

Agricultural Drought Vulnerability Assessment of Tanahun District, Nepal

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SUMMARY

Among different types of natural hazards, drought is the most complex and the least understood one. Low rainfall and an increase in soil temperature are the prime causes of agricultural drought. The most immediate consequences of drought are a fall in crop production so that farmers faced difficulty to sustain life, a decrease in the economy of the country, and a change in environmental conditions. Geographic Information Systems (GIS) and Remote Sensing (RS) technologies play a significant role in exploring and analyzing agricultural drought; such geospatial techniques classify different kinds of hazards either natural or manmade. Temporal satellite data of 10 years (2007-2016) of the Tanahun district were used to analyze and assess drought severity and a drought risk map was prepared. Additionally, a Land Use Land Cover (LULC) map of the study area was made. Ten rainfall stations, inside the district as well as close proximity districts, were taken to derive the Standardized Precipitation Index (SPI) from which meteorological drought risk map was prepared using GIS. Three indices named Standardized Precipitation Index (SPI), Normalized Difference Vegetation Index (NDVI), and Moisture Stress Index (MSI) were considered for the project. Landsat imageries were acquired from the United States Geological Survey (USGS) and radiometric corrections were applied; after that NDVI and MSI were extracted. Different weights were specified to these three indices and finally integrated to prepare a drought risk map with five different severity classes. The total area covered by different risk levels were categorized as very high, high, moderate, slight, and no risk as 1.02%, 48.8%, 34.07%, 14.24%, and 1.87% respectively. Correlation between mean rainfall and mean NDVI was performed and found to be a positive medium of 0.32. The drought risk map shows that most of the areas of the district were vulnerable to agricultural drought. As the rate of rainfall descends, the crop production also decreases so that it is inevitable to irrigate the agricultural realms by means of constructing irrigation channels at possible locations and changing the type of plantation which is the best alternative.

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