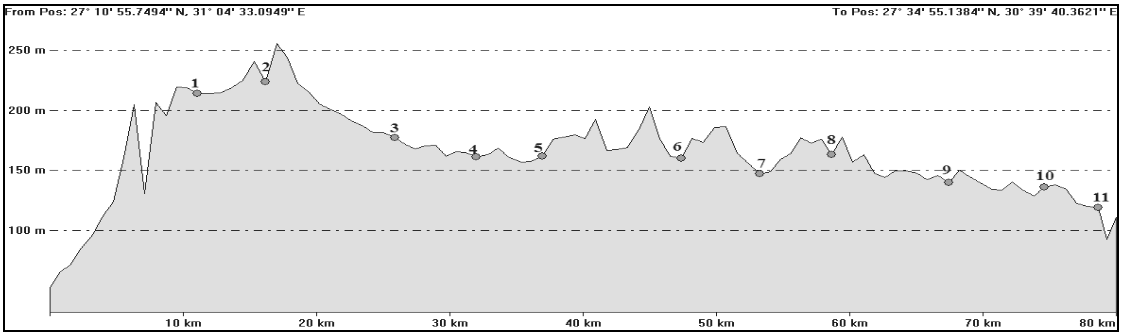

Figure 2. Distance and elevation of the soil profiles in the first transect.

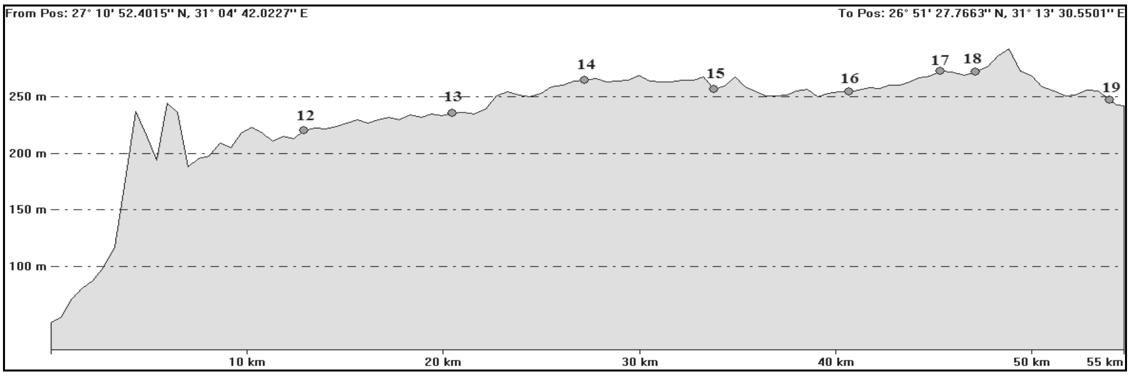

Figure 3. Distance and elevation of the soil profiles in the second transect.

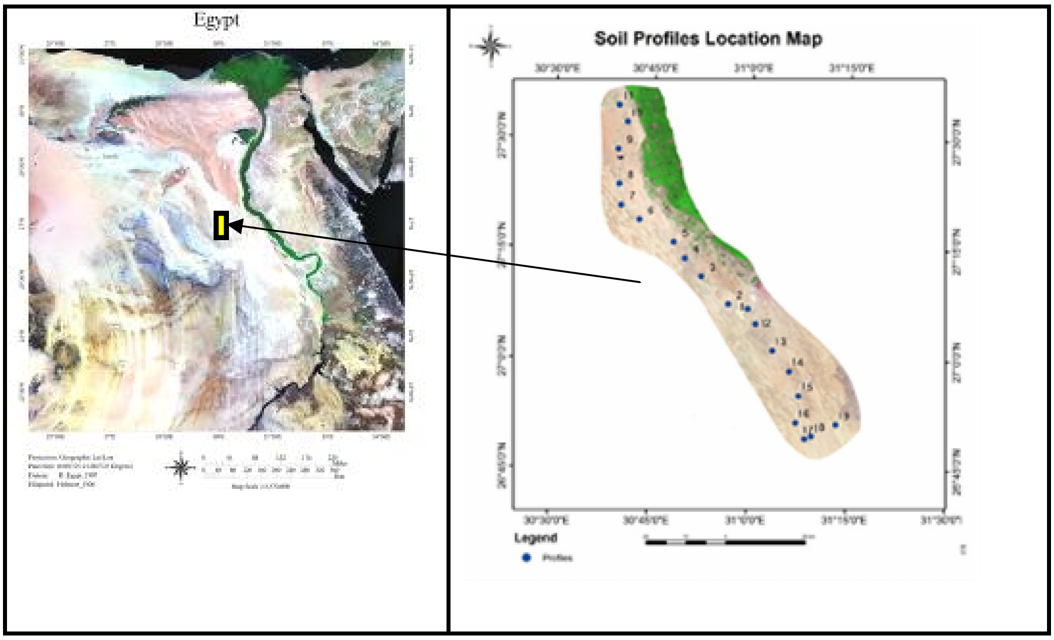

Figure 4. A location map of the studied soil profiles.

Locations of these soil profiles were recorded in the field using GPS guidance. Each soil profile was dug to the suitable depth, according to the type and nature of the soil material. All soil profiles were morphologically described according to the guidelines of FAO (2006). Soil samples were collected from profile layers, according to the vertical morphological variations and transferred to the lab. They were air-dried, crushed, sieved through a 2 mm sieve and stored in plastic containers for physical and chemical analysis.

The particle-size distribution was carried out by the pipette method using sodium hexametaphosphate as a dispersing agent without removing calcium carbonate (Piper, 1950). The organic matter content (OM) of the soil samples was determined using the dichromate oxidation method that is described by Wakley and Black (Jackson, 1973). Soil calcium carbonate ($CaCO_3$) was measured by the calcimeter method according to Nelson (1982). Soil pH was measured in a 1:1 soil to water suspension using a glass electrode as reported by Mclean (1982). The electrical conductivity of the soil saturated paste extract (EC_e) was determined according to Jackson (1973). Gypsum content was determined in the soil samples using the acetone method (Hesse, 1998). Cation exchange capacity (CEC) was determined using 1N calcium acetate and 1N calcium chloride at pH 7 as a saturating solution and 1 N sodium chloride buffered at pH 7.0 as a displacing solution (Youssef, 1968). Calcium and sodium were determined by the EDTA titration and flame photometry methods, respectively. The exchangeable sodium percentage (ESP) was calculated using the values of CEC and exchangeable sodium.

