

The Characteristics of Geological Disasters and the Preventive Measures of Geological Disaster Prevention Engineering

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Abstract: At present, with the continuous deterioration of geological disasters in China and the global environment, relative to the relationship between social economy and related resources, it has become a highly valued issue of all sectors of society, or an important part of human future development and survival. This paper first explains the concept of geological hazards, the characteristics of geological hazards, the relationship between geological hazards and geological environment, and then describes the hazards of geological hazards. Finally, through setting up geological hazard warning system, effectively using geological environment in geological hazard prevention and control, strengthening investigation and division of labor construction, geological hazard monitoring, etc. This paper expounds the preventive measures of geological disaster prevention and control engineering.

Keywords: Geological Disaster; Characteristic; Prevention and Control Works; Preventive Measure

1. Concept of geological disaster

Geological disaster mainly refers to the disaster formed by the deterioration of the geological environment caused by natural or man-made action, which makes the surface layer move. Geological disasters are an important part of human survival and development. Water and soil pollution, land degradation, geothermal hazards, etc. are the main manifestations of geological disasters. Therefore, it is very harmful to people. Among them, earthquake-type geohazards bring great damage to buildings and public facilities, etc. Geological hazards are difficult to prevent, so it is necessary to analyze their characteristics and hazards, and then find appropriate prevention and control measures to minimize the damage and hazards.

1.1 Characteristics of geological hazards

Jishou City, Hunan Province, China, is located in the Wuling region of central China, with intermittent uplift of regional neotectonic movement, large topographic relief, folding and fault development, and rock fragmentation; strong weathering and thick residual slope accumulation. In the city, landslide and collapse geological hazards are the main geological hazards. There are 161 geological hazard potential sites in this area, including 106 landslides and 17 cave-ins.

1.1.1 Landslide

Landslides are mainly the more widely distributed and hazardous types of geological hazards in the Chinese region. According to the scale of landslides, formation reasons and material composition, they are divided into various types of landslides. According to the size of landslides, they can be divided into three categories: large, medium, and small; according to the material composition of landslides, they can be divided into soil landslides and rock landslides; according to their formation era, they can be divided into two categories: new and old; according to the relevant investigation, most of the landslides on the surface of a certain area have very obvious tension cracks on the back edge of landslides, and in the middle

of landslides residential houses often Some landslide surfaces are covered with saber trees and drunken forests. Soil landslides are mainly residual slope deposits of loose material, with fragmented structure and good permeability. Continuous rainfall softens the soil and increases the plasticity of mud; the contact surface of the overlying saturated loose soil layer with the underlying soil layer and the underlying bedrock is very easy to form a slip zone (surface) of saturated soft soil, and when artificial excavation produces a high steep surface or a steep slope, the overlying soil body is very easy to slip along the contact surface.

1.1.2 Collapse

According to the scale, formation mechanism, stability, and material composition, the collapse is classified, the scale of the collapse in the region is small, the collapsed body is mainly of various types of rocks, and most of the collapse has a certain instability, including hard and soft rocks, lithology with mud dolomite, chert, mud siltstone and so on. In Jishou City, Hunan Province, the collapse bodies are mainly developed in the Cambrian Lower Tigers Qingxudong Group, Shipai Group, Middle Tigers Aoxi Group and Huaqiao Group, Ordovician Lower Tigers Baishuixi Group, and Cretaceous Lower Tigers Shimen Group and Dongjing Group strata; the lithology varies widely from hard rocks to soft rocks, and the lithology includes chert, muddy dolomite, muddy chert, shale, muddy siltstone and so on. The landslides are generally developed on slopes with topographic slopes greater than 45 degrees, and there are more than ten landslides with slope heights greater than 30 meters and four landslides with slope heights less than or equal to 30 meters in the region. Landslides and collapses in the region are distributed along the fracture zone in linear development, and the two flanks of the folds are the frequent sections of landslides and collapses, which mostly slide along this weak structural surface, as shown in Figure (1) below.



Figure (1)

2. Hazards Geological Hazards

The occurrence of geohazards can bring serious hazards, not only to the natural environment but also to the social economy, so a comprehensive analysis is needed.

2.1 Change of natural structure

Geological hazards are destructive and often the surrounding environment will slowly change after a geological disaster, such as rock fracture and mountain collapse. In nature, the diversity of organisms is based on the environment. When the natural environment is destroyed, the environment in which the organisms live will also change, which leads to the fact that some organisms cannot adapt well to the change of environment, so it will lead to the decline of animal population or even extinction.

2.2 Disruption of transportation roads

The interruption of traffic roads is mainly the second major hazard arising from geological disasters in China. In terms of social and economic development at the present stage, roads are the only important way to strengthen common regional links and achieve good economic development. In the process of geological disasters, road traffic may be interrupted due to damaged foundations. This disruption will not only affect inter-regional communication and liaison but also affect the transportation of materials from the outside world and bring difficulties to the rescue of the disaster area.

2.3 Interruption of power lines

The last prominent hazard of geological disasters is the interruption of power lines. For the analysis of the current situation, China is undergoing modernization, however, electric power resources are mainly the main driving force of China's modern development, which directly affects people's daily life. After a geological disaster occurs, it usually leads to damage to electrical equipment, which in turn directly affects the normal operation of the power grid, thus leading to the interruption of power supply to the grid, a situation that brings China's economic development to a standstill and prevents relevant industries from being carried out.

