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Rural landscape characterization from the perspective of the tourist using online reviews: A case study of Yayou Gou Village in Shandong, China

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In the field of landscape characterization, it is difficult to obtain the tourists' perceptions of a landscape. To overcome these drawbacks, online available reviews and comments from tourists can be utilized as an alternative way to characterize a landscape. This study examined the rural landscape characterization in Yayou Gou Village, which is a unique attraction in Shandong, China. A qualitative content analysis was undertaken on the tourists' comments and reviews of Yayou Gou Village on tourist websites and social media platforms, including Qnar, Meituan, Ctrip, Dianping and Sina Microblog. NVivo 12 was used for the content analysis and qualitative coding. A variety of natural, cultural, and social, perceptual, and seasonal characteristics of a rural landscape, as well as facilities and infrastructure were revealed. Cultural and social landscape characters including performance landscape and festival activities, building, educational and home-stay landscape, diet landscape, and night landscape, which are obviously richer than other aspects in this rural village. Natural, perceptual, and seasonal landscape characters are not fully exploited for rural tourism and landscape. This study suggests that natural, cultural, and social rural landscape, and facility and infrastructure were influenced by spatial, seasonal, and perceptual dimensions. Suggestions for better landscape conservation and management can be acquired through the characterization process. This study provides an innovative approach for landscape characterization with online review data from various tourists. It demonstrates that online social media data contain abundant information about the landscape that they have visited and could be well used to explore the landscape's characteristics in rural areas.

KEYWORDS

rural landscape, landscape perception, landscape characterization, rural tourism, social media, landscape management

1 Introduction

Rural landscapes are encountering significant changes in society, economy, culture, and demographics world-wide (Lokocz et al., 2011). This has occurred not only in North America and Europe (Lokocz et al., 2011) but also in China (Qing, 2016), particularly, under the background of the country's growing urbanization and modernization. Due to the socio-economic development requirement, rural landscapes in some areas have changed into urban landscapes, which has threatened rural landscape conservation (Qing, 2016; Xiangrong, 2018). Rural areas with rich landscape resources tend to choose tourism as a priority for industrial development (Huancheng and Fei, 2010), which requires a comprehensive understanding of unique characters and elements of these landscapes. Thus, rural landscape research has become more important and has attracted more attention, especially in the setting of China (Ziting and Jianyun, 2014; Xiangrong, 2018). Facing such situations, the rural landscape character needs to be deeply recognized and understood especially for rural planners and management in this context. There is growing evidence that rural landscapes are not equivalent to farmland anymore (Qing, 2016). For example, natural landscape elements, such as forests, streams as well as cultural landscapes are all incorporated in the current landscape characters. However, these characters are not easy to articulate and compile systematically (Lokocz et al., 2011), because of the difficulty in data sources (Koblet and Purves, 2020), and the complex perception of the landscape by different groups (Simensen et al., 2018).

Landscape characterization, which refers to a collective process for area-covering identification, classification and/or character assessment of landscape systematically (Simensen et al., 2018), is of particular significance for comprehending landscape. It is considered to be the way how a landscape is described and understood via those senses, particularly sight (Callau et al., 2019). Usually, landscape characterization has been regarded as the prior step for landscape appraisal or quality assessment and the knowledge base for latter procedures (Swanwick, 2002; Simensen et al., 2018; Callau et al., 2019). In recent years, a variety of studies conducted on the areas of landscape characterization (Simensen et al., 2018); for example, multiple sources utilization, including expert and local knowledge (Fagerholm et al., 2013); landscape description with Flickr tags, texts, and free lists (Wartmann et al., 2018); and landscape charter analysis for the suitability of touristic use (Cetinkaya and Ayhan, 2020). Its significant implications for landscape conservation and management (Guaita Martínez et al., 2019; Kaptan Ayhan et al., 2020), as well as the academic purpose (Yang et al., 2020), have also been found. Therefore, it has become one of the most popular research topics in landscape studies (Simensen et al., 2018; Callau et al., 2019).

Landscape visitors or users with different backgrounds may have different perceptions and opinions. Furthermore, it is not possible to create a consensus in even a small group of people. As a relatively complex process, landscape characterization needs much more participation of visitors who complete their tour in a landscape. However, a problem still exists in collecting and analyzing public perceptions (Butler, 2016; Koblet and Purves, 2020). Traditional research methods could not address this problem satisfactorily; for example, an in-depth interview only collects opinions from limited individuals in local areas (Bieling, 2014). This gap might be filled by online data (e.g., review texts) on social media from different visitors who experience the landscape, as has been practiced in landscape fields. For example, Koblet and Purves (2020) used a collection of nearly 7,000 online texts to gather landscape perceptions for the sense of sight, sound, and smell. This work aided the landscape character assessment (LCA) process and demonstrated the rich texts, connoting a high potential of landscape utilization that has not yet been fully exploited. Huang et al. (2013) recognized that social media data contains plentiful information about perceptions and experiences in different environments, and confirmed that it is a useful source for detecting people's perceptions and feelings about the environment through three case studies. Additionally, photographs have been combined with textual information to explore perceptions (Kaußen, 2018; Callau et al., 2019). Studies using online big data resources have proved useful in understanding and mapping ecosystem services (Van Zanten et al., 2016; Langemeyer et al., 2018; Richards et al., 2018). Previous researchers have demonstrated the potential of landscape perception, ecosystem service, and so on. However, more empirical research is needed to test and refine utilization in the rural landscape field, while research of landscape characterization using social media data in rural areas is rare.

