Mona maghraby

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

Mona maghraby

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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بعض الوثائق الأصلية تالفة وبالرسالة صفحات لم ترد بالأصل

Use of Aerial Photos and Thermal Band to Detect the Drainage Condition in Some Areas West of Delta, Egypt

By

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APPROVAL SHEET

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Degree : Master Degree

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Title of Thesis: Use of Aerial Photos and Thermal Band to Detect the Drainage Condition in Some Areas West of Delta, Egypt.
Supervisors: Prof. Dr. F. Hanna; Dr. W. F. Erian and Dr. G. A. Kamel
Depatment: Soils Department
Branch: Pedology
Approval:

ABSTRACT

The studied area is 10,000 feddans located in Maryut Area between latitude 30° 48' 30" and 30° 53' 30" N and longitude 29° 45' and 29° 55' E, where Nasser Drain is the northern boundary, Abu Massoud Canal is the southern boundary, Maryut Canal (between pump station No. 4 and pump station No. 5) is the western boundary and the eastern boundary is Cairo-Alexandria desert road (between Km 53.75 and Km 54.5 from Alexandria). The studied area is situated in the Torric moisture regime and the Thermic soil temperature regime. The studied area is mainly irrigated by Abu-Massoud Canal and served by Nasser drain. Most of the studied area is cultivated with wheat, Egyptian clover and scattered areas cultivated with Barley in winter. In summer it is mostly cultivated with Sweet melon and maize and scattered area cultivated with Sorghum. Tomato and other vegetables are cultivated in small areas at any time of the year. Fruit crops are also cultivated in the area mainly apple, pears, date palm and almond.

The dominant soils in the studied area are classified as Typic Haplocambids, Typic Haplocalcids and Typic Petrogypsids. The soil mapping units (after Kamel, 1998) were grouped into the landscape level. Most of the studied area is located in Mena Valley. Based on the difference in the main source of irrigation, the study area could be divided into three systems as the following: - The Maryut system (system M) Abu Massoud left side system (system Al), and Abu Massoud right side System (system Ar). The geostatistical analysis was performed on the selected land qualities (Soil salinity, Effective soil depth). By applying the spherical formula for the different values, an interpolated value maps have been achieved. The classification was conducted on the different value maps, regarding the soil salinity most of the studied area is occupied by the non saline soil class, which represented the major unit in both Abu Massoud left and right side systems, while in system Maryut the slightly saline soil was the major class. The non saline soils are covering most of the areas of Mena valley, Piedmont and Hill lands.The effective soil depth class in most of the studied area is the very deep soils. In Mena valley the deep soil represents the major unit. The correlation analysis between the soil characteristics revealed that there is a significant negative correlation between the soil salinity and the effective soil. Most of the studied area is considered as class d2*z1, characterized by a deep, non saline soils and class z1*d1 (very deep, non saline soils). The crossing operation was applied between the different soil qualities and the map calculation operation was used to select only the classes with the moderate to sever problem. Most of the selected area is located in the strongly saline, moderate depth soils class (d3*z4).

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ABSTRACT

The classification of the soil moisture condition in September 1989 showed that the most dominant class was the moderate moisture condition. The most dominant moisture class was the moderate moisture condition, which is mainly located in the Mena Valley mapping unit. The classification of the soil moisture condition in August 1997 showed that the moderate moisture condition class dominates most of the studied area and is mainly located in the Mena Valley mapping unit. The classification of the soil moisture condition of April 1998 showed that the relatively low moisture condition class represents the highest percentage and is mainly located in Mena Valley. The map calculation operation was applied to the thermal band of August 1997 and April 1998 to extract the areas with moisture condition potential problem (the moderate to very high moisture condition classes) and the crossing operation was applied between the two maps. Class c3*c3 (moderate moisture condition in both years) represents, the dominant class. The crossing operation which was performed between the potential moisture condition problem area and the grouped soil map showed that in Mena Valley class c3*c3 (moderate moisture condition in both years) is the dominant class, in the Piedmont and the Hill land mapping unit was mainly in the c3*c4 class (moderate moisture condition in 1997and relatively high moisture condition in 1998). The crossing operation was performed between the potential moisture condition problem areas and the selected classes of the soil salinity and effective soil depth and it was found that most of the selected areas are located in the c3*c4 (moderate moisture condition in 1997and relatively high moisture condition in 1998) and d3*z4 (moderate effective soil depth and strongly saline soil). The study used the modern techniques of remote sensing, GIS, geostatistical analysis and reached the goal of the study to detect the surface moisture condition as indication for drainage condition.

