



Research Article

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## Management of China's rare resources under the vision of environmental justice

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### ABSTRACT

Environmental justice requires that human beings allocate and undertake environmental rights and environmental obligations equitably while dealing with environmental crisis, to achieve co-exist and sustainable development of the whole human beings. Basing on the current environmental resource problems along with the development and utilization of rare earth resources (REEs), this paper analyzed the reasons for the lack of environmental justice in the development and utilization of REEs, and proposed some countermeasures to achieve the rare earth resources management in China.

**Key words:** Environmental justice, rare earth resources (REEs), management

### INTRODUCTION

Rare earth elements (REEs) consist of the 15 lanthanide elements with atomic numbers (Z) 57-71. There are a lot of rare earth resources (RERs) storage in the earth, but the distribution of RERs is extremely unbalanced. There exist huge differences of RERs storage among each country. According to the American Federal Bureau of Investigation (AFBI), data showed that there are abundant rare earth resources in China and at the end of 2012 it accounted for 50% of the total reserves of the world. Situations of RERs storage of other major countries is showed in table 1. According to the white paper "China's rare earth situation and policy" decreed by China's state council on June 6, 2012, China's RERs accounted for only 23% of the world's total reserves of RERs. Data released by AFBI in 2009, showed that China reserves 36 million tons of RERs, accounts for about 36% of the world's total 99 million tons RERs. To this data, the Ministry of Land and Resources of China carried out a special inspection, their result showed that storage of RERs in China was only 18.59 million tons, which accounted for about 23% percentage of the world's total reserves of 81.09 million tons. Since 2010, China has not proven new rare earth mine in great quantities, but the data investigated by U.S. Geological Survey is rising year by year, so RERs storage data in 2009 is generally believed and more representative.

Table 1 Distribution of RERs storage in 2012 of the world

Country	Storage(Unit:REO, 104tons)	Percentageof world's total storage (%)
China	5500	50.0
Commonwea-lth of independent states (CIS) and other	4100	32.3
U.S.A	1300	11.8
India	310	2.8
Australia	160	1.5
Brazil	36	0.3
Malaysia	30	0.3
Total	11000	100

Note: Data comes from [http://minerals.usgs.gov/minerals/plbs/commodity/rare\\_earths/](http://minerals.usgs.gov/minerals/plbs/commodity/rare_earths/).

REEs have excellent physical and chemical properties, and have been used widely in optical, electrical and magnetic

field. As a kind of non-renewable natural resources, it is very important to take measures to protect REEs and make rational utilization, in order to promote the sustainable utilization of the RERs. In recent years, the consuming of RERs is growing sharply, the global consumer market of RERs grows at the rate of 4%-6% annually.

#### **Problems in the Development and Utilization of China's RERs**

China is not the only country with rare earth, but in the past few decades it was assumed to be the largest producer, consumer and exporter of rare earth products.

According to the verification of Ministry of Land and Resources, China's rare earth reserves account for about 23% of the world's total reserves, however, it supplies more than 90% of the global market demand for a long-term [1]. Meanwhile, due to chaotic management and disorderly open co-opting, China did not get the proper benefit, on conversely it brought a great deal of ecological damage and serious waste of resources it may cause serious pollution of water sources. Moreover, in some parts, over-exploitation of RERs also causes landslides, rivers blocking, sudden environmental pollution events, even serious accident disasters, which bring great damage to human life and health of the public and the ecological environment.

**A serious waste of resources:** Rare earth pays a huge environmental cost, at the same time China's RERs are facing depletion. White Paper on China's rare earth Conditions and Policies pointed out that after super strength mining of more than half a century, the holding reserves volume of RERs and ensure exploiting years in China are continuously falling, and key mining resources have been accelerate the attenuation, resulting in most of the original mining resources exhausted. These phenomenon are mainly because the excessive mining enterprises, undocumented mining, cross-border exploitation, unauthorized mining, lowly resource utilization, etc. Ionic REEs mostly lie in remote mountainous areas in the south of China, and factors like high mountains, dense forests, scattered mine sites which make mining process costly and difficult to take charge of illegal exploitation of RERs. Only rich resources and easily mining mines are exploited, and thus have a low rate of resource recovery rate in these regions. The rate of ionic REEs extraction in the south is less than 50%, and 40% to 60% in the north with more serious REEs waste (about 20% REE reclaim) by illegal mining [2]. Some problems such as stealing mining REEs still exist in a certain individual regions which make a much lower REEs utilization.

