Impact of the Present Land Use and Environmental Conditions on Agricultural Development at Wadi Sannur, Beni Suef, EGYPT

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ABSTRACT

Sustainable agricultural development at newly reclaimed regions is strongly affected by environmental adaptability of applied land uses. Studied area located over five thousand feddans at Wadi Sannur down stream area which considered one of the most promising sites for agriculture development at Beni Suef governorate. Reclamation was partially undertaken since 1985 till now, due to existing of some limiting factors for land productivity and some utilization problems. This study aimed to assess land use alternatives based on land productivity and suitability, in addition, to investigate current environmental conditions and land utilization methods in the studied area. Thirty soil profiles were studied to represent soils of the area, and soil sampling was performed for further laboratory analysis. Results indicated that soils of the area were classified as *Typic Torripsamments* or *Lithic Torripsamments* which including 6 mapping units varying in both soil depth and texture class. The most dominant soil mapping unit in the area was over 32.4 % for deep medium over coarse texture soils. Productivity of the studied area soils classified into four classes; fair over 32.4%, poor over 32.3%, and very poor over 17.9% of the total area, while 17.4% of the area considered not valid for agricultural land uses. Type of limiting elements for productivity varied widely from site to others. In conclusion rough topography, rocky patches, shallow depth, coarse texture, low clay content, high gravels and weathered rock fragment contents, high salinity, high lime content, and general poor fertility are the main limitations. The study identified date palm, olive, guava and pommel as the successful land use alternatives in the area, in addition to some vegetables like onion and garlic. The suitability of olive trees as current land use was classified into three classes; marginal suitability over 67.7 %, currently non suitable over 17.9 % and permanently non suitable over 17.4 % of the total area. Current results were compared with corresponding soil data at 2001 which emphasized on the affection of current land use on soil properties such as fertility enhancement due to fertilization and subsurface salt accumulation due to leaching by irrigation. Field investigation revealed that deterioration which affected roads, irrigation canals and electrical services in the studied area. Based on the incorporation of evaluation results between land properties with environmental conditions, the study recommend the spreading of olive trees at non reclaimed locations with optimizing land use through temporal utilization rights.

Keywords: Land Evaluation, Land use, Land suitability, Wadi Sannur.

INTRODUCTION

The focal point in land evaluation concerning land use designing aimed at describing the land use and assessing the use requirements. Sustainable land use and changes in land use can only be achieved through land use planning which is usually decided based on the continuous field tension created between available resources and human needs (Beatty, *et al*., 1997). Land use must be described in terms of Land Utilization Types (LUT), their land use requirements, and the diagnostic land characteristics that will be used to evaluate the corresponding land qualities (FAO, 1993).

Planning of land use is the process of allocating resources, including time, capital, and labor, in the face of limited resources, in short, medium or long procedures in order to extract the maximum benefits from a given land (Euroconsult, 1989). The biggest modern-day reasons for planning are the explosions of population (FAO, 1985).

The planning of agrarian land use puts more pressure on the land, the risks associated with environmental degradation, impact of applied land use itself and the competition between different land uses. Generally, any agricultural development based on land use planning is affected by dominant environmental conditions which may include marketing and labor force availability, rather than land suitability (Van Diepen, *et. al*, 1991).

Land suitability is the fitness of a given type of land for a defined use. In a more operational sense, suitability expresses how well the land mapping units matches the requirements of the land utilization types (Rossiter, 1995). The process of land suitability classification is the appraisal and grouping of specific areas of land in terms of their suitability for defined uses (FAO, 1985). The concept of land suitability is only meaningful in terms of comparison between land qualities with the requirements of land use alternatives. Indigenous knowledge and farmer's aspirations have to be taken into account during planning which emphasizing the central role of the farmer (FAO, 2007).

Current agricultural land in Egypt is rounding 8 million feddans, and the Egyptian policy for agricultural expansion aims at existing more than 11 million feddans of cultivated lands by the year 2017. Target area for

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reclamation during that period at middle of Egypt region is 110000 feddans (Shokry, 1996). Wadi Sannur one of the most promising areas located at the middle of the eastern desert over about 20 thousand feddans. Down of Wadi Sannur soils were studied by Desert Research Center (DRC) to define main soil types and main limiting agents for productivity, where the study concluded that four mapping units were exited according to variations in soil depth (DRC, 2001).

