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Economic coordination evaluation of the ecological environment in mountain area affected by flood

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Abstract
In order to promote the economic development of the ecological environment in mountainous areas, the coordinated evolution of economic development and ecological environment system from 2014 to 2019 was evaluated. Under the influence of flood disaster, the evaluation index is constructed, the index data standardization is established, the evaluation index value of the ecological environment and economic coordination in the mountain area is obtained, the index weight is determined and calculated, the coordination mechanism between economic growth and ecological environment system is analyzed, and the ecological environment and economic coordination evaluation in mountain area under the influence of flood disaster is completed. The results show that the economic system development index, ecological environment system development index, and comprehensive system development index of mountainous areas are on the rise, and ecological environment protection has achieved certain results.

Keywords Flood disaster · Mountain ecological environment · Economic coordination · Evaluation index · Coupling coordination

Introduction

The economic coordination of the mountainous ecological environment is an important content of new development concepts and an inevitable requirement for realizing green sustainable development and building a well-off society. How the two can promote each other for common development has become the world's common efforts to achieve the goal of the current academic focus on one of the hottest issues. With the rapid economic development in mountainous areas, affected by floods and waterlogging disasters, environmental quality is likely to deteriorate, resource shortage and exhaustion, ecosystem degradation, and other ecological environmental problems, which have affected the sustainable economic and social development (Wang et al. 2019). Therefore, it is urgent to discuss the economic evaluation of ecological environment coordination in mountainous areas to save and recycle resources, reduce environmental pollution, and develop the economy effectively. In view of the relationship between economic development and environmental protection, some scholars mainly use the general equilibrium model (CGE) to study the relationship between economic development and environmental protection at the national scale, regional scale, urban scale, and rural scale; and some scholars have made quantitative exploration on the relationship between economic development and environmental protection at the national scale, regional scale, urban scale, and rural scale and have revealed the coupling relationship between the two factors which influence, promote, and develop each other, providing a useful reference for this study.

The mountainous area is a representative ecologically fragile area. Its landform and climatic conditions give birth to rich mineral resources and biological resources, which have their natural development advantages. However, affected by floods and waterlogging, the undeveloped and fragile mountainous terrain makes its ecological environment very vulnerable to damage, and the contradiction between development and protection is becoming increasingly prominent. How to consider the growth rate in the process of economic development and break through the dilemma of mutual coordination between economic growth and ecological environment and how to achieve green development are urgent issues worthy of

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comprehensive and in-depth study (Zutter 2018). Therefore, based on the reality and the availability of the data, the index system of the coupling and coordinated development evaluation of the regional economic development system and the ecological environment protection system is constructed. The study can provide effective ways and measures for promoting green development of the regional economy and provide a reference for government departments at all levels to formulate policies and measures for economic transformation and upgrading and achieve comprehensive and coordinated green development.

Assessment method for economic coordination of ecological environment in mountain areas

Construction of evaluation indicators

The economic coordination evaluation of mountain ecological environment needs to construct index system, and the construction of index system must follow certain principles. The following is the evaluation method of economic coordination of mountain ecological environment:

Economic development and eco-environmental systems contain a large number of evaluation indicators. Therefore, in the process of constructing and selecting the indicator system in mountainous areas, all aspects of the system should be included as much as possible to objectively reflect the status quo of the system and obtain more accurate research results (Aerts et al. 2018; Syverson et al. 2019). The following methods should be followed in constructing the evaluation index system.

(1) Integrity method. Ecological environment and economic development systems require the interaction of multiple indicators to fully reflect their specific changes. Therefore, according to the research needs, in the process of selecting indicators, attention shall be paid to including the contents of different levels to enable them to fully demonstrate the internal and external changes of the system and reflect the integrity of the system (Jonathan et al. 2020).
(2) Objective approach. According to the actual situation of the study area, this project fully considers the objectivity of each index and pays attention to the scientificity, accuracy, and reasonableness of the data source of the index to provide the basis for the scientific and objective analyses of the coupling and coordination of the ecological environment and economic development of the mountain area.
(3) Dynamic approach. When selecting the evaluation index of ecological environment and economic development in mountainous areas, we should fully consider the dynamic nature of each index to reduce the influence of time, region, and other factors and the error of the evaluation system (Handayani et al. 2019).
(4) Operability methods. Based on the availability of index data, the evaluation index can be calculated and analyzed, and the characteristics of the system can be reflected correctly. To this end, the indicators selected in this project are representative of the system to a certain extent to be able to quickly carry out research analysis and evaluation (Yusop et al. 2018).

