RSEI = f(G,W,T,D)

Remote Sensing Monitoring and Evaluation of Ecological Environment of Guangyuan City in the Mountain-Basin Transition Zone

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ABSTRACT

Limited research have been addressed on ecological monitoring in the transition zone between mountainous and basin areas, and relying on single factor alone is insufficient to reflect the overall ecological environment of an area. Therefore, in this study, utilizing five periods of Landsat satellite data, the Remote Sensing Ecological Index (RSEI) was used to quantitatively assess the ecological environment quality of Guangyuan City located in the mountain-basin transition zone over the past 22 years.

INTRODUCTION

Remarkable progress has been made in the monitoring of land surface ecological environment quality based on remote sensing. However, due to the complexity of terrain condition and eco-hydrological environments, remote sensing monitoring toward transition zone between mountainous and basin areas is still challenging, especially the insufficient explanatory power of using a single remotely sensed indicator or targeting a single surface variable, and thus an integrated quality assessment is needed to provide a comprehensive assessment of the quality of the entire ecological environment.

OBJECTIVE

- To select proper imagery to calculate the four main RSEI metrics.
- To quantitatively evaluate the state of ecological environment quality over the past 22 years through RSEI.
- To analyze spatial and temporal trends and drivers of ecological environmental quality of the study area.

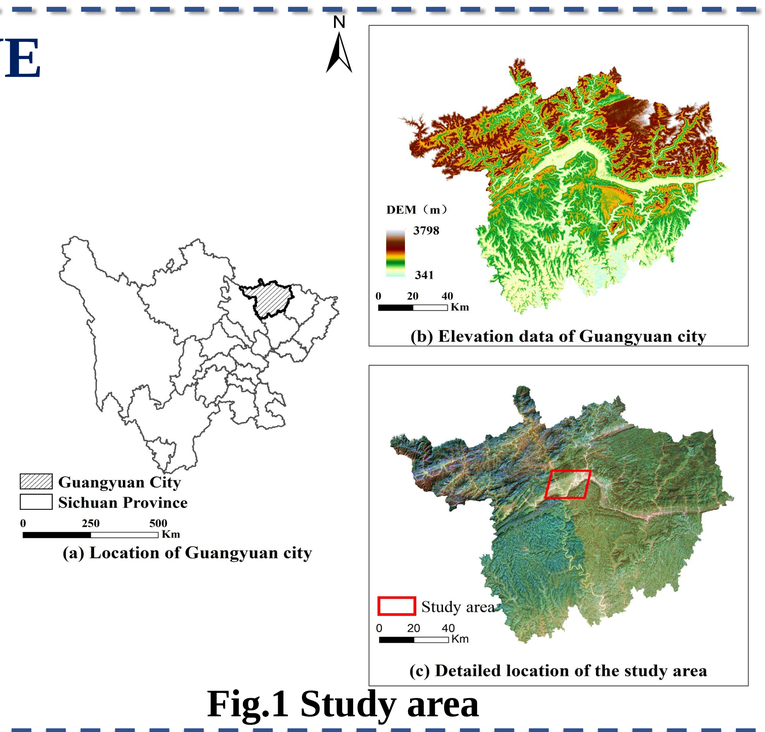

Fig.1 Study area

METHOD

$$RSEI = f(G, W, T, D)$$

- G: $NDVI$
- W: WET
- T: $NDBSI$
- D: LST

RESULTS

Table 1 Cumulative contribution of principal component analysis of each phase

Year	2000	2007	2011	2017	2021
PC1	70.26%	91.88%	79.50%	87.52%	80.09%
PC2	97.35%	98.98%	97.77%	97.28%	95.48%
PC3	99.78%	99.94%	99.90%	99.87%	99.20%
PC4	100.00%	100.00%	100.00%	100.00%	100.00%

Table 2 Single index and RSEI of each phase in the study area

Year	NDVI		WET		NDBSI		LST		RSEI
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	
2000	0.421	0.147	0.652	0.052	0.478	0.131	0.387	0.131	0.603
2007	0.524	0.123	0.749	0.044	0.229	0.061	0.590	0.128	0.821
2011	0.517	0.250	0.912	0.041	0.270	0.098	0.300	0.164	0.548
2017	0.534	0.173	0.904	0.034	0.362	0.088	0.598	0.108	0.565
2021	0.537	0.121	0.652	0.069	0.554	0.100	0.449	0.146	0.595

