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Measuring of Land Use Conflict: A Coastal Tourism Destination Case Study

Chuanbiao Wu[1], Keith H. Mandabach[2]*, Jean L. Hertzman[2]

[1]School of History and Tourism, Liaoning Normal University, Dalian, China
[2]School of Hotel, Restaurant and Tourism Las Cruces, New Mexico State University, New Mexico, USA

Abstract

This paper examines a typical Chinese coastal tourism destination, Lvshunkou District as an empirical example of comprehensive index of land use conflict and possible impacts on China's tourism. This industry is facing a transition from "destination scenic spot tourism" to "holistic tourism" as well as the development of new tourism attractions. China's tourism destinations face a new round of challenges as a result of construction and increased development. Tourism destination renovation/construction measured by the conflict degree of its land use and the evolution of this trend has important significance. This paper examines the spatial external pressure factor, spatial exposure and spatial risk effect value as specific indicators to measure the spatial conflict level, and establishes a mathematical model that measures the effect as a degree of land use conflict. In the past 10 years there have been attempts to stabilize land use through the implementation of comprehensive planning measures but even so the degree of land use conflict is increasing year by year. The areas of "basic out of control" and "serious out of control" are on the rise. This is probably related to dramatic development of tourism attractions.

Keywords: Land use; Measuring land use conflict; Coastal tourism destination

Introduction

At present, China's tourism industry is facing a new development era from "scenic/destination spot tourism" to "holistic tourism". The goal of holistic tourism is to build, operate and manage the whole region as function-integrity tourism destination, so as to break the wall of scenic spots and realize integrational development inside and outside of scenic spots [1]. Holistic tourism is a comprehensive and effective planning approach that attempts to increase tourism satisfaction through effective development throughout the region. This planning technique usually involves a new round of construction and development aimed at increasing tourism by improving tourism infrastructure.

As with most tourism research, this study focuses on tourism destinations as an important and stable stream of tourism research at home and abroad [2,3]. This type of research usually examines the concepts of, the development and management of, and the image and life cycle of tourism destinations as well as the relationship between tourism destinations and residents and tourism destinations market segmentation and location, competitiveness, choice, sustainable development and planning, research methods and case studies [4-8].

This study of land use in tourism destinations follows research of sustainable development and planning of tourism destinations. Lisa Tyrväinen et al. [9] studied the choice of land use in natural tourism destinations in Lapland in northern Finland. The results appear to demonstrate that building density and patterns are very important in maintaining and improving the environmental quality of tourism destinations as this affects the natural experience, and most importantly tourist accommodations. The results emphasize the necessity of careful planning and design in tourism destinations, as well as the goal of eco-efficient land use.

Greg and Christopher [10] examined land use conflict caused by different landscape values and land-use preferences. They posited that it can be used to develop different conflict indices and can be expressed on maps. They propose the identification method of land use conflict potential based on participation mapping. Land resources are indispensable for tourism destination development and play an important role in the construction and development of tourism destinations. Sometimes this can lead to unavoidable potential land conflict of land use during the construction of tourism service facilities.

Lvshunkou District is surrounded by sea on three sides, with beautiful scenery and a pleasant climate. It is well known as a national scenic area, a national ecological demonstration area, a national forest park, military history sites, cultural attractions and a national geological park. Lvshunkou is a very important holistic tourism coastal destination which during the period studied has seen an increase in listed tourism destinations from 12 to 35.

This study utilizes the example of this District to examine land use conflict in a coastal tourism destination. This paper measures land use conflict in Lvshunkou District based on the theory of landscape ecology [11]. The paper attempts to investigate and understand the existing problems and the evolution of trends in land use. It may provide planners an important basis to support a new round of construction of tourism destination infrastructure to contribute to the goal of the holistic tourism development.

The Method of Measuring Land Use Conflict

The model of measuring land use conflict

As a national scenic spot, Lvshunkou District is an important coastal tourist destination, and the quality of the ecological environment has an impact on whether it the region might achieve sustainable development. The change of its ecosystem is caused by the spatial change of its own development and utilization, and the more prominent is the interaction, spatial structure and function evolution of various landscape elements. From the perspective of ecological

***Corresponding author:** Keith H. Mandabach, School of Hotel, Restaurant and Tourism Las Cruces, New Mexico State University, New Mexico, USA, Tel: 575-646-5995; E-mail: kmandaba@nmsu.edu

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sustainable development, if the change of land use spatial pattern to the regional ecosystem function has a less positive (or negative) effect, then it indicates that the interference factors of various spatial resources lead to a decrease in the regional ecological risk, and then the level of spatial conflict is lower [12].

