



Research on Ecological Environmental Protection and High-Quality Coordinated Economic Development in the Yellow River Basin

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How to cite this paper: Li, L. (2023) Research on Ecological Environmental Protection and High-Quality Coordinated Economic Development in the Yellow River Basin. *Open Access Library Journal*, 10: e10102.

<https://doi.org/10.4236/oalib.1110102>

Received: March 31, 2023

Accepted: May 13, 2023

Published: May 16, 2023

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Abstract

Based on the data of 9 provinces (autonomous regions) in the Yellow River Basin from 2012-2021, we analyze the current situation of economic development and ecological environment in the Yellow River Basin from two dimensions: overall and by province. Based on the in-depth analysis of the current situation, we suggest three aspects of policy, industry and ecology: First, strengthening policy support and optimizing coordinated development mechanism; second, optimizing industrial layout and promoting green industrial upgrading; third, strengthening ecological protection and promoting green low-carbon development.

Subject Areas

Development Economics

Keywords

Ecological Protection, High-Quality Economy, Yellow River Basin

1. Introduction

In the context of sustainable development, economic growth and ecological protection have become the main contradiction in social development, and how to solve the contradiction has become the focus of attention. The speed of China's economic development has changed from the high speed development in the early stage of reform and opening up to the medium to low speed development, entering the new normal stage of economic development, and at the same time,

the 19th Party Congress report proposed “high-quality economic development”, high-quality development is no longer only the pursuit of economic growth rate, but also the pursuit of the quality of economic development, from the brutal development to High-quality development. The price of rapid economic growth in the past was the damage to the ecological environment to varying degrees, and the negative impact of this has become increasingly prominent. Therefore, it is especially important to study the coordinated development of ecological environmental protection and high-quality economic development.

The Yellow River is the mother river of the Chinese nation and the second largest river in China, flowing from west to east through 9 provinces (autonomous regions), with a basin area of 795,000 square kilometers and a total basin land area of 1.19 billion mu (including the inland flow area), while the basin is very rich in resources, such as coal, oil, natural gas, minerals, etc. It is an important ecological barrier and economic belt in China. The upstream area of Yellow River Basin is developed in agriculture, and the midstream area and downstream area are rich in minerals and metal energy [1], which provides elements to support the economic development. With the accelerated urbanization, the number of population in Yellow River Basin is also increasing, the total population in Yellow River Basin is 420.68 million at the end of 2012, and the total population in Yellow River Basin is 409.04 million at the end of 2021, accounting for 30% of the total population of the country, after ten years of development, the total population of the Yellow River Basin has increased by 11.64 million people. The increase in population, over-exploitation of resources and rapid economic development have increased the emission of waste gas and sewage in the Yellow River Basin, and the pollution level has been increasing, and the ecological environment has been seriously damaged. At the same time, the economic development of the provinces (autonomous regions) in the Yellow River basin is extremely disparate, with the economic growth pattern in the upper reaches of the Yellow River being sloppy and under driven, and the economic development in the middle and lower reaches being relatively stable, but the industry is in urgent need of transformation and upgrading. In September 2019, General Secretary Xi proposed during his visit to Henan province: ecological protection and high-quality development of the Yellow River basin is a major national strategy [2], and high-quality development requires sustainable development of the ecological environment and the economy, and only Good environmental protection can create conditions for sustainable economic development, “green water and green mountains are golden mountains”, which not only mentions new opportunities for the Yellow River Basin in ecological environmental protection, but also points out a new direction for high-quality economic development.

Therefore, in such a strategic context, exploring the coordinated relationship between ecological environmental protection and high-quality economic development in the Yellow River Basin is a very worthy issue for in-depth study. Taking nine provinces (autonomous regions) in the Yellow River Basin as the research object, we analyze the current situation of economic development and

ecological protection in the Yellow River Basin in two dimensions, as a whole and in each province, summarize the existing problems, and then put forward policy recommendations to provide policy guarantee for ecological environmental protection and high-quality economic development strategies in the Yellow River Basin of China.

