

**WETLAND MAPPING AND ASSESSMENT USING
REMOTE SENSING AND GEOGRAPHIC
INFORMATION SYSTEMS**

By

RANDA SHAFIK GEORGY MAKAR MORGAN

B.Sc. Agric. Sc. (Soil Science), Ain Shams University, 1993

M.Sc. Agric. Sc. (Soil Science), Cairo University, 2001

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راند شفيق جورجي مقار مرجان

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ABSTRACT

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Wetlands are ecologically and economically valuable. Unfortunately, in spite of their importance wetlands continue to be among the world's most threatened ecosystems. The aim of the current work is to employ remote sensing and GIS to map the selected wetlands and to characterize their current conditions and assess their ability to perform their functions. Two study areas were selected for this study namely; El-Bardawil and El-Burullus.

In this work, both ASTER and ETM+ data were employed to delineate the study areas. The suggested protocol included a sequence of image pre-processing and processing steps. The overall accuracy of the ETM+ data land use/ land cover classification ranged from 82.7 to 90.7%, while it ranged from 86.3 to 92.2% in the case of ASTER data for El-Bardawil and El-Burullus study areas respectively.

El-Bardawil study area was classified into two land units namely, the wetlands and the barren sandy soils. The wetlands included El-Bardawil shallow saline lake and sabkhas soil formations. The sabkhas were furthermore classified into sabkhas with deep water table and sabkhas with shallow water table. Soil texture of both sabkhas units was sandy. Their soils were characterized by grayish soil matrix or presence of grayish mottles. They were classified as Typic Aquisalids except small area in the first unit that was classified as Gypsic Aquisalids. The studied pollutants in these wetlands were attributed to the activities of El-Nasr Salt Co. and may be influenced by their closeness to El-Kantara – El-Arish road, harbours and villages.

The wetlands in El-Burullus area originally included El-Burullus shallow lake as well as the swamps and clay flats that surrounded the

lake, in addition to the coastal saline wet sandy soils along the Mediterranean Sea. Most of these wetlands were converted into agricultural areas or fish ponds. The current wetlands area included only the remaining parts of El-Burullus Lake and the coastal wet sandy soils. The losses of the wetland area accounted for about 59.1 % of the total wetland area and about 13.4 % of El-Burullus Lake surface area before reclamation.

Concerning the saline wet sandy soils, they were classified as Typic Psammaquents, Typic Aquisalids and Typic Torriorthents. The subsurface layers were mostly greyish, in addition to the presence of H₂S odour. The reclamation activity is starting to affect these soils especially those that will eventually depend on low irrigation water quality. El-Burullus lake water salinity was relatively low due to the massive discharge of the drainage water into it. The studied pollutants in the lake were influenced by their amounts in the nearby drains which discharge into the lake. The reclaimed wetlands were classified as Vertic Torrifluvents. These soils were affected by the use of low water quality for irrigation or fish ponds.

In this work, an electronic version of Wetland Evaluation Technique (WET) was designed to evaluate the wetlands functions. El-Bardawil wetland was represented by one assessment unit (AUs), which included El-Bardawil Lake and the sabkhas that surrounded it. The assessed unit was rated moderate for the groundwater recharge social significance and low for this function effectiveness. The same unit was rated high for shoreline stabilization social significance but the function effectiveness was considered low. This unit was rated moderate for the nutrient removal and retention social significance, but was low for the function effectiveness and moderate for the function opportunity.

Three wetland units were assessed in El-Burullus study area. One assessment unit AUk1c included the remaining area of the lake. The wet sandy soils at the shoreline of the Mediterranean Sea were represented by two assessment units namely; AUk2c and AUk3c, respectively. The assessed wetland units AUk1c and AUk2c were rated moderate for the

groundwater recharge social significance but were rated low for this function effectiveness. On the other hand, unit AUk3c was rated low for both the social significance and effectiveness. All the evaluated units were rated high for shoreline stabilization social significance. On the other hand, the rating of unit AUk1c was high while units AUk2c and AUk3c were low for this function effectiveness. Unit AUk1c was rated high nutrient removal and retention effectiveness, opportunity, and social significance. Unit AUk2c was rated low for this function effectiveness and opportunity but was rated moderate for its social significance. Unit AUk3c was rated low for this function social significance and low for its effectiveness and opportunity.

