Study on the Impact of Mineral Resources Exploitation around Cities on Resident Movement and Health Monitoring System

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Abstract. As a non-renewable resource, mineral resources occupy a very important role in human production and life. They are closely related to human beings. This article aims to analyse the status of mineral resource development and the distribution of mineral resources, and expound Relevant geological environment of the mine where the resource is located and some accompanying hazards, and put forward relevant suggestions and specific measures to protect the geological environment in view of the problems found. From the improvement of the utilization rate of minerals, the implementation of mine environmental protection and environmental supervision and other methods to protect the geological environment, I hope that we can provide some suggestions to our country on address environmental protection and development and utilization of mineral resources.

Key words. Mineral resources, mining, land supply, urban environmental health.

1. Introduction

With the rapid development of China's social economy, China's mining industry has also developed to a certain extent. Although our country's owners are extremely rich in mineral resources, the mining of minerals requires land occupation. Enterprises must invest a large amount of capital to obtain their effective use of land, and spend a certain amount of money on the reclamation after mining. For the land that has been reclaimed, how to dispose of it reasonably is a problem that most of China’s mining industry has yet to solve. At the same time, it is also the current land management work. Major issues that should be resolved. In recent years, the five new development concepts of innovation, coordination, green, openness, and sharing have put forward environmental problems that have become urgent problems to be solved. Therefore, the development of mineral resources must also keep up with the trend of the times and do a good job in address environmental protection, which also makes a certain contribution to the physical and sports health of urban residents [1].
2. Land use characteristics of mineral resources

2.1. Large land area, seriously damaging waste farmland
For many years, for China's large state-owned mining enterprises, on the one hand, it has played the role of a large land user, on the other hand, it has played the role of destroying the land. For different mining areas, the forms of damage to the land are also different. It can be roughly divided into five types: land occupation, collapse, excavation, pollution and disaster. According to relevant data, in the process of open-pit mining of coal mines, large areas of land will be dug up before commissioning, and during normal mining, every 10,000 tons of coal mined will cause 1.1 mu of land is severely digged, and if digging is used, every 10,000 tons of coal mined will turn 3 mu of land into collapsed land. If the two sets of data are averaged, that is, every 10,000 tons of coal mined will waste 2 mu of land. China needs to produce 1 billion tons of minerals every year, so the country will lose 200,000 mu of land because of coal mining, which has a certain impact on China's social stability and sustainable development.

2.2. Severely polluted environment
In the process of mining and processing of minerals, in addition to causing damage to the land, it will also cause serious pollution to the environment. These include: the pollution of the environment, vegetation and land caused by mine washing wastewater, mine sewage, stripping leaching water and the dust from the dump. The arable land is seriously degraded and the crop yields are greatly reduced, which ultimately aggravates the resource, population and environmental problems of the mining area. There are many types of heavy metals in mineral resources, such as, Hg, Pb, Cd, Cr and other metal elements. During the mining process, a large amount of these heavy metal elements and waste rock waste residues cause great pollution to water sources and surface soil. Mineral resources will also produce a lot of harmful substances during storage and smelting, and even affect the surrounding plants and crops, resulting in high Pb and Hg contents. These issues must be paid attention to.

2.3. Slope instability leads to serious ground subsidence
In China, the mining methods of mineral resources are mostly underground mining, such as minerals, which is a typical representative. The so-called goaf refers to the formation after a large number of mineral resources mining, such as ore mining, China ‘s annual ore mining volume is millions of tons, such high-intensity mining will form a large number of underground The space, and the ensuing ground subsidence, is a serious problem. In the past, the mining activities of mineral resources in our country were very chaotic, resulting in a very complicated distribution of the mined-out area, and even some mountain bodies and local surfaces have the consequences of cracking and deformation. Even if the surrounding rock of the metal mine is very strong, it cannot stop the problem of ground subsidence [2].

2.4. Waste residue and waste rock occupy cultivated land and form debris flow source
The mining process of mineral resources is accompanied by the production of a large amount of waste rock and waste slag. These waste rock and waste slag have not been scientifically used and processed, but are piled up at will, which not only occupies cultivated land and wastes land resources, but also invades riverbed polluted water sources and dust It will also cause a certain degree of pollution to the atmosphere. Some waste rock and spoil piled up in ravines and low-lying areas block the riverbed and change the surface runoff. In heavy rainfall, it is easy to cause debris flow, which will bring great harm to the production and life of people around and downstream. As shown in Figure 1, the problems and processes of mineral resource development.
3. Pre-mining evaluation of mineral resources around the city

