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LAND RESOURCES ASSESSMENT OF WADI EL FARIGH AREA,WESTERN DESERT, EGYPT

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ABSTRACT

In this research, wadi El-Farigh area western desert, selected as a case study site, which considers one of the high priority regions for future development agriculture in Egypt. Based on ENVI 5.0 and Arc GIs 10.1 using ETM+ land sat 7 to producing physiographic map for studied area. The mapping units were representative by eight a physiographic units of high decantation basin, low decantation basin, high Aeolian terrace, low Aeolian terrace, high over flow basin, low over flow basin, high sand sheet, low sand sheet. A total of 16 soil profiles representative the physiographic map units, were dug and descripted. The dominate texture is sandy, EC (ds/m) range between (0.46 – 6.8) , $CaCO_3$ % content ranged between (1.45–13.6), ESP% range between (5.14– 6) , CEC range between (3.68–5.44meq/100g) depth of soil profile) range between (45– 135 cm) organic matter (0.35–0.54 %) available nitrogen range between (11.32 – 40 ppm) available phosphorus range between (5.6 – 20.2 ppm) available potassium range between (10.9– 49.52 ppm). Based on the soil taxonomy USDA (2010) the soil of studied area classified as (Typic torripsamments, Lithic Torripsamments, Typic Torriorthents). According to (Require etal1970, FAO 1976, El- Toukhy1995), the land capability classified as the (III, IV, and V). The land suitability according to ASEL (Ismail *et al* 1994) for [wheat, potato, sunflower, peas, groundnut, green bean ,clover, onion, garlic, sweet melon ,melon, citrus, and apple] classified as (Rel. high suitable(S2) , Marginally suitable(S3) , Not suitable(N1)).
Keywords: Agricultural land suitability. Optimal land use. ASEL-GIS. El-Farigh area

INTRODUCTION

To meet the increasing of population the policy of horizontal expansion represented a great importance for the development challenges. Wadi El-Farigh region is considering one of the proposed areas for horizontal expansion policy. This research mainly aimed to determine the common land characteristics in the investigated area to evaluate for agricultural land capability, suitability and crop diversification to achieve the agriculture development using Require *et al*. 1970, FAO 1976, El-Toukhy,1995 and ASEL system (applied system of land evaluation) (Ismail *et al* 1994). This model is used for sustainable agricultural and assessing the main land use limitations that affect land productivity. Meanwhile, the research investigates a new reclaimed area in the Western Desert with the aim of producing the best agriculture land use for the area under investigation using two designed GIS-based models.

Agro ecological innovations are necessary to develop a new and truly reverse environmental deterioration and augment the supply of food (Uphoff 2002). According to the agro ecological potentialities, a particular agricultural use proper land management system are considered the most appropriate tools to achieve sustainability (FAO 1978).

The main target of land suitability assessment is to determine the ability of a piece of land to provide the optimal ecological requirements for a specific land use type. Indeed, assessing the capability of land is enabling optimum crop development and maximum agricultural productivity (Voncir *et al*. 2006; Ande 2011). In principle, the known physical suitability evaluation emphasizes more to the physical properties than economic conditions. It indicates the degree of suitability for a particular land use type (Rossiter and van Wambeke 1997). There are many models and computer packages for simulating the land evaluation applications for land use planning (FAO 1993).

Location:

Wadi El-Farigh is a narrow depression located in the west of the Nile Delta, approximately 44 km northwest of Cairo between longitudes, 30º 15´ and 30º 30´ E and latitudes, 30º 15´ and 30º 00 N.

Fig. (1): location of the studied area

The climatic conditions of Wadi El-Farigh area are those characterizing the desert areas of Egypt. It is characterized by a hot rainless summer. The meteorological data of Wadi El-Farigh area is shown in figure (2). The maximum temperature (34.5 °C) was recorded in July and August, while the minimum one (7.5 °C) was recorded in January with an average of 13.4 °C and 27.9 °C for the mean minimum and maximum annual temperature, respectively .The precipitation is rare and recorded only during

November, December, January, February, March and April. The highest value 4.9 mm was recorded in January and the lowest one 0.8 mm was recorded in April. Daily evaporation is high .The lowest value of evaporation (1.8 mm/day) was recorded during January, while the highest value (7.9 mm /day) was recorded in June. The lowest value of relative humidity (56%) was recorded in April, and May, while the highest one (66%) was recorded in December. The mean monthly wind velocity ranges from 6.8 to 9.0 km/hr. Wind velocity increases in winter and spring to reach its maximum in March. The annual mean of wind velocity was 7.7 km / hr. (After Meteorological Authority, 2006).

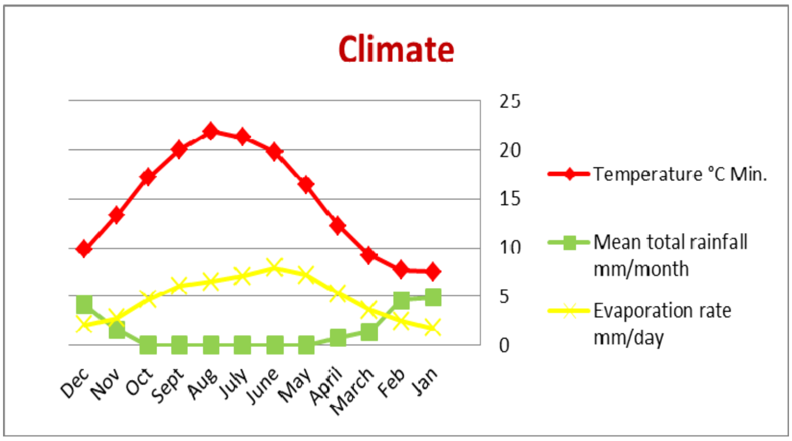


Fig. (2): Climatological of the studied area (After Meteorological Authority, 2006).

Shata and El Fayoumy (1970, said (2000) classified the geological features of Wadi El-Farigh as the following: 1.The sediments belong to the Pliocene are distributed on a large scale beneath Wadi El-Farigh area. In the vicinity of Wadi El Farigh, the Pliocene section is thick and distinct into two main portions mostly showing slight variations among themselves, such as a lower portion composed of green sandy clays and the upper one built up by calcareous grits. Brown "Oolite" calcareous silt and sand clayey lime soil with iron oxides are associated with the Pliocene formation in Wadi El- Farigh Depression. 2. The Pleistocene and Holocene deposits are covered a large area of Wadi El- Farigh and to the west of the Nile Delta. These sediments have widely distribution in the studied area and are essentially developed into gravel and sand faces.

