



INTERACTIVE WEBGIS PORTAL FOR LANDSLIDE SUSCEPTIBILITY GRADING

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ABSTRACT

This project evaluates landslide susceptibility in the Nilgiris district using various geo-environmental and topographic factors like slope, aspect, rainfall, lithology, LULC, etc.. Data from remote sensing, DEMs, and GIS tools were used to prepare input layers, while past landslide records supported model training and validation. The Random Forest algorithm classified the area into five risk zones, from Very Low to Very High. An interactive WebGIS portal was developed to visualize these zones, offering a useful tool for planners and disaster management authorities.

NEED FOR STUDY

- The Nilgiris region is highly prone to landslides due to steep slopes, heavy rainfall, and fragile geology, posing risks to life, infrastructure, and the environment.
- Frequent landslides disrupt transportation, damage property, and affect livelihoods, necessitating effective prediction and mitigation strategies.
- Integrating AI-based susceptibility models with an interactive WebGIS portal enhances real-time decision-making for disaster management and land-use planning.

OBJECTIVES

- To develop and deploy an interactive WebGIS Portal for Geospatial visualization.
- To implement and evaluate landslide susceptibility models using Random Forest in Google Earth Engine.
- To develop and deploy a WebGIS Portal by integrating landslide susceptibility grading for interactive visualisation.

