J. Agric. Sci. Mansoura Univ., 29 (12): 7599 - 7616, 2004

SOIL CLASSIFICATION AND LAND EVALUATION OF EL SER – EL GWAREER AREA, NORTHEASTERN SINAI, EGYPT

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ABSTRACT

El Ser – El Gwareer, the eastern part of North Sinai Agriculture Development Project (NSADP), is a depression that embodies many landforms; *i.e.,* sand sheet, sabkha, plain covered with desert pavement, wadi bottom and terraces. Eighteen representative soil profiles were morphologically studied and their samples were subjected to physical and chemical analyses aiming to carry out soil classification as well as land evaluation using different systems.

According to the US Soil Taxonomy (1998) soils belong to both Aridisols and Entisols. Five soil families could be identified within *Typic Torriorthents*, *Typic Torripsamments* and *Typic Torrifluvents* subgreat groups. Whereas other seven soil families were found belonging to *Typic Haplocalcids, Typic Haplogypsids, Typic Calcigypsids* and *Gypsic Aquisalids* subgreat groups.

Regarding land evaluation, systems adopted were the modified Storie Index by Nelson (1963), the land suitability for irrigated agriculture according to Sys *et al,* (1991), in addition a new computer model for Abd El Mutaleb and Hussein (1985) proposed by the authors, and applied here .

According to the modified Storie Index by Nelson (1963), it found that studied lands belong to classes marginally suitable C with productivity index ("D_I" from 60.0 to 60.6%) and currently not suitable (with "D_I" from 31.1 to 52.4%).

According to Sys *et.al.,* (1991), the studied area could be distinguished into classes; *i.e.,* moderately suitable (S_2) (with suitability index "C_I" from 52.1 to 60.3%), marginally suitable (S_3) (with "C_I" from 25.2 to 48.5%) and not suitable (N) (with "C_I" from 6.6 to 21.2%).

Regarding to the proposed computer model, the land falls into two classes ;namely, marginally suitable (D) and currently not suitable lands (E). The marginally suitable lands have final index (FILE) from 55.1 to 67.6%, while the currently not suitable lands (D) have final index (FILE) from 31.0 to 54.2 %. Comparison between the three land evaluation systems was discussed.

Keywords: El Ser – El Gwareer, North Sinai, soil morphology, classification, evaluation

INTODUCTION

Development of Sinai became as one of the strategic goals particularly after singing the peace treaty between Egypt and Israel in year of 1979. North Sinai Agricultural Development Project (NSADP) aspires linking Sinai with the Nile delta through conveying a portion of Nile water mixed with drainage water to reclaim about 600 thousands feddans in east of Delta and North Sinai.

El Ser – El Gwareer is a depression in northeast of Sinai peninsula located between the frontal and central rows of isolated blocks. The area is bounded by longitudes 33° 40` 46" and 34° 00` 09"E and latitudes 30° 47` 09" and 30° 56`04"N, with a total area of about 135 thousands feddans, (Fig. 1).

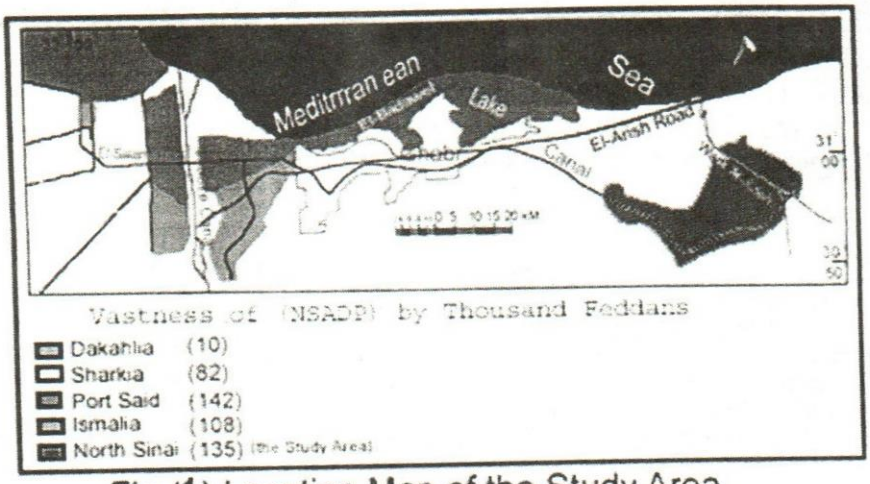

Fig (1) Location Map of the Study Area.

The study area is under arid climatic conditions ,(table 1). The annual rainfall amounts to 104.7 mm/y, concentrating over the period between November and March therefore, the soil profile control section is dry more than half of the accumulative days of the year. In terms of the limits outlined by US. Soil Survey Staff (1999), the study area is characterized by torric moisture regime. Exceptional cases are soils of sabkha that are saturated with water in one or more layers within 150 cm. depth for one month or more in 6 out of 10 years . Data in table 1 , show that the difference between the mean summer and winter soil temperature (at 50 cm. depth) is 11.7 °C indicating thermic soil soil temperature regime.

Table (1): Air and soil climatic data of El-Arish meteorological station over the period from 1941 to 1995

Period	Months	Temperature °C			Rainfall mm.	Relative humidity %	Evap mm/day	Wind velocity m/sec	Soil Temperature °C	
		Max.	Min	Mean					Ann.	Mean
Winter	Jan.	18.7	7.6	13.6	20.3	70.8	3.3	4.7	14.6	14.8
	Feb.	19.3	7.6	13.5	17.1	70.0	3.3	5.5	14.5	
Spring	March	21.3	9.0	15.1	12.8	71.8	3.6	5.4	16.1	19.4
	April	25.3	12.2	18.8	6.1	67.8	4.8	4.7	19.8	
	May	27.6	14.5	21.1	3.2	68.6	4.1	4.4	22.2	
Summer	June	30.5	17.8	24.2	0.0	69.6	4.3	4.1	25.2	26.5
	July	31.7	20.3	26.0	0.0	70.2	4.1	4.0	27.0	
	August	30.8	20.7	26.3	0.2	72.2	3.6	5.5	27.3	
Autumn	Sept.	30.4	19.2	24.8	0.6	74.2	3.4	3.65	25.8	22.9
	Oct.	28.4	16.3	22.4	6.0	72.5	3.5	3.7	23.4	
	Nov.	24.9	12.0	18.5	16.2	70.0	3.3	3.9	19.5	
Winter	Dece.	20.0	8.6	14.3	22.2	72.2	3.0	3.3	15.3	
	Mean	22.8	13.8	20.0		70.9	3.7	4.2		
	Total				104.7					
Difference between Summer and Winter										11.7

The prevailing climatic conditions refer to weak chemical weathering and soil development as well as soil forming processes that are confined to salanization, gypsification and calcification .

Geographically, the study area has an elevation ranging between 50 and >150 m.a.s.l, (table 2). The area lies within El Gifgafa – El Maqdaba depression, and embodies different landforms; *i.e.,* sand sheet sometimes with scattered small hummocks; level plain covered with desert pavement in some places; dry sabkha and wadi Lithologically, El Ghazawi (1989) and Nasr (1993) indicated that, the area is covered with deposits belonging to Pliocene, Pleistocene and Holocene. The Pliocene deposits are composed of conglomerates and gypsiferous salt marl. Pleistocene deposits are clay-sand intercalating sandstone. The Holocene deposits are built of loose fine to coarse sand.