El-Fayoumy (1989) suggested a new approach for land use planning which included the influencing of environmental conditions on land suitability for several crops at some scattered irrigated newly reclaimed areas. Ramadan (1992) used the FAO system of land evaluation to identify the optimum land use planning associated with most suitable crops at some areas in North Western coast. Abdel-Kader *et al.* (1996) processed the evaluated resources data collected in Fuka area at the western north coast and created different themes through GIS framework in such a way to enable planners to take decisions concerning optimum land use.

This study aimed at designing a preliminary land use plan at Wadi Sannur down stream soils based on present limiting factors assessment and superiorities between current and suggested land uses. Further, the study investigated the influence of current environmental conditions on the successfulness of land use alternatives in the area under consideration.

STUDY AREA

1- Location:

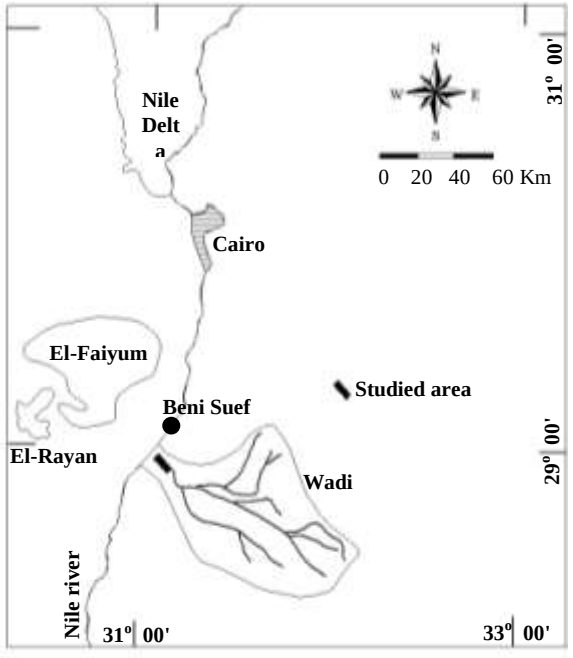
Studied area occupies an area of about 5000 feddans at Wadi Sannur entrance which lies in the middle west of the Egyptian eastern desert. The area is located at down stream sector of Wadi Sannur apart with 13 km south east of Beni Suef. It is bounded by latitudes 28° 58’ 06" and 28° 53’ 00 E and longitudes 31° 04’ 13" and 31° 10’ 00" N. (map 1).

2- Geology:

The lower portion of wadi Sannur which include the studied area was located in the natural depression of the calcareous Eocene plateau. That depression had received clayey sediments during Pliocene, and then covered by Quaternary sediments (Geological Survey and Mining Authority of Egypt, 1981).

3- Geomorphology:

Generally, elevations in the studied area ranged between 40-80 m A.S.L, where topography is characterized by dominant slopes towards west direction by 0.3 % and to north direction by 0.5 %. According to Abu EL-Izz (1971), Wadi Sannur upstream located in El-Meza calcareous plateau, while the studied site located in the flood plain of current wadi coarse. Many of tributaries having some alluvial terraces step down towards wadi main coarse from both north and south directions.



Map 1. Location of the studied area at Wadi Sannur

4- Present land use:

Wadi Sannur down stream soils which occupy about 20 thousand feddans were owned mainly by the American Group for Agricultural Development (10,000 F) since 1997 till now and the Nile Cooperative for Land Reclamation (5,000 F) since 1985 till now. In addition, there are some scattered areas belonging to private owning. The whole area was cultivated partially over only bout 2,000F by mainly olive trees and some other crops i.e.: citrus, grape, wheat, onion, garlic and sweet water melon. Beside some limited areas were occupied by ornamental plants.