The land capability classification was achieved by two methods; the first method used the applied system of land evaluation (ASLE) program for arid and semi-arid regions under both drip and surface irrigation systems (Ismail and Morsi, 2001) and the second one was the modified Storie index rating according to UCDAVIS, (2008) (Table 1). The modified Storie index rating was calculated using the following equation:

$$\text{StorieIndexRating} = \frac{A}{100} \times \frac{B}{100} \times \frac{C}{100} \times \frac{D}{100} \times \frac{E}{100} \times 100$$

Where: A = soil profile depth (cm). B = the weight mean of soil texture through the soil profile. C = slope. D = salinity content and E = gypsum content.

Table 1. Capability grades and classes of Storie index rating and applied system of land evaluation, respectively.

Storie Index Rating			Applied System of Land Evaluation (ASLE) program		
Grade	**%**	**Description**	**Class**	**%**	**Description**
1	80-100	Excellent	1	80-100	Excellent
2	60-79	Good	2	60-80	Good
3	40-59	Fair	3	40-60	Fair
4	20-39	Poor	4	20-40	Poor
5	< 20	Non agricultural	5	10-20	Very poor
			6	<10	Non agricultural

Results and Discussion

1- The Morphological Description of the Study Area.

The elevation of the studied soil profiles varies between 116 m and 283 m above the sea level (Figures 2 and 3). The soil relief of the study area generally ranges from almost flat to gentle sloping of 2-5% (Figure 5). The soil profile depth varies between shallow and deep. The soil structure of most profile layers shows a weak to medium subangular blocky with slight consistence. The main hue notation of the studied soil layer color changes from yellowish red to very pale brown (5 YR to 10 YR). These results are in an agreement with those of Faragallah (1995), Abd El-Aziz (1998) and Sayed (2012).

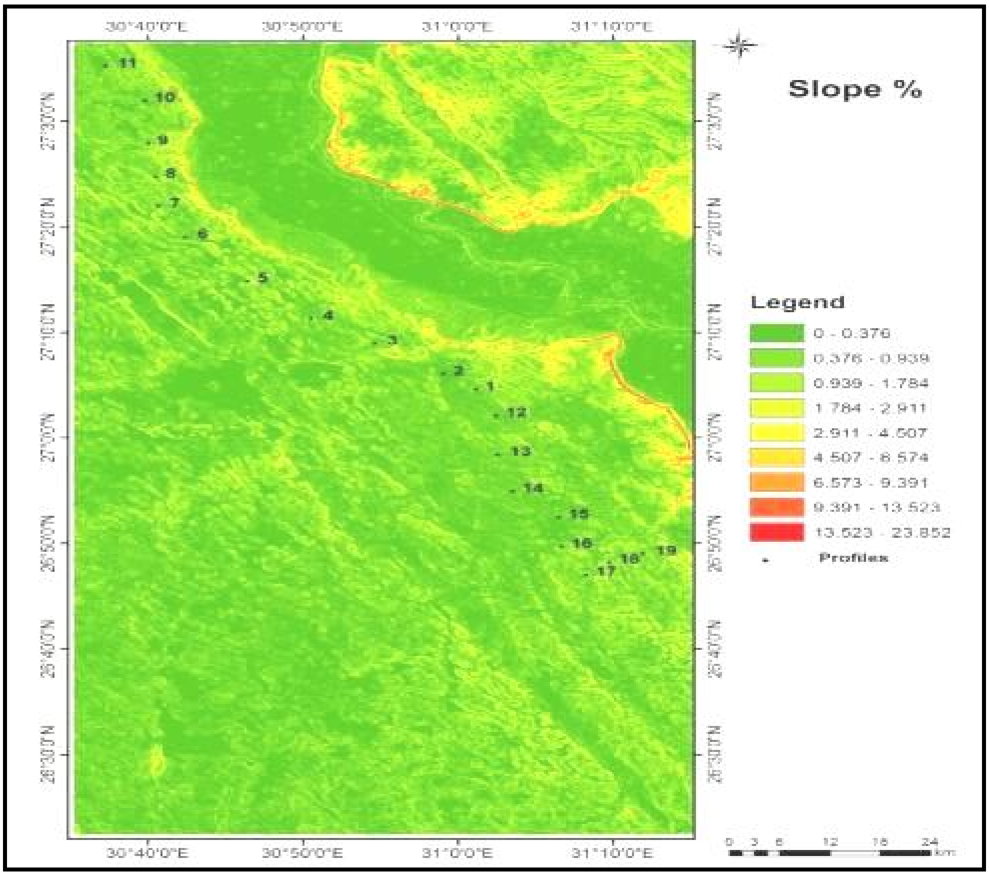

Figure 5. Slope of the study area.

2- Physical and Chemical Properties.

Data of the studied soils of the first and second transects (Tables 2 and 3) show that these soils have a texture ranging from very gravelly and/or gravelly sand to sandy clay loam (Figure 6). The soil organic matter content is low (less than 1%) and generally decreases with depth. The $CaCO_3$ content of these soils-varies between 13.1 and 89.4% (Figure 7). The lowest layers of the studied soil profiles show highest amounts of $CaCO_3$ reflecting the calcareous parent material nature of these soils. The studied soils have pH values above 7.0 with a range of 7.9 to 9.3 resulting that most of these soils are strongly alkaline. The EC_e values of these soils vary between 1.7 to 89.7 dS/m and ensure that most of the soil samples are highly to extremely saline (Figure 8). The gypsum content of the soil layers is low and ranged from 0.02 to 3.03%. However, the cation exchange capacity (CEC) values of the soil samples are in the range of 3.9 to 10.5 cmol+/kg soil which reflect the dominant coarse texture classes. Moreover, their exchange sodium percentage (ESP) values are relatively low and differ from 2.5 to 16.3% indicating that most of these samples are not sodic. These results coincide with those of Abd El-Aziz (1998), Gobran *et al*., (2010), Faragallah *et al*., (2011) and Sayed (2012).

Table 2. Some physical and chemical properties of studied soil profiles in the first transect (western desert highway of Assiut-Cairo).