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1- Introduction

The north-west part of the Nile Delta is considered as a capable expansion area adjacent to the old alluvial cultivated land in the Nile Delta. Soil-water relationship plays an important item in land use, and soil drainage condition can be used to identify such relationship throughout the morphological studies.

Remote sensing techniques are considered good and advanced tools to recognize soil surface conditions. In this respect, the use of thermal band interpretation can be very useful tool to detect the soil drainage conditions. The current study aims at using the thermal band data in detection of the soil moisture condition for a selected area (±10,000 feddans) in Maryut Agriculture project, north-west of the Nile Delta.

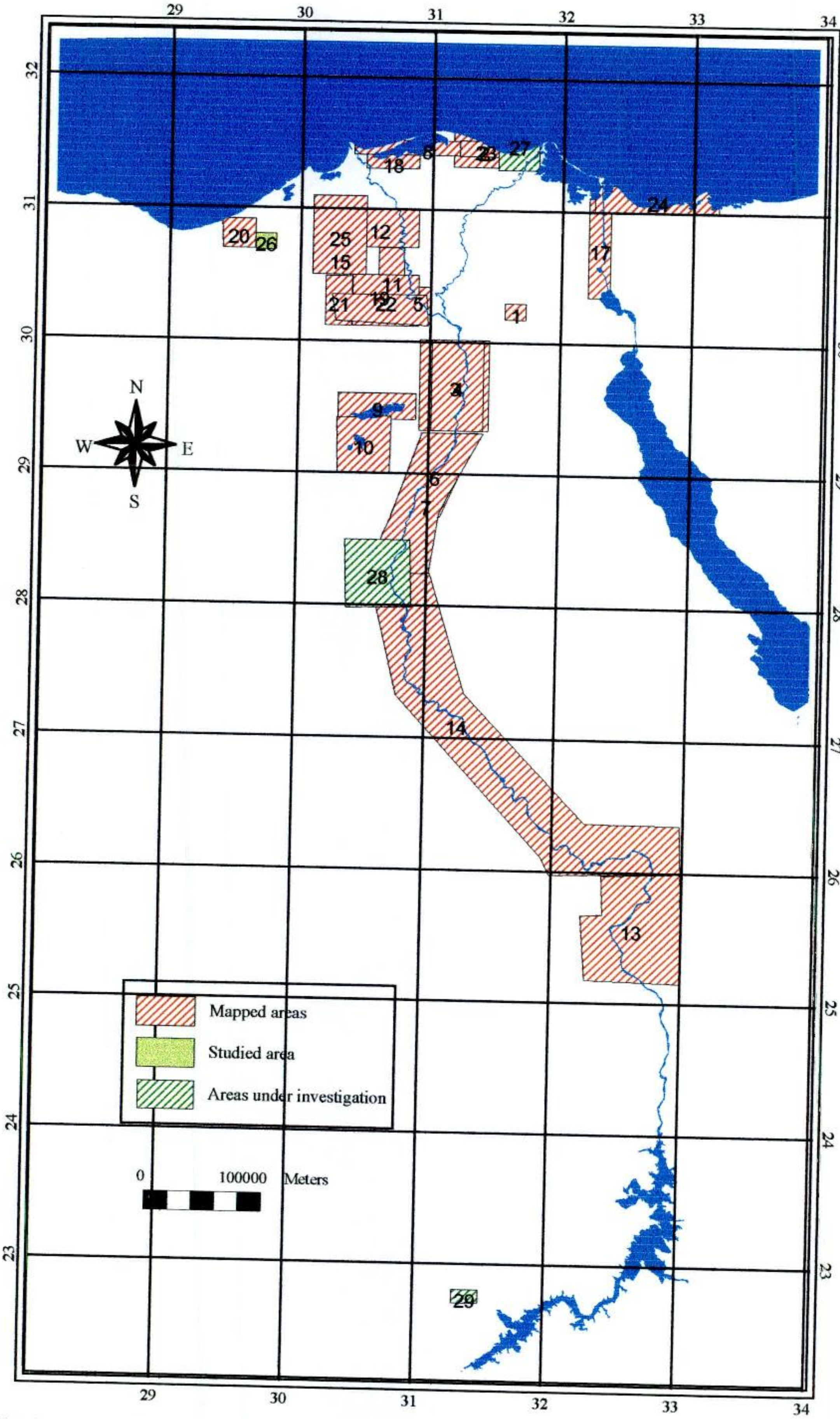
The goal of this study is mapping the soil moisture conditions of the investigated area as an indication for soil drainage conditions.

