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Measurement and Prediction of Coupling Coordination Level of Economic Development, Social Stability and Ecological Environment in Qinghai—Thoughts on Sustainable Societal Safety

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Abstract: Societal safety is the result of the coordinated development of several subsystems; the coupling–coordination relationship among economic development (ED), social stability (SS), and ecological environment (EE) is the premise of realizing sustainable societal safety (SSS). Taking Qinghai Province as an example, this paper quantitatively evaluates the development index of each subsystem by constructing ED-SS-EE evaluation index system, then analyzes the spatio-temporal evolution of ED, SS, and EE coupling coordination levels based on the coupling coordination model, and finally predicts the coupling coordination level of ED, SS, and EE by using the GM(1.1) model. The findings are as follows: (1) The economy is developing rapidly, but the regional development is extremely uneven; ED is driving SS, and SS lags behind ED and slowly improves; EE is improving continuously, and the spatial pattern is relatively stable. (2) The ED, SS, and EE systems have a high degree of coupling, showing a fluctuating upward trend. Coordination level is low, showing a slow upward trend, and the regional differences are obvious. (3) In the future, the coordination level of ED, SS, and EE systems in different regions will be upgraded from the level of near imbalance and barely coordination to the level of intermediate coordination, good coordination, and even high-quality coordination. The spatio-temporal description of ED, SS, and EE coupling coordination level not only reveals the development trend and problems of SSS in Qinghai, it also proves the feasibility of evaluating societal safety level based on the coupling coordination level of sustainable social structure system.

Keywords: sustainable societal safety; economic development; social stability; ecological environment; coupling coordination model; Qinghai Province

Citation: Ye, S.; Ge, Y.; Xu, S.; Ma, X. Measurement and Prediction of Coupling Coordination Level of Economic Development, Social Stability and Ecological Environment in Qinghai—Thoughts on Sustainable Societal Safety. *Sustainability* **2022**, *14*, 10515. https://doi.org/10.3390/su141710515

Academic Editors: Changqing Song, Peichao Gao and Wenhui Kuang

Received: 15 July 2022
Accepted: 20 August 2022
Published: 23 August 2022

1. Introduction

After the industrial revolution, the global population exploded, and the world economy and society developed at an unprecedented speed. At the same time, in order to meet the growing development needs of human beings, it has also brought about resource and environmental problems such as ecological destruction, soil erosion, climate warming, and deterioration of living environment quality [1,2]. In China, since the reform and opening up, various social undertakings have made remarkable achievements, the comprehensive national strength has been continuously improved, and the people's living standard and living environment quality have been significantly improved [3]. However, in recent years, with the rapid development of urbanization, the widening gap between the rich and the poor and the gradual imbalance of population structure and environmental pollution, the country is faced with the dual pressures and challenges of sustainable development and societal safety governance. In the Qinghai–Tibet Plateau, which is far away from the national economic and political center, besides the general problems of national development, such as population, resources, environment, etc. [4–6], there are also some individual problems in regional development, such as lagging ED, slow social reform, and fragile EE. In the short term, these situations seriously restrict the pace of local ED and social transformation, and even breed some potential SS problems. In the long run, these situations will seriously affect the realization of national and regional sustainable development goals in 2030. Therefore, it is particularly meaningful to think about a kind of SSS that can not only maintain a regional SS, but also ensure that sustainable development goals can be achieved on schedule.

The core goal of sustainable development research is to reveal the short-term and long-term coordinated operation state of the natural–social complex system from the regional scale to the global scale and then provide a decision-making basis for spatial governance at different scales [7]. Relevant research trends show that, on the one hand, the theoretical connotation of sustainable development has been continuously enriched and improved [8], and a knowledge system of sustainable development [9], sustainable society [10], scientific development concept [11], (marine) ecological civilization construction [12], double-carbon target development [13], green coordinated development [14], and regional high-quality development [15] has been initially formed. These studies jointly call for the future society to be a social form in which the humanistic environment and the EE are coupled and coordinated and constantly try to expand it at the level of social life and environmental protection, trying to show people a picture of a sustainable society with economic prosperity, livable environment, and SS [16,17]. On the other hand, the construction of index system and the evaluation of comprehensive index are increasingly regarded as an effective method for the evaluation of sustainable development, as well as an effective tool for policy making and academic exchange [18]. Human development needs to constantly obtain various services from the ecosystem; so, the real sustainable development is based on the EE, realizing the comprehensive evolution of social progress and ED, so as to realize the high-quality development of human society [19]. Under the guidance of this idea, the sustainable society index, which integrates sustainable development and social progress, is considered by many scholars to be able to comprehensively and comprehensively evaluate the sustainable development of a region [20–23]. In addition, some recent efforts to evaluate the level of sustainable development based on the perspective of green and low-carbon development are also worthy of recognition [14]. No matter the previous theoretical exploration of the connotation of sustainable development, the later quantitative evaluation of the sustainable social index, or even the recent call for a green and low-carbon society, they all pay attention to the social problems in sustainable development in different degrees and with different emphases; for example, the connotation of sustainable development emphasizes the behavioral constraints of social development, the evaluation of sustainable society focuses on the sharing and promotion of social well-being, and the idea of green and low carbon focuses more on the improvement of social quality in the times. However, few studies pay attention to the societal safety issues in sustainable development.

The essence of societal safety is to reduce social risks to a controllable range [24]; it requires ensuring that people enjoy a decent standard of living, the opportunity to receive quality education, and that their life and health are protected from actual and potential internal or external threats [25]. A safe society includes two abilities: one is to prevent the occurrence of adverse events, and the other is to prevent and deal with the consequences of adverse events when they occur and to quickly return to the normal state [26]. So, societal safety can be defined as the ability of social system to maintain key functions; protect citizens' lives, health, and safety; and meet citizens' basic development needs under various pressure conditions [27]. This includes two meanings; the ability to protect citizens' lives, health and property and meet their basic development needs is the basic requirement of societal safety, while the ability to maintain key functions focuses on the expectation of the continuity of societal safety. Obviously, societal safety is the result of the coordinated development of multiple subsystems and cross-domain collaboration among stakeholders (safety actors), and the clarification of their respective roles and responsibilities should be regarded as a key factor to measure the state of societal safety and its sustainability [28]. Unfortunately, the current research on societal safety pays more attention to the qualitative analysis of societal safety status and its causes and puts societal safety in the sustainable development strategy, and the evaluation and investigation of societal safety sustainability based on the idea of system coordination is still rare.

A stable social environment can better promote sustainable development, and sustainable development can also promote continuous social progress and sustained ED and build a solid material foundation and values and security system for SS, so there are countless interactions between societal safety and sustainable development in a region. Recently, some scholars have shown great interest in the cross-study of sustainable development and societal safety. For example, by looking for some invisible and indirect indicators of economic and social development, scholars evaluate and predict the societal safety level of some underdeveloped countries, accordingly formulate the implementation plan of sustainable development strategy, and regard this plan as an important part of the 2030 sustainable development goal [25]. According to the existing database of the United Nations, scholars have comprehensively evaluated the economic and social parameters in the sustainable development system [29]; simulated the social development by using the artificial neuron method; and predicted, optimized, and upgraded the societal safety prevention and control system according to a neural network [30]. Scholars have integrated the four themes of society, environment, health, and safety and provided an evaluation model for regional innovation and green development [31]. Undoubtedly, we can obtain many useful references from the above work. However, these studies have not explained clearly the interaction mechanism of the components of SSS and have not added the indicators that affect SS when calculating the index. These are the core issues to be solved in our paper.

As the previous studies have revealed, there is a very close internal logic between societal safety and sustainable development. The SSS system is a compound system of sustainable development and societal safety, which is like a triangular prism, with its three mirrors of ED, SS, and EE. Among them, SS is the guarantee and condition of ED and the direct embodiment of the stable operation of social system. ED is the foundation and purpose of SS, and it is also a criterion of social development. The environment provides food and habitat for human survival and development as well as energy and raw materials for ED, which is the material and energy foundation that human survival and development must rely on. Therefore, SSS refers to the coupling and coordination of ED, SS, and EE. The higher the coupling and coordination degree, the stronger the sustainability of a region's societal safety level, and vice versa.

This paper consists of four interrelated parts. The first part is the introduction, which briefly introduces the reason, literature review, and significance of the research. The second part tries to explain the interaction mechanism of the subsystems of SSS. The third part is the general situation of the study area, methods, index system construction, data collection and pretreatment. The fourth part is the analysis of the research results, mainly including three systems of ED, SS, and EE and the analysis of the evaluation results of their coupling coordination degree. The fifth part is the conclusion and discussion, which clarifies the conclusion of this study, makes necessary reflections on the shortcomings of SSS and the areas that need to be improved in the future, and explains the application prospect of SSS theory.

2. Sustainable Societal Safety

SSS system consists of two subsystems: sustainable development and societal safety. Is it possible for these two subsystems to merge similar items? This is to find the answer from the systematic characteristics and elements of sustainable development and societal safety. First of all, both sustainable development system and societal safety system are multidimensional, open, and dynamic systems. For example, most studies divide 17 SDGs into three dimensions: economy, environment, and society, and each dimension consists of several indicators [32]. Similarly, societal safety is also considered to include the prevention of adverse events, reliable social security functions, and safety governance system [26–28]. So, both the sustainable development system and the societal safety system are vertically hierarchical. Secondly, there is a significant horizontal cross between the evaluation index of sustainable development and the trigger factors of societal safety. For example, there are many overlapping projects between the socio-economic level in the sustainable development system and the social security level in the societal safety system [25,33]. The systematic characteristics of vertical hierarchy and horizontal intersection provide the possibility and operability for the integration of a sustainable development system and societal safety system.