With the development of social networking services, it has become easier for people to use online services and people are willing to share their experiences in the digital world. Large volumes of social media data have been generated, which contain lots of information about genuine experiences and opinions towards various environments; for example, traveler review sites are websites that contain opinions and evaluations by people who have visited landscapes, destinations, attractions or experienced other tour facilities (Cong et al., 2014). These data might be a significant source for detecting people's perceptions (Huang et al., 2013) and several studies have investigated texts (Derungs and Purves, 2014)or photographs (Kaußen, 2018; Callau et al., 2019; Gosal and Ziv, 2020) from websites to analyze various aspects of a landscape; for example, the aural experience from image description (Chesnokova and Purves, 2018), the relation of cultural ecosystem services and landscape characters (Oteros-rozas et al., 2018), landscape design of public space (Song and Zhang, 2020), exploration of sense of place (Song et al., 2021), and research of the drivers of visitation about urban park (Donahue et al., 2018). These studies

demonstrate that these data allow us to characterize the landscape in large areas more efficiently, which may fill the gap that was identified earlier.

However, previous research has not yet addressed how to incorporate large numbers of visitors into landscape characterization. Moreover, research has not fully solved the way in which landscape perception is accessed, especially by a large number of participants, nor has it tested the social media data utilization in rural landscape characterization. Consequently, in addition to the available online reviews and comments from tourists showing high potential for elaborating unique landscape character of rural areas, this study aims to demonstrate that collected online review texts are an effective method for rural landscape characterization and management, and conservation guideline development, specifically in the Chinese context. This study's objective is to demonstrate that online review and comments can be used effectively as data information to conserve and manage rural landscape.

To address this objective, we set out the following research question of "How can online reviews be collected and analyzed for landscape characterization and used to develop landscape management guidelines for conserving and protecting their unique characters?" The specific questions are as follows:

RQ1. How to select and collect online tourist reviews about rural landscapes?

RQ2. What rural landscape characters can be found through this characterization?

RQ3. How can these results be applied for further landscape conservation and management?

2 Literature review

When it comes to landscape characterization, the definition of landscape as a prerequisite cannot be ignored. This term contains several connotations and interpretations (Witko et al., 2011). According to the European Landscape Convention (ELC), a landscape is defined as an area as perceived by people whose character is the result of the action and interaction of natural and/or human factors (Council of Europe, 2000). This definition has a broader comprehensive meaning than a merely visual aspect (Stobbelaar and Pedroli, 2011). Similarly, Witko et al. (2011) argued that two individuals cannot have the same landscape perceptions because of their differences in their interactions with and background knowledge about landscape (Witko et al., 2011). Other definitions can be found in the literature; for example, Simensen et al. (2018) clarified landscape as a geographical area characterized by observable, natural and human-induced landscape elements. From these definitions, we can find that the core of the

concept is what is perceived. One possible approach to address how they are perceived is by seeking ways to describe and identify experience (Simensen et al., 2018; Wartmann et al., 2018). These methods to portray and identify characteristics are referred to as landscape characterization.

Because the landscape is closely related to human well-being, resident environment, and natural protection, landscape characterization has profound enlightenment and implications for landscape management, conservation (Cetinkaya and Ayhan, 2020; Gkoltsiou and Paraskevopoulou, 2021), and academic research (Balestrieri, 2015; Yang et al., 2020). The understanding of the landscape and its characters has a fundamental role in landscape tourism and recreation (Gkoltsiou et al., 2013; Solecka et al., 2018). Thus, it is gradually becoming one of the most popular topics among landscape studies.

Landscape characterization has a long history and many attempts have been applied in landscape research (Brabyn, 1996; Swanwick, 2002). For example, Brown and Itami (1982) combined physical elements of landscape, cultural features, with potential land use to assess the scenic resource value, visual sensitivity, and cultural value of landscape, and thus protect the regional landscape character in Australia. In the United Kingdom, landscape character assessment (LCA) was developed as an important tool in landscape characterization in the mid-1980s. Apart from natural and cultural landscape elements, human aesthetic and perceptions were included. After a value-free characterization process with preliminary data in desk work in LCA, the judgment and assessment will subsequently be made based on previous landscape classification and fieldwork (Swanwick, 2002).

In Europe, due to the stimulation of the ELC, its member states (and non-member) are discovering methods to promote landscape protection, management, and planning through identifying and characterizing the national landscapes throughout their entire territory (Van Eetvelde and Antrop, 2009; Simensen et al., 2018; Alparslan et al., 2019), which push the development of characterization methodology over time.

