

Further Understanding of the Synergy Between Environmental Protection and Industrial Development in the Yellow River Basin

Dongfang Qin^{1,2}, Weixian Xue¹

1. School of Economics and Management, Xi'an University of Technology, Xi'an 710054, China.

2. Xi'an Mingde Institute of Technology, Xi'an 710054, China.

Abstract: The essence of the coordination between environmental protection and industrial development in the Yellow River basin is the coordination of land functions in the basin, and the key is the coordination of the internal functions and functional combinations of urban land. From the perspective of urban "three living" space. The results show that: the intermediate links between environmental protection and industrial development in the Yellow River basin are environmental pollution control, technological progress and opening up.

Keywords: Collaborative Operation Mechanism; Environmental Protection; Industrial Development

Introduction

Human activities should be carried out on certain land sites. According to the main functions of land use space, it can generally be divided into three major spaces: production, living, and ecology. The synergistic system between environmental protection and industrial development in the Yellow River Basin is reflected in the matching of the "three living" spaces of cities along the line. On the one hand, the process and evolution trend of environmental protection and industrial development in the Yellow River Basin are consistent, and there is a synchronicity in the temporal trend between the two; On the other hand, there is a certain degree of spatial evolution convergence between environmental protection and industrial development in the Yellow River Basin, and even a corresponding matching relationship exists for non-equilibrium. The synergy between environmental protection and industrial development in the Yellow River Basin has an orderly structure in both breadth and depth, and the degree of order between the two systems is gradually increasing.

The places used for production and business activities in cities in the Yellow River basin are production spaces, mainly including pollution activity spaces such as production, transportation and trade of agricultural products, energy and minerals, and cleaner production activity spaces such as tourist attractions, financial Ghetto, cultural and public service areas. The ecological space in the Yellow River Basin is the sum of the living and reproductive environments for residents themselves. Although it cannot directly provide material products for urban residents, it provides the necessary coal, petroleum, and non-ferrous metal resources for regional production, as well as the ecological products such as green water, green mountains, and fresh air that residents rely on for their daily lives. The "living space" refers to the place where people live, consume, and engage in leisure and entertainment, generally including urban living space and rural living space. The ecological space, production space, and living space of cities in the Yellow River Basin are interrelated and mutually influencing. Ecological space provides material, energy, and environmental protection for production and living spaces. If ecological space deteriorates, production space will be constrained and living space will also be limited. Environmental protection is the core function of ecological space; Production space is fundamental and determines the condition of living space and ecological space. High quality industrial development is the core function of production space; Living space is the purpose, and

production space and ecological space ensure its service quality. At the same time, environmental pollution and product quality decline in living space will stimulate the environmental protection and ecological space industry development functions of production space through government regulations, consumer preferences, etc., thereby achieving a better living space.

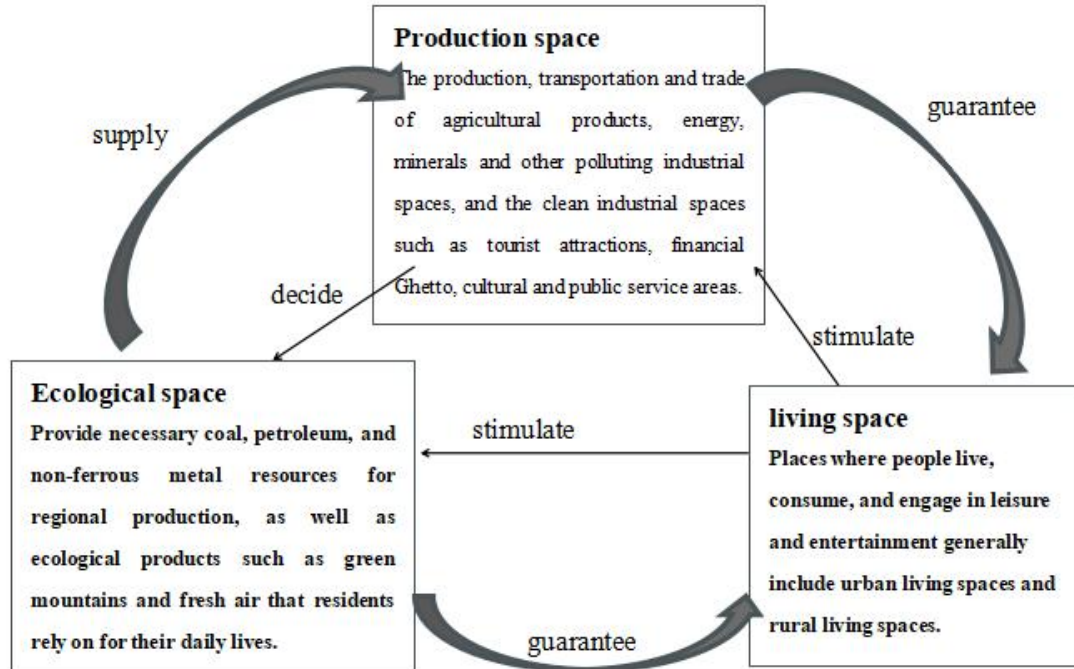


Figure 1: Spatial Correlation of the "Three Generations" in the Collaborative System of Environmental Protection and Industrial Development in the Yellow River Basin

