Chapter 8
Risk Mapping Analysis With Geographic Information Systems for Landslides Using Supply Chain

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ABSTRACT

Among the various natural disasters, landslides are considered to be one of the serious geological hazards that are triggered due to intensive rainfall, earthquakes, deforestation, mining, floods, etc. Landslides result in devastating impacts causes thousands of deaths and injuries, damage to properties. The changing pattern of landslide hazard zones every year forces the need to safeguard people and properties in the respective areas. Weighted linear combination (WLC) is used to prepare the landslide hazard zonation map in the Nilgiris district of Tamil Nadu, India. Nine layers, namely slope, aspect, lineament density, rainfall, distance of roads, elevation, distance from rivers, landuse/landcover, geology, are used in overlay analysis. Supply chain facilities are widely used in the field of transportation of goods to the consumers with the reduction of transportation costs. The implementation of supply chain mechanism along with GIS in disaster management could help to save numerous lives during disaster events.

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INTRODUCTION

The scientists and academicians are focusing on natural and man-made disasters which disrupts the existing system causing physical damages and threats to the livelihood. Landslides is one such disaster cause not only colossal destruction to roads, bridges, and houses but also lead to loss of life. Landslide is a major sliding activity of rocks or soil masses frequently occurs in steep mountain regions and hilly regions of Himalayan Mountains and Western Ghats in the south (Parkash, 2011). Over a period of 300 years, more than 500 landslides were recorded in various locations across the country leading to the death of over 10000 peoples (Parkash, 2011).

At the initial stage monitoring of landslides are being a challenging task for the surveyors. Initially surveying was carried out by using traditional surveying methods such as tape and chain with arrows, pegs and ranging rods. The results obtained was less accurate and time consuming which lead to a revolution in the field of surveying resulting in the introduction of dumpy level, theodolite followed by the introduction of Total Station (Selvi, 2012). Limitations was found that total station required huge man power and it cannot be adopted for real time monitoring. Introduction of remote sensing and GIS helped to solve the issues like floods, landslides, etc. (Lakshmi & Yarrakula, 2016). Remote sensing helps to monitor a particular area periodically and a database will be maintained in GIS. Remote sensing provides information of all restricted and inaccessible regions and reduces the man power required to perform the analysis (Lakshmi & Yarrakula, 2017). Various thematic layers are obtained in remote sensing environment and weighted linear combination techniques was adopted for the preparation of Landslide hazard zonation map using the derived weight (Ayele, Raghuvanshi, & Kala, 2014).

The word “risk” defines the negative effect such as damage, loss and disruption over a region. Emergency response is considered as a dynamic operation as it is time sensitive. The concept of supply chain which is widely used in business handling, introduced into the disaster management with the help of GIS for providing effective decision support during emergency. Supply chain management is the process adopted for planning and management of resources and to help evacuate the event location. Supply chain along with GIS is integrated with computer software to limit the effort of human beings to provide the accurate decision support system during disaster events (Kumar & Agrawal, 2011). The present study deals with the creation of landslide hazard zonation map with the help of WLC method and integration of supply chain to provide the possible routes for the people within the disaster location to evacuate the region and also to provide the decision makers to select the possible routes to reach the location in case of emergency.

REVIEW OF LITERATURE

Supply chain management was commented as “Army marches on its stomach” that existed at the time of Napoleon, for the supply of food, cloths, arms, etc. and was successfully implemented. The statement was not explained in his period. In 1992 Martin Christopher defined supply chain management as the management of upstream and downstream value-added flow of materials, final goods and related information among suppliers, company, resellers, and final customers (Sudipto Ganguly, 2013). The important components of supply chain management are transportation and storage of goods. Spatial information plays a vital role in optimization of available resources (Kumar & Agrawal, 2011). Supply
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