In addition to the LCA method, which is regarded as a holistic landscape approach, more approaches about landscape characterization exists (Simensen et al., 2018). For example, a combined biophysical and holistic method that includes climate, geology, hydrology, soils, land use, land structure, and so on could understand the landscape from abiotic and biotic aspects (Mücher et al., 2010). A parametric method with a biophysical concept also appears in the literature (Van Eetvelde and Antrop, 2009). However, an interesting result from all these methods is that user participation has less been employed in their characterization process. Even in LCA, relatively homogeneous regions are generated with expert assessment from cultural and natural aspects, while public views may be obtained through some empirical methods, such as

FIGURE 1
Location of the study area, Yayou Gou Village in Shandong Province, China.
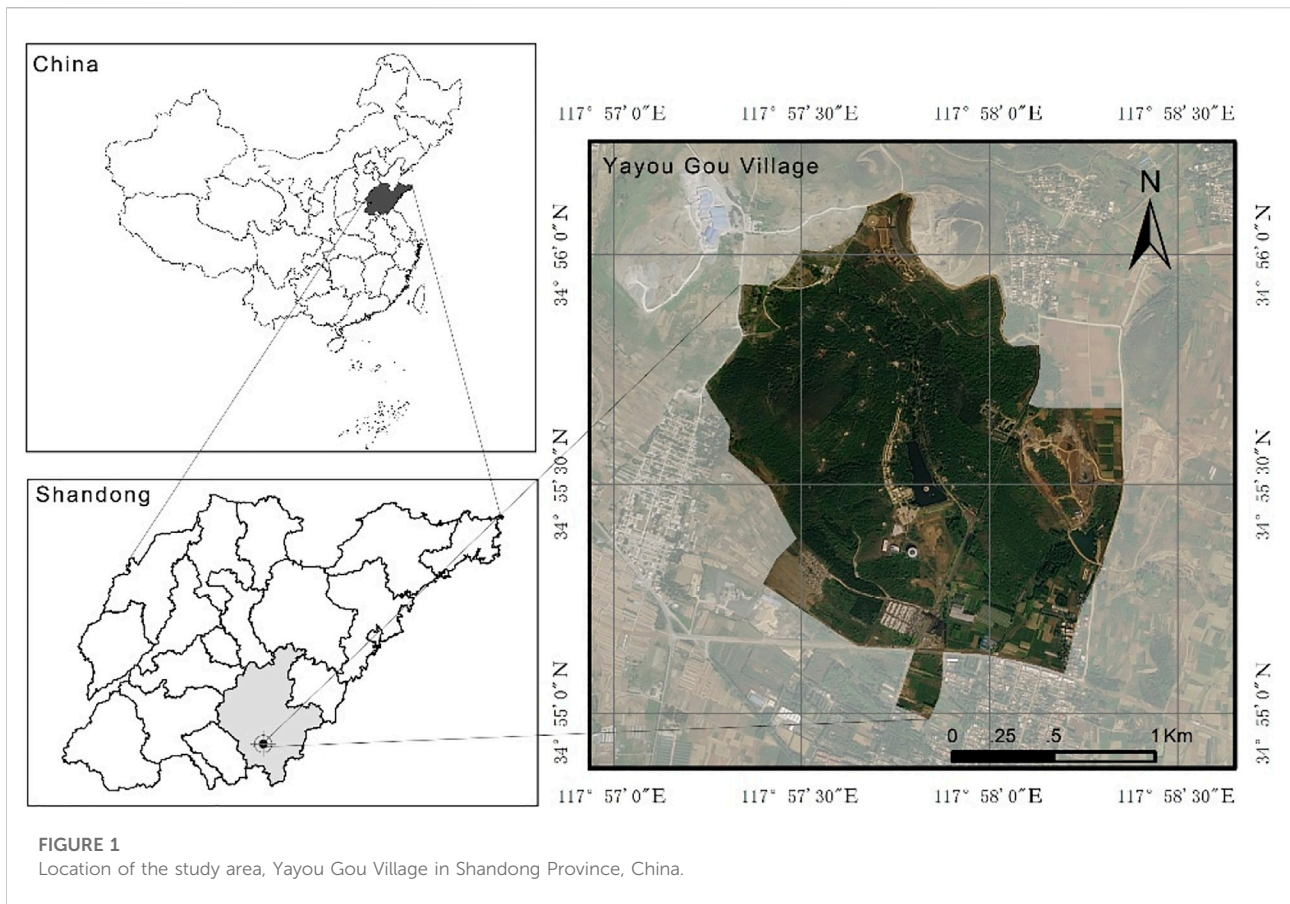
questionnaires, interviews, and group discussions (Wartmann et al., 2018). The key to successful characterization tends to include public participation or perceptions of a larger number of users (Zhuang et al., 2022), which was also emphasized by the European Landscape Convention (Koblet and Purves, 2020).

