CHAPTER 5

CONCLUSIONS

Landslide occurrence and behavior are governed by numerous spatial factors that can be, for the purpose of regional landslide hazard and risk assessment, cut down to several important ones. The factors considered in this study are slope, geology, landuse and stream proximity. These factors can be relatively easily acquired from geological maps, topographic maps and digital elevation model.

The heuristic approach adopted in this study has been proven elsewhere as one of the good methods especially hazard and risk assessment maps are to be made at a regional scale. The main drawback of this approach, however, lies in the subjectivity involved, both in the direct mapping as well as in the assignment of weights to the parameter classes. Nevertheless, the allocation of parameter weighting values can be assisted by the AHP, which permits a quantitative evaluation of each parameter based on the analyst's expertise. It has been shown that the use of the AHP method gives a means to define the factor weights in the linear landslide susceptibility model. Using the weights derived from AHP, a reasonably good landslide hazard and risk models were developed.

GIS has been proven to be an excellent tool in the spatial analysis of the terrain parameters for landslide hazard and risk zonation. Using GIS, good results are obtained in regional reconnaissance maps, when experienced-based conclusions on hazard susceptibility are qualitatively extrapolated over large areas. The maximum benefit of GIS is obtained at larger scales, when the details about the causative factors are determined in relation to the occurrence of landslides. The use of GIS can also be extended to the optimization of the hazard model, which otherwise is very cumbersome or not possible at all. However, the use of GIS cannot replace extensive field work and data collection. Therefore, more multidisciplinary collaboration is needed to establish a more rational dynamic model, as well as more detailed knowledge and understanding of the in situ-conditions of geomorphology, geology, and hydrology for accurate estimation of the spatial and temporal distribution of related parameters and their variance.

The usage of this landslide hazard and risk map should not be an end in itself. These maps should be rather used as a tool to narrow down the selection of a site for any developmental schemes such as roads, building construction, villages, towns, etc. in the initial planning phase. The use of such maps should always be followed by detailed subsoil and geotechnical investigation to acquire thorough information about the site.

The role of water as a triggering agent has been explicitly elucidated using the CHASM software. The effect of water and development of pore water pressure can be dynamically studied with the software. As is the case anywhere, water is one of the main agent triggering landslides in the study area and due consideration should be given to rainfall before anything is planned.

From this study, the assessment of landslide causative factors and hydrological modeling, it can be interpreted that the distribution of landslides is largely governed by a combination of geoenvironmental conditions, such as different landuse patterns, slope, proximity (<50 m) to the streams and geology of an area triggered by rainfall. And it can be concluded that the GIS-based methodology for integration of various topographic, geological, structural, landuse/landcover and other datasets seems to be quite suitable for developing a landslide hazard and risk zonation map.