

Research on Economic Transformation Development of Resource-depleted Cities from the Perspective of Ecological Civilization-Taking Heshan, Guangxi as an Example

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Abstract. Under the background that the country vigorously advocates ecological civilization and green economy, Heshan, as a resource-depleted city, is faced with severe challenges of resource exhaustion and harsh environment, leading that its economic transformation is difficult. Because the long-term extensive mining mode of the resources, there exists serious environmental problems and insufficient development of the environmental protection industry. It is necessary to take measures to solve the problems combined with the current situation of resources. It can develop fine machining and deep machining to extend the industrial chain, and unceasingly excavate the environmentally friendly alternative industries. At the same time, it can also explore special eco-tourism projects with industrial characteristics. And those will promote the development of the overall environment and the transformation of ecological economy of Heshan.

Introduction

As a century-old mining area, Heshan has a long history of mineral exploitation. The contradiction between economy and ecological environment has become prominent increasingly. A series of problems, such as resource shortage, environmental pollution and ecological imbalance, have become the bottleneck that restricts economic and social development. With the proposal of ecological civilization and the construction of green mines, Heshan must strengthen environmental governance and transformation development. How to mitigate the eco-environmental problems left over from history and promote economic transformation, which combines the status quo of local mining areas and featured mineral resources with environmental governance measures, has become the focus of current ecological civilization construction.

Status Quo of Heshan

Heshan, a mining city established for coal mining, was classified as one of the second batch of resource-depleted cities in China on March 5, 2009. It is the first resource-depleted city in Guangxi. The mining of coal resources in Heshan started in 1905, which is the earliest coal mine in Guangxi. As the largest energy production base in Guangxi, it is known as “the coal capital of Guangxi”. It has been taking coal mining industry and thermal power generation industry as the pillar of the city's economic development, resulting in rapid economic development., especially during the 10th Five-year Plan. According to the survey data, the proportion of primary industry, secondary industry and tertiary industry was adjusted from 16:56:28 in 2000 to 10:62:28. The city's industrialization rate reached 6.2% and the urbanization rate reached 44%. However, since the beginning of the 11th Five-year Plan, with the closure of four 360,000 kilowatts generating set of Heshan Power Generation Company in 2007, the exhaustion of coal resources and the impact of the international financial storm, the Heshan's economy began to decline. In 2008, the total industrial output value of the city was 1.958 billion yuan, 4.0% below its year-earlier level. Industrial added value reached 556 million yuan, 13.4% below its year-earlier level. The two major industrial pillars fell

significantly: 2.6 billion degrees' generating capacity for 50.9% below its year-earlier level and 780,000 tons' coal production for 42.6% below its year-earlier level.

Heshan is popular with coal, but it is also in trouble for it. Due to the single economic structure, shrinking resource industries, backward urban infrastructure, backward social undertaking, serious ecological damage and environmental pollution, as well as the increasing pressure of employment and the intensification of conflicts between mining and farmers, this coal-based city is urgent to achieve sustainable development through economic transformation.

Problems in the Eco-economic Transformation of Heshan

Severe Ecological Environment

As a century-old mining area, the problem of ecological damage and environmental pollution is very serious in Heshan. The *three simultaneous system*^① was initially prescribed in the Environmental Protection law of the PRC in 1989. The central government has also established the principle of "*the beneficiaries to compensate, the saboteurs to restore and the polluters to govern*"[1]. But before this, most of the mining engineering has been up and running. In order to pursue the rapid development of economy, Heshan wrongly followed the way of treatment after pollution, leading that the facilities for pollution control failed to achieve the environmental standards and environmental problems caused by abandoned mining areas have been accumulating day by day. It mainly includes the pollution of sewage, dust and solid waste and soil erosion caused by long-term mine production, as well as the destruction of rare animals and plants, natural landscape, cultural relics and historic sites, and the abandoned land of mines after the completion of mine operation. These have a great impact on the life and production of local residents. What's more, it seriously hinders the overall economic transformation of Heshan, and are not conducive to eco-economic construction and development.

Single Industrial Structure and Insufficient Capacity for Economic Development

In Heshan, there is a situation of single industry [2], resulting in single industrial structure, difficult development of environmental protection industry, and insufficient capacity of economic development. In the early stage, in order to pursue rapid economic development, Heshan adopted extensive mining mode for resources, causing lots of problems. Such as the unbalanced economic structure for single industry support, making for poor overall economic strength and weak risk resistance. Heshan has not formed the pattern of diversified economic development without sufficient alternative industry, and it fails to make full use of resources to extend the industrial chain, resulting in serious waste of resources. Furthermore, serious ecological damage and environmental pollution aggravate the intensity and difficulty of ecological economic transformation.