Standardization of indicators data for eco-economic coordination assessment in mountain areas

Assessment of economic coordination of mountain ecological environment

Due to the wide range of data sources and different data dimensions, it is not convenient for comparative analysis and research, so the data are first standardized. The economic coordination assessment of mountain ecological environment is shown in Table 1:

Standardized processing of evaluation indicators

In order to make the conclusions of the study objective and scientific analyses, it is necessary to standardize the original data of the indicators and treat them as the values of the same dimensions because the units of the indicators are different in the construction of the indicators of the mountain economic development and ecological environment system, and the comparative analysis and research are not convenient, and even the results of the study are greatly affected (Vieira et al. 2019). At present, the methods often used in the research field include the standardization method and threshold method.

Considering the actual situation and the impact on the results, the standardized method is selected to standardize the index data. According to the positive impact of different indicators on the system, there are positive indicators and negative indicators. The formula and steps for standardization of system data are as follows:

$$y_{in}{}' = \frac{y_i - \min y_i}{\max y_i - \min y_i} \quad (1)$$

$$y_{in}{}'' = \frac{\max y_i - y_i}{\max y_i - \min y_i} \quad (2)$$

In the formula, y_i is the actual value of the i index of each system, and $\max y_i$ and $\min y_i$ are the maximum and minimum values of the i index, respectively.

According to the calculation formula of index standardization, the basic data of mountain economic development system and ecological environment system are standardized, and

Table 1 Economic coordination assessment of mountain areas

Target layer	System layer	Classification layer	Index layer	Nature
Ecological environment and economic coupling coordinate development system	Economic development system (X)	Economic level (X_1)	Gross domestic product (x_1)	Positive indicators
			Per capita GDP (x_2)	Positive indicators
			Total consumption of social consumer goods (x_3)	Positive indicators
			Investment in fixed assets of the whole society (x_4)	Positive indicators
		Economic structure (X_2)	The proportion of tertiary industry in GDP (x_5)	Positive indicators
			Proportion of fixed assets in GDP (x_6)	Positive indicators
		Economic vitality (X_3)	Growth rate of fixed assets investment in the whole society (x_7)	Positive indicators
			Proportion of education funds in GPD (x_8)	Positive indicators
			GPD growth rate (x_9)	Positive indicators
		People's living standard (X_4)	Per capita disposable income of urban residents (x_{10})	Positive indicators
			Per capita net income of farmers (x_{11})	Positive indicators
	Eco-environmental system (Y)	Ecological environmental capacity (Y_1)	Forest cover (y_1)	Positive indicators
			Park green area per capita (y_2)	Positive indicators
			Water resources per capita (y_3)	Positive indicators
		Ecological environmental pressure (Y_2)	Industrial wastewater discharge (y_4)	Negative index
			Sulfur dioxide emissions (y_5)	Negative index
			Industrial solid waste production (y_6)	Negative index
			Fertilizer for agricultural use (y_7)	Negative index
			Natural population growth rate (y_8)	Negative index
		Ecological environment protection (Y_3)	The proportion of investment in environmental pollution control in GDP (y_9)	Positive indicators
			Comprehensive utilization rate of solid waste (y_{10})	Positive indicators
			Harmless disposal rate of household garbage (y_{11})	Positive indicators

the standardized values of each index are obtained. The results are shown in Tables 2 and 3.