Table (2) Elevation of lands in El-Ser–El-Gwareer area

Elevation, m.a.s.l.	Net area to be reclaimed, feddan	%
< 50	5,200	3.9
50 - 100	35,000	26.5
100 - 150	50,800	38.5
> 150	41,000	31.1

MATERIALS AND METHODS

On base of cadastral and geomorphic maps at scale 1: 100.000, eighteen soil profiles representing the different landscape units were examined and described according to FAO (1990). Eighty soil samples were collected and subjected to physical and chemical analyses; *i.e.,* particle size distribution, moisture characteristics, pH, EC, total carbonate content, gypsum content and organic matter content as outlined by Richards(1954), and methods mentioned by Black(1985).

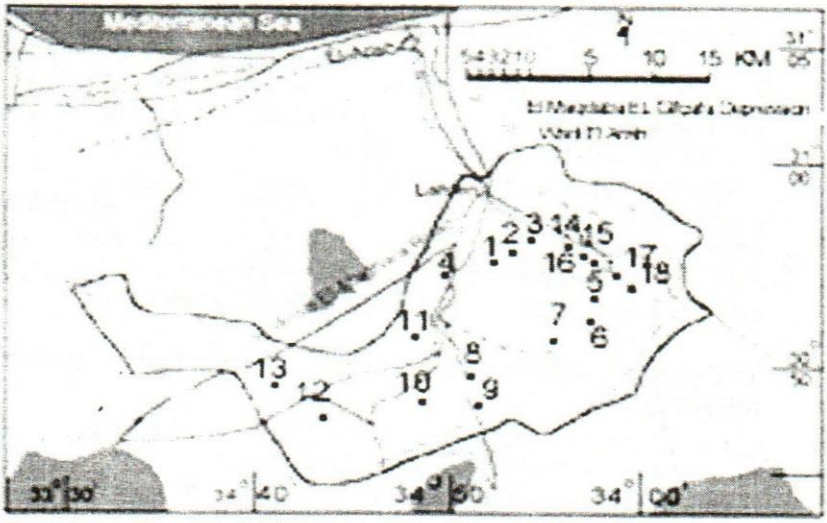

Fig (2) Profile's Location map of the Study Area

Soils were classified according to the USDA Staff (1975) and its key (1998). Land evaluation was carried out according to the Nelson (1963), Sys *et al,* (1991) and computer program suggested for Abd El Mutaleb and Hussein (1985) system by the authors.

RESULTS AND DISCUSSION

Soil Morphology and Land Classification

The following is an account for the characteristics of the different soils formed on the different landscape units and their taxonomy according to the USDA Staff (1975) and its key (1998).

Soils of Sand Sheets:

Sand sheets occupy the majority of the northeastern district of the study area (El Ehna – El Hamtha). Soils regarded are represented by profiles 1,2, 3 and 4. Land surface is almost flat, nearly level with ripple marks; sometimes patches of low hummocks supporting vegetation cover. Natural vegetation present with varying densities from one site to another. Soils are generally well drained, deep, sandy, sometimes display abrupt textural change within deepest layer of profile 3. They are non-to strongly saline as values of EC range between 0.9 to 70 dSm^{-1}; slightly to strongly calcareous (total carbonates content between 1.68 to 44.52%), slightly to moderately alkaline (pH from 7.3 to 7.8) and have low organic matter content (0.04 to 0.21%) tables 3 and 4 .

Morphological characteristics and other data show that, soils display no signs of presence of any secondary formation or any diagnostic horizon. Therefore, they are placed in the Entisols order, and at family they belong to *Typic Torripsamments :Siliceous (Calcareous), Thermic.*

Soils of the Sabkha

Sabkha is located in the southeastern part of the depression . and represented by profiles 5 and 6. Data in tables (3 to 4) indicate that, the landsurface is almost nearly level, but the presence of dense hummocks supporting hallophytic plants shows distinct undulating microrelife. Landsurface is covered with salt crust (profile 6). Soils are moderately to somewhat poorly drained and vary between coarse textured (profile 5) and moderately fine textured (profile 6) . Soils are strongly to extremely saline, as values of EC fall within the range 20.0 – 490.0 dSm^{-1} and increase up to 920 dSm^{-1} in the surface curst. Soils are neutral to mildly alkaline (pH from 7.1 to 8.4). Total carbonate content varies between 2.54 to 49.69%, whereas gypsum content from 1.7 to 10.4% , in fine crystals form.

The pedomorphological as well as chemical properties show the following:

- The soils represented by profiles 5 have got weakly developed gypsic horizon, therefore, they belong to the order Aridisols and *Typic Haplogypsids* subgroup, at family level they are *Typic Haplogypsids: Sandy, Siliceous (Calcareous); Thermic.*

- The soils represented by profile 6 acquire salic horizon accompanied with weakly developed calcic one, a case qualifies them to belong to the *Calcic Aquisalids* and to the family *Calcic Aquisalids : Fine Clay, Carbonatic, Thermic.*

Soils of the Plain

This landscape unit extends over different districts covering relatively a large area, where landsurface is almost flat and sometimes gently undulating, covered with gravelly-sized rock fragments forming desert pavements in some places. Desert shrubs often occur with varying densities. With respect to soil texture, (data in table3) show that, the soils cover a wide range, as follows; medium textured soils, represented by profiles 8 and 9 (at Ras Hamada) and profile 10 (at El Ser); fine textured soils represented only by profile 11 (at El Ser) and moderately fine over coarse (profile 12) and finally coarse over moderately fine textured soils that are represented by profile 7 (at El Maqdaba) and profile 13(at El Ser). Soil color is ,generally, yellow to reddish yellow with the predominance of the hue "7.5YR". Analytical data (table 4) indicate that, soil salinity and carbonate contents fall in a wide range; (EC 0.5 – 275.0 dSm^{-1}) and(total carbonate contents 1.893 – 51.151 %), gypsum content varies from 0 – 11%. Soils at El Ser (profile 10) show the lowest values of salts(EC from .6 – 1.7 dSm^{-1}) and carbonate content (from 11.56 to 13.65%) in contrast to soils of profile 6which have the highest values of salts(from32.0 to 920 dSm^{-1}) and 11 which exhibits the highest amounts of total carbonate (47.62 - 64.35%) .