#### **Reasons of Environmental Justice Lacked during the Development and Utilization of RERs**

Environmental justice is a new proposition arising from the deepening of the United States environmental crisis and the environmental movement since the 1980s. The meaning of environmental justice, in brief, is that all subjects rank *pari passu* and bear the same obligation when they are utilizing the resources and protecting the environment [3]. Environmental justice mainly includes three aspects, namely inter-species justice, intergenerational justice and intra-generational justice. Inter-species justice means that, man and nature, the two subjects, are equal. Human beings have to respect life and the nature, recognize the rights of the nature, and admit their moral obligation to nature world. Intergenerational justice is that the present and future generations are equal in utilizing natural resources to meet their own interests, seeking the right of survival and development, in other words, the present generations must leave necessary environmental resources and natural resources to the future generations. Intra-generational justice means the same generations, regardless of nationality, race, gender, economic levels and cultural differences have the same rights to live in good environment and use natural resource, generations in a country or a region must take into account the needs of other countries and other regions in the development and utilization of natural resources. The essence of environmental justice lies in a reasonable apportionment and allocation of environmental responsibility and ecological interests. From the perspective of environmental justice, we analyzed reasons for being lack of environmental justice during the process of developing and utilizing REEs in China.

**Government aspire the economic indicative in Political activities:** For a long time, the constraints of traditional development view and performance concept have deeply rooted in the local government and enterprises. With RERs optimistic on the market, some governments and enterprises are working for the short-term interests of individuals and the local, and focusing on economic development, neglecting environmental protection, and pursuing for of economic goals, regardless the sustainable development of the local environmental resources, mining beyond design capacity in many places, and all these lead to accelerate the destruction of the ecological environment. RERs, as strategically important resources, bring fiscal revenue to the government and huge profits to enterprises, but also bring disasters to the residents of the Rare Earth Mining areas. It is estimated that, only in Ganzhou, environmental restoration caused by rare earth mining pollution costs up to 38 billion RMB. Unfortunately, this figure is far more than the economic interests gained from rare earth mining. Till the end of 2011, main business income of 51 rare earth enterprises in Jiangxi Province is 32.9 billion RMB, with profits of 6.4 billion RMB, the profit of which ranks number one in the rare earth industry [4]. In a sense, one important reason of environmental pollution rapidly and the worse situation is the government staff one-sided pursuit of economic indicators and the mismanagement.

**Lack of the ecological compensation mechanism about rare earth mines:** Environmental justice opposed predatory development of resources and transferred ecological crisis to economic development. In a certain extent, the rapid development of the wealth of preponderant groups sacrifices the interests of vulnerable groups in the process of developing and utilizing RERs. Since the beginning of the 21st century, especially in recent years, the price of rare earth has been increasing. In rare earth mining region, preponderant groups who have accumulated a great number of money don't give adequate compensation to vulnerable groups. The iron ore mine of Baiyun Obo in Baotou is rich of rare earth, the dressing plants crushed the ores and grinded them into powder, irons were selected and separated by the magnetic, and then separated 10% rare earth again, all the remaining of slurries were pumped to the tailings. But the remaining slag still contained a lot of rare earth, after more than 40 years of accumulation it will form a capacity of 170 million tons of "Rare Earth Lake". In recent years, it is common to find the deformity sheep around the mine, and the proportion of cancer is increased in these villages. This environmental destruction caused by rare earth mining is lack of effective governance and compensation. In addition, present China's "Environmental Protection Law" obviously neglects ecological environment compensation, and the strength of the single method for natural resources protection is insufficient. Therefore, in the process of RERs development and utilization, vulnerable groups in the rare earth mining areas can hardly get powerful ecological compensation.

**International resources plunder:** Associated with the large-scale development of globalization, the developed countries transfer some high consumption, high pollution, raw materials warehouse, and even garbage dump to developing countries in international trade. They directly plunder the land, labor, natural resources and clean air, clean of water which belongs to the developing countries. Rare earth are rich in mineral resources, but the distribution is unbalanced, mainly in China, Australia, Russia, the United States, Brazil, Canada and other countries. Maybe due to the high pollution of the rare earth mining and resource scarcity, many countries import RERs to meet domestic demand.

**Unreasonable consumption and lack of democratic supervision:** The looting and destruction of human nature, and human consumption are inseparable. Marx believed that the consumer was not only the end of the production, but also the starting point for production, consumption was not only to achieve the production, and promote the production in turn, but also affected the exchange and distribution. If people want to get rid of the crisis of unsustainable development, we have to change the consumption patterns that damage the environment and our survival. Natural resources are not unlimited. Contemporary people's predatory consumption of RERs can cause completely disappeared of rare earth mine, as the future generations cannot take advantage of this resource to meet basic needs. Excessive consumption will also put pressure on the environment, which makes our future generations can no longer enjoy the beautiful ecological space. Excessive consumption is not only resulted in the depletion of resources and the deterioration of the environment, but also fueled consumerism and hedonism, which are more harm to the environment and our human beings. Under such consumption idea, government cannot implement its supervision right to the scientific use of RERs, and control the activities of these enterprises that pursuit short-term profit regardless of environmental protection.

#### **Countermeasures about the Development and Utilization of RERs to Achieve Environmental Justice**

Rare earth is China's important strategic resources. It is urgently to take a series of scientific management to transfer the resource advantages into economic advantages, in order to promote the sustainable development of China's rare earth industry. Environmental justice proposed a new thinking path for solving the problems existing in the process of China's RERs development and utilization.

