

## Difference Analysis on Ecological Civilization Construction in Reclamation Area

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**Abstract.** In order to scientifically evaluate the ecological civilization construction situations in reclamation area, this paper builds a frame system covering three links of pressure – status – response and containing 21 indexes on the basis of PSR model. Meanwhile, an empirical analysis is made for the ecological civilization construction situations and coordination degree in 14 divisions of Xinjiang Corps in 2013. The evaluation results present the following conclusions. (1) Ecological civilization construction presents regional difference in Xinjiang Corps and ecological civilization construction is a progressive course from north Xinjiang to south Xinjiang. The coordination degree of ecological civilization construction in north Xinjiang is higher than that in south Xinjiang, which almost reflects the regional situations of ecological civilization construction in Xinjiang Corps. According to various subsystems, the ecological system pressure in south Xinjiang is smaller than that in north Xinjiang, the health status of ecological system in north Xinjiang is better than that in south Xinjiang, and the management level of ecological environment in north Xinjiang is higher than that in south Xinjiang. (2) North Xinjiang is the population and economic center of Xinjiang Corps and it bears the main area of social & economic construction and resident gathering. Therefore, a great effort should be made to realize a healthy ecological system and enhance resource and energy utilization efficiency in north Xinjiang. At the same time, the ecological environment must be protected and ecological civilization system construction should be strengthened. South Xinjiang should aim to protect the vulnerable ecological environment, preserve its original ecological environment, and improve its resource and energy utilization efficiency and environmental pollution control ability.

### Introduction

Scientific constitution for an index system of evaluating ecological civilization construction is an important method to weigh and appraise ecological civilization construction[1]. Development of ecological civilization was mentioned at the 17th CPC National Congress for the first time, and ecological civilization construction was brought into “five-in-one” layout at the 18th CPC National Congress. This has fully reflected the aspiration and determination of CPC to enhance ecological civilization construction and socialist modernization.

Under this general background, domestic scholars have made many referable achievements in studies on ecological civilization construction, especially studies on evaluation index system. Domestic scholars have proposed multiple ecological civilization evaluation index systems covering province, region and city, and carried out a series of empirical researches. GUAN Yanzhu, ZHENG Jianhua and ZHUANG Shijian[2] (2007), DU Yu and LIU Junchang[3] (2009), et al. established an interactive relationship between man and nature and made an empirical analysis for the accessibility of ecological civilization construction indexes. YAN Yezhou and CHENG Jinhua [4] (2013), DIAO Shangdong and LIU Yunzhong[5] (2013), et al. analyzed the ecological civilization construction index system in Guangzhou City via index model. Besides, ZHANG Chuanhui, ZHAO 1

Jinling, HAN Wei[6-8] (2007, 2008, 2014), et al. discussed some ideas about ecological civilization from Marxist natural view, Chinese traditional natural view, and Xi Jinping's thought. The common research methods include entropy evaluation method, principal component analysis method, and comprehensive evaluation method. Western countries entered the industrialization period at an early time, so most overseas scholars mainly make studies from the aspect of environmental sustainability. Their studies can provide a good reference for this paper.

As a special region, Xinjiang Corps possesses a special geographical position and bears multiple functions. As a result, Xinjiang Corps needs a sustainable plan in transformation of agricultural development mode, adjustment of industrial structure, and sustainable development and utilization of resources, so as to effectively promote ecological civilization construction. Therefore, scientific evaluation of ecological civilization construction is beneficial to comprehensive construction of a well-off society in Xinjiang Corps. Moreover, it can point out the direction of modern ecological construction for agriculture more clearly, and realize good and sustainable development of social economy and environment[11].

### **Construction of ecological civilization evaluation index system under the perspective of ecological system**

**PSR model.** PSR (pressure – status – response) model is one of the models that can evaluate resource utilization and sustainable development. This model is based on causal relationship, and the three links of pressure – status – response will influence and restrict each other; it reflects the whole process of decision-making and countermeasure development. According to “pressure – status – response” model frame, we construct a regional ecological civilization construction evaluation index system composed of three subsystems (ecological system pressure, health status and ecological environment management level) including 21 indexes under the perspective of ecological system as per the comprehensive, typical and quantitative operation principle on the basis of PSR frame model (see Table 1).