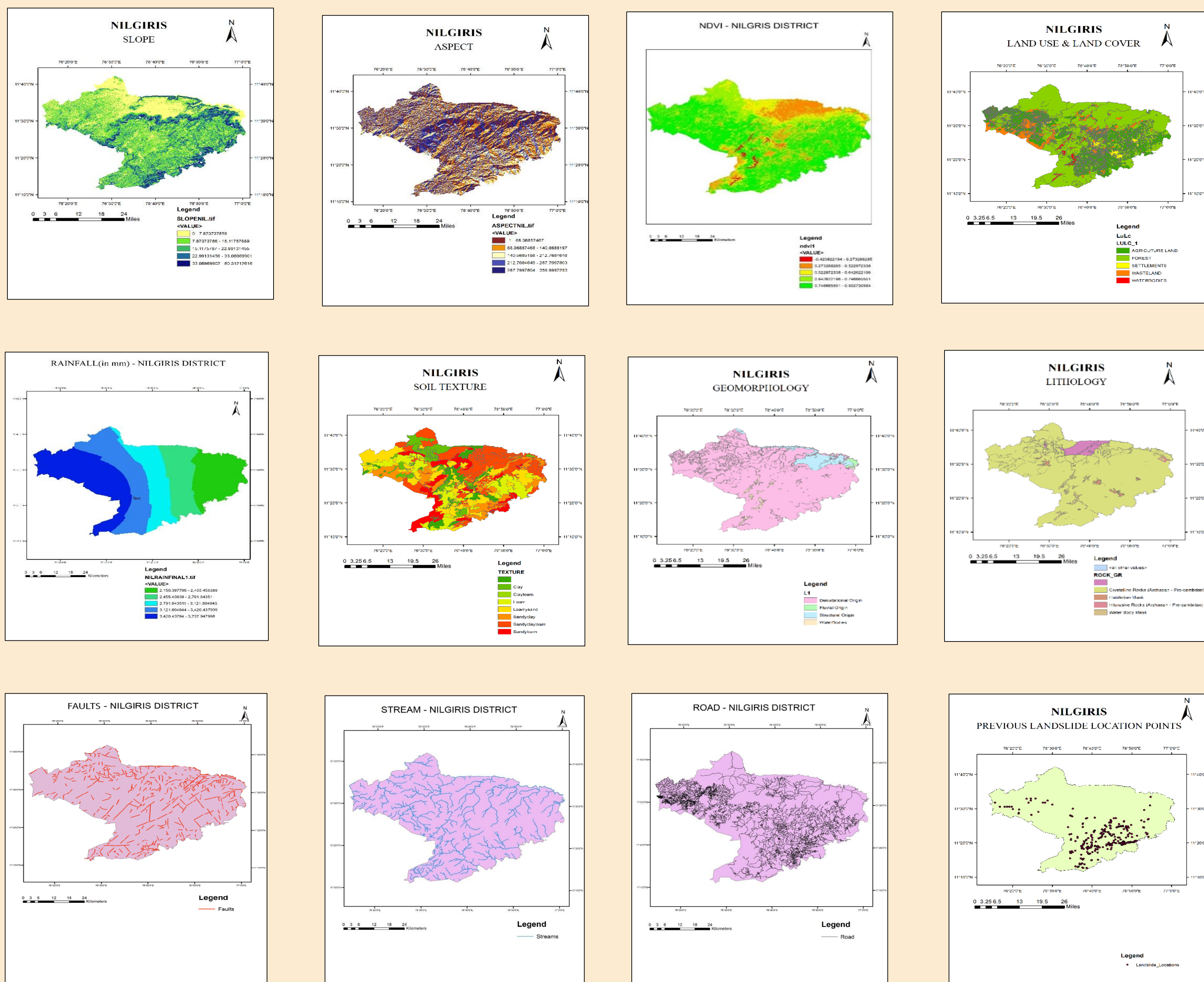
STUDY AREA

The Nilgiris, located in the western part of Tamil Nadu, India, is a mountainous region known for its rugged terrain, dense forests, and high susceptibility to landslides due to steep slopes and heavy monsoon rainfall. The district is part of the Western Ghats, a UNESCO World Heritage Site, and is ecologically significant.

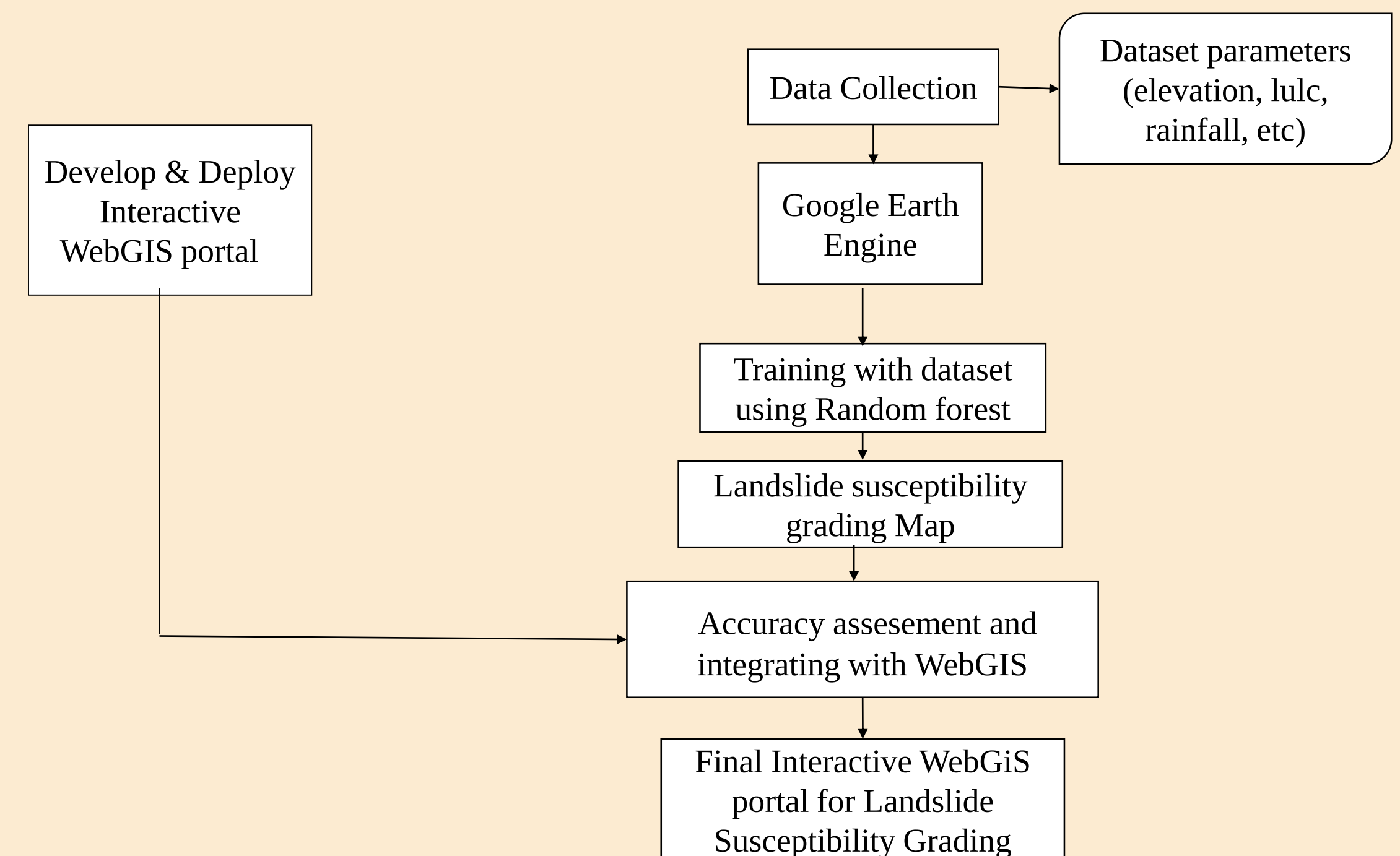
- Latitude:** 11.4102° N
- Longitude:** 76.7075° E
- Total Area:** 2,552 km²
- Elevation:** Ranges from 900 m to 2,637 m above sea level



