Integrating Machine Learning and Community-Based Approaches for Enhanced Early Warning Systems in Cascading Hazard Zones: A Case Study from Melamchi, Nepal

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Key words: Hydrography; Land management; Remote sensing; Risk management; early warning systems

SUMMARY

This study presents a comprehensive early warning system for cascading hazards in the Melamchi region of Nepal, integrating satellite data, machine learning, and community engagement. Ground-based surveys complement this by mapping risk zones, with local citizens actively marking flood entry points and landslide-risk areas. Utilizing Random Forest Regression, we assess flood and landslide susceptibility, enhancing predictive accuracy. This multi-faceted approach not only improves hazard prediction but also fosters community resilience and preparedness, offering a robust model for disaster risk reduction in vulnerable regions. This approach strengthens the technical aspect and also empowers local community by engaging them in disaster management process. By combining scientific data with local knowledge, it provides long-term preparedness in vulnerable regions. This model could be replicated in other areas exposed to similar risks.

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