# Language culture and land use: a case study of the dialect cultural regions in Anhui Province, China

Article

www.reading.ac.uk/centaur

# CentAUR

Central Archive at the University of Reading

Reading's research outputs online

*Article*

# Language Culture and Land Use: A Case Study of the Dialect Cultural Regions in Anhui Province, China

Xiyu Chen [1], Guodong Fang [2,3], Jia Kang [1], Bo Hong [1,*], Ziyou Wang [4,*] and Wuyun Xia [5]

1   College of Literature, Capital Normal University, Beijing 100048, China; 2230101019@cnu.edu.cn (X.C.); 2180401023@cnu.edu.cn (J.K.)
2   Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China; fangguodong24@mails.ucas.ac.cn
3   College of Resources and Environment, University of Chinese Academy of Sciences, Beijing 100049, China
4   Department of Real Estate and Planning, Henley Business School, University of Reading, Reading RG6 6UD, UK
5   Information Center of Ministry of Natural Resources, Beijing 100036, China; wyxia@infomail.mnr.gov.cn
*   Correspondence: 5908@cnu.edu.cn (B.H.); ziyou.wang@henley.ac.uk (Z.W.)

**Abstract:** The unity of material and spiritual civilization is among the important criteria for sustainable development and modernization construction. However, defining the relationship between the two has posed a challenge to researchers. In terms of spiritual civilization, many studies on dialect maps reflect the dialect characteristics and cultural features of different regions. Regarding material civilization, changes in land use and behavior have attracted the attention of many scholars, who have extensively discussed their regional heterogeneity. However, few studies have focused on the connection between the two, and discussions on the possible bidirectional interaction between dialects and land use have been limited. Thus, in order to bridge the gap between the spiritual civilization related to language and the material civilization related to land use, this study proposes an interactive theoretical framework and conducts an in—depth analysis by taking Anhui Province in China as an example. Firstly, it comprehensively identifies the dialect types within Anhui Province and maps the dialects. This fundamental work provides a crucial basis for understanding the distribution of different dialect regions. Subsequently, a profound analysis of the spatiotemporal changes in land use in this province over time is carried out. To further explore the characteristics of land use behaviors, this study employs the Latent Dirichlet Allocation (LDA) model to mine the latent semantic topics in the land use-related data, thus enabling a more detailed understanding of the diverse patterns of land use behaviors in different regions. Finally, by uncovering the characteristics of land use changes and behavior differences in different dialect regions, this study explores the possible bidirectional interaction mechanisms. The results show that significant spatial heterogeneity in land use behavior and its driving factors can be observed within different dialect regions. Its bidirectional interaction is manifested in land use behaviors regulating people's activities through constructing "fields" and forming habits that influence regional dialects and cultures. Meanwhile, under mobility mechanisms, new dialect systems replace indigenous languages in immigration destinations. Land use methods from emigration areas are spread through convenient communication, affecting the cultural psychology and land use behaviors of social groups in immigration destinations. This study expands the boundaries of linguistic and cultural geography, offering a new perspective for the identification of spatial differentiation and new ideas for the governance of spatial differences.

**Keywords:** dialect division; regional culture; land use; spatiotemporal evolution; population migration; bidirectional interaction; collaborative development

# 1. Introduction

The exploration of the interaction between material and spiritual civilizations represents a crucial aspect of modernization and sustainable development research [1,2]. Material civilization is the material achievement of human beings' transformation of nature, represented by production construction and infrastructure. Among them, land serves as the spatial carrier for production activities. Land use behaviors bear the weight of human material production activities, and they are an important manifestation of material civilization. Moreover, they are closely related to numerous cultural factors such as attitudes, values, beliefs, and personal cognitions [3].

Spiritual civilization is the sum of the spiritual achievements obtained by human beings in the process of transforming the objective world and the subjective world, represented by science and culture. However, culture is a very broad concept, and the factors influencing culture are extremely complex. Different ethnic groups, regions, and even different family traditions may leads to cultural differences. Among them, language is the material carrier of culture and a tool for cultural communication and dissemination. Therefore, it is also the best link connecting the spiritual civilization represented by culture and the material civilization represented by land [4].

As a representation of a language within a specific region, the concept of dialect has also emerged as a focal point of interest among scholars in linguistic research [5]. Since land use and language culture are, respectively, concentrated manifestations of material civilization and spiritual civilization, and they have a strong correlation in terms of connotation and denotation, they can serve as the connection point and entry point for the two-way correlation research between material civilization and spiritual civilization [6]. Extensive research has indicated that the geographical distribution of Chinese dialects is significantly intertwined with the intrinsic traits of Chinese culture. In particular, historical administrative regions, local opera cultures, and transportation networks have a close affinity with each other [7]. Thus, investigating the land use changes and their characteristics within diverse dialect regions is essential because it pertains to how the demarcations of these linguistic behaviors can modulate human activities and cultural mindsets, exerting an influence on other social pursuits such as land use [8,9]. This understanding is instrumental in comprehending land use behaviors and fostering the sustainable utilization of land resources [10–12].

The regional differentiation of natural terrain has led to profound changes in Chinese dialects and cultures and has also affected land use behaviors within certain regions. Geographical separation is the most common factor in language differences [13]. The division of Chinese dialects is based on the evolution of ancient entering tone characters and ancient voiced initial consonant characters [14]. The names of its divisions are ultimately almost all named after geographical directions, regions, or administrative regions, indicating that Chinese dialects are closely related to natural and human geography [15].

In 1876, the German linguist Georg Wenker initiated a survey of the dialects in the Rhine region to demarcate the boundary between the "Middle German Dialect" in the southern part and the "Low German Dialect" in the northern part. The six dialect maps he meticulously collected data for and subsequently drew became an integral part of the "German Language Map", which is regarded as the origin of the development of geolinguistics. Wenker's investigative approach established the foundation for subsequent studies in dialect geography [16]. His work not only illustrated the method for revealing the geographical distribution of dialects through systematic surveys but also provided insights that contributed to further explorations of the processes and mechanisms of language change. Towards the end of the 19th century, the French linguist Jules Gilliéron conducted a survey of more than 2000 words and phrases and edited and published the

"Atlas Linguistique de la France", which reflected the geographical distribution of words. Conducting a dialect survey with a focus on vocabulary holds substantial significance for investigating the land use behaviors within the dialect area because compared to the phonetic and grammatical systems, vocabulary can more effectively mirror the land policies and tools implemented in the past [17]. This view is in line with Gilliéron's famous assertion that "Every word has its history". Dialect geography has disclosed an important linguistic fact that each dialect feature (either phonetics, vocabulary, or grammar) has a certain distribution area, and different dialect features may have different distribution areas, representing the spatial manifestation of dialect differences [18]. Acknowledging that regular patterns can be observed in the spatial differences in dialects implies that regional dialects can be regarded as part of regional human activities and a window through which to observe the changes in other regional activities [19].

Consequently, the integration of dialectology with ethnic history or the activities of inhabitants for comprehensive research represents a crucial topic in the current academic landscape [20,21]. A multitude of studies have furnished explanations either centered around regional dialects or pertaining to regional land utilization and management [22,23]. In recent years, certain investigations have embarked on establishing correlations between these two domains, recognizing the significant role played by historical and cultural factors in the spatiotemporal alterations of land use or endeavoring to elucidate the influencing factors of dialect distribution patterns through natural and human geography [15,24,25]. Nevertheless, because of the interdisciplinary nature spanning from language research to land use behavior, the majority of extant studies are circumscribed within the boundaries of specific fields, concentrating on the interpretation and design of corresponding disciplinary concepts and schemes. Research on regional dialects is generally limited to the description of dialectal phonetic, lexical, or grammatical systems within the framework of linguistic theories [26]. Conversely, research on land use behaviors predominantly focuses on the fields of physical geography and social economics, aimed at using geographical tools (such as geographical detectors, geographically weighted regression) and sociological methods (such as factor analysis, econometric regression) to address issues such as the spatiotemporal changes in land cover, land productivity, and land value [27,28]. They fall short of constructing a more comprehensive and refined regional model from a cross-disciplinary vantage point.

Therefore, exploring the underlying reasons behind different types of land use from a humanistic perspective is of great significance for the coordination of United Nations Sustainable Development Goal 2, which is ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture, and 15, which is protecting, restoring and promoting the sustainable use of terrestrial ecosystems, sustainably managing forests, combating desertification, halting and reversing land degradation, and curbing the loss of biodiversity [29].

Furthermore, the existing research lacks essential comprehensive analysis. It fails to offer guidance on the synergistic influence of language, culture, and other social science elements on human behavior and production modalities. Given the intricate transformations resulting from the superposition of the language system, cultural psychology, geographical conditions, and the interaction between humans and nature, developing a full comprehension of the interrelationships among various elements and their consequent impacts on land use behavior can be exceedingly challenging [30].

Therefore, with the Anhui region as a case, this research endeavors to resolve the following four inquiries: 1. How do the regional dialects, land use behaviors, and their spatiotemporal evolution manifest themselves in this particular area? 2. Within this region, does the divergence in language and culture influence land use behaviors and their

evolution? 3. Is there a mechanism of bidirectional interaction between the two? 4. If such a mechanism exists, how can it be explicated? This research contributes to the exploration of the correlative relationship between language and culture and other human social activities. Precisely, this study puts forward a theoretical mechanism that amalgamates the bidirectional interaction among regional dialects, culture, natural geography, land use behaviors, and their spatiotemporal evolution [31,32]. Subsequently, the regional dialects and cultural spheres in Anhui Province are demarcated by referring to the classification criteria of dialects and cultural regions.

Thus, this research breaks down the traditional disciplinary barriers and, in an innovative manner, integrates the study of regional dialects in linguistics with the research on land use behaviors in the fields of physical geography and social economics. From an interdisciplinary perspective, it comprehensively takes into account the bidirectional interaction relationships among regional dialects, culture, physical geography, land use behaviors, and their spatiotemporal evolutions, and constructs a more comprehensive and systematic research framework. Such interdisciplinary integration not only enriches the research dimensions but also offers a novel approach to a profound understanding of the interactive influences between human social activities and the natural environment.

Meanwhile, the land use changes and behavior characteristics are unearthed through the utilization of the land use transfer matrix and the LDA generation model [33–35]. The correlations between the regional dialects and culture and the spatial evolution patterns and behavior specificities of land use are generalized based on the above. In addition to theoretical discussions, the significance of establishing an interactive comparison is also expounded, and suggestions for cross-disciplinary research are proffered [36].

The remaining part of this study is structured as follows: Section 2 presents the theoretical framework and introduces the methods, including the mechanism of the two-way interaction between land use behavior, dialect culture, the research area, its data sources and the spatial division methods of dialects and culture. It utilizes the land use transfer matrix (LUTM) and the LDA generation model to explore the spatial evolution of land use and its behavior characteristics. Section 3 demonstrates the results of the division of dialect and cultural regions, the patterns of land use changes, the specific behaviors of land use, and the correlations among the three. Section 4 discusses the important influence of the guiding logic and the attracting flow mechanism of the field and elaborates on the significance of establishing a comparison between regional dialects and land use based on the theoretical framework, as well as the advantages and limitations of this study. Section 5 summarizes the research and puts forward suggestions.

## 2. Theoretical and Methods

### 2.1. Theoretical Analysis

Geographical differences influence the specificity of land use behavior, leading to the internal construction of specific "fields" within the complex system of social life, which in turn continuously affect various elements within the system, including language and culture. The concept of "field" originates from Bourdieu's theory of practice, referring to the social space where individual practices occur. It is not only a combination of various spatial facilities but also a space that carries value, experiences, and emotional resonance [37]. Once a field is formed, the order of practice and geographical space correlate dynamically within a certain scope. This connection is associated with certain characteristics of the "field" with the social groups living within it, influencing every action of individuals according to the "field" they are in, forming specific orders of practice and norms [38]. For example, people living within the same cultural or dialect circle not only survive based on local

natural conditions but also reflect the emotional characteristics and ways of thinking of local culture in terms of dialect and values.

Therefore, land use behavior shapes the social activity space, constructs specific "fields", and regulates and constrains people's actions. Based on the internalized knowledge formed through practice and experience within the field, individuals in society are influenced by specific social relations to form "habitus", which not only has an "intuitive" potential influence on individual actions but also tends to guide social norms and expectations, leading to gaps, distances, and class differences among social groups [39]. "Habitus", as a durable socialized structure, encompasses aspects such as ways of thinking, language habits, and cultural pursuits [40]. For example, the topography and traditional farming methods of the Northern Anhui Plain have shaped the residents' warm and simple character. Full vowels and a loud timbre characterize the local dialect in Northern Anhui.

Once a specific habitus is formed, it complements language and culture, jointly influencing the social life of groups within a region and possessing strong stability. Therefore, tracing the origins of specific linguistic and cultural phenomena can also be evidenced by the convergence of other behaviors within the field [41]. For instance, if social groups in different dialect areas exhibit similar land use behaviors, there has likely been a large-scale population movement in the history of that area, and a kinship relationship between the languages they speak may also exist.

The relationship between regional dialects and regional land use behaviors is a bidirectional one, operating within a framework of mutual influence as proposed by "Social Darwinism". human society is regarded as an arena of survival competition, with the principle of "survival of the fittest" reigning over social progression. In this competitive milieu, the advantaged parties consistently augment their power and cultural sway, whereas the disadvantaged ones experience a gradual diminution [42,43]. This theory not only offers a natural selection-based rationale for social stratification but also validates it as a requisite for human prosperity [44], considering that the advancement of human society is linked inextricably to the preferential selection of congenial natural habitats and cultural institutions. Consequently, social aggregations within a common dialectal zone, facilitated by the ease of communication, are drawn towards the economically vibrant and culturally efflorescent regions therein and congregate there. These aggregations can also be attributed to the forces of natural selection.