This investigation area is a part of the research plan started on 1976 and still going by **Prof. Dr. F. Hanna** et al. in Soils Dept., Cairo Univ. as shown in **Table (1)** and illustrated in **Map (1).**

Table (1):- areas mapped using different remote sensing techniques between 1979 and 2001, and other areas under investigation , supervised by Prof. Dr. F. Hanna et al.

No.	Author	Year	Coordinate				Mapped Areas (feddan)
			Min		Max		
1	Ibrahim, S. S.	1979	31° 36'	30° 17'	31° 43'	30° 13'	32199.4
2	Maged, M. H.	1979	30° 20'	31° 10'	30° 50'	31° 40'	432996.0
3	Sadek, Sh. A.	1980	31° 12'	29° 19'	31° 50'	30° 00'	108000.0
4	Abu El-Enain, A. Sh.	1980	31° 43'	29° 17'	31° 17'	30° 00'	96806.0
5	Erian, W. F.	1981	30° 48'	30° 10'	31° 00'	30° 25'	161181.6
6	El-Hamidy, A. H.	1982	30° 46'	28° 28'	31° 06'	29° 11'	264203.5
7	Harp, S. K.	1983	30° 50'	28° 25'	31° 10'	29° 17'	79785.6
8	Mansour, M. A.	1983	30° 26'	31° 22'	31° 29'	31° 27'	115668.0
9	Shindy, M.	1984	30° 20'	29° 24'	30° 54'	29° 34'	251553.0
10	Abd El-All, Sh. A.	1984	30° 20'	29° 02'	30° 40'	29° 25'	80568.0
11	Sadek, Sh. A.	1984	30° 37'	30° 10'	30° 48'	30° 40'	167210.4
12	Erian, W. F.	1986	30° 20'	30° 40'	30° 54'	31° 00'	600588.0
13	Abd El-Hady, A. A.	1987	30° 30'	25° 00'	32° 00'	26° 00'	89213.7
14	Abd El-Hady, A. A.	1995	30° 00'	26° 00'	33° 00'	28° 00'	1145352.0
15	Sannad, M. M.	1995	30° 10'	30° 30'	30° 25'	30° 40'	72256.0
16	Omer, A. M.	1996	30° 15'	30° 05'	30° 55'	30° 15'	175171.0
17	El-Nahry, A.	1997	32° 10'	30° 20'	32° 18'	31° 00'	131372.4
18	Abo El-Enain, A. Sh.	1997	30° 30'	31° 17'	30° 52'	31° 25'	96806.0
19	Abd El-Kawy, W.	1998	30° 27'	30° 09'	30° 41'	30° 30'	75000.0
20	Kamel, S. M.	1998	29° 25'	30° 43'	29° 33'	30° 56'	144606.0
21	Ramadan, A. R.	1999	30° 25'	30° 08'	30° 10'	30° 29'	230000.0
22	Abd El-Sattar, M. B.	1999	30° 51'	30° 28'	30° 21'	30° 05'	142800.0
23	Abd El-Fatah, A.	1999	31° 13'	31° 22'	31° 33'	31° 32'	60509.6
24	Hola, N.	2000	32° 15'	31° 00'	33° 10'	30° 10'	271201.0
25	El-Nahry, A.	2001	30° 06'	31° 05'	30° 31'	30° 29'	180473.0
26	Shafik, R.	2001	29° 40'	30° 40'	29° 50'	30° 45'	10000.0
27	* Abdel Aziz, B.	--	31° 30'	31° 17'	31° 50'	31° 40'	96000.0
28	* Abdel El-Kawey, W.	--	30° 50'	28° 28'	30° 10'	28° 30'	650000.0
29	* Kamel, S. M.	--	31° 15'	22° 45'	31° 30'	22° 44'	100000.0
30	* Omer, A. M.	--	-- --	--	-- --	-- --	--
31	* Ramadan, R. A.	--	-- --	--	-- --	-- --	--
	Total						6061520.2