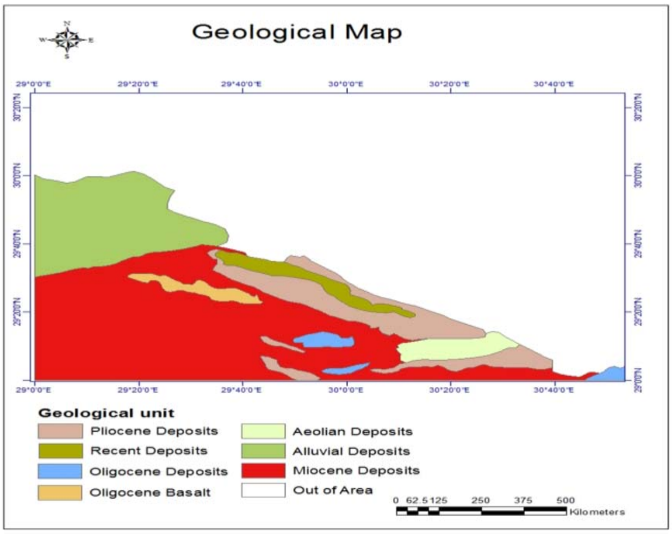


Fig. (3): geology of studied area after (Shata and El Fayoumy (1970), said (2000)

The structural plain occupies the wide area to the south and west of the alluvial plain. It consists of a number of alternating ridges and depressions reflecting the impact of both the lithology and the geological structure. Old gravel surface stretches for a long distance on the gentle slopes of this structural plain as well as the northern escarpment bounding Wadi El-Farigh. This old gravel represents the weathering products of the eastern high lands. The old gravels were derived from the pre-existing Oligocene gravel by the action of streams and water sheets. They were accumulated as a result of the tectonic movement, with uplifting, which took place at the end of the Miocene time. The surface of the structural plain comprises different structurally controlled ridges and depressions; structural ridges and structural depressions. (Abu-Al-Izz 1971)

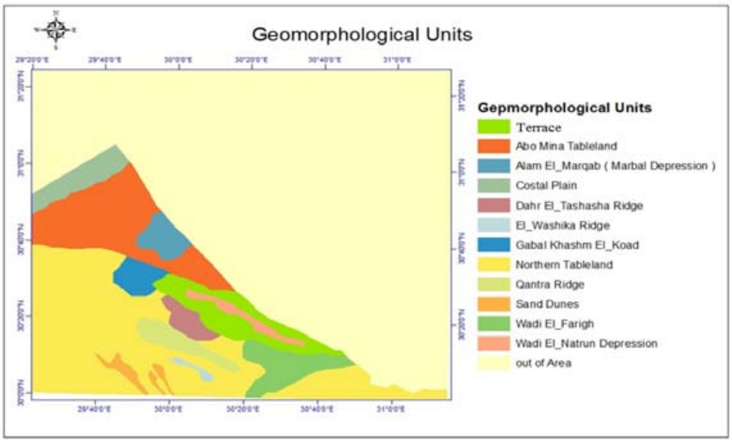


Fig. (4): geomorphological of the studied area. (Abu-Al-izz 1971)

This area has always been confined as a possible area for reclamation and utilization due to its location and the presence of ground water in a suitable quality for irrigation. The origin of the underground water in Wadi El-Farigh is seepage from the Nile stream, due to its proximity and low level (El- Maghraby, 1990). Wadi El Farigh area considered as an extremely arid region where the mean annual rainfall (41.4 mm/y), evaporation (114.3 mm/y) and temperature (21ºC) (Egyptian Metrological Authority, 1996).

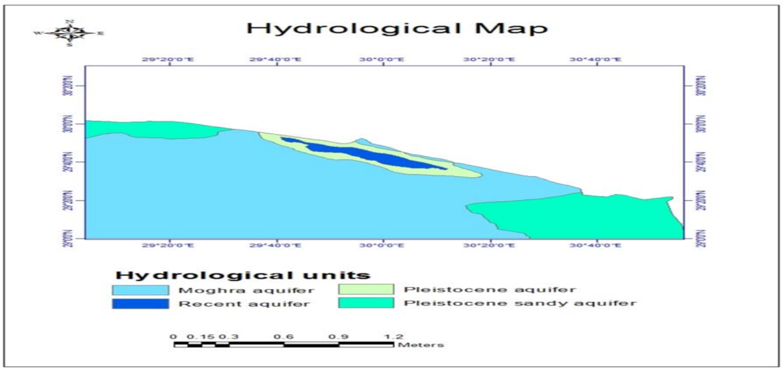
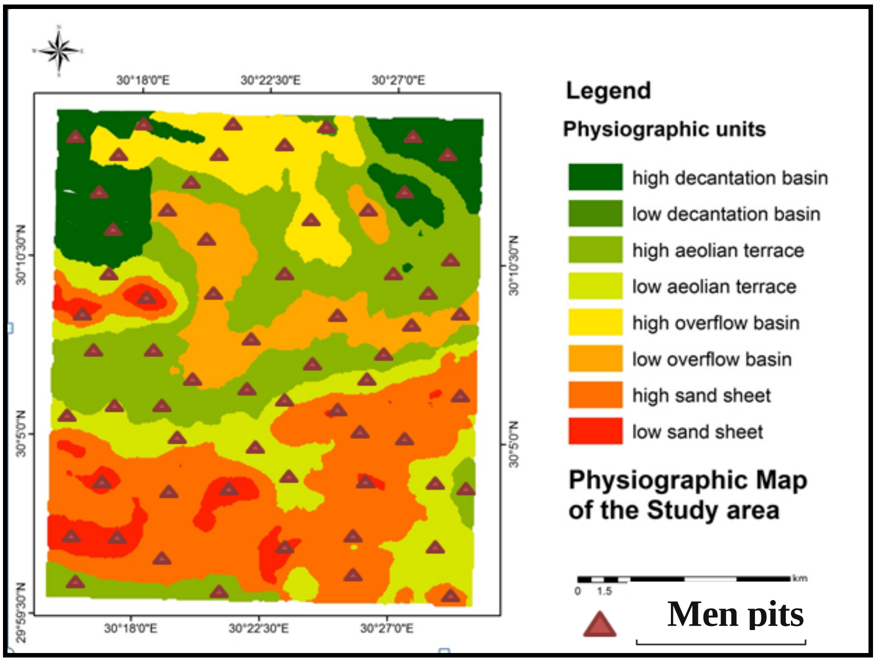


Fig. (5): hydrology of the studied area.

