

3rd International Conference on Hydrology & Meteorology

September 15-16, 2014 Hyderabad International Convention Centre, India

Landslide hazard zonation mapping of Mersa (Northern Ethiopia) using slope stability susceptibility evaluation parameter (SSEP) rating scheme

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Identification of slope instability problems in the initial stage of planning and investigation of engineering structures may lead to evolve possible remedial measures which may either be adopted to improve the slope stability or such problematic slopes may be avoided if identified during initial planning. Deterministic slope stability analysis techniques are time consuming and require thorough knowledge on geological and geotechnical considerations with a clear understanding on potential mode of slope failure. However, due to constraints of time and financial limitations systematic deterministic slope stability analysis techniques are often neglected or carried out too quickly without proper geological or geotechnical inputs. The developmental activities in mountainous terrains, particularly road constructions, cover large area of slopes and therefore, require some rapid slope stability analysis techniques. In this paper Landslide hazard zonation map is prepared using a new slope susceptibility evaluation parameter (SSEP) rating scheme, which is an approach for landslide hazard zonation. The SSEP rating scheme is developed by considering intrinsic and external triggering parameters that are responsible for slope instability. The intrinsic parameters which are considered are; slope geometry, slope material (lithology or soil type), structural discontinuities, land use and land cover and groundwater. Besides, external triggering parameters such as, seismicity, rainfall and manmade activities are also considered. For SSEP empirical technique numerical ratings are assigned to each of the intrinsic and triggering parameters on the basis of their contribution towards instability of slope. The parameters responsible for instability of slopes has been assigned with numerical ratings which is based on logical judgments acquired from experience of studies of intrinsic and external triggering factors and their relative impact on instability of slopes. The distribution of maximum SSEP ratings assigned to different intrinsic and external triggering factors is based on their relative order of importance in contributing instability to the slope. The SSEP technique was successfully applied in the area around Mersa town of North Wollo Zonal Administration, Amhara National Regional State in northern Ethiopia, some 490 km from Addis Ababa. The results obtained indicates that 39% (with total coverage area of 4,557,916 m²) of the area fall under Moderately hazard and 51% (with total coverage area of 6,847,750 m²) of the total area fall within high hazard whereas 2% (with area coverage of 253,319 m²) of the area fall under very high hazard. Further, in order to validate the LHZ map prepared during the study, past landslide activities and potential instability areas, delineated through inventory mapping was overlain on it. All past landslide activities and potential instability areas fall within very high and high hazard zone. Thus, the satisfactory agreement confirms the rationality of considered governing parameters, the adopted SSEP technique, tools and procedures in developing the landslide hazard map of the study area.

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Availability and sustainability of water in Imphal city

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The area of Imphal city, capital of Manipur is geologically belong to fluvio-lacustrine origin and extends over 33.29 sq km where annual rainfall is about 1424 mm. The city is meeting insufficient water supply for the residents of 2.5 lakh when there are wetlands, rivers, ponds, groundwater, in and around, as sources of water. The paper examines geological, geomorphological and hydrological factors using techniques like potential water availability, water surplus and deficit etc., and it is found favourable for sustainability of water in the city.

Biography

Naoroibam Deva Singh did his MPhil from NEHU, Shillong, PhD from Osmania University, Hyderabad and three months Remote Sensing Course, IIRS, Dehraun. He has published two books and three dozens of papers and is at present Dean, School of Human & Environmental Sciences, Manipur University.

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