* Under investigation



Map (1):- Areas mapped with aerial photo-interpretation and other remote sensing techniques in Soils Dept., Fac. of Agric., Cairo Univ. (1979- 2001), supervised by Dr. F. Hanna et al.

2- Review of Literature

2-1- Remote Sensing :

According to **Short (1998),** remote sensing is the acquisition and measurement of data/information on some properties of a phenomenon, object, or material by a recording device not in physical, intimate contact with the feature(s) under surveillance; techniques involve amassing knowledge pertinent to environments by measuring force fields, electromagnetic radiation, or acoustic energy employing cameras, lasers, radio frequency receivers, radar systems, sonar, thermal devices, magnetometers, gravimeters, and other instruments. Remote sensing data acquisition can be conducted on board of platforms including aircraft, satellites, balloons, rockets, space shuttles, etc. Inside or on board these platforms, sensors are used to collect data. Sensors measure the energy that is reflected by the earth's surface. Sensors include aerial photographic camera and non-photographic instruments such as radiometers, Electro-optical scanners, radar systems, etc.

Bakker et al. (1999), stated that the term remote sensing means the sensing of the earth's surface from space by making use of the properties of the electromagnetic waves emitted, reflected or diffracted by the sensed objects, for the purpose of improving natural resources management, land use and the protection of the environment.

2-1-1- Landsat Multispectral Scanner System

Mika (1997) revealed that the concept for earth-resources technology satellite took shape in the early 1960 following the success of early weather-observation spacecraft such as TIROS-the Television-Infrared Observation Satellite. He added that on board of Landsat-1 there were two sensing systems:- multispectral scanning system (MSS) and return beam vidicon (RBV). RBV was discontinued since Landsat-3. The MSS is a scanning multispectral imaging radiometer that produces radiometrically accurate images of the earth utilizing a scanning system that covers a 185-Km swath across the orbital path of the satellite.

According to **Short (1998),** the MSS have been used on Landsat - 1, 2, 3, 4 and 5. The MSS bands were numbered 4 through 7 because the RBV bands were designated as bands 1 through 3; the MSS bands were renumbered as bands 1 through 4 in Landsat 4 and routine collection of MSS data were terminated in late 1992.The spectral region of each band is listed in **Table (2).**

Table (2): The spectral region of the MSS bands

Band No.	Wave length Interval (µm)
B4	0.5 - 0.6 µm
B5	0.6 - 0.7 µm .
B6	0.7 - 0.8 µm
B7	0.8 - 9.1 µm

2-1-2- Landsat Thematic Mapper System:

Mika (1997) stated that since the launch of Landsat 4 in 1982, a new type of scanner, called Thematic Mapper (TM), has been introduced. The Thematic Mapper was named because its images would be used to produce maps tailored to different Earth-observations themes, such as agriculture, Hydrology, geology and the like. The TM represented a dramatic advancement in every dimension of sensor performance: spatial, spectral and radiometric.

According to **Short (1998),** the characteristics of the seven TM bands are represented in **Table (3)**.