Parallel to this, language undergoes spatiotemporal metamorphosis concomitant with the displacement and dispersion of its speakers. The migrating social collectives, while preserving their native linguistic heritage, assimilate novel elements into the language during the process of transformation. A new linguistic form comes into being upon cohabiting with the local populace in the destination area and coalescing into a new ethnic cluster. Subsequently, this nascent social cluster perpetuates the reinforcement of the new language and culture, concomitantly excluding pre-existing languages and cultures in the area attenuating the influence of the indigenous tongues. Language is the palpable manifestation of thought, and thought, in the guise of speech, possesses an intrinsic substance. The transition from the realm of ideas to the tangible world is tantamount to the translation from language to lived experience. Culture can alternatively be construed as a symbolic regime or a "network of significance", whereby it exerts an impact on the patterns of land utilization by means of shared convictions, knowledge, norms, and values [45].

Hence, the evolution of language and culture exerts further impact on land use behaviors in the recipient regions and begets novel land policies [46,47]. For illustration, a substantial population shift transpired in Anhui Province in the wake of war-induced disruptions in the late Qing Dynasty. Inhabitants from Luzhou (now Hefei) and Anqing migrated to Guichi and Qingyang in present-day Chizhou City. This migration not only

supplanted the fundamental status of the ancient Xuanzhou Wu dialect in this area with the Jianghuai Mandarin but also diffused the land management regime of the place of origin to the destination. Based on the survey conducted by Jinling University in the Republic of China, the permanent tenancy system in Chizhou City was introduced by the immigrant settlers from Anqing.

This article synthesizes the two-way interactive mechanism between regional dialects and land use behaviors into two theoretical frameworks. The first framework consists of four elements: "land use-field-habitus-dialect and culture". The second framework comprises four elements: "regional dialects and culture-ideology-behavior-land use", accompanied by three pathways: the transformation from mobility to alteration, the progression from attraction to congregation, and the shift from exclusion to fortification. The schematic representation of this mechanism is depicted in Figure 1.
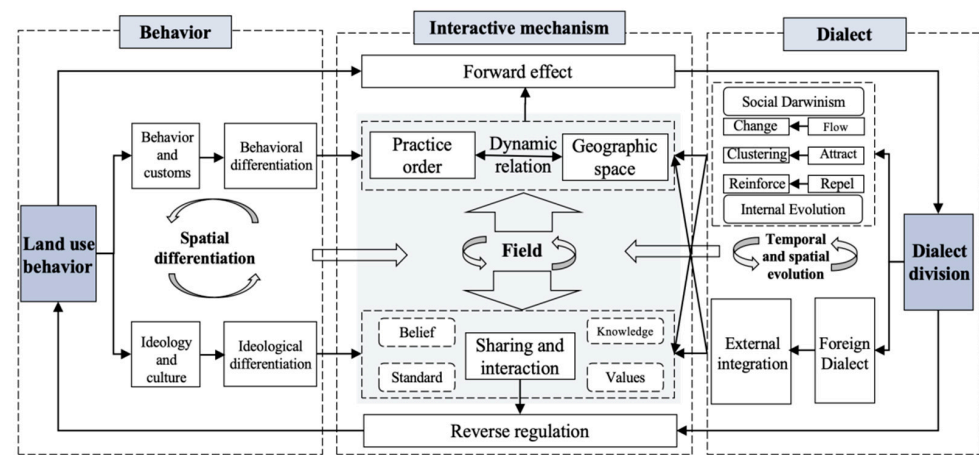


**Figure 1.** Two-way interactive mechanism.

### 2.2. Study Area and Data Sources

Anhui Province (29°41′–34°38′ N, 114° 54′–119°37′ E) is located in the eastern part of China, bordering Jiangsu and Zhejiang provinces to the east, Hubei and Henan provinces to the west, Jiangxi province to the south, and Shandong province to the north. Anhui Province has a monsoon climate that transitions from warm temperate to subtropical, with crisscrossing mountain ranges and numerous rivers, including the Dabie Mountains, Huangshan Mountains, Tianmu Mountains, Jiuhua Mountains, and the Yangtze River, Huai River, Xin'an River, Qiupu River, and Chu River. The province is rich in water resources and has a variety of soil types, ranging from brown soils in the north to yellow soils and yellow-brown soils in the south. The total area of Anhui Province is 140,100 square kilometers (approximately 1.46% of China's total area), with mountains, hills, plateaus, and plains accounting for 15.3%, 14.0%, 13.0%, and 49.6%, respectively. As of 2023, Anhui Province had sixteen prefecture-level cities (Hefei, Huaibei, Bozhou, Suzhou, Bengbu, Fuyang, Huainan, Chuzhou, Lu'an, Ma'anshan, Wuhu, Xuancheng, Tongling, Chizhou, Anqing, and Huangshan), with a permanent population of about 61.21 million people and an urbanization rate of 61.51%. In 2023, the region's GDP was 4705.06 billion yuan, with a per capita GDP of 76,830 yuan, representing growth rates of 5.8% and 5.7%, respectively, compared to the previous year.

The data used in this study include land use data, GDP raster data, population raster data, elevation raster data, annual precipitation raster data, and annual average temperature data (Table 1). The land use data have a resolution of 30 m and include six primary categories: cultivated land, woodland, grassland, water area, industrial and mining and residential land between urban and rural areas, and unused land, which are sourced

from the Resource and Environment Data Cloud Platform. From the perspective of data availability and the significance of changes, we have chosen land use data from the years 2000, 2010, and 2020, with a 10-year interval. The study uses GDP data as the proxy for regional economic development level and population data as the proxy for regional social development level. It also uses elevation data, annual precipitation, and annual average temperature as indicators of regional natural conditions. These data have a resolution of 1km and are sourced from the Resource and Environment Data Cloud Platform. It is worth noting that although the resolution of these indicators is different from the 30 m resolution of land use data, in the mechanism analysis, this study will unify the resolution by using 1 km grid cells as units, where the value of land use transition is calculated within each 1 km grid cell.

**Table 1.** Spatial resolution and source of the data used in this study.

| Datasets | Spatial Resolution | Year | Sources |
|---|---|---|---|
| Land Use/Cover | 30 m | 2000, 2010, 2020 | REDPC |
| GDP | 1 km | 2000 | REDPC |
| Population | 1 km | 2000 | REDPC |
| SRTM3 DEM | 1 km | 2000 | REDPC |
| Annual precipitation | 1 km | 2000 | REDPC |
| Annual average temperature | 1 km | 2000 | REDPC |

Notes: REDPC refers to the Resource and Environment Data Cloud Platform of CAS.

*2.3. Methods*

2.3.1. Dentification Methods for Regional Dialects and Culture

The main basis for classifying Chinese dialects has largely been phonemic phonological criteria, which include the presence or absence of voiced initials and their varying evolutionary paths, the existence or lack of entering tone rhymes and their different merging patterns, the number of nasal finals, and the quantity and diverse splitting and combining of tone categories. Thus, drawing on previous research, this study proposes a three-level classification method, "initial-tone-rhyme". Among these phonological standards, the reflection of ancient voiced initials in modern dialects is the most systematic and regular. Its systematicity lies in its wide-ranging control over the synchronic phonological system, and its regularity is demonstrated by its strong explanatory power for phonological evolution [48].

Therefore, this study first conducts an overall division of Chinese dialects in Anhui Province according to how ancient voiced initials are manifested in modern dialects. Next, it differentiates dialect areas based on the tone classes of the current pronunciations of ancient entering tone characters, separating those with different tone classes for ancient voiceless initial entering tone characters and ancient voiced and voiceless initial entering tone characters while also considering whether the entering tone is retained. Finally, it distinguishes dialects with substantially weakened or dropped nasal finals and vowel finals from adjacent ones by investigating the state of finals.

In line with the findings of diachronic studies, the regional cultural sphere represents a complex "humanities + N" system rife with intricate interconnections. The cultural landscapes in Anhui showcase remarkable complexity and diversity. This research commences by devising a multi-tiered framework encompassing "material, behavioral, institutional, and spiritual culture" that underpins cultural expressions. The objective is to dissect how diverse material and spiritual elements contribute to the systematic classification of regional cultures. Subsequently, the fundamental meanings of each tier are delineated and categorized. Material culture manifests as the outward guise of culture. Behavioral and institutional cultures, positioned at the intermediate level of the cultural edifice, steer people's

cultural preferences by molding their behavioral patterns. Spiritual culture, encapsulating spiritual ethos, psychological encounters, and value pursuits, represents the internalized essence of culture and occupies the apex and heart of the cultural construct [49].

### 2.3.2. Land Use Transfer Matrix

This study employed the land use transfer matrix (LUTM) to measure the changes in land use across different regions and periods [50]. LUTM can depict the transformation of land use types within a region from time $T$ to time $T + 1$ comprehensively and, specifically, better reveal the spatiotemporal evolution of land use patterns [51]. The study calculates the individual land use transition situations as follows:

$$LUC(i,j) = \begin{cases} S \times CON_i, (i = j) \\ S\sum_1^m I(i \to j), (i \neq j) \end{cases}$$
(1)

where $LUC(i,j)$ represents the amount of land of type $i$ converted to land of type $j$ from period $T$ to $T + 1$. $CON_i$ represents the number of grid cells that remain as the land use type $i$ from period $T$ to $T + 1$. $S$ represents the area of a single grid cell. $m$ represents the total number of grid cells in the study area. $I(\cdot)$ is an indicator function, assigned a value of 1 when the condition inside the parentheses is met, that is, when the type of land use is converted from $i$ to $j$ and assigned a value of 0 otherwise.

The LUTM can be represented in matrix form as follows [52]:

$$Matrix = \begin{bmatrix} LUC(1,1) & LUC(1,2) & \ldots & LUC(1,n) \\ LUC(2,1) & LUC(2,2) & \ldots & LUC(2,n) \\ \ldots & \ldots & \ldots & \ldots \\ LUC(n,1) & LUC(n,2) & \ldots & LUC(n,n) \end{bmatrix}$$
(2)

where represents the change in the total area from land use type $i$ to land use type $j$; and $n$ is the number of land use types.

### 2.3.3. GeoDetector Model and Logistic-RCS Model

The study utilized the GeoDetector to analyze the driving factors behind the conversion of cropland to built-up land in different dialect regions from 2000 to 2020. The GeoDetector can detect spatial heterogeneity and driving factors of geographical objects [53–55], where the factor detector constructs a q-statistic to measure the relative importance of factors.

The study applied the logistic-restricted cubic splines (RCS) model to analyze the driving factors of the mutual conversion between cropland and built-up land in different dialect regions from 2000 to 2020. The ordinal logistic model was used to explore the linear effect of driving factors [56–58], setting the conversion of cropland to built-up land as the control group and the conversion of built-up land to cropland as the experimental group. The study also incorporated the RCS into the logistic model [59,60] to accurately describe the degree of influence of various factors over different periods and investigate the nonlinear effects of driving factors.

### 2.3.4. Latent Dirichlet Allocation

A text is usually composed of several topics. The main idea of latent Dirichlet allocation (LDA) is to assume that a document is a mixture of multiple topics, and each topic is composed of a series of words distributed according to certain probabilities [61,62]. In statistical natural language processing, the method for text topic modeling is to regard topics as probability distributions of words and texts as random mixtures of these topics. Assuming $T$ topics, the $i$-th word $w_i$ in a given text can be represented as follows:

$$P(W_i) = \sum_{j=1}^{T} P(w_i|z_i = j)P(z_i = j) \tag{3}$$

In this context, $z_i$ is a latent variable, indicating that the $i$ vocabulary symbol $w_i$ is taken from that topic. $P(w_i|z_i = j)$ is the probability that the vocabulary $w_i$ belongs to topic $j$. $P(z_i = j)$ represents the probability that topic $j$ belongs to the current text. Assuming $T$ topics form $D$ texts represented by $W$ unique words, for notational convenience, let $\theta_w^{(z=j)} = P(z = j)$ denote the topic. A multinomial distribution over $W$ words, where $W$ is a word from the $W$ unique vocabulary. Let $\psi_{z=j}^{(d)} = P(z = j)$ represent the multinomial distribution over $T$ topics for document $D$, and thus, the probability of word $W$ in document $d$ is as follows:

$$P(w|d) = \sum_{j=1}^{T} \theta_w^{(z=j)} \cdot \psi_{z=j}^{(d)} \tag{4}$$

The LDA model makes a prior probability assumption on $\psi^{(d)}$ for $Dirichlet(\alpha)$, which enables the model to handle new texts outside the training corpus more easily. A symmetric prior probability assumption on $\psi^{(d)}$ for $Dirichlet(\alpha)$ is also made to facilitate the inference of model parameters as follows:

$$\begin{cases} w_i|z_i, \theta^{(z_i)} \sim Discrete\left( \theta^{(z_i)} \right), \theta^{(z_i)} \sim Dirichlet(\chi) \\ z_i| \psi^{(d_i)} \sim Discrete\left( \psi^{(d_i)} \right), \psi^{(d_i)} \sim Dirichlet(\alpha) \end{cases} \tag{5}$$

In the formula, $\chi$ represents the frequency of words sampled from a topic before seeing any words in the corpus while $\alpha$ represents the frequency of topics being sampled before seeing any document text. Although the specific values of $\chi$ and $\alpha$ will affect the degree to which topics and words are utilized, the way different topics are utilized remains almost unchanged. The way different words are utilized is also essentially the same. Therefore, it can be assumed that the symmetric *Dirichlet* distribution holds, and all $\chi$ take the same value, and all $\alpha$ take the same value.