For a certain mineral resource, it can generally be classified into various grades such as superior, medium and inferior according to national or industry regulations. Suppose a superior or intermediate mineral resource production enterprise, without considering the transportation cost, the cost \( C_m \) of the production unit superior or intermediate mineral resource, the production volume of the year is \( Q_m \), the production enterprise producing the inferior level of the mineral resource The average social production cost of \( C \) is \( l_C \), and the differential income obtained by enterprises that produce superior or intermediate mineral resources is

\[
V_m = (C_m - C_i) \times Q_m
\]  

(1)

\( C_i \) can be obtained by multiplying the production cost per unit of mineral resources of the inferior mineral resource production enterprise \( C_i \) and the current year's mining volume \( Q_i \), and then dividing by the mining amount to obtain the average value, which can be used as the average social production per unit of inferior mineral resources in the area. The basic standard value of cost. The formula is

\[
C_i = \left( \sum_{j=1}^{n} C_j \times Q_j \right) / \sum_{j=1}^{n} Q_j \quad (i = 1, 2, ..., n)
\]  

(2)

In the formula: \( C_i \) represents the production cost per unit of mineral resources of the inferior mineral resource production enterprise; \( Q_i \) represents the current year's mining volume of the inferior mineral resource production enterprise. \( C_m \) can be obtained by multiplying the production cost of all the production enterprises of superior or intermediate mineral resources in a certain area by the mining amount, and then dividing by the mining amount to obtain the average value. The basic standard value of the average social production cost. The formula is

\[
C_w = \left( \sum_{i=1}^{n} C_i \times Q_i \right) / \sum_{i=1}^{n} Q_i \quad (i = 1, 2, ..., n)
\]  

(3)
4. Double constraints of sustainable development of urban mineral resources exploitation

4.1. Resource exhaustion, urban decline
Resource-based cities can be divided into two categories: resource-free cities, that is, wilderness and wilderness cities that did not originally have cities, and cities that emerged due to the development of mineral resources; resource-based cities, that is, cities that originally existed, and later due to nearby areas Discover and develop mineral resources and turn them into resource-based cities, such as Renqiu, Handan and Korla. For a long period after the establishment of resource-based cities, resource-based enterprises were the main or even the only basic economic sector in the city. Therefore, in the growth and maturity of resource-based enterprises, resource-based cities develop rapidly with the rise of resource-based enterprises, and their development is synchronized.

4.2. State-owned enterprises "institutional bottleneck"
Under the planned system, the development of the business and service industry in the mining area does not rely on the market mechanism, but is realized through the enterprise-run society. Since the mining resources are in wilderness and wilderness, the security systems, public utility systems and even some government functions required by resource mining enterprises and their personnel can only be provided by the enterprises themselves. In this way, resource mining enterprises have become a "big and comprehensive" organization integrating resource mining, production support systems, logistics support systems, public utilities and government functions.

5. Evaluation indicators of mineral resources development around the city

5.1. Construction principles

5.1.1. Scientific principles. The index system should be established based on science and accurately, comprehensively and systematically reflect the connotation characteristics of sustainable development of resource-exhausted cities.

5.1.2. Practicality principle. The indicators should be selected reasonably, the indicators should be measurable, the statistical calibre and the classification method should be consistent, the calculation method should be easy to grasp, the required data should be easy to count and the authority should be ensured.

5.1.3. Dynamic principle. According to the viewpoint of system dynamic analysis, the relevant factors themselves should be fully considered when constructing the index system and mathematical model the changes in magnitude and weight make it reflected in the index system and mathematical model.

5.1.4. Feasibility principle. The selection of indicators should be based on the actual situation, and the representative comprehensive indicators and main indicators should be selected according to the specific conditions of the city. The indicators must be clear and unambiguous. Indicators that cannot be quantified or data are difficult to obtain and are relatively unimportant may be temporarily excluded from the indicator system.

5.2. Index construction
Specifically, the established indicator system should highlight the following functions: to reflect the quality and scale of economic development of resource-depleted cities; to reflect the operation of social systems, the key is to eliminate poverty and improve the quality of life, etc. Make a clear evaluation in the aspect; pay attention to the development and utilization of main resources and the abundance of existing resources; reflect the environment, especially the natural ecological environment capacity and regional sustainable development capacity (Figure 2).
6. Countermeasures for ecological environment protection of mineral resources development