2. Current Status of Ecological Environment and Economic Development in the Yellow River Basin

2.1. Current Status of Economic Development in the Yellow River Basin

2.1.1. Overall Situation

Most of the nine provinces (autonomous regions) in the Yellow River Basin are located in the central and western part of China, with a relatively backward economy compared with coastal areas, mostly in agriculture, rich in mineral resources, mostly heavy industry, and increasingly prominent environmental problems.

The total population of the nine provinces (regions) in the Yellow River Basin at the end of 2021 is about 420 million people, accounting for about 30% of the total population of the country, with an average urbanization rate of 61.54%.

According to the data in **Table 1**, it can be seen that the gross value added of the Yellow River Basin from 2012 to 2021 shows a year-on-year rising trend and rapid economic growth. The gross value added of the basin in 2012 is 1,411,898 billion Yuan, and the gross value added of the basin in 2021 is 2,873,951,000,000 Yuan, which doubles the gross value in ten years. The value added of the primary industry in the basin from 2012 to 2021 has the lowest, secondary and tertiary industries have a high percentage of value added, and the percentage of value

Table 1. Yellow river basin GDP 2012-2021 (Unit: billion Yuan).

	Total Production value	Primary Industry value added	Secondary Industry value added	Tertiary Industry value added
2012	141189.8	15131.0	70674.2	55384.9
2013	154835.3	16356.2	75417.1	63062.0
2014	166736.3	17245.8	78999.5	70491.1
2015	176546.1	17714.6	79492.4	79339.2
2016	188879.3	18128.5	82132.8	88618.1
2017	209600.1	18693.4	89956.3	100950.6
2018	229890.0	19484.3	95587.8	114817.9
2019	245997.3	20881.1	100007.6	125108.5
2020	252612.7	23602.6	99613.9	129396.5
2021	287391.5	25451.6	118743.4	143196.5

Data source: National bureau of statistics.

added in the tertiary industry exceeds the percentage of value added in the secondary industry in 2016, and the percentage of value added in the tertiary industry exceeds 50% in 2019.

2.1.2. Provinces

The development gap between the regions in the Yellow River Basin is large, with a disproportionately large gap between the gross regional product in the upper reaches and the middle and lower reaches, and a smaller gap in the middle and lower reaches, as shown in **Table 2**.

Nine provinces (autonomous regions) in the Yellow River Basin have experienced rapid economic growth, and after a decade of development, the gross domestic product has all doubled, with the fastest growth of regional GDP in Sichuan (126.1%) and the slowest growth in Gansu (89.6%). However, the economic development of different regions still varies greatly. In 2021, Shandong's regional GDP was as high as 8287.52 billion Yuan, accounting for 28.8% of the Yellow River Basin, Henan's regional GDP ranked second, accounting for 20.2%, while Qinghai and Ningxia's regional GDP was low, accounting for 1.2% and 1.6% respectively, reaching only one-tenth of its overall share compared to Shandong.

As shown in **Table 3**, all provinces (regions) in the Yellow River Basin are increasing the added value of tertiary industries in 2021 compared with 2012. Due to the slow development in the early stage, the fastest growing primary industry is Gansu, the fastest growing secondary industry is Qinghai, and the fastest growing tertiary industry is Sichuan; while the added value of tertiary industry in Henan and Shandong both exceed the added value of secondary industry, and the industrial structure tends to be optimized.

Table 2. 2012-2021 yellow river basin 9 provinces (autonomous regions) GDP (Unit: billion Yuan).