Finally, the methodological framework of this paper is shown in Figure 2, including the recognition of land use changes, the analysis of mechanisms, and the explanation of cause.
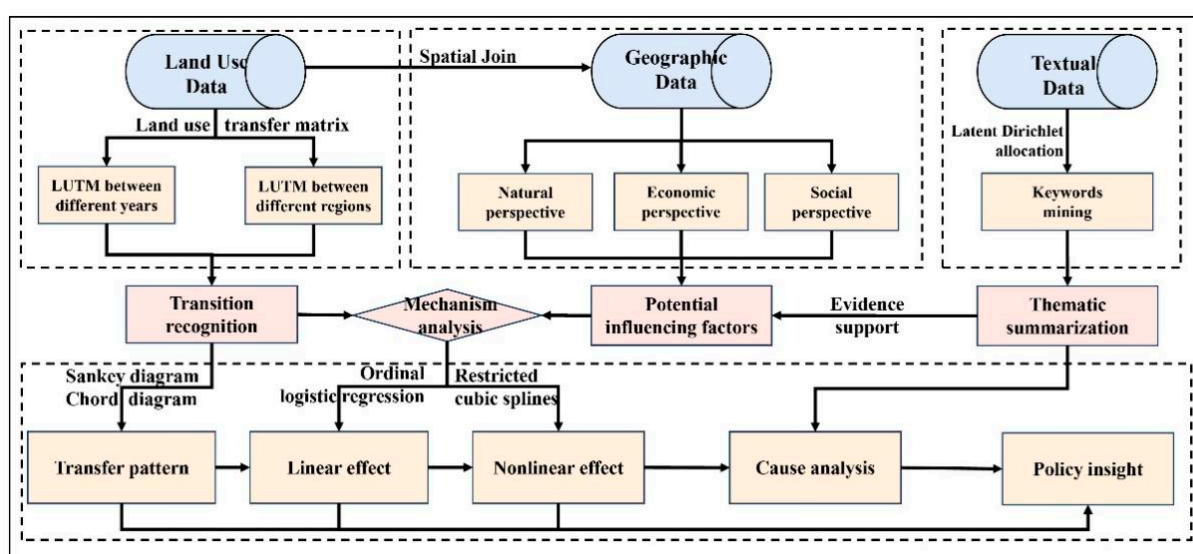


**Figure 2.** The methodological framework.

## 3. Research Results

### 3.1. Partition Results of Dialects and Cultural Circles

Figure 3 shows the division results of the dialect areas and cultural circles in the Anhui region. Overall, the dialects north of the Yangtze River in Anhui Province are relatively homogeneous, while the area south of the river is a mixed zone of multiple dialects. According to the research methodology mentioned above, the dialects in Anhui can first be trichotomized into Mandarin dialects in which the voiced stop and affricate consonants merge into aspirated or unaspirated voiceless stop and affricate consonants; Hakka and Gan dialects, where all the voiced stop and affricate consonants merge into aspirated voiceless stop and affricate consonants; and Wu dialects that systematically retain the voiced initials. Then, within the Mandarin dialects, Zhongyuan Mandarin can be distinguished based on the tone classes of the current pronunciations of ancient entering tone characters, in which the ancient voiceless initial entering tone characters and the ancient voiced initial entering tone characters are pronounced as yinping, and the ancient voiced initial entering tone characters are pronounced as yangping. Jianghuai Mandarin can be distinguished through the ancient entering tone characters still retaining the entering tone. Finally, by examining the situation of finals, the Hui dialect, with a large number of weakened or dropped nasal finals and vowel finals, can be differentiated from its adjacent dialects, such as the Gan and Wu dialects. The Hui dialect is found to be similar to the Gan dialect in terms of the current pronunciations of the voiced initials. In terms of the vowel system, the Hui dialect is similar to the Wu dialect and the Jianghuai Mandarin. Therefore, the Hui dialect can be regarded as a transitional zone between Jianghuai Mandarin and the Wu dialect.

The cultural regions in Anhui boast a long history and diverse integration. Anhui, demarcated by the Yangtze and the Huai Rivers, can be successively partitioned from north to south into the Huaihe River Cultural Region, the Luzhou Cultural Region, the Wanjiang Cultural Region, and the Huizhou Cultural Region based on the disparities in dialect communication and geographical elements. The Huaihe River Culture prevails in the area north of the Huai River and along its banks. Under the dual influence of the Central Plains Culture from Henan and Shandong and the radiation of the Luzhou Culture, it has cultivated unique cultural traits that combine tradition and diversity. The Luzhou Culture represents a new cultural sphere that emerged following the economic upsurge of Hefei, the provincial capital. Spreading predominantly in a contiguous pattern across Hefei and its neighboring counties and cities, it exhibits potent economic guidance and contemporaneousness. The Wanjiang Cultural Region sprawls along the Yangtze River. Historically, considerable immigration activities took place here, resulting in its cultural core placing equal emphasis on Confucianism, Taoism, and Buddhism, mirroring the region's distinctive inclusiveness and innovativeness. The Huizhou Culture is distributed across the six counties under the former Huizhou Prefecture south of the Yangtze River. It epitomizes the amalgamation of the material and spiritual civilizations of ancient Huizhou, blending the Central Plains Culture with the Shanyue Culture and manifesting traits like the flourishing of Confucian culture, a strong clan consciousness, and a focus on education.
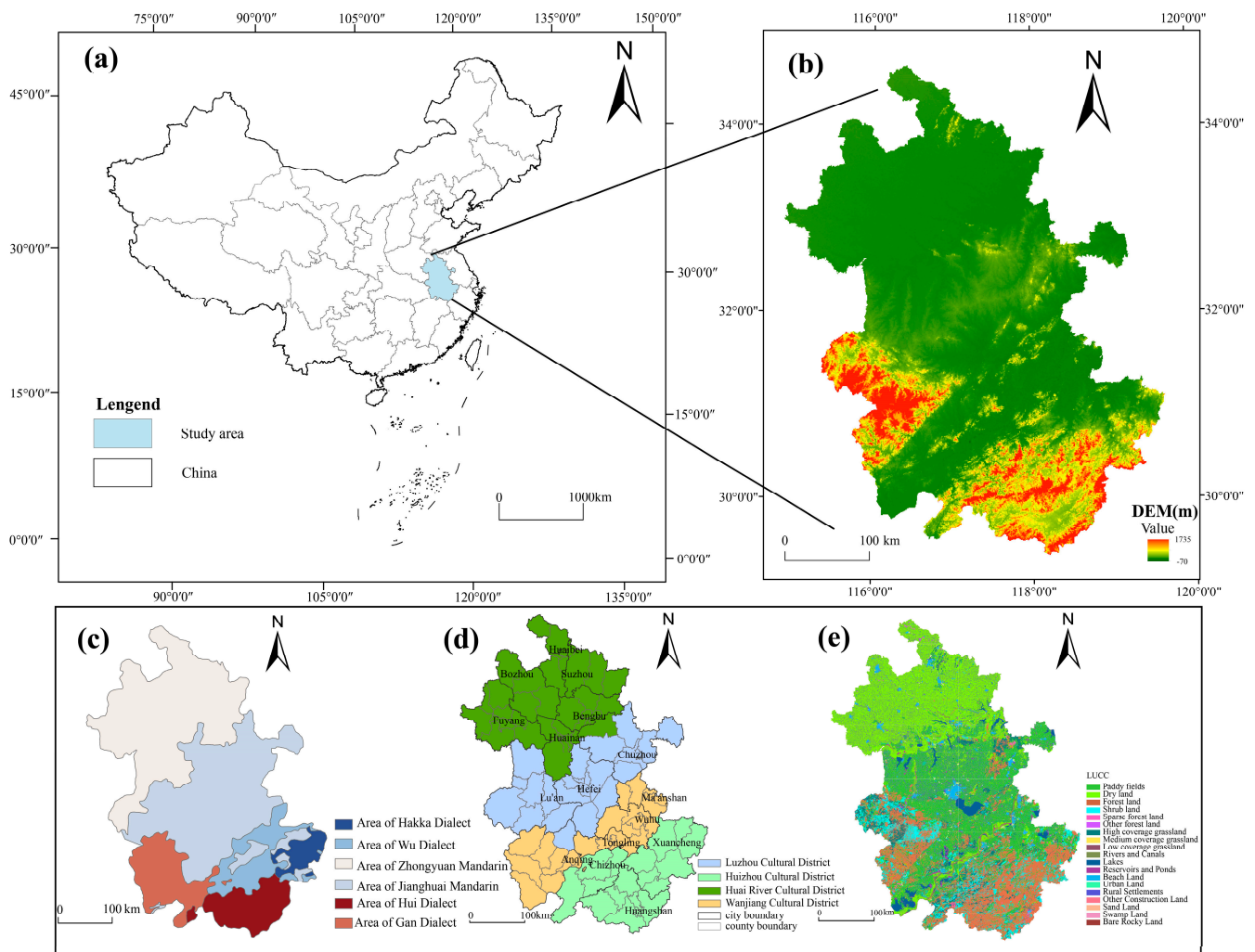
**Figure 3.** Overview of the study area: (**a**) Geographic location; (**b**) DEM; (**c**) Dialect area division; (**d**) Cultural Area Division Map; (**e**) Land use/cover of the study area in 2020.

### 3.2. Land Use Change Pattern

#### 3.2.1. Overall Change Pattern

LUTM (Land use transfer matrix) can measure the changes in land use across different regions and periods (Figure 4). Therefore, this study employed LUTM to measure the interconversion between different types of land from 2000 to 2010 (Table 2) and from 2010 to 2020 (Table 3) and presented a visual depiction using the Sankey diagram (Figure 5). From 2000 to 2010, the largest area of land transfer was from cropland land to built-up land, with a transfer amount reaching 2032.37 km$^2$, while the transfer from built-up land to cropland was only 205.88 km$^2$. Rapid urbanization had caused a swift transfer of cropland to built-up land. Woodland and grassland also contributed to the expansion of built-up land, with transfer amounts reaching 99.92 km$^2$ and 38.41 km$^2$, respectively.

From 2010 to 2020, although the transfer of cropland to built-up land continued to have the highest proportion of all land type changes, with a transfer amount reaching 2113.21 km$^2$, at the same time, other types of land also began to replenish cropland due to China's strict cropland protection policy, with the highest transfer amounts coming from built-up land and woodland, reaching 700.95 km$^2$ and 653.95 km$^2$. These actions have somewhat alleviated the loss of cropland in Anhui Province.
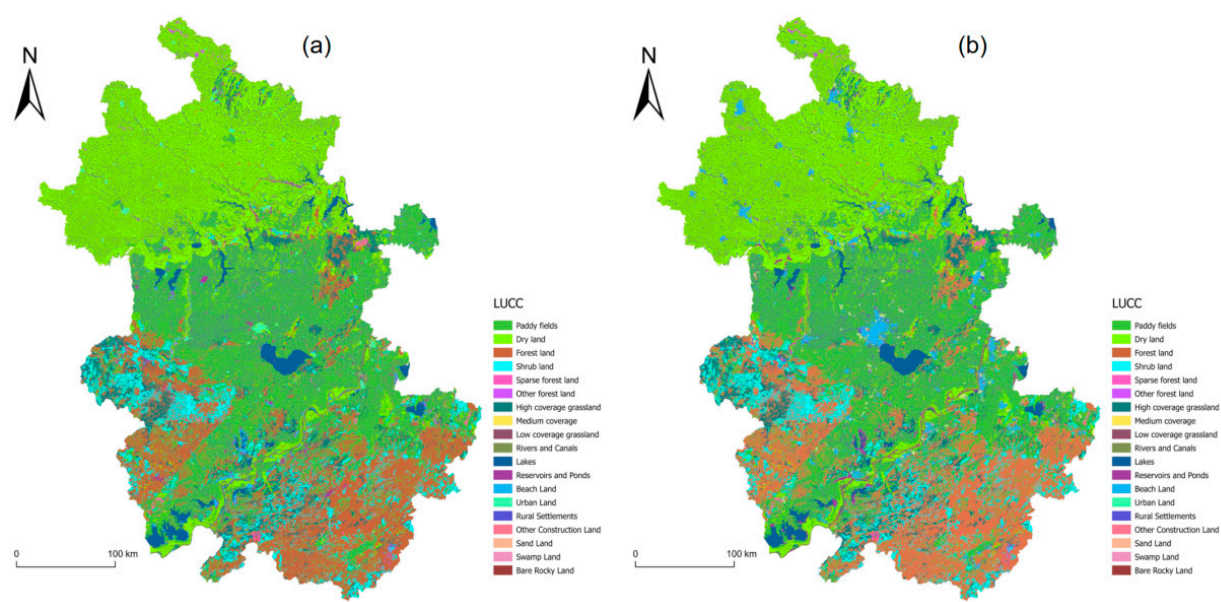
**Figure 4.** Land use/cover of Anhui at different times: (**a**). 2000. (**b**). 2020.

**Table 2.** Transfer matrix of land use of Anhui between 2000 and 2010 (km$^2$).

| 2000 / 2010 | CL | WL | GL | WB | BL | UL | Sum |
|---|---|---|---|---|---|---|---|
| CL | 78,156.09 | 218.15 | 41.30 | 242.86 | 2032.37 | 0.08 | 80,690.85 |
| WL | 205.88 | 31,932.41 | 53.91 | 7.86 | 99.92 | 0.53 | 32,300.51 |
| GL | 36.41 | 59.07 | 8218.79 | 5.21 | 38.41 | 0.03 | 8357.91 |
| WB | 141.89 | 8.11 | 5.69 | 7028.00 | 15.46 | 0.00 | 7199.15 |
| BL | 379.54 | 5.41 | 2.27 | 4.50 | 11,226.59 | 0.00 | 11,618.31 |
| UL | 0.01 | 0.92 | 0.01 | 0.52 | 0.00 | 4.65 | 6.11 |
| Sum | 78,919.82 | 32,224.07 | 8321.97 | 7288.95 | 13,412.76 | 5.29 | 140,172.85 |

Notes: CL refers to cropland; WL refers to woodland; GL refers to grassland; WB refers to the waterbody; BL refers to built-up land; UL refers to unused land.