The analytical data (tables 3 and 4) and field observations showed that, the soils of the unit could be distinguished into; soils with weakly Calcic or Gypsic horizons and soils have no secondary formation. Therefore, the majority of soils belong to order Aridisols and the others belong to Entisols. The following is a account of taxa units identified

- Soils represented by profiles 9 , 10 and 12 possess weakly Calcic and salic horizons, therefore they are placed to subgroup *Calcic Haplosalids.* In terms of family modifiers, they could be distinguished into soil families; *Calcic Haplosalids :Coarse loamy ,Mixed, Thermic* (profiles 9 and 10) and *Calcic Haplosalids : Sandy ,Mixed, Thermic;* (profile 12)
- Soils represented by profile 13 display weakly developed Gypsic horizon, the case that qualifies them to be classified at the subgroup *Typic Haplogypsids* and at the family *Typic Haplogypsids : Coarse loamy ,Carbonatic, Thermic.*
- Other soils represented by profiles 8 and 11 have Calcic horizons, therefore, they are classified as *Typic Haplocalcids* .At the family modifiers two families could be identified *;i.e., Typic Haplocalcids : Sandy loam ,Mixed, Thermic.* (profile 8) and *Typic Haplocalcids : Sandy clay loam ,Mixed, Thermic* (profile11)
- Soil represented by profile (7) show different modes of soil formation: the frist layers (0 – 40 Cm) are sandy devoid of any salinity and have relatively low total carbonate content, and traces of gypsum. Their presence are due to wind action. The lower (from 40 – 110 Cm) have fine texture silty clay

loam higher salinity; *i.e.*, EC values above 20dS/m and calcareous. Therefore, the tops layers could be place in the *Typic Torripsamments* subgroup while the lower layers could place in subgroup *Calcic Haplosalids*.

These soils are formed on the present channel (wadi bottom) and terraces of Wadi El Arish which transect the eastern sector of the study area from south to north. The representative soil profiles are 14, 15, 16, 17 and 18 (tables, 5, and 6).

Regarding the present channel soils wadi bottom landscape represented by profiles 14 and 15. their have nearly level to undulating with scattered desert shrubs. Soils are generally deep with texture varying from (profile 15) to sandy loam (profile 14). Soils are , in general; very pale brown that are 10YR 8/4 in dry condition to 10TR 7/4 in moist condition. Non saline to non to slightly saline as EC is varies between 0.4 and 3.8 dSm^{-1}; slightly to extremely calcareous where carbonate content ranging from 4.69 to 29.71% and low organic matter content (0.09 – 0.30%). .

Table (3): Properties of the soils of El Ser – El Gwareer area (El-Gifgafa –El-Maqdaba depression)

Land form	Prof. NO.	Depth Cm	SP.	pH in soil past	EC dSm^{-1}	CEC me/100g soil	ESP	Total carbo-nate %	Total gyp-sum %	O.M %	Texture class.
Sand sheet	1	0 – 20	16.7	7.3	1.0	10.87	0.26	2.40	Tr.	0.21	Sand
		20 – 40	18.7	7.6	0.9	12.61	1.36	5.89	Tr.	0.21	Sand
		40 – 70	18.0	7.5	2.6	12.09	1.61	8.62	Tr.	0.2	Sand
		70– 120	25.0	7.8	1.5	10.52	1.35	1.717	Tr.	0.2	Sand
	2	0 – 30	46.7	7.5	70.0	55.66	14.82	42.10	5.2	0.08	Slity clay
		30 – 50	20.3	7.3	6.6	10.48	3.18	3.23	Tr.	0.07	Sand
		50- 110	21.0	7.7	2.4	10.86	0.61	2.24	Tr.	0.04	Sand
		110–140	19.7	7.7	3.7	6.35	3.73	10.75	Tr.	0.04	Sand
		140 – 175	21.7	7.7	1.7	5.65	0.99	1.68	Tr.	0.03	Sand
Sand sheet	3	0 – 15	20.3	7.5	3.7	10.43	0.63	1.84	Tr.	0.05	Sand
		15 – 40	20.0	7.6	3.0	8..91	0.63	1.65	Tr.	0.11	Sand
		40 – 70	21.2	7.8	3.0	4.78	0.11	2.15	Tr.	0.11	Sand
		70 – 95	21.8	7.9	2.0	5.65	0.92	1.78	Tr.	0.12	Sand
		95 – 130	21.5	8.2	1.7	5.65	1.10	1.57	Tr.	0.12	Sand
		130 +	42.0	7.9	6.9	64.38	14.65	44.52	6.4	0.12	Slity loam
	4	0 – 20	17.7	8.2	0.5	10.43	5.36	1.89	1.8	0.14	Sand
		20 – 40	18.7	8.2	0.6	10.43	1.70	2.71	Tr.	0.12	Sand
		40 – 70	18.7	7.8	1.6	5.65	0.10	5.40	Tr.	0.29	Sand
		70 – 100	20.0	7.8	1.5	9.13	0.64	8.87	Tr.	0.29	Sand

Table (3) Cont.

Land form	Prof. NO.	Depth, Cm	SP.	pH in ex. soil past	EC, dSm^{-1}	CEC me/100g soil	ESP	Total carbonate %	Total gypsum %	O.M %	Texture class.
Sabkha	5	0 – 20		8.1	186.0	13.91	11.89	4.23	6.9		Sand
		20 – 40	21.7	8.4	20.0	55.65	8.41	5.55	7.2	0.14	S.L.
		40 – 55	22.3	8.1	20.0	34.78	4.03	7.59	7.2	0.16	S.L.to L.S
		55 – 90	26.7	8.0	30.9	45.21	4.08	9.51	10.4	0.17	Sand
		90 – 140	24.0	7.9	25.3	16.52	3.08	22.62	9.8	0.17	Sand
	6	0 – 2		7.1	920.0			2.55	5.4	0.51	-
		2 – 7	28.3	7.0	490.0	64.34	8.10	26.96	5.4	2.22	Si. C.L.
		7 – 15	35.0	7.7	192.0	26.08	8.33	33.43	5.0	0.41	Si. C.L.
		15 – 35	40.0	7.8	92.0	33.04	7.90	43.99	5.0	0.95	Si. C.L.
		35 – 80	53.3	8.0	61.0	35.31	6.82	49.69	3.2	0.7	C.L.
		80 – 110	48.3	8.0	32.0	38.26	5.03	42.51	2.1	0.96	C.L.
		110 – 140	35.0	8.0	42.0	55.65	2.62	21.12	1.7	0.69	C.L.
Plain	7	0 – 10	22.0	7.9	1.9	10.91	1.31	3.02	Tr.	0.12	Sand
		10 – 25	20.0	8.1	1.3	8.87	0.83	5.28	Tr.	0.17	Sand
		25 – 40	22.0	7.9	1.5	8.87	1.10	4.68	Tr.	0.12	Sand
		40 – 65	44.0	7.9	23.4	33.04	10.00	43.66	Tr.	0.45	Si. C.L.
		65 – 80	24.0	7.8	24.0	33.04	17.89	13.21	Tr.	0.45	Si. C.L.
		80 – 110	27.0	7.8	24.3	5.65	14.19	27.28	Tr.	0.45	Si. C.L.
	8	0 – 5	16.7	8.0	2.6	26.08	9.10	23.11	Tr.	0.23	S.L.
		5 – 10	21.7	7.9	4.8	22.61	5.43	20.64	Tr.	0.32	S.L.
		10 – 20	27.3	7.8	5.8	22.61	4.46	20.38	3.2	0.15	S.L.
		20 – 30	24.7	7.3	4.2	26.09	0.87	23.77	3.0	0.20	S.L.
		30 – 45	25.7	7.6	7.4	13.91	4.49	26.30	5.7	0.27	S.L.
		45 – 100	27.0	7.6	7.6	45.22	1.49	24.10	5.1	0.17	S.L.
	10	0 – 10	19.7	7.1	74.0	31.30	10.87	21.88	Tr.	0.28	S.L.
		10 – 20	21.0	7.2	73.0	34.00	2.10	29.38	3.5	0.28	S.L
		20 – 50	27.3	7.2	1125	13.90	2.78	27.31	5.4	0.60	L.S
		50 – 100	24.3	7.3	95.0	13.04	2.70	23.03	11.3	0.5	L.S
		0 – 10	26.0	8.1	1.7	27.82	1.43	13.32	Tr.	0.32	S.L
		10 – 25	26.7	8.2	0.9	27.82	1.43	14.39	Tr.	0.32	S.L
		25 – 35	26.7	8.2	0.6	21.73	1.93	11.56	10.2	0.20	S.L
		35 – 50	28.0	8.2	0.6	22.73	1.80	13.65	Tr.	0.20	S.L
		50 – 100	21.0	8.2	0.9	22.60	8.38	12.15	Tr.	.02	S.L
	11	0 – 10	26.7	7.5	53.0	42.21	18.73	4.01	2.4	.058	C.L.
		10 – 20	47.3	7.6	62.0	45.21	4.16	47.62	4.3	0.69	C.L.
		20 – 55	44.0	7.7	53.0	26.08	13.67	64.35	4.3	0.27	Si. C.L.
		55 – 80	50.0	7.8	36.0	88.70	1.04	50.52	4.3	0.42	Si. C.L.
		80 – 115	42.0	7.7	35.0	43.05	10.38	51.15	2.0	0.42	Si. C.L.
		0 – 10	27.7	7.0	275.0	27.83	12.66	12.65	3.2	0.52	L.S.
		10 – 25	25.0	7.2	92.0	26.09	13.33	9.58	Tr.	0.44	L.S
		25 – 55	22.7	8.0	2.7	15.66	11.14	14.45	Tr.	0.29	L.S
		55 – 75	22.0	8.2	5.1	55.61	12.10	23.84	Tr.	0.19	L.S
		75 – 110	18.3	7.6	4.0	9.63	4.60	35.274	Tr.	0.26	Sand
		110 +	17.0	7.5	5.4	11.44	1.50	43.84	Tr.	0.26	Sand
		0 – 7	20.0	7.5	3.2	22.91	1.06	19.81	Tr.	0.31	L.S.
		7 – 30	22.3	7.5	3.0	27.83	1.03	11.56	8.4	0.19	L.S.
		30 – 65	16.0	7.8	17.6	9.57	4.67	9.49	8.0	0.21	Sand
		65 – 100	16.7	7.5	8.6	31.30	5.95	6.21	10. 5	0.21	Si. C.L.

