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Assessment of the Vulnerability of Paddy Cultivation to Impacts of Climate Change in Anuradhapura District in North Central Province, Sri Lanka

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Abstract

Anuradhapura District in Sri Lanka heavily relies on paddy cultivation and plays a significant role in the country's paddy production. Given the grave threat posed by climate change to paddy cultivation in this region, it is crucial to assess its vulnerability. This study aims to fill the gap in sub-national vulnerability assessments by determining the degree of vulnerability and mapping it in the district. A combination of secondary and primary data was employed in this study. Secondary data encompassed the analysis of average annual and monthly rainfall and temperature variations in Anuradhapura District from 2010 to 2020, as well as the occurrence of droughts and floods in the same period. Additionally, the study examined the variations in average annual paddy yield in Anuradhapura District from 2010 to 2020. For primary data collection, Climate Change Vulnerability Indices (CCVI) were employed, which included indicators, exposure, sensitivity, and adaptive capacity. Under the exposure indicator, climate exposure, biophysical exposure, and biological exposure were considered. Sensitivity was assessed through social, financial, and farm sensitivity sub-indicators, while adaptive capacity was evaluated using socio-economic, agricultural, and institutional capacity sub-indicators. The field sampling focused on divisions with significant paddy lands that depend on minor irrigation and rainfed cultivation, such as Thirappane and Kahatagasdigiliya. Nuwaragam Palatha Central which had fewer paddy lands and a population engaged in non-paddy-related activities, was used as a control. Two Grama Niladhari (GN) divisions from each selected Divisional Secretariat (DS) division were randomly chosen for detailed sampling. In each GN division, 50 families were randomly selected to participate in semi-structured questionnaire surveys supplemented with focus group discussions and key informant surveys. The collected data were used to create a vulnerability map for Anuradhapura District through GIS analysis. The study results revealed that the annual rainfall showed a decrease from 2010 to 2020. Other parameters did not show significant variation. In terms of vulnerability, Kahatagasdigiliya DSD exhibited the highest vulnerability followed by Thirappane DSD. The lowest vulnerability was observed in Nuwara Gampalatha Centre DSD.

Keywords: Climate change, Paddy cultivation, Adaptation measures, Vulnerability assessment, Anuradhapura

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