Table 1 PSR model under the framework of evaluation index system of Xinjiang production and construction of ecological civilization

Element layer	Index layer	Statistical pattern	Index attribute	Index explanation
Ecological system pressure X1 (Pressure)	Natural population growth rate (%) X1	Added value of population / gross population of last year	Constraint index	Population pressure
	GDP per capita (Yuan) X2	Statistical index	Incentive index	Economic pressure
	Comprehensive energy consumption (ten thousand tons, standard coal) X3	Statistical index	Constraint index	Resource and environment pressure
	Pesticide usage amount X4	Statistical index	Constraint index	Land bearing capacity pressure
	Agriculture plastic film usage amount X5	Statistical index	Constraint index	
	Agricultural fertilizer consumption (pure amount) X6	Statistical index	Constraint index	
Ecological system health status X2 (status)	Energy consumption of production valve (ton, standard coal) X7	Total energy consumption of enterprises / total industrial output value of enterprises	Constraint index	
	Industrial added value rate (%) X8	Industrial added value (current price) / total industrial output (current price) × 100%	Incentive index	
	Net income of farmer (Yuan) X9	Statistical index	Incentive index	
	Total industrial output value (100 million Yuan) X10	Statistical index	Incentive index	
	Afforestation fee of state-owned and state-holding enterprises X11	Statistical index	Incentive index	Ecosystem conservation situation
	Water-saving irrigation machinery (set) X12	Statistical index	Incentive index	
	Wood felling quantity (hectare) X13	Statistical index	Constraint index	
	Reservoir capacity (10,000 m <sup>3</sup> ) X14	Statistical index	Incentive index	
	Death rate (%) X15	Statistical index	Constraint index	Health status of residents
Ecological environment management level X3 (response)	Proportion of R&D expenditure in GDP (%) X16	Statistical index	Incentive index	Economic strengthening
	Recycling rate of industrial water (%) X17	Statistical index	Incentive index	Pollution control ability
	High-tech water-saving irrigation area (10,000 Mu) X18	Statistical index	Incentive index	
	Afforestation area on barren mountains and wastelands (hectare) X19	Statistical index	Incentive index	
	Profit rate of industrial costs and expenses (%) X20	Statistical index	Incentive index	
	Broadcasting program comprehensive population coverage rate (%) X21	Statistical index	Incentive index	

## Empirical evaluation results

**Data source and index statistics.** this paper, 13 sample divisions (except the 11th division, Construction Industry Division) of Xinjiang Corps are selected as evaluation samples of this study. Data of this paper all originate from Statistical Yearbook 2014 of Xinjiang Corps, Environmental Statistical Yearbook 2014 of Xinjiang Corps, Statistical Bulletin 2013 of Xinjiang Corps, and official data issued by various divisions. In this paper, correlation analysis is conducted at first, and 11 indexes with relatively great correlation coefficients are selected from the 21 indexes and introduced into PSR model for analysis.

**Weight determination.** setting 13 divisions of Xinjiang Corps as samples, standardization treatment is conducted for the index data, and dimension reducing processing and empowerment are carried out via principal component analysis method. Thus comprehensive weights of various indexes are obtained; after normalization, the normalized weights are gained (Table 3).

Table 3 Principal components load matrix and weight

Component	First principal component	Second principal component	Third principal component	Weight after normalization
Comprehensive energy consumption	0.895	0.356	-0.145	0.1123
Agriculture plastic film usage amount	0.528	0.837	0.044	0.1041
Agricultural fertilizer consumption (pure amount)	0.194	0.883	0.212	0.0762
Afforestation fee of state-owned and state-holding enterprises	0.855	0.382	0.073	0.1184
Profit rate of industrial costs and expenses	-0.232	-0.202	0.87	0.0004
Water-saving irrigation machinery	0.281	0.291	0.764	0.0787
Total industrial output value	0.859	0.375	-0.02	0.1145
Proportion of RD expenditure in GDP	0.899	0.313	0.039	0.1183
Industrial water	0.944	0.206	0.048	0.1182
Afforestation area on barren mountains and wastelands	0.263	0.568	-0.167	0.0516
High-tech water-saving irrigation area	0.623	0.753	-0.026	0.1074

**Analysis on comprehensive scores and evaluation results.** e evaluation values of index layer, system layer and objective layer are calculated according to weight coefficients and standardized evaluation values of indexes at various index layers. Meanwhile, the results are converted into centesimal system, and scores of ecological civilization construction in Xinjiang Corps are gained, as shown in Table 4.