S.L = Sandy loam
L.S = loamy sand
Si. C.L = Silty Clay Loam
S.C.L = Sandy clay loam
C.L = Clay loam
Si. L = Silty Loam

Table (4) particle size distribution of soils of Ser – El Gwareer Area (El-Gifgafa –El- Maqdaba depression) .

	Prof. No	Depth Cm	Sand %						Silt + clay %	Silt %	Clay %			Textured Class
			Very coarse	Coarse	Medium	Fine	Very fine	Total			Coarse	Fine	Total	
Land form	1	0 – 20	0.01	4.79	69.20	20.70	4.30	99.00	1.00					Sand
		20 – 40	0.51	4.29	52.10	37.10	5.00	99.00	1.00					Sand
		40 – 70	0.20	7.60	79.20	7.00	3.10	97.10	2.9					Sand
		70 – 120	0.01	3.89	39.30	45.80	10.0	99.00	1.00					Silty loam
	2	0 – 30		1.5		(5.7)		(7.2)	92.8	81.60	1.9	9.3	11.2	Sand
		30 – 50	0.11	3.79	56.20	34.70	4.00	98.80	1.20					Sand
		50 – 110	0.01	4.09	53.80	34.70	6.20	98.80	1.20					Sand
		110 – 140	0.20	12.60	47.30	34.70	3.10	97.90	2.10					Sand
		140 – 175	0.01	0.99	62.90	32.00	3.70	99.60	0.40					Sand
	3	0 – 15	0.01	1.99	52.10	38.90	5.10	98.10	1.90					Sand
		15 – 40	0.01	3.99	63.10	28.30	3.90	99.30	0.70					Sand
		40 – 70	0.01	2.09	50.00	40.20	6.10	98.40	1.60					Sand
		70 – 95	Nil.	0.10	47.10	51.20	0.60	99.00	1.00					Sand
		95 – 130	Nil.	1.00	51.00	45.30	2.50	99.80	0.20					Sand
		130 +		0.8		2.8		3.60	96.4	43.6	44.7	8.1	52.8	Silty clay
	4	0 – 20	0.17	2.72	55.73	34.00	5.83	98.45	1.55					Sand
		20 – 40	1.04	2.75	40.48	43.94	10.87	99.08	0.92					Sand
		40 – 70	1.06	2.57	44.45	43.06	7.86	99.00	1.00					Sand
		70 – 100	2.00	7.20	34.59	32.06	21.47	97.32	2.68					Sand
		0 – 20	0.17	2.72	55.73	34.00	5.83	98.45	1.55					Sand
	5	0 – 20	Nil.	0.16	25.71	58.11	14.02	98.00	2.00					Sand
		20 – 40	Nil	1.00	23.06	67.76	7.22	99.04	0.96					
		40 – 55		5.3		74.7		80.0		8.5	5.4	6.1	11.5	Sand
		55 – 90	9.32	20.36	39.9	21.73	6.59	97.90	2.10					Sand
		90 – 140	12.12	19.09	43.13	17.47	6.67	97.48	1.52					
Sabkha	6	0 – 2						Salt Crust						
		2 – 7	8.3			8.4		16.7		40.8	9.4	33.1	24.5	Silty clay
		7 – 15	5.5			7.7		13.2		38.3	11.9	36.6	48.5	Silty clay
		15 – 35	5.4			5.6		11.0		41.9	11.6	35.5	47.1	Silty clay
		35 – 80	0.1			5.1		5.2		49.1	11.9	33.8	45.7	Silty clay
		80 - 110	1.2			7.5		8.7		49.5	13.9	27.9	41.8	Silty clay

Table (4)