Suggestions to Improve the Eco-economic Transformation of Heshan

Strengthening Environmental Governance

At the time when China is vigorously promoting the construction of ecological civilization and green mines, Heshan can work in comprehensive ecological environment management and restoration as follows:

In the connection between policy and practice, *the principle of distinguishing the old from the new* should be implemented. [3] This means that the problems that must be addressed for the environmental restoration and treatment will be divided into two types. One is ecological environment damage caused by the existing mining area, such as pollution caused by unapproved

① The three simultaneous system refers to the facilities for preventing and controlling pollution in construction projects, which shall be designed, constructed and put into operation at the same time with the main project. Facilities for the prevention and control of pollution shall comply with the requirements of the approved environmental impact assessment documents, and shall not be dismantled or left idle without authorization.

construction projects. The other is ecological environment damage caused by abandoned mines left in history, such as accumulation of coal waste. This distinction combines the blocking of the source with the clearing of old accounts. It insists that development and protection go hand in hand, which is conducive to solving the ecological and environmental problems accumulated in history and curbing new ecological deterioration factors.

In capital safeguard, we should expand sources of funds. Ecological environment governance depends on abundant financial support. Therefore, it is necessary to establish a fund investment mechanism of environmental governance with national financial input as the main part and multi-channel fund-raising as the secondary part, for the problem of ecological environment destruction in Heshan has a long history. First, we should actively strive for policy-oriented special funds for environmental protection, such as special funds for energy conservation and emission reduction, and special funds for “Beautiful Guangxi · Ecological countryside”. Secondly, we should optimize the structure of government fiscal expenditure, gradually increase the proportion of environmental governance investment in public expenditure, and increase investment in basic public services for ecological and environmental protection. Third, it is necessary to establish a special fund for waste mine environmental issues management and improve the mine environmental governance recovery fund [4], so as to guide enterprises to invest funds to maintain and control the ecological environment and achieve better ecological benefits.

The supervision and management in mine environment should also be strengthened. Mineral resources development involves many aspects, including the central and local governments, mining enterprises, mining residents and users, etc. It can give full play to their role and encourage public participate in monitoring in Heshan city. It is also necessary to strengthen the construction of the dynamic monitoring system of the ecological environment in the Heshan mining area. Then arrange the monitoring points reasonably in each mining area to conduct systematic intensive monitoring of the geological environment and ecological conditions, such as ground collapse, tension crack and underground hydrology. This will push the whole supervision channel towards social governance for more ecologically friendly and green.

Extend the Industrial Chain of Ecological Production for Resources

Due to its long history of mining, Heshan is mainly a resource-intensive and labor-intensive industry. At present, there is a prominent contradiction between economic development, resource exhaustion and environmental degradation. It is necessary to use existing resources and science and technology to extend the industrial chain, so as to promote ecological production and develop ecological industry. On the one hand, energy saving production, fine machining and deep machining on the existing mineral resources of Heshan can improve the added value of products, such as promoting comprehensive utilization of fly ash and deep processing of non-ferrous metals in production. On the other hand, the accumulated gangue can be reprocessed to turn waste into treasures, for example, developing calcined kaolinite and producing macromolecular ratio artificial cryolite, and even constructing gangue power plants which can transform waste resources into power resources. According to the “Guangxi Local Record · Coal Industry”, Heshan mining bureau planned to invest 2.92 million yuan to produce 160, 000 square meters of glazed wall tiles with yellow gangue as raw materials in 1997 [5]. Now, both technically and financially, they are better off than they were then. Therefore, we should make good planning and make full use of successful practical experience to constantly explore ways to extend the industrial chain, which can not only increase the productivity and value of mineral resources, but also be beneficial to solve the problem of ecological environmental pollution in land and water caused by the piling up of gangue^①, etc. Thus, the contradiction between resource exhaustion and economic development can be alleviated and it is possible to achieve ecological and sustainable development.

^① According to the research statistics of scholars, the piling up of only gangue covers an area of more than 100 million square meters in China, and it still increases at a rate of more than 3% every year.