Table 4 Evaluation results

Divisions	Pressure		Status		Response		Comprehensive evaluation			Coordination degree		
	Evaluation value	Centesimal system	Evaluation value	Centesimal system	Rank	Evaluation value	Centesimal system	Evaluation value	Centesimal system	Rank	Evaluation value	Rank
The 9 <sup>th</sup> division	-0.2247	56.43	-0.0749	53.35	8	-0.1337	43.62	-0.4333	52.87	13	1.0564	1
The 2 <sup>nd</sup> division	-0.1401	57.78	0.0049	60.43	6	0.1225	75.01	-0.0127	59.79	5	0.9656	2
The 7 <sup>th</sup> division	-0.2552	55.95	0.0759	66.74	4	-0.1085	46.70	-0.2879	55.26	8	0.3533	3
The 10 <sup>th</sup> division	-0.0834	58.68	-0.0805	52.85	10	0.1928	83.62	0.0289	60.48	4	0.1284	4
The 3 <sup>rd</sup> division	-0.5472	51.32	0.1532	73.61	2	0.0051	60.62	-0.3889	53.60	12	-0.0682	5
The 1 <sup>st</sup> division	-0.6336	49.95	0.2926	85.99	1	0.0321	63.93	-0.3089	54.92	9	-0.4421	6
The 8 <sup>th</sup> division	1.8874	89.95	0.0966	68.58	3	0.0124	61.52	1.9964	92.87	1	-0.6844	7
The 5 <sup>th</sup> division	-0.2287	56.37	-0.0182	58.39	7	-0.0049	59.40	-0.2518	55.85	7	-1.0012	8
The 6 <sup>th</sup> division	0.4727	67.50	0.0749	66.65	5	-0.0792	50.30	0.4684	67.71	2	-1.0973	9
The 13 <sup>th</sup> division	-0.0326	59.48	-0.1446	47.16	12	0.0053	60.65	-0.1719	57.17	6	-1.1592	10
The 14 <sup>th</sup> division	-0.1980	56.86	-0.1577	45.99	13	-0.0020	59.76	-0.3577	54.11	11	-1.4130	11
The 4 <sup>th</sup> division	0.0907	61.44	-0.0804	52.86	9	0.0345	64.22	0.0448	60.74	3	-1.5930	12
The 12 <sup>th</sup> division	-0.1071	58.30	-0.1419	47.39	11	-0.0763	50.66	-0.3253	54.64	10	-1.6814	13

## Conclusions and suggestions

**Conclusions.** Firstly, regional difference is presented in pressure, status and response of ecological civilization construction in Xinjiang Corps. Ecological civilization construction in Xinjiang Corps is a progressive course from north Xinjiang to south Xinjiang. The coordination degree of ecological civilization construction in north Xinjiang is higher than that in south Xinjiang, which almost reflects the regional situations of ecological civilization construction in Xinjiang Corps. According to various subsystems, the ecological system pressure in south Xinjiang is smaller than that in north Xinjiang, the health status of ecological system in north Xinjiang is better than that in south Xinjiang, and the management level of ecological environment in north Xinjiang is higher than that in south Xinjiang. These conclusions are almost consistent with the practical situations.

Secondly, North Xinjiang is the population and economic center of Xinjiang Corps and it bears the main area of social & economic construction and resident gathering. Therefore, a great effort should be made to realize a healthy ecological system and enhance resource and energy utilization efficiency in north Xinjiang. At the same time, the ecological environment must be protected and ecological civilization system construction should be strengthened. South Xinjiang should aim to protect the vulnerable ecological environment, preserve its original ecological environment, and improve its resource and energy utilization efficiency and environmental pollution control ability.

**Suggestions.** Firstly, various divisions should set up target values according to their practical conditions and build assessment criteria that meet their practical situations, so as to reduce energy

consumption of total output value, increase resource utilization efficiency and resource output efficiency, and take the “low-consumption, efficient and intensive” road of new modern agriculture.

Secondly, divisions with healthy ecological systems should maintain their ecological dominance and develop clean energy economy at a proper time. Meanwhile, “three-high and one-low” industry should be prevented in ecologically vulnerable areas, and common people’s ecological protection awareness must be enhanced. Thirdly, in regions with weak management and control ability, the pollutant emission reduction force should be increased, outdated capacity must be eliminated, repair for agricultural non-point source pollution and high consumption of water resource should be strengthened, and supervision strength of the government must be intensified.

In conclusion, ecological civilization construction in various divisions of Xinjiang Corps should not only pay attention to social and economic development pressure, land bearing capacity pressure, and resource consumption pressure, but also comprehensively consider ecological health, high-quality economic development, pollution regulation, and environmental protection ability.

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