

# The Role of Conditioning Factors in Determining Rainfall Intensity Necessary for Triggering Shallow Landslides in Portugal

Caio Villaça<sup>1</sup> (caiovnv10@gmail.com), José Luís Zêzere<sup>1</sup>, Pedro P. Santos<sup>1</sup> <sup>1</sup>University of Lisbon



## Introduction

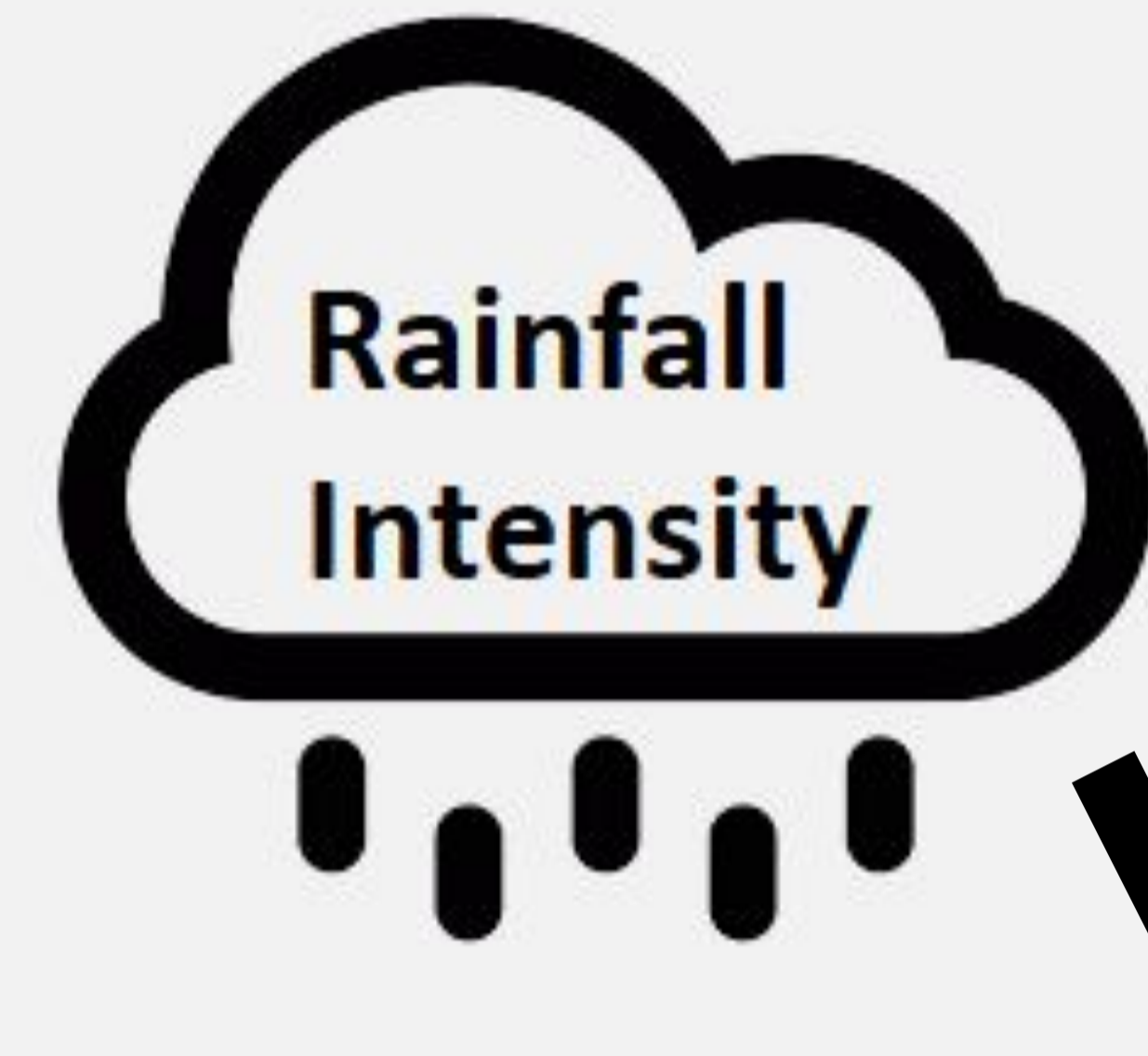
Landslides are a common natural hazard that occurs in many regions worldwide, including Portugal. They can cause significant damage to infrastructure and pose threats to human lives. Understanding the relationship between the conditioning factors and the triggering factor is crucial for effective landslide prediction and mitigation strategies.

## Goals

Develop a statistical model that can provide insights into the relative importance of conditioning factors in defining the rainfall intensity necessary to trigger a shallow landslide in the different regions of Portugal.