**Strengthen the government scientific management on RERs:** To promote RERs development with green, recycle and low-carbon requires the joint efforts of the government and enterprises. First, the government should control the intensity of rare earth development, and strengthen the rare earth integration. On September 2012, the Ministry of Land and Resources announced the list of rare earth prospecting and list of rare earth mining rights. According to the lists, there are only 10 enterprises in China have the rare earth exploration rights, the mining rights are reduced from 113 down to 67, the rate of reduction of four percent, which show the determination of China to integrate rare earth governance and rare earth[5]. Meanwhile, we must adjust and optimize the industrial structure of rare earth, to encourage the development of high-tech, high value-added application of rare earth industry. For ultra vires, illegal construction of the rare earth smelting separation project should be hold responsible for the relevant units and persons. Second, encourage rare earth enterprises technological innovation. Promote the use of in-situ leaching, smelting separation without ammonia, extraction combined and other green and efficient mining and processing technology and new advanced low-emission, low energy consumption equipment retrofit existing rare earth mine. Carry out recycling work of tailings resources and rare earth products actively, improve the level of rare earth resources recovery and utilization, reduce energy consumption, material consumption and reduce environmental pollution[6]. Cultivate rare earth talents vigorously, and strengthen intellectual property rights protection and technical standards for the construction of creating favorable conditions for the development of rare earth technology.

Meanwhile, enterprises should strengthen the management of innovation, foster the formation of a resource-saving and environment-friendly, make intensive development, and fulfill their social responsibilities of the modern enterprise.

**Establish and improve the ecological compensation mechanism to rare earth mines:** With the development of economy and society, the strategic position of RERs has become increasingly prominent. It is desperately needed to establish and improve the ecological compensation system which reflects the rare earth market supply and demand and the scarcity of resources, also the ecological values and intergenerational compensation. First, China should accelerate the implementation of rare earth mine ecological environment protection and management recovery margin system, the recovery costs of the rare earth mine development should be included in the whole opening cost, strict implementation of the enterprise ecological environment protection and recovery of economic responsibility. Rare earth mining must be based on mine ecological protection and management recovery programs not lower than the cost of mine ecological protection and management principles, collecting and increasing standards comprehensively. Secondly, in view of the problems for historical and regional environmental pollution, ecological destruction and environmental health damage compensation issues caused by rare earth developing progress, China should actively explore an ecological compensation mechanism with which was dominated by government-leading, enterprise and society participated in the process of rare earth mining. Government formulates the ecological compensation standard and promotes the establishment of the rare earth mining ecological compensation fund. According to the investors "benefit" principle, multi-channel financing through market mechanism is encouraged to accelerate the process of governance and recovery.

**Strengthen the international environmental conversation and cooperation:** A double win strategy in the field of rare earth is implemented in China. In one side China pursues a reasonable rare earth supply the international market, on the other side it also has to protect the ecological environment and resources, which is in line with the sustainable development of China, and the interests of all countries of the world. China insists on common but differentiated responsibilities principle, fair principle and principle on the basis of their ability, we should strengthen dialogue and cooperation with other rare earth producer and consumer, to solve resource and environmental problems in the development of industry. In recent years, China actively participates in the international exchanges in the field of rare earths, and has established the academic exchange platform for the discussion of international rare earth development and application, the summit forum about international rare earths affairs, such as BaoTou rare earth BBS. China also actively takes part in some activities related to the application organization of international rare earth permanent magnet, display and lighting applications. Bilateral and multilateral exchanges and dialogues are done among the United States, the European Union, Russia, Japan and other which have made further communication and information, enhanced mutual understanding and promoted the sustainable development of the world rare earth science, technology and industry. At the same time, countries that are rich in RERs should develop domestic resources actively, so that the international market supply channels and trade scales are all expanded, and the responsibilities of the global rare earth supply and maintenance of the global environment are realized, also achieved sustainable development of the world economy.

**Establish a green consumption concept and strengthen the domestic supervision:** The concept of green consumption is a temperance type of life style, it initiates the moderate and reasonable consumption opposing the unreasonable. It is proposed under the situation of unsustainable economic development crisis. Upgrading industrial structure optimization can be through the establishment of a green consumption concept, and the development of a green consumption, and optimize the consumption structure, which are not only to better meet the needs of the residents, but also a better cycle between production and consumption. The virtuous cycle of production and consumption, can improve the enterprises and consumers' green consumption consciousness. The change of consumption idea, make the enterprise consciously to strengthen internal management. In the process of production, enterprises reduce their pollution and destruction of the natural environment voluntarily. Citizen, setting up the green consumption and strengthening democratic supervision, can complement the lack of government supervision and management. At the same time, enterprises adhere to the unity of economic, social and ecological benefit principle, control the development intensity, adjust the structure of space, their purposes are to ensure reasonable storage of RERs for future generations, and keep the sustainability of RERs development and utilization ecological benefits and long-term interests on the premise of reasonable economic and social benefits pursuit.

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