Determination and calculation of index weight

At present, there are two methods to determine the weights of indexes: the subjective weighting method and the objective weighting method. The subjective weighting method mainly relies on human experiences, such as expert grading to determine weights, mainly including analytic hierarchy process, Delphi method, and efficacy coefficient method (Panteras and Cervone 2018); the objective weighting method relies on the objective and realistic data of the objects to be evaluated to calculate the weights of each evaluation index, mainly including principal component analysis, entropy value method, and variance coefficient method. In order to make the research result comprehensive and accurate, this article uses the coefficient of variation method to determine the index weight (Kumar and Paul 2020). The method of the coefficient of variation refers to the method of directly using the standardized data and information of indicators to calculate the weight of indicators through the formula of the coefficient of variation, which can fully reflect the gap of the evaluated indicators. The weight calculation steps and methods are as follows.

(1) The formula for the coefficient of variation of each indicator is as follows:

$$W_i = \frac{p_i}{v_i}(i = 1, 2, \ldots, n) \tag{3}$$

In the formula, W_i is the coefficient of variation of index i; p_i is the standard deviation of index i after standardization; and v_i is the average of index i after standardization.

(2) The weights of each indicator are as follows:

$$H_i = \frac{W_i}{\sum_{i=1}^{n} W_i}(i = 1, 2, \ldots, n) \tag{4}$$

Through the calculation of the previous formulas, the weights of each index are obtained. In the ecological environment system, the weights of the per capita area of park green space, the output of industrial solid wastes, the natural growth rate of population, and comprehensive utilization rate of solid wastes are all higher than the average weights of the ecological environment system by 0.0909, which has a great impact on the ecological environment (Cheng et al. 2019). In the economic development system, the economic level indicator, the proportion of fixed assets in GDP, and the weight of rural residents' per capita net income are greater than the average weight of 0.0909.

Analysis of coordination mechanism between economic growth and ecological environment system

Role of ecological environment in economic growth

Human survival and economic activities are inseparable from the environment; the economy and the ecological

Table 2 Standardized values of economic development system in mountain areas

	2014	2015	2016	2017	2018	2019
x_1	0.31	0.44	0.57	0.72	0.85	1.00
x_2	0.33	0.46	0.59	0.73	0.86	1.00
x_3	0.34	0.48	0.62	0.74	0.87	1.00
x_4	0.21	0.33	0.47	0.64	0.81	1.00
x_5	0.82	1.00	0.89	0.80	0.48	0.52
x_6	0.34	0.44	0.61	0.77	0.87	1.00
x_7	0.63	1.00	0.89	0.80	0.48	0.52
x_8	0.00	0.19	0.63	0.38	0.38	0.69
x_9	0.49	1.00	0.67	0.42	0.02	0.00
x_{10}	0.36	0.51	0.64	0.79	0.88	1.00
x_{11}	0.29	0.41	0.52	0.65	0.87	1.00

environment are contradictory but also mutually unified. According to the ecological economic theory, the relationship between economic growth and the ecological environment is closely linked.

First, the ecological environment has a positive effect on economic growth. The ecological environment is the foundation of economic growth. The circulation and transformation of material and energy is the most essential link between the ecological environment system and the economic development system. The ecological environment provides all the material basis for economic development and is the fundamental guarantee for economic development. In order to develop the economy, all the raw materials and resources needed are taken from the ecological environment. Without the ecological environment, there can be no economic development at all. The ecological system can also accept the waste from the economic system and utilize the functions of the ecological environment in the diffusion, storage, and assimilation of waste. The use of such functions can reduce the cost of manual waste treatment. In addition, economic growth activities need certain environmental conditions as a guarantee, such as agricultural production needs arable land, sunlight, water, and so on.