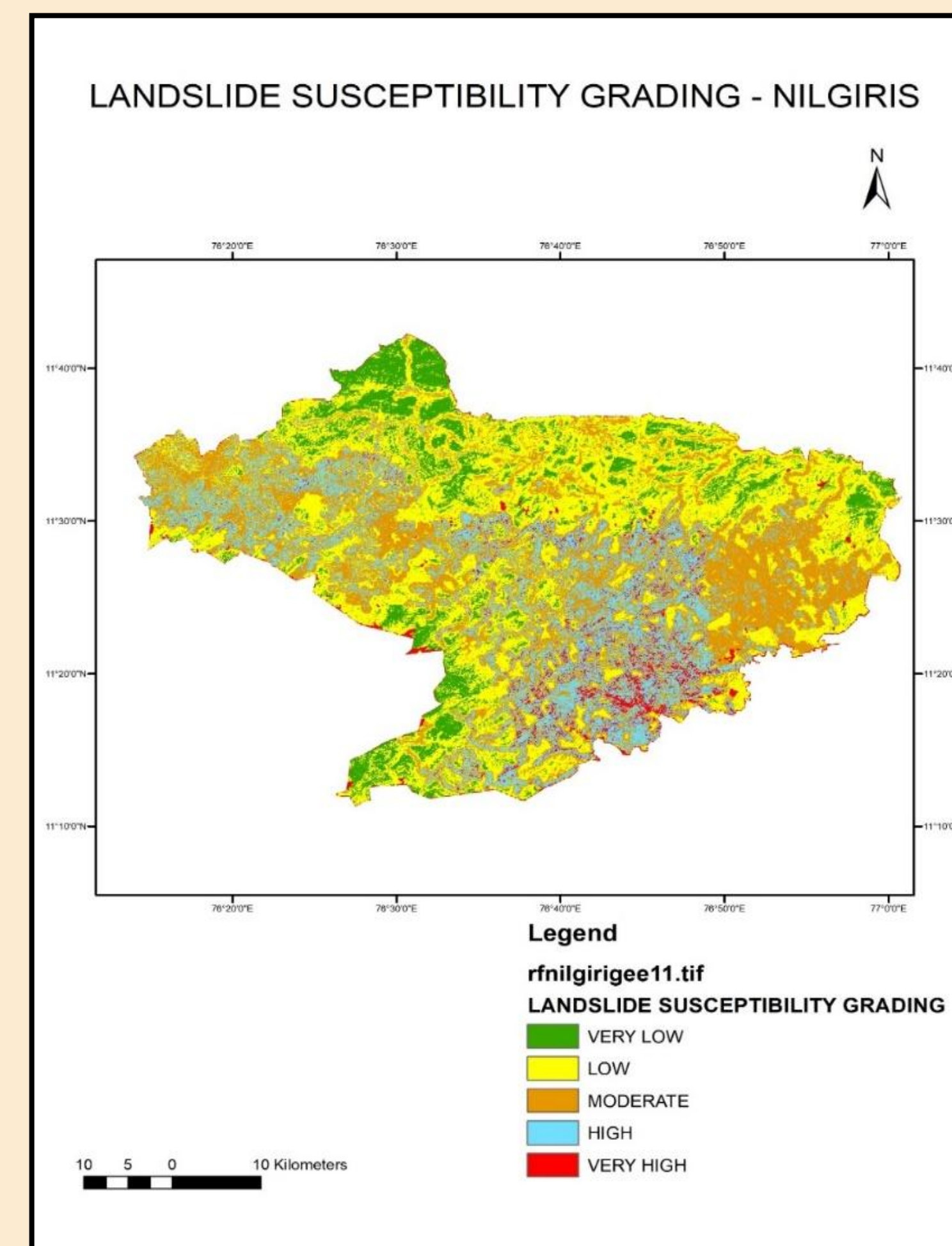
DATA USED



METHODOLOGY



RESULT & OUTPUT



Susceptibility Grading

Range of Probability value of each pixel	Classified value	Susceptibility Grading
Less than 0.15	1	VERY LOW
0.15 to 0.35	2	LOW
0.35 to 0.60	3	MODERATE
0.60 to 0.80	4	HIGH
Higher than 0.80	5	VERY HIGH