**Table 3.** Transfer matrix of land use of Anhui between 2010 and 2020 (km$^2$).

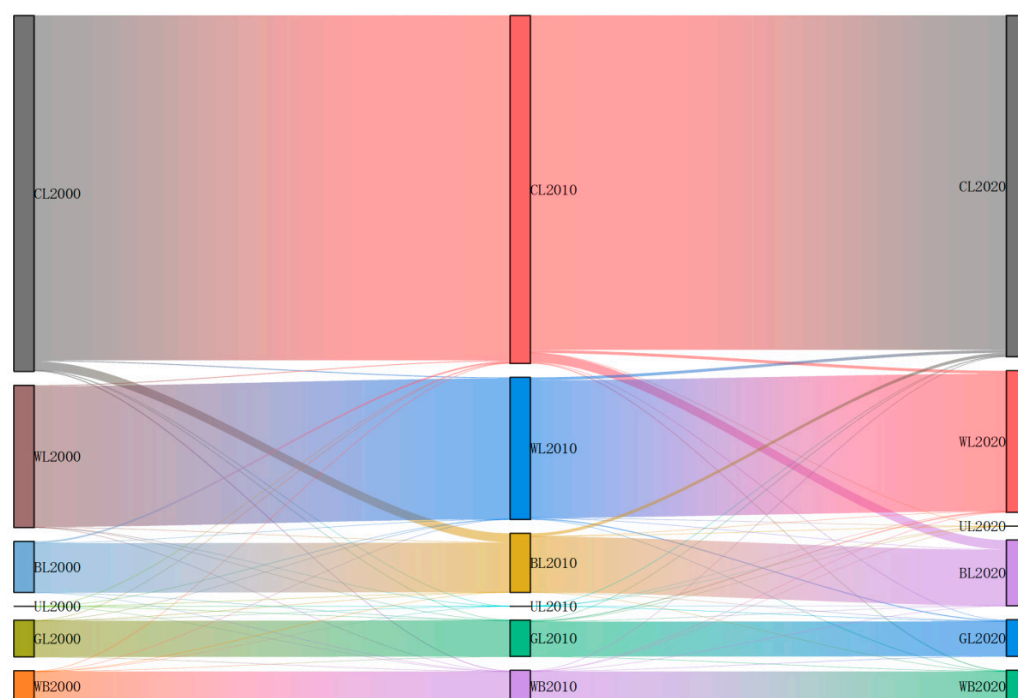| 2010 / 2020 | CL | WL | GL | WB | BL | UL | Sum |
|---|---|---|---|---|---|---|---|
| CL | 75,808.07 | 669.35 | 93.81 | 226.25 | 2113.21 | 8.28 | 78,918.98 |
| WL | 653.95 | 31,187.93 | 237.68 | 23.13 | 114.49 | 3.72 | 32,220.90 |
| GL | 97.43 | 225.59 | 7938.78 | 11.83 | 45.94 | 1.87 | 8321.43 |
| WB | 147.03 | 24.08 | 11.12 | 7064.56 | 39.85 | 1.22 | 7287.86 |
| BL | 700.96 | 22.14 | 9.70 | 24.26 | 12,653.67 | 2.14 | 13,412.87 |
| UL | 0.05 | 0.25 | 0.15 | 0.00 | 0.05 | 4.79 | 5.29 |
| Sum | 77,407.50 | 32,129.34 | 8291.24 | 7350.03 | 14,967.21 | 22.02 | 140,167.32 |

**Figure 5.** Land use change in 2000, 2010, and 2020. Notes: In the Sankey diagram, the first, second, and third columns, respectively, represent the land use condition in the years 2000, 2010, and 2020. The lines between the columns reflect the transition of land among different use types, and the thickness of the lines indicates the magnitude of the flow.

3.2.2. Dialect Area Change Pattern

The study also used the land use transition matrix to measure the land use transfer from 2000 to 2020 for different dialect regions (Table 4). Further, it used the chord diagram to reflect the situation visually (Figure 6) [63]. Among them, the Jianghuai Mandarin Area and the Zhongyuan Mandarin Area were the main sources of cropland in Anhui Province, but the loss was also very serious. Built-up land remained the main direction for the transfer of cropland. The total area of cropland transferred to built-up land in the Jianghuai Mandarin Area reached 1892.86 km², and this indicator reached 1498.46 km² in the Zhongyuan Mandarin Area, far higher than in the other four dialect areas. In the other four dialect areas, cropland accounted for a relatively smaller proportion, and woodland was a larger proportion of land types in these areas, but with relatively less fluctuation. The transformation between cropland and built-up land remained the main theme of land use changes in these areas.

**Table 4.** Transfer matrix of land use in different areas of Anhui between 2000 and 2020 (km²).

| Regions | 2000 / 2020 | CL | WL | GL | WB | BL | UL | Sum |
|---|---|---|---|---|---|---|---|---|
| | CL | 27,982.64 | 201.58 | 50.03 | 161.20 | 1892.86 | 4.50 | 30,292.81 |
| | WL | 191.90 | 7849.86 | 76.78 | 9.16 | 77.77 | 1.33 | 8206.80 |
| | GL | 45.05 | 78.42 | 3281.17 | 6.99 | 37.62 | 1.54 | 3450.79 |
| Area of Jiang huai Mandarin | WB | 103.23 | 7.71 | 7.52 | 3784.15 | 28.42 | 0.05 | 3931.09 |
| | BL | 255.91 | 3.95 | 2.43 | 6.53 | 3638.81 | 0.41 | 3908.05 |
| | UL | 0.03 | 0.05 | 0.05 | 0.00 | 0.03 | 2.03 | 2.19 |
| | Sum | 28,578.75 | 8141.58 | 3417.99 | 3968.03 | 5675.50 | 9.86 | 49,791.72 |

| Regions | 2000 / 2020 | CL | WL | GL | WB | BL | UL | Sum |
|---|---|---|---|---|---|---|---|---|
| Area of Zhong yuan Mandarin | CL | 35,645.64 | 53.63 | 22.97 | 157.02 | 1498.46 | 2.93 | 37,380.66 |
| | WL | 54.15 | 1761.67 | 34.71 | 4.41 | 33.45 | 1.91 | 1890.29 |
| | GL | 17.46 | 35.30 | 1261.99 | 1.68 | 17.76 | 0.00 | 1334.19 |
| | WB | 84.79 | 5.65 | 2.08 | 1359.47 | 16.75 | 0.30 | 1469.05 |
| | BL | 502.90 | 2.40 | 2.09 | 12.31 | 6273.39 | 0.54 | 6793.63 |
| | UL | 0.04 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.35 |
| | Sum | 36,304.98 | 1858.65 | 1323.85 | 1535.20 | 7839.81 | 5.68 | 48,868.17 |
| Area of Hui Dialect | CL | 1332.94 | 138.66 | 4.80 | 2.43 | 85.44 | 0.00 | 1564.28 |
| | WL | 128.25 | 8477.32 | 42.20 | 2.12 | 16.36 | 0.02 | 8666.26 |
| | GL | 6.19 | 39.28 | 767.16 | 0.02 | 1.05 | 0.02 | 813.72 |
| | WB | 1.79 | 2.13 | 0.04 | 34.85 | 0.98 | 0.00 | 39.80 |
| | BL | 6.39 | 2.40 | 0.13 | 0.47 | 73.22 | 0.00 | 82.61 |
| | UL | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.30 | 0.34 |
| | Sum | 1475.57 | 8659.82 | 814.34 | 39.89 | 177.05 | 0.34 | 11,167.01 |
| Area of Hakka Dialect | CL | 1277.57 | 60.87 | 9.27 | 2.00 | 47.25 | 0.00 | 1396.96 |
| | WL | 61.29 | 2343.90 | 7.38 | 0.94 | 20.77 | 0.01 | 2434.30 |
| | GL | 10.12 | 6.85 | 260.39 | 0.15 | 3.11 | 0.01 | 280.63 |
| | WB | 1.87 | 1.02 | 0.19 | 31.35 | 0.19 | 0.00 | 34.62 |
| | BL | 8.08 | 1.04 | 0.21 | 0.07 | 64.93 | 0.00 | 74.32 |
| | UL | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.23 | 0.25 |
| | Sum | 1358.95 | 2413.69 | 277.44 | 34.52 | 136.24 | 0.25 | 4221.09 |
| Area of Gan Dialect | CL | 4566.52 | 188.80 | 17.61 | 26.65 | 169.13 | 0.00 | 4968.71 |
| | WL | 184.96 | 5564.83 | 52.34 | 6.29 | 30.60 | 0.14 | 5839.16 |
| | GL | 18.61 | 49.27 | 1294.00 | 3.29 | 5.79 | 0.02 | 1370.98 |
| | WB | 25.84 | 6.97 | 2.30 | 1111.28 | 1.19 | 0.00 | 1147.58 |
| | BL | 55.50 | 3.91 | 0.62 | 0.66 | 288.54 | 0.00 | 349.22 |
| | UL | 0.00 | 0.12 | 0.04 | 0.17 | 0.00 | 1.07 | 1.39 |
| | Sum | 4851.43 | 5813.91 | 1366.90 | 1148.34 | 495.24 | 1.23 | 13,677.04 |
| Area of Wu Dialect | CL | 3883.67 | 97.17 | 12.96 | 73.65 | 208.67 | 2.98 | 4279.09 |
| | WL | 89.59 | 4739.17 | 35.35 | 3.28 | 25.12 | 0.92 | 4893.43 |
| | GL | 16.63 | 32.68 | 957.15 | 0.68 | 13.90 | 0.03 | 1021.06 |
| | WB | 31.29 | 3.43 | 0.59 | 389.95 | 3.10 | 0.05 | 428.41 |
| | BL | 27.82 | 1.86 | 0.34 | 1.04 | 241.19 | 0.01 | 272.24 |
| | UL | 0.01 | 0.02 | 0.02 | 0.00 | 0.02 | 0.70 | 0.77 |
| | Sum | 4049.01 | 4874.34 | 1006.41 | 468.59 | 491.99 | 4.68 | 10,895.00 |

3.2.3. Factors Influencing Land Use Changes from the Perspective of Regional Dialects

The results of the analysis show that among all types of land use changes, cropland and built-up had the highest proportion of mutual conversion. Therefore, this study first focused on the land that had been converted from cropland to built-up land and used the geographical detector model to explore the potential driving factors and their interactive effects.
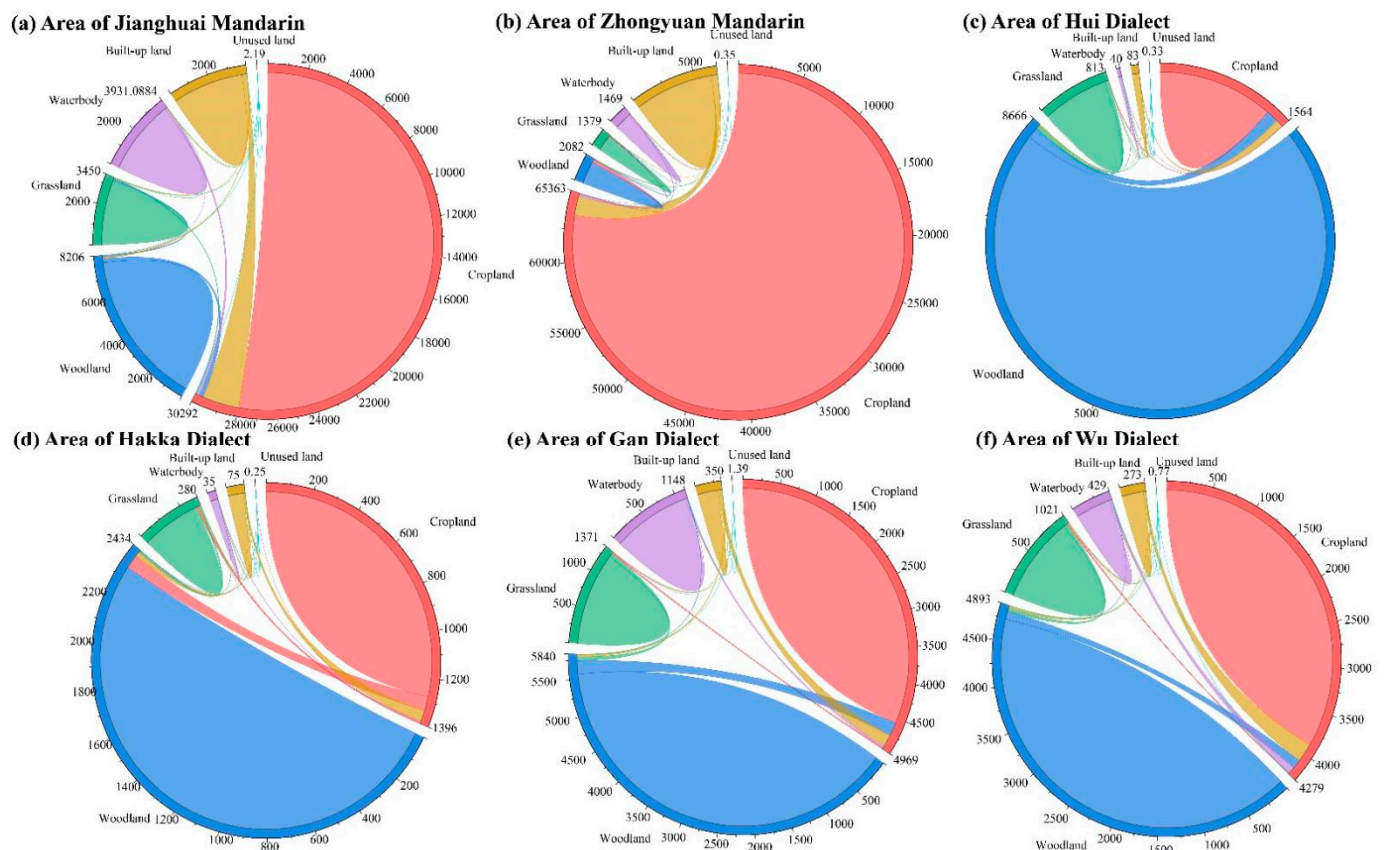
**Figure 6.** Land use change between 2000 and 2020 in different areas: (**a**) Area of Jianghuai Mandarin. (**b**) Area of Zhongyuan Mandarin. (**c**) Area of Hui Dialect. (**d**) Area of Hakka Dialect. (**e**) Area of Gan Dialect. (**f**) Area of Wu Dialect. Notes: In the chord diagram, the color of the lines reflects the direction of land transition between different use types, while the thickness of the lines indicates the magnitude of the flow.