MATERIALS AND METHODS

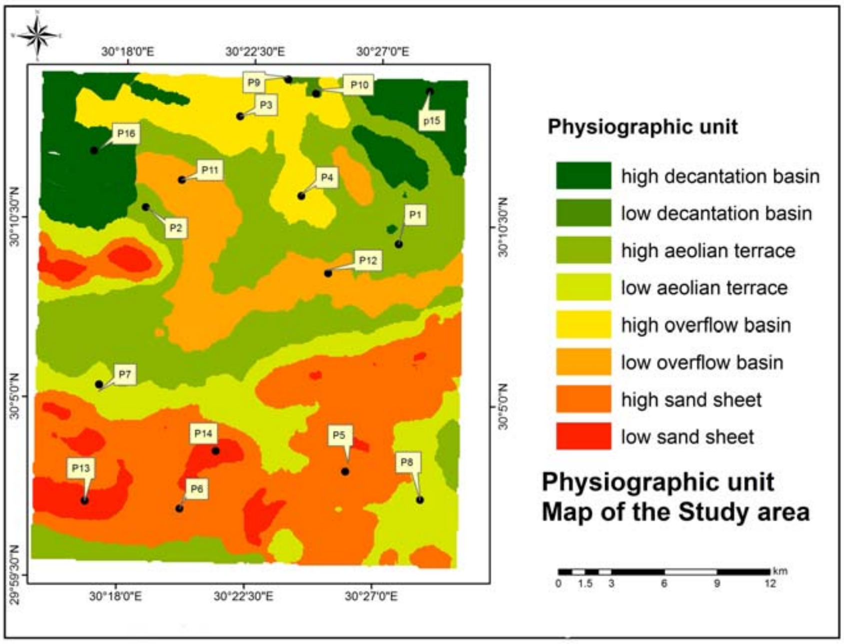
Physiographic map

Physiographic map produced for the studied area was carried out using digital image processing of Landsat7 ETM+ image, dated to 2005. This image was executed using ENVI 5.0 software (ITT 2012). Digital elevation model (DEM) of the studied area is used for driven soil mapping. Satellite image was stretched using linear 2 %, smoothly filtered and their histograms were matched according to Lillesand and Kiefer (2007). The image was atmospherically corrected using; FLAASH module (ITT 2012). The different landforms were initially determined and delineated from the satellite image and the digital elevation model extracted from the contour map, following the methodology developed by Dobos *et al*. (2002). Sixty menpits choosing to corrected the bounders and units of physiographic map. (Map 1)



Map (1): Physiographic map of the men pits.

Sixteen soil profiles choosing to representative the mapping units Map (2)



Map (2): physiographic map of soil profiles locations.

The morphological descriptions of soil profiles were carried out using FAO (2010).

Physical analysis as particle size distribution, was determined according to (Trask,1950).Chemical analyses are electrical conductivity (EC ds/m), calcium carbonate ($CaCO_3$%), organic matter (O.M%), pH, exchangeable sodium(ESP%), macro nutrients (N,P,K ppm), and cation exchange capacity(CEC meq/100g) were determined according to(Black 1982&1986) USDA (2004). Keys to Soil Taxonomy (USDA 2010) were used to classify the different soil profiles according to the morphological description of the investigated profiles and the data extracted. ArcGIS 10.1 utility and its spatial analyst extension (ESRI 2012) were used for mapping soil variables and land suitability mapping.

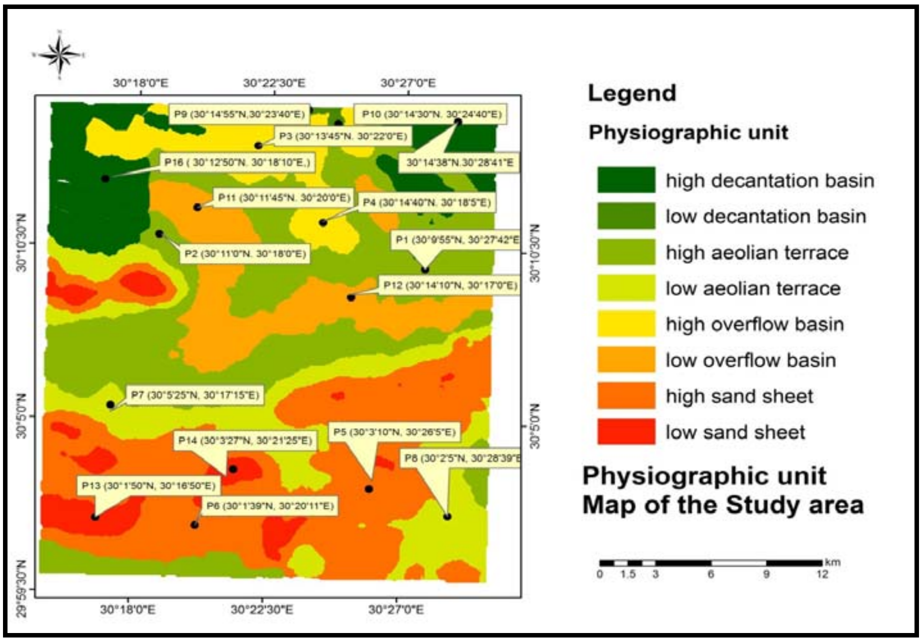
Land capability determined according to (Require etal1970, FAO 1976, El-Toukhy 1995). Land suitability assessment by ASEL program according to (Ismail etal, 1994).

In this research, ASEL-GIS model was used for land assessment and comparison purposes. It stands for the Agriculture Land Evaluation System for arid and semi-arid regions and has been developed by Ismail *et al* (2005). The land suitability indices, classes, and limitations for 13 crops were calculated by matching the standard crop requirements (internal coded data within the model) and various soil parameter levels (FAO 1979; Ismail *et al*.

1994, 2001). Nevertheless, ASEL was linked directly to its relational database and coupled indirectly with a GIS through the loosely coupled strategy. Using land suitability analysis based on GIS utility, site information can be gained. It is considered as strong and efficient application within land use planning, habitat analysis, etc. (El-Nahry and Khashaba 2006).

RESULT AND DISCUSSION

The dominant landforms were delineated based on the acquired DEM, Enhanced ETM+ satellite image and The main physiographic map units of the studied area at scale (1: 50,000) and map legend are representative in Map (2) Table (1).



Map (3): Physiographic map of the investigated area.

Table (1) Physiographic soil map legend of the investigated area

Landscape	Relief	Lithlology/ Origin	Land form	Mapping unit	Area %	Area Km	Profile No.	Soil classification
Decantation basin (DB)	Flat/ Almost flat	Colluvial deposits	High decantation basin	DB1	2	13.02	15-16	**Typic Torripsamment**
			Low decantation basin	DB2	1	4.66	9-10	**Typic Torripsamment**
Aeolian terrace (AT)	undulating	Aeolian deposits	High aeolian terrace	AT1	31	199	1-2	**Typic Torriorthents**
			Low aeolian terrace	AT2	14	90.68	7-8	**Lithic Torripsamment**
Overflow basin (OB)	Almost flat	Alluvial deposits	High overflow basin	OB1	10	62.82	3-4	**Lithic Torripsamments**
			Low overflow basin	OB2	12	76.94	11-12	**Typic torripsamments**
Sand sheet (SS)	Undulating/ Almost flat	Sands stone	High sand sheet	SS1	27	173.26	5-6	**Typic Torriorthents**
			Low sand sheet	SS2	5	30.63	13-14	**Typic torripsamments**

From the physiographic mapping units and table of legend clear that the units which representative of the variation in the studied area as the following:-

1-Soil of decantation basin(DB):-These soils occurred on flat/Almost flat areas occupying an area of (17.68km)representing 3% of the total area ,Mapping units of High decantation basin (DB1), and low decantation basin (DB2)

2-Soil of Aeolian terrace (AT): -These soils occurred on undulating areas occupying an area of (289.68km) representing 45% of the total area, Mapping units of High Aeolian terrace (AT1); and Low Aeolian terrace (AT2).

