Review of: "Exploring the Impact of Future Land Uses on Flood Risks and Ecosystem Services, With Limited Data: Coupling a Cellular Automata Markov (CAM) Model, With Hydraulic and Spatial Valuation Models"

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Potential competing interests: No potential competing interests to declare.

This study provides a comprehensive exploration of the intricate relationship between land use changes and their impact on hydrological processes and flood risks. The integration of Cellular Automata Markov (CAM) modeling with Geographic Information Systems (GIS) and Python showcases a novel approach to predict future land cover changes, emphasizing their potential implications on flooding. However, there are some issues which must be considered carefully

The study simplifies land use changes by not considering the spatial distribution unless explicitly programmed to do so. This oversimplification may not accurately capture the real-world complexity of land use dynamics, especially in regions with diverse and heterogeneous landscapes.

The Cellular Automata Markov (CAM) model works on a pixel-by-pixel basis, which might not adequately represent the interconnectedness of neighboring areas. This limitation can result in a less realistic portrayal of land use changes and their effects on flooding.

The behavior of the CAM model is highly dependent on the rules and parameters set. The study acknowledges this dependence and highlights the need for careful consideration, but it also means that variations in these parameters could lead to different results.

The study keeps the example simple by not including factors like proximity to existing urban centers in the CAM model. While this choice aligns with the goal of showcasing a limited-data approach, it may not fully represent the potential concentration of urbanization around existing centers.

The use of a design storm in the hydraulic model is a common but synthetic approach that might not capture the characteristics of real storms. This simplification could impact the accuracy of flood predictions and limit the model's ability to account for variations in storm patterns.

Although the study acknowledges the practical necessity of working with limited input data in data-scarce areas, this limitation may affect the generalizability of the findings to regions with more robust data availability.

While the study mentions the potential use of Machine Learning to improve prediction accuracy, it does not explore this avenue in-depth. Further exploration of machine learning techniques could enhance the model's performance.

The spatial Ecosystem Services Valuation (ESV) model's estimation of monetary impacts based on land cover changes might oversimplify the economic valuation process, overlooking various factors that contribute to the economic value of ecosystems.

The study primarily focuses on future land cover changes without deeply exploring the temporal dynamics and potential shifts in the hydrological processes over time.

The study assumes static transition probability matrices, and their applicability may vary over time. Incorporating dynamic matrices that account for evolving conditions could improve the model's accuracy.