Land form	Prof. No	Depth Cm	Sand %						Silt + clay %	Silt %	Clay %			Textured Class
			Very coarse	Coarse	Medium	Fine	Very fine	Total			Coarse	Fine	Total	
Plain	7	0 – 10	Nil.	0.19	36.40	53.32	8.67	98.58	1.42					Sand
		10 – 25	0.40	1.60	30.76	52.75	11.68	97.19	2.81					Sand
		25 – 40	0.39	1.70	41.43	48.04	7.78	99.34	0.66					Sand
		40 – 65		1.8		70.9		72.7	27.30	0.9	13.8	12.6	26.4	Si.C.L
		65 – 80		16.6		41.6		58.2	41.80	21.6	0.4	19.8	20.2	S.C.L to S.L
		80 – 110		26.2		37.3		63.5	36.50	14.6	9.7	12.2	21.9	Si.C.L
	8	0 – 20	0.01	4.79	69.20	20.70	4.30		1.00					Sand
		0 – 5		9.5		60.7		70.2		11.2	3.3	15.3	18.6	Sandy loam
		5 – 10		13.6		62.5		76.1		9.1	2.1	12.7	14.8	Sandy loam
		10 – 20		17.6		60.8		78.4		7.7	3.3	10.6	13.9	Sandy loam
		20 – 30		18.2		61.9		80.1		5.6	1.2	13.1	14.3	Sandy loam
		30 – 45		16.6		63.8		80.4		9.5	0.3	9.8	10.1	Sandy loam
		45 – 100		16.2		65.4		81.6		9.7	0.3	8.4	8.7	S.L to L.S
	9	0 – 10		9.7		53.7		63.4		22.9	2.1	11.6	13.7	Sandy loam
		10 – 20		15.9		47.9		63.8		25.1	4.5	6.6	11.1	Sandy loam
		20 – 50		13.9		57.3		71.2		18.4	4.3	6.1	10.4	Loamy sand
		50 – 100		16.1		59.8		75.9		15.5	5.4	3.2	8.6	Loamy sand
	10	0 – 10		20.2		58.1		78.3		4.9	2.7	14.1	16.8	Sandy loam
		10 – 25		10.5		60.3		70.8		15.1	12.9	1.2	14.1	Sandy loam
		25 – 35		16.1		60.1		76.2		10.4	2.9	10.5	13.4	Sandy loam
		35 – 50		22.5		52.0		74.5		9.2	1.6	14.7	16.3	Sandy loam
		50 – 100		20.1		59.1		79.2		9.6	1.7	9.5	11.2	Sandy loam
	11	0 – 10		0.7		2.1		2.8		44.1	24.2	28.9	53.1	Silty clay
		10 – 20		0.5		1.9		2.4		44.0	24.3	29.3	53.6	Silty clay
		20 – 55		0.1		1.1		1.2		45.5	24.1	29.2	53.3	Silty clay
		55 – 80		0.4		1.5		1.9		44.5	24.5	29.1	53.6	Silty clay
		80 – 115		0.1		1.0		1.1		45.3	23.1	30.5	53.6	Silty clay
	12	0 – 10		3.1		60.5		73.6	26.4	7.6	3.9	14.9	18.8	Loamy sand
		10 – 25		16.1		60.4		76.5	23.5	8.9	2.1	12.5	14.6	Loamy sand
		25 – 55		19.8		63.1		82.9	17.10	8.3	1.1	7.7	8.8	Loamy sand
		55 – 75		28.2		51.9		80.1	19.90	9.4	2.6	7.9	10.5	S.L.to L.S.
		75 – 110	18.32	22.68	47.32	9.45	1.36	99.13	0.87					Sand
		110 +	15.49	20.33	46.38	13.13	3.47	98.80	1.20					Sand
	13	0 – 7		13.9		61.1		75.0	25.00	11.1	4.1	9.8	13.9	Loamy sand
		7 – 30		13.4		61.5		74.9	25.10	9.6	1.8	13.7	15.5	Loamy sand
		30 – 65	11.26	22.10	29.51	16.58	16.44	95.89	4.11					Sand
		65 – 100		0.1		5.5		5.6	94.40	60.3	27.4	6.7	34.1	Silty clay loam

Table (5) particle size distribution of soils of wadi El – Arish; at El Ser – El Gwareer Area .

Land form	Prof. No	Depth, Cm	Very coarse sand %	Coarse sand %	Medium sand %	Fine sand %	Very fine sand %	Total %	Silt +clay %	Silt %	Clay %			Texture Class
											Coarse	Fine	Total	
Wadi Bottom	14	0 – 20	0.13	0.67	41.79	50.70	5.75	99.04	0.96					Sand
		20 – 45	0.10	0.13	36.42	59.36	3.65	99.84	0.16					Sand
		45 – 60		3.7		78.9		82.6	17.4	5.3	6.6	5.5	12.1	Sandy loam
		60 – 85		18.2		49.4		67.6	32.4	18.0	6.1	8.3	14.4	Loamy sand
	15	0 – 7	0.48	9.66	64.36	23.30	1.43	99.23	0.77					Sand
		7 – 30	1.56	14.89	63.00	18.55	1.70	99.7	0.30					Sand
		30 – 45	3.32	26.18	55.69	13.64	1.07	99.90	0.10					Sand
		45 – 80	0.01	1.99	69.80	24.40	3.10	99.3	0.70					Sand
		80 – 130	0.25	2.14	40.88	52.58	3.91	99.76	0.24					Sand
	16	0 – 15	0.43	0.57	16.51	73.56	7.93	99.90	1.00					Sand
		15 – 45		1.2		11.2		12.4	54.4		25.9	7.3	33.2	Si. C. L
		45 – 60		6.9		68.3		75.2	9.7		10.2	4.9	15.1	S. L
		60 – 80		0.7		16.6		17.3	47.1		27.3	8.3	35.6	Si. C. L
		80 – 100		0.3		6.4		6.7	58.9		22.6	11.8	34.4	Si. C. L
		100 – 130		0.8		14.1		14.9	51.8		22.4	10.9	33.3	Si. C. L
Wadi Terraces	17	0 – 15	0.43	0.57	16.51	73.56	7.93	99.90	1.00					Sand
		15 – 40		(1.7)		48.2		49.90		28.4	14.9	6.8	21..7	S. C. L.
		40 – 90	0.17	2.71	83.98	11.54	1.16	99.56	0.44					Sand
		90 – 130	0.38	1.87	82.81	13.46	1.19	99.71	0.29					Sand
	18	0 – 20		0.1		19.6		13.6		54.8	15.6	9.9	25.5	Si.L
		20 – 35		0.2		13.4		5.3		54.9	24.2	7.3	31.5	Si. C. L
		35 – 70		0.1		5.2		9.6		63.7	21.5	9.5	31.0	Si. C. L
		70 – 90		0.1		9.5		11.5		58.2	20.7	11.5	32.2	Si. C. L
		90 – 120		0.1		11.4		14.5		60.5	20.0	8.0	28.0	Si. C. L

Table (6): Properties of the soils of Wadi El – Arish; at El Ser – El Gwareer Area

