

# Impact of river sediment yield on sustainable agriculture in Rajapur Municipality, Bardiya

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## Introduction

Rajapur Municipality in Bardiya District, Lumbini Province, Nepal, relies heavily on agriculture, benefiting from its fertile land and abundant water resources. However, river sediment yield presents a significant challenge to sustainable agricultural development, affecting the livelihood of the predominantly farming population.

## Research questions

- How does river sediment yield impact the sustainability of agricultural practices in Rajapur, Bardiya?
- How does sediment deposition affect soil quality, water retention, and crop productivity?
- What are the socio-economic impacts of sediment yield on local farming communities?

## Methodology

The methodology involves simulating sediment transport and deposition using HEC-RAS 6.4.1 based on DEM and cross-sectional data from the Karnali River in Rajapur Municipality. Hydro-meteorological data were used as inputs. Calibration and validation were done using statistical indicators ( $R^2$ , NSE, RMSE). Key informant interviews and household questionnaire surveys, along with field verification, were conducted for further validation.

## Key findings

Sediment yield in Rajapur enriched soil but caused flooding and erosion, affecting soil quality, water retention, and crop productivity. The HEC-RAS 6.4.1 model identified significant sediment transport in Cross-Section 14000–753. Farmers adopted adaptive practices like crop diversification and sediment management, which improved soil fertility, productivity, and rural development.

## Conclusion

The study shows that sediment yield from the Karnali River significantly impacts agricultural productivity and soil fertility in Rajapur Municipality. While some benefit from enhanced soil fertility, others face land and crop losses. Sediment transport patterns, driven by land use, affect erosion, deposition, and rural development.

