EGU23-16501
EGU General Assembly 2023
© Author(s) 2023. This work is distributed under
the Creative Commons Attribution 4.0 License.

Assessment of landslide susceptibility in the rocky coast subsystem of Essaouira, Morocco

Sergio C. Oliveira[1,2], **Abdellah Khouz**[1,3,4], Jorge Trindade[1,2,3], Fatima ElBchari[5], Blaid Bougadir[4], Ricardo A. C. Garcia[1,2], and Mourad Jadoud[6]

[1]Centre of Geographical Studies, Institute of Geography and Spatial Planning, Universidade de Lisboa, Lisbon, Portugal (cruzdeoliveira@campus.ul.pt)

[2]Associated Laboratory Terra, Universidade de Lisboa, Lisbon, Portugal

[3]Department of Sciences and Technology, Universidade Aberta, Lisbon, Portugal

[4]Higher School of Technology Essaouira, Laboratory of Applied Sciences for the Environment and Sustainable Development (SAEDD), Cadi Ayyad University, Marrakech, Morocco

[5]Polydisciplinary Faculty of Safi, Safi, Morocco, Department of Earth Sciences, Cadi Ayyad University, Marrakech, Morocco

[6]Faculty of sciences El Jadida, Geosciences and Environmental Techniques Laboratory, Chouaïb Doukkali University, El Jadida, Morocco

Several researchers have developed landslide susceptibility maps in recent years using a variety of methods and models. The Information Value method has frequently been used to assess landslide susceptibility in a variety of coastal environments. In this study we used these bivariate statistical techniques to assess the coastal region of Essaouira's susceptibility to landslides. 588 different landslides were found, classified, and mapped along the rocky coast of this coastal stretch. The observation and interpretation of many data sources, such as high-resolution satellite images, aerial photographs, topographic maps, and extensive field surveys, are employed to understand terrain predisposing conditions and to predict landslides. Essaouira's rocky coastal system is situated in the centre of Morocco's Atlantic coast. The study region was divided into 1534 (50 m wide) cliff terrain units. The landslide inventory was randomly split into two separate groups for training and validation purposes: 70% of the landslides were used for training the susceptibility model and 30% for independent validation. Elevation, slope angle, slope aspect, plan curvature, profile curvature, cliff height, topographic wetness index, topographic position index, slope over area ratio, solar radiation, presence of faulting, lithological units, toe lithology, presence and type of cliff toe protection, layer tilt, rainfall, streams, land-use patterns, normalized difference vegetation index, and lithological material granulometry were the twenty-two layers of landslide conditioning factors that were prepared. Using a pixel-based model (12.5 m x 12.5 m) and an elementary terrain unit-based model, the bivariate Information Value approach was used to determine the statistical link between the conditioning factors and the various landslide types and to produce the coastal landside susceptibility maps. The multiple coastal landslide susceptibility models were evaluated for accuracy and predictive power using the receiver operating characteristic curve and area under the curve. The findings allowed for the designation of 38% of the rocky coast subsystem as having a high susceptibility to landslides, with the majority of these areas being found in the southern part of the coastal region of Essaouira. Both future planned

development operations and environmental conservation can benefit from these susceptibility maps.

Acknowledgements: The work has been financed by national funds through FCT (Foundation for Science and Technology, I. P.), in the framework of the project “HighWaters – Assessing sea level rise exposure and social vulnerability scenarios for sustainable land use planning” (EXPL/GES-AMB/1246/2021).