In China's western border areas, the natural conditions are harsh, the EE is fragile, the ED and social transformation lag behind other areas for a long time, and the regional development faces the dual pressures of ecological safety management and maintaining SS. These problems do not belong to political and military safety at the national level, nor do they belong to the community safety managed by local governments, which should belong to the safety issues of sustainable society. We believe that SSS refers to the ability of ED, SS, and EE systems to maintain sound operation and coordinated development; it is guided by sustainable development, required by ecological sustainability, driven by ED, and guaranteed by SS, under the background of ecological civilization construction, to optimize and upgrade the regional social–natural composite safety prevention and control system. SSS requires the construction of a coupled, coordinated, safe, stable, open and inclusive social development model on the premise of ensuring ecological safety. It takes high-quality development as its basic demand, and its core essence is to realize the transformation of ED, SS, and EE from imbalance to coordination.

In an SSS system, the sustainable evolution of the ecosystem is fundamental, the efficient development of the economic system is the driving force, and the stable operation of the social system is the guarantee. From the composition of each subsystem, regional coordination, social security, spatial order, and public safety management jointly determine the stability of a regional social system. Climate change, human activities, the degree of environmental pollution, and the performance of ecological governance jointly affect the sustainable evolution of the ecosystem. Economic benefits, industrial structure, opening to the outside world, and social inclusion jointly determine the level of ED. From the perspective of the functional relationship among subsystems, the EE provides the spatial basis for SS, social development provides civilized ideas and governance practices for the EE; and social development also provides rules and regulations, development models, social environment and policy support for ED; while ED feeds back social development through dividend sharing and social well-being to promote its smooth operation, EE provides material production materials such as energy and raw materials for ED, and ED provides technical and financial support for EE governance (Figure 1).

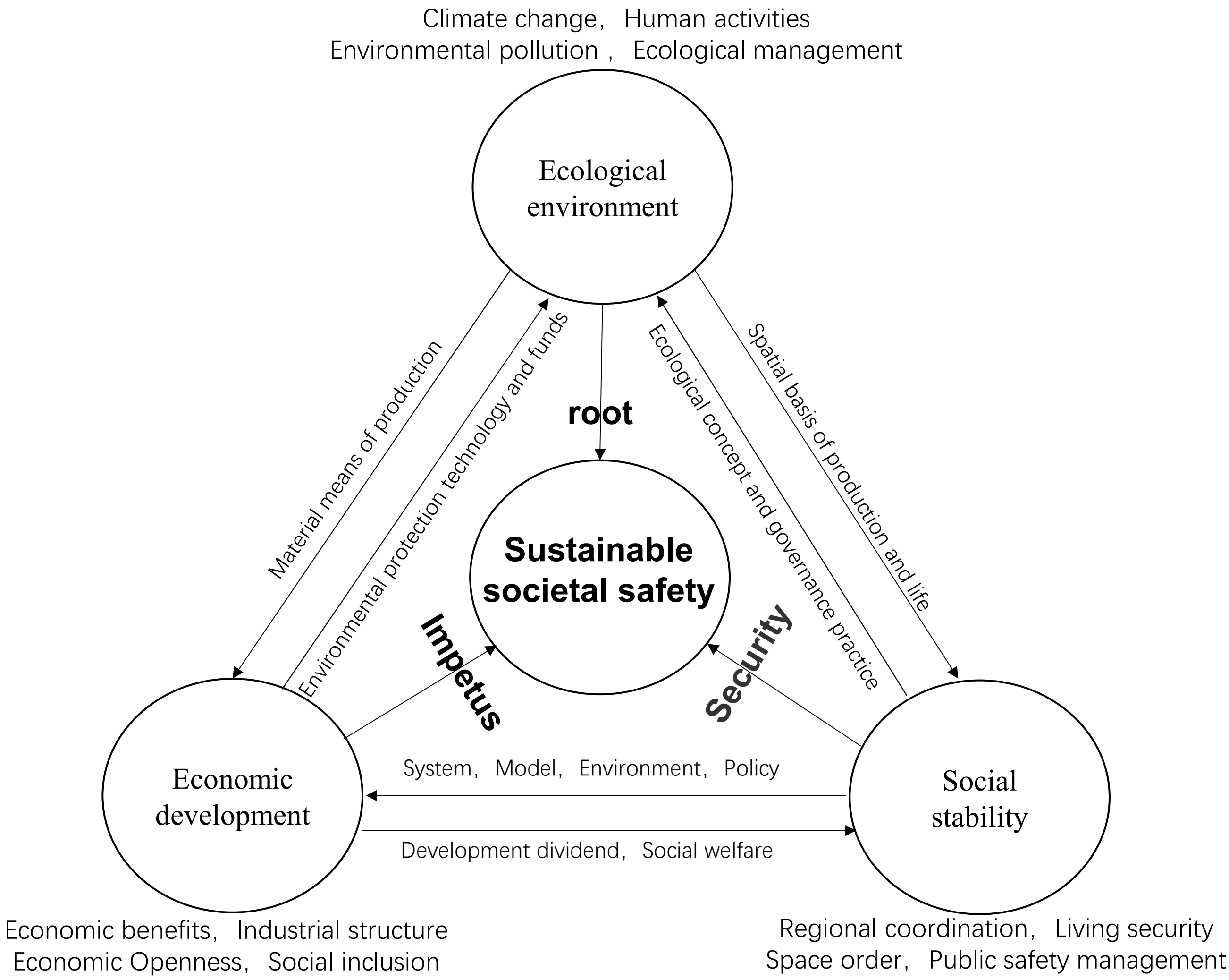


Figure 1. Interaction Mechanism of ED, SS, and EE.

3. Research Scheme and Data Source

3.1. The Study Area

Qinghai Province is located in the northeast of Qinghai–Tibet Plateau, bordering Gansu Province in the east and north, the Xinjiang Uygur Autonomous Region in the northwest, Tibet Autonomous Region in the southwest, and with Sichuan Province in the southeast. It is composed of eight cities or prefectures (minority autonomous prefectures) including Xining City, Haidong City, Yushu Tibetan Autonomous Prefecture, Haixi Mongolian Tibetan Autonomous Prefecture, Haibei Tibetan Autonomous Prefecture, Hainan Tibetan Autonomous Prefecture, Huangnan Tibetan Autonomous Prefecture, and Guoluo Tibetan Autonomous Prefecture (Figure 2). Most of Qinghai is plateau and mountainous, and the main topographic units are Qilian Mountains, Kunlun Mountains, Tanggula Mountains, Bayankala Mountains, Qaidam Basin, Qingnan Plateau, and Loess Plateau. More than 50% of the areas are above 4000 m above sea level, and the climate is a typical plateau continental climate, with an average annual temperature of −5.8–8.6 °C, strong solar radiation, long illumination time, large temperature difference between day and night, and vertical changes [34]. As the birthplace of the Yangtze River, the Yellow River and the Lancang River, swamps, wetlands, glaciers, and lakes are widely distributed; it is known as the "water tower of Asia" and the "source of rivers" [35,36]. In the historical period, Qinghai's economic and social development has lagged behind other provinces and regions in the Chinese mainland for a long time, and the extensive exploitation of mineral resources in some areas has led to serious damage to the EE. In recent years, with the support of national policies, such as western development, ecological civilization construction, counterpart support, poverty alleviation and rural revitalization, the EE management has been strengthened, the ED speed has been improved, and the social environment has been relatively stable.