## Methodology

Data collection:  
Conditioning factors and historical rainfall

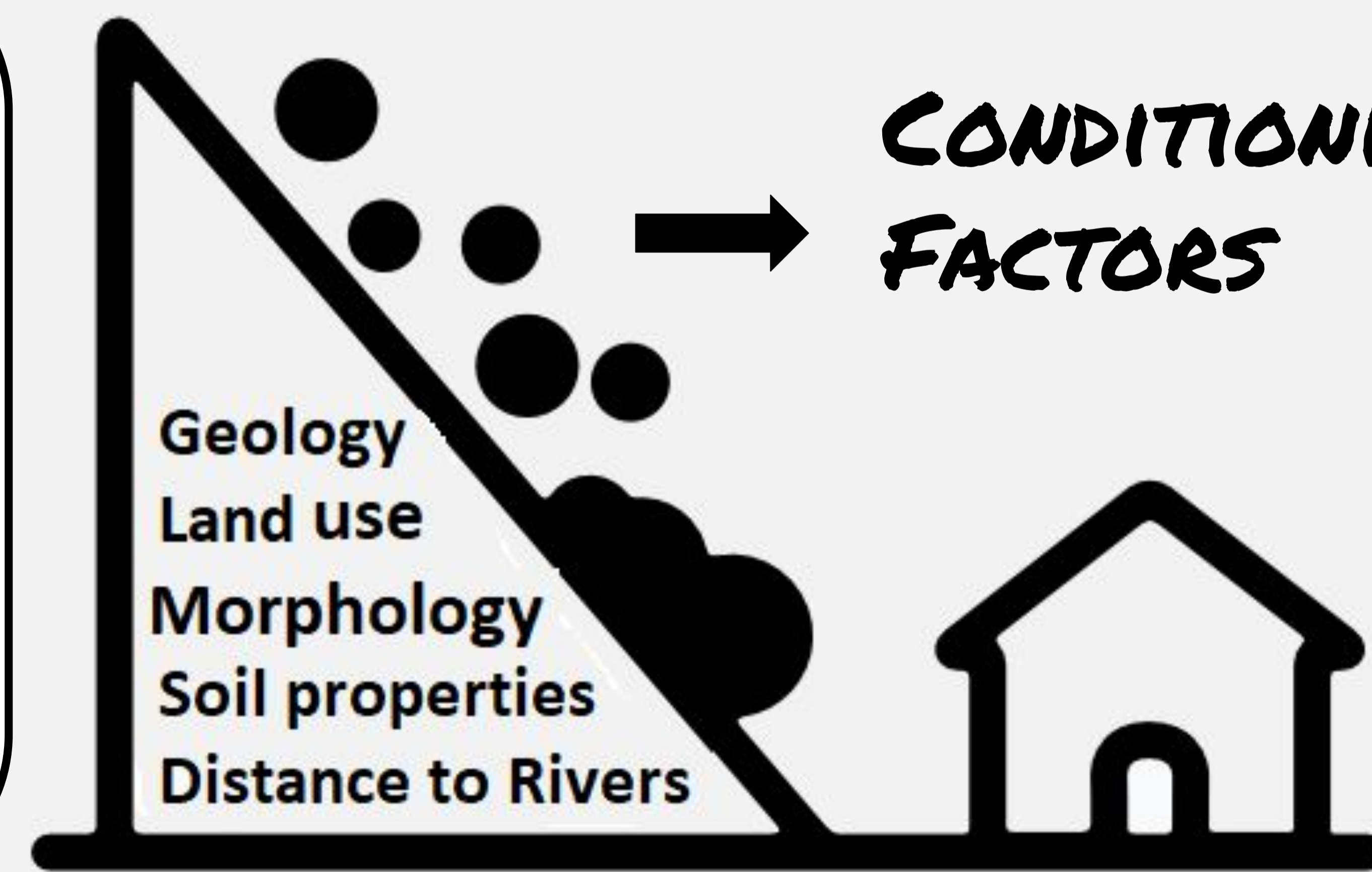


**TRIGGERING FACTOR**

Random Forest model:  
30% testing, 70% training

Predict rainfall intensity for every pixel.  
Classes to be predicted:  
Class 1: rain intensity > 20 mm  
Class 2: rain intensity < 10 mm

ROC curve score for validation



**CONDITIONING FACTORS**

## Results and Conclusions

- Important conditioning factors: **Elevation**(18%), **Water capacity**(16%), **Aspect** (13%) and **Clay content** (12%)
- The model accuracy was 81% and ROC curve score was 0,82. **“Excellent” ability to predict the chosen data.**
- Data were divided into 5 groups: very low, low, moderate, high and very high rainfall intensity
- **Low rainfall** prediction represents 27% of Lisbon and 9% of northern region
- **High rainfall** represents 50% of northern region and 20% of Lisbon region
- The model can be useful for **early warning systems**