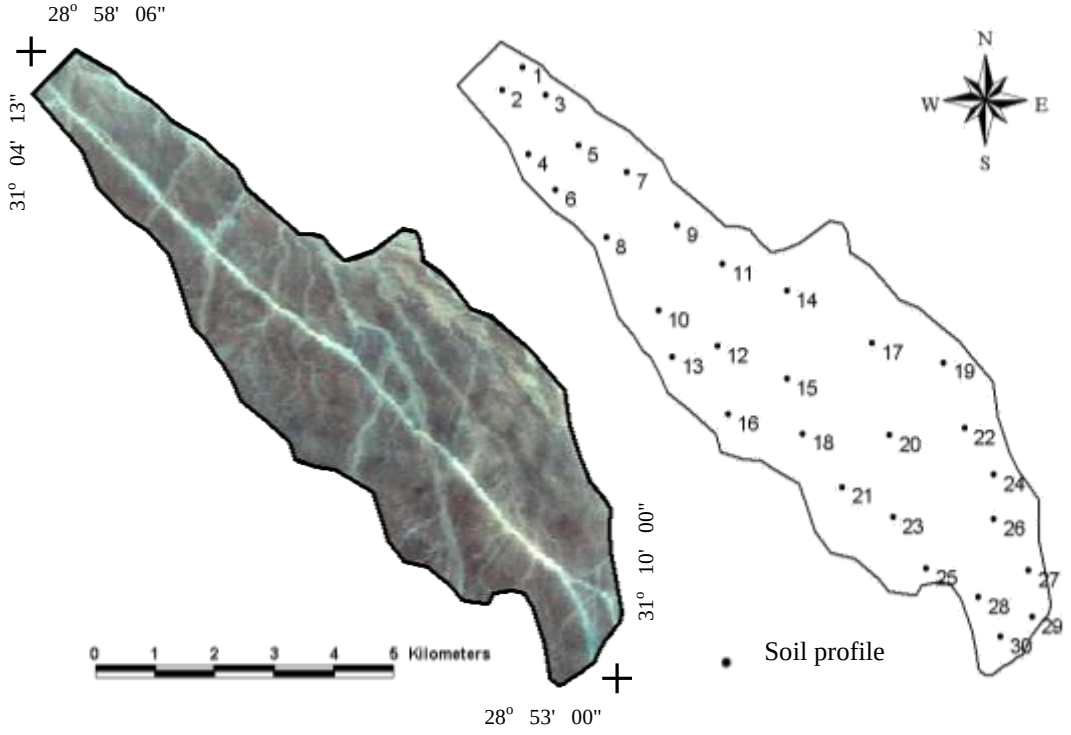
MATERIALS AND METHODS

1- Field work:

Area under investigation which extends over 5000 feddans was surveyed using thirty soil profiles were chosen from different farms of several land use practices (Map 2). Selected soil profiles were morphologically described according to FAO (2006), then sampled for further laboratory analyses.

2- Questionnaire:

Thirty questionnaires were interpolated corresponding to representative sampled sites. The main required data were about; farm acreage, crop production, crop rotation, availability of labor force, marketing, agronomical processes quality and degree of mechanization.



Map 2. Locations of studied soil profiles at Wadi Sannur

3- Soil analyses:

Collected soil samples were analyzed to determine (a) physical properties such as soil texture, gravels percentage, saturation percentage and hydraulic conductivity (Page *et al.*, 1982); (b) chemical properties such as electrical conductivity (EC), soluble cations – anions, soil reaction (pH) (Page *et al.*, 1982) and total calcium carbonate (Jackson, 1973); (c) fertility properties such as organic carbon (Jackson, 1973), total nitrogen (Black, 1983), available phosphorus and potassium (Soltanpour, 1985), available micro elements (Lindsay and Norvell, 1978).

4- GIS processing:

Soil profile locations and associated spatial and attributed data were georeferenced using UTM coordinate system and exported to ARC-GIS, 9.0 (ESRI, 2006). Each soil property presented as single layer, and then layers were overlapped to generate the final soil map of the area. Consequently, land evaluation data was processed to produce the land capability and suitability maps using GIS to indicate the optimum land use in the studied area.

5- Land evaluation:

Land evaluation was carried out to calculate quality indices of soil chemical and physical properties (S.I), soil fertility (F.I), environmental conditions (E.I), and water quality (W.I) using the Applied System of Land Evaluation (Marie *et al.*, 1994). The final index of land evaluation (FILE) was calculated and described as percentage to characterize the land capability of the area according to the following equation:

$$F.I.L.E. = \frac{4}{\frac{1}{S.I} + \frac{1}{E.I} + \frac{1}{W.I} + \frac{1}{F.I}}$$

Land suitability as describe the fitness of a given land mapping unit for a land utilization type, include four levels of generalization through classification process; Orders: which reflecting suitability occurrence "suitable" (S) or "not suitable" (N), Classes: which indicating suitability degree, Subclasses: which specifying kinds of limitation, and Units: indicating required management.

Land suitability for several field, forage, vegetables and fruit crops were identified for each soil unit according to the fitness of crop requirements with soil properties and climate conditions (Sys *et al.*, 1993-III). While, land suitability classes were achieved by classifying the land under consideration based on the final index of crop relevancy as shown in table (1).

