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Full Length Article

Land use assessment of barren areas in Damietta Governorate, Egypt using remote sensing

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ABSTRACT

Damietta occupies an area of about 910 km^2 north of the Nile Delta and hosts about 1.3 million persons living within four administrative centers. The region comprises agricultural lands, water bodies, urban area and barren lands. Agriculture is the most land use while there is a significant development of barren lands, which occur at the north and east of Damietta. The present study aims to evaluate and assess the suitability of using barren lands in Damietta for the different uses. Satellite images have been utilized in order to make an accurate inventory of barren lands. The physico-chemical characteristics and soil rating were carried out to evaluate soil quality. Results showed that soils of Damietta belong to *Entisols* (recent soils) and there are five classes of soil quality, ranging from excellent to very poor. It was found that barren lands at the north of Damietta have poor potentiality for agriculture. They could be utilized for other land use, such as residential, industrial or for touristic activities. While those occur east of Damietta could be utilized for aquaculture or as bioremediation facilities for biological treatment of agricultural wastewaters.

1. Introduction

Damietta Governorate occurs at the tip of the Nile Delta along the western fringes of the Lake Manzala (Fig. 1). The capital of the Government is Damietta City, which was one of the ancient cities of Egypt and it was the Egyptian gate along the Mediterranean Sea before the construction of Alexandria about 300 years BC. Today, Damietta is one of the most important industrial centers of Egypt and its importance has increased as a new container platforms harbor along the Mediterranean Sea was constructed in 1980s. Damietta Governorate consists of four administrative centers, Kafr Saad, Faraskour, El-Zarka and Damietta center. Population of Damietta is about 1.3 million during the last formal census with most population lives in Damietta City. Agricultural land

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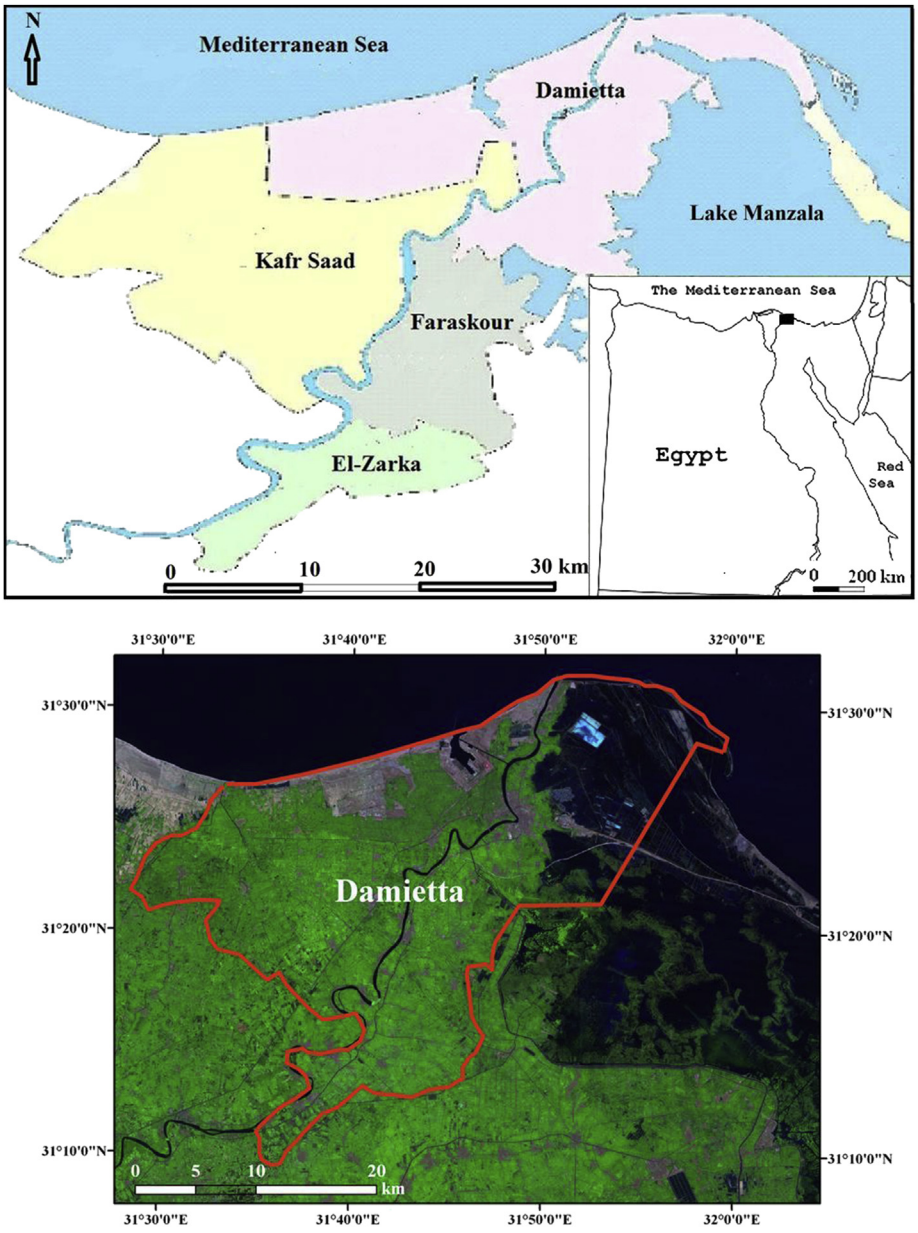

Fig. 1 – Location map and a satellite image of Damietta.

constitutes the majority of Damietta area. There are other lands that are barren mainly at the north and east of the Governorate. The northern barren lands represent the coastal sandy strip bordering the Mediterranean Sea and covered by sand dunes [1] while the eastern strip constitutes the western fringes of the Lake Maznala. According to the Central Laboratory of Agricultural Climate (www.clac.edu.eg) of the Ministry of Agriculture, climate of Damietta is generally Mediterranean, where dry summer predominates with mild dry winter. Annual winter temperatures fall to 13 °C in January and rise to 26 °C in August with a mean annual temperature of 20 °C. Precipitation (P) is generally low and does not exceed 125 mm/y. Due to its occurrence close to the Mediterranean Sea, the humidity is generally high with maximum value during summer months (up to 76%). Evapotranspiration (ET) is much greater than precipitation rates. Maximum ET occurs in June (198 mm) with a total annual ET of 1374. Wind is generally bimodal. Most of incoming winds blow from the northwest direction in summer, spring and autumn and the other wind direction is from the southwest during winter. According to the UNESCO classification of arid lands [2], Damietta occurs within the arid zone, where its aridity index (the annual P/annual ET) is 0.07.

Soils generally have distinctive characteristics from one to another. The soil classification deals with the systematic categorization of soils based on distinguishing their own characteristics. A comprehensive soil classification system provides a hierarchical grouping of natural soil bodies. The soil classification system now widely used worldwide is the American Soil Classification System developed by the United