Factor detection results indicated a significant spatial heterogeneity in the driving factors across different dialect regions (Table 5). GDP was the main driving force for the conversion of cropland to built-up land in the area of Jianghuai Mandarin. Population, GDP, and precipitation were the main driving forces for the conversion of cropland to built-up land in the area of Zhongyuan Mandarin. Precipitation was the main driving force for the conversion of cropland to built-up land in the area of Hui Dialect. Population and GDP were the main driving forces for the conversion of cropland to built-up land in the area of Hakka Dialect. Temperature, GDP, precipitation, and DEM were the main driving forces for the conversion of cropland to built-up land in the area of Gan Dialect. Temperature, GDP, precipitation, and DEM were the main driving forces for the conversion of cropland to built-up land in the area of Wu Dialect.

Furthermore, to explore the factors causing the mutual conversion between cropland and built-up land, this study designated the conversion of built-up land to cropland as the experimental group and the conversion of cropland to built-up land as the control group and conducted factor analysis using the ordered logistic model.

**Table 5.** Analysis of the driving factors for the conversion of cropland to built-up land in different dialect areas.

| Variables | (1) Area of Jianghuai Mandarin | (2) Area of Zhongyuan Mandarin | (3) Area of Hui Dialect | (4) Area of Hakka Dialect | (5) Area of Gan Dialect | (6) Area of Wu Dialect |
|---|---|---|---|---|---|---|
| Tem | 0.040 (0.672) | 0.093 (0.259) | 0.073 (0.367) | 0.037 (0.524) | 0.036 ** (0.023) | 0.100 *** (0.007) |
| Pop | 0.004 (0.967) | 0.360 ** (0.027) | 0.004 (0.633) | 0.947 *** (0.000) | 0.031 * (0.055) | 0.080 (0.237) |
| GDP | 0.774 *** (0.000) | 0.291 ** (0.039) | 0.918 (0.000) | 0.530 *** (0.000) | 0.433 *** (0.000) | 0.660 *** (0.000) |
| Pre | 0.017 (0.312) | 0.214 *** (0.009) | 0.101 * (0.031) | 0.053 (0.214) | 0.075 *** (0.000) | 0.078 ** (0.014) |
| Dem | 0.015 (0.635) | 0.083 (0.295) | 0.092 (0.138) | 0.055 (0.353) | 0.044 *** (0.005) | 0.061 ** (0.026) |
| N | 1621 | 1717 | 229 | 122 | 374 | 302 |

Notes: This table reports the q-value for each driving factor; ***, **, and * respectively represent $p < 0.01$, $p < 0.05$, and $p < 0.1$. The $p$-value is within the parentheses.

From the results of the ordered logistic model (Table 6), significant differences can be observed in the factors influencing the conversion between cropland and built-up land among different dialect regions. An increase in economic level would cause the conversion of cropland to built-up land in all dialect regions. In contrast, an increase in DEM would cause the conversion of built-up land to cropland in all dialect regions except for the Hui dialect area. An increase in precipitation would lead to an increase in the conversion of cropland to built-up land in the Jianghuai Mandarin Area and the Zhongyuan Mandarin Area.

**Table 6.** Regression results of the ordered logistic model.

| Variables | (1) Area of Jianghuai Mandarin | (2) Area of Zhongyuan Mandarin | (3) Area of Hui Dialect | (4) Area of Hakka Dialect | (5) Area of Gan Dialect | (6) Area of Wu Dialect |
|---|---|---|---|---|---|---|
| Tem | 0.0041 (0.1143) | 0.0178 (0.1936) | 0.0673 (0.2319) | −0.6089 (0.8846) | −0.0751 (0.1557) | −0.5280 (0.3425) |
| Pop | 0.00005 (0.0001) | 0.00002 (0.0001) | −0.0004 (0.0003) | 0.0002 (0.0004) | −0.0003 (0.0002) | −0.0003 (0.0004) |
| GDP | −0.8214 *** (0.1704) | −2.1452 *** (0.3813) | −1.9504 ** (0.8705) | −0.8451 * (0.4797) | −2.7745 ** (1.2905) | −1.3324 ** (0.5758) |
| Pre | 535.6234 *** (189.5797) | 698.2612 ** (286.2270) | −429.1752 (394.3113) | −1418.4940 (1139.4370) | 380.8869 (288.0725) | −219.7171 (449.1903) |
| Dem | 0.0016 *** (0.0006) | 0.0013 ** (0.0006) | −0.0002 (0.0006) | 0.0068 *** (0.0025) | 0.0005 (0.0006) | 0.0019 ** (0.0008) |
| N | 1811 | 1765 | 379 | 143 | 491 | 390 |

Notes: ***, **, and * respectively represent $p < 0.01$, $p < 0.05$, and $p < 0.1$.

Although the ordered logistic model could identify the factors affecting the mutual conversion between cropland and built-up land, and the coefficients and directions of their effects, nonlinear models should be introduced to depict the extent of the impact of various factors at different times. We referred to Ma et al. (2024) [59] and introduced the RCS based on the ordered logistic model. The results are shown in Figure 7 and Table 7. The red line represents the estimated value, and the two black lines represent the upper and lower 95% confidence intervals. If the Ln OR value of a factor is greater than 0, it indicates that the presence of this factor promoted the conversion of built-up land to cropland; if the Ln OR

value is less than 0, it indicates that the presence of this factor promoted the conversion of cropland to built-up land.
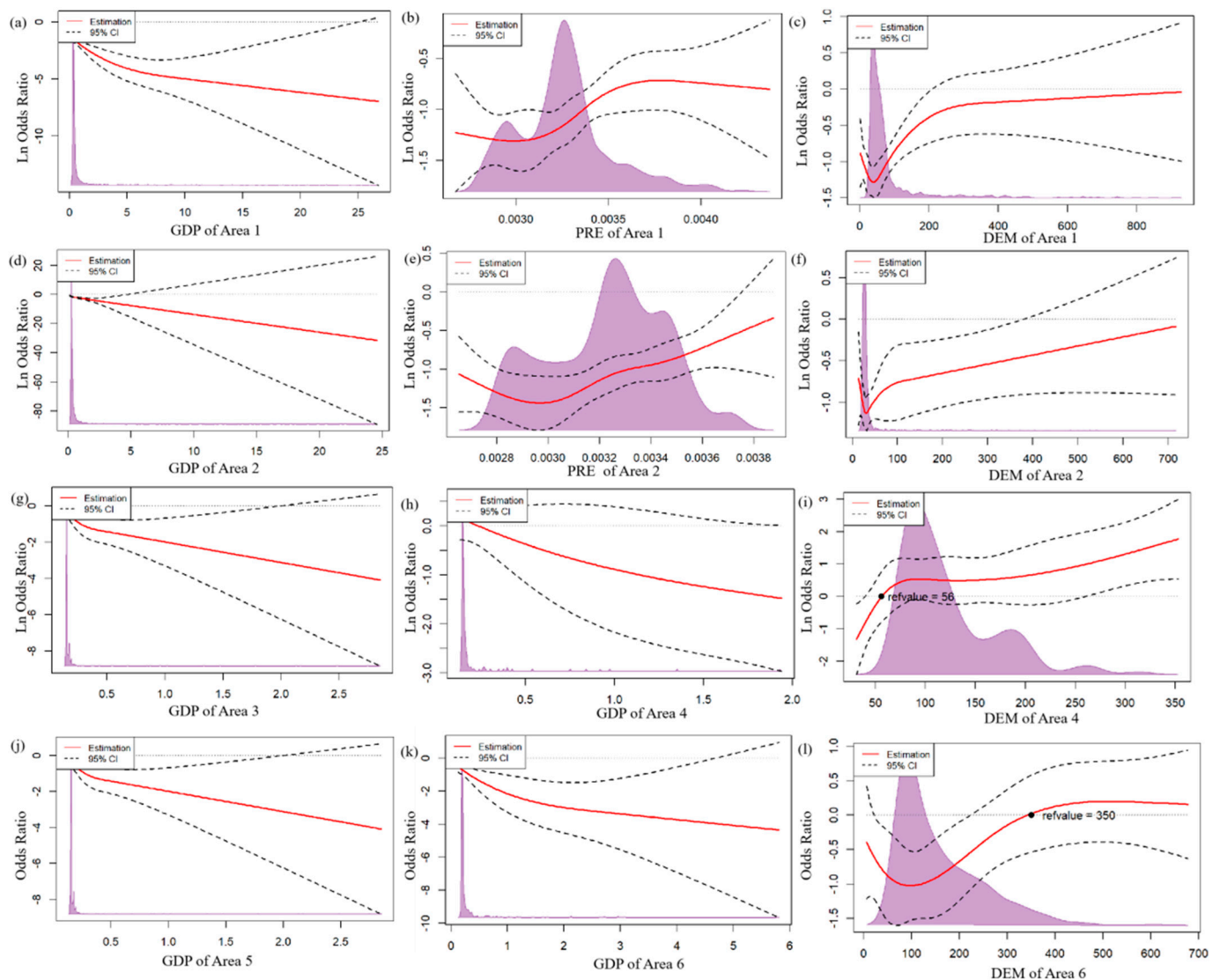


**Figure 7.** The results of the Restricted Cubic Splines. Notes: Areas 1 to 6 refer to the Jianghuai Mandarin, Zhongyuan Mandarin, Hui Dialect, Hakka Dialect, Gan Dialect, and Wu Dialect areas, respectively. (**a**–**l**) report the results of the Restricted Cubic Splines for Area 1's GDP, Area 1's PRE, Area 1's DEM, Area 2's GDP, Area 2's PRE, Area 2's DEM, Area 3's GDP, Area 4's GDP, Area 4's DEM, Area 5's GDP, Area 6's GDP, and Area 6's DEM, respectively.

Specifically, for the five dialect areas other than the Hakka dialect, as GDP continued to increase (Figure 7a,d,g), its effect in promoting the transfer of cropland to built-up land became increasingly higher, which also verified the regression results of the ordered logistic model in Table 6. However, for the Hakka dialect area (Figure 7h), the study found that the promotion of cropland to built-up land by GDP only occurred in some high GDP areas (greater than 1.8) and was not significant in low-value areas. DEM showed no significant effect in the entire Hakka dialect area. In contrast, in the Jianghuai Mandarin area, Zhongyuan Mandarin area, and Wu dialect area, DEM showed a significant effect in promoting the transfer of cropland to built-up land in most intervals, only showing no significant effect when it exceeded a threshold (the threshold for the Jianghuai Mandarin area was 200, for the Zhongyuan Mandarin area was 380, and for the Wu dialect area was 235). Areas with higher DEM might bring a more difficult planting environment, and as the

urban boundary expanded, these areas were more likely to be converted to built-up land. Although the RCS results for DEM did not match the result of the ordered logistic model in Table 6, it could be intuitively seen from Figure 7 that extremely high values of DEM might affect the ordered logistic regression in Table 6, leading to a bias in the estimated results of the ordered logistic regression. We further performed the ordered logistic regression using 5% right winsorized data, and the regression coefficient for DEM turned from positive to negative, verifying the RCS results. PRE promoted the conversion of cropland to built-up land in the Jianghuai Mandarin area and Zhongyuan Mandarin area, but this promoting effect continuously weakened as precipitation increased.

**Table 7.** The monotonicity and threshold of variables' influence.

| Factors Area | Area of Jianghuai Mandarin | Area of Zhongyuan Mandarin | Area of Hui Dialect | Area of Hakka Dialect | Area of Gan Dialect | Area of Wu Dialect |
|---|---|---|---|---|---|---|
| Tem | N | N | N | N | N | N |
| Pop | N | N | N | N | N | N |
| GDP | + | + | + | N→+ (1.8) | + | + |
| PRE | − | − | N | N | N | N |
| DEM | +→N (200) | +→N (380) | N | N | N | +→N (235) |

Notes: N means no significant effects; Red filling indicates an increasing trend of the marginal effect; Green filling indicates a decreasing trend of the marginal effect; Yellow filling indicates the presence of a threshold in the process, and parentheses contain the mutation threshold.

### 3.3. Land Use Specific Behavior Under LDA Topic Model

This study selected local gazetteers from 16 counties and cities in Anhui Province. These local gazetteers are important documentary materials comprehensively recording various aspects of the local areas, including physical geography, historical evolution, politics and economy, and social culture. Texts related to land use were extracted from them and divided into six data documents according to dialect divisions. The optimal number of topics for the Central Plains Mandarin, Jianghuai Mandarin, Gan, Hakka, Wu, and Hui dialect regions were determined to be 3, 2, 3, 3, 3, and 2, respectively, using perplexity curves.

Through LDA topic modeling, this study obtained the themes of the six dialect regions in Anhui Province, China, and the high-probability characteristic words for each theme. The top six high-probability characteristic words to illustrate their main land use behaviors are presented in Table 8.

Building on Table 9 and integrating the theoretical mechanisms presented earlier in this paper, this study categorizes the characteristic words of different dialect areas into three groups, themed around land—use behaviors, fields, and habitus, respectively. Subsequently, a summary of these characteristic words is conducted, leading to the following table.

Within diverse dialect regions, land use behaviors manifest distinct characteristics. By integrating the characteristic words associated with different themes, we have discerned that disparities in regional dialects give rise to varied social psychologies and cultural pursuits, which, to a certain extent, account for the differentiation of land use behaviors. Different land use behaviors construct diverse fields by shaping the spaces for social activities, and further exert influence on human production and daily life, thus forming distinct social habitus. Based on this, the present study is enabled to delve deeper into the correlation between language culture and the economy, and offer references for the coordinated development of regions.