Social media data normally engages a large number of participations and may provide public perceptions of various landscape areas. It also has an advantage with a lower cost than traditional surveys. For example, the behavior and need of users about public green space can be gathered through social media to more efficiently inform management (Donahue et al., 2018), the sentiment and attitude of participants can be acquired through social media data (Gao et al., 2022), and landscape aesthetic value in protected areas can be determined by spatial modelling using social media images (Gosal and Ziv, 2020). As one type among these social media, travelers' reviews from travelling websites include rich information about people's perception and assessment. Features of tourism experiences at the specific site can be examined from tourist reviews (Cong et al., 2014). Recreational resources in landscape can be evaluated by analyzing the review data from major travel websites in China (Yuewei et al., 2019). Besides, the reviews are regarded as credible and useful guide for potential

consumers. Therefore, the use of this data in research is attracting attention.

3 Research methodology

In this research, we aim to examine and extract the unique rural landscape character from the online reviews of tourists. It is therefore necessary to first introduce the sources of the online reviews, how they were collected and processed, and how they were analyzed for disclosing the results.

3.1 Study area

Yayou Gou Village is located in the northwest of Lanling County, Linyi City, Shandong Province, China and covers an area of 200 ha (Figure 1). Based on the old village of Yayou Gou, it has been developed into a scenic spot since 2017. There are 72 families with 252 persons still living here.

Yayou Gou Village is unique due to its abundance of rural landscape resources. It can be regarded as a representative village of north China with ample natural and human landscape

elements (Figure 1). The landform is mainly dominated by hills covered with vegetation, such as pine trees and chestnuts, which generates a rich diversity of natural landscape elements. There are three hills around the human settlement of the village. A river sourcing from the spring in the north, flows from the north to south of the village, creating a series of forms of water, including waterfalls, springs, streams, lakes, and so on. The cultural landscape also has a great attraction for tourists. The traditional buildings in the village are well preserved, with many stone buildings and rich cultural relics. These buildings are used for different purposes, not just for living. About 140 ha of chestnuts, walnuts, hawthorns, peppers, and other fruit tree have been planted, adding to the beautiful rural scenery. At the same time, it has preserved and developed the local cultural activities, and local Chinese opera are preserved and inherited well. As the following quotation from the local government's introduction website indicates, rural landscapes are well preserved and aimed to reappear the living rural scenes:

> As a typical representative of the ancient villages in the North of China, in order to make the original rural tourism resorts as the core, combined with geographical landscape and village economic development status in Yayou Gou Village, according to the historical development evolution, *via* the "time" as the mainline, we truly represent the economic and cultural life landscape of Lanling rural people in important historical period and their longing for a better future. (http://www.lanling.gov.cn/info/1030/3232.htm)

The reasons for selecting Yayou Gou Village as the study case in this research were threefold. First, it is a relatively well-preserved and intact village in North China reflecting the traditional rural landscapes. Second, it not only possesses abundant landscapes with rural characters but has also constructed many contemporary attractions based on village history and development period for tourists without damaging the whole village style. Third, Yayou Gou Village attracts large numbers of domestic visitors, mainly from Linyi City and its surrounding areas, who have left a large amount of reviews and comments on some online websites, thus providing potential data for this research.

3.2 Source of review data

Understanding the tourists' perceived landscapes through their reviews was an important step in this study, but the crucial precondition is selecting websites that contain the expected reviews of visitors to obtain precise and adequate information. Tourists of Yayou Gou Village are mainly from China, and the potential samples tend to be selected from Chinese travelling websites. After searching attempts in Baidu (www.baidu.com),

one of the most influential and powerful Chinese search engines, for popular travelling website lists in August 2021, a list including Ctrip, Qunar, Fliggy, Tuniu, Elong, Lvmama, Qyer, Mafengwo, Tongcheng, and Tripadvisor was found as the top 10 travelling websites of 2021. Additionally, Sina Microblog was also tested because it may yield relative comments, Meituan and Dianping were taken into consideration because they also provide good ticket services and consumption comments.

3.3 Data collection and processing

Through the one-by-one testing using keywords "Yayou Gou" in the websites above, Meituan, Qunar, Ctrip, Sina Microblog, and Dianping were given further consideration because they have more than 100 reviews individually.

Meituan is a life service e-commerce platform, whose services cover more than 200 categories such as catering, takeout, taxi-hailing, hotel tourism, movies, leisure, and entertainment. The outstanding tickets service for tourists provides the possibility for visitors to write reviews after their visit. Unlike Meituan, Qunar and Ctrip only focus on travel-related products and services, while Sina Microblog is a social platform for information sharing and communicating. Hundreds of microblog users prefer to share their experiences and opinions about Yayou Gou travelling. Dianping is a local life information and trading platform, as well as an independent third-party consumer review website. We used "Yayou Gou" in Chinese as the keywords for detecting reviews about this village on these five websites on 11 August 2021.

After collecting the reviews from these websites, tough processing is required. Several steps were needed to achieve the best interpretable data in processing for further analysis:

(1) Some reduplicative reviews caused by technical reasons or the same reviews from one tourist who bought two or more tickets were examined and removed.
(2) Invalid reviews that only included emotion icons or less than three words were removed (e.g., "good," "very good," "beautiful," etc.).
(3) Advertisements with strong recommendations of specific tour products or services were removed. These reviews normally include words of shop name or contact information.
(4) The review items with "stop words" (e.g., "not bad" or "pretty good") were removed because these words mainly express their sentimental attitude rather than describing landscape characters.

