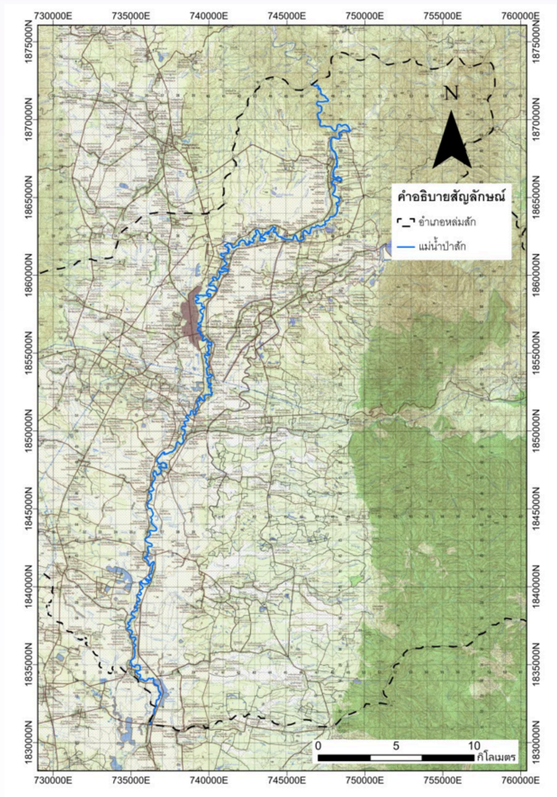
Analyzing Erosion Hotspots of Pa Sak River, Lom Sak District, Phetchabun Province Using Fluvial Geomorphic Indices.

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Abstract

This study aims to analyze cut-bank erosion hotspots along an 85-kilometer stretch of the Pa Sak River in Lom Sak District, Phetchabun Province. The research integrates Geographic Information Systems (GIS) with four key geomorphological and environmental factors: specific stream power index (SSPI), stream bend curvature, land use, and infrastructure density. All of these factors were derived from a Digital Elevation Model (DEM) and were processed using weighted overlay analysis (WOA) to prioritize their influences and classify erosion risk into five levels. The findings indicate that the majority of the study area is under high erosion risk (31.01%), followed by low (27.78%), moderate (22.03%), very low (9.82%), and very high (9.36%). Field validation revealed significant physical correlations: high- to very-high-risk areas exhibit pronounced erosion scars, steep banks, and high sinuosity (meandering). Conversely, very low to low-risk areas are characterized by slight curvatures, dense vegetation that enhances soil stability, and minimal evidence of erosion. These spatial insights provide a critical framework for strategic planning and disaster mitigation efforts.

Introduction



The Pa Sak River in Lom Sak District, Phetchabun Province, is highly susceptible to hydrological changes due to heavy rainfall and extreme monsoon storm events. These conditions have caused frequent flash floods. Geomorphologically, the river exhibits a meandering pattern.

The Pa Sak River is highly prone to lateral erosion due to its meandering nature and frequent extreme flooding. This study uses geomorphological indices and GIS to identify high-risk areas. The resulting erosion risk maps will serve as a crucial tool for local authorities in urban planning and disaster mitigation.

Objectives

1. To study the geomorphological characteristics of the Pa Sak River within the Lom Sak District, Phetchabun Province.
2. To identify and analyze potential erosion risk points along the Pa Sak river.
3. To examine the factors influencing the distribution of the identified erosion risk areas.

Methodology

DATA PREPARATION

Data Acquisition
- DEM
- Land use
- Infrastructure density

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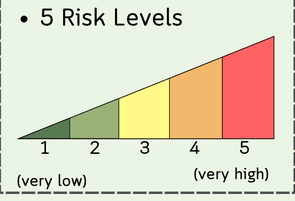
Feature Extraction
- Inflection point
- 500 m. Segmentation

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Index Calculation
- Stream Power index (SPI)
- Curvature
- Land use
- Infrastructure

GEOSPATIAL MODELING

Index Reclassification
- 5 Risk Levels



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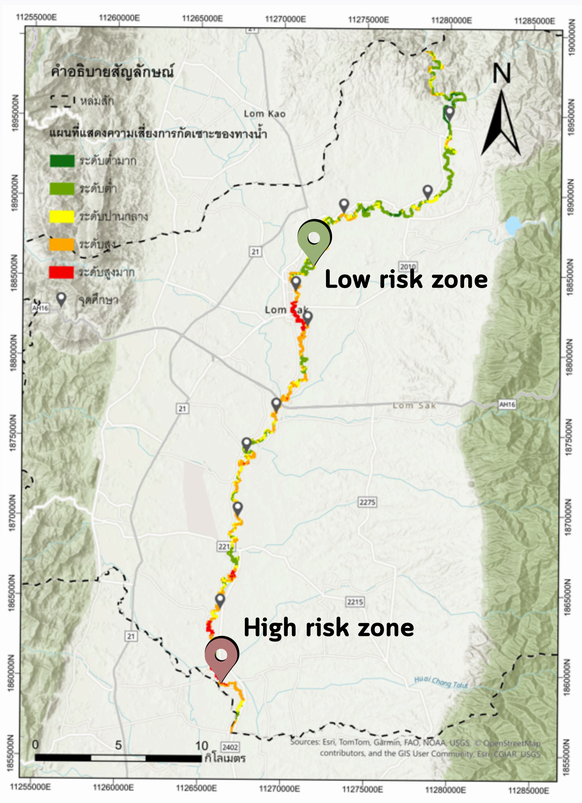
Weight Overlay Analysis
- SPI
- Curvature
- Land Use
- Infrastructure

→

Erosion Risk Map Pa Sak River

FIELD SURVEY
- 11 survey points along Pa Sak River
- Characterization of the river & erosion evidences

Results



Field surveys at 11 sites confirmed that



Low risk zone
- stabilized by dense vegetation
- Gentle slope
- No visible erosion scars



High risk zone
- Outer bank collapse
- structural damage

Risk level found in the area followed by
- Very Low 27.78%
- Low 9.82%
- Moderate 22.03%
- High Risk 31.01%
- Very High Risk 9.36%

High-risk hotspots are primarily concentrated in the central and southern parts of Lom Sak District, where meandering is most prominent and human activity is dense.

Conclusions

- Most of the Pa Sak River in Lom Sak is highly susceptible to bank erosion due to its meandering nature and high stream power during extreme flood events.
- Areas with low vegetation cover, bare ground, and high infrastructure density are more vulnerable, while areas with dense tree roots show better stability.
- The resulting erosion risk map provides a vital spatial framework for local authorities to implement effective flood protection and sustainable urban planning.

Acknowledgements

This study was supported by the Department of Geological Sciences, Chiang Mai University. The author expresses sincere gratitude to Asst. Prof. Dr. Pichawut Manopkawee and Assoc. Prof. Dr. Niti Mankhemthong for their invaluable guidance throughout this research. Special thanks to the Royal Thai Survey Department and the Alaska Satellite Facility (ASF) DAAC for providing essential spatial and satellite data. Finally, the author would like to thank my parent for their support during the field survey.

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