Feature Importance

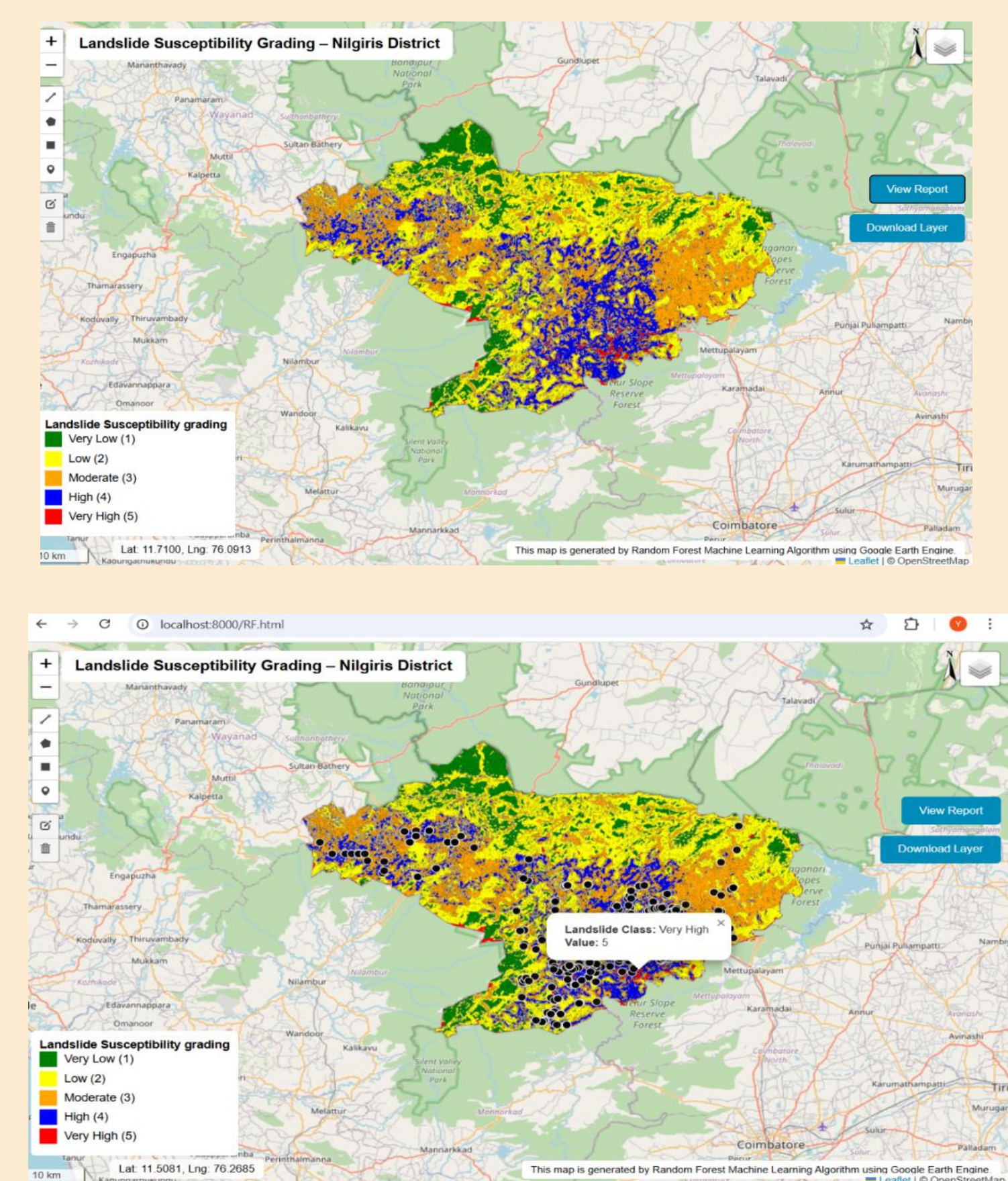
Parameter	Importance (%)
Slope	71.42
Aspect	70.80
NDVI	74.68
LULC	21.94
Rainfall	37.19
Geomorphology	2.60
Lithology	3.00
Soil	25.58
Fault	77.15
Road	62.35
Streams	64.47

Confusion matrix

		Predicted	
		Positive	Negative
Actual	Positive	82(TP)	17(FN)
	Negative	32(FP)	56(TN)

- Overall accuracy : 0.73797 (73.8%)
- Kappa Coefficient value of this Random forest model is 0.49

WebGIS portal



CONCLUSION

A landslide susceptibility graded map was generated using the Random Forest algorithm in Google Earth Engine (GEE), based on key geospatial layers such as slope, rainfall, NDVI, geomorphology, lithology, etc. The output was classified into five susceptibility zones: Very Low to Very High. This classified map layer was then integrated into an interactive WebGIS portal, allowing users to explore landslide risk spatially. The portal serves as a decision-support tool for disaster preparedness, land-use planning, and risk mitigation in vulnerable regions.