Table 1 shows the original and cleansed number of reviews for further interpretation after processing.

We used a purposive sampling strategy in selecting the textual information from collected reviews. This is a non-

TABLE 1 The original and cleansed number of reviews for further interpretation after processing.

Website sources	Original number of reviews	Cleansed number of reviews	Cleansed number of words in Chinese	Percent (%)
Meituan	4,749	1,693	24,330	65.65
Qunar	1,326	35	1,556	1.36
Ctrip	271	266	10,580	10.31
Sina Microblog	461	422	59,895	16.36
Dianping	165	163	24,520	6.32
Total	6,972	2,579	120,881	100

probability method that is normally applied in qualitative research (Bazeley, 2013). We only code the information in terms of the rural landscape in these review texts for our established goals.

3.4 Data analysis

Content analysis was selected as an analytical approach in this qualitative research. QSR NVivo 12, a qualitative auxiliary analysis tool, was used because of its outstanding function of coding, query, link, model, and so on. The following three phases during coding activity were carried out after the cleansed data was imported into NVivo software: building a coding frame, pilot analysis and main analysis (Bazeley, 2013).

3.4.1 Building a coding frame
Main codes, sub-codes, and free codes were developed through coding in selected text material and previous literature. In addition, a complete definition of codes was needed, including code names, description of meanings, and examples.

3.4.2 Pilot phase
The main aim of this phase is to evaluate and modify the built coding frame in the last step. This phase consisted of selecting another material, trial coding process and evaluation, and modification.

3.4.3 Main analysis
This phase coded all of the collected texts via the modified coding frame. All of the texts were read and coded line by line. Table 2 shows examples of coding sample sentences for items to encode secondary character and main character.

4 Results and findings

There were 324 reference points and 84 free codes in the result. In the next step of interpretative coding, 84 codes were

categorized into 22 codes, which demonstrate the secondary character for tourists. In the last, we reduced them to five main codes which represent the main characters of Yayou Gou Village (Figure 2; Table 3). These main characters included cultural and social landscape ($n = 132$, 40.8%), natural landscape ($n = 58$, 17.9%), perceptual landscape ($n = 96$, 29.6%), seasonal landscape ($n = 25$, 7.7%), and facilities and infrastructures ($n = 13$, 4%).

It is obvious that cultural and social landscape character takes up a major proportion (40.8%), with seven secondary landscape characters that are mentioned in all six sources of social media data, while other characteristics have different proportions and sources. These characteristics are described in more depth in the following sections.

4.1 Cultural and social landscape

The characteristics of the cultural and social landscape were most significant in this research, indicating an ample status of culture and society related landscape elements. This characteristic was supported by seven sub-codes, which were performance landscape, festival activities, diet landscape, building landscape, home-stay landscape, night landscape, and educational landscape. The interpretations of these sub-codes will be given in the following sections.

4.1.1 Performance landscape and festival activities
There were abundant performance landscapes in Yayou Gou Village. "It was a unique experience to listen to and watch the performances under the trees in such a beautiful village," which shows the attribute of richness and ornamental value. The performance landscapes therein consist of animal shows, bonfire parties, folklore performances, aquashow, and acrobatic shows (Figure 3).

Animal shows are a big interest for tourists. They can see the different scenes about animals (e.g., a donkey works a mill or a goat pulls a cart). These landscapes provide visitors with different and interesting feelings; however, some people show

TABLE 2 Examples of landscape character coding of comments in Yayou Gou Village.

Main character	Secondary character	Items	Sample sentences
Cultural and social landscape	Performance landscape	Folklore performance	I went there just in time for a folk performance to see the whole Chinese traditional wedding.
		Animal show	The performance of the King of Lanling must be seen! Spectacular! The racecourse is located at the top of the mountain, and the good time to see that is in the morning and afternoon, do not miss it.
	Diet landscape	Food category	After the beautiful scenery, you can go to Xinghua Street to taste the food. Each restaurant has different characteristics, such as chestnut cake, powder crust, pancakes and other local specialities.
	Home-stay landscape	Home-stay style	The home-stay style here can be summed up as a perfect fusion of country style and modern elements, affordable, recommended.
Natural landscape	Flora landscape	Chestnut landscape	Full of chestnut trees, I believe that the harvest scene must be good!
	Fauna landscape	Feeding experience	The animal feeding experience at the gate was so wonderful that you can feed the deer closely and touch them softly.
Perceptual landscape	Spiritual character	Ancient village sight	The second stop is to go to the Yayou Gou Village, which really retains a lot of ancient cultural heritage. The buildings inside are the original old houses, filling a sense of age.
Facility and infrastructure	River-corridor landscape	Kapok river corridor	I like the river corridor of kapok very much. It has not blossomed yet. There are wind chimes on the top, the bell jingling when the wind blows.
Seasonal landscape	Spring	Spring	It's beautiful. I love it. Perfect place for a spring outing.
	Winter	Winter	In winter, the scenery of rural original ecology is decorated with a layer of snow, which is quite harmonious and wonderful.

sympathy to these animals for their hard work. In particular, an equestrianism performance named "Lanling King" was extremely shocking and attracted visitors. This show was adopted from the ancient war that occurred in the local area. More than 12 references mentioned this landscape and all comments were positive. Visitors are able to immerse themselves in the ancient war with superb horsemanship based on the story of Lanling King.

