

# Study on the Geological Disasters and Population Migration in Mining area

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## Abstract

The article is based on the perspective of public management, utilizes literature and comparative research methods, analyzes the type and distribution of the mine geological disasters in China, as well as the population migration movements in mining area, and studies mechanism of geological disaster to Migration from aspects of the living environment, population security, mining economic, demographic psychology and so on. The study found that the geological disasters were often caused by Extensive population migration in Mining area. Government departments should be based on population, resources and environment sustainable development for the concept, to reduce disaster and losses, improve the living environment, to coordinate the Man-land Relationship.

**Keywords:** Mining area, Geological disasters, Population migration, Man-land Relationship

## 1. Introduction

Natural disasters are common challenge that people were facing, reducing disaster is a common action for mankind, and they often cause large-scale population migration. People have made tremendous progress in disaster prediction and mitigation since 1960s, but the disasters which caused personal injury and property damage has increased drastically. Due to a sharp increase in population and large numbers of people living at the edge or danger zone, more and more people will be faced with the threat of various disasters. For this reason, many people had to flee their homes and migration to become disaster immigrants. The

two-day meeting of Nansen, in the Norwegian capital Oslo, the Norwegian Refugee Council released a report that there were over 42 million people were forced to move due to natural disasters in the world in 2010, 90% of these people suffered disasters related to climate change. The report which entitled the "Climate changed: people displaced" said that, the figure has exceeded the total population of forced migration due to wars and conflicts. This paper mainly studies on geological disasters and population migration-related issue, it is important to explore how to reduce disaster and losses, improve the living environment, and coordinate the Man-land Relationship.

### 1.1. Mining area research

As for the concept of mine area, there are many names at home and abroad, most foreign call mining town, the domestic unify call the mining city, also known as "resource-based city," "industrial city", "mining camps" and so on. This article think that mining area is built on the rich mineral resources, storage areas, a population with a high degree of concentration, the residents in mineral extraction, processing as the major activities of the comprehensive social function of social geographical Community. The composition of Mining area centers on mine population, including the composition of the production and living areas, mining and rural regional physical space; the composition of the mining enterprises, mining community, mining and agricultural relations system of social space [1]. For the mining industry study abroad, in the first, it mainly from the perspective of sociology, psychology, urban communities, B. Marsh (1987) study on residents' sense of Belonging in northeastern

Pennsylvania coal town[2]. O'faircheallaigh stated on the demographic characteristic of Gregory resource-based Alyangula in detail in northern Australia by using 1981 census data [3]. From 1960s to 1980s, Australia built 24 towns, cities and towns due to the exploitation of mineral resources, in the 1980s the coal towns is the main trend. 25% Population live in resource-based towns outside the metropolitan area in Canada. Since the late 1980s, the Western Australia mining industry development, promote the development of Long-distance commuting mode (LDC) [4].

### **1.2. Geological Disaster research**

Geological disasters refer to a geological action or phenomenon in the effect of natural or human factors and bring damage and loss to human life and property, environment. Like collapse, landslides, mudslides, ground fissures, soil erosion, desertification, and swamping, soil salinization, as well as earthquakes, volcanoes, geothermal harm and so on. May to September 2010, China's Sichuan, Gansu, Chongqing, Yunnan, Guizhou, Jiangxi, Zhejiang, Fujian, Guangdong and other provinces (municipalities) have been subjected to heavy rain, triggering many landslides, mudslides, causing serious casualties, in particular, the midnight on August 7, Zhouqu County in northern suffered heavy rains, causing a large debris flow, resulting in 1364 people were killed, 401 missing[5]. In 2008, the largest earthquake occurred in the Wenchuan in China since the founding of new China, the earthquake affected area over 100,000 square kilometers, the affected population reach 46.24 million, nearly 100,000 deaths (including missing persons) [6]. Since 2009, the Three Gorges Project has carried out 3 times 175 meters experimental water storing, after the new reservoir storing water to high water levels in three to five years, according to the universal law of the reservoir construction at home and abroad, a lot of new landslides and collapse will appear, and then the prevention of geological disasters situation is very serious, about 10 million people will face relocation.

### **1.3. Population migration research**

Defined for the migration, Johnston thought that migration is individual or group residence of permanent or semi-permanent change "[7]. In the end of the 19th century British scholar Ravenstein study on Migration System for the

first time, migration of population are summarized in his book "migration law" [8]. Ravenstein thought that the reasons of prompting population movements include discriminated against, oppressed, and a heavy burden, climate and unsuitable poor living condition, but the economic is the most important factors [8]. Herberle considered that population migration is caused by a series of "force", including the involvement of a person to leave a place of "push" and attract him to another place "pull" [9]. Lee believes that the cause and impact of population migration factors are: (1) to move out of local factors; (2) to move into the factors; (3) intermediate barriers factors; (4) migration intervention factors [10].

