

## LETTER TO THE EDITOR

## The Influence of the Coordination of Population Resource Distribution and Ecological Environment Carrying Capacity on the Promotion of Economic Development

Xinming Deng, Shengjin Wang\*

Northeast Asia Research Institute of Jilin University, Changchun 130012, China

\*Email: dengxinmingdxm@126.com

Human social economic development and resources environment are mutually dependent on each other. Resources environment provide material conditions for human production and labor, and it is the material basis of human economic activities. At the same time, it is also the discharge place and natural purification place of waste produced in human social and economic activities. The course of human development is a long-term interactive process between human social economy and resources environment. Coordination refers to the harmonious, consistent and benign interaction between several interrelated elements. In order to realize sustainable development, it is necessary to coordinate the relationship between human and nature, to coordinate the relationship between economic development and resources environment, and to comprehensively grasp and solve the problems of population, resources, environment and economic development as a whole. In order to achieve this goal, we must understand the interaction between the environment of the population and the development of the economy, and ensure that they are in a harmonious state of good interaction, which requires us to set up a set of mechanisms to evaluate and detect the coordination of the environment and the economic development of the population. Based on the idea of sustainable development and the establishment of the index system of population, resources, environment and economic development, this paper calculates the coordination between population, resources, environment and economic development, and makes a corresponding analysis of the results. Some countermeasures and suggestions are put forward for the existing problems.

environmental bearing capacity; population distribution; economic development; coordinate

### 1 Introduction

Human social economic development and resources environment are mutually dependent on each other. Resources environment provide material conditions for human production and labor, and it is the material basis of human economic activities. At the same time, it is also the discharge place and natural purification place of waste produced in human social and economic activities. The course of human development is a long-term interactive process between human society, economy and resources environment.

The experience and lessons in the development of human history show that human development must be based on harmonious coexistence with nature. Since the 20th century, the research on the coordinated development of

ecological environment and economy has been paid more and more attention at domestic and foreign, and coordinated development has been recognized as the best choice to deal with the relationship between economic development and environmental protection. (Dobay et al., 2017) The harmonious development of the ecological environment and economy is completely consistent with the concept of the sustainable development, and from any regional scale, the sustainable development requires the coordination of the relationship between the social and economic development and the utilization of natural resources and the ecological environment, The sustainable development is the standard of the harmonious development of human and nature (Serrano et al. 2018).

Xiaohua Wang, Liqiang Cao, Lin Shen, Qingshan Bai published an article in the Ekoloji (Issue 106, 2018), entitled “ The Coordinated Development About Eco-environment and Economy: A Case Study of Guanzhong Area”. In this paper, it is pointed out that with the extensive economic development model of high pollution and high emission, resources and environment are facing a serious deterioration trend, which makes human beings can not ignore the contradiction between ecological environment and economic development. Principal component analysis (PCA) and mathematical model method are used to establish the evaluation method of ecological environment system and economic system index system. The results show that, from the time series, this relationship is mainly characterized by the two characteristics of the coupling coordination. First of all, the coupling coordination of evolution maintains an upward trend in fluctuations. Second, the study area has obvious characteristics in each stage, such as slow development, fast decline speed and fast development speed. This study puts forward some effective suggestions from the macro and micro angles, which is the theoretical basis of the road of sustainable development.

On the basis of the above research, it is necessary to know the effect of the coordination of population resource distribution and ecological environment carrying capacity on the promotion of economic development, and it is necessary to understand the basic conditions of the ecological carrying capacity, economic development, and the degree of coordination and coupling of the two. The sustainable development ability of the comprehensive evaluation area is analyzed, and the regional distribution law of the sustainable development ability is analyzed, and the reference is provided for the development of the regional socio-economic development, the utilization of the resources and the environmental protection.

## 2 Idea Description

In the early economic development, the problem of environmental damage has little impact on economic growth. Therefore, resources are not the decisive factor of economic growth, and ecological factors have not entered the field of western economics. Until the 1940s, mainstream economists still tended to develop natural resources, regarded the constraints of environmental factors on economic development as insignificant, and considered that solving the supply of material products was the main task of production (Wei et al. 2018). After World War II, with the sustainable development of science and technology, the continuous improvement of labor productivity and the rapid growth of the world economy, a large number of environmental pollution and ecological degradation problems have emerged, the severity of which has not been expected. The economists found it difficult to find out whether to interpret and study these problems from the perspective of ecology or economics, so they began to carry out the research on the relationship between ecological construction and economic development.