Compared with the introduced bonfire party, folklore performances display the local folk customs, including local Chinese weddings and related ceremonies. These can restore and spread the local and rural cultures. The aquashow is a modern experiential activity with a water machine for tourist amusement and the acrobatic show features traditional acrobatics with Chinese characteristics.

These performances are mainly developed or adopted from local and traditional cultural elements, which can provide the regional culture landscape for tourists. Others are introduced and amuse the tourists with modern style. Similar situations occurred in festival activities.

In Yayou Gou Village, three festivals were mentioned: chestnut festival, farmer's day activities, and music festival. The chestnut festival is a local activity to celebrate the harvest of chestnuts. People can experience the harvest process and chestnut-related food makes as they described:

"It is in the Mid-Autumn festival and National Day holiday, and Yayou Gou chestnut festival is underway which is definitely good news for foodies. We can just pick fresh chestnuts from the tree and make chestnut food on the spot. It is a good taste no matter how you make it."

4.1.2 Building, educational and home-stay landscape

Building landscape is one of the most impressive landscapes for tourists because of its original attributes, rurality, and innovative usage (Figure 4). The stone houses in Yayou Gou Village are in the original rustic style and are well received by visitors. This kind of house was produced by residents. Their main material is stone exploited in local hills. When going into the house, people can form a deep feeling of rurality through the buildings and other elements.

The innovative ways of using these buildings also impress visitors. For example, the stage has been restored for Liuqin Opera, which is a local and unique kind of opera. People, especially the elderly, prefer to watch and listen to them under the trees, as well as experience rural flavor at the same time. Among these adapted building landscapes, the most powerful and interesting is a series of buildings called "Hundred craft studio," which inherit and display a lot of local crafts about food, weaving, and so on (Table 4).

Based on the remaining buildings, the revolutionary museum and rural history museum were developed to exhibit the regional war events, and rural development and evolution. Consequently, the educational value of Yayou Gou is more prominent, thus developing two forms of the
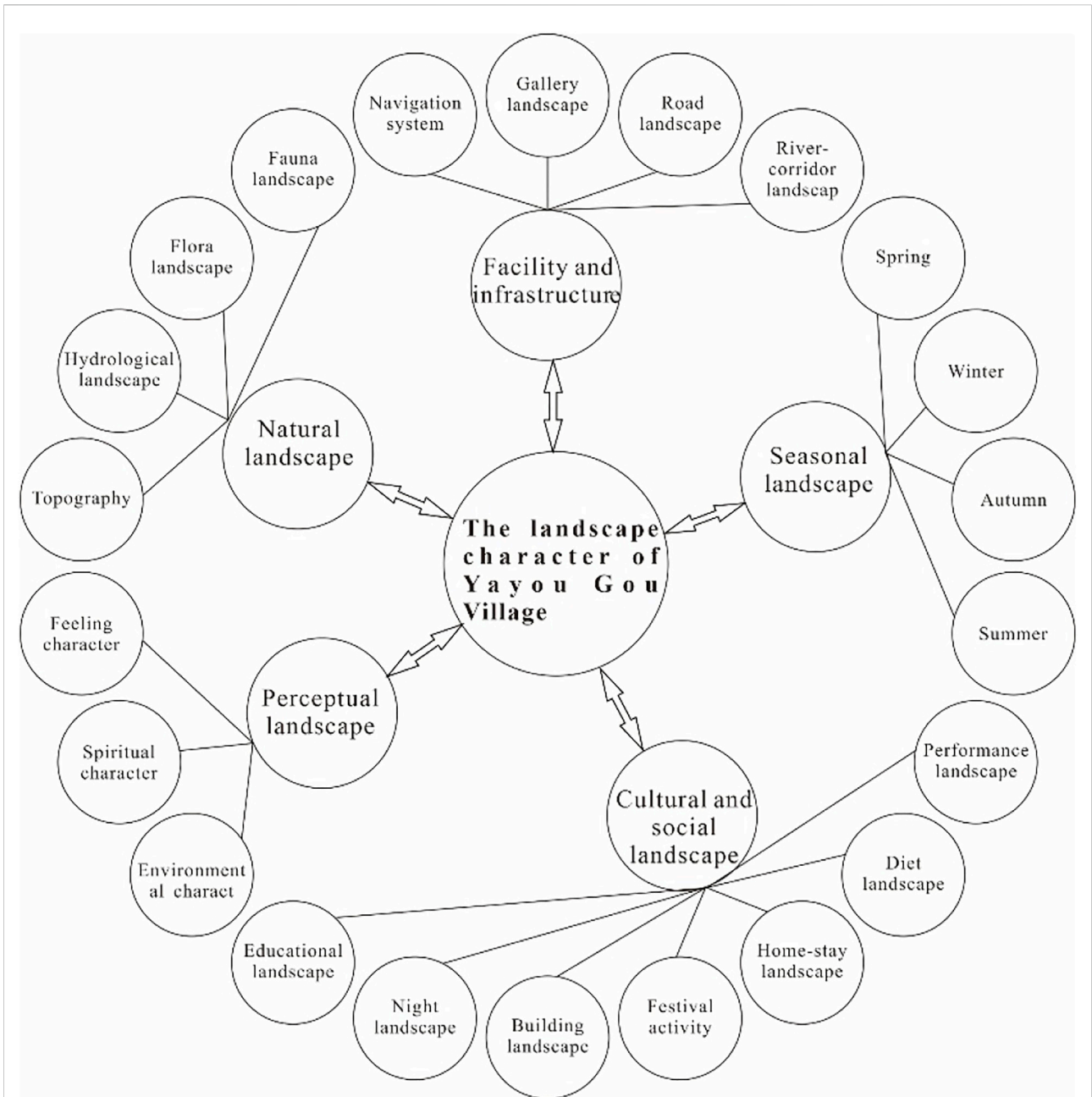
FIGURE 2
The secondary character of landscape in Yayou Gou Village.