Develop Alternative Industrial Projects to Support the Development of Ecological Industry

Cultivating diversified industrial structure is one of the goals of the transformation of resource-depleted cities that is one of the urban transformation development projects being implemented currently by the state. Heshan should actively respond to the national policy of supporting environmental governance in mining areas and actively develop alternative industrial projects to promote the construction and development of industrial transformation. It must insist on implementing measures of environmental protection and environmental governance and focus on developing alternative industrial projects in the "Resource-depleted City Transformation Plan of Heshan" and "13th Five-year Plan for Heshan's Environmental Protection and Ecological Construction", for example, establishing calcium carbonate industrial park, which can utilize the abundant calcium carbonate resources in Heshan to promote the light (nanometer) calcium carbonate production project. In addition, it can also develop a series of other alternative industries, such as new building materials desulfurization stone powder project, chemical calcium carbide project, industrial silicon production project, straw power plant and gangue power plant, stone project with an annual output of 200,000 square meters, and cement production line project with a daily output of 5,000 tons and so on. In order to accumulate strength for the economic transformation and development of Heshan, it must promote those projects as soon as possible and build two industrial park of industry conversion in Lingnan District and Ma'an District in Heshan. Of course, part of the operating income from those projects will be re-invested in the mine environmental management and environmental rectification. It can be seen from this that not only is this conducive to the environmental management practice in the mining area, but also can promote the employment transfer and drive the overall transformation and development of Heshan.

Developing Eco-tourism with Industrial Characteristics

In the tide of ecological civilization system reform, Heshan must combine the ecological restoration of mining area with urban economic transformation and development under the concept of Fate Community [6] and the principle of *mine-city collaborative ecological system*^① [7]. Heshan can promote ecological restoration projects, construct a coordinated eco-tourism system of "mining and city" and develop eco-tourism with industrial characteristics.

The first industrial tourism festival in Guangxi was successfully held in Heshan in 2015, and has been held annually since then. Heshan should take this opportunity and learn from the successful experience of Ruhr region of Germany in realizing economic transformation with *the tourism route of industrial culture road* [8]. It can unceasingly excavate and revitalize the tourism resources by taking characteristic mining and smelting culture as the core and relying on the sightseeing tourism belt of Hongshui River, so as to promote the activation and image remodeling of Heshan's tourism resources [9]. On the one hand, as a century-old mining area, there are a large number of facilities and equipment in Heshan, idle tracks and wagons for transporting coal, for example, which can be turned into treasure. If you go there, you can see that part of the "special line" used for coal transport has been transformed into the "ten-mile flower corridor" tourist line and the abandoned train carriage has been transformed into a "train restaurant" in the historic mining area. Heshan can continually construct the Heshan national mine park [10] and tourist attractions of "28 tracks" at East Mining Area by making full use of those waste resources. On the other hand, the mining museum must be completed as soon as possible. Meanwhile, it can create cultural landscape area of industrial relics and intuitive experience area of mining culture, which means integrating mining and metallurgy culture into tourist attractions to enhance tourism. For instance, the scene of miners' production and life can be painted on the wall, and the production parts can be pieced together into

① There are differences between mining areas and cities. At present, so many scholars study separately with urban development or ecological restoration and reconstruction of mining areas. I believe that these are two aspects of one problem because of an internal connection between them. It is unreasonable to study in isolation. From the perspective of sustainable development, it is necessary to build a "mine-city" collaborative transformation ecosystem by combining the environmental restoration of mining areas with urban development in resource-depleted areas.

various animal shapes sprayed with colorful pigments.

Therefore, Heshan must strengthen the transformation of mining cultural experience tourism projects and the later construction of Heshan national mine ecological park. Above all, this can make the abandoned mine, mines, mining shantytowns, old railway station, railway and train become an important element and component of tourist attractions, forming unique industrial tourism in Guangxi and even across the country, so as to promote the branding as well as large scale of Heshan's eco-tourism with industrial characteristics and achieve the goal of economic transformation.

Summary

In the context of the ecological civilization advocated by the state, resource-depleted cities like Heshan cannot continue on the wrong path of pollution first and treatment afterwards. So ecological protection must be taken into account in economic transformation to break the bottleneck of economic transformation development. In conclusion, on the basis of environmental governance, it is necessary to break the extensive production and operation mode of mineral resources in Heshan, to explore and establish an ecological industrial chain, to develop alternative industries, and to create the unique industrial ecological tourism in Heshan, so as to achieve the economic transformation and development in the period of resource exhaustion in Heshan.

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