This paper utilizes a conflict index based on ecology to analyse the conflict of land use status of a tourism destination to explain the degree of land use impact on the ecological environmental changes. It is hoped this analysis will provide information for future development and construction. For the analysis, the spatial external pressure factor, spatial exposure and spatial risk effect value were selected as specific indicators to measure the level of land use spatial conflict [13,14], and that the level of spatial conflict = spatial external pressure + spatial exposure + spatial risk effect value, and its mathematical expression equation is as follows:

SC=P+E+S….. (1)

In the formula, P is spatial external pressure, E is spatial exposure, S is spatial risk effect value, and SC is spatial conflict.

Measurement of external pressure factor of spatial unit: The area-weighted brown (AWMPFD) is utilized as an ecological landscape index to express the degree of impact the ecological disturbance of the neighbourhood landscape has on the landscape unit. This measures the size of the unit external pressure factor by measuring the spatial shape complexity of landscape patches allowing calculation of the spatial external pressure (P).

Measurement of spatial unit exposure: The landscape fragility index describes the degree of damage caused to the spatial unit by external influence interference as one analyses the spatial situation of different land types in the study area. This measures the disturbance effect of spatial conflict and competition on the regional ecosystem. It also compares the exposure degree of different spatial types, and calculates the exposure index (E) of different land use spatial types.

Calculation of the value of spatial risk effect: The spatial risk effect value reflects the degree of behaviour interference on a spatial unit by development and utilization. Based on the degree of landscape fragmentation in the ecological landscape index, this measure calculates the trends of the landscape ecological patterns of the complex continuous change structure analysing the heterogeneous and discontinuous patch mosaic as the spatial risk effect index (S) (Table 1).

Classification of land use conflict

Introduction to classification of land use conflict: Spatial conflict comprehensive measure index is the index to evaluate land use conflict, including the area-weighted mean patch fractal dimension index introduced by exterior pressure of spatial unit, the exposure index introduced by spatial unit exposure, and the landscape fragmentation degree introduced by spatial risk effect value [15]. By introducing spatial landscape factors such as spatial unit exposure, external pressure and spatial ecological risk effect, the paper analyses the current situation of land use conflict, calculates the three parameters of tourism destination land unit external pressure, spatial unit exposure, and spatial risk effect value, and finally obtains the comprehensive conflict measure value of spatial units in the study area.

The classification of land use conflict types is based on the comprehensive conflict measure value of each spatial unit in a research area. The distribution of the conflict needs cluster analysis is preliminarily classified and the characteristics of each cluster are analysed. A field survey researches all types of nodes (landscape features), and reasonably merge each cluster; Finally, through comprehensive evaluation the spatial conflict degree is divided into four levels: "serious out of control", "basic out of control", " basic control" and "stable control" [16].

Analysis of different types of land use conflict

- The "stable control" research area: In this area, the spatial external pressure, spatial unit exposure and spatial risk effect value are low, the degree of external disturbance is small, and the ecological stability is strong.
- The "basic control" research area: This area is affected by some external factors, but the degree of influence is limited, the internal overall is relatively stable, and its ecological function is in the controllable and effective range.
- The "basic out of control" research area: This area is affected by external factors relatively large, and great changes are taking place in the whole. If the measures are not taken in time to protect the stability of ecological function, the area might slip into the state of "seriously out of control".
- The "serious out of control" research area: In this area, the external pressure of spatial unit, the spatial unit exposure and the spatial risk effect value of the regional spatial unit are very

Index	Type	Calculation formula	Meaning
Spatial ecological external pressure conflict index	area-weighted mean patch fractal dimension(P=AWMPFD)	$P=\sum_{i=1}^{m}\sum_{j=1}^{n}\left[\frac{2\ln(0.25P_{ij})}{\ln(a_{ij})}\left(\frac{a_{ij}}{A}\right)\right]$ P_{ij} is the patch perimeter, a_{ij} is the patch area, A is thetotal landscape area	The extent of the impact of human activities on the spatial landscape pattern
Spatial unit exposure conflict index	exposure index(E)	$E=\sum_{i=1}^{n}F_i\times\frac{a_i}{S}$ F_i is all kinds of landscape fragility index, a_i is all kinds of landscape area, S is the total area of spatial unit	The degree of difficulty of the spatial unit under the influence of external disturbance
Spatial eco-risk conflict index	Spatial risk effect index)	$S=\frac{n_i}{A}$ A is the original eco-spatial area of a certain period of time in the spatial unit; n_i is the spatial area occupied by ecological function for a certain period of time	The process of landscape ecological pattern changing from the continuous structure to the complex, heterogeneous and discontinuous patch mosaic

Table 1: The ecology of conflict index calculation formula and its meaning.

high; the degree of disturbance is large; the activity is frequent; and the ecosystem is destroyed or in a certain extent of danger.