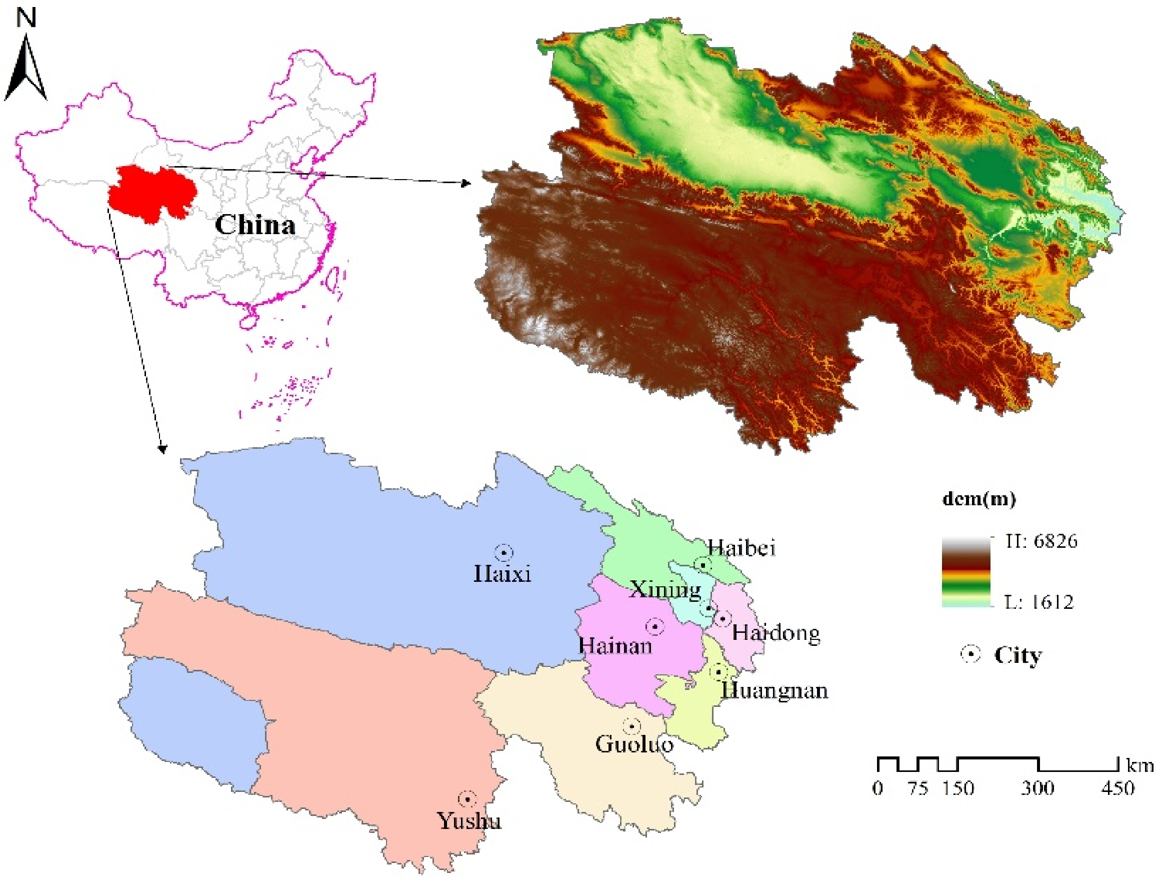


Figure 2. Location of the Qinghai Province.

3.2. Index System Construction

In this paper, the evaluation index system of ED, SS, and EE is constructed according to the principles of theoretical basis, accurate representation, and data availability of index selection [37]. Ecology is the sum total of natural resources and natural environment on which human beings depend, and its advantages and disadvantages depend on the pressure of human production and life on resources and environment in a certain period, the ecological productivity of resource endowment, and the strength of EE governance and protection [38]. Drawing on the existing research, this paper will evaluate the EE from three dimensions: pressure, state, and protection [39]. ED refers to the process in which a country or region gets rid of poverty and moves towards the modernization of its economic and social life. Considering the possibility of data acquisition, we chose economic benefits, economic structure, and economic openness for comprehensive reflection [39–41]. We observed the SS system from three dimensions, social coordination, social governance, and social security [41,42]. See Table 1 for the specific evaluation indicators and the theoretical basis for their selection. What needs to be explained is that we hope to take the harmonious integration of the components of SSS as the starting point and the end result, which not only reflects the social and ED, but also reflects the development state of the EE. In order to better highlight the idea of combining ED with environmental benefits and synchronizing economic growth with people's livelihood security, there are no indicators of scientific education and ideology here [43].

Table 1. ED, SS, and EE systems evaluation index system.

System Name	Observation Dimension	Evaluating Indicator	Unit	Attribute	Refer to
ED System (U1)	Economic benefits	Per capita GDP	Yuan	+	[14]
		Urbanization rate	%	+	[44]
	Economic structure	Proportion of tertiary industry	%	+	[40]
		Output value of secondary industry/output value of tertiary industry	%	+	[38]
		Total annual tourism revenue	%	+	[45]
	Economic Openness	Total postal business	Ten thousand yuan	+	[43]
		Total social consumer goods	One hundred million yuan	+	[38]
		Highway mileage	kilometres	+	[45]
SS system (U2)	Social coordination	Investigate urban unemployment rate	%	–	[44]
		Rural Engel coefficient	%	–	[42]
		Per capita income ratio between urban and rural areas	/	–	[43]
	Social governance	Social security and employment expenditure	%	+	[44]
		Public management of fixed assets investment	One hundred million yuan	+	[42]
	Social security	Per capita disposable income	Yuan	+	[41]
		Per capita living expenditure	Yuan	+	[42]
EE system (U3)	Ecological pressure	Industrial wastewater discharge	Ten thousand tons	–	[44]
		Industrial smoke (powder) dust emission	Tons	–	[38]
		Output of industrial solid waste	Ten thousand tons	–	[39]
	Ecological state	Forest coverage rate	%	+	[45]
		NDVI	/	+	[46]
		Excellent rate of air quality	%	+	[38]
	Ecological protection	Proportion of environmental investment in GDP	%	+	[39]
		Industrial waste utilization rate	%	+	[44]

3.3. Research Methods

3.3.1. Entropy Method and Comprehensive Index Method

When evaluating each subsystem, it is very important to determine the index weight, which is related to the authenticity and reliability of the evaluation results. There are two kinds of weighting methods, subjective weighting method and objective weighting method. Subjective weighting is qualitative weighting based on the experience and professional knowledge of experts and scholars, which is highly subjective. Objective weighting is to give weight to each index by measuring method according to the change of original data, which is less affected by subjective factors. In this paper, the entropy method in the objective weighting method is used to weight the evaluation indexes, and by analyzing the horizontal and vertical information entropy of each index and the correlation between each index, it can objectively reflect the importance of each evaluation index in the index system [47]. After the weight of each index is obtained, the score of each subsystem is calculated by the comprehensive index method.

Step 1, Standardize the original data.

When the original data is a positive indicator, the following formula is used:

$$X_{ij} = \frac{Z_{ij} - Z_{ij\min}}{Z_{ij\max} - Z_{ij\min}} + 0.0001 \quad (1)$$

When the original data is a negative indicator, the following formula is used:

$$X_{ij} = \frac{Z_{ij\max} - Z_{ij}}{Z_{ij\max} - Z_{ij\min}} + 0.0001 \quad (2)$$

Step 2, calculate the proportion of index j in the ith year:

$$P_{ij} = \frac{X_{ij}}{\sum_{i=1}^{m} X_{ij}} \quad (3)$$

Step 3, calculate the entropy value of j indexes:

$$e_j = -k\sum_{i=1}^{m} (P_{ij} * \ln P_{ij}), k = \frac{1}{\ln m} \quad (4)$$

Step 4, calculate the index weight:

$$w_j = 1 - e_j / \sum_{j=1}^{n} 1 - e_j \quad (5)$$

Step 5, calculate the subsystem evaluation score:

$$U_a = \sum_{j=1}^{n} X_{ij} * w_j, a = 1, 2, 3 \quad (6)$$

3.3.2. Coupling Coordination Model

The key to a system from disorder to order lies in the synergy of internal order parameters, and the coupling degree is a measure of this synergy; the greater the coupling degree, the greater the degree of interaction between systems. We regard the degree of interaction among the three systems of ED, SS, and EE through their respective constituent elements as the degree of coupling among the three systems, and its size reflects the degree of interaction among the three systems [48].

$$C = \left\{ \frac{U_1 * U_2 * U_3}{[(U_1 + U_2 + U_3)/3]^3} \right\}^{\frac{1}{3}} \quad (7)$$

where C is the coupling degree; U_1, U_2, and U_3 are the comprehensive evaluation values of ED, SS, and EE subsystems, respectively; and the range of C is (0, 1). When C is 1, the system is in the most coupled state, and when C is 0, the system is in the unrelated state.

$$D = (C * T)^{\frac{1}{2}} \quad (8)$$

$$T = \alpha U_1 + \beta U_2 + \delta U_3 \quad (9)$$

where D is the coordination degree; C is the coupling degree; T is the comprehensive evaluation value of the three subsystems; and α, β, and δ are the weights. According to the connotation of sustainable social security, this paper assigns them to 0.3, 0.35, and 0.35, respectively. In this paper, the standard of coupling coordination degree is mainly based on the division scheme in Table 2 [49].

Table 2. Classification criterion for identifying the coordinated development relationship.

Stage	Range	Coordination States	Range
Stage of disorder	$0 \leq D < 0.4$	Serious imbalance	(0, 0.1)
		Severe disorders	(0.1, 0.2)
		Moderate disorders	(0.2, 0.3)
		Mild disorder	(0.3, 0.4)
Stage of transition	$0.4 \leq D < 0.6$	On the verge of disorder	(0.4, 0.5)
		Barely coordination	(0.5, 0.6)
		Primary coordination	(0.6, 0.7)
Stage of coordinated development	$0.6 \leq D < 1$	Intermediate coordinate	(0.7, 0.8)
		Good coordination	(0.8, 0.9)
		Perfect coordination	(0.9, 1)

3.3.3. GM(1.1) Grey Model

GM(1.1) grey model is a commonly used method to predict the development trend of the current situation. According to the characteristics of the predicted objects, it can be divided into series prediction, disaster prediction, change prediction, topology prediction, and system comprehensive prediction. In this paper, series prediction is used to quantitatively estimate the development and change of an index, and the prediction result is the specific value of the index in the future time node [50].