Table 3 Standardized values of indicators of mountain ecological environment protection system

	2014	2015	2016	2017	2018	2019
y_1	0.36	0.25	0.35	0.34	0.26	1.00
y_2	0.64	0.68	0.89	0.92	0.96	1.00
y_3	0.45	0.00	0.26	0.60	0.77	1.00
y_4	0.56	0.00	0.60	0.22	1.00	0.88
y_5	0.88	0.57	0.44	0.47	0.00	0.17
y_6	0.52	0.59	0.69	0.78	0.88	1.00
y_7	0.65	0.37	0.21	0.24	0.09	0.00
y_8	0.00	0.64	0.68	0.94	1.00	1.00
y_9	1.00	1.00	0.00	0.60	1.00	0.20
y_{10}	0.15	0.30	1.00	0.11	0.66	0.91
y_{11}	0.91	0.86	0.95	0.96	0.99	1.00

Second, the ecological environment has an adverse effect on economic development. If economic growth and development, economic activities will occur; if economic system to the environmental system to discharge pollutants restricted by the environmental capacity of the ecological environment of resources is limited, it is impossible to contain the economic system of unlimited emissions of waste if the resources needed to exceed the carrying capacity of the ecological environment; if the ecological environment will hinder and restrict economic development, this will not only bring huge costs of environmental pollution treatment but also affect human health and survival. Resource exhaustion and environmental pollution will become a bottleneck of economic development.

Role of economic growth in the ecological environment

The effect of economic growth on the ecological environment is mainly shown in two aspects: one is that when the economic development reaches a certain extent, the excessive exploitation of natural resources and the discharge of a large amount of unbearable waste into the ecological system lead to serious pollution of the ecological environment and destruction of the ecological environment system. On the other hand, when the economy develops to a certain stage, different industrial structures have different impacts on the ecological environment. On the premise of not hindering economic development, the economic system changes the traditional mode of economic growth, changing the industrial structure and protecting the ecological environment. At the same time, economic development can also determine the government's investment in environmental protection, determining whether there are sufficient funds for the development of new technologies and training of new personnel, thereby better governance of the environment. Therefore, economic development cannot only destroy the ecological environment, restricting the sustainable development of the ecological environment, but also restore the damaged ecological environment, thus promoting sustainable development of the ecological environment.

(1) Scale effect. With the rapid growth of GDP, the economic scale becomes larger and larger. For a rapidly developing region, the increase of economic growth needs a lot of resource input. It is generally believed that, under the condition that the economic structure, technical level, and other factors remain unchanged, the economic aggregate will be larger. On the one hand, the excessive use

of natural resources will affect the "source" of the environmental system, such as excessive exploitation of groundwater, unreasonable use of land resources, excessive and harvesting of forest resources; and on the other hand, the excessive discharge of wastes will exceed the self-purification capacity of environmental factors and ultimately affect the "sink" of the environmental system. The change of "source" and "sink" of the environmental system results in the decline of ecological environment quality. Therefore, according to the principle of ecological economics, there is a reverse relationship between economic scale and environmental quality.

The impact of economic expansion on environmental quality includes the following two aspects:

First of all, the production process will inevitably bring waste pollution to the environment. Assuming that the unit output of pollution emissions will not change, the economic structure will not change, and the expansion of economic scale will inevitably lead to increased resource consumption, resulting in increased pollution. If the definition of property rights is vague, the negative externalities of pollution cannot be internalized; and if the cost of pollution is small, the pollution will be further aggravated. For the less-developed areas, although the economic aggregate is lower than that of the developed countries, if the economic scale expands rapidly, it will have a greater impact on the environment in a short time.

Secondly, with the increase of the economic scale and the increase of the living standard, the residents begin to pay attention to factors other than the income and pursue the improvement of the quality of life when the income increases to a certain extent, which has higher requirements for the environmental quality. The willingness to buy cleaner and more environmentally friendly products, if considered a commodity, would constrain companies from producing under stringent environmental standards and help governments impose tougher environmental and tax standards. For the people in the underdeveloped areas, the beneficial impact of the scale effect depends on the degree of economic growth, people's tolerance for the environment, and the government's policy direction.