	Qinghai	Sichuan	Gansu	Ningxia	Neimenggu	Shaanxi	Shanxi	Henan	Shandong
2012	1528.5	23922.4	5393.1	2131.0	10470.1	14142.4	11683.1	28961.9	42957.3
2013	1713.3	26518.0	6014.5	2327.7	11392.4	15905.4	11987.2	31632.5	47344.3
2014	1847.7	28891.3	6518.4	2473.9	12158.2	17402.5	12094.7	34574.8	50774.8
2015	2011.0	30342.0	6556.6	2579.4	12949.0	17898.8	11836.4	37084.1	55288.8
2016	2258.2	33138.5	6907.9	2781.4	13789.3	19045.8	11946.4	40249.3	58762.5
2017	2465.1	37905.1	7336.7	3200.3	14898.1	21473.5	14484.3	44824.9	63012.1
2018	2748.0	42902.1	8104.1	3510.2	16140.8	23941.9	15958.1	49935.9	66648.9
2019	2941.1	46363.8	8718.3	3748.5	17212.5	25793.2	16961.6	53717.8	70540.5
2020	3009.8	48501.6	8979.7	3956.3	17258.0	26014.1	17835.6	54259.4	72798.2
2021	3385.1	54088.0	10225.5	4588.2	21166.0	30121.7	22870.4	58071.4	82875.2

Data source: National bureau of statistics.

Table 3. Yellow river basin provinces (autonomous regions) added value of three industries (Unit: billion Yuan).

	Primary industry value added		Secondary industry value added		Tertiary industry value added	
	2012	2021	2012	2021	2012	2021
Qinghai	174.2	353.6	620.2	1364.7	734.1	1666.7
Sichuan	3142.6	5662.0	11231.1	19949.7	9548.8	28476.2
Gansu	590.9	1364.8	2493.3	3451.2	2308.9	5409.5
Ningxia	189.0	364.6	992.5	2099.2	949.5	2124.4
Neimenggu	1453.2	2353.9	4553.6	9880.6	4463.3	8931.5
Shaanxi	1314.8	2409.9	7612.3	14019.0	5215.3	13692.9
Shanxi	642.0	1286.9	6852.7	11578.1	4188.4	10005.4
Henan	3577.2	5626.9	15042.6	23566.4	10342.2	28878.2
Shandong	4047.1	6029.0	21275.9	32834.5	17634.4	44011.7

Data source: National bureau of statistics.

2.2. Current Status of Ecological Development in the Yellow River Basin

2.2.1. Overall Situation

The Yellow River Basin is an important ecological barrier in China, with national key ecological function areas, water-related reserves, and national parks in the basin, as well as a diversity of species and a habitat for many valuable aquatic organisms. The current situation of the ecological environment in the Yellow River Basin will be analyzed from three aspects: pressure, state and response.

During the decade from 2012 to 2021, sulfur dioxide emissions, nitrogen oxide emissions and total wastewater discharges in the Yellow River Basin have been decreasing year by year, with significant ecological pressure and ecological protection effects. The ecological status still has much room for improvement; the harmless treatment rate of domestic waste has reached 100% in 2021 in all regions except Inner Mongolia and Qinghai, and the industrial wastewater treatment rate as well as the comprehensive utilization rate of industrial solid waste are increasing year by year, with good ecological response status.

2.2.2. Provinces

The region with the most sulfur dioxide emissions in 2021 is Inner Mongolia, which is also related to its industrial structure, but compared with 2012 has been reduced by 1,160,100 tons, indicating that the effect of ecological protection in the past ten years is obvious, Henan and Shandong regions sulfur dioxide emissions in 2021 are 60,000 tons and 165,300 tons respectively, compared with ten years ago is already a world of difference, indicating that the regional industrial transformation and upgrading Successful, into the green industrial stage; 2021 urban green space area is the most in Shandong 272,500 hectares, the least is

0.87 million hectares in Qinghai, the highest built-up area green coverage rate is 43.7% in Shanxi, the lowest or Qinghai 34.8%, which is also related to the regional urbanization construction, Qinghai urbanization rate is much lower than the middle and lower reaches.

3. Problems

3.1. Uneven and Insufficient Economic Development

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.

Yellow River Basin 9 provinces (autonomous regions) economic development level is uneven and lagging behind compared to the eastern coastal areas, especially the upper reaches of the region Gansu, Ningxia, Qinghai, etc., compared with other provinces in the basin on the development gap is very large. The region in the basin is rich in coal, oil and other resources, mostly heavy industry, serious environmental pollution and low level of industrialization, slow development of green industries, ecological agriculture, etc., and insufficient momentum for industrial transformation and upgrading. From the overall economic level of the country, many provinces in the Yellow River Basin are in the middle of industrialization and the proportion of the overall gross product in the country is declining, mineral, energy and other resource concentrations are at the bottom of the industrial chain, and there is a serious lack of medium and high-end industries. The limited carrying capacity of ecologically fragile areas prevents the formation of large-scale production, which also limits the economic development of the region.