Land form	Prof. NO.	Depth, Cm	SP.	pH in ex. soil past	EC dSm^{-1}	CEC me/100g soil	ESP	Total carbonate %	Total gypsum %	O.M %	Texture
Main channel	14	0 – 20	21.0	8.1	0.6	5.65	0.57	4.96	Tr.	0.12	Sand
		20 – 45	20.0	8.1	0.4	3.91	0.30	7.44	Tr.	0.10	Sand
		45 – 60	22.0	8.0	0.6	7.39	0.64	15.60	Tr.	0.12	Sand
		60 – 85	19.3	8.0	0.8	3.04	1.54	29.71	Tr.	0.12	Sand
		85 - 120	22.7	7.7	3.6	6.52	1.28	26.30	Tr.	0.12	Sand
	15	0 – 7	20.0	8.1	0.6	7.74	0..27	8.76	Tr.	0.30	Sand
		7 – 30	17.0	8.6	0.4	5.65	0..32	16.03	Tr.	.014	Sand
		30 – 45	16.7	8.2	0.8	8.70	1.02	25.07	Tr.	0.09	Sand
		45 – 80	18.0	8.1	0.9	6.91	0.80	6.62	Tr.	0.09	Sand
		80 – 130	19.7	8.0	0.9	6.96	16.37	8.25	Tr.	1.03	Sand
Terrace	16	0 – 45	36.7	7.3	76.1	38.26	1.48	20.93	2.4	0.42	SiCL
		45 – 60	28.7	7.2	69.0	16.52	4.41	25.47	Tr.	0.29	SL
		60 – 80	36.0	7.4	51.7	41.74	11.03	53.21	1.7	0.44	SiCL
		80– 100	39.0	7.5	48.7	40.52	12.58	55.90	1.7	0..37	SiCL
	17	0 – 15	21.8	7.9	1.1	10.45	1.84	9.14	Tr.	0.43	Sand
		15 – 40	30.7	8.1	1.0	31.30	4.40	34.67	Tr.	0.30	SCL
		40 – 90	20.0	8.1	1.0	6.09	1.25	10.46	Tr.	0.06	Sand
		90– 130	21.0	8.2	1.1	9.87	1.60	11.49	Tr.	0.06	Sand
Terrace	18	0 – 20	41.5	7.5	36.6	45.13	6.77	57.97	Tr.	0.16	SL
		20 – 35	37.3	7.3	44.5	47.83	3.83	53.01	Tr.	0.36	SiCL
		35 – 70	41.0	7.3	45.9	52.92	2.75	56.32	Tr.	0.34	SiCL
		70 – 90	39.0	7.4	40.0	35.91	2.20	57.15	0.8	0.04	SiCL
		90– 120	39.7	7.4	29.0	36.96	4.35	57.97	Tr.	0.06	SiCL
		120- 70	43.3	7.5	28.3	43.48	5.23	53.83	Tr.	0.07	SiCL

Soils of the Wadi

With respect to soils of wadi terraces, they are represented by profiles 16,17 and 18. Landsurface is nearly level (profiles 16,17) or undulating (profile 18). Natural vegetation may be absent (profile 18) or occurs in high density (profile 17). Soils represented by profiles 16 and 18 are, generally, deep; moderately fine textured; extremely saline as EC ranged from 28.3 to 76.1 dSm^{-1}; extremely calcareous where total carbonate content varies from 20.93 to 57.97% and have low organic matter content (0.04 – 0.42%). The soils represented by profile 17, on the other hand are sandy except the subsurface layer which sandy clay loam and non saline as EC is between 1.0 to 1.1 dSm^{-1}. Carbonates range between 9.13 and 43.67% accumulating in the subsurface layer . Cation exchange capacity ranges between 16.52 (profile 16) to 52.91 (profile 18) me./100g.soils for the moderately fine textured soils.

It is indicated that, theses soils belong to two orders Aridisols and Entisols. The Aridisols include and subgroups *Calcic Haplosalids* (profiles 16

and 18). At the family level it could be distinguished into *Calcic Haplosalids :Fine loamy; Carbonatic, Thermic;* (profiles 16), *Calcic Haplosalids :Fine silty ; Carbonatic, Thermic* (profiles 18). The Entisols involve *Typic Torrifluvents* (profiles 14,15 and 17). In terms of family modifiers, they could be distinguished into *Typic Torrifluvents :Siliceous(Calcareous), Thermic;* (profiles 14 and 15), *Typic Torrifluvents :Coarse loamy (Calcareous), Thermic;* (profiles 17).

Table (7) Soil Taxonomy of the studied area

Pro. No	Soil Subgroup	Soil Family
1 2 3 4	*Typic Torripsamments*	*Siliceous (Calcareous), Thermic*
5 13	*Typic Haplogypsids*	*Sandy, Siliceou (Calcareous); Thermic.* *Coarse loamy ,Carbonatic, Thermic*
6	*Calcic Aquisalids*	*Fine Clay, Carbonatic, Thermic*
8 11	*Typic Haplocalcids*	*Sandy loam ,Mixed, Thermic* *Sandy clay loam ,Mixed, Thermic*
9 10	*Calcic Haplosalids*	*Coarse loamy ,Mixed, Thermic*
12 16 18		*Sandy ,Mixed, Thermic* *Fine loamy; Carbonatic, Thermic* *Fine silty ; Carbonatic, Thermic*
14 15 17	*Typic Torrifluvents*	*Siliceous(Calcareous), Thermic* *Coarse loamy (Calcareous), Thermic*

Land Evaluation

Evaluating the soils of El Ser – El Gwareer is discussed according to three different systems ; *i.e.,* Nelson (1963); Sys *et al,* (1991) Abd El Mutaleb and Hussein (1985) after being computerized by the authors (2004).

Land evaluation, in terms of modified Storie Index, Nelson (1963)

Results in table 8 show that, soils under consideration belong to two classes; namely, marginally suitable (C) and currently not suitable (D). The former, land marginally suitable for agriculture, have productivity index (D_I) ranging between 60.0 and 66.6%. These lands are represented by profiles 1,2,3 and 4, at El Hamtha – El Ehna area(*Typic Torripsamments)*,profile 8, at Ras Hamada and (*Typic Haplocalcids,)* profile 10, at El Ser (*Calcic Haplosalids*). This class has two moderately severe limitations; *i.e.,* texture and salinity.

On the other hand, lands that are currently not suitable have (D_I) values within a relatively wide range (31.1 – 52.4%) represented by profiles 5,6 and 7 at El Maqdaba,(which classified as *Typic Haplogypsids* and *Calcic Aquisalids* and *Typic Torripsamments;* respectively) profiles 11(*Typic Haplocalcids)* ,12 (*Calcic Haplosalids)* and 13(*Typic Haplogypsids*)at El Ser and profile 9(*Calcic Haplosalids)* at Ras Hamada in addition to wadi soils ; profiles 14 ,15 and 17(*Typic Torrifluvents)*, and 16 and 18(*Calcic Haplosalids)* at wadi El-Arish. these lands display uncorrectable moderately severe

limitations ; *i.e,* soil texture and moderately severe to severe correctable limitations; *i.e.* , soil salinity.