An empirical Study on the Level of Land use Conflict in Coastal Tourism Destination—take Lvshunkou District as an Example

The overview of Lvshunkou district in China

Lvshunkou District in China has a 5000-year history. In the Han Dynasty the area was part of Tashi County, in the Tang Dynasty it was called "Duli town", and in the Yuan Dynasty it was named "Shizikou". In 1371 during the Ming dynasty, it was renamed "Lvshunkou" which means "everything goes well." In 1880, the Qing government established Beiyang Navy Division there. With assistance from Western governments, they built a military port, forts, docks, and troop quarters. Lvshunkou port, also known by its Western name, Port Arthur was classified as one of the world's five most famous military ports during the late 19th century.

This prominence made the area attractive for conquest by foreign governments. During the Sino-Japanese war of 1894 and the Sino-Russian war of 1904, Lvshunkou was the scene of major conflict. The Russians and to a much larger extent the Japanese committed atrocities against Chinese troops and civilians. After the wars, Lvshunkou known as "Lvshun, "was occupied by Russia for seven years, and by Japan for 40 years. During World War II, on August 22, 1945, the Soviet Red Army entered Lvshunkou and exercised military control until 1955, when it withdrew from Lvshunkou. On November 25, 1945, Lvshunkou city government was established, on February 20, 1960 Lvshunkou merged with Dalian into Lvda city, in 1981 Lvda city was renamed Dalian city, and Lvshunkou became one of its districts.

Lvshunkou District is located at the southern tip of the Liaodong peninsula. South and the southeast portion of the district sits on the Yellow Sea. The Shandong peninsula across the Yellow Sea; the Korean peninsula is adjacent to the Yellow Sea and the on the West and Northwest is the Bohai Sea. Lvshunkou District has a beautiful environment and pleasant climate. Mountains, seas, rivers, lakes, forests, and wetlands reflect each other and create the beautiful world of wonderland. It has national scenic spots, ecological demonstration areas, nature reserves, forest park, and a geological park. The intersection of Yellow Sea and the Bohai Sea is here and the intersection is referred to as "the ends of the earth" in Liaoning.

In 2016 the forest coverage of the region reached 54.5%, and Lvshunkou won the "China habitat environment example prize" and "Liaoning province best habitat environment county district". The total area is 506.8 square kilometers and the coastline is 169.7 kilometers. Lvshunkou District is becoming one of a small number of the coastal tourist destinations in China which h ave five types of transportation available: port, railway, train ferry, highway, and light rail. In 2016, the GDP was RMB 28.4 billion yuan, and the total resident population was 210,000, and the urbanization rate reached 80% [17].

Data sources and processing

The research data include land use change survey data compiled in 2004 and 2016, and land use status maps and remote sensing image data [18]. According to the research content of land use conflict measurement in Lvshunkou District, we need to pre-process the data: (1) land use data extraction and data type merging; (2) constructing research unit.

Data extraction of land use status in research area: According to the scope of the study area, the land use status data in 2004 and 2016 were extracted, and then the land use classification was carried out. The land use map of the study area was obtained in 2004 and 2016, as shown in Figures 1 and 2.

The construction of research unit: To avoid the whole regional space appearing too fragmented, and considering the research scope, scale, space, spatial resolution, patches of data types and the amount of data and other factors, this paper takes the appropriate spatial scale as the spatial unit of conflict measure. In each spatial unit, the researchers calculate the relevant ecological landscape index which can be used to quantitatively evaluate the conflict level of land use status.

The size of the spatial landscape units measure the conflict level of the whole region is a square which is shown in the map (Figure 3) as 1535 standardized squares. The area of each standardized square is 1.44 square meters. Because of the different topography such as in the ocean borders or the land borders where some standardized squares may be

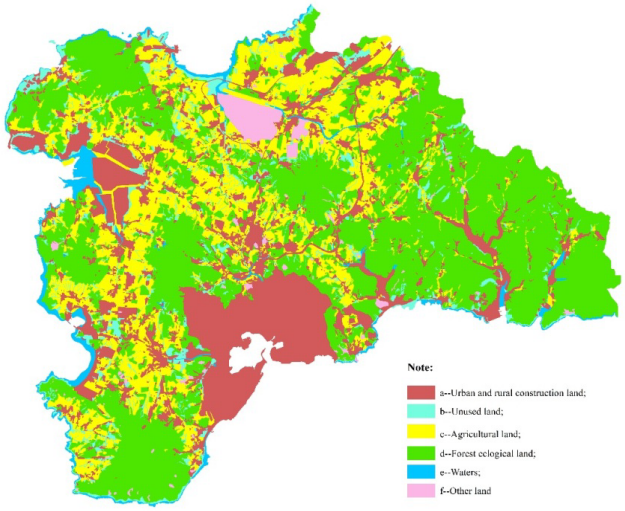

Figure 1: The land use map of the study area in 2004.