Profile No	Depth (cm)	Particle-size distribution			Texture grade	Organic matter (%)	$CaCO_3$ (%)	pH 1:1	EC_e (dS/m)	Gypsum (%)	CEC kg)/(cmol+	ESP (%)
		Clay (%)	Silt (%)	Sand (%)								
1	0-20	9.72	13.90	76.38	Sandy loam	0.30	49.0	8.9	11.4	0.27	6.6	3.6
	20-40	8.61	27.26	64.14	Sandy loam	0.26	68.8	8.7	36.4	0.59	5.6	13.6
	40-105	22.08	28.11	49.81	Gravelly loam	0.24	85.9	8.3	34.6	0.82	4.3	8.6
2	0-40	9.00	6.65	84.35	Gravelly loamy sand	0.81	22.7	8.5	25.9	0.34	6.4	5.0
	40-55	6.85	14.90	78.26	Gravelly loamy sand	0.75	36.9	8.0	86.1	0.07	6.1	14.8
	55-105	10.55	13.06	76.38	Very gravelly sandy loam	0.42	46.7	7.9	82.0	0.72	5.7	16.3
3	0-30	16.42	5.78	77.80	Sandy loam	0.34	40.2	8.6	29.1	0.83	7.2	3.6
	30-70	5.99	22.52	71.49	Sandy loam	0.40	48.9	8.8	40.9	1.24	7.0	7.9
4	0-40	11.78	9.89	78.33	Sandy loam	0.38	33.8	8.7	16.2	0.84	8.5	5.5
	40-70	9.39	11.00	79.61	Gravelly loamy sand	0.44	33.8	8.8	25.1	1.14	9.5	6.4
	70-110	8.08	26.20	65.72	Gravelly sandy loam	0.17	55.4	8.8	35.7	1.13	6.6	10.7
5	0-40	9.19	8.56	82.25	Loamy sand	0.52	20.8	8.7	5.3	0.29	8.1	6.4
	40-60	8.84	23.88	67.28	Sandy loam	0.28	78.4	8.7	28.3	0.02	5.2	8.6
	60-110	9.47	29.02	61.51	Gravelly sandy loam	0.27	82.1	8.5	17.1	0.35	4.8	5.7
6	0-40	8.02	10.85	81.13	Loamy sand	0.31	29.6	8.8	2.7	0.02	6.1	5.9
	40-50	6.38	23.45	70.17	Sandy loam	0.29	29.4	8.8	5.1	0.03	5.8	6.7
	50-80	6.14	15.83	78.02	Loamy sand	0.26	40.2	8.7	7.7	0.43	5.4	7.4
	80-120	10.15	7.21	82.64	Loamy sand	0.26	51.1	8.6	17.5	0.68	4.8	3.9

Table 2. Continued.

Profile No	Depth (cm)	Particle-size distribution			Texture grade	Organic matter (%)	$CaCO_3$ (%)	pH 1:1	EC_e (dS/m)	Gypsum (%)	CEC kg)+/(cmol	ESP (%)
		Clay (%)	Silt (%)	Sand (%)								
7	0-30	20.15	13.19	66.66	Sandy clay loam	0.83	35.6	8.9	10.8	0.03	7.0	2.5
	30-60	5.48	1.63	92.89	Sand	0.65	21.6	8.6	30.7	0.75	4.1	7.4
	60-70	5.56	17.42	77.02	Loamy sand	0.23	18.1	8.7	27.1	0.83	4.4	6.5
	70-130	6.98	4.16	88.86	Sand	0.07	45.3	8.4	28.2	1.10	4.6	7.9
8	0-40	9.02	18.10	72.87	Very gravelly sandy loam	0.53	40.5	8.3	45.3	1.19	7.2	14.3
	40-60	7.82	13.02	79.16	Very gravelly loamy sand	0.54	30.4	8.3	52.2	1.30	7.3	9.4
	60-75	6.52	16.22	77.26	Loamy sand	0.52	18.4	8.8	21.4	0.99	6.6	7.1
	75-110	8.86	7.95	83.18	Loamy sand	0.30	47.7	8.6	24.2	1.11	6.4	7.1
9	0-30	7.12	1.35	91.53	Sand	0.37	20.3	8.6	3.5	0.09	4.3	5.8
	30-55	5.57	5.85	88.58	Very gravelly sand	0.32	34.2	8.6	19.4	0.37	6.8	4.3
	55-110	7.42	4.78	87.80	Very gravelly sand	0.32	41.6	8.4	27.9	1.13	6.3	8.6
10	0-30	6.55	3.40	90.05	Gravelly sand	0.40	13.1	8.4	5.6	0.74	5.4	9.3
	30-45	8.11	10.61	81.28	Loamy sand	0.35	14.1	8.7	31.9	1.83	7.3	8.6
	45-75	6.76	8.78	84.46	Gravelly loamy sand	0.27	17.5	8.6	47.2	1.63	6.6	14.3
	75-120	0.70	12.43	86.87	Gravelly sand	0.13	26.3	8.5	29.9	1.49	5.0	10.0
11	0-30	2.18	9.60	88.22	Gravelly sand	0.69	20.8	8.5	10.3	0.56	7.0	3.4
	30-60	6.46	10.09	83.45	Loamy sand	0.74	22.9	8.8	39.6	1.30	6.8	10.0
	60-80	2.09	22.32	75.59	Gravelly loamy sand	0.30	22.7	8.6	43.1	1.33	6.9	14.3
	80-120	2.90	8.91	88.18	Gravelly sand	0.28	23.1	8.5	50.5	1.21	5.3	11.8

Table 3. Some physical and chemical properties of studied soil profiles in the second transect (western desert highway of Assiut-Aswan).

Profile No	Depth (cm)	Particle-size distribution			Texture grade	Organic matter (%)	$CaCO_3$ (%)	pH 1:1	EC_e (dS/m)	Gypsum (%)	CEC kg)/(cmol+	ESP (%)
		Clay (%)	Silt (%)	Sand (%)								
12	0-20	10.28	11.87	77.85	Sandy loam	0.19	41.3	8.6	25.7	1.08	10.5	6.7
	20-60	4.09	4.29	91.62	Very gravelly sand	0.10	47.4	8.5	67.1	1.61	8.5	13.3
	60-100	3.14	5	91.86	Very gravelly Sand	0.09	59.7	9.3	74.5	3.03	5.6	9.7
13	0-20	4.58	4.13	91.29	Gravelly sand	0.34	30.4	9.1	18.4	0.29	5.3	5.3
	20-35	3.56	5.39	91.05	Sand	0.23	55.2	8.5	45.6	1.13	3.9	12.0
	35-75	6.71	4.2	89.09	Gravelly sand	0.09	34.7	8.4	53.7	1.23	5.4	10.0
	75-110	6.67	5.53	87.80	Gravelly loamy sand	0.09	81.5	8.5	34.6	1.33	5.0	8.7
14	0-25	12.88	1.53	85.59	Loamy sand	0.29	37.8	8.7	39.4	1.12	8.6	9.3
	25-75	9.18	3.75	87.07	Loamy sand	0.12	64.7	8.5	67.2	2.33	7.7	11.4
	75-100	8.04	5.44	86.52	Loamy sand	0.09	71.8	8.6	89.7	1.31	6.6	13.7
15	0-15	11.38	4.59	84.03	Loamy sand	0.19	39.5	8.5	36.2	1.03	8.0	11.7
	15-60	9.78	5.54	84.68	Gravelly loamy sand	0.13	52.4	8.7	46.9	1.01	6.4	8.3
16	0-10	10.72	6.93	82.35	Loamy sand	0.14	44.7	9.2	6.9	0.09	8.3	15.4
	10-40	7.78	7.13	85.09	Loamy sand	0.12	47.1	9.2	2.2	0.04	7.6	13.1
	40-80	12.38	3.17	84.45	Loamy sand	0.10	60.1	9.0	2.3	0.04	6.6	16.2
	80-105	8.45	5.62	85.93	Gravelly loamy sand	0.10	79.5	9.0	1.7	0.03	6.0	7.5

Table 3. Continued.