Coordinated evaluation model of population distribution and ecological environment carrying capacity The carrying capacity of ecological environment is the population size of a country or region with a certain nutritional

level under certain production conditions. It mainly reflects the relationship between regional land, population and food and socio-economic situation (Zhang et al. 2018). It can be measured by the population size (human) or carrying density (human / km<sup>2</sup>) that can be continuously supported by regional environmental productivity at a certain level of grain consumption. The specific calculation model is as follows:

$$LCC = L_i / L_j \quad (1)$$

In the formula,  $LCC$  is the carrying capacity of regional ecological environment;  $L_i$  is the actual situation of regional ecological environment of basic evaluation unit;  $L_j$  is the density of regional population distribution of evaluation unit.

The carrying capacity of population ecological environment refers to the comparison between the actual population size and the regional ecological environment carrying capacity to reflect the relationship between ecological resources and population distribution. The specific calculation model is as follows:

$$LCCI = B_i / LCC \quad (2)$$

In the formula,  $LCCI$  is the index of carrying capacity of regional population ecological resources,  $B_i$  is the actual population size of the region. The population overload rate and surplus rate of ecological environment resources based on the evaluation unit are further calculated (Kibria et al. 2017), and the specific calculation model is as follows:

$$LR_{hk} = (1 - LCCI) \times 100\% \quad (3)$$

$$LR_{cd} = (LCCI - 1) \times 100\% \quad (4)$$

In the formula,  $LR_{hk}$  is the surplus rate of regional ecological environment;  $LR_{cd}$  is the overload rate of regional ecological environment (Zhang et al. 2017).

According to the above model, taking Xinjiang Province as an example, the coordination between population distribution and ecological environment carrying capacity in this area is evaluated, and the detailed results are shown in Table 1.

**Table 1 Evaluation results of coordination between population distribution and ecological environmental carrying capacity in some areas of Xinjiang**

region	population and ecological environment carrying capacity	
	index	type
Turpan	5.37	serious imbalance
Hami	3.33	serious imbalance
Karamay	16.20	serious imbalance
Urumchi	12.23	serious imbalance

Shihezi	1.70	imbalance
Aletai	1.19	imbalance
Ili	0.78	coordinated surplus

### 3 Results

As can be seen from Table 1, there are 7 offset-type areas. Among them, the bearing capacity of the population and land resources in the city of Urumqi, Karamay, Hami and Turpan belongs to the severely maladjusted area, and the population and the ecological resource carrying capacity index  $LCCI > 2$ . Urumqi is a social, economic and cultural center in Xinjiang, with convenient traffic information and high degree of population aggregation. It is the only super big city in Xinjiang, with high level of industrialization and urbanization, and the bearing capacity of population and ecological environment are seriously out of balance. Karamay City is a resource-based city. In recent years, due to the development and utilization of oil, natural gas and other mineral resources, it has led to the rapid development of its social economy, and the social material accumulation conditions that attract population accumulation are better, which makes its population seriously overloaded. However, there is a shortage of water resources in Hami and Turpan, and the productivity of land resources is low, but the transportation is convenient and the degree of population accumulation is higher.

As can be seen from table 1, only Ili area, which is located in the western slope economic belt of Tianshan Mountain in northern Xinjiang, belongs to the category of coordinated development, which is rich in natural resources and suitable for population living under environmental conditions such as temperature, but the degree of social and economic development in the region is relatively low. The ability to control and develop resources and environment is weak.

### 4 Discussion

Reasonable assessment of the degree of coordination between the level of protection and utilization of regional resources and environment and the level of social and economic development is an effective way to identify the key development contradictions, determine the appropriate development strategies and objectives, and realize the sustainable development of the region. Through the establishment of a model to evaluate and analyze the ecological environment carrying capacity of Xinjiang province and its coordination with the development of county economy, and then find out the methods and strategies to alleviate the deepening contradiction between regional ecological environment and economic development. The purpose of this paper is to make the economy of this region develop coordinated and sustainable on the basis of ecological environment. The establishment of a good mechanism of ecological reconstruction and economic coordinated development will be of great theoretical value and practical significance to environmental protection, ecological restoration, poverty eradication, economic development and the sustainable development of the whole regional economy. Therefore, it is necessary to speed up the adjustment of industrial structure in this kind of area and promote its social and economic development.

### 5 Conclusion

The research object of this paper is the coordination of population resource environment and economic development in Xinjiang province. Based on the research results of domestic and foreign scholars, the paper

analyses the coordination of population resource environment and economic development of Xinjiang province based on the establishment of the index system of population resource environment and economic development. However, the limitation of the author's ability and time is limited in this paper. In the future, the relationship between the distribution of population and resources and the coordination of ecological environment carrying capacity in economic development will be further analyzed, so as to provide certain theoretical reference value for the related research and enhance the practical significance of this study.

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