**Table 8.** Subject Terms of Datasets within Diverse Dialect Regions.

| Topic Area | Zhongyuan Mandarin | Jianghuai Mandarin | Gan Dialect | Hakka Dialect | Wu Dialect | Hui Dialect |
|---|---|---|---|---|---|---|
| Topic1 | project, industrial park, company, land, residential building, land acquisition | pavement, company, covered area, Chuzhou, sidewalk, overall length | annual output, cultivation, fall head, total output, pisciculture, ten thousand wei | rice, product, peanut, oil crops, sesame, level | environment, drain away water, county, plan, land, residence community | service, organization, village, travel, plan, hydropower, station |
| Topic2 | manage, environmental, production, improve, pollute, work, control | per unit yield, rice, oilseed rape, tree farm, two flanks, cotton | rice, period, crop, rice field, total output, water plant | tree farm, shrub, afforestation, grassland, tung tree, gardens | wild rice, watermelon, peach, ten thousand, mu, yield, clover | watermelon, rice, Gantang, tea, fruit, yield |
| Topic3 | wheat, per unit yield, total output, soybean, reclamation | / | construction company, catch, manage, coteau, power plantresidence | county, plan, building, construction, bureau, town, power plant, residence | raise, rice, primarily, import, wheat, ten thousand, mu | / |

On one hand, dialects serve as crucial carriers of regional culture. Through the integration of dialect regions with fields, habitus, and land use behaviors, the table demonstrates the impact of regional language culture on economic activities. For example, the fields, habitus, and land use behaviors in the Huizhou dialect region, respectively, encompass "Ancient Huizhou Charm, Cultural Heritage and Economic Development", which embodies the close integration of the local traditional culture and tourism development, and reflects the unique role of regional culture in economic development. Understanding this correlation facilitates our more effective utilization of regional cultural resources in the process of economic development and promotes the integrated development of the cultural industry and the economy.

On the other hand, through the classification and analysis of the characteristic words in different dialect regions, we can identify the advantages and disadvantages of each region in aspects such as economic development, agricultural production and land use. For instance, the Jianghuai Mandarin region features abundant rainfall and prosperous trade, which is conducive to the transportation of agricultural products and land development in the surrounding areas. This provides a foundation for the coordinated development among regions and promotes resource complementarity, industrial cooperation, and experience exchange among regions.

**Table 9.** Characteristic Terms Summarized under the Theoretical Mechanism.

| Dialect Area | Land Use Behavior | Field | Habitus |
|---|---|---|---|
| Zhongyuan Mandarin | Intensive land use, Centralized management, Land consolidation, Land development, Land acquisition | Economic growth, Urbanization, Fertile land | Meticulous calculation, Cooperative overnance, Wheat cultivation |
| Jianghuai Mandarin | Road construction, Land development, Cultivated land reclamation | Transportation hub, Well—developed water system, Abundant rainfall | Trade exchange, Transportation, Rice cultivation |

**Table 9.** *Cont.*

| Dialect Area | Land Use Behavior | Field | Habitus |
|---|---|---|---|
| Gan dialect | Terrain transformation, Water conservancy construction, Land consolidation | Interlaced mountains and waters, Complex terrain, Inconvenient transportation | Hard working, Nature transformation, Breeding operation |
| Hakka dialect | Forest land reclamation, Conversion of farmland to forest, Land transfer, Ecological services | Ecological protection, inconvenient Transportation, Beautiful mountain and water scenery | Reverence for nature, Nature protection, Afforestation |
| Wu dialect | Cultivated land development, Land consolidation, Drainage and irrigation | Rural idyll, Land of fish and rice, Hilly plains | Simple and honest work style, Agricultural farming, Seedling raising and crop rotation |
| Hui dialect | Scenic area development, Historical building protection, Orchard and tea garden construction | Long history, Ancient Huizhou charm, Tea and fruit base | Cultural inheritance, Tea export, Fruit picking |

## 4. Discussion

*4.1. Relationship Between Land Use Change and Its Behavioral Characteristics and the Dialect-Culture Pattern*

We combined the data and research findings from the previous three subsections and summarized the main types, characteristics, and behaviors of land use in the Anhui region against the backdrop of dialect divisions and their features, as shown in Table 10.

**Table 10.** Changes and Characteristics of Land use Behaviors in Diverse Dialect—cultural Zones.

| Dialect Areas and Their Characteristics | Corresponding Cultural Circles | Main Type of Land Use | Characteristics of Land Use Change | Characteristics of Land Use Behavior |
|---|---|---|---|---|
| The characteristics of Zhongyuan Mandarin are the historical full-obscure initials have undergone devoicing, with the modern pronunciation of voiceless stops, affricates merging with aspirated sounds for level tones, and unaspirated sounds for oblique tones, and the departure tone does not distinguish between yin and yang; historically clear initials and sub-obscure initials with entering tone syllables are now pronounced with a light level tone, while full-obscure initials with entering tone syllables are now pronounced with a heavy level tone. | the Huai River culture | Cropland | The amount of cropland transferred out was significantly greater than the amount transferred in, with the majority of the loss being diverted to built-up land and water bodies and a small portion being converted to unused land; newly added built-up land mainly originated from cropland. | Faced with the optimization, transformation, and environmentally friendly development of land resources, the main crops are wheat and soybeans, with an emphasis on per-acre yield, total output, and agricultural reclamation rate. |

| Dialect Areas and Their Characteristics | Corresponding Cultural Circles | Main Type of Land Use | Characteristics of Land Use Change | Characteristics of Land Use Behavior |
|---|---|---|---|---|
| The characteristics of Jianghuai Mandarin are the historical full-obscure initials have undergone devoicing, with modern pronunciations of stops and affricates in level tones merging into aspirated sounds and in oblique tones merging into unaspirated sounds. In contrast, the departing tone does not differentiate between yin and yang. The historical entering tone is still preserved in modern speech, and most of them are with a glottal stop coda. | the Luzhou culture | Cropland | The amount of cropland transferred out was much greater than the amount transferred in, with the majority of the loss being diverted to built-up land and a small portion being converted to unused land. The amount of built-up land transferred in was greater than the amount transferred out, with the increase primarily sourced from cropland. Fluctuations in other types of land were relatively minor. | Land use pursues systematic and scientific approaches. The modernization level of construction and transportation land is relatively high. The main crops are rice, rapeseed, cotton, hemp, etc. |
| | the Wanjiang culture | Cropland | | |
| The characteristics of the Gan dialect are the historical full-obscure initials have undergone devoicing, with modern pronunciations of stops and affricates in level tones merging into aspirated sounds and in oblique tones merging into unaspirated sounds; the departing tone does not distinguish between yin and yang; some fully obscured entering tone characters are now read in the yang departing tone. | the Wanjiang culture | Woodland and cropland | The conversion between woodland and cropland had essentially achieved a dynamic balance. The loss of woodland, cropland, and grassland was diverted to built-up land. Fluctuations in other types of land were relatively minor. | In addition to planting traditional rice and rapeseed, the aquaculture and fish farming industries are also well-developed. |
| The characteristics of the Hakka dialect are the historical full-obscure initials have undergone devoicing, with modern pronunciations of stops and affricates merging into aspirated clear sounds regardless of level or oblique tones; there are no dental fricatives or retroflex sounds, and monosyllabic words are prevalent and preserved ancient entering tone characters. | the Huizhou culture | Woodland and cropland | The conversion between woodland and cropland had essentially achieved a dynamic balance. The loss of woodland, cropland, and grassland was diverted to built-up land. Fluctuations in other types of land were relatively minor. | Land use is adapted to local conditions, and the gardening industry is well-developed; the main crops, in addition to rice, include sesame, peanuts, and other oil-bearing crops. |
| The characteristics of the Wu dialect are the systematic retention of full-obscure initials is characterized by a tripartite division of voiceless, aspirated, and full-obscure initials in modern pronunciation; the departure tone is divided into yin and yang; some full-obscure entering tone characters are now read as yang departure tone. The occlusive components of ancient voiced stops have mostly transformed into sonorants; voiced affricates have largely evolved into fricatives. | the Wanjiang culture | Woodland and cropland | The transfer of cropland into woodland was slightly greater than the transfer out. The loss of woodland and cropland was diverted to built-up land, with a small portion being converted to unused land. The increase in cropland primarily came from grassland. | Land use focuses on environmentally friendly development and scientific planning, characterized by the development of multi-cropping rice and a thriving vegetable industry. The main crops, in addition to rice and wheat, include water bamboo shoots, peaches, and other fruits and vegetables. |
| | the Hui dialect | Woodland and cropland | | |

**Table 10.** *Cont.*

| Dialect Areas and Their Characteristics | Corresponding Cultural Circles | Main Type of Land Use | Characteristics of Land Use Change | Characteristics of Land Use Behavior |
|---|---|---|---|---|
| The characteristics of the Hui dialect are the historical full-obscure initials have typically undergone devoicing, with modern pronunciations of stops and affricates merging into aspirated clear sounds regardless of level or oblique tones; there are no dental fricatives or retroflex sounds, and monosyllabic words are prevalent and preserved ancient entering tone characters. | the Hui dialect | Woodland and cropland | The transfer of cropland into woodland was slightly greater than the transfer out; the loss of woodland and cropland was mainly diverted to built-up land; fluctuations in other types of land were relatively minor. | Emphasizes urban and rural planning. The tourism industry is well-developed, with considerable export-oriented land use behavior. The main crops, in addition to rice, include tea, various flowers, fruits, etc. |

### 4.2. The Guiding Logic of the Field

Similar or identical land use behaviors play a formative role in constructing a "field" by molding the social activity space. The land use practices and experiences within a specific field engender internalized knowledge among particular groups, which in turn regulate and restrain the behavioral activities of the population. This process further influences the regional dialects and cultures through the establishment of habitus. For instance, the urban agglomerations within the Huaihe River Basin of Anhui have a predilection for developing a combined land use mode integrating traditional farming and construction. The land is utilized predominantly as cultivated land, with crops such as wheat, sorghum, rice, and soybeans being commonly cultivated, exhibiting a high degree of similarity to the bordering regions like the southeastern part of Henan Province and the northwestern part of Jiangsu Province. The congruence in land use behaviors prompted the social groups in this area to form a field and habitus, leading to analogous choices in dialects and cultures. As a result, the Zhongyuan Mandarin and Huaihe River Cultural Region have emerged, notwithstanding their administrative division across several different provinces and municipalities.

The homogeneity in land use begets parallel choices in dialects and cultures. Conversely, the spatial disparities in land use also precipitate variances in language and culture, which are particularly conspicuous in the vocabulary systems of dialects [64]. During the compilation of local chronicles, this study unearthed that the dialects of the Jianghuai Mandarin, Wu, and Hui dialect regions have long-standing dialect words related to the character "wei", such as "wei han" and "wei tian". For example, the local chronicles record, "As for the wei han and similar landforms, they are the very means by which the people sustain their livelihood" [65] and also, "Several prefectures in southern Anhui rely entirely on the wei tian for their sustenance, with the official wei in Taiping Prefecture and the Jinbao wei in Ningguo Prefecture being of particular significance" [66]. In contrast, such "wei"-related dialect words are scarcely found in the dialects of the Zhongyuan Mandarin area. Our investigations reveal this divergence in the dialect vocabulary system is correlated directly with the idiosyncrasies of land use behaviors. During the Ming and Qing Dynasties, Luzhou and Anqing Prefectures in central and southern Anhui were renowned grain-producing regions across the country, with the wei han and wei areas serving as principal grain-producing zones [67]. The term "wei" denotes a dyke, while "han" refers to the land enclosed by a dike. "Wei han" represents a type of land in low-lying areas, surrounded by dikes to fend off floodwaters, and is commonly employed for agricultural cultivation in regions with a dense water network. This form of land use is rarely witnessed in the Zhongyuan Mandarin area. This dialect word not only chronicles the long-term land

use behaviors of the people in central and southern Anhui but also mirrors the wisdom and practices of the people in the riverine and lacustrine regions in their struggle against water and utilization of the land. It also serves as compelling evidence of the impact of spatial differences in land use patterns on the development of dialect vocabulary.

The language and culture of ethnic groups have intricate correlations closely intertwined in terms of land use. Even if they presently employ different dialect types, a genetic relationship predicated on a shared original language may still exist [68]. In the context of Chinese, it is generally acknowledged that most dialects lack oral mutual intelligibility. However, this does not imply that different Chinese dialects constitute distinct languages. Rather, they exhibit significant historical stratification differences, signifying that they retain the characteristics of Ancient Chinese at specific historical junctures to varying extents [69]. The resemblance in land use behaviors and spatiotemporal evolution patterns between the Hui and the Wu dialect areas in Anhui is pronounced. The proportion of planted gardens in both regions is relatively elevated; the fruit and vegetable cultivation industries are comparably developed, and both have gravitated towards modern high-income land use modalities at an earlier stage. The similarity in land use behaviors intimates a linguistic kinship. Research in historical linguistics has substantiated that the Hui dialect area was likely part of the Wu dialect area prior to the Western Jin Dynasty. The Hui dialect evolved from the Wu dialect, and the two have maintained a close rapport ever since. Consequently, the relationship between the Hui and the Wu dialects is intimate, with numerous similarities observable in pronunciation, vocabulary, and grammar.

*4.3. Significant Impact of Mobility Mechanisms*

Under the influence of Social Darwinism, social groups within a certain region are drawn by various factors such as economic, political, and geographical conditions and thus migrate towards areas that offer more favorable prospects for development. In the context of diverse cultures, one of the principal causes for the shift from a state of isolation to one of mutual interaction and infiltration is population migration or immigration. Immigration leads to the dissemination of cultures and facilitates the exchange and fusion of different regional cultures, giving rise to new cultural forms and propelling cultural advancement [70]. Simultaneously, population migration also induces substantial alterations in language. In the dialect map of Anhui Province, Qingyang County is encircled by the Xuanzhou Wu dialect area in southern Anhui.