educational landscape: patriotic education and experience education.

- Patriotic education landscape. This kind of landscape mainly refers to the education derived from visiting the revolutionary museum for adults and children. In the museum, the important events and details are described

with words, pictures, videos, and related objects. Not only adult tourists but also children get patriotic inspiration from these shocking exhibitions.
- Educational landscape. This mainly refers to children experiencing the rural and traditional hard-living scenery, and cherishing or valuing their modern happy life. Many parents consider it is a valuable education for children:

TABLE 3 The main character of landscape in Yayou Gou Village.

Main character	Source	Frequencies	Percent (%)	Secondary character		Source	Frequencies
Cultural and social landscape	6	132	40.8	Performance landscape	Numerous performances, Animal show, Bonfire party, Folklore performance, Aquashow, Acrobatic show	5	22
				Diet landscape	Food price, Food category, Regional characteristic	5	42
					Local pancake, Fried chicken, Bean curd jelly, Hot sauce, Big-bowl tea, Burdock, Delicacy street		
				Home-stay landscape	Home-stay distribution, Home-stay style, Home-stay price, Home-stay quantity, Home-stay experience	4	13
				Festival activity	Chestnut festival, Farmer's Day activity, Music festival	4	4
				Building landscape	The Northern Song Dynasty style, Ancient stage, Red Yimeng Revolution Museum, Rural history museum, Commercialized architecture, Rural flavour of architecture, Farmyard, Stone house, Original building utilization, Hundreds Crafts Studio	5	34
				Night landscape	Night children's play, Night lantern, Night stage performance	3	13
				Educational landscape	Patriotic education, Experience education	2	4
Natural landscape	5	58	17.9	Topography	Hill	1	5
				Hydrological landscape	Shout spring landscape, Canal corridor landscape, Yanliu Lake, Mother-son spring	3	9
				Flora landscape	Numerous trees, Fruit tree, Sea of flowers, Chestnut landscape, Apricot tree	5	21
				Fauna landscape	Animal species, Zodiac Zoo, Feeding experience, Black Swan, Pool koi, Sheep feeding, Pigs interaction	4	17
Perceptual landscape	6	96	29.6	Environmental character	Northern village representative, Rough design, Beautiful scenery, Fresh air, Good ecological environment, Beautiful mountains and rivers, Paradise, Numerous tourists	5	22
				Spiritual character	Ancient village sight, Revolutionary tourism area, Regret to visit, Large area, Walking a lot, Slow pace of life, Rich folk customs, Rural old objects, Suitable for children to experience, Pastoral landscape characteristics, Nostalgia, Rural life atmosphere, Comprehensiveness characteristic	6	61
				Feeling character	Harvest feeling, Relieving the pressure, Comfortable feeling	4	13
Seasonal landscape	5	25	7.7	Spring	Spring	3	9
				Winter	Winter	4	6
				Autumn	Autumn	3	8
				Summer	Summer	2	2
Facility and infrastructure	4	13	4	Navigation system	Lack of guide map, Unobvious sign	3	7
				Gallery landscape	Wind-bell gallery	1	2
				Road landscape	Millstone road, Stone road	1	1
				River-corridor landscape	Kapok river corridor	2	3

"It is a very good education process for children to feel the living environment and way of the older generation and to know how happy the life is now compared to the past."