(1) Let time series $X_t = \{x_t(1), x_t(2) \ldots x_t(n)\}$ have n observation series, and we accumulate the original series to generate a new series $X_1 = \{x_1(1), x_1(2) \ldots x_1(n)\}$; then, the corresponding differential equation of GM(1.1) model is:

$$\frac{dX_1}{dt} + aX_1 = \mu \tag{10}$$

where a is the development grey number and μ is the endogenous control grey number.

(2) Let $\hat{a}$ be the parameter vector to be estimated, $\hat{a} = \left(\frac{a}{\mu}\right)$, and solve it by the least square method to obtain $\hat{a} = (B^T B - 1)B^T Y_n$; solve the differential equation to obtain the prediction model:

$$x_1^T \hat{X}_1(k+1) = \left[x_0(1) - \frac{\mu}{a}\right]e^{-ak} + \frac{\mu}{a} \tag{11}$$

(3) The accuracy and parameters of the prediction model are tested, and the reasonable and effective prediction value can be obtained only after the model passes the test [49].

3.4. Data Sources and Processing

The data to study the ED, SS, the excellent rate of air quality, the proportion of investment in environmental treatment to GDP, and the forest coverage rate are from the Statistical Bulletin of National Economic and Social Development (2011–2020), the Statistical Yearbook of Qinghai (2011–2020), and the Statistical Yearbook of Qinghai (2011–2020). The data of industrial wastewater discharge, industrial smoke (powder) dust discharge, industrial solid waste production, and industrial waste utilization rate in the EE came from the EE bureaus and statistics bureaus in Qinghai. The NDVI data in the environment came from the geographic remote sensing ecological network (www.gisrs.cn, accessed on 7 June 2022).

Some data were missing, which was supplemented by the arithmetic mean and trend inference of the previous two years' data. In order to make different indicators comparable across regions and years, and to eliminate the magnitude and direction differences between the original data, the range standardization method is adopted to process the original data of each indicator (Formulas (1) and (2)) [48].

4. Results

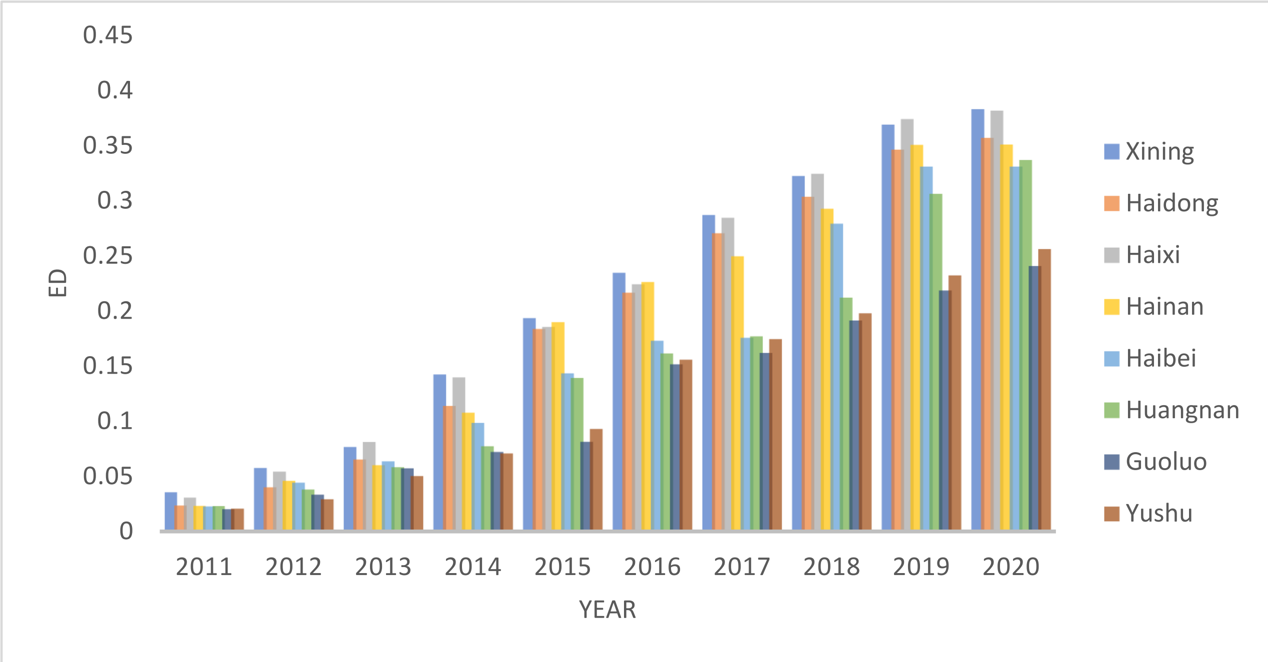
4.1. Evaluation Results of ED, SS, and EE

Through the time-space comparative analysis of the evaluation results of ED, SS, and EE, we can find out the power source for the promotion of SSS level in various regions and the main contradiction points of system coupling and coordination. The evaluation results show that, in the past 10 years, the ED, SS, and EE index of Qinghai has been on the rise; the fluctuation range is relatively small, but the spatial development level is different, and the regional growth rate is different.

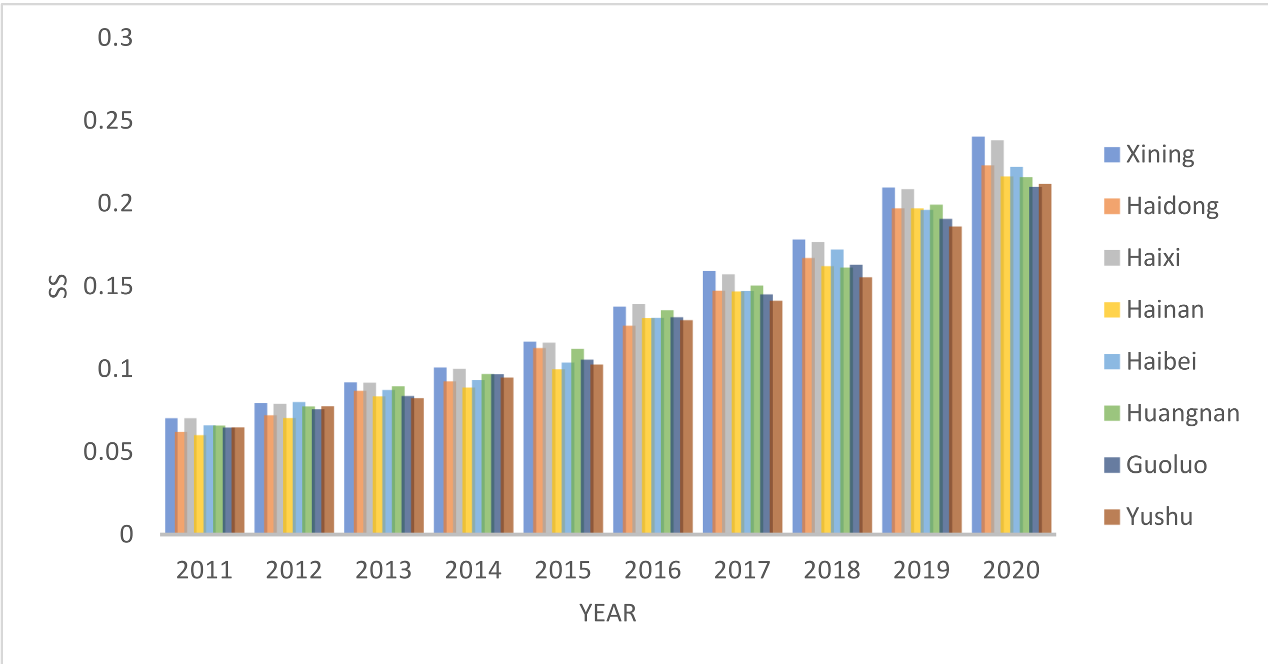
Qinghai's ED index grew rapidly, with the average value increasing from 0.0250 to 0.3297 from 2011 to 2020, an increase of nearly 12 times, which was mainly due to the contribution of rapid development before 2019. In 2020, affected by the COVID-19 epidemic, tourism revenue and retail sales of social consumer goods all declined to a certain extent, and the ED trend slowed down obviously. The province's ED shows four-level spatial characteristics. The ED of Xining (0.2101) and Haixi (0.2079) ranks high in the province, the ED of Haidong (0.1919) and Hainan (0.1896) is above the middle level, the ED of Haibei (0.1661) and Huangnan (0.1529) is below the middle level, and the ED of Guoluo (0.1228) and Yushu (0.1280) lags behind (Figure 3a).

Compared with ED, Qinghai's SS index grows slowly, with an average value of less than doubled from 0.0655 in 2011 to 0.1303 in 2020. ED can greatly promote SS, but this influence is not decisive. Driven by the level of living and consumption in per capita disposable income, the SS index of Xining (0.1389) and Haixi (0.1377) has been ahead of other regions. Due to the low investment in social security and employment, the SS index of Hainan (0.1239) has been low. The SS index of other regions fluctuates between 0.1247 (Yushu) and 0.1304 (Huangnan). Before 2015, the unemployment rate in Xining and Haidong was high, the public management investment in Haixi was low, and the living consumption level and income level in other regions were low. However, due to the high investment in employment, social security, and public management, the spatial difference of SS index in different regions was not significant. After 2015, Qinghai's SS index showed some remarkable characteristics: the SS index of Xining and Haixi continued to lead the whole province, and the growth rate increased year by year; Hainan, Haidong, Haibei, and Huangnan were steadily improving, falling behind Xining and Haixi, and leading Guoluo and Yushu. Although the SS index of Guoluo and Yushu was also growing steadily, the horizontal comparison shows that the stamina was insufficient (Figure 3b).