6.1. Strengthen macro-control and strengthen the plan for the development and utilization of mineral resources

Scientific planning is the premise and basis for the rational development and utilization of mineral resources. Based on a comprehensive analysis of the overall situation and changing trends of China's social and economic development of mineral resource consumption needs, scientifically formulate a general plan for the development and utilization of mineral resources in a certain period in the future. And pay attention to highlight the following aspects: (1) Reasonable development of mineral planning. The uneven distribution of resources is one of the basic characteristics of mineral resources. During the planning process, the actual status of the dominant minerals, main consumed minerals, and inferior minerals in China's mineral resources must be fully studied. In order to reasonably plan the speed and level of development and utilization of different types of mineral resources in China; (2) Planning of reasonable development scale. The unbalanced distribution of mineral resources and the practical experience of industrialized development in developed countries tell us that no country can completely rely on its own resource supply to complete industrialized development projects. The integration of the world economy and the globalization of the allocation of mineral resources provide us with good conditions and environment for obtaining external resources. In this case, we must fully analyse and study the mineral resource demand, social and economic development of China in a certain period in the future. Factors such as the development capacity of mineral resources, the reserves and potential prospects of mineral resources, the carrying capacity of the ecological environment for the development and utilization of mineral resources, the possibility of acquiring mineral resources abroad and the degree of risk, etc., rationally plan China's mineral resources in a certain period in the future; (3) Reasonable scale and level of development and utilization [3]; (4) Reasonable development layout planning. The distribution characteristics of mineral resources and the differences in the vulnerability of the ecological environment in different regions determine the preparation of mineral resource development and utilization plans. Not only must the size and level of the total amount of development and utilization be reasonably determined, but also the macro layout of resource development and utilization must be solved. The problem of reasonable matching of resource development and regional ecological environment capacity is solved, and the problem of resource development and ecological environment protection is solved well; (4) Planning of rational development of mining areas. On the basis of controlling the total amount of development and utilization and optimizing the layout, closely combining the spatial distribution of mineral resources and the resource consumption status of the regional industrial structure, do a good job in the planning of mining areas for resource development and utilization, realize scale development and relative concentration, and improve resource development and utilization Scale benefit.
6.2. Standardize mining order and strengthen mine environment restoration and disaster management

Mining development projects have greatly disturbed and destroyed the ecological environment, and are prone to environmental geological disasters such as landslides, landslides, mudslides, ground collapse, and soil erosion. They have become an important source of environmental disasters in China, and it is necessary to establish and improve mine environmental protection and restoration governance. Relevant laws and supporting systems strictly regulate and monitor the environmental recovery and disaster management of mines. Mainly include: (1) A deposit system for mine environmental restoration and governance is issued as soon as possible to ensure the funds required for the mine ecological environment restoration and governance project; (2) Strictly regulate the geological environmental protection planning of mining enterprises, and integrate resource development planning and environmental protection planning, Mine environment restoration and disaster management planning are integrated into one, to realize the "three simultaneous" system of simultaneous development, simultaneous protection and simultaneous governance; (3) Strengthen the mine geological environment impact assessment system, mine geological environment guarantee system and mine geological environment periodic reports And the inspection system, turn the end management to the source prevention and the whole process supervision, improve the protection level of the mine geological environment; (4) Improve the periodic reporting and inspection system of the mine geological environment. All mined enterprises must regularly submit mine geological environmental protection reports to the land and resources department where the mine is located. The main contents filled in are various geological disasters caused by mining, environmental pollution problems and measures taken [4].

6.3. The return of urban function under the concept of people-oriented

Mineral resource-based cities have the dual meanings of mineral production bases and cities, so these two parts should also be taken into consideration in the development direction. On the one hand, currently mineral resources are still the largest resource in China's energy composition. With the rapid development of urbanization, the demand for mineral resources in various industries, especially industry and manufacturing, is still very large. Total mineral consumption in 2016 It accounts for 62% of the country's total energy consumption. Therefore, as a mineral resource-based city that undertakes the main mineral production and supply tasks, it is necessary to continue to fulfil this responsibility, and at the same time strengthen the industrial transformation and upgrading, from extensive development to intensive transformation, as a city Diversified development provides space. On the other hand, a city is a relatively large, relatively dense and relatively long-term residence composed of different heterogeneous individuals. It is an artificial environment created by human beings to meet their own survival and development needs [5]. Therefore, if the resource-based city wants to develop, it should reconstruct the neglected human and social factors in the development of the city into the function development of the resource-based city, so that the resource-based city not only has the function of an industrial base, but also should become a liveable city. While developing the mineral industry, it is also necessary to strengthen the construction of other functions of the city, such as urban public infrastructure, central and business areas, cultural education, ecological greening, etc., and improve the physical space of the city based on the needs of the people for a better life. To return the mineral resource-based cities to the essence of the city.

7. Conclusion

China's economic development is in a transition period from high-speed growth to high-quality development. The exploitation and utilization of mineral resources should also keep pace with the times, focusing on innovative and scientific environmental protection mining methods to avoid subsequent geological environmental pollution problems. The geological environmental protection of the mining area is closely related to the development of mineral resources. If you do not pay attention to protection and develop minerals with high intensity, you will eventually cause a series of safety problems, which will seriously threaten the quality of sports life and the safety of life and property of the residents near
the mining area. The development of mineral resources development enterprises restricts the progress of the national economy. We must change the concept of mining and utilization of mineral resources, protect the mining area and the nearby geological environment, and create more lasting development momentum under the premise of sustainable development.

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