

## Assessing the Risk of Socio-economic Drought: A Case Study of Chuxiong Yi Autonomous Prefecture, China

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**Abstract :** Drought is one of the most complex and destructive natural disasters, with a huge impact on both nature and society. In recent years, adverse climate conditions and uncontrolled human activities have exacerbated the occurrence of global droughts, among which socio-economic droughts are closely related to human survival. The study of socio-economic drought risk assessment is crucial for sustainable social development. Therefore, this study comprehensively considered the risk of disaster causing factors, the exposure level of the disaster-prone environment, and the vulnerability of the disaster bearing body to construct a socio-economic drought risk assessment model for Chuxiong Prefecture in Yunnan Province. Firstly, a three-dimensional frequency analysis of intensity area duration drought was conducted, followed by a statistical analysis of the drought risk of the socio-economic system. Secondly, a grid analysis model was constructed to assess the exposure levels of different agents and study the effects of drought on regional crop growth, industrial economic growth, and human consumption thresholds. Thirdly, an agricultural vulnerability model for different irrigation levels was established by using the DSSAT crop model. Industrial economic vulnerability and domestic water vulnerability under the impact of drought were investigated by constructing a standardized socio-economic drought index and coupling water loss. Finally, the socio-economic drought risk was assessed by combining hazard, exposure, and vulnerability. The results show that the frequency of drought occurrence in Chuxiong Prefecture, Yunnan Province is relatively high, with high population and economic exposure concentrated in urban areas of various counties and districts, and high agricultural exposure concentrated in mountainous and rural areas. Irrigation can effectively reduce agricultural vulnerability in Chuxiong, and the yield loss rate under the 20mm winter irrigation scenario decreased by 10.7% compared to the rain fed scenario. From the perspective of comprehensive risk, the distribution of long-term socio-economic drought risk in Chuxiong Prefecture is relatively consistent, with the more severe areas mainly concentrated in Chuxiong City and Lufeng County, followed by counties such as Yao'an, Mouding and Yuanmou. Shuangbai County has the lowest socio-economic drought risk, which is basically consistent with the economic distribution trend of Chuxiong Prefecture. And in June, July, and August, the drought risk in Chuxiong Prefecture is generally high. These results can provide constructive suggestions for the allocation of water resources and the construction of water conservancy facilities in Chuxiong Prefecture, and provide scientific basis for more effective drought prevention and control. Future research is in the areas of data quality and availability, climate change impacts, human activity impacts, and countermeasures for a more comprehensive understanding and effective response to drought risk in Chuxiong Prefecture.

**Keywords :** DSSAT model, risk assessment, socio-economic drought, standardized socio-economic drought index

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