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Entitled

GEO-SPATIAL MODELING OF CARBON SEQUESTRATION ASSESSMENT IN DATE PALM, ABU DHABI: AN INTEGRATED APPROACH OF FIELDWORK, REMOTE SENSING, AND GIS

by

Basam Saeed Dahy

Faculty Advisor

Dr. Salem Issa, Department of Geosciences
College of Science

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Abstract

Date palm, *Phoenix dactylifera*, is considered the most important fruit crop in arid regions. In addition to its ability to tolerate harsh weather, high temperature, drought, and high levels of salinity, date palm is a good medium for carbon sequestration in such ecosystems. The purpose of this study is to use geospatial technologies (RS and GIS) assessed by field measurements towards assessing the carbon sequestered by date palm (DP) plantations in Abu Dhabi; in both their biomass compartment as well as the soils under beneath. The specific objectives of this research were: (1) to calculate the biomass ratios in DP and the carbon percentage in both biomass and soil, (2) to develop biomass allometric equations specifically for DP, (3) to map the main LULC classes and to extract and map the DP in Abu Dhabi, (4) to build a RS-based spatial model for biomass and carbon stock (CS) assessment of DP, and (5) to quantify and visualize the amount of biomass and CS in Abu Dhabi, using the built RS-based spatial model. The methodology proposed in this dissertation relied on fieldwork, lab work as well as analysis of remote sensing data. The work procedures included pre-field preparations to identify sample areas of interest, field work that included sample collection and measurement of plant characteristics, and post-field activity that focused on processing remote sensing data, model development, and validation. Finally, the Geospatial approach introduced in the present study proved to be an effective and promising technique for the quantification and mapping of the distribution of carbon sequestered in date palm plantations throughout the study area. This is considered a milestone towards reducing carbon emissions resulting from deforestation and forest degradation (REDD+) and to design incentive programs in the UAE and the region. Therefore, Geospatial technologies can be applied to enhance the decision-making process on sustainable monitoring and management of carbon sequestration by date palms in this country and other similar ecosystems. The research's approach has never been developed elsewhere for date palms in arid areas.

Keywords: Carbon Sequestration, Remote Sensing and GIS, Biomass, Arid Lands, UAE.