Table 1. Land suitability classification

Suitability class	Degree of suitability	Final index (%)
S1	Highly suitable	100 - 80
S2	Suitable	79 - 60
S3	Moderately suitable	59 - 40
S4	Marginally suitable	39 - 20
NS1	Currently non-suitable	19 - 10
NS2	Permanently non-suitable	< 10

RESULTS AND DISCUSSION

1- General description of the studied area:

The area under investigation has considerable variation in elevations towards whole directions. Most of the area has obviously coarse texture and includes great contents of varisized gravels which are mixed sometimes with weathered rock grits. Recognized rocky layers were particularly defused to the southern east portion of the area and become very close to the surface. The considered area was partially cultivated basically with fruit trees in addition to some forages or vegetables.

2- Land characteristics:

2.1- Soil properties

2.1.1- Physical properties: Soil profile depth varied within four classes from 20 cm as very shallow soil depth to 150 cm as deep soil ones. Deep soils occupy 45.6% of the studied area while moderately deep soils covering 19.1 % of the area. While the rest of areas are considered shallow and very shallow soils covering areas of 17.9 % and 17.4 %, respectively of the total area (table 2 and map 3). Based on table (2) which summarized some physical properties; soils having medium soil texture classes over coarse ones found covering 57.9 % of the total area, while coarse soil texture is dominant over 30.6 %, however, texture classes showed in map (3). Most of the studied soils were moderate to high gravelly, where gravels ranged between 10.4 – 45.0 %.

2.1.2- Chemical properties: Most of the investigated soils considered to be moderate saline as indicated in table (2) where electric conductivity (EC) varied between 4.0 and 7.5 dS/m, while some studied profiles were salt affected as EC values ranged between 7.7 – 15.8 dS/m. Calcium, chloride and sulfate were found to be the most dominant soluble ions. Soil reaction values were neutral with slightly alkaline tendency as pH ranged varied from 7.5 to 7.9 for the whole area. On the other hand, soils of the studied area are non alkaline referring to the exchangeable sodium percent (ESP) which varied between 3.8 and 5.4. Soil calcium carbonate varied widely from 8.2 % to 25.7% with depth wise increasing as showed in table (2).

2.2- Soil fertility status

In general, soil organic material was very low in the studied soils as ranged from 0.01 – 0.80 %. Regarding macronutrients; total nitrogen was low and ranged from 0.001 to 0.016 %, phosphorus was also low and varied between 0.2 – 2.2 %, while potassium concentrations were moderate and varied from 50.2 to 410.2 %.

2.3- Soil classification and mapping:

According to Soil Taxonomy (Soil Survey Staff, 2006) most of the studied soils are following order Entisols as lacking any diagnostic subsurface horizons, and classified as *Typic Torripsamments or Lithic Torripsamments*. Further, soils of the studied area could be classified into six soil mapping units based on their variations in both soil depth and texture as listed in table (3) and showed in map (3).

2.4- Environmental conditions

Pumped Nile water through drip irrigation system is the dominant method of irrigation in the area, while some other scattered areas are irrigated using developed surface systems. Roads in the studied area are mainly tracks crossed with relevant paved one. Studied area is located far from the desert road along 15 km with growing communication locations. Labor force is available outside the area, although, shortage occurs during olive harvesting season. The area in general has a relevant degree of safety. Agronomical processes status was good for some of them and excellent for others, with partial mechanization.

3- Land use assessment

3.1- Land productivity and limiting factors: Results indicated that limitations for land productivity which prevent optimum land use varying from site to others, however, they could be concluded as:

(1) Topography variations and significant unleveled land surfaces,

(2) Appearance of surface rock patches and outcrops,

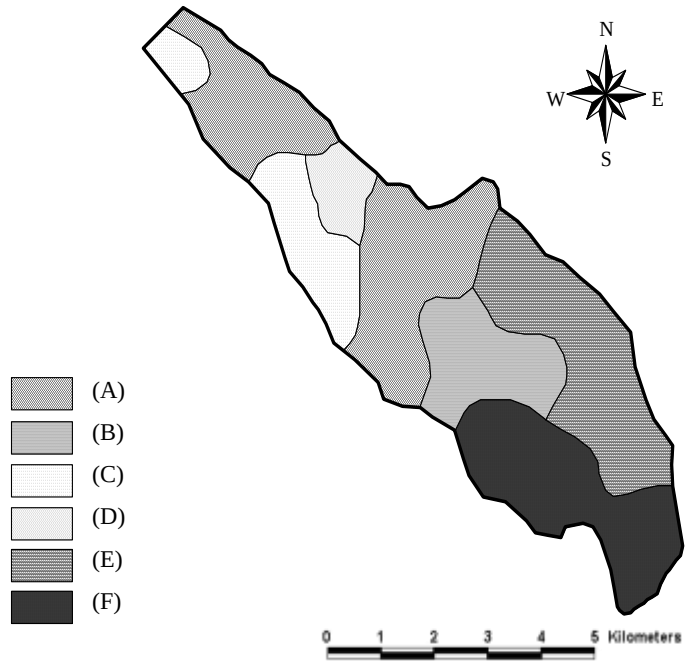
(3) Shallowness of soil profile depth,

(4) Dominancy of coarse texture and low percentage of clay content,

Table 2. Summarized data of representative soil profiles in the studied area

Mapping Unit	A			B			C			D			E		F
Rep. Profile	7			18			2			9			17		21
Depth to – cm	25	85	150	50	100	150	20	50	80	30	80	10	40	20	
Physical properties:															
Gravels %	12.5	10.4	33.4	35.1	22.5	37.4	42.2	35.4	45.8	2.5	11.7	13.5	42.8	22.2	
Sand %	70.2	79.8	89.5	90.5	89.4	92.1	88.7	78.2	62.1	60.2	75.5	35.1	90.0	91.2	
Silt %	6.4	10.7	6.4	4.4	5.8	1.9	7.8	12.3	5.4	11.4	5.3	33.7	5.6	5.0	
Clay %	23.4	9.5	4.1	5.1	4.8	6.0	3.5	9.5	32.5	28.4	19.2	31.2	4.4	3.8	
Texture *	SCL	LS	S	S	S	S	S	LS	SCL	SCL	LS	CL	S	S	
Chemical properties:															
pH	7.5	7.7	7.8	7.6	7.6	7.9	7.5	7.5	7.6	7.5	7.6	7.7	7.5	7.5	
EC dS/m	4.5	6.6	5.4	4.5	4.1	4.0	1.9	2.8	4.2	7.7	4.5	7.5	15.8	15.4	
ESP	4.5	4.8	5.2	4.6	4.5	5.4	4.4	4.6	4.8	4.5	4.8	4.8	3.9	3.8	
$CaCO_3$ %	18.4	8.2	22.5	12.0	15.4	18.7	14.2	12.8	18.5	15.0	19.2	12.6	25.7	25.0	
Fertility properties:															
O.M %	0.04	0.08	--	0.05	0.04	--	0.06	0.06	--	0.02	0.01	0.8	0.12	0.15	
Total N %	0.004	0.010	--	0.002	0.004	--	0.004	0.004	--	0.002	0.001	0.012	0.010	0.016	
P ppm	2.2	1.2	--	1.6	1.4	--	1.8	1.0	--	0.6	0.2	0.6	1.2	1.0	
K ppm	130.2	142.5	--	98.2	65.4	--	254.4	165.2	--	66.5	50.2	370.5	410.2	142.8	

* S = Sand LS = Loamy sand SCL = Sandy clay loam CL = Clay loam



Map 3. Soil Mapping Units in the studied area

Table 3. Description of dominant soil mapping units in the studied area

Mapping Unit	R.S.P	Description	Area (%)
A	7	Medium over coarse texture deep soils	32.4
B	18	Coarse texture deep soils	13.2
C	2	Coarse over medium texture moderately deep soils	11.6
D	9	Medium over coarse texture moderately deep soils	7.5
E	17	Fine or medium over coarse texture shallow soils	17.9
F	21	Coarse texture very shallow soils	17.4

