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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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 H_2S 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, redoxmorphic features, anthropogenic impacts

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