Qinghai's EE had been constantly improving, with the horizontal average rising from 0.0435 to 0.1075, an increase of 1.47 times. The spatial pattern was relatively stable; the low-value areas were mainly distributed in Xining (0.0875), Haidong (0.0913) and Haixi (0.0763), and these areas are areas with a relatively high level of urbanization in Qinghai, as well as important industrial towns, with a relatively large amount of waste water, smoke (powder) dust, and solid waste. At the same time, the forest coverage rate and NDVI index in Haixi were far lower than those in other areas, further lowering the score. Hainan (0.1256) and Haibei (0.1299), which are non-industrial areas adjacent to Xining and Haidong, have EE indexes in the middle of the province, and their environmental improvement is slower than that of other areas. The EE indexes of Huangnan (0.1230), Guoluo (0.1350), and Yushu (0.1271) were kept at a high level. Guoluo has benefited from the high NDVI index and has a good EE foundation. In recent years, Huangnan has strengthened the EE management, and achieved remarkable results in urban greening and grassland ecological restoration. Yushu has less industrial pollution, and its ambient air quality has always maintained a high level (Figure 3c).

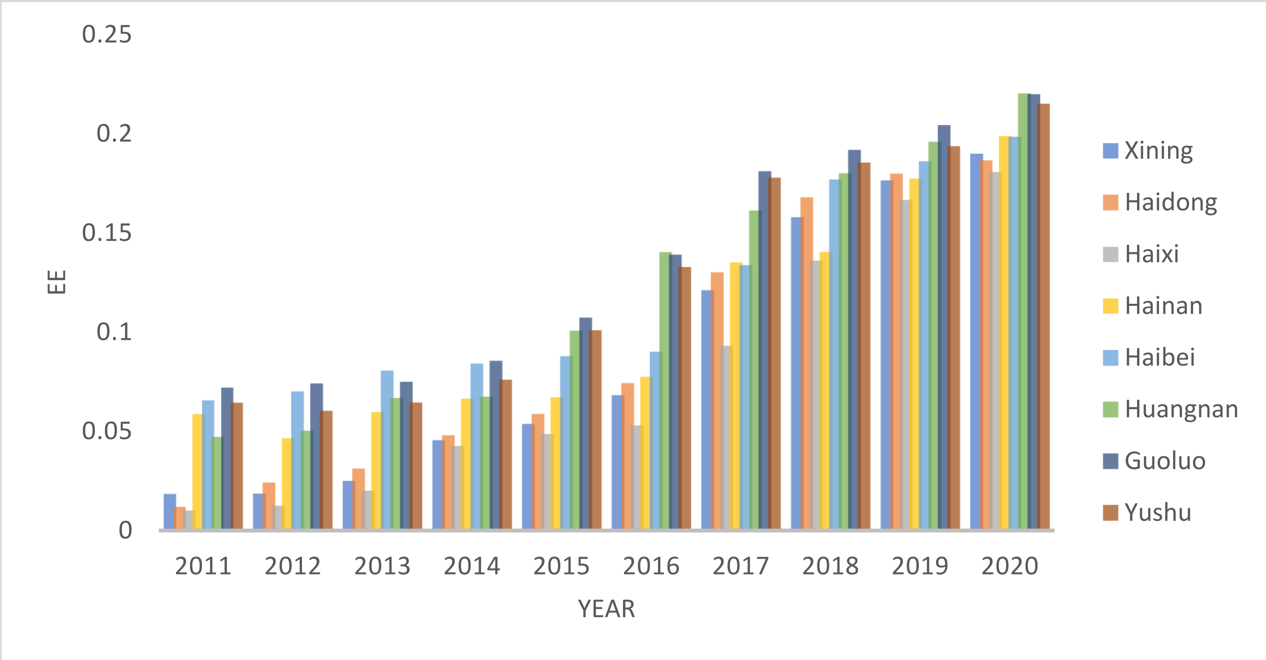


(**a**)



(**b**)

Figure 3. *Cont*.



(**c**)

Figure 3. (**a**) Evaluation results of ED in Qinghai from 2011 to 2020; (**b**) Evaluation results of SS in Qinghai from 2011 to 2020; (**c**) Evaluation results of EE in Qinghai from 2011 to 2020.

4.2. Spatio-Temporal Differentiation of Coupling Coordination Level of ED, SS, and EE System

We used Formula (7) to calculate the coupling degree of the ED, SS, and EE systems in Qinghai from 2011 to 2020 (Figure 4). In the past 10 years, the coupling degree of eight prefectures (cities) has been fluctuating and rising, and the overall level was high. The average coupling degree increased from 0.8624 in 2011 to 0.9734 in 2020, and the average value was 0.9435, which indicated that the ED, SS, and EE systems in Qinghai were closely related and influenced each other. Among them were from 0.8624 to 0.9610 in 2011–2014, from 0.9610 to 0.9396 in 2014–2016, and from 0.9396 to 0.9734 again in 2016–2020. Except that the coupling degrees of Haidong and Haixi in 2011 were 0.7970 and 0.7530, and that of Haixi in 2012 was 0.7760, the other regions were all above 0.8. As far as the region is concerned, Haixi had the lowest value of 0.8701, Huangnan had the highest value of 0.9782, and other regions were between 0.9039 (Xining) and 0.9767 (Guoluo). From the perspective of regional growth, the biggest increase was in Haixi, from 0.753 in 2011 to 0.953 in 2020. The smallest increase was in Hainan, from 0.917 in 2011 to 0.968 in 2020.

The coordination level of Qinghai's ED, SS, and EE systems from 2011 to 2020 is calculated by Formula (8) (Figure 5). The coordination degree of eight regions is on the rise. Haidong and Haixi have risen from severe maladjustment to near maladjustment, Xining and Huangnan increased from moderate imbalance to a barely coordinated state, and other areas have risen from moderate imbalance to near imbalance. Haixi had the largest increase, with an increase of 2.03 times. Guoluo had the smallest increase, with an increase of 1.176 times. As can be seen from Table 3, the coordination level of the ED, SS, and EE systems in various regions of Qinghai was low, and the average values were in a state of slight imbalance. Spatial differentiation was obvious; Xining, Haidong, and Haixi were in a state of excessively advanced ED and seriously lagging EE. Hainan and Haibei were in a state of advanced ED and lagging EE. Huangnan's ED as ahead of its time, and SS was basically in harmony with the EE. Guoluo's ED and SS were basically coordinated, and its EE was in an advanced state. Yushu's ED was basically in harmony with its EE, and its society was in an advanced state of stability (Table 3).

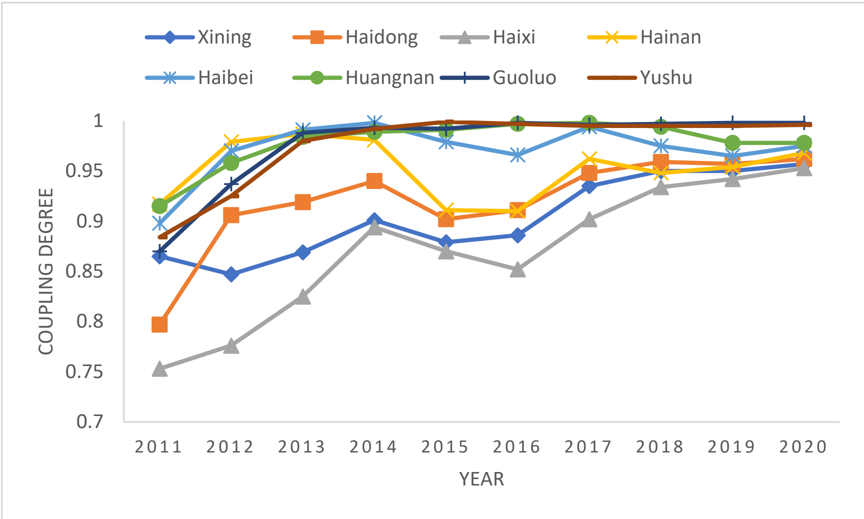


Figure 4. Spatio-temporal differentiation of coupling degree of ED, SS, and EE systems in Qinghai.

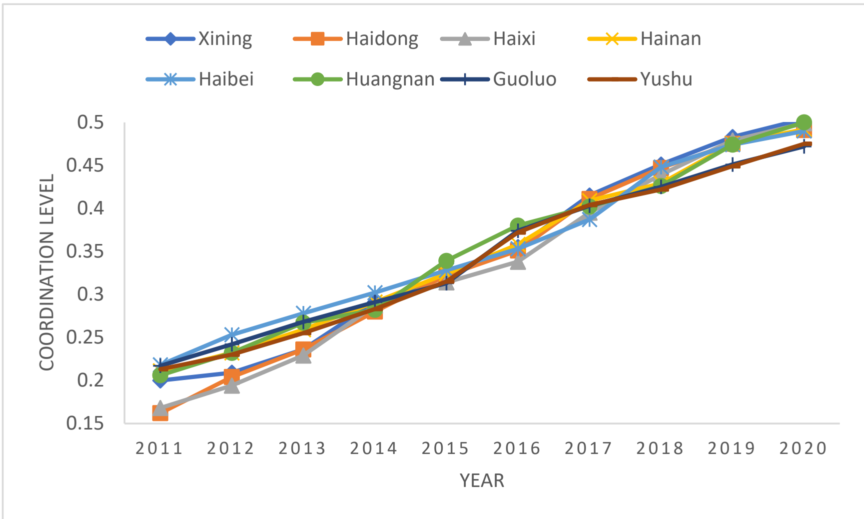


Figure 5. Spatio-temporal differentiation of coordination level of Qinghai's ED, SS, and EE systems.