3. Preventive measures for geohazard prevention and control works

3.1 Set up a geohazard alarm system

It is necessary to strengthen patrol for geological disaster sites with a high degree of danger, or high risk. At the same time, early warning equipment should also be installed in the geological disaster area, which is also the most important part of the construction disaster area. At the same time, the problem of geohazard alarms also needs to be dealt with from both technical and management aspects. Its main content is, firstly, on the technical level of the alarm device, it is mainly to detect and analyze the information related to geological disasters through modern monitoring technology to understand the probability of geological disasters in the area. When a geological disaster occurs, it can be fed back to the management department in time. Using scientific and technological means, advanced testing instruments, and methods, the controlled areas are regularly evaluated and analysis reports are formed; when some conditions change, especially when some situations change, the relevant personnel can evaluate the impact produced by these areas. Along with long-term monitoring, a sound management response mechanism should be established. In recent years, with the continuous development of information technology, the Internet and Internet of Things technology have also made great breakthroughs, especially the monitoring technology represented by the Internet of Things technology, which brings great convenience to people, and can combine technology and management; build software and hardware systems to organically combine monitoring, evaluation and early warning systems, so that when abnormal conditions are monitored, a rapid response can be made and take measures. Secondly, at the management level of geological alert design, there are two main aspects of the research. One is to analyze the information fed back by technicians and then manage the information accordingly. The second aspect is to strengthen the management of the geo-alarm system, both technically and in terms of human resources, in a comprehensive manner. In general, the geological hazard observer in the local area has to start from both technical and human aspects to carry out the scientific management of how to do it.

3.2 Effective Use of the geological environment in geological disaster prevention and Control

First, build a safe engineering geological environment. Pay attention to the changes in the geological environment and detect the problems that appear in all aspects, especially in the areas where geological changes occur frequently, it is necessary to strengthen the detection; always pay attention to the development trend of geological disasters, especially in special cases, it is necessary to strengthen the forecast and detection, and analyze the impact caused by the changes of geological environment, fully warn the geological disasters that may appear at any time, and focus on detecting the key areas. In addition, the relevant personnel also need to achieve the full combination of prevention and control, so as to reduce the occurrence of geological disasters, adhere to the concept of sustainable development, and implement the concept of harmony between man and nature into the prevention and control of geological disasters in China.

Second, the use of the regional geological environment. Before developing and utilizing the geological environment, it is necessary to analyze the geological environment according to the needs of the geological environment survey layout, according to the regional characteristics, and utilize the area construction with the characteristics of service, and the nature of service needs to be ensured while utilizing. At the same time, the relevant personnel needs to establish a sound assessment model, after the management of the regional environment, to better grasp the content of the assessment mechanism. It is the collection of information that is crucial from the point of view of the needs of program use. After mastering the information of the assessment for reasonable construction, always pay attention to the social development trend during the construction of the geological environment afterward, and play the existing relevant management system.

Finally, evaluation of the use of the geological environment. The safety of the geological environment is obtained after the relevant investigation, and the geological environment is developed scientifically and reasonably, which not only provides the possibility to serve social as well as economic development but also minimizes the danger. Strengthening the development of the geological environment will help to promote the social and economic development of our country and minimize the degree of damage and the scope of its influence. The construction of a geoenvironmental evaluation system mainly includes the assessment of geoenvironmental capacity, and engineering geoenvironmental quality and proposes relevant solutions according to the objectives and characteristics of different regions.

3.3 Strengthen the construction of investigation and division of labor

With the continuous development of science and technology in China, society is paying more and more attention to the forecast and prevention of natural disasters, and a large amount of science, technology, and equipment are invested in the prevention and control of geological disasters. However, in the process of geological disaster prevention and control, it is necessary to start with the investigation of geological disasters and to develop effective countermeasures to solve them according to the actual situation. Generally speaking, it is necessary to start a geological disaster investigation from the following aspects: First, in the actual investigation process, it is necessary to investigate not only the geological situation of the region but also the surrounding geological environment. At the same time, it is also necessary to study the key areas in depth and make key observations in areas where geological hazards are present at any time. Secondly, in order to assess the risk of geological hazards, it is necessary to forecast and monitor geological hazards in advance and formulate scientific and reasonable countermeasures for prevention and control in order to reduce the hazard of geological hazards. Finally, medium and long-term prevention and control countermeasures are proposed according to the actual situation. Relevant personnel should pay great attention to the detection of geological hazards and formulate corresponding emergency plans according to the actual situation. In the emergency plan, the corresponding evacuation routes should be formulated and the corresponding

emergency management measures should be formulated according to the specific situation of the local area to ensure that the emergency management plan is scientific and reasonable.

3.4 Geological hazard monitoring

In the prevention and monitoring of geological hazards, there are two main types of monitoring: macro-monitoring and micro-monitoring. In the actual monitoring work, relevant personnel often use sensor systems to obtain information related to geological activities. Through the monitoring of geological hazards, the location and degree of geological hazards can be judged in advance, and the impact of geological hazards on people's actual lives can be reduced. It is worth noting that in the process of monitoring the geological environment, the person concerned should ensure the correctness of the detection information, especially in areas that are very prone to landslides and mudslides. In addition, the characteristics of geohazard monitoring are somewhat extensive, and the corresponding automatic equipment is used to detect the geoenvironmental in an all-round way, while the intensity of geohazards should be guaranteed and combined with the real situation to quantify the degree of geohazard hazards so that people can better understand the degree of geohazard hazards.

Conclusion

In conclusion, with the increasing frequency of geological disasters in China, the relevant personnel must study effective preventive measures to further ensure the safety of people's lives and properties. This paper mainly explores the preventive measures of geological disaster prevention and control engineering. On the basis of elaborating the concept of geohazards, characteristics of geohazards, and the relationship between geohazards and the geological environment, it explains that geohazards have the hazards of changes in natural structures, interruption of traffic roads, and interruption of power lines, and puts forward the strategies of setting up geohazard warning systems, effectively using the geological environment in geohazard prevention and control, strengthening investigation and division of labor construction, and geohazard monitoring.

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