

# Analysis of Land Cover Change in the Wind-Sand-Grass Beach Area in the Northwest of Yulin City in the Past 40 Years

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## Abstract

Based on the land cover remote sensing monitoring data of the three phases of Yulin City in 1980, 2000 and 2020, the land cover status index is used to explore the land cover status of the Wind-Sand-Grass beach area in the northwest of Yulin City. The results show that the average value of the cover index in Yulin City in 1980, 2000, and 2020 is 47.65, 50.98, and 51.11, respectively, which belong to the third level. The land cover index in the northwest Wind-Sand-Grass beach area of Yulin City maintains a continuous upward trend, and its change trend is affected by Natural factors and social factors influence together, among which ecological policies and urbanization development dominate.

## Keywords

Yulin City; Remote Sensing; Land Cover Status Index; Change Trend; Wind-Sand-Grass Beach Area.

## 1. Introduction

Yulin City is located at the northern end of Shaanxi Province and the west bank of the middle reaches of the Yellow River. The northern part belongs to the sandy grassland area of the Mu Us Sandy Land, accounting for 42% of the area of Yulin City, and the southern part belongs to the loess hilly and gully area, accounting for 58% of the total area [1,2]. The terrain of this area is high in the northwest and low in the southeast. The climate is characterized by hot and rainy summers, cold and dry winters, with an average annual temperature of 7~13 °C, an average annual precipitation of about 400 mm, and obvious seasonal differences [1]. It is one of the most severe areas of desertification and soil erosion, with typical climate characteristics of the semi-arid region in the northwest. In recent years, with the protection of the ecological environment of the Mu Us sandy land and the management of sandstorms in China, Yulin City has implemented ecological projects such as returning farmland to forests and grasslands, which has caused major changes in land cover in the sandy grassland area in the northwest of Yulin City, and the ecological environment has been effective. Recovery, but the stability is still poor [3,4]. Therefore, this study takes the Wind-Sand-Grass beach area in the northwest of Yulin City as the research area, based on the land use remote sensing data in the past 40 years, uses the land cover status index to grasp the land cover status of the Wind-Sand-Grass beach area in the northwest of Yulin City as a whole, and explore its driving force. Factors, aiming to provide

theoretical support for the ecological environment protection of the study area and the sustainable development of regional ecological economy.

## 2. Data Sources and Research Methods

### 2.1. Data Source

The land cover remote sensing monitoring data is provided by the Resource and Environmental Science Data Center of the Chinese Academy of Sciences (<http://www.resdc.cn>), with a spatial resolution of 1 km [5]. Land use types include 6 primary types and 25 secondary types of cultivated land, forest land, grassland, water area, residential land, and unused land. This study selects the data of 1980, 2000, and 2020 phase 3 to study the land cover status of the study area in the past 40 years. Through mosaic and mask extraction of remote sensing monitoring data of land use types, the spatial distribution data of land use types in Yulin City in 1980, 2000 and 2020 are obtained, and the projection transformation is completed. The unified projection is WGS84, and the storage type is TIF format.

### 2.2. Coverage Condition Index

Cover status index is a designated quantity to describe the status of regional land cover change, and it is often used in the study of regional land use type changes [6]. It is defined as the percentage of the total area of forest land, shrubs, grasslands, water bodies, wetlands and other good land cover types in the total area of the study area. The calculation method is shown in the formula:

$$Z = (\sum_i^n S_i / S) * 100\% \quad (1)$$

In the formula, Z represents the land cover status index,  $S_i$  represents the area of good land cover types such as woodland, grassland, shrubs, water bodies, and wetlands, and S represents the total area of the calculated study area. The land cover status is divided into 5 grades according to class: index 80-100 is grade 1; 61-80 is grade 2; 41-60 is grade 3; 21-40 is grade 4; 1-20 is grade 5. The closer the land cover status index is to 100, the better the land cover status [7].

## 3. Results and Analysis

The coverage status index was used to evaluate the land cover status of the Wind-Sand-Grass beach area in the northwest of Yulin City. The results are shown in Table 1. The average value of the cover status index in Yulin City in 1980, 2000, and 2020 were 47.65, 50.98 and 51.11, respectively, which belonged to the third level. The index of land cover conditions continues to increase. Among them, Fugu County was the area with better cover conditions in 1980, and Yuyang District and Hengshan County were ranked 4 in the area. In 2020, three districts and counties will change their coverage index levels. Among them, Yuyang District and Hengshan District have been upgraded from Level 4 to Level 3, Shenmu County has been upgraded from Level 3 to Level 2, and the uncovered status index level in the study area is 4. In general, in the past 40 years, the coverage index of the sandy grassland area in the northwest of Yulin City has maintained a continuous upward trend, indicating that the vegetation coverage area in the study area has gradually increased during the 40 years, and affirming the contribution of the Yulin City Government and people to the ecological and environmental protection.

**Table 1.** Land cover index of the blown-sand area in the northwest of Yulin City in 1980, 2000, and 2020

Administrative District	1980		2000		2020	
	Coverage Condition Index	Grade	Coverage Condition Index	Grade	Coverage Condition Index	Grade
Yuyang	38.15	4	44.15	3	46.80	3
Hengshan	39.31	4	40.69	3	42.60	3
Jingbian	48.85	3	51.11	3	49.70	3
Dingbian	47.24	3	47.37	3	44.92	3
Fugu	65.38	2	65.60	2	63.28	2
Shenmu	53.38	3	60.28	2	61.44	2
Comprehensive	47.65	3	50.98	3	51.11	3

The change of land cover status is the result of the combined effect of multiple driving forces. In addition to the impact of climate conditions on land use types, human activity production and national policies are another driving force for land cover changes [7]. Under the background of global temperature warming and no significant increase in rainfall, the land cover index of the sandy grassland area in the northwest of Yulin City has continued to rise. The main reasons are analyzed. The change direction of the land cover has been changed, and the ecological environment quality of the Wind-Sand-Grass beach area in the northwest of Yulin City has been significantly improved. In summary, social factors such as the implementation of ecological policies and human activities are the main factors for the changes in land cover in the study area.

#### 4. Conclusion

The average value of the coverage index in Yulin City in 1980, 2000 and 2020 were 47.65, 50.98 and 51.11 respectively, all of which belonged to the third level. Among them, the area with better coverage in 1980 was Fugu County with a level of 2; in 2020 There are 3 districts and counties that have changed their coverage status index levels. Among them, Yuyang District and Hengshan District have been upgraded from level 4 to level 3, Shenmu County has been upgraded from level 3 to level 2, and there is no coverage status index level 4 in the study area. In the past 40 years, the coverage index of Yulin City has maintained a continuous upward trend, indicating the gradual increase in land coverage in the study area in the past 40 years, and affirming the contribution of the Yulin Municipal Government and people to ecological and environmental protection.

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