Abstract
“Landslide Hazard Zonation Analysis and Management in Bodi-Bodimettu Ghat section, Theni District, Tamil Nadu”
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Landslide is a common natural hazard that usually occurs in mountainous areas. Rapid urban development and high traffic intensity movements have been hampered to a great extent by phenomenon of landslides. In Ghat section, vertical cuttings and steep slopes are induced slope failures. An assessment of landslide hazards is therefore a prerequisite for sustainable development of the hilly region. The present research work is centered on the development of macro scale technique which may find useful application for systematic planning of development activities. The Bodi-Bodimettu ghat section has been taken as a study area for application of this technique. Accordingly the objectives envisaged in the research are preparation of a regional scale landslide hazard zonation (LHZ) map of Bodi-Bodimettu ghat section and delineation of hazard prone hill slope. This is followed by assessment of status of stability by detailed slope stability study for the identified hazard prone slopes and finally suggestion of suitable remedial measures for these slopes to counter future problems of slope instability on these hill slopes. The macro-scale studies were also carried out using BIS, multi-criteria analysis method, frequency ratio and comparative study of three approaches.

The macro-scale LHZ map were prepared using BIS Bodi-Bodimettu area that, ten out of seventeen facets were identified slope facets fall in moderate hazard (MH) class while seven facets fall in high hazard (HH) class. The 58.82% of area falls under moderate, 41.18% of an area falls in high hazard zone. The macro-scale studies were also carried out using multi-criteria analysis method, the final output map
showed that three zones namely LH, MH and HH were distributed all over the study area. About 36.18% of the area falls in low hazards, about 28.6% of an area falls under moderate hazard and about 35.30% of the area indicates high hazard zone. In another method called frequency ratio model, the results indicate that about 40.16% of the area falls in low, about 23.5% of an area in moderate and about 33.89% of the area falls in high hazard. The results of three methods were comparative study using the parameters such as landslide density, success rate curve and spatially agreed area, the results depict that 39.62% of total area falls in an identical hazard prone in two maps based on BIS and MCA methods. Similarly, a comparison of map based on MCA with that of FR method gives an identical area of 41.84%, whereas those of BIS and FE methods have 40.95% of identical area of the total area. Approximately same variation is seen in the final results of BIS in comparison to other methods namely MCA and FE.

The detailed study mainly involves stability analysis of rock and soil slopes. Thirty four rock slope sections and twenty five soil slope sections were selected for detailed slope stability study. The rock mass character was evaluated using rock mass rating (RMR) and slope mass rating (SMR) technique with kinematic analysis. Based on Hoek and Bray’s kinematic analysis, nineteen sections are fulfilling planar failure conditions and 12 sections are comes in wedge failure conditions. The FOS is less than one in 10 sections (R2, R6, R8, R11, R15, R16, R17, R31, R32 and R33) and it is coming under unsafe zone. The remaining 9 sections are in safe condition. In wedge analysis, 12 sections are selected and FOS was calculated in this sections falls in safe categories.

Based on detailed study of soil slopes, out of 25 sections thirteen sections indicate shallow debris/soil condition and hence talus failure analysis was adopted.
The other twelve sections show thick debris/soil condition and hence circular failure chart (CFC) method was used. Talus failure analysis indicates that the slopes are unstable (FOS < 1) in case of seven slope sections, while other sections are critically stable (FOS = 1.0 to 1.2) and stable (FOS = 1.2 to 1.5). The circular failure chart method adopted in case of debris/soil sections shows that four sections are unstable under dry conditions and they evidently show slope failures. One section shows stability in dry conditions though it becomes unstable at 25% water saturated conditions. On the other hand four sections show that the slopes are stable under dry condition (FOS = ranging between 1.69 and 3.89) and become unstable (FOS < 1) under 75% water saturated conditions. Three soil slope sections are stable in both dry and wet conditions. Therefore, it is strongly recommended to monitor the slopes for its stability. Suitable remedial measures are to be adopted for these feeble slopes.