Profile No	Depth (cm)	Particle-size distribution			Texture grade	Organic matter (%)	$CaCO_3$ (%)	pH 1:1	EC_e (dS/m)	Gypsum (%)	CEC kg)/(cmol+	ESP (%)
		Clay (%)	Silt (%)	Sand (%)								
17	0-20	7.63	4.47	87.90	Loamy sand	0.13	50.2	8.5	2.4	0.03	4.9	13.4
	20-55	6.4	3.58	90.02	Sand	0.10	49.1	9.1	2.5	0.03	5.1	15.3
	55-85	5.67	4.02	90.31	Sand	0.09	36.9	8.7	13.8	0.39	5.4	11.1
	85-110	15.7	5.55	78.75	Gravelly sandy loam	0.07	89.4	8.6	26.7	0.83	4.7	9.7
18	0-30	15.86	5.51	78.63	Gravelly sandy loam	0.15	42.4	8.9	10.2	0.20	8.9	8.9
	30-65	16.52	8.76	74.72	Gravelly sandy loam	0.10	41.7	8.6	27.1	0.92	6.5	7.3
	65-100	12.93	4.83	82.24	Gravelly sandy loam	0.07	51.4	8.4	43.5	1.68	4.7	11.3
19	0-10	16.7	3.81	79.49	Sandy loam	0.12	74.2	8.7	11.2	0.67	6.7	15.7
	10-40	15.45	2.53	82.02	Sandy loam	0.08	65.7	8.8	29.9	1.70	6.2	8.0
	40-70	15.38	2.86	81.76	Gravelly sandy loam	0.04	75.6	8.5	83.5	2.15	6.2	13.9

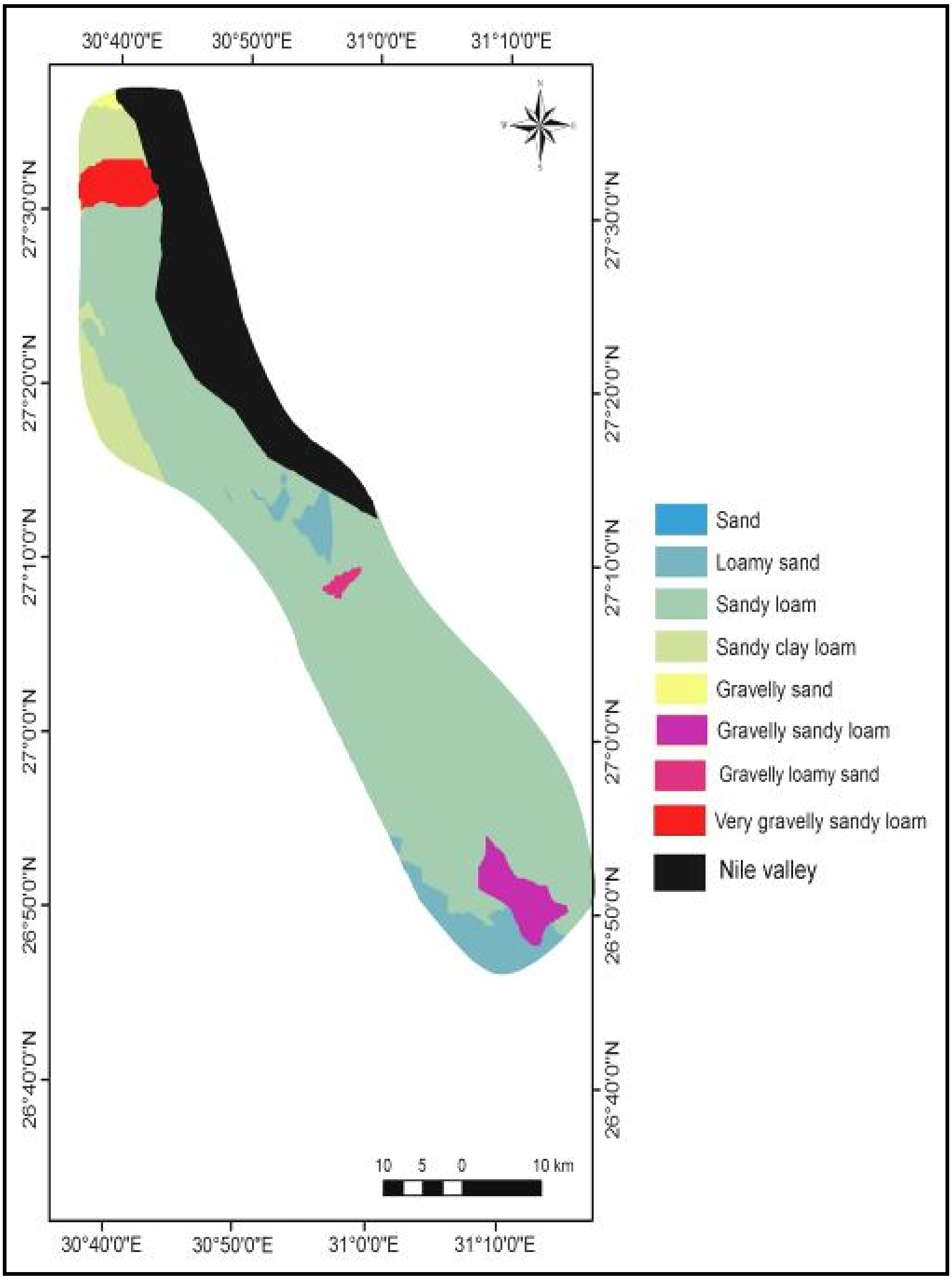

Figure 6. Soil texture of the surface layer of the studied area.