3-Soil of Overflow basin (OB):-These soils occurred on undulating areas occupying an area of (139.76 km) representing 22% of the total area .Mapping units of High Overflow basin (OB1); and Low Overflow basin (OB2).

4-Soil of sand sheet (SS):-These soils occurred on undulating areas occupying an area of (203.89km) representing 32% of the total area. Mapping units of High sand sheet (SS1); and Low sand sheet (SS2).

The morphological descriptions of soil profiles were carried out using FAO (2006) as in table (2).

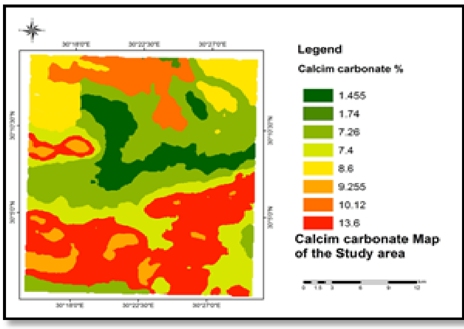
Table (2) morphological description of the investigated soil profiles

From table clear that the dominate texture of soils is sandy except same layers were gravely sand and loamy sand. The dominate Structure is single grains in the deferent layers. Consistency as stickiness and plasticity ranged between none and moderately. There is no cementation in the surface and sub-surface layers except the deep layers have very hard to extremely hard limestone's in some profiles

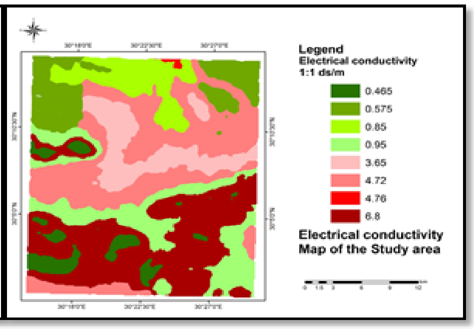
Chemical analysis as pH, $CaCO_3$%,EC ds/m, O.M%, av. N ppm, av. P ppm, av. K ppm, CEC meq/100g, ESP %. Are show in table (3) and Maps (4, 5, 6, 7, 8, 9, 10,11and12?)

Table (3): chemical analysis of the investigated area.

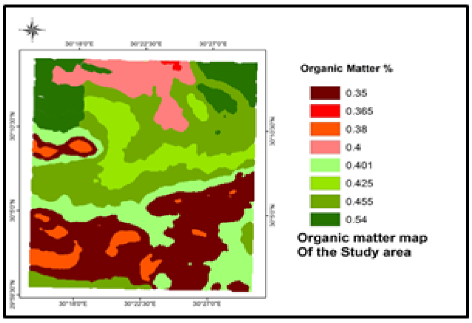
Physiographic unit	Profile no.	pH	$CaCO_3$	EC	O.M	N	P	K	CEC	ESP	depth
high aeolian terrace	1	7.9	7.26	4.72	0.46	12.37	15.9	29.1	3.68	6.59	87.5
low aeolian terrace	4	7.7	7.4	0.95	0.40	33.1	5.6	25.6	4.45	6.6	45
high overflow basin	2	7.7	10.12	0.85	0.4	14.27	9.4	15	3.72	5.89	85
low overflow basin	6	7.6	1.455	3.65	0.43	11.32	13.1	41.3	4.26	5.14	120
high sand sheet	3	7.6	13.6	6.8	0.35	25.25	6.2	10.9	4.7	8	50
low sand sheet	7	7.7	9.255	0.465	0.38	25.2	10.1	37	5.03	6.295	130
high decantation basin	8	7.8	8.6	0.575	0.54	40	20.2	49.52	5.44	7.12	135
low decantation basin	5	7.8	1.74	4.76	0.37	11.405	14.2	23	4.96	6.86	115



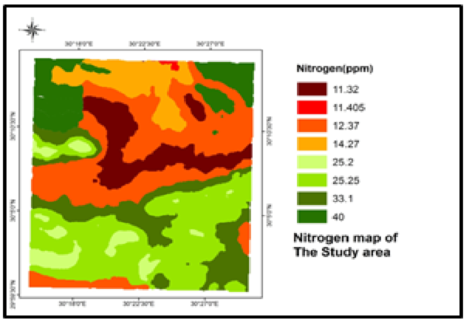
Map (4): calcium carbonate of the studied area.



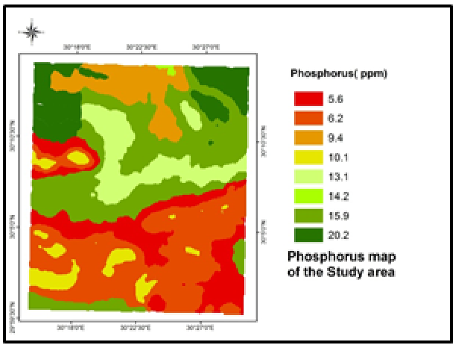
Map (5): electrical conductivity of the studied area.



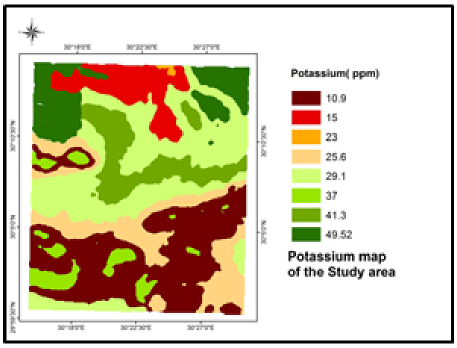
Map (6): organic matter of the studied area.



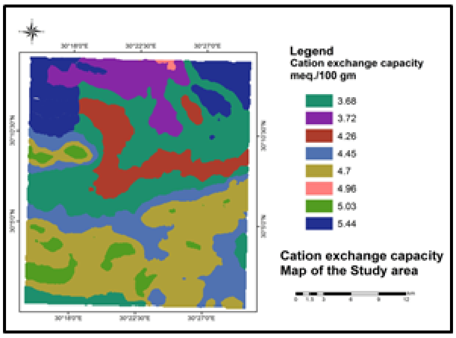
Map (8): Av. Nitrogen of the studied area.



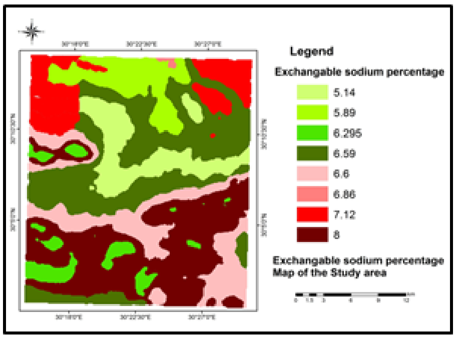
Map (8): Av. Phosphorus of the studied area.