## **2. Case: Geological disasters and population migration in mining areas in Yunnan**

### **2.1. The distribution of geological disasters in Yunnan**

The special and complex geological conditions in Yunnan, more fragile geological environment, geological disasters-prone, with a wide, more type, and more dangerous characteristics. The main types of geological disasters include landslides, mudslides, avalanches, and ground subsidence etc. Geological disasters affected over a broad area and the condition of disaster is worst. In 129 county which are governments resident town, 41 town suffered different degrees of hazard of the geological disasters. In the 1419 township which is government resident town, more than 160 directly affected by threats or hazards of landslides, debris flows, 79 town are the more serious harm; nearly 5000 villages, more than 30 million mountain rural population in the geological under the threat of disasters and hazards.

| Disaster Situation | Geological Disasters | Landslide | Debris Flow | Collapse | Ground Subsidence | Other   |
|--------------------|----------------------|-----------|-------------|----------|-------------------|---------|
| Annual             | Total                | (times)   | (times)     | (times)  | (times)           | (times) |
| 2003               | 1691                 | 1234      | 220         | 173      | 62                | 2       |
| 2004               | 3056                 | 2100      | 725         | 183      | 45                | 3       |
| 2005               | 1888                 | 971       | 670         | 195      | 52                | 0       |
| 2006               | 1023                 | 873       | 74          | 149      | 107               | 0       |
| 2007               | 1154                 | 883       | 80          | 146      | 42                | 3       |

Table 1: The geological disaster situation in Yunnan (2003-2007)

Data source: from 2003 to 2007, Yunnan Geological Environment Bulletin

The type of geological disasters mainly include landslide, debris flow. The common types of geological disasters include Landslides, mudslides, avalanches, ground subsidence, ground fissures and desertification. Among them, landslides, debris flows are the major disaster which often caused the loss of life and property, restricting economic and social development with the characteristics of broad area, strong activity, suddenly. From the above table, we can see that the main types of geological disaster are landslides and debris flows during 2003 to 2007, it is related to special natural and geographical conditions in Yunnan, climatic conditions. According to the ground survey and remote sensing data, there are 6012 landslide points are recorded in Yunnan Province, 3349 debris flow, 245 ground

collapse and 26 other geological disasters. At present, there are 16171 geological disaster monitoring points in total have been included in the monitoring and prevention, accounting for 10% of the point of the total number of geological disaster[11].

## 2.2. The mining area current situation of population vicissitudes in Dayao, Yunnan

Mine population change is mainly caused by changes in the mobility of population, followed by natural changes, social changes are smaller. Changes in population migration refers to the population in the mobile space, including changes in the settlement of mobile and temporary mobility, migration, migration make the geographical distribution change, causing composition of the population sex and age and population socio-economic change.

| Year | Born (person) | Death (person) | Population of Move in (person) | Population of Move out (person) | Natural Growth Rate (%) |
|------|---------------|----------------|--------------------------------|---------------------------------|-------------------------|
| 2007 | 101           | 106            | 120                            | 94                              | -0.42                   |
| 2006 | 112           | 99             | 126                            | 164                             | 1.08                    |
| 2005 | 126           | 124            | 156                            | 179                             | 0.14                    |
| 2004 | 149           | 127            | 143                            | 1304                            | 1.43                    |
| 2003 | 154           | 123            | 122                            | 211                             | 1.94                    |

Table 2: The situation of population changes in Liuju town (2003-2007)

Data source: from 2003 to 2007, Dayao statistical bureau, Dayao County, economic and social development statistics, data of 2003, 2004, 2005, 2006, 2007

Migration is the way of the population change in mining community. Since 2000, in Dayao Yunnan Copper District, a large number of household population relocate to Chuxiong City, the mainly migrate population is the DY copper workers. In 2003, 211 people move out from LiuJu town, while 122 people move into; in 2004, there are 1304 people move out from

Liuju town ,and only 143 people move in, this year is the sharpest year to move out; From 2005 to 2007, the population of moved out and immigrant population was in balance(Table 2).

### **3. The mechanism that geological disasters affected on migration in Ming area**

#### **3.1. The influence of geological hazards on environment**

For immigrants, the immigration process is what they had to leave the familiar with the production and living environment to adapt to unfamiliar environment, during the process, not only material wealth, social resources will be suffered huge loss and impact, but also the generations inheritance customs, values and way of life may be abandoned to the social corner, or in danger of disappearing, geological disasters have led to the mine casualties, broken families, resources, housing, machinery and equipment and other means of production was seriously damaged, especially suffered unprecedented damage to the already very fragile ecological environment, the mining area residents survival and the basis for the development will be substantially reduced, to further reduce the livability of the mining area and capacity of population carrying.