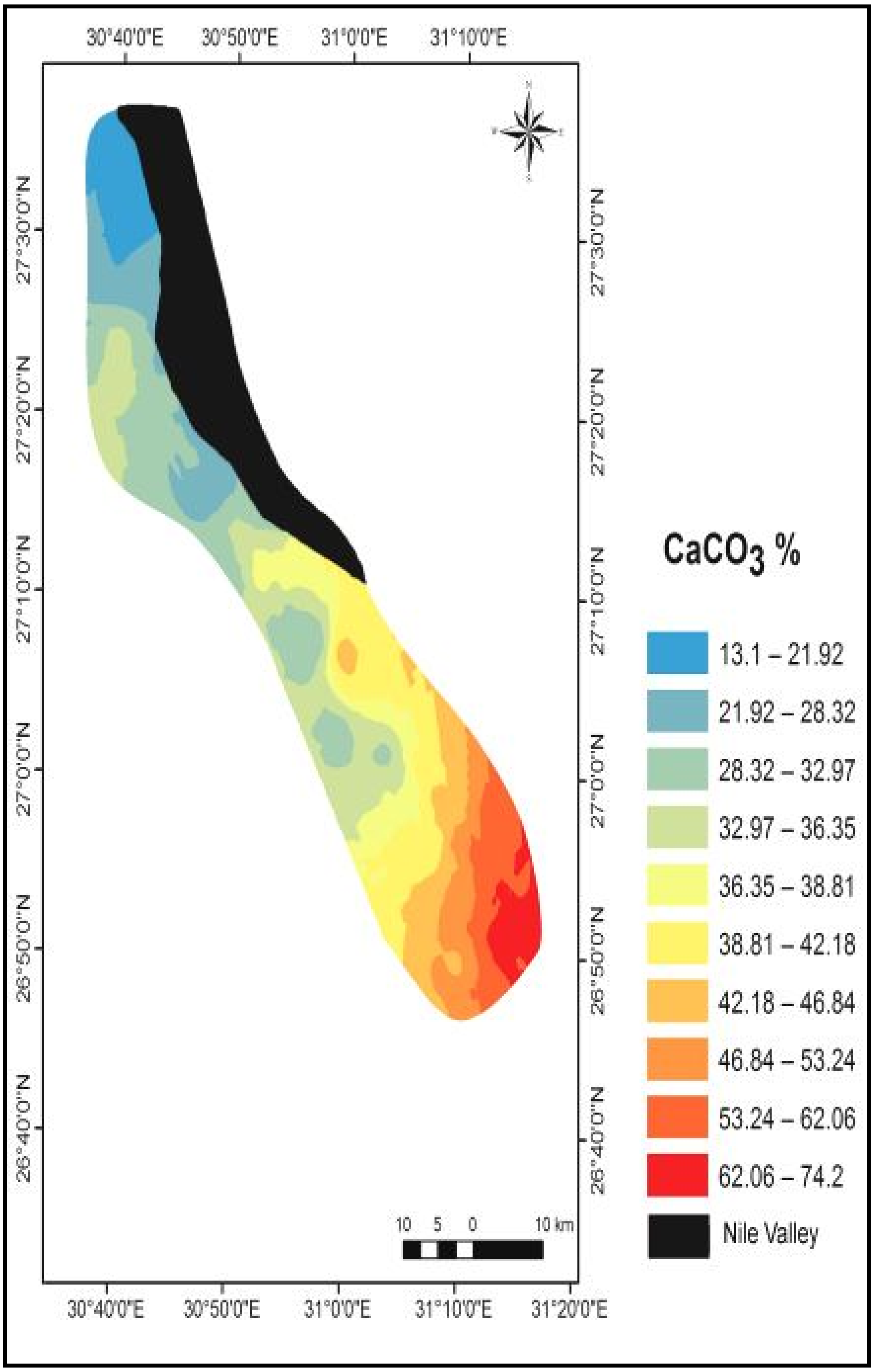

Figure 7. Calcium carbonate content of the surface layer of the studied area.

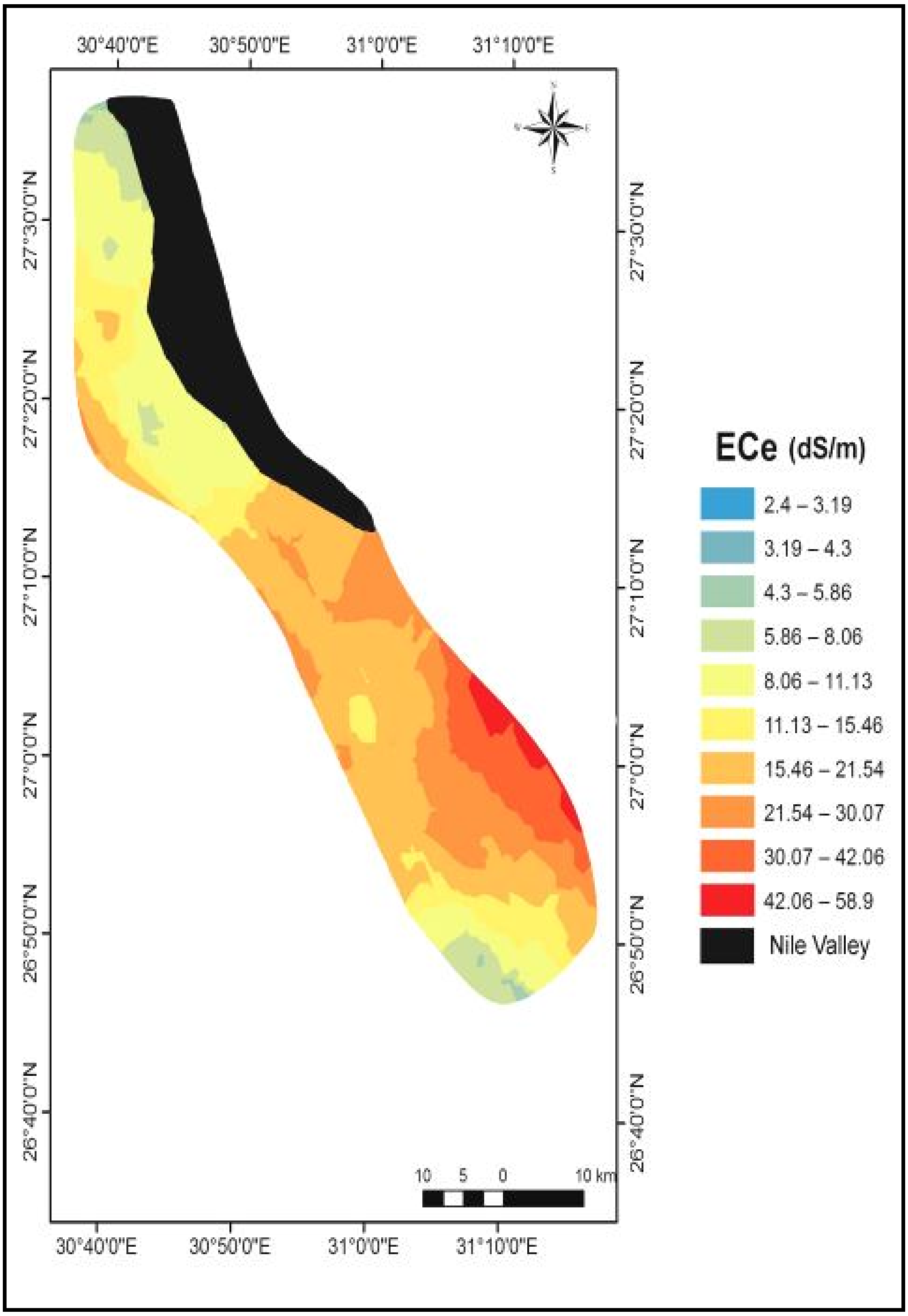

Figure 8. Electrical conductivity (EC_e) of the surface layer of the studied area.