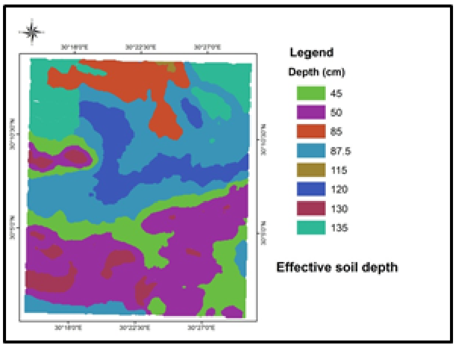
Map (9): Av. Potassium of the studied area.



Map (10): Cation exchange capacity of the studied area.



Map (11): Exchangeable sodium percentage of the studied area.

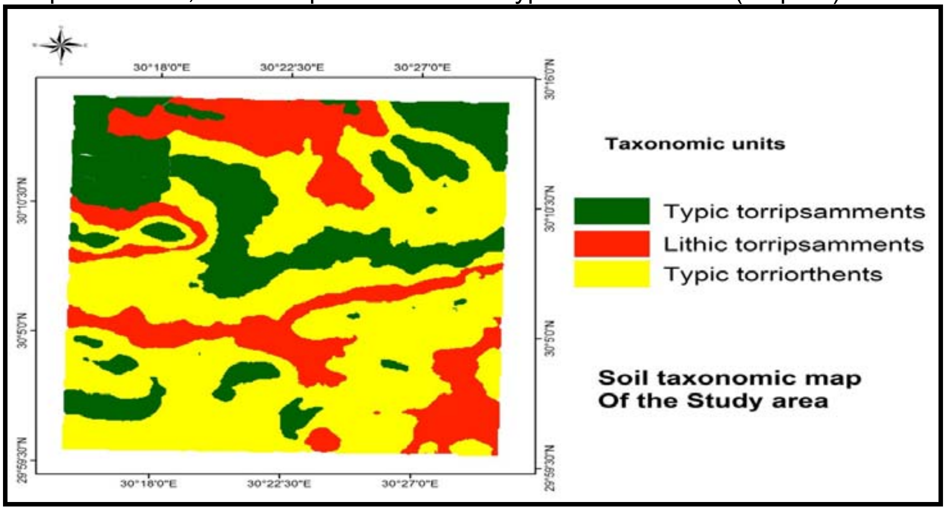


Map (12): Profile depth of the studied area.

From table and maps clear that the dominate $CaCO_3$ contend is low than 10% in the all soil mapping units except the high over flow basin and high sand sheet which ranged between 10.12 and 13.6% .The total soluble salt (EC ds/m) values are low than one in the all soil mapping units except high Aeolian terraces low over flow basin high sand sheet low decantation basin which ranged between 3.65 - 6.8. Cation exchange capacity (CEC meq/100g) is low than 5.44 meq/100g which referred to the decreased of the fine to very fine fraction (clay and colloidal). Sodium exchangeable percent (ESP %) is low than 15%. Av. Nitrogen, Av. Phosphors, Av. Potassium are low which refer to there is no cultivated and management.

Soil map

Based on the keys of soil Taxonomy (USDA 2010) was used to classified the soil of the investigated area according to the morphological description and the data extracted from samples of the investigated soil profiles. Which could be used to classified the soils as typic torripsamments, lithic torripsamments and typic torriorthents. (Map 13)



Map (13): soil map of the investigated area.

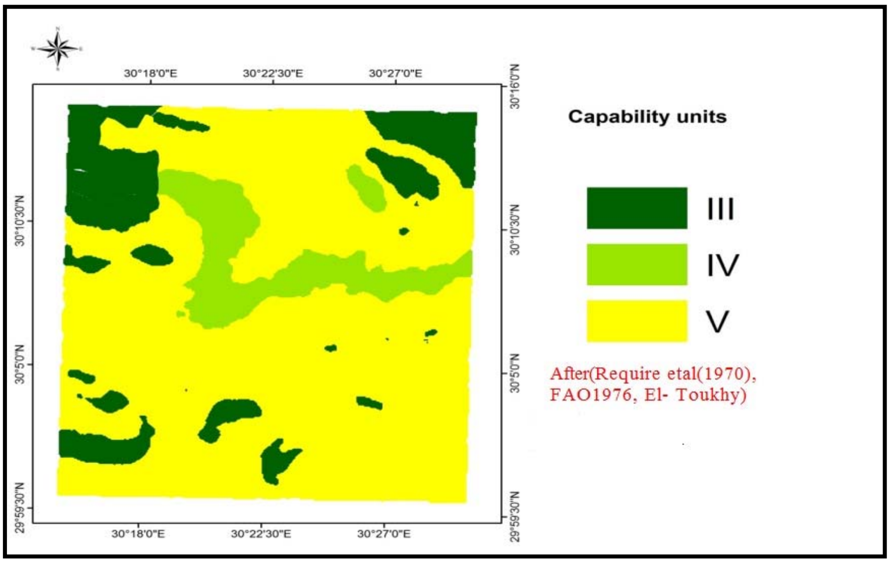
Land capability:-

according to (Require etal1970,FAO 1976, El- Toukhy. 1995) the data of the investigated area as moisture availability (H), drainage (D), effective soil depth (P) ,texture/structure (T),soluble salt concentration (S), organic matter (O), cation exchange capacity/nature of clay (A), mineral reserve (M), productivity index(PI), and productivity grades (G). which shown in Table (4) and Map(14) could be classified the land capability of the investigated area varied from third class in soil of physiographic units as (low sand sheet , high decantation basin) , fourth class in soil of physiographic units as (low over flow basin), and fifth class in soil of physiographic units as (high sand sheet, low decantation basin, high over flow basin , high Aeolian terrace, low Aeolian terrace).

Table (4): the soil properties which based on the land capability calculated.

Site No.	Mapping unit	Rating of soil characteristics								PI	G
		H	D	P	T	S	O	A	M		
1	high aeolian terrace	70	70	70	70	100	50	60	60	4.32	V
2	high overflow basin	70	80	80	70	100	50	60	60	5.64	V
3	high sand sheet	70	50	50	70	80	50	60	60	1.76	V
4	low aeolian terrace	70	50	50	70	100	50	60	60	2.21	V
5	low decantation basin	90	90	80	70	80	50	60	60	6.53	V
6	low overflow basin	90	100	90	70	90	50	60	60	9.18	IV
7	low sand sheet	90	100	100	80	100	60	70	70	21.68	III
8	high decantation basin	90	100	100	80	100	60	70	70	21.68	III

Moisture availability (H), Drainage (D), Effective soil depth (P), Texture / structure (T), Soluble salt concentration(S), Organic matter content (O), Cation exchange capacity / nature of clay (A) , Mineral reserve (M) , Productivity index (PI) and Productivity Grades (G)



Map (14): land capability classification of the investigated area.

