Andrés Velastegui
dvelaste@espol.edu.ec
FICT/CIPAT, Ecuador

José García
FICT/GAD Portoviejo

Isabel Chuizaca
FICT/CIPAT

Renata Pacheco
INPE

Christhian Santana
University of Rio Grande do Sul

José Ochoa
University of Maryland Baltimore County

Mijail Arias
FICT/CADS

Assessing regressive erosion effects: Unveiling riverside land use land cover changes post hydroelectric project construction

INTRODUCTION

Fluvial erosion → Floodplain instability; Landslides

Regressive erosion → Irrigation; Hydropower plants

OBJETIVE

Assess the effects of regressive erosion along the Coca River through changes in land use and land cover (LULC) to identify the impact of CCSHP operations on migration, deposition, and river channel erosion during 2017–2021

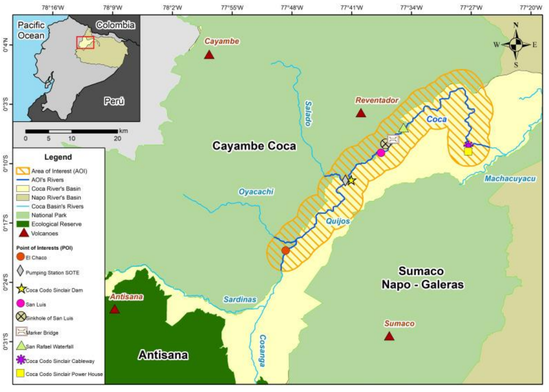

Fig. 1. Area of Interest (AOI) location map and research benchmarks

METHODOLOGY

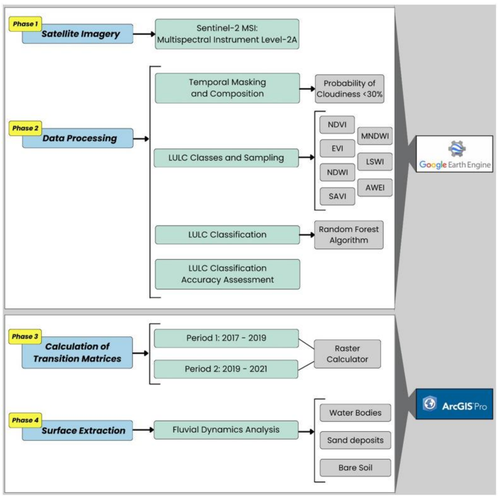

Fig. 2 Flowchart of the applied methodology

RESULTS

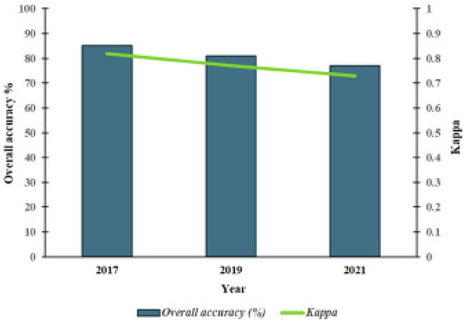

Fig. 3 Overall accuracy and Kappa values for each year of interest

Table 2. Surface area values for each class for the three years of interest

	LULC 2017		LULC 2019		LULC 2021	
Classes	ha	km²	ha	km²	ha	km²
Water bodies	763.73	7.64	1023.39	10.23	1292.78	12.93
Forest	37874.06	378.74	38553.27	385.53	35887.67	358.88
Pasture	21351.95	213.52	15935.49	159.35	16606.27	166.06
Bare soil	2069.98	20.70	7267.22	72.67	8574.66	85.75
Sand deposits	1231.54	12.32	528.29	5.28	916.45	9.16
Urban area	269.33	2.69	252.13	2.52	280.21	2.80

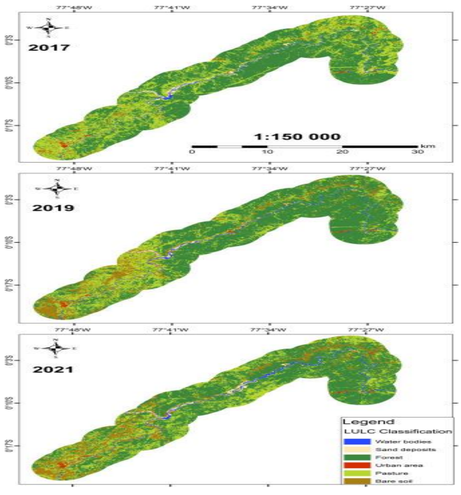

Fig. 4. LULC classification map within the AOI

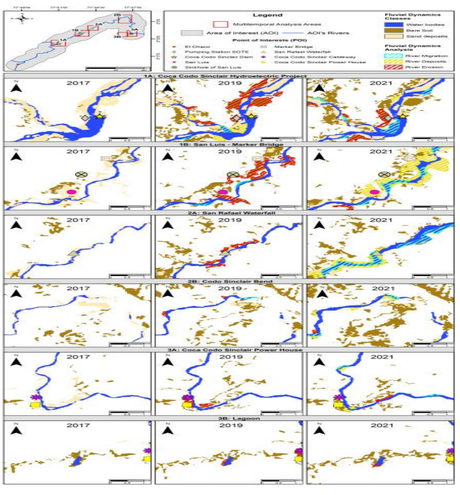

Fig. 5. Multi-temporal analysis of the Coca River fluvial dynamics

CONCLUSION

- The retrogressive erosion of the Coca River transforms forest and agricultural cover into sand deposits and bodies of water, demonstrating a critical impact on river dynamics.
- Although the CCSHP project generates 34% of Ecuador's electricity, its adverse effects require urgent assessment and control to mitigate risks.
- Innovation and prevention in satellite monitoring and geomorphological analysis to better understand changes in rivers and prevent natural disasters.

RECOGNITIONS

- GeoINSPIRAR Recognition of Excellence by Esri