(2) Structural effects. When a region shifts from a focus on agriculture to an emphasis on industry, with the pace of industrialization, more and more resources and energy are being developed and utilized, pollution emissions are increasing rapidly, and environmental quality is declining sharply; while when the economic development reaches a higher level, the industrial structure is gradually optimized and upgraded, heavy industries with high energy consumption and high pollution are gradually reduced, service industries and technology-intensive industries are increasing, and the rates of resource consumption and pollution discharge are decreasing, but the total amount of pollution discharge is uncertain, which is called the "structural effect." At the primary stage of industrialization, the proportion of agricultural output value in the total output value is large, the consumption of resources is small, and the environmental pressure is small; along with the acceleration of industrialization, more and more resources are being utilized, the rate of resource consumption begins to exceed the rate of resource regeneration and the carrying capacity of the environment, the pollution increases significantly, and the ecological environment begins to deteriorate; after the economic development reaches a certain stage, the industrial structure upgrades, the knowledge-intensive industries and tertiary industries with little consumption of resources and environment occupy a leading position, and the ecological environment tends to improve. Therefore, according to the principle of ecological economics, there is a "font" curve relationship between industrial structure and environmental quality.

(3) Technical effects. The technical effect refers to the reduction of pollution output and emission per unit of economic output through technological progress, investment in pollution control, environmental policy, and other measures. Technology effect can be divided into clean technology effect and pollution control effect. In the process of economic growth, the clean technology effect mainly depends on the production technology level of enterprises. If industrial enterprises adopt advanced production technology and raise the utilization rate of resources, the pollution generation per unit output will be reduced. The pollution control effect mainly depends on the pollution control expenditure and the intensity of the government's environmental protection policy. Enterprises increase investment in pollution control and use advanced technology to treat pollutants and the government strengthens the environmental protection, the pollution discharge will be reduced. According to the experience of developed countries, in the period of economic growth, only the investment of environmental pollution control can effectively control the environmental pollution and improve the environmental quality.

From the point of view of the production function, technological progress can produce substitution effect and income effect so that production can achieve greater output in any environmental quality. The existence of the substitution effect makes technological progress have a positive impact on consumption and pollution, while the existence of income effect has a positive impact on consumption and a negative impact on pollution.

Analysis of coordination mechanism between economic growth and ecological environment

How to coordinate the development between ecological environment and economic development will be the main problem in the process of sustainable development. It is of great practical significance to correctly understand and deal with the interaction between ecological environment and economic development. The interaction mechanism between the economic system and ecological environment system is shown in Fig. 1:

As shown in Fig. 1, according to the theory of ecological economics, the mechanism between the economic system and environmental system can be summarized as five ecological environment factors, namely, climate, water, land, vegetation, and pollution load, which are directly affected by the economic system through scale effect, structural effect, and technical effect. When the cumulative intensity reaches a certain degree, the cumulative effect will ultimately affect the change of ecological environment quality.

The basic characteristics of a coordinated eco-environmental economic system are (1) the economy has developed rapidly, the quality of the ecological environment has been constantly improved; and (2) the economy and the ecological environment are in a benign cycle, and the social economy can develop sustainably.

The harmonious development of economy and environment is to regard economic system and environment system as two aspects which are interrelated, interacted, and mutually based in the process of regional development and to emphasize the coordination, integrity, sustainability, and spatial fairness between them. The core of harmonious development is to protect and enhance the capacity of regional sustainable development while maintaining the sustainable growth of the regional economy; to meet people's increasing demands for the ecological environment; and to promote the comprehensive, coordinated, and sustainable development of human society. There is a relationship of mutual restriction and mutual promotion between economy and environment. The growth mode of high technology and high material consumption, and the undertaking of highly polluting industries transferred from external developed areas, while promoting the growth of material wealth, have greatly increased the demand for natural resources; increased the discharge of wastes; and destroyed the structure and function of the ecological environment. It will further aggravate the contradiction between the supply and demand of resources and the environment, leading to the deterioration of the investment environment, and thus hindering the sustained economic growth; the rapid economic growth has also further enhanced the environmental governance capacity. By increasing the investment in environmental protection, on the one hand, we can improve the technical level and reduce the discharge of pollutants; on the other hand, we can intensify the control of existing pollutants, promote the continuous optimization and improvement of the environment, increase the environmental capacity, and provide and create a good environmental resource base and investment environment for economic growth; while the adjustment and optimization of industrial structure and the transformation of economic growth mode strengthen this trend and promote the sustainable economic development.