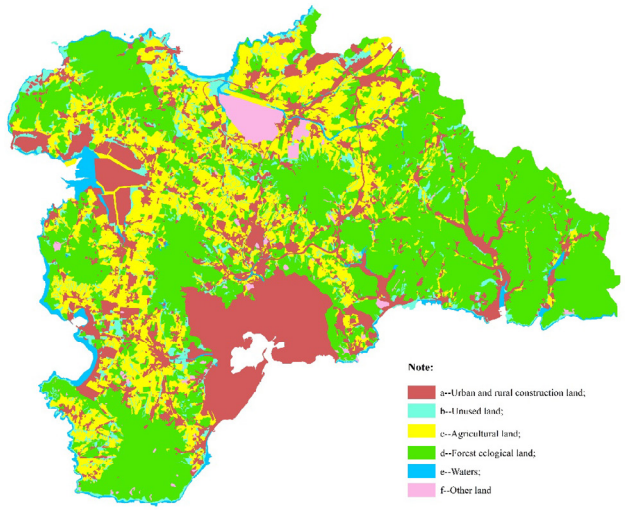

Figure 2: The land use map of the study area in 2016.

less than 1.44 square meters actually, all squares may not be exactly 1.44 square meters but for consistency they will be calculated as a complete grid area of 1.44 square meters. These incidental differences cause very minor differences in calculations which can be ignored. The complete grid map is shown in Figure 3.

Empirical measurement of land use conflicts in Lvshunkou district

Measurement and analysis of land use conflict in Lvshunkou district in 2004:

The calculation of relevant indexes: According to the formula of conflict index in Table 1, we can calculate the index value which is related to the conflict index in Lvshunkou District in 2004, and then on the basis of the landscape ecology model, we can calculate the four types of indexes of 1535 research units; external pressure measure value, exposure measure value, risk effect measure value, and land use spatial conflict comprehensive evaluation value.

The determination of the standard type division: Because each index is divided into four levels: "stable" "basic controllable" "basic out of control" and "serious out of control", and the natural distribution of reference 1535 research units of each index, we obtained division standard system, which contains external pressure measurement, exposure measure, risk effect measure level and comprehensive evaluation value (Table 2). The rating of the level shows as the degree of conflict.

Calculation result: Using the formula of conflict index in Table 1 and the landscape ecological model constructed in this paper, the index of spatial external pressure, spatial exposure, spatial risk effect value and the level of spatial conflict of 1535 research units were calculated. And then, according to the classification criteria in Table 2, we can obtain the level of spatial conflict of 1535 research units in four measurement values, which contains stable control, basic control, basic out of control, and serious out of control. Finally, the scores of the four measures of 1535 research units are input into ArcGIS software, and the software automatically generated the corresponding Figures 4 and 5. ArcGIS software is geographic information system analysis software, which performs spatial analysis.

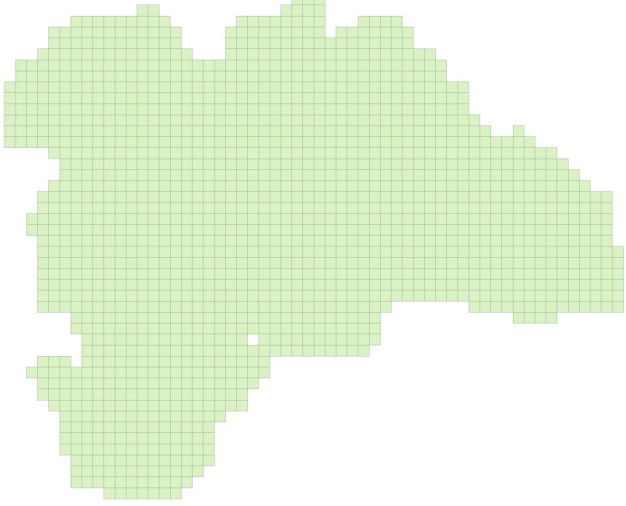

Figure 3: Landscape grid unit of Lvshunkou District.

Rating of control	External pressure	Exposure	Risk effect	Comprehensive
Stable	0.00-0.40	0.00-0.30	0.00-0.30	0.00-0.30
Basic	0.40-0.70	0.30-0.70	0.30-0.70	0.30-0.70
Basic out of	0.70-0.85	0.70-0.85	0.70-0.85	0.70-0.85
Serious out of	0.85-1.00	0.85-1.00	0.85-1.00	0.85-1.00

Table 2: The range of characteristic intervals of each index.

According to the standard of Table 2, the characteristic distribution of each index in the study area was obtained which is shown in Figure 4. In Figure 4, blue dots represent the 12 major tourist attractions in Lvshunkou District in 2004. The comprehensive measurement value of the current situation of spatial utilization in Lvshunkou District in 2004 is 0.5285, which is within the basic control range. The comprehensive measure of the 1535 research units is mainly in stable control range, accounting for 49.84%; exposure and risk measure effect measure mainly concentrated in the basic control range, respectively, 38.31%, 48.27%; external pressure measure concentrated in basic controllable range, accounting for 31.66%. Each unit features conflicting values and their proportion, as shown in Table 3.