Table (8): land productivity classes according to the modified Storie Index(Nelson1963)

Land form	Soil Subgroup	Prof. No.	Depth (a)	Text. (b)	Slope (c)	pH (X_1)	Salinity (X_2)	Erosion (X_3)	Productivity Index, (D_I)	Land class
Sand Sheet	*Typic Torripasmments*	1	100	70	100	100	95	95	63.2	C
		2	100	80	100	100	79	95	60.0	C
		3	100	80	100	89	89	95	60.1	C
		4	100	80	100	89	96	95	64.9	C
		7	100	80	90	89	75	95	45.7	D
	Typic Haplocalcids	8	100	90	100	85	83	95	60.3	C
		11	91	85	100	89	55	95	35.9	D
		9	91	90	100	97	65	95	49.1	D
		10	100	85	100	85	97	95	66.6	C
		12	100	90	100	100	55	95	47.0	D
	Calcic Aquisalids	13	100	90	100	100	55	95	47.0	D
		5	100	70	100	85	55	95	31.1	D
		6	100	80	100	99	55	95	41.4	D
Wadi Bottom	Typic Torrifluvents	5	100	70	100	85	55	95	31.1	D
		14	100	70	100	89	96	85	50.8	D
		15	100	70	100	89	99	85	52.4	D
Wadi Terraces		١٧	100	70	100	85	65	95	36.7	D
	Calcic Haplosalids	16	100	85	100	98	55	95	43.5	D
		18	100	90	100	99	55	95	46.6	D

However, the above-mentioned evaluation is unrealistic due to the unfair judgment due to the following . Limit of salinity 2.0 dS/m rated as 90% which is not as we think true especially in sandy soils. Evaluation consider average of all layers and we think this will decrease evaluation in case of having very saline surface layer, as we can take off this layer if its thin out of the profile before reclamation. Also the system consider texture of the surface layer only and this will affect the evaluation. Values considered for erosion are not quantified and the same erosion hazard could be evaluated differently by different person. Contents of total carbonates or total gypsum is not considered in this system, therefore, a soil containing; *i.e.,* 80% of total carbonate and has loamy textured class and very low salt content will be consider by this system as highly suitable, though it is infact permanently not suitable.

Evaluating land suitability for irrigated agriculture, according to Sys *et. al.*, (1991)

The studied soils are evaluated according to Sys *et al*(1991) sustem: In this system, lands evaluated as moderately suitable for irrigated farming (S_2) have suitability index (C_I) ranging from 52.1 to 60.3%. They are represented by profiles 1,3,4 at El Hamtha – El Ehna area(*Typic Torripsamments*)and 10, at El Ser (*Calcic Haplosalids*). They occupy most of the northern portion of the study area that have three forth of their characteristics attain slight limitation and they don't have any moderate or severe limitations .

Table (9) Land suitability for irrigated agriculture of the study area, according to Sys, *et al* 1991.

Land form	Soil Subgroup	Pro. No	a	b	c	d	e	f	g	h	i	j	C_I	Land Class
Sand Sheet	*Typic Torripasmments*	1	90	75	100	100	100	100	95	95	100	95	57.9	S_2
		2	90	75	100	100	45	96	87	95	100	95	23.0	N-S3
		3	90	75	100	100	97	100	98	95	100	95	52.1	S_2
		4	90	75	100	100	99	100	95	91	95	95	52.1	S_2
		7	90	81.8	100	100	52	91	75	90	95	95	21.2	N
Plain	*Typic Haplocacids*	8	90	100	100	100	88	98	70	94	100	95	48.5	S_3- S_2
		11	90	60	100	100	45	92	40	95	100	95	8.5	N
	Calcic Haplosalids	9	90	88	95	100	45	97	72	100	100	95	22.5	N-S3
		10	90	100	95	100	100	95	85	92	100	95	60.3	S_2
		12	90	90.7	100	100	45	91	73	91	100	95	20.9	N
	Typic Haplogypsids	13	90	86.8	95	100	75	97	90	100	100	95	44.8	S3
Sabkha	*Calcic Aquisalids*	5	90	81.4	100	100	45	95	90	99	95	95	25.2	S3
		6	90	74.1	100	45	45	94	60	96	95	695	6.6	N
Wadi Bottom	*Typic Torrifluvents*	14	90	75	100	95	100	100	79	90	100	95	43.3	S3
		15	90	75	100	100	100	97	87	90	50	95	9.6	N
Wadi Terraces		17	90	79.8	100	95	100	99	75	90	100	95	43.3	S3
	Calcic Haplosalids	16	90	100	100	95	45	96	58	94	100	95	19.1	N
		18	90	100	100	100	45	97	30	90	95	95	24.2	N-S3

The land marginally suitable (S_3) have (C_I) from 25.5 to 48.5%. represented by profiles 5 and 13 *(Typic Haplogypsids)*, 8, at Ras Hamada and (*Typic Haplocalcids)* and 14 and 17 (*Typic Torrifluvents)* at wadi El-Arish. This suitability class characterizes different localities and have moderately severe to severe constrains; *i.e.*, texture; carbonate contents and salinity. The lands that are not suitable have (C_I) values range from 6.6 to 24.4% and are represented by profiles 2 at El Hamtha – El Ehna area(*Typic Torripsamments:)*, 6 and 7 at El Maqdaba,(which classified as *Calcic Aquisalids* and *Typic Torripsamments;* respectively), 9,12 ,16 and 18 (*Calcic Haplosalids)* at Ras Hamada and wadi El-Arish, ; respectively, 11(*Typic Haplocalcids* sand 13(*Typic Haplogypsids*)at El Ser, 15(*Typic Torrifluvents)*. Lands having suitability indices near the border limits ; *i.e.*, 48.5 or 24.2 they may be up graded if their constrains could be easily corrected.

From the above-mentioned discussion, it could be noticed that, this system is specialized for the irrigated agriculture, while the other systems, Storie modified by Nelson (1963) was proposed for rain fed agriculture. Comparing the two mentioned systems, it can be found that, the Sys *et. al,* (1991) took care of some of points neglected by Nelson (1963) system such as total carbonate and gypsum contents and texture of the all profile. In addition it consider the weighted main average for any soil properties used in the system except for soil texture. Thus it may correct some of the drawbacks of Nelson (1963). However, the system published by Sys and Verhèy (1978) (not applied here) is more convenient from the view point of the users : as they considered the place of soil layers during weighted soil texture. However other soil propertied considered in both systems ; sys *et. al,* (1991) and Sys and verhèy (1978) are the same.

If limits considered for soil salinity re-evaluated to fit the Egyptian environment , this system would be more applicable for the soils of Egypt.

Land evaluation according to a proposed computerized Abd El Mutaleb and Hussein (1985) system

The present approach is a modification of a system that was proposed by Abd El Mutaleb and Hussein (1985), giving the eco-environmental conditions great consideration, in addition to the physical and chemical properties of soils. A computer program has been designed so that all mathematical equations can be easily and accurately calculated.

Data in table 10 clearly indicate that, the majority of lands of El Ser – El Gwareer area are considered either marginally (C)or not suitable (D)for agricultural activity. The soils evaluated as marginally suitable have Final Index for Land Evaluation (FILE) ranging from 55.1 to 67.6%. This land class involves the soils represented by profiles 1,2,3, at El Hamtha – El Ehna area(*Typic Torripsamments)*8 at Ras Hamada and (*Typic Haplocalcid)* profile 10 and 12 at El Ser (*Calcic Haplosalids*) in the northern and southern parts as well. They have deep soil profiles with severe erosion hazard and very severe texture limitation that actually detract the physical index (P_I) ,that has values from 53.3 to 80.8% ; and in tern lessen soil index to values ranging between 44.2 to 65.6%. These soils display good chemical properties (C_I = 71.5 to 86.9%). Eco-environmental conditions (E_I) have rating from 73.1 to 73.7%.