The essence of the harmonious development of economy and environment is to seek the best dynamic balance point in the system dynamic evolution of developing economy and protecting the environment, which is to avoid the abrupt inverted U-shaped relationship between economic growth and the environment in developed countries, to promote the transformation of environmental quality in developing areas, and to form a flat inverted U-shaped relationship between economy and environment to realize the sustainable development of human society.

Experimental analysis

The comprehensive index plays an important role in the comprehensive evaluation of the coupling and coordination of ecological environment and economic development.

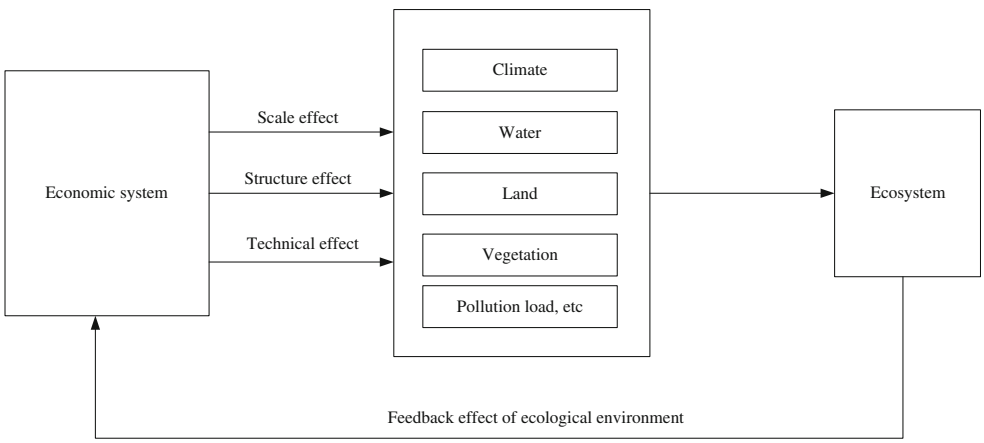

Fig. 1 Structural diagram of the economic system and ecological environment system

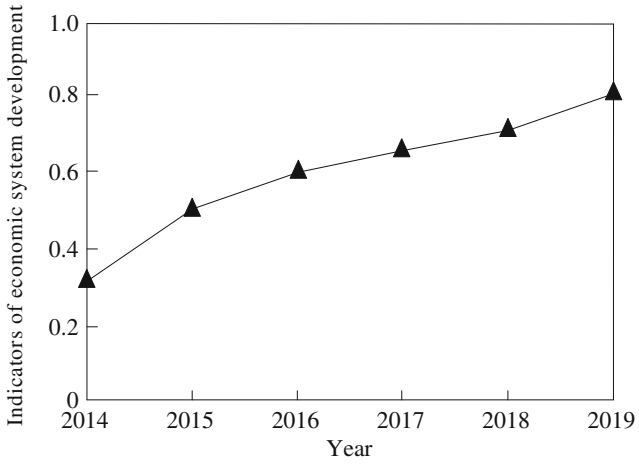

Fig. 2 Dynamic changes of Mountain Economic System Development Index from 2014 to 2019

In this project, the comprehensive evaluation model of the mountainous eco-environmental system and economic development system is constructed, mainly referring to the research of Liao Chongbin's coupling coordination degree. The evaluation functions of the mountain economic system development index, eco-environmental system development index, and system comprehensive development index can be constructed as follows.

$$f(x) = \sum_{i=1}^{n} a_i x_i \tag{5}$$

$$f(y) = \sum_{i=1}^{n} b_i y_i \tag{6}$$

$$T = af(x) + bf(y) \tag{7}$$

In the formula, a_i and b_i are the weight values of the i index; x_i and y_i are the standardized values of the i index; $f(x)$ is the comprehensive evaluation value of the economic development system; $f(y)$ is the comprehensive evaluation value of the ecological environment; and its change range is [0,1]. The larger the value,