Nevertheless, the prevalent dialect in the local area is Jianghuai Mandarin. The "guest dialect" spoken by the majority of residents in Qingyang County, which falls within the Gan dialect region-Wanjiang Cultural Circle, encompasses elements of the Hunan dialect, Hubei dialect, and the Jianghuai Mandarin from regions such as Wuwei, Tongcheng, Zongyang, and Anqing. The majority of these immigrants have settled in the eastern and northern townships of the county [71]. Hubei immigrants who communicate in the Hubei dialect are also dispersed in areas like Shuanghe, Youhua Township, and Anshan, Xinhe Township in Qingyang. Hunan immigrants are chiefly distributed in Youhua and Dingqiao Townships in Qingyang, speaking the Xiang dialect [72]. The root cause of this phenomenon is that subsequent to the Taiping Heavenly Kingdom War, immigrants from Henan, Hubei, and the northern part of Anhui migrated in large numbers into the various counties and districts in southern Anhui, including Qingyang County, due to the ravages of the war. During this period, the indigenous population either perished or dispersed, and the proportion of immigrant settlers far surpassed that of the native inhabitants. Consequently, a dominant dialect like Jianghuai Mandarin, with a growing number of speakers, has had a profound impact on the indigenous language, to the extent that Jianghuai Mandarin has supplanted

the indigenous dialect in most parts of Qingyang County. Only a scant number of elderly native residents in Qingyang Chengguan are still able to converse in the local dialect.

The influx of a substantial number of foreign immigrants has led to the replacement of the local indigenous language by the immigrant dialect system, which has subsequently emerged as the new lingua franca. Facilitated by convenient communication channels, the land use policies and methods from the place of origin were disseminated, tending to supplant and assimilate the pre-existing land use patterns in the destination area, bringing about conspicuous changes in the land use scenario within the region. According to the local chronicles of Qingyang County, prior to the Taiping Heavenly Kingdom Movement, the original acreage of farmland in Qingyang County amounted to 1,637 hectares and 39 mu, with a fractional remainder. However, following the Taiping Heavenly Kingdom Movement and with the arrival of a large number of immigrants, the rate of farmland reclamation in Qingyang County witnessed a rapid upsurge [73]. As recorded in the county annals, "From the commencement of reclamation in the early Tongzhi period (1862) until the 16th year of the Guangxu period (1890), a cumulative total of 756 hectares, 42 mu, 3 fen, 0 liang, 9 hao, 2 si, and 5 hu of mature farmland had been reclaimed" [74]. Concurrently, due to the significant number of deaths among the original residents during the war, numerous agricultural lands and forest farms were rendered ownerless and barren. Thus, immigrants from regions such as Luzhou and Anqing Prefectures became the new proprietors of these lands. Subsequent to the completion of the dialect substitution, the immigrant settlers from Anqing introduced the permanent tenancy system to Qingyang County, which had a momentous impact on the local land use situation. The implementation of the permanent tenancy system afforded farmers a relatively stable outlook regarding land use, enabling them to undertake long-term investments in the land, such as soil amelioration and the construction of small-scale water conservancy projects. It also catalyzed a transformation in the land production relations within Qingyang County.

*4.4. Significance of Establishing the Comparison*

This study highlights that analyzing the spatiotemporal evolution of land use and its bidirectional interactive relationships from the perspective of regional dialects is of interdisciplinary significance. From the perspective of research methodology, compared with existing studies, the research methods employed in this paper have made innovative contributions to the study of land use and its relationship with dialectal zoning. on the one hand, similar studies mostly use the land use transition matrix at a relatively macro scale (such as national scale or multi-regional scale) to depict the patterns of land use transition [51,75,76]. While this approach can yield more pronounced results, for the study area of this paper, Anhui, which is a relatively diverse and complex region, natural conditions (such as the Yangtze River and Mount Huangshan) form natural barriers to language communication and cultural exchanges. The land use situations among different regions are highly intricate. A single—zone approach may overlook the geographical scale effects. Therefore, our research starts from a more micro perspective and constructs a land use transition matrix which interacts with dialect zoning to more accurately measure the regional differences in land use situation. On the other hand, based on the commonly used geographically weighted regression and econometric models (such as the ordered logistic regression and two—way fixed effect model) by predecessors [27,63], we introduce the restricted cubic spline method. This not only makes the results more intuitive and clear, but also characterizes the threshold values at which influencing factors play a significant role and their effects under different values.

For the study and dissemination of dialect culture, land use behavior is an important factor affecting the division of dialects and culture, and the spatiotemporal evolution of land

use patterns is also one of the windows to observe the accuracy of the divisions. The formation, distribution, and evolution of Chinese dialects are related closely to non-linguistic factors, such as natural and human geography. Therefore, the division of Chinese dialects should be based on the inherent characteristics of the language itself while fully integrating non-linguistic factors. Dialect areas that span mountains, rivers, and administrative regions are often closely related to natural geography, historical migration, historical administrative divisions, and cultural regions. Land use, as a social activity of a group within a region, inevitably has a significant impact on the distribution and development of the regional dialect. Historical migration materials may be incomplete, but the land use behavior of a certain social group is inherited in an orderly manner. Hence, we can determine more accurately the historical migration or communication activities that may have occurred in a specific area by observing changes in the land use patterns of that area. The findings could provide empirical evidence for dialect research, especially for the study of historical comparative dialectology. They may contribute to the phylogenetic classification of related languages in some dialect-mixed areas.

For land use planning and management, by comparing the land use behaviors of different dialects and cultural regions, we can gain a deeper understanding of how dialects influence land use patterns and create spatiotemporal differences in land use patterns. The guiding logic of "cultural spirit" refers to the rational awareness deep within culture that is guided by the physical environment of the national territory, highlighting the unique qualities and developmental logic of a culture. The territorial space is not only the material carrier on which natural resources depend but also the place and environment for the survival of the nation, and thus should be considered as the spatial unity of material and spiritual civilization. Specific dialects and cultures shape the spiritual guidance of social groups, leading to the specificity of land use behavior and its spatiotemporal evolution within different dialects and cultural regions. When planning and managing land resources, only by fully learning and mastering the dialect and culture of the area can we grasp the spiritual core of the local social group and formulate policies that are in line with the regional development logic.

The comparison between Chinese dialect-cultural divisions and land use involves multiple disciplines, including linguistics, land science, and sociology. The interdisciplinary research approach helps to delve into land use issues from different perspectives, explain the historical evolution of dialects, and enrich the theories and practices in related fields. Overall, it not only helps in protecting and preserving dialectal culture but also promotes social integration, supporting land use planning and management and enhancing the ability to respond to global environmental changes.

*4.5. Limitations of the Study*

However, this study has some limitations. Firstly, the situation of language distribution is complex, and the kinship relationships among various dialects are also intricate. This complexity stems from social factors such as historical migrations and intermarriages. For example, in southern Anhui, there are some mixed dialect areas formed due to migrations. Owing to the overly complex language systems, this study was unable to elaborate on the characteristics of each small dialect region in detail. Moreover, it is difficult to identify patterns in the land use situations within these areas, and it is impossible to establish a one-to-one correspondence with specific dialect cultural regions because their distributions are too scattered. Therefore, this study only presents the results of the main regions where dialects are concentrated and cultural commonalities are high, and it cannot generalize the actual situations of all regions in Anhui Province.

Secondly, this study focuses on text analysis and theoretical demonstration, and based on the situations of dialect and cultural zoning, it explains the specificity of land use behaviors. However, the interactive relationship between dialect culture and land use can be influenced by multiple factors. Different natural and economic environments, adjustments in national policies regarding dialects and land use planning, etc., may all lead to other changes in language culture and land use behaviors. Therefore, more empirical evidence is still needed to determine the interaction between dialect culture and land use behaviors.

Finally, this study basically only used synchronic materials when analyzing regional dialects, and did not conduct a comparative study between the historical evolution of dialects and the spatiotemporal evolution of land use behaviors. In fact, diachronic evolution contains a great deal of important information, which can explain some situations of dialect mixing and the reasons for the changes in the spatial patterns of land use. If the results of diachronic investigation are combined with synchronic text analysis, the results will be more scientific.

## 5. Conclusions and Recommendations

This study provides the outcomes of a text analysis, which endeavors to disclose the spatiotemporal evolution of land use and its bidirectional interactive nexus from the vantage point of language and culture. With Anhui Province as the research domain, the land use behavior preferences and their corresponding spatiotemporal evolutionary patterns within six distinct language and culture regions were statistically examined, and the mechanism underpinning their interaction was expounded. The findings reveal that pronounced spatial heterogeneity exists in land use alterations, utilization behaviors, and their driving forces across different language and culture regions. On the one hand, analogous or identical land use behaviors fabricate "fields" by molding social activity spaces. The land use practices and encounters within specific fields engender internalized knowledge among particular groups, which in turn regulate and circumscribe people's behavioral activities, and, through the cultivation of habitus, impact the regional dialects and cultures.

On the other hand, social groups situated within the same language and culture region, subject to natural selection, gravitate towards developed areas. This migration leads to the progressive supplanting of indigenous languages in the immigration destinations by new dialect systems, concomitantly influencing the cultural psyche and social production activities of the recipient social groups. Moreover, facile language communication further facilitates the dissemination of land use methodologies from the areas of origin, exerting a substantial influence on land use behaviors in immigration destinations [77].

Through the two-way interactive mechanism between language culture and land use behaviors, we have discovered that culture can shape human behaviors through language. This is because language serves as the material carrier of culture and a tool for cultural exchange and dissemination, and it is the optimal link connecting the spiritual civilization represented by culture and the material civilization represented by land. With language as the bond, culture interacts with and influences human behaviors, forming an organic whole. Within this cultural behavior complexes, culture shapes people's ways of behavior, thinking patterns, and emotional expressions through various forms. Conversely, human behaviors continuously create, inherit, and transform culture. The two are closely intertwined and inseparable, jointly influencing human social production and daily life.

Consequently, within the purview of land use and management research, the cardinal principle of tailoring measures to local circumstances should be adhered to in the implementation of land policies [78]. Specifically, when devising land use policies, more refined

and precise planning should be executed in accordance with language and cultural demarcations, thoroughly considering the idiosyncrasies of diverse dialects and cultural regions. Particularly during the policy pilot phase, emphasis should be placed on preserving the pliability of the policy to ensure its adaptability to the actual conditions of different dialect regions. Secondly, in the course of land planning, it is insufficient to only analyze economic, geographical, and other factors; rather, cultural carrying capacity and dialect elements must also be incorporated into the consideration framework to guarantee the scientific and rational nature of the planning schema. When implementing specific land policies, a greater number of diverse dialect regions should be selected as pilot sites to conduct in-depth investigations into the universality of the policies within disparate language and cultural contexts, enabling the timely detection of issues and the implementation of optimization adjustments. Finally, in the practice of land management, managers should recruit and appoint certain local cadres, especially those with an in-depth understanding of the local language and culture capable of spontaneously making appropriate modifications to the policies in light of the actual situation during the policy implementation process. In turn, it will foster the organic integration of spiritual and material civilizations, propel the efficient progress of land use and management undertakings, actualize the coordinated development of society, economy, and culture, and augment the comprehensive benefits of regional development.

This study reveals the complex relationship between language culture and land use behaviors from a brand-new perspective. It not only blazes a new trail in the field of linguistic research but also offers valuable insights for future research in the areas of land use and land cover. The innovative exploration of the bidirectional interactive relationship not only enriches the theoretical framework but also provides practical guidance for land-related decision making. In the future, should the examination results of the diachronic evolution of dialects be integrated with the spatio-temporal changes in land use, and the changes in different periods be correlated one-to-one, we will be able to uncover how historical language cultures and land use behaviors have influenced each other and developed in tandem within this region. This will further advance the knowledge established in this study and fill the gaps that remain unfilled.

**Author Contributions:** Conceptualization, B.H.; methodology, X.C. and G.F.; software, X.C. and J.K.; validation, X.C. and B.H.; formal analysis, X.C. and B.H.; investigation, G.F.; resources, B.H.; data curation, B.H. and Z.W.; writing—original draft preparation, X.C.; writing—review and editing, B.H.; visualization, G.F.; supervision, B.H. and W.X.; project administration, B.H.; funding acquisition, X.C. and B.H. All authors have read and agreed to the published version of the manuscript.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author due to restrictions.

**Conflicts of Interest:** The authors declare no conflicts of interest.

# References

1. Smith, J.A. The Role of Cultural and Material Civilization in Sustainable Development. *J. Sustain. Dev.* **2023**, *15*, 45–62.
2. Good, D.F. The Interplay of Material and Spiritual Civilization in Modernization and Sustainable Development. *J. Glob. Ethics* **2022**, *18*, 235–252.
3. Coral, C.; Bokelmann, W.; Bonatti, M.; Carcamo, R.; Sieber, S. Agency and structure: A grounded theory approach to explain land-use change in the Mindo and western foothills of Pichincha, Ecuador. *J. Land Use Sci.* **2020**, *15*, 547–569. [CrossRef]
4. Kristine, H. On the Relationship between Language and Culture. *Armen. Folia Angl.* **2011**, *7*, 1046991.

5.    Teng, X.; Wen, C. Study on the Influence of Cultural Diversity on the Environmental Behavior of Migrant Population: An Empirical Analysis Based on Dialect Distance. *China Environ. Manag.* **2024**, *2*, 15–25.

6.    Anthony, C.D.; Innocent, C.E. Indigenous Language, Technology-Education and Human Spiritual Potentialities. *Open J. Philos. OJPP* **2023**, *13*, 134053.

7.    Zhuang, C. The Relationship between the Geographical Pattern of Guangdong Dialects and Natural and Historical Geography. *J. Inst. Chin. Stud.* **2008**, *48*, 408–427.

8.    Xia, F.; Lu, P. Can mixed land use promote social integration? Multiple mediator analysis based on spatiotemporal big data in Beijing. *Land Use Policy* **2023**, *132*, 106800. [CrossRef]

9.    Fontein, J. Languages of land, water and 'tradition' around Lake Mutirikwi in southern Zimbabwe. *J. Mod. Afr. Stud.* **2006**, *42*, 223–249. [CrossRef]

10.    Alessandro, P.; Raffaele, P.; Francesco, C. Understanding Farmers' Willingness to Adopt Conservation Agriculture in Central Italy: The Role of Socio-Economic and Psychological Factors. *Land* **2024**, *13*, 103390.

11.    Ahmed, A. Rural Energy Communities as Pillar towards Low Carbon Future in Egypt: Beyond COP27. *Land* **2023**, *12*, 2349.