Table 3. Average value of Qinghai's ED, SS, and EE scores and coordination degree.

	Xining	Haidong	Haixi	Hainan	Haibei	Huangnan	Guoluo	Yushu
$\overline{U}_1$	0.2108	0.1912	0.2079	0.1896	0.1662	0.1529	0.1228	0.1280
$\overline{U}_2$	0.1384	0.1287	0.1377	0.1256	0.1299	0.1304	0.1267	0.1207
$\overline{U}_3$	0.0875	0.0913	0.0763	0.1028	0.1174	0.1230	0.1350	0.1271
$\overline{D}$	0.3466	0.3379	0.3342	0.3380	0.3531	0.3508	0.3456	0.3418
Coordination degree	Mild disorder	Mild disorder	Mild disorder	Mild disorder	Mild disorder	Mild disorder	Mild disorder	Mild disorder
Characteristic	Economy too ahead, ecology seriously lagging behind	Economy too ahead, ecology seriously lagging behind	Economy too ahead, ecology seriously lagging behind	Economy ahead, ecology lagging behind	Economy ahead, ecology lagging behind	Economic ahead, basic coordination between society and ecology	Ecological ahead, basic coordination between economy and society	Society lags behind, basic coordination between economy and ecology

4.3. Prediction of Coupling and Coordinated Development of ED, SS, and EE Sistem

Before forecasting the future coupling and coordination level of ED, SS, and EE, it is necessary to test the applicability of the GM(1.1) model to the data in this paper. So, we randomly selected a set of coupling coordination level data for confirmatory prediction. By comparing the error degree and model parameters between the prediction results and the original data, it was found that the prediction model has high robustness and reliability (Table 4). Refer to Wang's scheme for the detailed verification process [51].

Table 4. GM(1.1) Model test parameters.

	Original Value	Predicted Value	Residual	Relative Error	Grade Deviation
2011	0.218	0.218	0	0.000%	-
2012	0.253	0.255	−0.001	0.765%	0.061
2013	0.278	0.278	0	0.094%	0.008
2014	0.302	0.303	−0.001	0.191%	−0.003
2015	0.328	0.330	0.002	0.500%	−0.003
2016	0.353	0.359	−0.006	1.734%	−0.012
2017	0.387	0.391	−0.004	1.096%	0.006
2018	0.448	0.426	0.022	4.859%	0.059
2019	0.474	0.464	0.01	2.035%	−0.03
2020	0.490	0.506	−0.016	3.241%	−0.054
$\lambda \in [0.862, 0.967]$, $C = 0.0109 \leq 0.35$, $p = 1.000 \leq 1.0$, RMSE = 0.010					

After the model has passed the test, the coupling coordination data of the ED, SS, and EE systems in Qinghai from 2011 to 2020 were set as analysis data; the type of residual series was set as generating series residual; the prediction time length was set as five; the number of repeated modeling of residual was set as five, and the prediction results of the coupling coordination level were obtained (Table 5). As can be seen from Table 5, the coupling coordination degree of ED, SS, and EE in different regions of Qinghai will continue the evolution trend from 2011 to 2020, from the level of near imbalance and barely coordination to the level of intermediate coordination, good coordination, and even high-quality coordination. As far as the region is concerned, Xining may be upgraded from reluctant coordination to high-quality coordination. Haidong, Haixi, and Huangnan may be greatly upgraded from being on the verge of maladjustment to a well-coordinated level. In Haibei, Guoluo, and Yushu, the development of coupling coordination level may tend to be flat, from being on the verge of imbalance to intermediate coordination level.

Table 5. Forecast of coupling and coordinated development of ED, SS, and EE systems.

	Xining	Haidong	Haixi	Hainan	Haibei	Huangnan	Guoluo	Yushu
2021	0.592	0.581	0.587	0.562	0.551	0.565	0.534	0.541
2022	0.658	0.645	0.654	0.617	0.600	0.619	0.580	0.591
2023	0.730	0.715	0.730	0.677	0.654	0.678	0.631	0.645
2024	0.811	0.793	0.814	0.743	0.713	0.743	0.685	0.705
2025	0.900	0.880	0.846	0.815	0.776	0.814	0.745	0.770

5. Discussion

When evaluating societal safety or social risks, most studies adopt the method of linear weighted summation. On the issue of weight distribution, expert consultation and analytic hierarchy process are widely used [52]. However, these methods are full of personal subjectivity, and the prestige of the consulted experts or scholars in academic circles is unquestionable, but it cannot be guaranteed that they are familiar with every research area, so it is very easy to fall into an empirical trap. At the same time, these studies only focus on the evaluation of societal safety status and the analysis of societal safety inducing factors, but do not pay attention to the influence of the stability of social structure on societal safety status and its sustainability, which is one of the starting points of their widespread criticism by academic circles.

5.1. Evaluation Method of SSS Based on System Structure Coupling Coordination

The emergence of societal safety problems is the result of a combination of many factors over a long period of time. Based on the coupling and coordination level of sustainable social structure system to reflect the level of societal safety, this can break through the defect that traditional societal safety research only pays attention to the current situation of safety and neglects or even ignores the sustainability of societal safety. At the same time, it also effectively avoids the disadvantages of the previous evaluation methods affected by personal subjective factors. A truly safe society should be one with coordinated structural development, and we should not only pay attention to the negative influence of a certain system element. As shown in Figure 6, SSS system consists of EE, SS, and ED systems. O(0,0,0) stands for the zero point of SSS, A(1,1,1) stands for the ideal goal of SSS, and vector OA is a coupled and coordinated path of SSS, which requires the coordinated development of ED, SS, and EE. No matter which element in the system does not evolve together with the other two elements, social development will eventually deviate from the ideal track, which may lead to some social problems more or less, and even a series of societal safety effects in serious cases. That is to say, the SSS level of a region in T year is not the module length of the vector Ot directly obtained by weighted summation, and it should be the module length of the mapping vector Ot′ of the real horizontal vector OT of system development on the coupling coordination path vector OA [14].

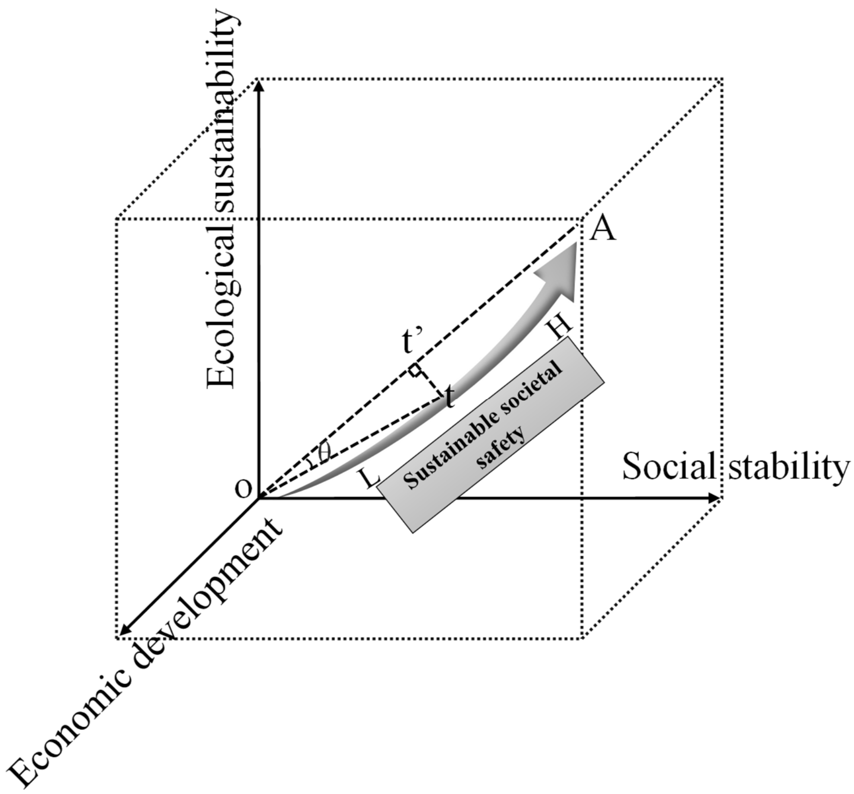


Figure 6. Theoretical model of SSS based on structural coupling coordination.