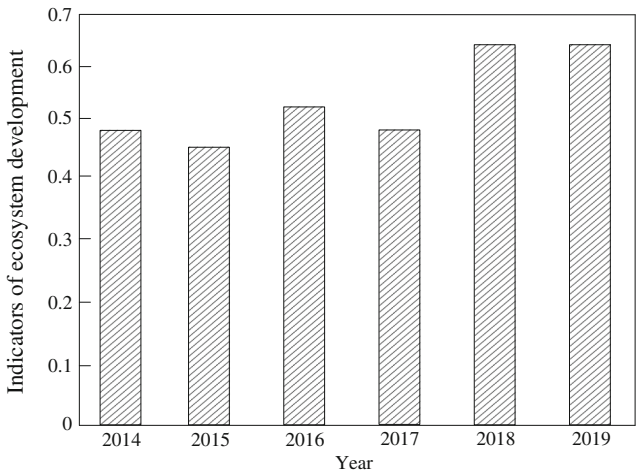

Fig. 3 Dynamic change of Mountain Ecosystem Development Index from 2014 to 2019

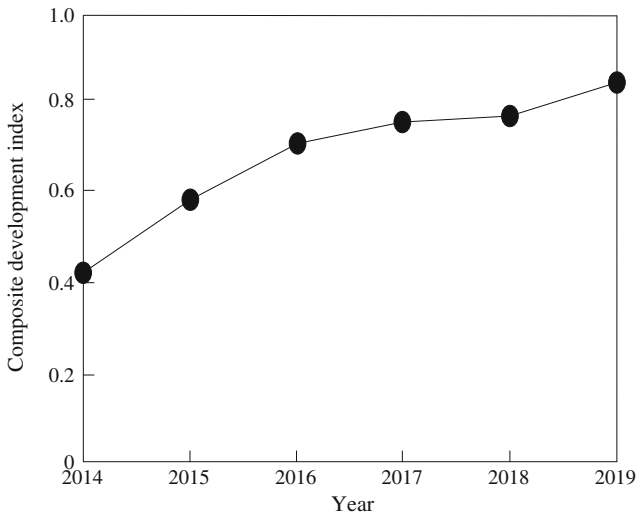

Fig. 4 Dynamic changes of Mountain Economic Development and Comprehensive Development Index of ecological environment system from 2014 to 2019

the higher the index level of the system level. T is the comprehensive index of economic development and ecological environment evaluation systems in the mountainous area, which reflects the overall benefit level of economic development and ecological environment system in the mountainous area; a and b are undetermined coefficients. Based on the equal influence of the two in the interaction, according to the score of experts, $a = b = 0.5$ is finally obtained. The analysis results of dynamic changes of economic system development index, ecological environment system development index, and system comprehensive development index in mountainous areas from 2014 to 2019 are shown in Figs. 2 to 4.

As can be seen from Fig. 2, the Mountain Economic Systems Development Index for 2014–2019 showed an upward trend year by year, with a minimum of 0.31 in 2014 and a maximum of 0.80 in 2019, approximately 2.6 times as much

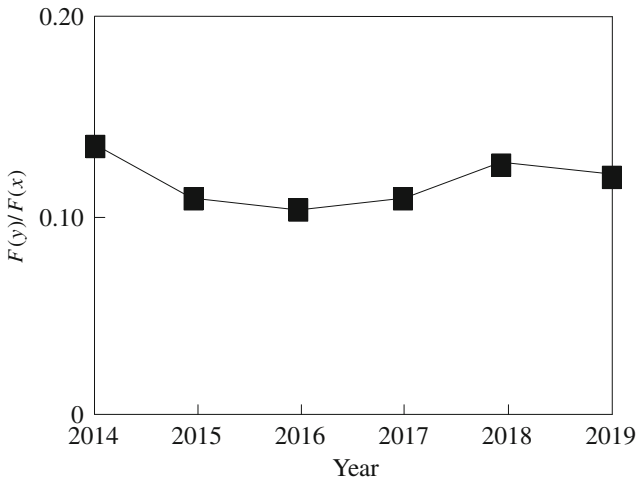

Fig. 5 Dynamic changes in the ratio of the comprehensive index of ecological environment and economic development in mountain areas from 2014 to 2019

as in 2014. With the rapid advancement of industrialization and urbanization, the level of economic development in mountainous areas is improving.

