

Title: Delineating the drought vulnerability zones in Bangladesh

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Abstract: The research aims to explore the vulnerability of Bangladesh to drought by considering a comprehensive set of twenty-four factors, classified into four major categories: meteorological, hydrological, agricultural, and socioeconomic vulnerability. To achieve this, the study utilized a knowledge-based multi-criteria method known as the Analytic Hierarchy Process (AHP) to delineate drought vulnerability zones across the country. Weight estimation was accomplished by creating pairwise comparison matrices for factors and different types of droughts, drawing on relevant literature, field experience, and expert opinions. Additionally, online-based interviews and group discussions were conducted with 30 national and foreign professionals, researchers, and academics specializing in drought-related issues in Bangladesh. Results from overall drought vulnerability map shows that the eastern hills region displays a notably high vulnerability rate of 56.85% and an extreme low vulnerability rate of 0.03%. The north central region shows substantial vulnerability at high levels (35.85%), while the north east exhibits a significant proportion (41.68%) classified as low vulnerability. The north west region stands out with a vulnerability rate of 40.39%, emphasizing its importance for drought management strategies. The River and Estuary region displays a modest vulnerability percentage (38.44%), suggesting a balanced susceptibility distribution. The south central and south east regions show significant vulnerabilities (18.99% and 39.60%, respectively), while the south west region exhibits notable vulnerability of 41.06%. The resulting model achieved an acceptable level of performance, as indicated by an area under the curve value of 0.819. Policymakers and administrators equipped with a comprehensive vulnerability map can utilize it to develop and implement effective drought mitigation strategies, thereby minimizing the losses associated with drought.

Key words: Drought Vulnerability Analytic Hierarchy Process (AHP) Multi-Criteria Decision Analysis (MCDA) Bangladesh Meteorological Factors

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