

On the Prevention and Control of Geological Disasters and the Utilization of Geological Environment

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Abstract: With the rapid development of the social economy, people's awareness of environmental protection is gradually increasing. This is because the probability of geographical disasters occurring in the country is also gradually increasing. People have also begun to pay attention to the prevention of geological disasters and the geological environment, because geological disasters can have a great impact on people's life safety at any time. Therefore, it is necessary to take corresponding preventive measures in advance for geological disasters. This article conducts a series of analyses on geological disasters and other related topics.

Keywords: Geological hazards; Geological environment; Disaster prevention and control; Environmental utilization.

1. Introduction

For geological disasters, when they occur, they can bring great disasters to people and have strong destructive power. At the same time, they can also have a significant impact on the development of the social economy. Moreover, from the current situation^[1], people have begun to excessively exploit natural resources for their own interests, leading to serious damage to nature and increasing the probability of geological disasters. This has brought negative factors to the development and stability of the country. Therefore, for the above issues, relevant departments need to timely prevent and control geological disasters, and also make full use of their geological environment to reduce the occurrence rate of safety accidents.



Figure 1. Site of landslide geological hazard

2. The Relationship Between Geological Hazards and Geological Environment

Geological disasters can change the geological environment. For geological environment, it mainly refers to the result of the interaction between the Earth's own activities and human activities. Therefore, there is a close connection between these two, and when geological disasters occur^[2], they can also have a significant impact on the geological environment. For example, when an earthquake occurs, it can

cause geological disasters, leading to significant changes in the entire surface morphology of the Earth. In severe cases, it can even cause the ocean to directly transform into land. In addition, when geological disasters gradually change the geological environment, this action is also highly mandatory and irreversible^[3]. In other words, when the geological environment is damaged due to geological disasters, this behavior is forced to be accepted.

The geological environment has a constraining relationship with geological disasters. During the process of geological environment changes, the geological disasters it brings are also different, so the degree of damage also varies greatly. If the geological environment changes significantly, even to the point where it loses its ability to adapt automatically^[4], many natural disasters will occur. For example, in the event of an earthquake, some areas may experience landslides or collapses due to the influence of topography, which can gradually lead to more severe mudslides and geological disasters.

Geological hazards refer to the movement events of rocks, soils, or rock and soil debris and their mixtures with water that pose a significant threat to human life, property, and living environment on the surface of the Earth. Common geological hazards include earthquakes, landslides, mudslides, collapses, ground subsidence, etc. The occurrence of these disasters is often closely related to specific geological conditions, such as terrain, landforms, geological structures^[5], lithology and soil conditions, hydrogeological conditions, etc. The geological environment is the result of the interaction of various natural environmental factors on the Earth's surface and internal structures. It includes all the substances and processes of the Earth's lithosphere, and is the main place where humans rely on for survival and development. The geological environment, in the process of continuous evolution, will bring about varying degrees of geological disasters. Especially in recent years, with the increasing speed and intensity of human transformation of nature, the rate of change in geological environment has exceeded people's imagination, and the frequency and scale of geological disasters have also shown an upward trend. The relationship between geological hazards and geological environment is reflected in two aspects. On the one hand, the geological environment has a constraining

effect on the occurrence of geological disasters. Geological disasters always develop in a certain geological environment, and topography, landforms, and geological structures together constitute the conditions for the occurrence of geological disasters. Their changes and interactions have become triggers for geological disasters. For example, crustal movement and deformation of geological structures can lead to the occurrence of earthquakes and landslides; Soluble rock layers are prone to form karst caves, leading to ground collapse; The stability of sedimentary soil is poor, which can easily lead to landslides and debris flows. On the other hand, the occurrence of geological disasters can also have a transformative effect on the geological environment. The occurrence process of geological disasters is also the process of reshaping the relevant geological environment by geological disasters. With the occurrence of disasters such as rockfalls and landslides, some rock masses lose their potential energy and become temporarily stable from instability. However, at the same time, the occurrence of disasters can also change the stress state and environmental status of geological bodies, forming new carriers of disasters and reproducing the next movement and displacement of geological bodies. This transformation not only affects the quality of the geological environment, but may also trigger new geological disasters, forming a vicious cycle.

3. Key Points for Geological Hazard Prevention and Geological Environment Utilization

During the initial construction process of the regional geological environment, relevant personnel need to first have a detailed understanding of the area, investigate relevant information, and then conduct an actual measurement of the site. Based on this measurement, a scientific and reasonable construction plan and scheme can be formulated. For example, in the engineering area, due to its service-oriented nature. So, when construction workers start to conduct exploration, they need to choose a reasonable plan through two points to minimize the damage to this area. In actual measurement, construction workers also need to implement scientific and reasonable measures based on the characteristics of this area, so that its ecological balance can always be maintained in the best state, and at the same time, it needs to be implemented in accordance with relevant national regulations. Finally, when starting the construction, the construction personnel should ensure that the project has been completed and then make corresponding adjustments according to the local situation to ensure that the sustainable development path can continue^[6].