The Mountain Ecosystem Development Index for 2014–2019 shows an upward trend in volatility, as shown in Fig. 3.

As can be seen from Fig. 3, the overall growth rate of the eco-environmental system development index in mountainous areas is as follows: the lowest value of the eco-environmental system development index in 2015 is 0.45, and the highest value in 2018 is 0.66. The results show that the government has increased the investment and control of the ecological environment, the ecological environment quality of the mountain area has been improved year by year, and the economic system development index of the mountain area is much higher than that of the ecological environment system.

From Fig. 4, we can see that the comprehensive development index of mountain economic development and eco-environmental system in 2014–2019 has shown a continuous upward trend, rising from 0.41 in 2014 to 0.81 in 2019, with an annual increase of 97.6% and an average annual increase of 19.51%. The analysis results show that the overall development capacity of economic and environmental systems in the study area is increasing steadily. This is mainly reflected in the rapid economic development and environmental protection efforts to strengthen environmental governance efforts to increase.

In order to better analyze the dynamic changes between economic development and ecosystems, the project uses the ratio of the Ecosystems Development Index to the Economic Systems Development Index [$f(y)/f(x)$] for further analysis. The statistical results are shown in Fig. 5.

As can be seen from Fig. 5, the ratio of the Mountain Eco-Environmental Quality Development Index to the Economic Systems Development Index declined significantly from 2014 to 2019. Specifically, the ratio of the two in 2014 was 0.13, indicating that the overall ecological environment quality of the mountain area is good, but the economic development is relatively lagging. By 2017, the ratio of the two has increased, indicating that the rapid economic development in mountainous areas during the "11th Five-year Plan" period is gradually coordinated with the ecological environment quality, which lags behind the economic development. Overall, in the process of the rapid development of the mountain economy, ecological environment protection has achieved some results, but the speed of economic development is higher than the speed of improvement of ecological environment quality, revealing that economic development and ecological environment need to be further coordinated.

Conclusion

The dynamic evolution of the coupling and coordination between economic development system and ecological environment system in the mountainous area from 2014 to 2019 is evaluated by using the method of the coefficient of variation and dynamic coupling theory. The main conclusions are as follows:

(1) According to the principle of constructing the index system and in combination with the actual situation of the study area, the evaluation index system for the coordinated development of economic development and ecological environment protection in mountainous areas is established, with 22 indexes in total. The results show that the economic system development index, eco-environmental system development index, and comprehensive system development index of the study area are showing an upward trend.
(2) From 2014 to 2019, the dynamic coupling degree of the mountainous economic system and ecological environment system has shown an upward trend on the whole and is in a state of evolution from medium-level coupling to good-level coupling.
(3) From 2014 to 2019, the dynamic-coupled coordination degree of the mountainous economic system and ecological environment system has shown an overall trend of continuous increase, and the overall situation is evolving from a moderately or slightly declining development to a well-coordinated development type; but the system-coupled coordination degree is relatively low and the overall ecological environment is relatively fragile.

The mountainous area is a typical ecological fragile area. Affected by the flood disaster, the industry is mainly labor intensive and resource intensive, with a short industrial chain, high energy consumption, heavy pollution, and low capacity of green sustainable development. Seeking the road of transformation and development has become the primary task of realizing green sustainable development in the research area. In view of the particularity of economic development and ecological environment protection in mountainous areas, we must take reasonable and effective measures to make them develop coordinately. We should vigorously promote the supply-side structural reform, promote the transformation and upgrading of industrial structure, establish ecological compensation and incentive mechanism, and coordinate the relationship between economy and environment.

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