Key words:

Wetlands, Wet soils, El-Burullus wetlands, El-Bardawil wetlands, redoxomorphic features, anthropogenic impacts

Contents

	Page
List of Tables	IV
List of Maps	VI
List of Figures and Plates	IX
1 Introduction	1
2 Review of Literature	3
2.1 Wetlands	3
2.1.1. Wetlands definition	3
2.1.2. Wetlands in dry climates	4
2.2. Wet soils	5
2.2.1. Wet soils identification and classification	5
2.2.2. Wet soils of Egypt	8
2.3. Employing remote sensing in wetland mapping	9
2.4. Wetland assessment	13
2.4.1. Wetland functions assessment	15
2.4.2. Use of remote sensing and GIS for wetland functions assessment	17
3 Environmental Settings of the Studied Areas	19
3.1. El-Bardawil study area	19
3.1.1. Location	19
3.1.2. Climate	20
3.1.3. Geology	21
3.1.4. Geomorphology	22
3.1.5. Soils	24
3.1.6. Water resources	25
3.1.7. Natural vegetation	26
3.1.8. Land use	27
3.1.9. El-Bardawil Lake	27
3.2. El-Burullus study area	29
3.2.1. Location	29
3.2.2. Climate	30

3.2.3. Geology	32
3.2.4. Geomorphology	34
3.2.5. Soils	36
3.2.6. Hydrology	38
3.2.7. Natural vegetation	40
3.2.8. Land use	40
3.2.9. El-Burullus Lake	41
4 Materials and Methods	44
4.1. Materials	44
4.1.1. Software	44
4.1.2. Ancillary data	44
4.1.3. Remotely sensed data	45
4.2. Methods	47
4.2.1. Preparation of the required data layers	47
4.2.2. Image Pre-Processing	48
4.2.3. Image Processing	53
4.2.4. Field work	54
4.2.5. Laboratory analyses	55
4.2.6. Soil and water quality evaluation	57
4.2.7. Wetland assessment	60
5 Results and Discussion	62
5.1. Principal Component Analysis (PCA)	62
5.2. Image classification	70
5.2.1. Unsupervised classification	70
5.2.2. Supervised classification	71
5.3. Characterization of El-Bardawil study area	77
5.3.1 El-Bardawil wetlands	78
5.3.2. The barren sandy soils	92
5.4. Characterization of El-Burullus study area	98
5.4.1. The current wetlands	99
5.4.2. The reclaimed wetlands	106
5.4.3. The old cultivated deltaic soils	116

5.4.4. The relatively old cultivated sandy soils	119
5.4.5. The irrigation water	122
5.4.6. The drainage water	124
5.5. Wetland assessment	126
5.5.1. Designing of an electronic WET version (E-WET)	126
5.5.2. Wetland function effectiveness and opportunity evaluation	127
5.5.3. Wetland social significance evaluation	137
6. Summary	143
7. References	152
8. Appendices	164
Arabic summary	

LIST OF TABLES

	Page
Table 1: Climatological data of El-Arish Meteorological Station	20
Table 2: Climatological data of Rosetta Station	30
Table 3: Climatological data of Baltim Station	31
Table 4: Major Characteristics of the Landsat system	45
Table 5: Major Characteristics of the ASTER sensor	47
Table 6: Soil salinity evaluation	58
Table 7: Evaluation of soil macro and micro nutrients	58
Table 8: Normal concentrations of total heavy metals in soils	58
Table 9: Recommended maximum concentration of trace elements in irrigation water	59
Table 10: Guidelines for evaluation of water quality for irrigation	59
Table 11: Threshold of toxicity of substances in the water supply for aquaculture	60
Table 12: Classification of surface freshwater quality for the maintenance of aquatic life	60
Table 13a: The correlation matrix of the ETM+ data of El-Bardawil study area	62
Table 13b: The correlation matrix of the ASTER data of El-Bardawil study area	63
Table 14a: The correlation matrix of the ETM+ data of El-Burullus study area	64
Table 14b: The correlation matrix of the ASTER data of El-Burullus study area	65
Table 15a: The eigenvectors of the calculated covariance matrix of all the ETM+ data	67
Table 15b: The eigenvectors of the calculated covariance matrix of all the ASTER data	68
Table 16: The eigenvectors of the calculated covariance matrix	70