R.S.P = Represented Soil Profile

(5) Existing of high amounts of gravels and weathered rock fragments,

(6) High salinity of some soil layers,

(7) High calcium carbonate in some limited sites,

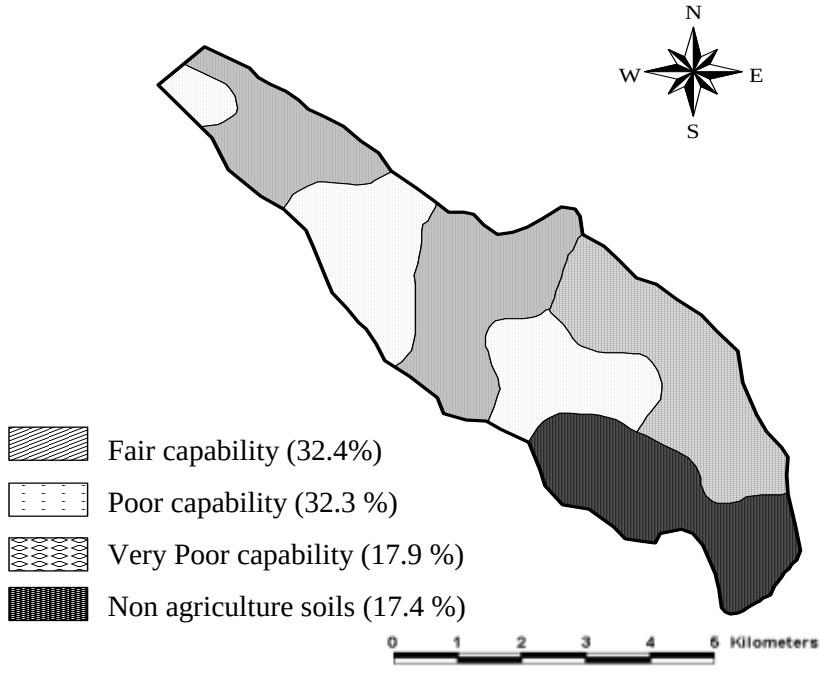
(8) General low levels of soil organic matter and macronutrients.

According to the above identified land limitations, studied area classified into four land capability classes as listed in table (4) and showed in map (4). Maximum land productivity in the area under consideration classified as Fair land capability which covered 32.4 % of the total area while poor land capability affected by soil texture, gravels, salinity, lime content and/or low fertility occupied 32.3 % of the total area. Land capability was degraded at the rest of studied area as influenced mainly by the shallowness of soil profile and by existing of rocky patches. Low productivity soils classified as Very poor and Non agriculture classes which found to be over 17.9 % and 17.4%, respectively. Generally, soil limitation like alkalinity and toxicity are not encountered while salinity limitation could be easily corrected by applying effective leaching. Concerning soil fertility as an agricultural limitation, the proper soil management practices and adequate fertilization programs for different crops can maximize productivity of studied soils.

Table 4. Land capability classes and land suitability indices for land use alternatives at identified soil mapping units in the studied area

Soil Mapping Unit	Land capability indices *	Land capability classes	Land suitability indices for **			
			Date palm	Olive	Guava	Pummel
A	48.5	Fair	38.2	38.4	30.5	32.4
B	38.2	Poor	33.5	35.8	27.7	28.8
C	26.8	Poor	29.1	29.0	23.6	24.5
D	25.0	Poor	25.4	26.3	25.0	22.2
E	15.4	Very Poor	14.5	18.5	12.6	15.4
F	7.6	Non-agric	5.2	1.0	0.0	1.2

* C3 (40-59%) – C4 (20-39%) – C5 (10-19%) – C6 (< 10%)
** S4 (20-39) – NS1 (10-19) – NS2 (<10)



Map 4. Land capability classes in the studied area

3.2- Land suitability: Results indicated that four different fruit trees are the most suitable for the studied area namely with the sequence; date palm, olive, guava and pummel. Further results showed that onion and garlic are the optimum vegetable alternatives in the studied area. However, three different land suitability classes are distinguished in the area for olive trees as present land use; marginal, currently non-suitable and permanently non-suitable as seen in map (5).. Marginal land suitability for olive occupies 64.7 % of the area which indicate an economic land use with relatively high production costs due to some limiting factors. Currently non-suitable class found over 17.9 % of the total area, which describe in need of non economic technologies for land reclamation due to existing of some natural limitations concerning shallow profile depth or gravelly coarse texture. While permanently non-suitable class for olive covers 17.4 % of the area which include high degree of permanent limitations i.e. rock outcrops and very shallow profile depth.

Un-reclaimed areas have to be leveled and bounded by wind break trees. Soils at salt affected sites have to be reclaimed by leaching using Nile water according to calculated leaching requirements. Obvious low fertility has to be enhanced using macro and minor element additions. Drib irrigation system is the optimum method recommended for water supplying due to its high relevancy to dominant coarse soil texture

