



Spatial and temporal variations of water erosion, aridity and vegetation

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ABSTRACT: Temporal and spatial variations of Potential Water Erosion and Aridity risk indexes, and Vegetation Cover were analysed in Central and North Eastern part of Turkey. This paper presents some analyses of monthly, seasonal and annual fluctuations of rainfall rate, air temperature, aridity index, potential water erosion index values and sediment contents for the selected stations in terrestrial and North Eastern Coastal parts of Turkey. Climatological data of monthly mean and annual total rainfall rate, air temperature and evaporation observed between 1901-2001 were considered. Temporal and spatial variations of normalized values were analysed. Climatological changing effects on rainfall, air temperature, drought risk, aridity indices, simple departure index and precipitation concentration index near vicinity of rural and coastal parts were calculated. Rainfall rate, aridity, desertification and drought risk indices, Normalised Difference Vegetation Index (NDVI), map of dryness risk class have been analysed. Climatological changing effects on meteorological parameters were considered by comparing the normal values of parameters recorded between 1930 and 1960 with the observations between 1901 and 2001. Remotely sensed satellite data were used to select experimental sites for more detailed analyses. Desertification Risk Index (DRI) and other normalised data were compared. There is no aridity risk at the north eastern part of Turkey, but Central Anatolia is under the aridity risk. This paper includes some results of the research project supported by the *Turkish Scientific and Technical Research Centre (TUBITAK)*.

Keywords: Aridity and Drought Risk Indexes, Potential Water Erosion, Desertification Risk Index, NDVI.

INTRODUCTION:

Main aim of the paper is to compare potential water erosion risk classes with vegetation cover and sediment concentration values in rural and coastal part of Turkey.

Many large and meso-scale climate change simulations for the 21st century are based on concentration of green house gasses, (Giorgi and Francisco, 2000). The role of regional climate changing on erosivity and aridity factors were investigated by using some measuring and modelling techniques, Feoli et al., (2000), Turkes (1999).

In scientific researchs that associate the atmospheric water regulation and environment, and especially archieving and interpreting the rainfall statistics, meteorological data is very important. Ground measuring systems and remote sensing techniques are essential for data archiving. Global drought is the most damaging environmental phenomenon.

Vegetation greenness impacts on maximum and minimum air temperature, and micro-climate has been considered in the analysis of temperature forecasting and modelling. Vegetation cover needs to be included as a factor in surface temperature forecasting, numerical modelling, and climate change assessments.

The main aim of this study is: i)to analyse climatological changing effects on air temperature, rainfall rate, relative humidity, ii)) to define aridity risk, iii) to define temporal and spatial variation of vegetation cover, iv)to define transition regions of precipitation concentration index, v) to define variation of simple climatic deviation index. For this purposes, some ground measurements of meteorological variables and remote sensing data have been analysed in time and space domains, Feoli (2000), Turkes et al (2002).

Study Area and Data

Monthly total rainfall rate and average air temperature values were considered in central Anatolia and North Eastern Coastal Part of Turkey from 1901 to 2001, New et al, (1999, 2000). Together with surface measurements, remote sensing data (NOAA AVHRR, VIS and NIR) for different periods (1986-87, 1994-2002) have been considered.

1 RESULTS

The cities in Central Anatolia, Konya and Kayseri are under the dry conditions. Rainfall rate values have increased in the northwestern part of Central Anatolia. Total annual rainfall rate values would be more than 600mm in following 30 years period, Aslan et al, (2004). There is a significant evidence of this trend for $\alpha = 0.05$ in this part. Based on long term estimations, wet conditions are expected beginning from 2003. In North Eastern Black Sea Region, annual total rainfall rate values generally show an increasing trend except Samsun.

There is no aridity risk at the North Eastern part of Turkey. Central Anatolia is under the aridity risk. In Eastern part, semi-humid or dry conditions have been observed instead of humid or semi-humid conditions in recent years.

Analysis show that Central Anatolia has a moderate seasonal rainfall distribution. Black Sea region has a uniform rainfall distribution in the previous periods.

Regional Variation of Simple Climate Departure Index (SCDI) values are increased in these regions. The highest increasing values have been recorded in Central Anatolia. In this part, SCDI values are greater than zero and, positive SCDI values correspond to positive departures of precipitation. Between 1901-1930, 1961-1990 and 1991-1998, in Central Anatolia there is seasonal rainfall distribution. At Black Sea Region, until 1990, uniform rainfall distribution was observed.

Analysis of density of vegetation cover (Normalised Vegetation Index, NDVI) variations are presented in this paper. In summer period, except Black Sea Region, NDVI values are low in Turkey. In general, beginning from 2000, NDVI values show an increasing trend in study area.

CONCLUSIONS

This study is related with the utilisation and interpretation of some surface measurements together with the remote sensing data to explain and have some solutions of urbanization and land use planning.

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