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**Identifying Spatial Clusters of Vulnerability Levels to Floods: An Initiative to Improve Disaster Resilience**

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**Abstract**

Floods, the most frequent natural disaster in Sri Lanka, has become one of the significant barriers to the social and economic wellbeing of the country. Given that the frequency and intensity of the floods will be increased in the small island developing states in the tropical region as per the predictions of Intergovernmental Panel on climate change, it is timely essential to investigate how the vulnerability levels can be assessed as an initiative to strengthen the resilience of the communities. This study aims to identify spatial clusters of vulnerability levels of the flood-prone regions selecting Ihala Welgama Grama Niladhari division (GND) in Bulathsinhala divisional secretariat division in Kalutara district as the case study. This study uses multi-dimensional aspects of vulnerability, including social, physical, economic, institutional and attitudinal aspects of vulnerability to deepen the understanding of the vulnerability levels and to identify spatial clusters. Accordingly, indices were developed based on selected variables related to each of the above aspects to derive the multi-dimensional vulnerability levels. A household questionnaire survey was developed to get the data required for calculating above indices, and this survey covered the entire population of the GND (100 households). Then, the indices were calculated for each household unit of the GND. Standardised values of each sub-index ranging from 0-1 were clustered using multivariate clustering of ArcGIS pro to identify spatial clusters. Three clusters (high, moderate and low vulnerable spatial clusters) were identified based on the optimised Pseudo F-Statistics. Highly vulnerable cluster accounted for 28% of the total households, and 51% of the households are moderately vulnerable to floods. Only 21% showed a low vulnerability. Majority of the households in the highly and moderately vulnerable clusters were located within the closer proximity to the river compared to the low vulnerable cluster. Mapping spatial clusters based on multiple dimensions of vulnerability is an effective way to identify clusters that need to prioritise in enhancing the resilience of households in flood-prone areas.

**Keywords:** Resilience, Vulnerability, Multivariate clustering, Spatial, Floods