3- Land Capability of the Studied Soils.

Land capability classification systems are used to study and record all data relevant to find the combination of agricultural and conservation measures which would permit the most intensive and appropriate use of the land without undue danger of soil degradation. In this study, two systems, ASLE program and modified Storie index rating, are used to assess the land capability of the studied soils.

1) ASLE program.

The Applied System of Land Evaluation (ASLE) program works interactivity and compares the characteristics of the land unit to be evaluated with the generalization levels established for each use capability class (C1, C2, C3, C4, C5 and C6). The prediction of capability classes is the result of the qualitative evaluation process or the overall interpretation of some biophysical factors such as drip irrigation, number of layers, depth, relief, climate, ground water, soil properties and soil fertility. Based on the structure of this program and data displayed in Table (4), most of the soils of the first transect (profiles 1, 5, 6, 7, 9, 10 and 11) are considered poor with respect of land use point of view under drip irrigation system whereas, the soils represented by profiles 2, 3, 4 and 8 of this transect are non-agricultural. However, under this irrigation system, most of the soils of the second transect (profiles 12, 13, 14 and 15) are considered non-agricultural.The soils that include profiles 16, 18 and 19 are poor, and that is represented by profile 17 is very poor (Figure 9).

In addition, under using the surface irrigation system, most of the soils of the first transect (profiles 1, 5, 6, 7, 9, 10 and 11) are poor for agricultural land use whereas the soils that contain profiles 2, 3, 4 and 8 are non-agricultural.

On the other hand, most of the soils of the second transect (profiles 12, 13, 14 and 15) are non-agricultural land. Also, under this irrigation system, the soils represented by profiles 16, 18 and 19 are poor, and that includes profile 17 is very poor for agricultural use (Figure 10). So, it could be concluded that the soils of the study area are generally poor (C4) to non-agricultural (C6).

2) Modified Storie index.

By applying the modified Storie index equation, the soils of the first transect are generally considered fair (grade 3) for agricultural use (Table 4). However, those soils represented by profiles 1, 3, 4 and 5 are poor (grade 4). On the other hand, the soils that include profiles 9 and 10 have grade 5 (non-agricultural). On the contrary, most of the soils of the second transect are poor (grade 4) but those represented by profiles 16 and 17 are fair (grade 3). However, the soils that have profiles 12 and 13 are-considered non-agricultural (grade 5) (Figure 11).

Therefore, it can be concluded that both applied system of land evaluation (ASLE) program and modified Storie index show the same prediction and they are close for evaluating the soils of the study area with respect to the agricultural use. Most of these soils are considered poor or fair for agricultural use. The main limited properties of these studied soils are soil texture, calcium carbonate and salinity.

Table 4. Capability class and grade using ASLE and modified Storie index, respectively, of the studied soil profiles.

Location	Profile No.	ASLE program under drip irrigation		ASLE program under surface irrigation		Modified Storie Index	
		%	Class	%	Class	%	Grade
First Transect.	1	21.8	C4	20.0	C4	29	Grade 4
	2	7.3	C6	7.0	C6	42	Grade 3
	3	6.7	C6	7.2	C6	27	Grade 4
	4	8.3	C6	7.7	C6	36	Grade 4
	5	23.3	C4	23.5	C4	31	Grade 4
	6	23.4	C4	23.3	C4	50	Grade 3
	7	26.4	C4	26.4	C4	47	Grade 3
	8	8.0	C6	7.9	C6	42	Grade 3
	9	25.8	C4	27.0	C4	18	Grade 5
	10	24.9	C4	24.9	C4	19	Grade 5
	11	26.6	C4	26.7	C4	46	Grade 3
Second Transect.	12	6.7	C6	6.8	C6	13	Grade 5
	13	6.9	C6	6.9	C6	14	Grade 5
	14	6.5	C6	7.1	C6	33	Grade 4
	15	4.9	C6	5.2	C6	30	Grade 4
	16	22.0	C4	22.0	C4	42	Grade 3
	17	18.5	C5	18.5	C5	42	Grade 3
	18	21.9	C4	21.9	C4	31	Grade 4
	19	20.1	C4	21.8	C4	23	Grade 4