#### **3.2. The impact of geological disasters on population security in mining area**

Since 2000, in China, there are about 1100 people dead and disappearance at average every year, it caused by the sudden geological disasters, according to the survey, nearly 240,000 places are geological disaster points, threatening the 13.59 million people. Yunnan was home to one of the heaviest damage of geological disasters provinces. The statistics from 1949 to 2000 show that the geological disasters in Yunnan Province caused more than 9,000 people were killed and 21,000 injured. Since the 1990s, Yunnan average annual death up to 169 people; the last five years the average number of death reach 93, during three years the average annual death up to 84 people, the annual number of death reach 10 percent of the country. Annual Geological disasters result in direct economic losses of 470 million yuan at average [12]. In 2005, the hurricane disaster occurred in City of New Orleans, in the United States, before and after the disaster, many residents have all moved elsewhere asylum and then return, to rebuild home after disasters past [13].

### **3.3. The influence of geological disasters on economic development in mining area**

Chinese geological disasters mainly distribute in the mineral-rich mining area. In 2011, there were 15,620 times geological disasters, resulting in 117 casualties and economic damage to property, 243 people was killed and 32 missing, 137 people injured, caused direct economic losses 40 billion yuan. The mainly type of geological disasters is landslide, mainly occurred in central and western hilly area, there are 15072 times happen during June to October, resulting in 217 people were killed and missing, respectively 96% and 79% of the total. In Yunnan Province, 129 county-level administrative regions have disaster records, geological disasters happen each year more than 3,000 times in the worst affected area, in 2001 and 2002 ,the number of death, and direct economic losses for two consecutive years and ranked first in the country.

#### **3.4. The impact of geological disasters on population mental in mining area**

Geological disasters occur frequently, people who live in mining area lack of the sense of belonging, the original settlers even emerge the psychological burden of a certain degree of fear, stress, disgust, natural disasters, it have very profound short-term and long-term effects on human psychology. According to World Health Organization (WHO) survey, after natural disasters or major emergencies, about 20-40% affected people will develop mild mental disorder, these people do not need special psychological intervention, and symptom will be relieved in a few days or a few weeks. 30% -50% of people will appear to severe mental disorders, timely psychological intervention and post-support will help the symptoms have been alleviated. Disaster year, 20 % people possibly will appear serious mental illness, they need long-term psychological intervention [14].

### **4. Results**

Geological disasters have a significant impact on living environment in the mining area, population security, mining, economy, population psychology, and it is not conducive to build a harmonious society in the mining area, government departments must attach great importance on it. Population movements caused by the mine geological disasters should be based on the requirements of sustainable

development, starting from the perspective of comprehensive human development and ecological environmental protection, scientific planning, overall planning, development of appropriate migration policy, guide and promote various forms of population movements flow, so that the mining area population to relocate to the ecological environment which is relatively superior living, long-term or permanently from the earthquake hazards of the human condition and other geological disaster-prone areas, and to have an important ecological role and function, and ecology vulnerable regions more time, more space.

There are several aspects of work should be strengthened in order to reduce the damage of Geological disasters to social and economic development in mining areas. First, to improve the early warning of geological disasters and emergency response systems, and establish a professional monitoring and complementary long-term monitoring and prevention mechanisms; second, to establish a major geological disaster prevention special fund, strengthen the source of prevention, and reduce the occurrence of geological hazards; thirdly, to strengthen publicity education, raise public awareness of disaster prevention; Fourth, to draft the law of population migration, regulate people's migration behavior; Fifth, combined the system of government support with social participation, establish a long-term mechanism to deal with geological disasters.

## 5. Conclusion

After tremendous disasters, there will always be a new phenomenon of population migration, this migration can be both a government-led large-scale immigration, may also be individual spontaneous migration behavior. Reasonable population migration is also a development, as for the resources and environment and socio-economic systems, population migration is benefit to change the status of the allocation of resources, and relatively balanced the distribution of population and resource, it can both reduce the pressure on resources and environment, and realize the marginal maximize output; for the population, only moved to the superior region of production and living conditions, people can get a relatively ample supply of material, in order to improve effectively the overall quality of the population.

The population distribution towards to the equilibrium configuration of the population and resources and environment, no matter the resource situation or livable level, human activities should be reduced in Mountainous seismic belt. Geological disasters give us a important inspiration that we should put the value of life on the highest position, using scientific and reasonable method to deal with the problem of actual placement and long-term development of the mining area population. Using the opportunity of post-disaster reconstruction and urbanization, combining the urban and rural development and new rural construction, dealing with population and resources environment, economic and social relationship, exploiting industrial policy, the household registration policy, land policy, employment policy and social protection policies, to promote reasonable flow of population in disaster area, and finally optimizing the spatial structure of the population.

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