

Agriculture vulnerability assessment in selected municipalities of Karnali Province

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Introduction

Karnali Province is a region known for its challenging geography, agricultural systems, and climatic conditions that led the question of food security every year. Geospatial techniques, including remote sensing and geographic information system ease the decision-making process. The study areas comprises 34 wards from three Palikas with different geographical settings – Simikot in Humla, Dullu in Dailekh and Bheriganga in Surkhet.

Research questions

- To analyze agricultural vulnerability in the municipal wards and to prioritize them for agricultural planning using composite vulnerability index (VI).

Methodology

The checklist of vulnerability assessment indicators were prepared and surveyed among Palikas and Agricultural co-operatives. Secondary information about disasters were compiled and the vulnerability indicators were assessed using the categories- low, medium, high. Each factor was assigned a score from 1 to 5 based on its contribution to overall vulnerability. The Vulnerability Index (VI) was normalized between 0 and 1, and the total vulnerability score was calculated.

Key findings

The analysis reveals that agricultural vulnerability is significantly influenced by the factors-land use & land cover, drainage systems, slope stability, market access, livestock, and road accessibility. The VI value for Simikot-1 was found to be above 0.8, indicating it is extremely vulnerable among the 34 wards across the three municipalities. Wards 1, 8, and 13 in Dullu, Wards 4, 7, and 8 in Simikot, and Ward 13 in Bheriganga were identified with high VI scores, while Dullu-4 and Bheriganga-7 had the lowest VI scores.

		Indicator					
		Drainage System	Slope Stability	Market Availability	LULC	Livestock	Road Access
Ward	Bheriganga-1	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-2	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-3	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-4	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-5	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-6	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-7	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-8	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-9	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-10	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-11	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-12	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Bheriganga-13	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-1	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-2	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-3	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-4	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-5	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-6	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-7	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-8	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-9	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-10	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-11	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-12	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Dullu-13	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-1	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-2	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-3	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-4	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-5	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-6	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-7	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW
	Simkot-8	VERY LOW	LOW	MODERATE	HIGH	VERY HIGH	VERY LOW



Conclusion

The overall vulnerability index reflects the higher access or better conditions leading to lower vulnerability, and poorer access or unfavorable conditions resulting in higher vulnerability. The results support decision-making and prioritization of agricultural interventions, highlighting the importance of geospatial data for effective agricultural planning and management. Limited access to modern farming technologies, insufficient infrastructure, and pervasive poverty contribute to the overall fragility of agricultural systems.