12.    Sandim, A.; Silva, M.E.; Fernandes, P.; Fonseca, T. Enhancing Sustainability and Yield in Maritime Pine Forests: Evaluating Silvicultural Models for Natural Regeneration. *Land* **2024**, *13*, 170. [CrossRef]

13.    de Saussure, F. *Course in General Linguistics*; Payot Press: Paris, France, 1916.

14.    Li, R.; Fu, M. *Language Atlas of China*; The Far East Publisher: Hong Kong, China, 1987.

15.    Lv, J. *The Distribution Pattern of Chinese Dialects and Its Relationship with Physical and Human Geography*; Zhonghua Book Company: Beijing, China, 2019.

16.    Koerner, E.F.K. Myths in the history of linguistics the case of the goals of georg wenker's dialectology. *Folia Linguist. Hist.* **2003**, *37*, 1–22. [CrossRef]

17.    Leo, S. Jules Gilliéron on JSTOR. *Z. Für Französische Sprache Lit.* **1926**, *48*, 506–511.

18.    Yuan, J. *An Outline of Chinese Dialects*; Language and Literature Publishing House: Beijing, China, 2021.

19.    Takuya, T.; Yasuo, I. Quantifying the spatial pattern of dialect words spreading from a central population. *J. R. Soc. Interface* **2020**, *17*, 20200335.

20.    Antonella, S. Language and Identity in the Balkans: The Case of Albanian Dialects. *J. Balk. Near East. Stud.* **2020**, *22*, 1–17.

21.    Jacek, F. *Handbook of Language and Cultural Heritage*; De Gruyter Mouton Press: Berlin, Germany, 2018.

22.    Lieselotte, A. *The Morphology of English Dialects*; Cambridge University Press: London, UK, 2009.

23.    Timothy, B. *Ethical Land Use: Principles of Policy and Planning*; The Johns Hopkins University Press: Baltimore, MD, USA, 1994.

24.    Zhang, F.-E.; Wang, X.; Su, H.; Yong, Y. The influence of functional zoning on land use and travel behavior in Shanghai, China. In Proceedings of the International Association for China Planning Conference (IACP), Wuhan, China, 17–19 June 2012.

25.    Huang, K.; Xia, F. Classification of rural relative poverty groups and measurement of the influence of land elements: A questionnaire-based analysis of 23 poor counties in China. *Land* **2023**, *12*, 4–918. [CrossRef]

26.    Song, X.P.; Hansen, M.C.; Stehman, S.V.; Potapov, P.V.; Tyukavina, A.; Vermote, E.F.; Townshend, J.R. Global land change from 1982 to 2016. *Nature* **2018**, *560*, 639–643. [CrossRef]

27.    Zhou, Y.; Zhong, Z.; Cheng, G. Cultivated land loss and construction land expansion in China: Evidence from national land surveys in 1996, 2009 and 2019. *Land Use Policy* **2023**, *125*, 106496. [CrossRef]

28.    Liu, S.; Deng, Y.; Huang, Y.; Qin, X. Research Progress and Prospect of Farmers' Land Use Behavior at Home and Abroad Based on CiteSpace. *Agric. Technol.* **2025**, *45*, 143–149.

29.    Atukunda, P.; Eide, W.B.; Kardel, K.R.; Iversen, P.O.; Westerberg, A.C. Unlocking the potential for achievement of the UN Sustainable Development Goal 2—'Zero Hunger'—In Africa: Targets, strategies, synergies and challenges. *Food Nutr. Res.* **2021**, *65*, 29219. [CrossRef] [PubMed]

30.    Masashi, S.; Kevin, J.G. Towards a unified understanding of human–nature interactions. *Nat. Sustain.* **2022**, *5*, 374–383.

31.    Bai, W.; Zhang, Y. Analysis of Traditional Cultural Factors in the Land Use Change of the Qinghai-Tibet Plateau. *Resour. Sci.* **2002**, *4*, 11–15.

32.    Xia, F.; Huang, Y.; Dong, L. Comparison of comprehensive benefits of land-use systems under multi-and single-element governance. *Land Use Policy* **2024**, *141*, 107164. [CrossRef]

33.    Qu, L.A.; Chen, Z.; Li, M.; Zhi, J.; Wang, H. Accuracy improvements to pixel-based and object-based LULC classification with auxiliary datasets from Google earth engine. *Remote Sens.* **2021**, *13*, 453. [CrossRef]

34.    Nedd, R.; Light, K.; Owens, M.; James, N.; Johnson, E.; Anandhi, A. A synthesis of land use/land cover research synthesis: Definitions, classification systems, meta-studies, challenges, and knowledge gaps in the global landscape. *Land* **2021**, *10*, 994. [CrossRef]

35.    Han, N.; Wu, J.; Fang, X.; Wen, J.; Zhan, S.; Xie, S.; Li, X. Transferable Linear Discriminant Analysis. *IEEE Trans. Neural Netw. Learn. Syst.* **2020**, *31*, 5630–5638. [CrossRef]

36. Zhu, H.; Meng, P.; Xu, Z. Influence of Regional Culture on the Compilation of the Overall Land Use Planning: A Case Study of Ningxia Hui Autonomous Region. *J. Anhui Agric. Sci.* **2014**, *42*, 6004–6007.

37. Pierre, B. The Field of Cultural Production, or: The Economic World Reversed. *Poetics* **1983**, *12*, 311–356.

38. Lorenza, M.; Simone, P. The Dynamics of Linguistic and Cultural Reproduction within the Educational Field. *J. Multiling. Multicult. Dev.* **2020**, *41*, 661–675.

39. Yan, J.; Huang, Y.; Xia, F. Optimization of National Spatial Pattern for Chinese-Style Modernization: Basic Principles, Theoretical Logic, and Strategic Tasks. *China Land Sci.* **2023**, *37*, 1–10.

40. Pierre, B. *Habitus and Field: General Sociology*; Polity Press: London, UK, 2020.

41. Pierre, B. Language, Habitus, and Power: The Social Production of Linguistic Value. *Sociol. Theory* **1991**, *9*, 148–165.

42. Paul, C. Social Darwinism: The concept. *Hist. Eur. Ideas* **1996**, *22*, 261–274.

43. Smith, J. Critiquing Social Darwinism: A Multidisciplinary Approach. *J. Soc. Theory* **2018**, *5*, 123–145.

44. Laurie, A.R.; Lina, H.S. Justifying social inequalities: The role of social darwinism. *Personal. Soc. Psychol. Bull.* **2020**, *46*, 1139–1155.

45. le Polain de Waroux, Y.; Garrett, R.D.; Chapman, M.; Friis, C.; Hoelle, J.; Hodel, L.; Hopping, K.; Zaehringer, J.G. The role of culture in land system science. *J. Land Use Sci.* **2021**, *16*, 450–466. [CrossRef]

46. Xu, Y.; Tian, L. The "Concept of Land" and the "American Dream" in the Changes of Early American Land Policies. *Am. Stud.* **2018**, *32*, 118–133.

47. Zheng, H.; Lu, C.; Shang, D.; Cao, S. Cultural invasions and land degradation. *Reg. Environ. Change* **2015**, *15*, 939–944. [CrossRef]

48. Li, X. Re-understanding of the Classification Methods for Chinese Dialects. *Dialects* **2005**, *4*, 356–363.

49. Clifford, G. *The Interpretation of Cultures. Basic Books*; Basic Books Press: New York, NY, USA, 1973.

50. Hemmavanh, C.; Ye, Y.; Yoshida, A. Forest land use change at trans-boundary Laos-China biodiversity conservation area. *J. Geogr. Sci.* **2010**, *20*, 889–898. [CrossRef]

51. Chang, X.; Xing, Y.; Wang, J.; Yang, H.; Gong, W. Effects of land use and cover change (LUCC) on terrestrial carbon stocks in China between 2000 and 2018. *Resour. Conserv. Recycl.* **2022**, *182*, 106333. [CrossRef]

52. Aslam, R.W.; Shu, H.; Tariq, A.; Naz, I.; Ahmad, M.N.; Quddoos, A.; Javid, K.; Mustafa, F.; Aeman, H. Monitoring landuse change in Uchhali and Khabeki wetland lakes, Pakistan using remote sensing data. *Gondwana Res.* **2024**, *129*, 252–267. [CrossRef]

53. Wang, J.F.; Li, X.H.; Christakos, G.; Liao, Y.L.; Zhang, T.; Gu, X.; Zheng, X.Y. Geographical detectors-based health risk assessment and its application in the neural tube defects study of the Heshun Region, China. *Int. J. Geogr. Inf. Sci.* **2010**, *24*, 107–127. [CrossRef]

54. Polykretis, C.; Grillakis, M.G.; Argyriou, A.V.; Papadopoulos, N.; Alexakis, D.D. Integrating multivariate (GeoDetector) and bivariate (IV) statistics for hybrid landslide susceptibility modeling: A case of the vicinity of Pinios artificial lake, Ilia, Greece. *Land* **2021**, *10*, 973. [CrossRef]

55. Yuan, X.; Chen, B.; He, X.; Zhang, G.; Zhou, C. Spatial Differentiation and Influencing Factors of Tertiary Industry in the Pearl River Delta Urban Agglomeration. *Land* **2024**, *13*, 172. [CrossRef]

56. Rutherford, G.N.; Guisan, A.; Zimmermann, N.E. Evaluating sampling strategies and logistic regression methods for modelling complex land cover changes. *J. Appl. Ecol.* **2007**, *44*, 414–424. [CrossRef]

57. Gao, H.; Wang, T.; Gu, S. A study of resident satisfaction and factors that influence old community renewal based on community governance in Hangzhou: An empirical analysis. *Land* **2022**, *11*, 1421. [CrossRef]

58. Kokkoris, I.P.; Skuras, D.; Maniatis, Y.; Dimopoulos, P. Natura 2000 public awareness in EU: A prerequisite for successful conservation policy. *Land Use Policy* **2023**, *125*, 106482. [CrossRef]

59. Ma, S.; Wang, B.; Liu, W. Assessment of street space quality and subjective well-being mismatch and its impact, using multi-source big data. *Cities* **2024**, *147*, 104797. [CrossRef]

60. Johannesen, C.D.L.; Langsted, A.; Mortensen, M.B.; Nordestgaard, B.G. Association between low density lipoprotein and all cause and cause specific mortality in Denmark. *BMJ Br. Med. J.* **2020**, *371*, m4266. [CrossRef]

61. Blei, D.M.; Ng, A.Y.; Jordan, M.I. Latent Dirichlet allocation. *J. Mach. Learn. Res.* **2003**, *3*, 993–1022.

62. Xiao, Q.; Xie, H.; Liu, P. A Recognition Method of Hot Events in Social Media by Integrating LDA into CNN. *Inf. Sci.* **2019**, *37*, 27–33.

63. Zhou, Y.; Li, X.; Liu, Y. Land use change and driving factors in rural China during the period 1995–2015. *Land Use Policy* **2020**, *99*, 105048. [CrossRef]

64. Silvia, D.S. The Impact of Immigration on the Lexical System of the Host Language: A Case Study of Spanish in the United States. *Lang. Var. Change* **2019**, *31*, 309–337.

65. Lin, Y.; Zou, B. *Taiping Prefecture Chronicles*, Jiajing ed.; Jiangsu Ancient Books Publishing House: Nanjing, China, 1998.

66. Yu, Y.; Xu, N. *Nanling County Chronicles*, Republic of China ed.; Jiangsu Ancient Books Publishing House: Nanjing, China, 1998; Volume 40.

67. Wang, S.; Yuan, X. The Development of Grain Production in the Wan Nan Wei Tian Grain-Producing Area since the Ming and Qing Dynasties. *J. Anhui Univ. Technol. Soc. Sci. Ed.* **2023**, *42*, 21–29.

68.	Johanna, L. The Uralic-Altaic Hypothesis: A Re-evaluation of the Linguistic Affinities between Uralic and Altaic Languages. *J. Linguist.* **2001**, *37*, 319–338.

69.	Wu, J. The Phylogenetic and Typological Classification of Languages. *Mod. Foreign Lang.* **2020**, *43*, 330–340.

70.	Marek, H.D. Migration and Culture. *Clin. Chem. J. Am. Assoc. Clin. Chem.* **2015**, *61*, 1120–1121.

71.	Qingyang County Local Chronicles Compilation Committee. *Qingyang County Chronicles*; Huangshan Book Society: Hefei, China, 1992.

72.	Zheng, Z. The Division of Southern Anhui Dialects (Manuscript). *Dialect* **1986**, *1*, 8–18.

73.	Tian, S. *A Preliminary Study on the Immigration of Chizhou in Modern Anhui and Related Issues*; Anhui University Press: Hefei, China, 2010.

74.	Hua, C.; Liao, G.; Zhou, Z. *The Guangxu Edition of Qingyang County Chronicles, Volume Two: Taxation and Labor Service Records (Part Three), Photo-Reproduced from the Woodblock Edition of the 17th Year of Guangxu*; Jiangsu Ancient Books Publishing House: Nanjing, China, 1998.

75.	Liu, W.; Zhan, J.; Zhao, F.; Yan, H.; Zhang, F.; Wei, X. Impacts of urbanization-induced land-use changes on ecosystem services: A case study of the Pearl River Delta Metropolitan Region, China. *Ecol. Indic.* **2019**, *98*, 228–238. [CrossRef]

76.	Zuo, D.; Xu, Z.; Yao, W.; Jin, S.; Xiao, P.; Ran, D. Assessing the effects of changes in land use and climate on runoff and sediment yields from a watershed in the Loess Plateau of China. *Sci. Total Environ.* **2016**, *544*, 238–250. [CrossRef] [PubMed]

77.	David, N.F. The Role of Language in Economic Development. *J. Econ. Lit.* **2019**, *57*, 593–647.

78.	Maria, B.; Rosemarie, S. Acceptance studies in the field of land use—A critical and systematic review to advance the conceptualization of acceptance and acceptability. *Land Use Policy* **2018**, *76*, 235–245.