3.2. Fragile Ecological Environment

The ecologically fragile areas in the Yellow River Basin are widely distributed, large in area and multi-divided in type [3]. The ecological environment in the upper and middle reaches of the Yellow River Basin is harsh, with dry climate, serious and concentrated soil desertification, low annual precipitation, sparse vegetation and serious soil erosion. At present, the loess plateau soil is loose, the ratio of water and sand is out of balance, and the siltation in the lower reaches of the Yellow River is serious, which poses a great threat to the lives and properties of people along the river. In the past decade, although many ecological restoration and protection measures have been implemented, such as: returning farmland to forest and grass, building protective forests, and constructing ecological zones, all of which have been quite effective, only one aspect of them has been focused on when protecting ecology, without combining ecology and economy, and lacking the overall linkage between ecological protection and high-quality economic development [4]. For sustainable development, we must adhere to the policy of coordinated development of ecological protection and economy, and

avoid the situation of destruction while restoration.

4. Problems

The ecology and economy of the Yellow River Basin are an organic whole, and it is necessary to coordinate the upper, middle and lower reaches of the basin, and to promote the coordinated development of ecological protection and economic quality with the goal of green development according to local conditions. Based on the above research, this paper makes suggestions in terms of policy, industry and ecology to provide policy reference for the coordinated development of ecology and economy in the Yellow River Basin.

4.1. Strengthen Policy Support and Optimize Coordinated Development Mechanism

Optimize cross-regional governance coordination and development mechanism to enhance information sharing on the basis of information interoperability. First, to improve the Yellow River Basin governance sectoral regulations, local regulations, comprehensive planning, etc., and also to connect them effectively. The second is to establish an information sharing platform, use network digital technology to establish a database, share data from different regions and departments, and make comprehensive use of them. Third, to improve the risk warning mechanism, improve the cross-regional management system, joint law enforcement, joint defense, joint management, to avoid duplication of work.

4.2. Optimize Industrial Layout and Promote Green Industrial Upgrading

The Yellow River Basin has a wide range of resource endowments, to adapt to local conditions and high-quality development. First, adjust the industrial structure and establish a modern industrial system. According to the actual situation of the region and regional characteristics, the implementation of the differentiated development of industry, while the reasonable layout of industry, to create a green cycle of the industrial system. Second, accelerate the development of modern agriculture and advanced manufacturing, improve the green cycle development of agriculture and animal husbandry, and digital empowerment to promote the green transformation of advantageous industries. Third, to promote the synergistic development of cities in the basin, to create urban clusters and metropolitan areas.

4.3. Strengthen Ecological Protection and Promote Green and Low-Carbon Development

First, improve the water environment, treat and repair water pollution caused by industrialization and urbanization, strengthen the regulation of river outfalls, implement sewage reuse systems, reasonably allocate water resources in the Yellow River basin, vigorously promote water conservation policies, and build water ecosystems in the region. The second is to strengthen soil regulation, repair

damaged soil, establish ecological protection zones, and collaborate with underground sewage and soil management. Third, reduce air pollution, strengthen the monitoring efforts of key industries, reinforce the requirements of urban air quality compliance assessment, promote green and low-carbon lifestyles, reduce greenhouse gas emissions and achieve sustainable development.

Fund Project

Henan University Humanities and Social Science Research Projects “Research on ecological environmental protection and high-quality coordinated economic development in the Yellow River Basin” (2022-ZDJH-00241). The Research Project of Think Tank in Higher Education of Henan Province in 2023 “Research on the path of high-quality development of rural industrial integration in Henan” (2023ZKYJ07).

Conflicts of Interest

The author declares no conflicts of interest.

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