Measurement and analysis of land use conflict in Lvshunkou district in 2016:

The calculation of relevant indexes: The calculation method of relevant indexes and use of 1535 research units in 2016 is the same as in 2004. Again the indexes were external pressure measure value, exposure measure value, risk effect measure value, and land use spatial conflict comprehensive evaluation value.

The determination of the standard of type division: Considering the comparability principle, the standard of land use conflict classification in 2016 was consistent with that in 2004. According to the standard of Table 2, the characteristic distribution of each index in the study area is obtained, as shown in Figure 5. In Figure 5, blue dots represent 35 tourist attractions in Lvshunkou District in 2016 which is almost 3 times the attractions documented in 2004. The comprehensive measurement value of the current situation of spatial

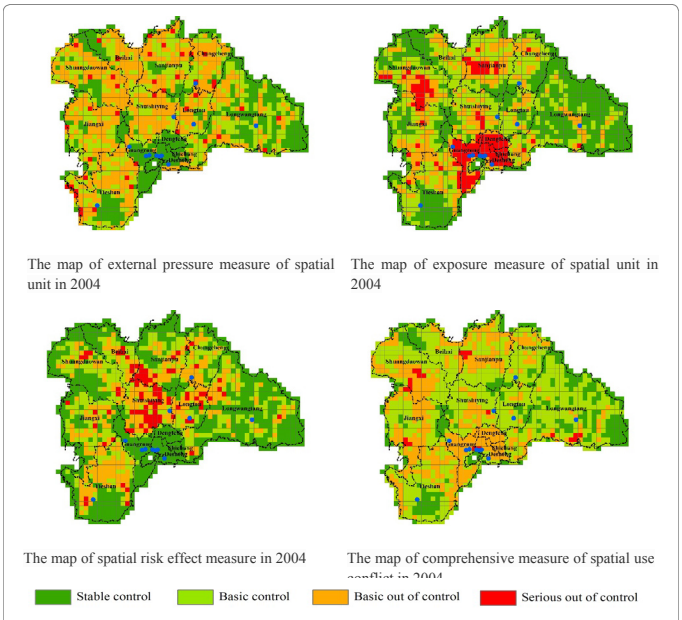

Figure 4: Maps of conflict measure of spatial utilization in the research area in 2004.

utilization in Lvshunkou District in 2016 is 0.5575, which is within the basic control range. A comprehensive measure of 1535 research units is mainly in stable control range, accounting for 52.05%; exposure and risk effect measure mainly concentrated in the basic out of control range, respectively, 36.61%, 47.56%; external spatial pressure measure concentrated in serious out of control range, accounting for 38.24%. Each unit features conflicting values and their proportion, as shown in Table 4.

Conflict analysis of land use status in Lvshunkou district

Analysis of land use conflicts in Lvshunkou district in 2016: In 2016, the comprehensive index of land conflict in Lvshunkou District was 0.5575, relatively high. But it was in the stable control range, with a percentage of 52.05%. The basic control area is relatively small, accounting for 34.33%, distributed in 5 sub districts and 8 villages, which are Dewing Village and Huohouling Village in Shuishiying sub district, Qujia Village and Shantou Village in Shuangdao sub district, Longwangtang Village in Longwangtang sub district, Guojia Village and Zhangjia Village in Tieshan sub district, Shantou Village in Jiangxi sub district. In these areas there are relatively fewer tourist attractions, and tourism facilities are not fully developed.

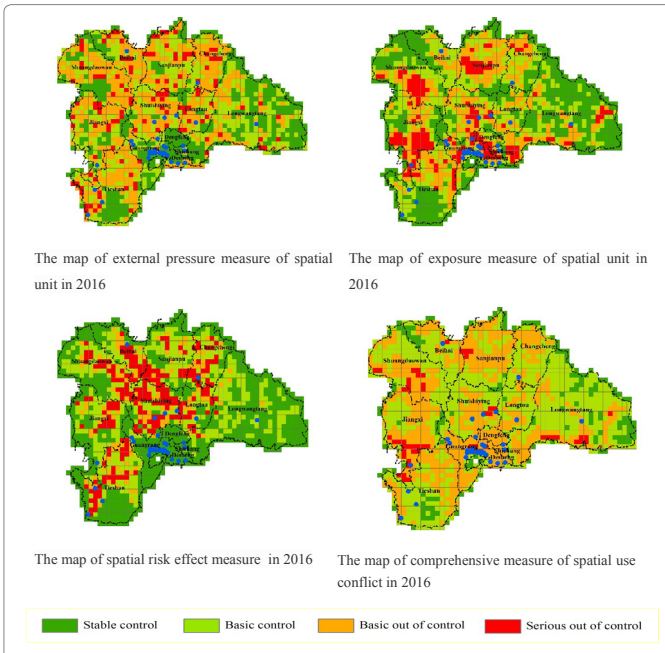

Figure 5: The maps of conflict measure of spatial utilization in the research area in 2016.

