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THE ROLE OF REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS FOR THE CONSERVATION AND SUSTAINABILITY OF MOROCCAN PALM GROVES

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ABSTRACT
Palm groves are one of the most characteristic agro-ecosystems of Morocco, not only for their natural and scenic value, but also because over hundreds of years, they have created a favorable environment that man has used to cultivate, taking advantage of the microclimate and protection offered by the palm trees in this so arid environment. The current development process of the provinces in the Souss Massa Draa region is increasing inter-regional mobility of people and materials (including seeds and plants), increasing the risk of spreading pests and diseases potentially lethal to palms, so a phytosanitary control of them is required.
In the context of the border cooperation project PALMERA, between the Canary Islands and Morocco, it is intended to intensively monitor different palm groves in the provinces of Agadir, Ouarzazate and Zagora, by means of modern comprehensive procedures and the use of remote sensing and geographic information systems (GIS).
The first objective is the mapping of palm trees in the study areas and the detection of possible diseases using very high spatial resolution satellite imagery. A field work is being done which involves the characterization of plots (valid for the classification and validation process) by means of GPS and the collection of spectral signatures of healthy palm trees and others with different degrees of affection. A FieldSpec 3 spectroradiometer with a spectral range from 350 nm to 2500 nm will be used. Different classification techniques (pixel and object based) will be evaluated and applied, for mapping and estimating the number of palm trees on one side, and to analyze different satellite imagery vegetation indices for the detection of symptoms on the other side.
The second objective is to design an information system tool for control, prevention and eradication of different diseases that affect palm groves. This tool, completely developed with open-source software, has four operating modules: A field data acquisition application for mobile devices, a web-based application for the management of the collected information, a geographic information system and a web interface which allows the visualization of the GIS data in the Internet. The mobile application allows the collection of geo-referenced field data (palm trees affected by any disease, localization of insect traps, etc). This information is synchronized with a PostgreSQL database that can be accessed via web by a Java application. The geographical information will be handled with gvSIG software and its module PostGIS. A web site, developed with Java, Openlayers and Geoserver, will provide a highly effective way of accessing all the information. This tool will help project managers and field technicians take the correct decisions in order to detect, control and eliminate plagues and diseases found in the palm groves.
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