of the shortwave infrared and thermal bands of the ETM+ and ASTER data

Table 17: The area of the land use/ cover units of El-Bardawil 74 study area

Table 18 : The area of the land use/ cover units of El-Burullus 76 study area

Table 19: The effectiveness and opportunity evaluation of El- 127 Bardawil study area

Table 20: The effectiveness and opportunity evaluation of El- 132 Burullus study area

Table 21: The social significance evaluation of El-Bardawil 137 study area

Table 22: The social significance evaluation of El-Burullus 139 study area

LIST OF MAPS

	Page
Map 1: Location map of El-Bardawil study area	19
Map 2: Location map of El-Burullus study area	29
Map 3a: Unsupervised classified image of El-Bardawil study area	71
Map 3b: Unsupervised classified image of El-Burullus study area	71
Map 4a: Land use/ land cover map of El-Bardawil study area produced from ETM+ data	73
Map 4b: Land use/ land cover map of El-Bardawil study area produced from ASTER data	74
Map 5a: Land use/ land cover map of El-Burullus study area produced from ETM+ data	76
Map 5b: Land use/ land cover map of El-Burullus study area produced from ASTER data	76
Map 6: Location of the soil profiles and water samples of El-Bardawil study area	77
Map 7: Land units of El-Bardawil study area	77
Map 8: Effect of reclamation projects on wetland area	98
Map 9: Location of the soil profiles, fish ponds and water samples of El-Burullus study area	99
Map 10: The wetlands assessment units of El-Bardawil study area	127
Map 11: Groundwater recharge function effectiveness of El-Bardawil study area	128
Map 12: Shoreline stabilization function effectiveness of El-Bardawil study area	128
Map 13: Nutrient removal and retention function effectiveness of El-Bardawil study area	129
Map 14: Nutrient removal and retention function opportunity	130

El-Bardawil study area

Map 15a: The wetland assessment units of El-Burullus study area (previous condition) 131

Map 15b: The wetland assessment units of El-Burullus study area (current condition) 131

Map 16: The aquatic vegetation cover of El-Burullus study area according to NDVI derived from the TM data 132

Map 17a: Groundwater recharge function effectiveness of El-Burullus study area (previous condition) 133

Map 17b: Groundwater recharge function effectiveness of El-Burullus study area (current condition) 133

Map 18a: Shoreline stabilization function effectiveness of El-Burullus study area (previous condition) 134

Map 18b: Shoreline stabilization function effectiveness of El-Burullus study area (current condition) 135

Map 19a: Nutrient retention and removal function effectiveness of El-Burullus study area (previous condition) 136

Map 19b: Nutrient retention and removal function effectiveness of El-Burullus study area (current condition) 136

Map 20a: Nutrient retention and removal function opportunity of El-Burullus study area (previous condition) 137

Map 20b: Nutrient retention and removal function opportunity of El-Burullus study area (current condition) 137

Map 21: Groundwater recharge social significance evaluation of El-Bardawil study area 138

Map 22: Shoreline stabilization social significance evaluation of El-Bardawil study area 138

Map 23: Nutrient removal and retention social significance evaluation of El-Bardawil study area 139

- Map 24a: Groundwater recharge function social significance of 140
El-Burullus study area (pervious condition)
- Map 24b: Groundwater recharge function social significance 140
of El-Burullus study area (current condition)
- Map 25a: Shoreline stabilization function social significance of 141
El-Burullus study area (pervious condition)
- Map 25b: Shoreline stabilization function social significance 141
of El-Burullus study area (current condition)
- Map 26a: Nutrient removal and retention function social 142
significance of El-Burullus study area (pervious condition)
- Map 26b: Nutrient removal and retention function social 142
significance of El-Burullus study area (pervious condition)

