

AUTOMATED SEASONAL BASED CLASSIFICATION ALGORITHM TO MONITOR DROUGHT EFFECT ON ZAYANDEH-RUD LAND USE/COVER CHANGE USING TIME SERIES NOAA-AVHRR SATELLITE DATA.

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INTRODUCTION

This research is done on Zayandeh-Rud basin which is one of the most important and strategic regions of Iran. The continuing growth of urban population and rapidly increasing demand on land and water resources have led to a competition on land and water between the industrial and the agricultural sectors. Although drought is one of the most important hazards affecting land use/land cover in Zayandeh-Rud catchment; however, there is a confusion to explain the main root causes of land use/cover change and consequently land and water degradation. Therefore, the main objective of this research set to evaluate the potential drought-events impacts on land use/cover dynamics over a 10-year period (1992-2003).

MATERIALS AND METHODS

At the first phase, primarily, Standard Precipitation Index (SPI) computed for 1970-2003 rainfall records of weather gauge stations. Then, the methods with the best performances depicted to produce the spatio-temporal SPI drought index layer. At the second phase, a seasonal-based classification algorithm for AVHRR (Advanced Very High Resolution Radiometer) data developed to enhance the classification accuracy. The model works based on the seasonal values of Normalized-Difference Vegetation Index (NDVI) correlated to vegetation canopy cover. The algorithm was compared with the maximum likelihood supervised classification algorithm.

RESULTS AND DISCUSSION

Application of seasonal-based classification algorithm results demonstrated an increase at overall accuracy from 74.34% (in the maximum likelihood), to 90.07% (in the seasonal-based method) and the Kappa index from 70.58%, (in maximum likelihood), to 88.8% (in seasonal-based method). Based on the final statistical analysis, in the final phase, SPI drought index showed statistically significant relationship to change in rain fed areas ($R^2=0.82$), barren land areas ($R^2=0.51$), mixed garden and irrigated areas ($R^2=0.49$), water bodies area ($R^2=0.45$) and rangelands under both medium and good conditions ($R^2=0.42$). Nevertheless, statistically, no significant relationship found for forest and reforestation areas ($R^2=0.28$), rangelands under fair to poor conditions ($R^2=0.12$) and irrigated cropland areas ($R^2=0.00$). In conclusion, based on the research results, the potential key factor of landscape change at the most part of Zayandeh-Rud catchment recognized as the natural drought. However, in forest and reforestation areas, rain fed croplands and rangelands under both fair and poor conditions, other driving factors are in priority. In such areas, human activities in different aspects, such as over grazing in poor rangeland area, clear cutting and deforestation in forestland areas and land cover disturbances by natural rangelands deformation to low performance rain fed croplands, might be main cause of land disorders in the research area.

Key Words:

Seasonal Based Classification, NOAA AVHRR, Zayandeh-Rud.

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