Firstly, construction personnel need to have a comprehensive understanding and analysis of the entire geological environment of the project. Then, based on its characteristics, a safe and environmentally friendly geological environment can be established. Subsequently, management personnel also need to conduct a comprehensive evaluation of the entire earthquake environment to avoid the recurrence of disaster problems. Secondly, management personnel need to consider human factors and their impact on the engineering geological environment. After identifying the problem, relevant measures need to be formulated. Only in this way can the geological environment be utilized reasonably. In addition, in order to conduct a more comprehensive assessment of the geological environment, relevant personnel not only need to consider the geological

environment, but also need to analyze and investigate other aspects. For example, relevant personnel can assess the safety issues of the entire construction, inspect the entire area where the building project is located, and then pay more attention to the relevant standards in the construction process.

In order to effectively prevent geological disasters, relevant departments need to carry out more research activities on disaster prevention and control. Conduct in-depth analysis on the typical geological environment and causes of geological disasters in the areas where they occur. For some major disasters in certain regions, if the prevention and control measures are not timely enough, society will cause significant economic and safety losses to people. Therefore, in response to this issue, the country needs to establish a relocation mechanism and improve its content to effectively prevent various losses caused by geological disasters. For some large-scale and severely hazardous areas, relevant departments usually need to take some measures. For example, in disaster prone areas, professional equipment can be used to monitor the entire site in order to prevent disasters early.^[7]

If the system of the monitored area for geological disasters triggers an alarm, and the management personnel discover that the area is highly dangerous or prone to disasters, it is necessary to take corresponding measures in advance. In order to prevent residents from being harmed, it is also necessary to have the surrounding residents relocate in advance.^[8] For areas with high levels of danger or geological hazards with more risks, it is necessary to strengthen inspections. At the same time, warning devices need to be installed in geological hazard areas, which is also the most important part of geological hazard construction areas. At the same time, political issues related to geological hazard warning also need to be strengthened in both technical and management aspects. The main content is that, firstly, at the technical level of the alarm device, it is necessary to detect and analyze the relevant information of geological disasters based on modern monitoring technology, and understand the probability of geological disasters occurring in the region. Ensure that if geological disasters occur, they can be promptly reported to the management department for handling.^[9] Secondly, in the management aspect of geological warning design, the main research content is divided into two parts. The first part is to analyze and manage the information based on the feedback from technical experts. The second part is the need to strengthen the management of geological warnings, both at the technical and personnel levels, and comprehensively improve them. In general, geological hazard observers in local areas need to combine technology and human factors to carry out scientific management^[10].

For sudden geological disasters, a comprehensive emergency response mechanism is needed. This is because a relatively complete processing mechanism can effectively reduce the occurrence rate of losses and ensure the safety of people's lives and property. At the same time, with the rapid development of the socio economy, the country currently has strong capabilities to extend a helping hand at the earliest possible time, helping people in the region overcome difficulties.

In terms of geological disaster prevention and control, firstly, strengthening geological monitoring and early warning is key. We should use advanced technological means to monitor the dynamic changes of geological hazards in real time, issue timely warnings, and take effective measures to reduce the occurrence and losses of disasters. At the same

time, for geological disasters that have occurred, it is necessary to quickly organize rescue efforts to reduce the degree of damage caused by the disaster. Secondly, in terms of geological environment utilization, we need to plan scientifically and develop rationally. In areas with fragile geological environments, engineering construction should be restricted to avoid further damage to the geological environment. In areas with abundant geological resources, scientific mining should be carried out to ensure the sustainable utilization of resources. In addition, ecological restoration and other means can be used to restore the ecological functions of the geological environment, such as greening mines and building mining parks, to better protect and utilize the geological environment. Finally, the prevention and control of geological disasters and the utilization of geological environment require the joint efforts of the whole society. The government should strengthen policy guidance, formulate sound policies for geological disaster prevention and geological environment utilization, encourage technological innovation and talent cultivation. At the same time^[11], the public should also raise awareness of disaster prevention and reduction, actively participate in geological disaster prevention and control, and geological environment utilization work.

4. Conclusion

The prevention and control of geological disasters and the utilization of geological environment are complex and important issues. Geological disasters, such as landslides, mudslides, and ground collapses, pose a serious threat to human society and economy. Therefore, the prevention and control of geological disasters are particularly important. In terms of prevention and control, geological monitoring and early warning should be strengthened to promptly identify potential geological hazard risks^[12]. At the same time, engineering measures such as reinforcing the mountain and constructing drainage systems should be taken to reduce the occurrence of disasters. In addition, it is crucial to raise public awareness of disaster prevention and reduction. The rational utilization of geological environment cannot be ignored. In areas with fragile geological environments, engineering construction should be carried out with caution to avoid damage to the geological environment. In areas with abundant geological resources, scientific mining should be carried out to achieve sustainable utilization of resources. In short^[13], the prevention and control of geological disasters and the utilization of geological environment need to comprehensively consider various factors such as geology, environment, economy, and society. Through scientific planning, rational layout, and effective management, we can achieve effective prevention and control of geological disasters and sustainable utilization of the geological environment, creating a safer and better environment for human survival and development.^[14]

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