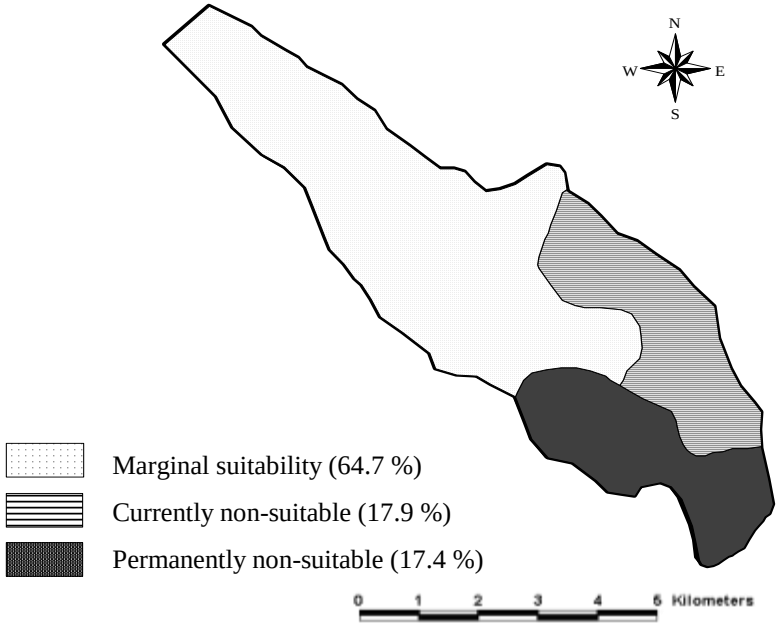
3.3- Effect of present land use: Current data of analyzed soil profiles were compared to corresponding old resultant data of the formed study which carried out by Desert Research Center (DRC) in 2001 to conclude the affections of land use on soil properties during ten years. Such comparison is summarized in table (5), where some present soil properties belonging to profiles Nos. 6 and 3 at soil mapping unit A, were compared respectively with corresponding ones of profiles no. 5 and 4 at the same locations of the previous study. Obviously soil fertility was enhanced in general during that period due to fertilizers applications, where organic material, available phosphorus and potassium were increased specially at topsoil (table 5). Soil salinity and lime content were relatively leached and transported down of surface layers.

3.4- Utilization limiting factors: The American Group for Agricultural Development (SCSG) owned 10 thousand feddans in Sannur to spread olive trees and subsequent industrial recycling of olive byproducts. Despite, the area was not reclaimed except for 1,000 F since 1997 till now due to high costs of land reclamation processes. Moreover the Nile cooperative union for land reclamation owned 5 thousand feddans since 1985 from the Egyptian authority of desert development, in which some were distributed partially to non specialized owners from congress members and police officers without seriously procedures of reclamation. That's led to great conflict between owners and Beni Suef governorate in which their owning was reviewed and stopped. The utilizing right of land is the optimum way to insure agriculture development in newly reclaimed areas as a deal between agricultural authorities and peoples.

Infrastructure including roads and irrigation canals were slightly deteriorated in the area due the lacking of continuous maintenance. Large area of Sannur soils is threatened by water shortage as affected by destroying a long part of the main irrigation canal according to competition with stoniness practices in the area. Also, electricity services have not been completed at many irrigation pumping machines in the area. Agriculture development in the studied area seeking for steady status between owners and governorate, moreover, continuous agricultural supporting and maintenance are needed.

Table 5. Summarized comparison between current and former data at particular locations within mapping unit A in the studied area

Mapping Unit	A - Present land use: olive trees												
Compared Profiles	5 (2001)			6 (2011)			4 (2001)				3 (2011)		
Depth to – cm	15	85	150	20	75	150	10	28	90	150	25	85	150
EC dS/m	7.8	5.2	3.7	3.7	5.8	4.8	5.7	25.0	7.5	2.4	4.5	17.5	10.5
$CaCO_3$ %	6.8	15.1	6.1	5.1	10.4	12.5	22.2	9.5	16.4	19.4	20.2	13.2	15.7
O.M %	0.05	0.06	--	0.12	0.08	--	0.08	0.40	--	--	0.14	0.18	--
P ppm	1.4	1.4	--	1.72	1.60	--	1.2	0.4	--	--	1.65	0.82	--
K ppm	379.3	324.5	--	412.2	385.0	--	234.6	182.2	--	--	333.2	254.0	--



Map 5. Land suitability for olive trees in the studied area

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الملخص العربي

تأثير إستغلال الأراضى والظروف البيئية الحالية على التنمية الزراعية بوادى سنور بنى سويف– مصر