C4= Poor — Grade 3: Fair

C5= Very poor — Grade 4: Poor

C6= Non-agricultural — Grade 5: Non-agricultural

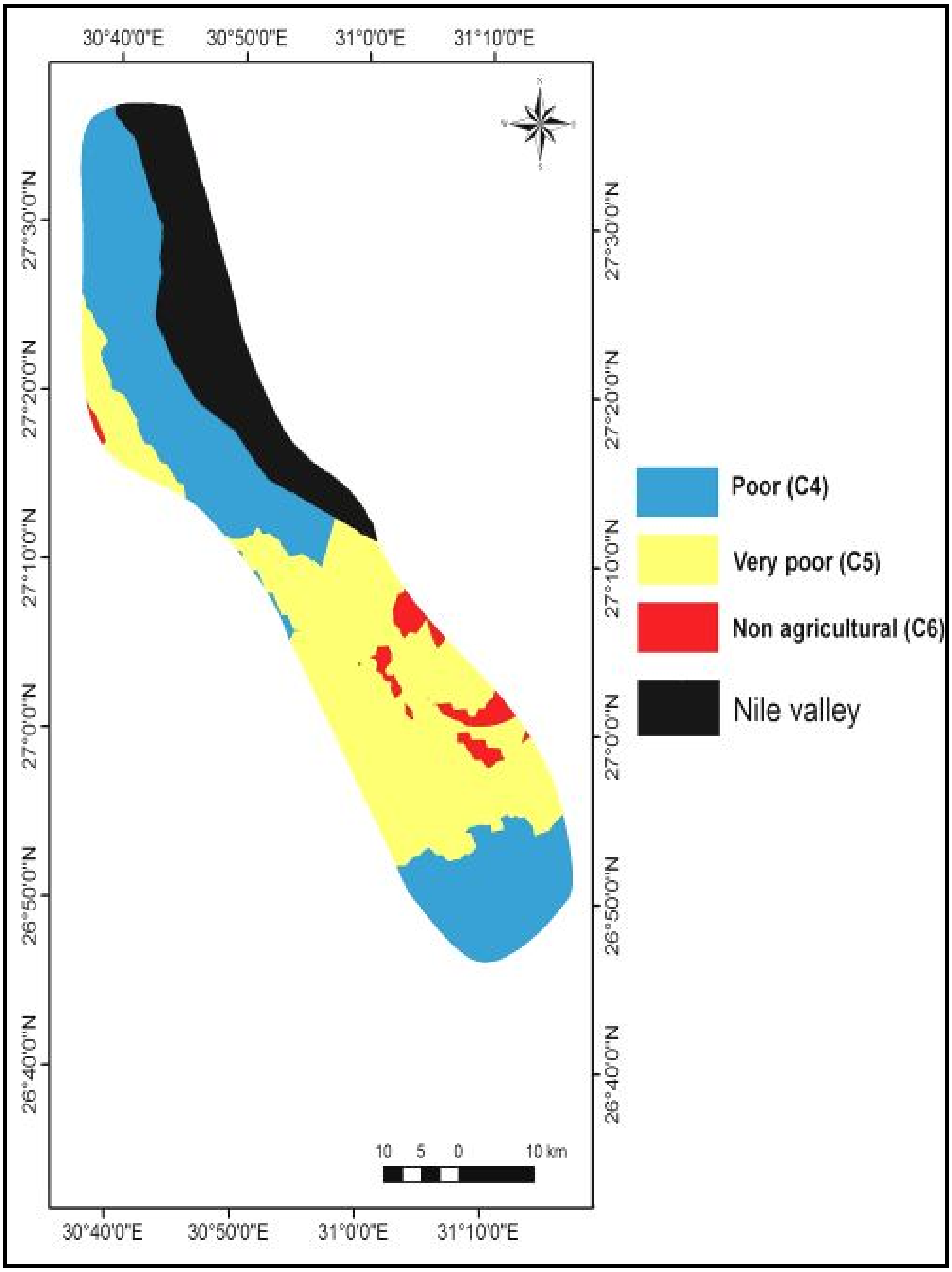

Figure 9. Land capability classes of the study area under drip irrigation according to the ASLE program.

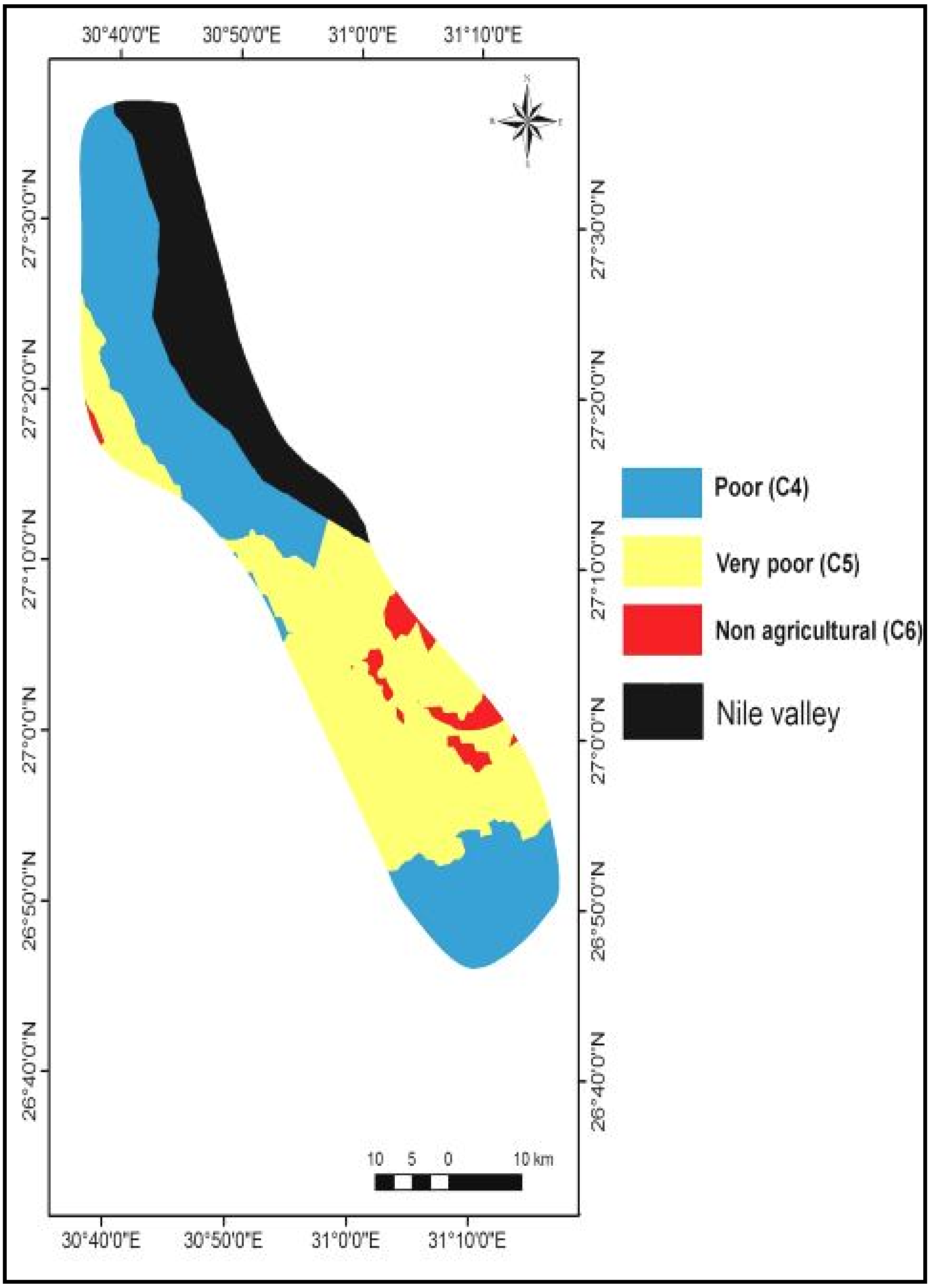

Figure 10. Land capability classes of the study area under surface irrigation according to the ASLE program.