Unsuitable lands (classes D), are represented by profiles 5,6, (which classified as *Typic Haplogypsids* and *Calcic Aquisalids;* respectively),9(*Calcic Haplosalids)* at Ras Hamada, 16 and 18(*Calcic Haplosalids)*, 17(*Typic Torrifluvents)* at wadi El-Arish. They have constrains related to the chemical variables that lowered soil index (S_I).. Worthy to mention that, soils represented by profiles 4,7,14,15 and 17, have (FILE) values 53.2 and 54.2% within the upper limit of class indicating that practicing wise management may shift this group toward class (C). It is clear that, this approach has given rather similar results to these obtained by Nelson (1963) (table 11) as almost half of the studied profiles(about 11 soil profiles) and upgraded represented by profiles 5,12,13,14,15 and 17 from class D by Nelson (1963) to class C according computerized Abd El Mutaleb and Hussein (1985) system. Considering the eco-environmental aspects in computerized Abd El Mutaleb and Hussein (1985) system, it could one of the reasons that upgraded th land class.

The original system proposed by Abd El Mutaleb and Hussein (1985), are very complicated and subjected to human errors due to the difficult and numerous calculation, so it is fell necessary to computerized Abd El Mutaleb and Hussein (1985) system, so it become much easier and less liable to errors by the authors. However, more convenient than the system as it involves Eco-environmental very important to agriculture production.

Table (10): Land productivity classes, according computerized Abd El Mutaleb and Hussein (1985) system

Land form	Soil Subgroup	Profile No	Physical index	Chemical index	Soil index	Environmental index	Final Land index	Land class
Sand Sheet	*Typic Torripsamments*	1	53.3	86.9	46.4	73.1	56.7	C
		2	75.3	75.2	65.6	73.1	63.8	C
		3	58.2	77.2	45.0	73.7	55.6	C
		4	56.6	75.4	42.6	73.1	53.9	D
		7	55.9	75.8	42.3	73.1	53.6	D
	Typic Haplocalcids	8	80.7	78.0	62.9	73.7	67.6	C
		11	87.2	18.8	16.4	73.1	26.8	E
	Calcic Haplosalids	9	77.5	25.3	19.7	73.1	31.0	D
		10	79.8	71.5	57.1	73.1	64.1	C
		12	80.8	54.7	44.2	73.1	55.1	C
	Typic Haplogypsids	13	77.4	91.3	70.6	73.1	71.8	B
Sabkha	*Calcic Aquisalids*	5	58.7	64.9	38.1	73.7	50.1	D
		6	83.0	28.4	23.9	67.3	35.3	D
Wadi Bottom	*Typic Torrifluvents*	14	50.7	84.9	43.1	73.1	54.2	
		15	51.2	82.5	42.2	73.1	53.5	D
		17	53.1	78.7	41.8	73.1	53.2	D
Wadi Terraces	*Calcic Haplosalids*	16	89.8	33.9	30.5	73.1	43.0	D
		18	84.4	36.2	30.5	73.1	43.0	D

Table (11) Comparison between the different land evaluation systems

Land form	Prof. No.	Nelson 1963)		Sys *et al.* (1991)		Computerized Abd El-Moutalb, and Hussien 1985`	
		D_I	Class	C_I	Class	D_I	Class
Sand Sheet	1	63.2	C	57.9	S_2	56.7	C
	2	60.0	C	23.0	N	63.8	C
	3	60.1	C	52.1	S_2	55.6	C
	4	64.9	C	52.1	S_2	53.9	C
Sabkha	5	31.1	D	25.2	S_3	50.1	C
	6	41.4	D	6.6	N	35.3	D
Plain	7	45.7	C	21.2	N	53.6	C
	8	60.3	C	48.5	S_3	67.6	C
	9	49.1	D	22.5	N	31.0	D
	10	66.6	C	60.3	S_2	64.1	C
	11	35.9	D	8.5	N	26.8	E
	12	47.0	D	20.9	N	55.1	C
	13	47.0	D	44.8	S_3	71.8	B
Wadi Bottom	14	50.8	D	43.3	S_3	54.2	C
	15	52.4	D	9.6	N	53.5	C
Wadi terraces	16	43.5	D	19.1	N	43.0	D
	17	36.7	D	43.3	S_3	53.2	C
	18	46.6	D	24.2	N	43.0	D

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تقسيم و تقييم أراضى منطقة السر و الجوارير شمال شرق سيناء- مصر

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تمثل منطقة السر و الجوارير الجزء الشرقى من مشروع التنمية الزراعيـــة لشـــمال سيناء(NSADP) و هى على هيئة منطقة منخفضة تشتمل على عدة أشكال أرضية مثل sand sheet sometimes with low hummocks; level plain with desert pavement; dry sabkha and wadi

تم اختيار ١٨ موقعا درست فطاعتها الأرضية مورفولوجيا و جمعـــت عينـــات ممثلـــة لطبقاتها المختلفة حيث تم تقدير خواصها الطبيعية و الكيميائية بغرض تقسيمها من الوجهة الطبيعية و تقييم إمكانيتها الزراعية.

أوضحت الدراسة أن أراضى منطقة الدراسة تندرج الى رتبتين هما (Aridisols and Entisols)وفقا للنظام الأمريكي(1974) US Soil Taxonomy و تعديلات لسنة (١٩٩٨) و قد أمكن تمتز (١٢) عائلة خمسة منها تتبع تحت مجمـــوعتى (*Typic Torriorthents* and *Typic Torripsamments*) و السبع عائلات الأخرى تتبع تحت المجموعات التالية(*Typic Haplocalcids, Typic Haplogypsids, Typic Calcigypsids* and *Gypsic Aquisalids*) .

ووفقا لنظم تقييم صلاحية الأراضى للاستغلال الزراعى فقد اتفـــق نظـــام modified Storie Index by Nelson (1963) مع النظام المقترح خلال الدراسة حيث أشار الـــى أن أراضـــى منطقة الدراسة ما بين الأراضى الهامشية و تلك الغير صالحة تحت الظـــروف الحاليـــة للإنتـــاج الزراعى فقد تراوح دليل الأراضى الهامشية بين ٦٠ – ٦٦,٦% و للأراضى الغير صالحة ٣١,١ – ٥٢,٤ % وذلك وفقا نظام modified Storie Index by Nelson (1963) بينما دليل (FILE) للأراضى الهامشية ٥٥,١ – ٦٧,٦% و للأراضى الغير صالحة٣١,٠ – ٥٤,٢% وذلك وفقا للنظام المقترح خلال الدراسة.

بالنسبة لصلاحية هذه الأراضى لممارسة الزراعة المروية فقد أشار تطبيق نظام Sys, *et al* (1991) الى ثلاثة مستويات من الأراضى و هى الأراضى متوسطة الصلاحية و يتـــراوح دليل إنتاجيتها بين ٥٢,١ – ٦٠,٣ % و الأراضى الهامشية ذات دليل إنتاجية يتراوح بين٢٥,٢ – ٤٨,٥ % و الأراضى الغير صالحة و التى لها دليـــل إنتاجيـــة يتـــراوح بـــين٦,٦ – ٢١,٢ % . بالإضافة للأراضى التى تقع بين الأراضى الغير صالحة و الأراضى الهامشية و التى لهـــا دليـــل إنتاجية يتراوح بين ٢٢,٥ – ٢٤,٥