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إن نجاح التنمية الزراعية بالمناطق حديثة الإستصلاح مرهون بتحديد إستخدامات أرضية متوافقة بيئيا، حيث أن تحديد الإستغلال الأرضى مرتبط بالإمكانيات الأرضية والظروف البيئية وجميعها يؤثر على تحقيق التنمية المستدامة. وتعد أراضى مخرج وادى سنور أحد المواقع الواعدة للتنمية الزراعية بالظهير الصحراوى لمحافظة بنى سويف حيث تمتد منطقة الدراسة على مساحة حوالى 5 آلاف فدان قد تم إستصلاحها جزئيا منذ 1985. ويهدف البحث إلى تقييم أراضى هذه المنطقة للتعرف على المحدات الزراعية السائدة فى منطقة الدراسة لتحديد بدائل الإستخدام الأرضى المتوافقة مع المحدات السائدة، مع دراسة إمكانية إستزراع مساحات جديدة وإعداد سيناريو الإستخدام الزراعى لها، إضافة لتقييم تأثير الإستغلال الزراعى الحالى على بعض خواص التربة. كما يهدف البحث إلى دراسة الوضع البيئى للمنطقة ونماذج الإنتفاع القائمة ومدى تأثيرها على نجاح التنمية الزراعية. حيث تم حصر أراضى منطقة الدراسة بإستخدام ثلاثون قطاعا أرضيا وبناءا على تتابع طبقاتها تم تجميع عينات التربة الممثلة والتى تعرضت للتحليل المعملى لتقدير صفات التربة الطبيعية والكيميائية والخصوبية. كما تم إستيفاء عددا من الإستمارات لإستبيان بعض البيانات الحقلية والبيئية عند مواقع الملاحظة المستغله. صنفت منطقة الدراسة لتتبع رتبة الإنتيسول وصولا لتحت المجموعة *Typic Torripsamments* و *Lithic Torripsamments*، كما أمكن تمييز عدد 6 أنواع أرضية بداخل هذه الوحدات تباينت فى صفات عمق القطاع الأرضى وقوام التربة، قد سادتها وحدة التربة عميقة القطاع ذات القوام المتوسط أعلى الخشن على مساحة 32.4% من منطقة الدراسة. أوضحت النتائج أن قدرة تربة منطقة الدراسة الإنتاجية متباينة حيث قسمت إلى أربعة أقسام، إنتاجية متوسطة على إمتداد مساحة 32.4% بينما شغلت قدرة التربة الفقيرة مساحة 32.3% من منطقة الدراسة، وتدنت القدرة الإنتاجية لتكون فقيرة جدا أو غير زراعية على إمتداد 17.9% و17.4% على الترتيب من إجمالى المساحة. وحددت الدراسة مجموعة معوقات الإنتاج الزراعى مع إختلاف درجاتها وإنتشارها بوحدات الأراضى المختلفة بمنطقة الدراسة فى وعورة الطبوغرافيا، إنتشار وجود السطوح الصخرية، ضحالة عمق قطاع التربة، خشونة القوام وإنخفاض نسب المكون الطينى، إنتشار وجود الحصى والفتات الصخرى المجوى، إرتفاع ملوحة بعض طبقات التربة، إرتفاع نسبة الجير ببعض المواقع، التدنى العام فى مادة التربة العضوية ومغذيات التربة. بالنسبة لسيناريو الإستغلال الزراعى الأمثل أوضحت الدراسة أن أشجار نخيل البلح والزيتون والجوافة والرمان هى أنجح محاصيل بستانية بالمنطقة إلى جانب بعض محاصيل الخضر كالبصل والثوم والتى يوصى بتحميلها بين صفوف الأشجار. وعموما أكدت الدراسة على وجود ثلاث أقسام لدرجات ملائمة أشجار الزيتون كأستغلال أرضى حالى للإستزراع بالمنطقة وهى ملائم هامشيا على 67.7% من إجمالى المساحة، وغير ملائم مؤقتا أو غير ملائم دائما على 17.9% و17.4% على الترتيب من المساحة الكلية المدروسة. وبناءا على مقارنة بيانات التربة الحالية بتلك الواردة قبل عشر سنوات عند ذات المواقع تبين أن الإستخدام الحالى للأراضى قد أثر على بعض صفات التربة كتحسن مستوى خصوبة التربة نتيجة المعاملات التسميدية وتركز ملوحة التربة أسفل السطح نتيجة عملية الغسيل. وأوضحت الدراسة الحقلية الميدانية لمنطقة الدراسة تدهور حالة بعض المرافق كالطرق وقنوات الرى وخدمات توصيل التيار الكهربائى لماكينات الرى فضلا عن منازعات ملكية الأراضى بين الملاك وإدارة المحافظة، وتوصى الدراسة أنه من خلال دمج تقييم خصائص التربة والظروف البيئية وتأثيرها على إستخدام الأرض ومستوى الإنتفاع منها بإمكانية تعميم إستزراع أشجار الزيتون فى المساحات الجديدة مع تقنين إستخدام الأراضى فى صورة حقوق إنتفاع مؤقته لضمان جدية الإستصلاح والإستزراع.