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Extended Abstracts

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Wetland hydrology

title: **Eco-hydrological monitoring of wetlands in a semi-arid region using remote sensing, GIS, GPS and various data sets: a case study of Konya closed basin, Turkey**

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INTRODUCTION

Wetlands are considered the most biologically diverse, fertile, productive, regulatory and informative ecosystems on earth. Desertification of wetland is a common problem mainly driven by scarcity of water due to global warming, depletion of groundwater aquifer, man made construction of extensive drainage canal networks, and reservoirs on rivers feeding wetlands, etc (Komuscu, 2000; Ünal, Sargın et al. 2009). The study was conducted for the wetlands around the lake Tuz in Konya closed basin, in Turkey. The lake Tuz is undergoing desertification, has lost its 60 % water over the past 18 years (Özkaymak, 2009). Konya closed basin has witnessed a decline in groundwater level in the past 3 decades. The wetlands ecosystem, surrounding the lake Tuz, has rainfall and ground water recharge as hydrological inflow where as evapotranspiration as hydrological outflow. The eco-hydrological monitoring of the wetlands gives a clear picture of its dynamics in relation with the surrounding environment. The objective of this study was to monitor eco-hydrological variables by quantifying Actual Evapotranspiration (ET_a) and Normalized Deviation Vegetation Index (NDVI) as hydrological and ecological variables in the wetlands. Estimation of ET_a and NDVI spatio-temporally utilizing earth observation data, field data using remote sensing, Geographic Information System (GIS), Global Positioning System (GPS) and time series analysis were done. For the quantification of ET_a spatio-temporally, the MODerate-resolution Imaging Spectroradiometer (MODIS) data was used for the year 2000, 2004 and 2008. Image pre-processing and Surface Energy Balance System (SEBS) processing were carried out to calculate the energy fluxes and ET_a . Time series of ET_a spatial distribution have been made for different 12 habitat types in the wetland.

STUDY AREA

The wetland, near Lake Tuz, is located between 38°11' - 39°18'N latitudes and 32°15' - 34°15'E longitudes in the Konya closed basin to the south from Ankara in the heart of Turkey. The wetland is of an irregular shape having total area of 7651 km². It is situated at an elevation of 905 m above mean sea level (Gökmen, 2009).

RESEARCH METHODS

To study ecological dynamics of spatio-temporally for different habitat types in the wetlands, NDVI, MODIS-derived vegetation index, was used for the year 2000 to 2008. The ecological index, NDVI was also derived from SEBS processing of MODIS data for the year 2000, 2004 and 2008. The ET_a and NDVI was inter and intra related with other meteorological variables to have better understanding of dynamics of the wetlands ecosystem.

RESULT AND DISCUSSION

This section discusses results of the study in quantifying hydrological flux and ecological variables spatio-temporally and finding the inter-relationship among these variables in the wetlands in semi-arid closed basin by utilizing earth observation, GIS, meteorological and field observation data.

Figure 1 is graphically plot of annual mean NDVI and annual rainfall from year 2000 to 2008. The mean NDVI represents mean of NDVI of D6.1, E1.2 and E6.2 habitat types in the wetlands.

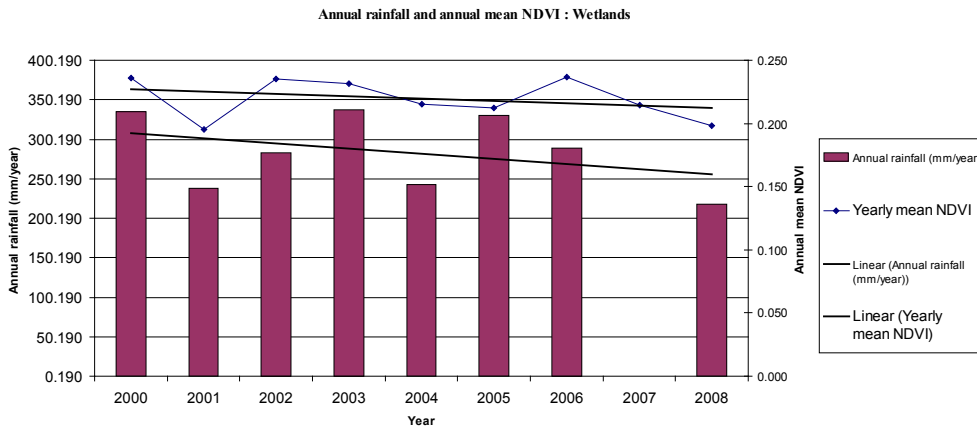


Figure 1. Annual mean NDVI and annual rainfall in the wetlands.

The overall results of the study were that the ET_a and NDVI for various habitat types have declining trend over the year 2000 to 2008. The annual mean rainfall and class A pan evaporation in the study area also had declining trend during overall study period. These demonstrate that the wetlands of Konya closed basin in the semi – arid region are in the process of desertification.

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