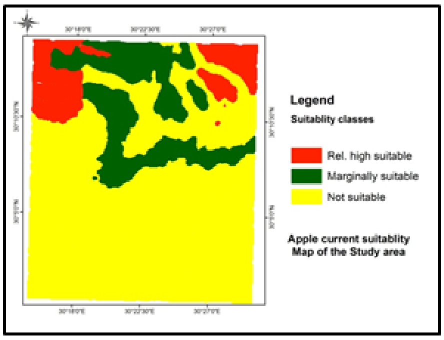
Land suitability:-

The land suitability indices, classes, and limitations for 13 crops were calculated by matching the standard crop requirements (internal coded data within the model) and various soil parameter levels (FAO 1979; Ismail *et al*. 1994, 2001).From Table (5) and Maps[15,16,17,18,19,20,21,22,23,24,25,26and27] clear that suitability varied from physiographic map units to another and from crop to another as following :-

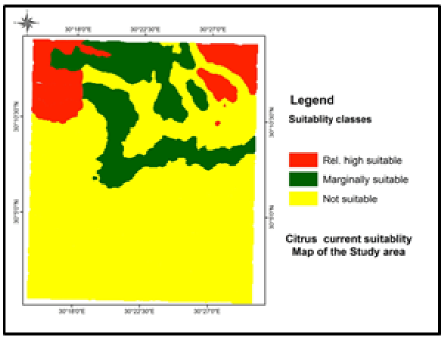
Table (5): Agricultural land suitability for some crops using ASEL system

Sunflower	Ground nut	Peas	Wheat	Green beans	Clover	citrus	apples	Potato	Onion	Garlic	Sweet melon	Melon	Crops	
													Mapping Units	Profile No.
4	4	4	4	4	4	4	4	4	4	4	4	4	HAT	1,2
4	3	4	4	4	3	4	4	3	3	3	3	3	LAT	3,4
3	3	3	3	3	3	3	3	3	3	3	3	3	HOB	5,6
3	3	3	3	3	3	3	3	3	3	3	3	3	LOB	7,8
3	3	3	3	4	3	4	4	3	3	3	4	4	HSS	9,10
3	3	3	3	4	4	4	4	3	3	4	3	3	LSS	11,12
2	2	2	2	2	2	2	2	2	2	2	2	2	HDB	13,14
4	4	4	4	4	4	4	4	3	4	4	3	3	LDB	15,16

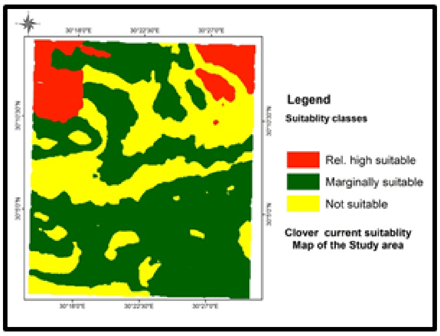
N2 Not suitable most of the time most of the time most of the time	N1 Not suitable	S3 Marginally suitable	S2 Rel. High suitable	S1 Highly suitable	Suitability classes
5= Very severe	4=Severe	3= oderate	2= light	1= No	Limitations



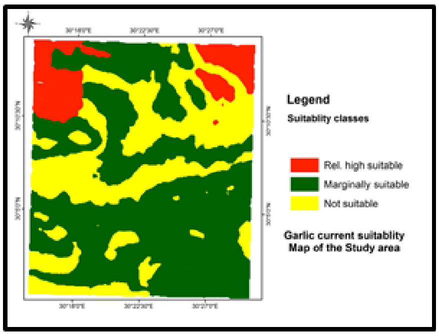
Map (15): Land suitability for Apple.



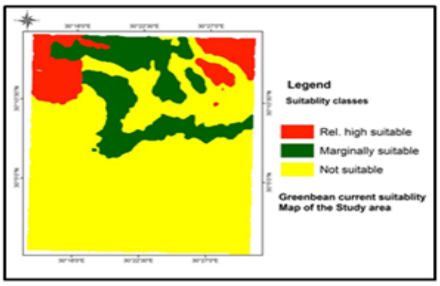
Map (16): Land suitability for citrus.



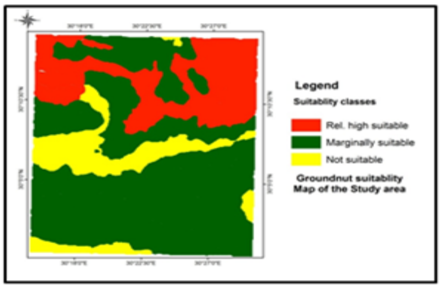
Map (17): Land suitability for clover.



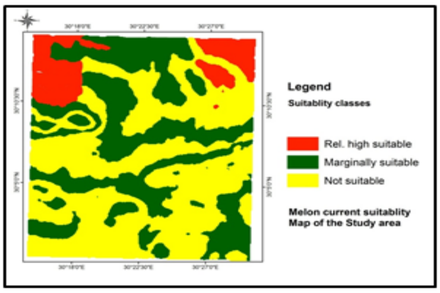
Map (18): Land suitability for Garlic.



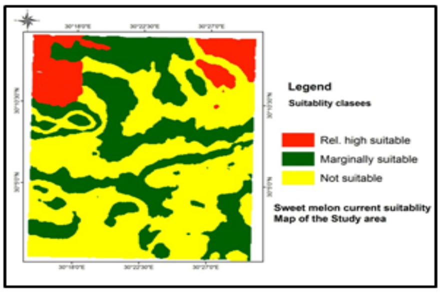
Map (19): Land suitability for Green bean.



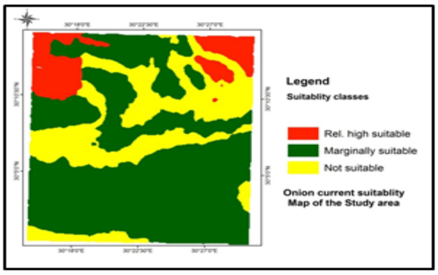
Map (20): Land suitability for Ground nut.



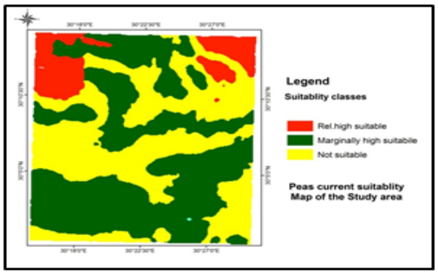
Map (21): Land suitability for Melon.



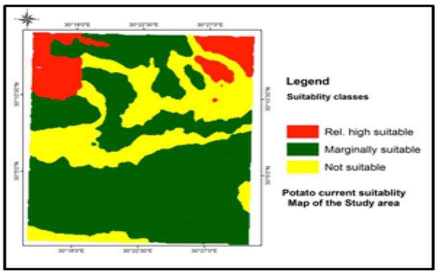
Map (22): Land suitability for Sweet melon.