5.2. Areas and Directions for Future Research

SSS belongs to the category of non-traditional safety, and its evaluation needs to consider three aspects: the objective attribute of safety, the subjective attribute of safety, and the inter-subjectivity of safety [53]. Limited by the length of the article, it is unrealistic to evaluate the three aspects of SSS in one article. Therefore, this article only evaluates the objective standards of SSS. In fact, the research objects of SSS should include the environment, economy, social space system, social system/social relations, the safety behaviors and strategies of political subjects, and residents' feelings and attitudes towards the safety environment. Its perspective emphasizes the analysis of micro-safety mechanism, the summary of verifiable safety laws, and the evaluation of people's subjective factors. Theories and methods in social structure theory, behavioral geography, emotional geography, environmental psychology, political geography, environmental geography, regional sustainable development theory, societal safety theory, and other related fields provide a theoretical basis and reference for SSS research. Space, development, and stability are the core concepts in the theoretical framework of SSS. Future research can deeply examine the direct influence of geographical environment on SS, the intermediary role of emotion (identification/stability) in the relationship between geographical environment and SS control behavior, and the strategy of constructing the legitimacy of societal safety governance based on emotion.

6. Conclusions

6.1. Main Conclusions

From the perspective of SSS, the coupling and coordination level of regional ED, SS, and EE system is a key aspect to measure societal safety and its sustainability. By constructing three system evaluation index systems and evaluating them systematically, the coupling coordination level of the three systems in 2011–2020 is evaluated by using the coupling coordination degree model, the spatial and temporal variation characteristics and problems of the SSS level in Qinghai Province in 2011–2020 are revealed, and the coupling coordination development trend of each system in the next five years is predicted. The main conclusions are as follows:

(1) The economy is developing rapidly, and regional development is extremely uneven. Xining and Haixi have a high level of development, Haidong and Hainan are above average, Haibei and Huangnan are below average, and Guoluo and Yushu are lagging behind. There is a positive correlation between SS and ED, but it lags behind ED and slowly improves. With the continuous promotion of ED, the SS index of Xining and Haixi is at a high level. Because the local government has little investment in social security and employment, the SS index of Hainan is low, and the rest of the regions are in the middle. The EE continues to improve, and the spatial pattern is relatively stable. The low-value areas are mainly distributed in Xining, Haidong, and Haixi. The eco-environmental indexes of Huangnan, Guoluo, and Yushu have been kept at a high level, and the eco-environmental indexes of Hainan and Haibei are in the middle reaches.

(2) The coupling degree is fluctuating and rising, belonging to a high-level coupling state, which shows that ED, SS, and EE are closely related and influence each other. The degree of coordination is also on the rise, with obvious regional differences. Haidong and Haixi have risen from severe maladjustment to near maladjustment, Xining and Huangnan have risen from moderate maladjustment to a barely coordinated state, and other areas have risen from moderate maladjustment to near maladjustment.

(3) In the future, the coupling and coordination levels of ED, SS, and EE will continue the existing development trend, and different regions will be upgraded from the level of being on the verge of imbalance and barely coordinated to the level of intermediate coordination, good coordination, and even high-quality coordination. Xining has been upgraded from reluctant coordination to high-quality coordination. Haidong, Haixi, and Huangnan have been greatly improved from being on the verge of maladjustment to a well-coordinated level. The coupling and coordinated development of

Haibei, Guoluo, and Yushu will tend to be gentle, from the brink of imbalance to the intermediate level of coordination.

The description of the spatial and temporal characteristics of the coupling and coordination level of ED, SS, and EE in Qinghai Province not only reveals the systematicness of SSS, but also proves the feasibility of measuring the level of societal safety based on the coupling and coordination level of a sustainable society structure system. The main research results are in good agreement with the current situation of local SSS, which can provide some enlightenment for social development.

6.2. Policy Enlightenment

When confronted with societal safety dilemmas, we are guided by specific problems, and put forward emergency plans that focus on preventing the primary and secondary negative effects of safety incidents; these countermeasures can also play an immediate governance effect. However, if we take a long-term view, these strategies can be understood as an expedient measure, a passive response given by the outside world based on the safety results, rather than an active attack after scientifically predicting the safety situation. This is obviously a temporary solution but not a permanent cure, and it fails to observe the principle of nipping it in the bud. SSS pays attention to the coordinated development of the internal elements of the system, and structural stability is a necessary condition for coordinated development. If the government fails to give overall consideration to public services, or even gives preference to others, it will only make the pace of development in different areas of society inconsistent, which will eventually lead to some societal safety incidents.

ED is not the decisive factor of SS. In Xining, Haixi, Haidong, and other areas with a high ED level, low-income groups should be given diversified employment opportunities, more policy inclinations should be provided, and their competitiveness in the job market can be enhanced through targeted job skills training. In this way, the per capita income level can be raised, the gap between the rich and the poor can be reduced, the employment rate can be guaranteed, and then the people's sense of existence value can be enhanced. ED can promote SS. In the backward minority areas such as Guoluo and Yushu, the development of local tourism and ecological economy can promote local ED, feed back the society in the form of transfer payment and social welfare, effectively raise local wages and income levels, and enhance the sense of material gain of local people. The improvement of social and economic environment can restrain the deterioration rate of EE to a certain extent, which is mainly reflected in the development of governance technology, the investment of governance funds, and the advancement of governance idea. At the same time, it should also be noted that ED will also have a certain negative impact on the EE. The key to solving this problem is to find the balance point between ED and environmental protection, which should be focused on in Xining, Haidong, Haixi, and other areas where the contradiction between ED and EE is prominent. In short, we can optimize the structure of public service resources, funds, and technical inputs to build a sustainable development society with a sustainable ecological space and the synchronous coordination of the economic space and balanced and stable social space.

Author Contributions: Conceptualization, methodology, software, writing—original draft preparation, and visualization: S.Y.; validation, formal analysis, and data curation: S.X.; writing—review and editing: X.M.; supervision, project administration, and funding acquisition, Y.G. All authors have read and agreed to the published version of the manuscript.

Funding: This study was funded by the Second Qinghai–Tibet Plateau Scientific Expedition and Research Program (grant number: 2019QZKK0608), the Natural Science Foundation of Qinghai Province (grant number: 2021-ZJ-909), and Major Program of National Social Science Foundation of China (grant number: 20&ZD138).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Liu, M.; Wei, H.; Dong, X.; Wang, X.; Zhao, B.; Zhang, Y. Integrating Land Use, Ecosystem Service, and Human Well-Being: A Systematic Review. *Sustainability* **2022**, *14*, 6926. [CrossRef]
2. Wilson, M.C.; Wu, J. The problems of weak sustainability and associated indicators. *Int. J. Sustain. Dev. World Ecol.* **2017**, *24*, 44–51. [CrossRef]
3. Xiao, G.; Qiao, H.; Wu, L. Forty Years of Reform and Opening Up and the Building of a Moderately Prosperous Society. *Contemp. Soc. Sci.* **2020**, *2*, 1. [CrossRef]
4. Zhao, Y.; Chen, D.; Fan, J. Sustainable Development Problems and Countermeasures: A Case Study of the Qinghai-Tibet Plateau (QTP). *Geogr. Sustain.* **2020**, *1*, 275–283. [CrossRef]
5. Ye, J.; James, F.; Reynolds; Sun, G.; Li, F. Impacts of increased variability in precipitation and air temperature on net primary productivity of the Tibetan Plateau: A modeling analysis. *Clim. Chang.* **2013**, *119*, 321–332. [CrossRef]
6. Yang, H.; Wang, Z.; Dai, Q. Ecological impact assessment method of highways in Tibetan Plateau: A Case study of Gonghe-Yushu Expressway. *J. Mt. Sci.* **2020**, *17*, 1916–1930. [CrossRef]
7. Fu, B. Promoting geography for sustainability. *Geogr. Sustain.* **2020**, *1*, 1–7. [CrossRef]
8. Sironen, S.; Seppälä, J.; Leskinen, P. Towards more non-compensatory sustainable society index. *Environ. Dev. Sustain.* **2015**, *17*, 587–621. [CrossRef]
9. Tan, F.; Lu, H. Assessing regional sustainable development through an integration of nonlinear principal component analysis and Gram Schmidt orthogonalization. *Ecol. Indic.* **2016**, *63*, 71–81. [CrossRef]
10. Seppälä, J.; Leskinen, P.; Myllyviita, T. Expert Panel Weighting and Aggregation of the Sustainable Society Index (SSI) 2010—A Decision Analysis Approach. *Sustain. Dev.* **2017**, *25*, 322–335. [CrossRef]
11. Xu, S. Theoretical Contribution of the Scientific Outlook on Development in the Context of Epidemic. *Open Access Libr. J.* **2021**, *8*, 1–16. [CrossRef]
12. Lin, Y.; Yang, Y.; Li, P.; Feng, C.; Ding, J.; Zhou, J.; Jiang, Q.; Ye, G. Spatial-temporal evaluation of marine ecological civilization of Zhejiang Province, China. *Mar. Policy* **2022**, *135*, 104835. [CrossRef]
13. Zhu, B.; Jiang, M.; Wang, K.; Chevallier, J.; Wang, P.; Wei, Y. On the road to China's 2020 carbon intensity target from the perspective of "double control". *Energy Policy* **2018**, *119*, 377–387. [CrossRef]
14. Li, S.; Liu, J.; Hu, X. A three-dimensional evaluation model for green development: Evidence from Chinese provinces along the belt and road. Environment. *Environ. Dev. Sustain.* **2022**, 1–25. [CrossRef] [PubMed]
15. Huang, X.; Cai, B.; Li, Y. Evaluation Index System and Measurement of High-quality Development in China. *Rev. Cercet. Interv. Soc.* **2020**, *68*, 163–178. [CrossRef]
16. Wu, S.; Fu, Y.; Shen, H.; Liu, F. Using ranked weights and Shannon entropy to modify regional sustainable society index. *Sustain. Cities Soc.* **2018**, *41*, 443–448. [CrossRef]
17. Torkayesh, A.E.; Ecer, F.; Pamucar, D.; Karamaşa, Ç. Comparative Assessment of Social Sustainability Performance: Integrated Data-Driven Weighting System and CoCoSo Model. *Sustain. Cities Soc.* **2021**, *71*, 102975. [CrossRef]
18. Rajesh, K.S.; Murty, H.R.; Gupta, S.K.; Dikshit, A.K. An overview of sustainability assessment methodologies. *Ecol. Indic.* **2009**, *9*, 189–212. [CrossRef]
19. Wang, X.; Wang, Y.; Gao, P.; Song, C.; Cheng, C.; Shen, S. Review and prospect of "Sustainable Society Index". *Adv. Earth Sci.* **2021**, *36*, 317–324. [CrossRef]
20. Witulski, N.; Dias, G.J. The Sustainable Society Index: Its reliability and validity. *Ecol Indic.* **2020**, *114*, 106190. [CrossRef]
21. Schlossarek, M.; Syrovátka, M.; Vencálek, O. The Importance of Variables in Composite Indices: A Contribution to the Methodology and Application to Development Indices. *Soc. Indic. Res.* **2019**, *145*, 1125–1160. [CrossRef]
22. Smith, L.M.; Case, J.L.; Smith, H.M.; Harwell, L.C.; Summers, J.K. Relating ecoystem services to domains of human well-being: Foundation for a U.S. index. *Ecol. Indic.* **2013**, *28*, 79–90. [CrossRef]
23. Mapar, M.; Jafari, M.J.; Mansouri, N.; Arjmandi, R.; Azizinezhad, R.; Tomás, B.R. A composite index for sustainability assessment of health, safety and environmental performance in municipalities of megacities. *Sustain. Cities Soc.* **2020**, *60*, 102164. [CrossRef]
24. Beck, U. *Risk Society: Towards a New Modernity*; Sage Publications: London, UK, 1992.
25. Yurii, K.; Aleksy, K.; Olena, G.; Henryk, D. Social Safety of Society for Developing Countries to Meet Sustainable Development Standards: Indicators, Level, Strategic Benchmarks (with Calculations Based on the Case Study of Ukraine). *Sustainability* **2020**, *12*, 8953. [CrossRef]
26. Henrik, H.; Alexander, C. A framework for evaluating societal safety interventions. *Safety Sci.* **2021**, *142*, 105393. [CrossRef]
27. Høyland, S.K. Exploring and modeling the societal safety and societal security concepts—A systematic review, empirical study and key implications. *Safety Sci.* **2017**, *110*, 7–22. [CrossRef]
28. Olsen, O.E.; Kruke, B.I.; Hovden, J. Societal Safety: Concept, Borders and Dilemmas. *J. Contingencies Crisis Manag.* **2007**, *15*, 69–79. [CrossRef]

