2.1.7. Monitoring the vegetation dynamics as a response to climatic changes in the eastern Mediterranean region using long-term AVHRR/NDVI and LANDSAT images

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Climatic variability and drought periods affect the pattern of vegetation growth and agriculture production, particularly in dryland regions. In the past decade, these phenomena have attracted special attention in the eastern Mediterranean region because they affect differently the economy, agriculture and society as a whole. High temporal resolution remote sensing data are required in order to discriminate between short and long term trends in surface features, as indicators of enduring environmental pressure. Time series analysis is able to detect the tendencies of development in terms of changes in vegetation abundance (e.g. NDVI). Inter-annual climatic changes such as temperature and precipitation profoundly influence plant phenological status such as the onset of growth, the rate of biomass accumulation, and the onset and rate of vegetation senescence. The present study addresses long-term variation in vegetation cover in response to climatic variability and changes in Jordan. The analysis is based on monthly 1 km AVHRR/NDVI and LANDSAT TM data. Trend analysis was applied using two non-parametric methods, the Modified Seasonal Kendal test and the Kendall slope. The inclination and significance of long-term trends in vegetation abundances were used as indicators for monitoring vegetation response to climatic conditions. Additionally, shifts in the phase spectra and results from continuous wavelet transform gave important evidence about changes in vegetation and land cover. The obtained results show that the changes in vegetation were highly related to the climatic conditions as well as to geo-physical, socio-economic and political factors.

Keywords: climate change, vegetation dynamic, trend analysis, satellite images, Jordan.

2.2.1. A land suitability study under current and climate change scenarios in KRB, Iran

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The fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC) predicts that an increase in mean temperature and a decrease in mean annual rainfall will most likely amplify. Such changes will affect not only crops but also land suitability. Assessing the suitability of an area for crop production requires a considerable effort in terms of information collection that presents both opportunities and limitations to decision-makers. In this study, a GIS based method has been used to match land suitability for winter wheat production, based on the biological requirements of the crop and the quality and characteristics of land within the Karkheh River Basin (KRB), Iran. Overall suitability is recognized by the Most Limiting Factor method (MLF), in preference to a weighted GIS model which scores attributes. The results showed that under current climate condition 8.7%, 7.6% and 28% of the area, respectively, is 'highly', 'moderately' and 'marginally' suitable for winter wheat production, and the remaining 55.7% is unsuitable. Under climate change scenarios, the suitability of land for winter wheat showed considerable variation. With increased temperature and precipitation, 'highly and moderately suitable' areas increased, but with decreased precipitation, 'highly suitable' areas decreased by as much as 91%. This methodology could readily be adapted and developed for other soil and climatic conditions.

Keywords: Iran, climate change, Karkheh River Basin (KRB), land suitability, Most Limiting Factor method (MLF), winter wheat.