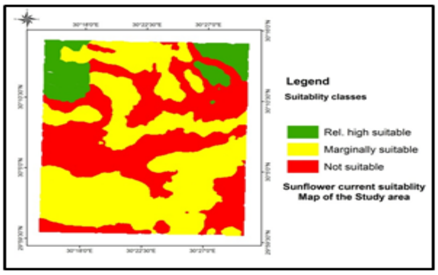
Map (23): Land suitability for Onion.



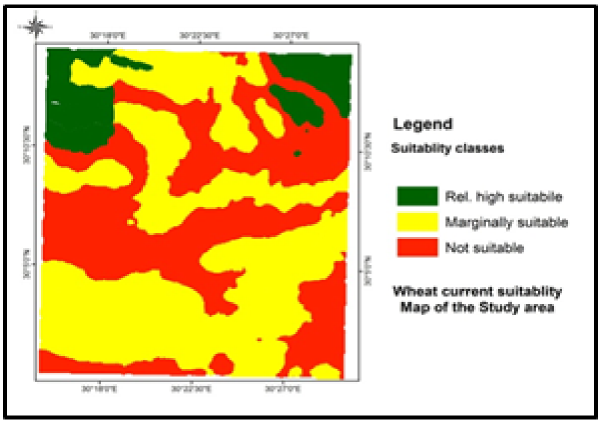
Map (24): Land suitability for Peas.



Map (25): Land suitability for Potato.



Map (26): Land suitability for Sunflower.



Map (27): Land suitability for Wheat.

Suitability, which is built in ASEL system for agriculture land evaluation.

Out of sixteen investigated soil profile points, the map units HDB, showed Rel.high suitability (S2) for most evaluated crops. The map unit LDB showed marginally suitable (S3) to potato, sweet melon, melon. Not suitable (N1) to sunflowers, ground nut, peas, wheat, green beans, onion, garlic. Clover, citrus, apple .The map unit HAT showed not suitable (N1) for most evaluated crops. The map unit LAT showed marginally suitable (S3) to ground nut potato, onion, clover, garlic, sweet melon, melon. Not suitable (N1) to sunflowers, peas, wheat, green beans, citrus, apple. The map units HOB, showed marginally suitable (S3) for all evaluated crops. The map units LOB, showed marginally suitable (S3) for all evaluated crops. The map units HSS, showed marginally suitable (S3) for sunflowers, ground nut, peas, wheat, clover, potato, onion, garlic crops. Not suitable (N1) to green beans, citrus, apple, sweet melon, melon, The map unit LSS showed marginally suitable (S3) to sunflowers, ground nut, peas, potato, onion, sweet melon , melon. Not suitable (N1) to green bean, clover, citrus apple, garlic.

Conclusion

Wadi El-Farigh is a narrow depression located in the west of the Nile Delta, approximately 44 km northwest of Cairo between longitudes, 30º 15´ and 30º 30´ E and latitudes, 30º 15´ and 30º 00 N. The climatic conditions of Wadi El-Farigh area are those characterizing the desert areas of Egypt. It is characterized by a hot rainless summer. The meteorological data of Wadi El-Farigh area is shown in figure (2). The maximum temperature (34.5 °C) was recorded in July and August, while the minimum one (7.5 °C) was recorded in January with an average of 13.4 °C and 27.9 °C for the mean minimum and maximum annual temperature, respectively .The precipitation is rare and recorded only during November, December, January, February, March and April. The highest value

4.9 mm was recorded in January and the lowest one 0.8 mm was recorded in April. Daily evaporation is high .The lowest value of evaporation (1.8 mm/day) was recorded during January, while the highest value (7.9 mm /day) was recorded in June. The lowest value of relative humidity (56%) was recorded in April, and May, while the highest one (66%) was recorded in December. The mean monthly wind velocity ranges from 6.8 to 9.0 km/hr. Wind velocity increases in winter and spring to reach its maximum in March. The annual mean of wind velocity was 7.7 km / hr. (After Meteorological Authority, 2006). The dominate texture is sandy, EC (ds/m) range between (0.46 – 6.8) , $CaCO_3$ % content ranged between (1.45–13.6), ESP range between (5.14– 6) , CEC range between (3.68–5.44) depth range between (45– 135cm) organic matter (0.35–0.54 %) available nitrogen range between (11.32 – 40 ppm) available phosphorus range between (5.6 – 20.2 ppm) available potassium range between (10.9– 49.52 ppm). Based on the soil taxonomy USDA (2010) the soil of studied area classified as (Typic torripsamments, Lithic Torripsamments, Typic Torriorthents).Principally, this research investigates new reclaimed areas in the Egyptian Western Desert region with the aim of producing optimum agriculture land use by using evaluation GIS-based models. The produced agricultural land use could provide decision makers, land managers, and farmers with the information needed for improving land use quality decisions and guide them as to what crops are mostly suitable for the area, especially in cases where there insufficient agricultural knowledge about the new area's land characteristics.

In general speaking, the land within the study area can be classified in three suitability classes (S2, rel. high suitable; S3, marginally suitable N1 and not suitable). The Rel. high suitability class S2 represents 4 % of the studied area and is mostly located in the southern part. Mainly found in the high level of plain landscape and river terraces. Meanwhile, the low level of plain and penplain map units indicate marginally stabile to not suitable with 96 % of the total area. However, high Aeolian terrace tableland map units showed not suitability for general evaluated crops. The most suitable crops to grow in the study area are Sunflower, Ground nut, Peas, Wheat, Green beans, Clover, citrus, apples, Potato, onion, Garlic, sweet melon and Melon in the order indicated. The general dominant limiting parameters affecting land suitability are availability of water, availability of nutrients, erosion hazard and texture.

REFERENCES

1- Abu Al-Izz, M.S. 1971. Landforms of Egypt. 281p. DarA1-Maaref, Cairo, Egypt

2- Ande OT (2011) Soil suitability evaluation and management for cassava production in the derived savanna area Nigeria. Int. J Soil Sci. 6 (2):142–149

3- Black C.A. (ed) (1986).' 'Methods of soil analysis. Part1, physical and microbiological properties "second (ed). Agronomy series no. 9, ASA, SSSA, madison, Wis., USA1982.

4- Black C.A, (ed) (1982)."Methods of soil analysis. Part2, chemical and microbiological properties "Agronomy series no. 9, ASA, SSSA, madison, Wis., USA1982.

5- Dobos E, Norman B, Bruee W, Luca M, Chris J, Erika M (2002). The use of DEM and satellite images for regional scale soil database. Proceedings of the 17th World Congress of Soil Science, August14–21, 2002, Bangkok, Thailand

6- Egyptian Meteorological Authority (1996). “Climatic Atlas of Egypt”. Ministry of Transport, Cairo, Egypt.

7- El- Maghraby, M. M., (1990). "Geographical and hydrological studies of Sadat City, Egypt" M.Sc.Thesis, Fac. Sci., Alexandria University.