The basic out of control areas accounted for 11.53% and are primarily located in 8 Sub districts Dengfeng, Shichang, Guangrong, Desheng, Sanjianpu, Shuishiying, Changcheng, and Tieshan. There are a large number of tourist attractions in these areas and they are listed in Table 5 for 2004 and Table 6 for 2016. The quantity and development intensity of scenic spots of these areas are greater than those of basic control areas. Therefore, it appears development and construction of a large number of tourist attractions is a major factor in the increase of land use conflict. Another factor contributing and explaining the increase in land use conflict not impacted by tourism has been the dramatic increase in industrial park construction and construction related to agricultural modernization.

The serious out of control areas accounted for 2.08%, are mainly located in the south of Jiangxi Sub district, Guangrong Village in Guangrong Sub district, Shengli Village in Shengli Sub district, Sanbali Village in Shuishiying Sub district as shown in Figure 5. This is the tourist attraction concentrated area of Lvshunkou District. The tourism facilities are excellent, and the intensity of land use and development is relatively high.

From the degree of land use conflict and its distribution area, the degree of land use conflict is closely related to the diversity and intensity of tourism resource development. In the serious out of control areas, the south of Jiangxi Sub district, Glory Village in Glory Sub district, Victory Village in Victory Sub district, and Santali Village in Shuishiying Sub district, the natural landscape and human landscape development are more mature. Tourism related facilities are well-developed and land development intensity is high. This has resulted in land use conflict and thus a serious out of control rating for this area.

The basic out of control areas are primarily distributed in the outer areas of the seriously out of control areas where the development of tourism resources and tourism industry infrastructure has increased since 2004. These areas include Dawang Village and Huohouling Village in Shuishiying Sub district, Qujia Village and Shantou Village in Shuangdao Sub district, Longwangtang Village in Longwangtang Sub district, Guojia Village and Zhangjia Village in Tieshan Sub district, and Shantou Village in Jiangxi Sub district. These are the main regions of urban development but also includes agricultural businesses as well as agricultural fields and food processing facilities. The land use of these areas is basically a stable region. The stable control areas are

Ratings	External pressure		Exposure		Risk effect		Comprehensive	
Levels	Units	%	units	%	units	%	units	%
Stable	351	22.87	489	31.86	357	23.26	765	49.84
Basic	486	31.66	312	20.33	343	22.35	473	30.81
Basic out of	477	31.07	588	38.31	741	48.27	289	18.83
Serious out of	221	14.40	146	9.51	94	6.12	8	0.52

Table 3: Statistics of different levels of measurement index in research area in 2004.

Ratings	External pressure		Exposure		Risk effect		Comprehensive	
Levels	units	%	units	%	units	%	units	%
Stable	235	15.31	433	28.21	258	16.81	799	52.05
Basic	382	24.89	368	23.97	313	20.39	527	34.33
Basic out of	331	21.56	562	36.61	730	47.56	177	11.53
Serious out of	587	38.24	172	11.21	234	15.24	32	2.08

Table 4: Statistics of different levels of measurement index in research area in 2016.

Sub District	Examples of District Attractions	Quantity of Attractions
Dashing	Baiyu Hill and Tower, Lvshun Port, Lvshun Train Station, Lvshunkou Scenic Area	4
Guangrong	Lvshun Museum, 203 Highland, Taiyanggou Scenic Area	3
Shuishiying	The Old Museum of Japanese and Russian prisons	1
Tieshan	Laotie Mountain	1
Changcheng	Yinggeshi Botanical Garden	1
Longwangtang	Longwangtang Cherry Garden	1
Longtou	Dongjiguan mount	1
Total		12

Table 5: Attractions and Sub Districts in 2004.

Sub District	Examples of District Attractions	Quantity of Attractions
Desheng	Baiyu Hill, Lvshun Port, Lvshun Train Station, Lvshunkou Scenic Area, Dianyan Fort, Naval Port Park, Wanzhong Cemetery Memorial, Lvshun Naval Weapons Museum, Lvshun Submarine Museum, Snake Ecological Museum	10
Guangrong	Lvshun Museum, Historic Kanto Army Deputy Commander's Residence, 203 Highland, Taiyanggou Scenic area, 203 Highland Cherry Park, Victory tower, Snake museum, Historic Kanto Army Headquarters Exhibition Hall, Sino - Soviet Friendship Tower	9
Shuishiying	The Old Museum of Japanese and Russian prisons, Soviet Martyrs Cemetery, Butterfly Cultural Creative Park, Soviet Martyrs Memorial Tower	4
Tieshan	Laotie Mountain, The boundary Marker/Line between Huang Sea and Bo Sea, Laotie Mountain Hot spring	3
Changcheng	Yinggeshi Botanical Garden	1
Longwangtang	Longwangtang Cherry Garden	1
Longtou	Dongjiguan Mountain, Japan – Russia War Museum	2
Jiangxi	the world peace park	1
Beihai	Hot Spring Area of Kaishi Hot Spring Resort	1
Shichang	Yingchun Park, Shangri Palace hot springs	2
Shuangdaowan	Snake Island (the island is in the sea)	1
Total		35

Table 6: Attractions and Sub Districts in 2016.

primarily distributed in the forestry areas and wetland reserves, and the land policies are based on the ecological environment protection plans.

