Investigation of landslide mapping types

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Abstract
Natural disasters are seen in almost every part of the earth's surface and cause the reshaping of the earth's surface. In recent years, people's awareness of disasters has increased and the number of solution-oriented studies has increased. The first step is to create maps of disaster areas in order to minimize the damage that disasters can cause to people and the environment. Creating maps of landslide areas provides great convenience to earth scientists in combating landslides. The development of remote sensing techniques in recent years has enabled the creation of a sensitive and detailed mapping of the land. In this study, different landslide mapping types (inventory, hazard, risk and susceptibility) were discussed.

Introduction

The morphology of the earth's surface is changing and reshaping due to mass movements. A small change on forces acting on rocks and soils may cause slope failure. This is an unavoidable situation. However, with the help of some measures that can be taken, it is possible for people and the environment to get rid of this situation with the least damage. Monitoring and mapping failure prone areas using high spatial resolution images are the basis for disaster management [1].

Field study have been performed by well-trained geologists until recent years. However, it is time consuming and labor intensive. Fine-scale terrain structures may be omitted with the traditional mapping. The developments in remote sensing technology enable us to obtain high resolution and actual data from field. Unmanned aerial vehicles and laser scanners have been frequently used since last decade [2-3].

Landslide is the most common natural disaster and can be seen almost everywhere on the earth's surface. Landslides develop with geological, geomorphological, meteorological factors and human influence. Landslides cause loss of life and property. Landslide areas, which is a major environmental threat, can be modelled by using a UAV. Now, there is a great interest in utilizing UAV in natural hazard applications. Non-invasive techniques are preferred in recent years.

The rapid increase in population requires the creating of new settlements. Rough lands are prone to landslides. It damages buildings and farmland. It has fatal or injury consequences. It closes the highways, thus preventing transportation. Landslides prevents economic development.

During the land use planning stage, landslide inventory, hazard, risk and susceptibility maps are essential to reduce the damages [4].

Landslide inventory map

Landslide inventory maps are maps that show the areal distributions, characteristics, geological features and historical records of existing landslide areas in the field. They are used as a base for many analyzes. With these maps, hazards can be identified and reliable and up-to-date data can be presented to decision makers. Inventory maps also help in choosing the right place. The landslides that have happened in the past give information about the landslides that may happen in the future.

The methods used to create a landslide inventory map are Satellite images, Literature studies, Field observations and Aerial photographs. Moreover, it is necessary to talk to the local people.

Landslide risk map

Landslide risk maps are studies that evaluate the economic and environmental damages together with the estimation of the damage to occur, as well as the loss of life and property that may occur as a result of the landslide.

Landslide hazard map

The landslide hazard is the probability of a landslide occurring in a certain area and within a certain time. It is necessary to identify the potentially risky places before the disaster, in order to minimize the damage. This map shows type, speed and intensity of landslide.

Landslide susceptibility map

The landslide susceptibility map shows the tendency of a region to landslide and potential areas where landslides can occur will be identified. The factors affecting the sensitivity vary from region to region. It is necessary to determine the importance levels of the parameters. The more detailed information is available, the more precise the study will be done.

In the production of landslide susceptibility maps, generally, aspect, distance to drainage network, distance to fault, distance to ridges, distance to road, drainage density, height, fault density, geology, land cover, plan and profile curvature, road density, slope, slope length, river flow strength, surface area ratio and topographic humidity index are used.

The methods generally used in the production of landslide susceptibility maps are probability method (frequency ratio), Analytical hierarchy method, bivariate, multivariate, logistic regression, Fuzzy logic, artificial neural networks and frequency ratio method.

Discussion

Geographic Information Systems (GIS) have been efficiently used to create and analyze landslide maps. Parameters that have different weights can be used in the map production phase. Mapping the landslide site with high-precision and accuracy is vital to lessen the damage. GIS technology enable us to see the details in geomorphology of the environment.

Conclusion

Mapping the potentially dangerous areas is the first step to prevent a possible disaster. In this study, utility of different landslide mapping types was discussed. These maps will be used to represent the slope movements in computer environment. In order to take precautions to landslides these maps need to be prepared accurately.

References

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