8- El-Nahry AH, Khashaba HE (2006) Land suitability modeling of natural vegetation using integrated remote sensing and GIS techniques: a case study. J Applied Sci. 6(1):51–56

9- ESRI (2012) Arc map version 9.3.1 user manual, ESRI: ESRI product, California, USA

10- El- Toukhy, M. M. A., (1995). Studies on land evaluation and land use of some soils in the nbHh Delta. Ph.D. thesis, Fac. Agric., Zagazig Univ., Egypt.

11- FAO (2010). "Guidelines to soil profile description", FAO publications, Rome.

12- FAO (1993) Guidelines for land use planning. FAO Development Series 1, Rome, ISBN: 1020–0819

13- FAO (1979) Land evaluation criteria for irrigation: soils bulletin 50.Food and Agriculture Organization of the United Nations, Rome

14- FAO (1978) Report on the agro-ecological zones project. World soil resources report No. 48. FAO, Rome

15- FAO (1976)."A Framework for land evaluation" FAO soils Bulletin No.32, Rome.

16- Ismail HA, Bahnass MH, Abd El-Kawy OR (2005) Integrating GIS and modeling for agricultural land suitability evaluation at East Wadi El-Natrun, Egypt. Egyptian J Soil Sci. 45:297–322

17- Ismail HA, El-Zahaby EM, El-Fayoumy ME (1994) A modify approach for land evaluation under arid condition. Applications. Mansoura Uni. J Agric. Sci. 19:3497–3513

18- Ismail HA, Morsy I, El-Zahaby EM, El-Nagar FS (2001) A developed expert system for land use planning by coupling land information system and modeling. Alexandria J Agric. Res 46:141–154
19- ITT (2012) ITT Corporation ENVI 5.0 software. White Plains, NY, USA
20- Lillesand TM, Kiefer RW (2007) Remote sensing and image interpretation, 5th edn. John Wiley and Sons, New York, p 820, ISBN-13:9788126513352
21- Meteorological Authority (2006). The normals for Egypt up to 2007. Ministry of Civil Aviation, Cairo, Egypt. Meteorological Res. Bull., 22:86-87.
22- Requier J., D.L.,Bramao and J.P.,Comet,(1970).A new system of appraisal in terms of actual and potential productivity. FAO soil Resources, Development and Conservation Service, Land and Water Development Division. FAO, Rome, 38PP.
23- Rossiter DG, van Wambeke AR (1997) Automated Land Evaluation System (ALES) version 4.65 user’s manual. Crop and atmosphere sciences SCAS teaching series no. T93-2. Cornell University, Ithaca
24- Said, R. (2000) "The Geology of Egypt". El-Sevier Pub., Comp., Amsterdam.
25- Said, R. (1990). The Geology of Egypt. Elservier Publishing Co., Amsterdam, New York, USA, 734 p.
26- Shata, A.A. and El Fayoumy, I.F. (1970). Remarks on the regional geological structure of the Nile Delta. Proceedings of the Bucharest Symposium on Delta, 6-14 May 1969. Geol Soc. J., 41: 99-127.
27- Trask, P.D.1950"Applied sedimentation John Wiley & sons, Inc. New york
28- Uphoff N (2002) Agro-ecological innovations: increasing food production with participatory development. Earth scan Pub, London
29- USDA (2010) Keys to soil taxonomy, 3rd edn. USDA, NRCS, USA
30- USDA (2004) Soil survey laboratory methods manual, soil survey investigation report no. 42. Version 4.0, 3rd edn. USDA, NRCS, USA
31- Voncir N, Mustapha S, Amba A, Kparmwang T (2006) Evaluation of productivity potentials of soils of the Gubi soil series. J Applied Sci. 6(13):2843–2845

تقييم الموارد الارضية لمنطقة الوادي الفارغ ، الصحراء الغربية مصر

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**** هيئة الاستشعار من بعد**

منطقة وادي الفارغ بالصحراء الغربية اختيرت كمنطقة للدراسة لبعض العتبارات احداها انها من مناطق التطور الزراعي في مصر على اساس برنامج ENVI 5.0 و ArcGIS 10.1 تم استخدام صور الاقمار الصناعية ETM+ 7 لانتاج الخريطة الفيزيوغرافية لمنطقة الدراسة . ووحدات الخريطة التي ظهرت في الخريطة الفيزيوغرافية وهي الممثلة للمنطقة هي ثمانية وحدات فيزيوغرافية تتمثل
high decantation basin, low decantation basin, high Aeolian terrace, low Aeolian terrace, high over flow basin, low over flow basin, high sand sheet, low sand sheet.
وهي وحدات جيومورفولوجية . تم اخذ ١٦ قطاع ارضي لتمثل الوحدات الفيزيوغرافية الخريطية وتم حفرها ووصفها . ومن الدراسة اتضحت الاتي ان القوام الرملي هو سائد في المنطقة تتمثل في التوصيل الكهربائي تتراوح مابين(٠.٦٤-٠.٦٨ ds/m) ومحتوى من الكاربونات الكالسيوم يتراوح بين (١.٥٦-١٣.٦%) صوديوم المتبادل يتراوح بين (٥.١٤ – ٦.٠٠%) سعة التبادلية الكاتيونية يتراوح مابين (٣.٦٨ – ٥.٤٤ meq/100g) وعمق القطاع الارضي يتراوح مابين (٤٥ – ١٣٥سم) ومادة العضوية يتراوح مابين (٠.٣٥ – ٠.٥٤) ومحتوى من النايتروجين الصالح يتراوح مابين (١١.٣٢ – ٤٠)جزء من مليون ، وفسفور الصالح يتراوح مابين (٥.٦ – ٢٠.٢) جزء من مليون ، ومحتوى من البوتاسوم الصالح يتراوح مابين (١٠.٩-٤٩.٥٢) جزء من مليون. وعلى اساس التصنيف الامريكي لسنة ٢٠١٠ تم تصنيف اراضي منطقة الدراسة كتالي
(Typic torripsamments, Lithic Torripsamments, Typic Torriorthents). According to (Require etal1970, FAO 1976, El- Toukhy)
وعلى اساس خواص الارض الاتية : الرطوبة الارضية (H) والصرف (D) والعمق الارضي المؤثر في الزراعة (P) والقوام/البناء (T) والملوحة (S) والمحتوى العضوي (O) والسعة التبادلية الكاتيونية (CEC)/طبيعة الطين (A) والمخزون المعدني(M) و دليل الانتاجية (PI) ودرجة الانتاجية (G).تم تصنيف الانتاجية المنطقة الى درجة (5-4-3) وعلى اساس برنامج ASEL تم تصنيف اراضي المنطقة محل الدراسة حسب صلاحيتها للمحاصيل الزراعية المختلفة (القمح، والبطاطا، عباد الشمس، والبازلاء والفول السوداني والفاصوليا الخضراء، والبرسيم والبصل والثوم والشمام والبطيخ والحمضيات، والتفاح) الي (عالية الصلاحية نسبيا S3 حدية الصلاحية S2 وغير صالحة N1).

قام بتحكيم البحث

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