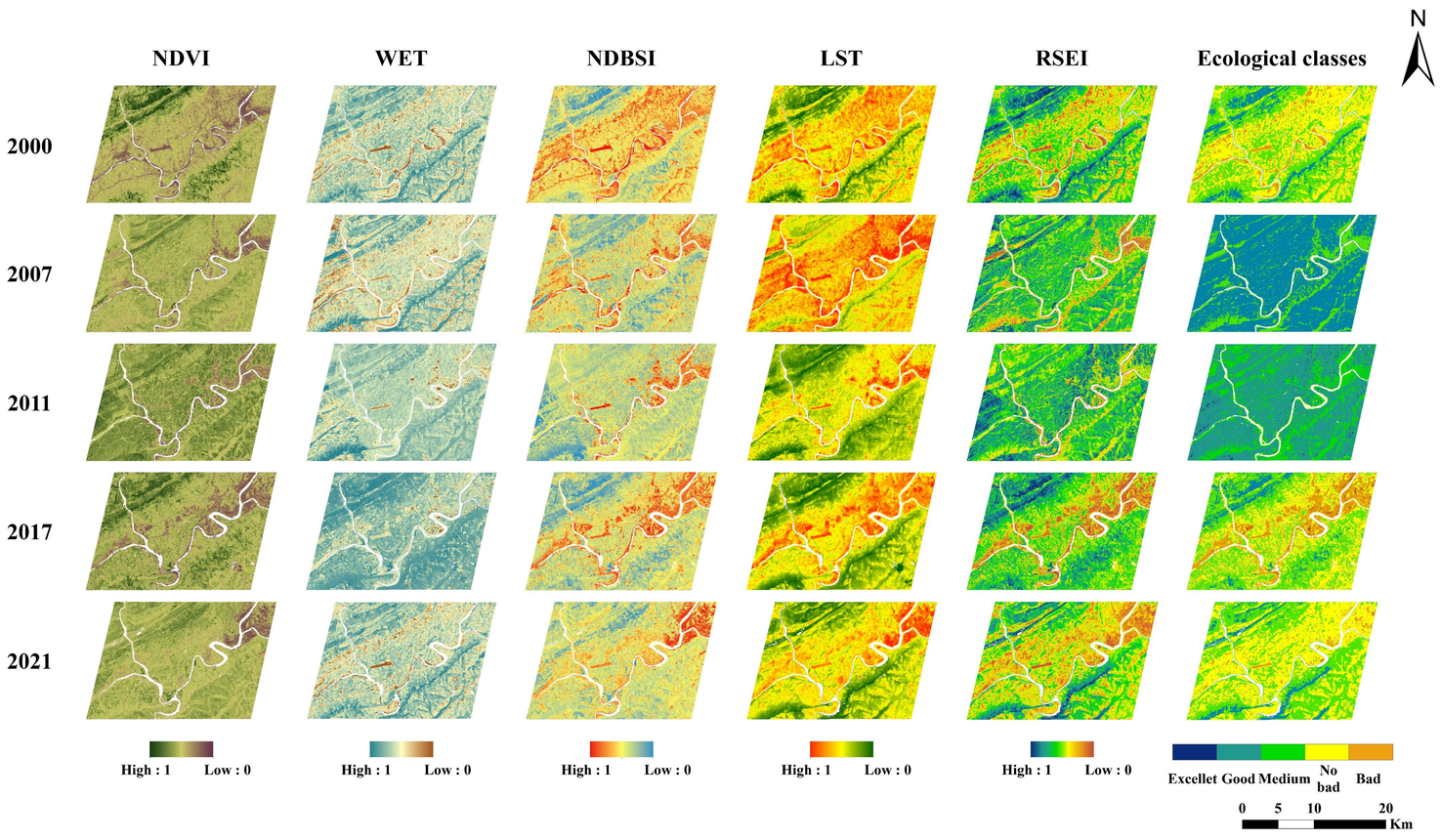

Fig.2 Spatial distribution of indicators and ecological classes in the study area

CONCLUSIONS

- Temporally, the RSEI values in the study area for the years 2000, 2007, 2011, 2017, and 2021 were 0.603, 0.821, 0.548, 0.565, and 0.595, respectively, exhibiting a pattern of increase-decrease-increase, with an overall weak declining trend;
- Spatially, the study area was mainly classified as ‘good’ in 2000, 2011, and 2017; ‘excellent’ in 2007; and ‘moderate’ in 2021.

DISCUSSION

- Multi-temporal comparative analyses reveal ecological changes in the study area.
- The RSEI method is suitable for assessment in this study area.
- The validation method of RSEI and the quantitative measurement of error and uncertainty need to be further explored.

MAJOR REFERENCES

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