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Drought Vulnerability Detection and Mapping in Attapadi, A Part of Southern Western Ghats, India- Using Geoinformation Science and Technology

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Abstract: ***Drought is an insidious hazard of nature which is considered by many to be the most complex but least understood of all natural hazards. It is among the natural disaster that causes damages and affects many people's life in many part of the world. Drought can be divided into four categories of meteorological, hydrological, agricultural and social-economic. Drought vulnerability is a concept which shows the likelihood of damages from hazard in a particular place by focusing on the system status prior to the disaster. Drought vulnerability has been viewed as a potential for losses in the region due to water deficiency at the time of drought. In this study the vulnerability of drought in Attapadi province in Palakkad district is investigated by providing vulnerability maps which demonstrates spatial characteristics of drought vulnerability.Modern technology has made substantial contribution in the identification of drought vulnerable area. The modern technology used in present system for drought prone area identification is remote sensing and geographic information system. Drought is one of the climatic, natural disasters, having an impact on both the economy and the society, with its long-standing problems. Drought by nature is a result of inter-related parameters. The study is based on the concept that the severity of the drought is a function of rainfall, hydrological and physical aspects of the landscape, leading to meteorological, hydrological and physical drought. In the present study a Geographic Information Systems (GIS) and remote sensing -based tool for drought vulnerability assessment at a micro level has been developed. The result of this study can be used for preparedness planning and for allocating resources for facing droughts in this region.***

Keywords: Drought, Geographic Information System, Remote Sensing, Attapadi, Vulnerability Maps

1. Introduction

Drought is considered by many to be the most complex but least understood of all natural hazards, affecting more people than any other hazard (Abdel Aziz Belal ,2014). Drought risk is a product of a region's exposure to the natural hazard and its vulnerability to extended periods of water shortage (Nishadi,2015). Drought is a period of abnormally dry weather sufficiently for the lack of precipitation to cause a serious hydrological imbalance and carries connotations of a moisture deficiency with respect to man's usage of water. GIS is an information system that is designed to work with data referenced by spatial or geographic coordinates. GIS combined with MCE (Multi-Criteria Evaluation) can achieve measurable evaluation of drought risk. Karamouz *et al,* 2015, introduced Technologies for evaluating agriculture meteorological drought risk with GIS-MCE. The results indicated that technology of GIS-MCE can combine multiple source information associating with agriculture meteorological drought risk and achieve measurable result. Satellite remote sensing provides a synoptic view of the land and a spatial context for measuring drought Impacts, which have proved to be a valuable source of spatially continuous data with improved information for monitoring vegetation dynamics. Sierra-Soler *et al,* 2015 used the newly developed LULC methodology to determine the effects of drought in specific classes with great precision.

According to Jerrod *et al,* 2016, Earth observation satellites could prove useful for the assessment and evaluation of drought effects in forest ecosystems. The objective of his study were to briefly review the existing sources of remote sensing data and their potential to detect drought damage; to review the remote sensing applications and studies carried out during the last two decades aiming at detecting and quantifying disturbances caused by various stress factors, and especially those causing effects similar to drought. If nations and regions are to make progress in reducing the serious consequences of drought, they must improve their understanding of the hazard and the factors that influence vulnerability. It is critical for drought-prone regions to better understand their drought climatology (i.e., the probability of drought at different levels of intensity and duration) and establish comprehensive and integrated drought information system that incorporate climate, soil, and water supply factors such as precipitation, temperature, soil moisture, snow pack, reservoir and lake levels, ground water levels, and stream flow. All drought prone nations should develop national drought policies and preparedness plans that place emphasis on risk management rather than following the traditional approach of crisis management, where the emphasis is on reactive, emergency response measures. Crisis management decreases self-reliance and increase dependence on government and donors. India is predominantly an agrarian country as more than 70% of its population is dependent on agriculture. Due to the vagaries of rainfall more than 68% of the net sown area in the country is drought prone, out of which 50% is severe in nature. The country experiences drought every 2 to 3 years in one part or other (Jeyaseelan et al., 2001). The nation experienced phenomenal drought condition in the years 1972, 1979 and 1989 (C.S.E, 2001). UNICEF reported that 'an estimated 130 million people – 15 percent of the population – in more than 70,000 villages and 230 urban