1. Basis for dividing the functions of the three living spaces in collaborative systems

The multifunctional nature of land resources in the Yellow River Basin balances the complex relationship between food security, industrial development, and environmental protection. The land use of the Yellow River Basin is a combination of natural and artificial systems, while the land function of the Yellow River Basin is a more comprehensive functional system. However, up to now, there is still a lack of a comprehensive classification of land function in the Yellow River Basin, and most classification systems still cannot achieve true integration. Although many scholars have attempted to classify the land functions of the Yellow River Basin from the perspectives of production, life, and ecology using the indicator system method, the indicator system is only a substitute variable for various land functions and cannot be directly measured accurately from the "Three Lives" function itself.

However, with the continuous development of the social economy, the demand for land functions to serve residents' lives is increasing. The integration of ecosystem function classification and landscape function classification has become mainstream. Lovell et al. (2010) classified ecosystem service functions into three categories of production, ecology, and culture, with 15 specific functions, from the perspective of landscape multifunctionality. These classifications provide a basis for the study of the functional classification system of urban three living spaces in the Yellow River Basin.

2. Collaborative Foundation: Environmental Protection Function of Ecological Space

Ecological space refers to the natural conditions and their effects formed in the process of ecosystem and ecological

activities to maintain human survival, including gas regulation, climate regulation, water regulation, water and waste purification, mitigation of emergencies, pollination, soil conservation, nutrient cycling, and Primary production. The 9 types of secondary functions of ecological spaces mostly originate from the ecosystem functional system, and are also widely recognized as basic functions in ecosystem functional research. Soil, hydrology, vegetation, climate, and biological elements are the basic components that constitute the value of ecosystem services in land use, and through the comprehensive effects of these elements, specific functional types are generated. Among them, the process of material and energy flow, especially the process of human utilization of underground and surface materials, is a direct representation of the value of ecosystem services and the object of identifying land use ecological functions.

The environmental protection function is increasingly becoming the core function of the ecological space in the Yellow River Basin. The Yellow River Basin spans the eastern, central and western regions of China and is mainly distributed on the west side of the Hu Huanyong Line. It has a number of national ecological security zones and environmental protection zones, which constitute an important ecological barrier in China. The Yellow River Basin has complex natural environmental characteristics. Since 1999, the state has responded to the ecological vulnerability of the Yellow River basin, implemented the policy of Grain for Green, increased the proportion of ecological space, and sprouted the environmental protection function of ecological space; After 2005, with the implementation of the national strategy of western development and industrial transfer, the destruction of ecological space by production space in the Yellow River Basin was controlled, and the environmental protection function was gradually improved.

3. Collaborative Conditions: Industrial Development Function of Production Space

Production space refers to the spatial carrier in which land is directly obtained as a labor object or used as a carrier for social production to produce various products and services. Production space bears three major functions: direct material production, production of raw materials such as energy and minerals, and indirect production. The direct material supply function is the production space that provides agricultural products, industrial products, and services necessary for human survival and development. It is the fundamental function for maintaining human survival and development, with food and water being the two most important functional supply items for land use. The production function of raw materials such as energy and minerals provides basic raw materials for secondary production, which is the core of maintaining a modern Industrial society. However, because most of the energy and mineral resources are non renewable, most scholars do not include them in the ecosystem functions. For regions with rich energy and mineral resources, the attributes of energy and mineral land are generally unchanged within a certain time, The land use system that neglects the production function of energy and mineral resources is not comprehensive. The indirect production function provided by the land system is not actually real production, but its essential function comes from its bearing on the attached objects on the ground. It is only attributed to the production function because the aboveground activities it carries are indirect production.

4. Synergistic effect: The living space is fully functional

Living space refers to various space carrying, material and spiritual security functions provided by land in the process of human survival and development. It is the space carrier of people's Activities of daily living. The functions of living space mainly include: space carrying and shelter function, material life guarantee function, and spiritual life guarantee function. Among them, spatial carrying and shelter functions include residential carrying, transportation carrying, storage carrying, and public service carrying, which are the foundation for maintaining the operation of urban and regional economic systems. The basic material livelihood guarantee function is the last line of defense to maintain people's basic living needs. In areas with a large agricultural population, cultivated land provides not only traditional production functions, but also basic guarantees for life and work. The guarantee function of spiritual life is also one of the core contents of land function. Nature

provides natural research objects for scientific research and educational activities, and natural and cultural landscapes are the source of human pursuit of leisure, culture and art, aesthetics, as well as spirit and history.

The realization of living space is the fundamental purpose of land use, and the environmental protection function of regional ecological space provides guarantee for the realization of production space and living space functions. The realization of production function can provide economic foundation and material support for the realization of living function, and the decrease in living space efficiency feedback the disharmony between production space and ecological space.

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