Analysis of the evolution characteristics of land use conflict in Lvshunkou district:

The comprehensive measure value of land use conflict in Lvshunkou district is increasing continuously: The comprehensive measure value of spatial land use conflict in Lvshunkou District developed from 0.5285 in 2004 to 0.5575 in 2016, and increased by 0.03. The intensity of spatial land use conflict is in a relatively high position, although the development of comprehensive measure value in recent 12 years is relatively stable. However, the overall intensity value of conflict tends to the direction of "out of control" status, and the areas of "basic out of control" and "seriously out of control" are increasing year by year.

Through comparing the results of land use conflict measure in 2004 and 2016, we know that the areas of "basic out of control" and "serious out of control" in Lvshunkou District are increasing, while the areas of "stable control" and "basic control" are decreasing. The area of "serious out of control" in 2016 is 3.8 times in 2004, and the intensity of conflict change is more significant, mainly concentrated in urban areas and around towns. The "basic out of control" areas decreased from 18.83% in 2004 to 11.53% in 2016, a decrease of 7%. As shown in Figure 6.

The increase trend of the internal measure indexes of land use conflict in Lvshunkou district: The ratio of "stable control "areas of external pressure of spatial unit decreased from 22.87 % in 2004 to 15.31% in 2016, and the ratio of "serious out of control "areas increased from 14.4 % in 2004 to 38.24 % in 2016. The ratio of "stable control "areas of exposure of the spatial unit decreased from 31.86% in 2004 to 28.21% in 2016, and that of "basic out of control "areas decreased from 38.31% in 2004 to 36.61% in 2016. The area of "basic control "increased from 20.33% to 23.97%, and the area of "serious out of control" increased from 9.51% to 11.21%. The proportion of the "stable control" areas of risk effect of spatial unit decreased from 23.26% in 2004 to 16.81% in 2016, while the "basic control "areas decreased from 22.35% to 20.39%, and the "basic out of control" areas dropped from 48.27% to 47.56%, and the "serious out of control" areas increased from 6.12% to 15.24%. As shown in Tables 3 and 4.

From the comparison of Figures 4-6, we can see that from 2004 to 2016, the external pressure change areas of the spatial unit are mainly distributed in five Sub districts in Lvshunkou District: Sanjianpu, Great Wall, Longtou, Beihai, and Shuishiying. The exposure change areas of the spatial unit are mainly distributed in 5 Sub districts in Lvshunkou District: The Glory, Market, Dengfeng, Victory and southeast of Jiangxi. The risk effect change of areas of this spatial unit are mainly distributed in the northwest of Tieshan Sub district, the east of Jiangxi Sub district and Double Island Sub district, and the junction of Longtou Sub district and Great Wall Sub district. This causes land use conflict changes in the status in Lvshunkou District are closely related to tourism resources development by changes in infrastructure, mode and intensity as well as the tourism industry development.

Discussion

The causes

From 2004 to 2016, the whole economy of the region and the nation of China has most likely altered the diversity of the land use pattern of Lvshunkou District. The changes in carrying capacity of land are probably causing serious environmental and ecological challenges

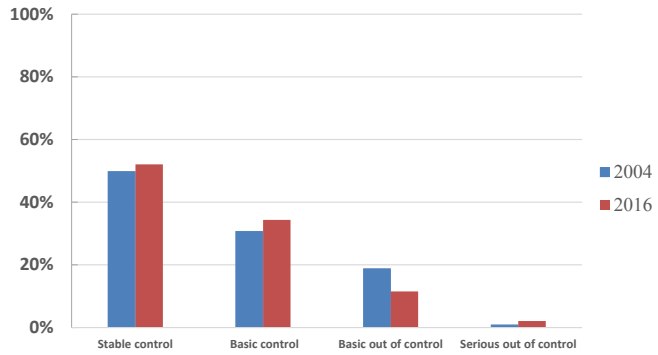

Figure 6: Comparison diagram of measure types of land use conflict in Lvshunkou District in 2004 and 2016.

to the District. Gross domestic product (GDP) increased from RMB 7 billion yuan in 2004 to RMB 28.8 billion yuan in 2016. Agriculture, industry, tourism and ecological construction are increasingly competing for land use.

Over the past 12 years, the construction implementation of modern urban agriculture in Lvshunkou District has contributed to the construction of animal husbandry, industrial parks, fruit farms with apple and cherry orchards as well as strawberry farms. The agricultural output value doubled from 1 billion yuan in 2004 to 2 billion yuan in 2016.

