Proceedings of the ISymRU 2021
Interdisciplinary Studies: Poster Presentation

Modeling Predictive Assessments of Landslide Vulnerability Based on Rainfall Patterns: A Case Study of Badulla District

Dissanayaka D. M. D. S. K.[1] ✉, **Malkanthi A. M. C.**[1]

Abstract

Having a complex physical landscape with mountain ranges, divided plateaus, and narrow valleys, landslides have become a major type of natural disaster in Badulla District. Extreme rainfall, slope, unplanned agriculture activities and irrigation activities are identified as the major causes for this phenomenon. Thus, the present study aims to identify a relationship between rainfall and landslides to predict landslide vulnerability in selected regions of Badulla district based on seasonal rainfall analysis. Monthly rainfall data and monthly landslide data from 1999 to 2019, collected from the department of National Building Research Organization (NBRO), were used in the study. Python was used to develop the prediction in anaconda platform and Arc GIS was used to select the areas based on Haputhale, Dambethenna and Bandarawela divisional secretariat divisions. Considering the main rainfall stations in the study the Grama Niladari divisions were extracted and based on the GN divisions, landslide data were extracted from the data set to identify the relationship between rainfall and landslide. Seasonal Autoregressive Integrated Moving Average (SARIMA) model was used to predict the seasonal variation and monthly rainfall in the rainfall stations. Based on the lowest Akanke's Information Criterion (AIC) with standard error of 301 and 311, SARIMA model fitted as the best statistical model. The highest rainfall was recorded in 2006 and the lowest rainfall in 2016. In the developed model, the relationship between monthly rainfall and monthly landslide shows a statistically significant correlation with the p value greater than 0.089. A warning is issued for the months that exceed the threshold value of 1.698 for a possible landslide in the selected region. This system can be used for disaster management by notifying the people in vulnerable areas in advance as well as for planning agriculture-based activities to reduce the possible losses.

Keywords: *Landslide vulnerability, python, rainfall, SARIMA model*

[1] Department of Physical Sciences and Technology, Faculty of Applied Science, Sabaragamuwa University of Sri Lanka, Sri Lanka
✉ Corresponding author: dilinidissanayaka18@gmail.com