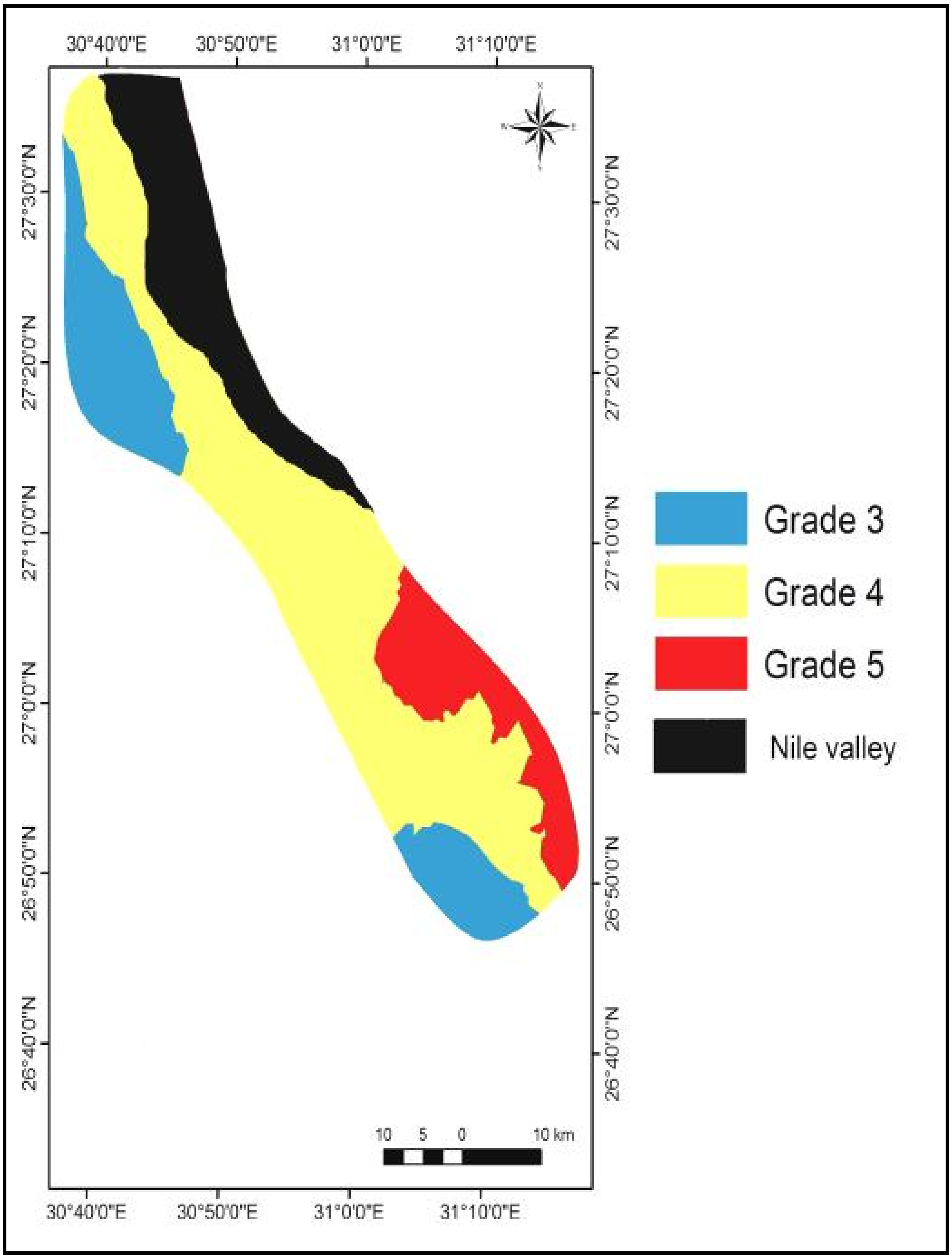

Figure 11. Land capability grades of the study area according to the modified Storie index rating.

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تقييم صلاحية بعض الأراضى الممثلة للهضبة الجيرية الغربية فى أسيوط للزراعة

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الملخص

تمثل المساحة المنزرعة فى محافظة أسيوط بالشريط الضيق من الأراضى الرسوبية الموجود على جانبي نهر النيل كما يعتبر الإنتاج الزراعى من هذه الأراضى محدود ولا يكفى الزيادة السكانية السريعة، وبالتالى كان من الضرورى البحث عن موارد أرضية أخرى حتى يمكن إجراء تقييم لها ومدى إستخدامها فى الزراعة. تعتبر الهضبة الجيرية الغربية بمحافظة أسيوط إحدى هذه الموارد الأرضية حيث تتميز كثير من أراضيها بأنها شبة مستوية. وبالتالى فإن الهدف من هذه الدراسة هو تقييم بعض الأراضى الممثلة للهضبة الجيرية الغربية الموجودة فى محافظة أسيوط ومدى مناسبتها للأستغلال الزراعى.

وتوضح نتائج هذه الدراسة أنه يسود فى هذه الأراضى القوام الخشن (الرملى ، الطمييى الرملى ، الرملى الطمييى) كما يتباين محتواها من الحصى مع العمق. وتراوحت أعماق القطاعات ما بين قطاعات ضحلة إلى قطاعات عميقة. كما أن محتوى هذه الأراضى من المادة العضوية منخفض جداً (أقل من ١%) وتتباين قيم الملوحة فى عجينة التربة المشبعة ما بين غير ملحية إلى شديدة جداً فى الملوحة. بينما إختلفت قيم تفاعل التربة بين ٧,٩ إلى ٩,٣. ويتراوح محتوى التربة من كربونات الكالسيوم ما بين ١٣,١ إلى ٨٩,٤% ويرجع ذلك إلى طبيعة مادة الأصل الجيرية. وكانت السعة التبادلية الكاتيونية منخفضة جداً وذلك لسيادة قوام التربة الخشن. كما أن محتواها من الجبس منخفض ويتراوح ما بين ٠,٠٢ إلى ٣,٠٣% ، ومعظم أراضى المنطقة تحت الدراسة غير صودية.

تم إجراء تقييم القدرة الإنتاجية لبعض هذه الأراضى بإستخدام نظامين من نظم التقييم وهما نظام Applied System of Land Evaluation (ASLE) ونظام Storie Index حيث أظهرت النتائج بإستخدام النظام الأول أن هذه الأراضى فقيرة الصلاحية إلى أراضى غير قابلة للاستغلال الزراعى بينما بإستخدام النظام الثانى تبين أن أراضى منطقة الدراسة كانت أراضى متوسطة الصلاحية إلى أراضى غير زراعية كما كانت أهم العوامل المحددة لزراعة المنطقة تحت الدراسة هى كربونات الكالسيوم والقوام والملوحة.