In terms of industry, three new science and industrial parks have been added. The region also developed new marine industry economic harbour zone with a low-carbon imprint industrial park. It appears there has been a major emphasis on developing industry as well as financial support for the Lvshunkou economic development zone. The Great Wall economic development zone and the Sanjianpu Industrial Science and Technology Park have also helped drive the development of the Lvshunkou District.

Tourism is a major driving force. Possibly because of the aforementioned dramatic increase in tourist attractions from 12 in 2004 to 35 in 2016, Lvshunkou District won the title of national leisure agriculture and rural tourism demonstration zone after large-scale development and construction of tourist attractions. The construction involved in the development of the green mountain ecosystem aimed at increasing ecotourism has been successful in attracting tourists. While positive economically, all of these developments compete for the limited amount of land available which may have impacted and caused overdevelopment and the land-use conflicts reported in this paper. From our calculations it appears that the land use conflict disorder is becoming more and more serious.

Strategies, limitations and suggestions for further research

In the hope of ensuring the continued sustainable use of land, this comprehensive study of evaluating the land carrying capacity of Lvshunkou District might assist planners in choosing future development options. This should include the suitability of land use of each Sub district and the carrying capacity and its suitability for appropriate land use. Another focus might be that developers should ensure that the land usage conforms to its underlying properties and that the land use does not exceed its carrying capacity. At the same time, it is hoped that whenever possible the government coordinate the planning of various departments, encourage multi-use planning, and integrate development that allows for the future rational use of land use to avoid land use conflicts in each industry.

For further research, another analysis should be conducted on land use conflict for Lvshunkou District at the appropriate time but certainly by 2028. Additional studies of other similar coastal tourism land use conflicts are also suggested. A more detailed analysis of the tourism development planning processes including a study analysing the cost and benefits of the planning process might also be helpful. It is hoped this study will stimulate more thought on the importance of land use analysis.

References

1. Wu DT, Wu D, Wang LH (2017) Three strategies of the whole region tourism. Research on Development.
2. Ma Y, Zhang XS (2008) A Research Review of Tourist Destination in China. World Regional Studies.
3. Zhong XM, Yu XC (2005) A Review of Foreign Studies on Tourist Destination: Based on the Subscribed Articles of Tourism Management in the last 10 Years. Tourism Science.
4. Xu CX, Cheng J (2017) The Construction of Memory Graph Market Segmentation Method of Tourism Destination. Economic Geography.
5. Liu P, Wu HQ, Jiang B, Guo Q (2017) The Effect of Image Advertising in Tourism Destinations: A Difference-in-Differences Estimation. Tourism Tribune.
6. Chen GZ (2015) Analysis of Mapping Knowledge Domains of Tourism Destination Research. Resource Development and Market 31: 1545-1553.
7. Shao GJ, Wang ZQ, Wang GQ (2014) Evaluation Mode of Tourist Destination Competiveness. Soft Science.
8. Cheng L, Zhang TH, Fu Y (2015) Urban Residents' Cognition of Haze-fog Weather and Its Impact on Their Urban Tourism Destination Choice. Tourism Tribune.
9. Tyrväinen L, Uusitalo M, Silvennoinen H, Hasu E (2014) Towards sustainable growth in nature-based tourism destinations: Clients' views of land use options in Finnish Lapland. Landsc Urban Plan 122: 1-15.
10. Brown G, Raymond CM (2014) Methods for identifying land use conflict potential using participatory mapping. Landsc Urban Plan 122: 196-208.
11. Wu JG (2001) Landscape Ecology: Pattern, Process, Degree and hierarchy. High Education Press.
12. Tan SK (2008) A Research on Concepts, Causes and Classifications of Land Conflicts in Foreign Countries. Chinese Agricultural Science Bulletin 24: 379-385.
13. Zhou GH, Peng JJ (2012) The Evolution Characteristics and Influence Effect of Spatial Conflict: A Case Study of Changsha-Zhuzhou-Xiangtan Urban Agglomeration. Prog Geogr 31: 717-723.
14. He YH, Tang CL, Zhou GH (2014) The Analysis of Spatial Conflict Measurement in Fast Urbanization Region from the Perspective of Geography-A Case Study of Changsha-Zhuzhou-Xiangtan Urban Agglomeration. Nat Resour J 29: 1660-1674.
15. Serveiss VB (2002) Applying ecological risk principles to watershed assessment and management. Environ Manage 29: 145-154.
16. Obery AM, Landis WG (2002) A Regional Multiple Stressor Risk Assessment of the Codorus Creek Watershed Applying the Relative Risk Model. Human and Ecological Risk Assessment: An Inter J 8: 405-428.
17. Dalian Municipal Bureau of Statistics (2016) Statistical bulletin on national economic and social development in Dalian city.
18. Land Resources and Housing Bureau of Dalian City (2004-2016) Survey data of land use status change in Dalian.