29. Dalevska, N.; Khobta, V.; Kwilinski, A.; Kravchenko, S. A model for estimating social and economic indicators of sustainable development. *Entrep. Sustain. Issues* **2019**, *6*, 1839–1860. [CrossRef]
30. Aleksy, K.; Volodymyr, T.; Aleksandra, K. Transparent cognitive technologies to ensure sustainable society development. *J. Secur. Sustain. Issues* **2019**, *9*, 561–570. [CrossRef]
31. Padash, A.; Ghatari, A.R. Toward an Innovative Green Strategic Formulation Methodology: Empowerment of Corporate Social, Health, Safety and Environment. *J. Clean. Prod.* **2020**, *261*, 121075. [CrossRef]
32. Liu, X.; Zhao, W.; Liu, Y.; Hua, T.; Hu, X.; Cherubini, F. Contributions of ecological programs to sustainable development goals in Linzhi, over the Tibetan Plateau: A mental map perspective. *Ecol. Eng.* **2020**, *176*, 106532. [CrossRef]
33. Shao, C.; Chen, S.; Gao, J.; He, Y.; Zhou, H. Design of China's sustainable development evaluation index system based on the SDGs. *China Popul. Resour. Environ.* **2021**, *31*, 1–12. [CrossRef]
34. Jia, H.; Shan, L.; Luo, S. Comprehensive Evaluation of Ecological Civilization in Qinghai Province Based on Entropy Method and Coupling Coordination Degree Model. *Ecol. Econ.* **2020**, *36*, 215–220.
35. Hua, T.; Zhao, W.; Francesco, C.; Hu, X.; Paulo, P. Sensitivity and future exposure of ecosystem services to climate change on the Tibetan Plateau of China. *Landsc. Ecol.* **2021**, *36*, 3451–3471. [CrossRef]
36. Teng, H.; Liang, Z.; Chen, S.; Liu, Y.; Chappell, A.; Yu, W.; Shi, Z. Current and future assessments of soil erosion by water on the Tibetan Plateau based on RUSLE and CMIP5 climate models. *Sci. Total Environ.* **2018**, *635*, 673–686. [CrossRef]
37. Zhu, J.; Sun, X.; He, Z. Research on China's sustainable development evaluation indicators in the framework of SDGs. *China Popul. Resour. Environ.* **2018**, *12*, 8–9. [CrossRef]
38. Du, X.; Meng, Y.; Fang, C.; Li, C. Spatio-temporal characteristics of coupling coordination development between urbanization and eco-environment in Shandong Peninsula urban agglomeration. *Acta Ecol. Sin.* **2020**, *40*, 5546–5559. [CrossRef]
39. Chu, Y.; Fu, J.; Chen, H. Temporal and Spatial Evolution of the Coupling Coordination of the High-Quality Development of Regional ecological environment and Economy: Taking Henan Province for Example. *Ecol. Econ.* **2020**, *38*, 161–168.
40. Su, Y.; Li, J.; Wang, D.; Yue, J.; Yan, X. Spatio-Temporal Synergy between Urban Built-Up Areas and Poverty Transformation in Tibet. *Sustainability* **2022**, *14*, 8773. [CrossRef]
41. Ye, X.; Sun, J. Research on Coordination Measurement of Equity, Economic Efficiency and Social Stability. *Economist* **2015**, *5*, 5–15. [CrossRef]
42. Yang, Z. Research on the Index System and Evaluation Index System of Social Stability in the Transitional Period. *Law Rev.* **2014**, *3*, 138–145. [CrossRef]
43. Chen, X.; Zhou, H.; Wang, X. The County Environment-Economy-Society Based on Ecological Civilization Research on Coupling Vulnerability and Coordination: Take Qiqihar City, Heilongjiang Province as an example. *Hum. Geogr.* **2018**, *33*, 94–101. [CrossRef]
44. Zhao, J.; Liu, Y.; Zhu, Y.; Qin, S.; Wang, Y.; Miao, C. Spatiotemporal differentiation and influencing factors of the coupling and coordinated development of new urbanization and ecological environment in the Yellow River Basin. *Resour. Sci.* **2020**, *42*, 159–171. [CrossRef]
45. Gao, X.; Wang, B.; Sun, D. Do railways improve territorial cohesion of the Tibetan Plateau? A case study of the Qinghai-Tibet Railway. *Appl. Geogr.* **2022**, *144*, 102720. [CrossRef]
46. Feng, Y.; Li, G. Interaction between urbanization and eco-environment in Tibetan Plateau. *Acta Geogr. Sin.* **2020**, *75*, 1386–1405. [CrossRef]
47. Yang, L.; Guo, Y.; Liu, J. Using Entropy Weight Method to Assess Transit Satisfaction: A Focus on Older Adults. *China City Plan. Rev.* **2021**, *30*, 64–73.
48. Wang, S.; Kong, W.; Ren, L.; Zhi, D.; Dai, P. Research on misuses and modification of coupling coordination degree model in China. *J. Nat. Resour.* **2021**, *36*, 793–810. [CrossRef]
49. Wang, C.; Yang, Q.; Wu, S. Coordinated Development Relationship between Port Cluster and Its Hinterland Economic System Based on Improved Coupling Coordination Degree Model: Empirical Study from China's Port Integration. *Sustainability* **2022**, *14*, 4963. [CrossRef]
50. Madhi, M.; Mohamed, N.; Mahomed, F.M. An Initial Condition Optimization Approach for Improving the Prediction Precision of a GM(1,1) Model. *Math. Comput. Appl.* **2017**, *22*, 21. [CrossRef]
51. Wang, K.; Han, M.; Lu, R. Prediction of Special Education Scale Based on Grew GM(1.1) Model. *Math. Pract. Theory* **2018**, *48*, 250–257.
52. Han, C.; Zhao, K.; Zhang, X. Study on Weight Assignment of Social Security Risk Assessment Indicators in the Urbanization Process. *J. People's Public Secur. Univ. China* **2019**, *3*, 133–145.
53. Xie, G.; Zhu, J. Theoretical Construction of China's Non-Traditional Frontier Security Governance System and Modernization of Its Capacity-A Discussion from the Perspective of General Frontier Security and National Security. *Thinking* **2021**, *47*, 52–66.