The home-stay landscape is a popular type of vernacular building usage in Yayou Gou and other rural areas in China. Here, tourists mainly mentioned home-stay distribution, style, price, quantity, and their living experience. There are

FIGURE 3
Examples of performance landscapes. **(A)** Animal show, **(B)** acrobatic show, **(C)** folklore performance, **(D)** local opera show.

five types of home-stay in the village and each of them possesses a kind of style combined with rurality. Just like a visitor said, "The home-stay style here can be summed up as a perfect fusion of country style and modern elements, at affordable price, and I would like to recommend that." The home-stay could meet the demands of tourists with various backgrounds and provide them an amazing accommodation experience.

4.1.3 Diet landscape

This type of landscape was mentioned in 42 references of all five sources, with the largest proportion of all sub-characters. Three aspects are concluded about the overall attributes of diet landscape: food price, food category, and regional characteristics. The descriptions about food price and category are all positive, and praised for their lower price and abundant varieties. In addition, more than six tourists believe that the food has a high regional characteristic and make them recall previous delicacies they ate when they were young.

The delicacy street is extremely adored for its rural diet buildings (Figure 5). People can find a number of regional food types in this street, which offer tourists with culinary delights in addition to the scenery. In particular, local pancakes, fried chicken, tofu jelly, chili sauce, big-bowl tea, and burdock are recommended by visitors for their distinctive taste and characteristics.

4.1.4 Night landscape

Compared to the peaceful sceneries in many rural areas, Yayou Gou has a wonderful night landscape. Night lanterns, night stage performances, and the night children's play constitute the night landscape. The flower light in this ancient village makes people particularly intoxicated, and the village has a special charm under the background of the lanterns. The stage performance and children's play at night also make the village more attractive.

4.2 Natural landscape

The characteristics of the natural landscape are dominant in topography, hydrological landscape, and flora and fauna landscape (Figure 6). However, the natural landscape character here is not as noticeable as cultural and social landscape character from the perspective of the tourists. For the topography of Yayou Gou, the hill is referred to five times because it is surrounded by hills on the east, north and west sides, which is regarded as its biggest characteristic.

For hydrological landscape, four elements are highly recommended, namely: shout-spring landscape, Yanliu lake, mother-son spring, and canal corridor landscape. Because part of the tourist route is along the river derived from spring in the

FIGURE 4
Examples of building landscape. **(A)** Pancake studio, **(B)** patriotic education building, **(C)** educational building, **(D)** home-stay building.

TABLE 4 The category of Hundred Craft Studio in Yayou Gou Village.

Name	Content
Wind studio	Wine, fruit wine and its production process
Pancake studio	Local pancake (Jianbing in Chinese) and its production process
Tofu studio	Tofu and its production process
Steamed bun studio	steamed bun and its production process
Cooking oil studio	Cooking oil and sesame oil
Pickle studio	Pickle food
Noodle studio	Sorts of noodles
Carpenter studio	Wooden product and its production process
Spice studio	Sorts of spice production
Bamboo-weaving studio	Weaving product about bamboo and its production process

Source: Qianda et al. (2021).

north and flowing to the south, some scenic spots and landscapes are related to the spring and water (e.g., shout-spring and mother-son spring). The water flows into Yanliu lake, which provides potential for water activities.

Another distinctiveness in terms of the natural landscape is the flora and fauna landscape. The greening rate here is more than 95%, with pine forest and fruit forest. Chinese chestnuts and apricots are planted around the foot of hills, while a pine forest is found at the top of the surrounding hills. Animals are also important elements used for rural landscape, such as zodiac zoo, black swan, pool koi, sheep feeding, and pig interaction.

4.3 Perceptual landscape

There are 96 references (29.6%) related to perceptual landscape, which can be divided into three categories: environmental character, spiritual character and feeling character.

Regarding environmental character, many tourists consider Yayou Gou as the representative village of northern China with a good ecological environment and beautiful scenery. Specifically, the fresh air, green hills and clear water are perceived when they encounter Yayou Gou Village. However, tourists also noted the crudeness of the landscape design, suggesting that in the early days of the village becoming a public scenic area, the landscape design was not perfect in some aspects.

FIGURE 5
Examples of diet landscape. **(A)** Pancake food, **(B)** delicacy street.

FIGURE 6
Examples of natural landscape. **(A)** Topography, **(B)** hydrological landscape, **(C)** fauna landscape, **(D)** flora landscape.

Another character is about spiritual aspects; for example, pastoral character, nostalgia and richness in folk customs and old objects. Many tourists find that Yayou Gou has a comprehensive experience because it is not only an ancient village but also a revolutionary tourism area. Not only can adults find the slow pace of life but it is also suitable for children to experience. Yet some tourists express their regrets for visiting because it is a large area, which requires many walks to complete the full route. For example, "I began to count my steps after entering the scenic area, but I did not visit all of sights after more than 20,000 steps," and "All the scenic sights have been visited in the second time, but the feet hurt a lot."

The last is about feeling characteristics while they were visiting. The great significance in travelling is to relieve the pressure from busy work. More than 10 tourists mentioned "It is a pleasant place" and "you can take off all the burdens and experience the unique scenery of the ancient village." Besides, harvest feeling and comfortable feeling are also perceived by tourists.

FIGURE 7
The interrelationship of landscape characters in rural areas.
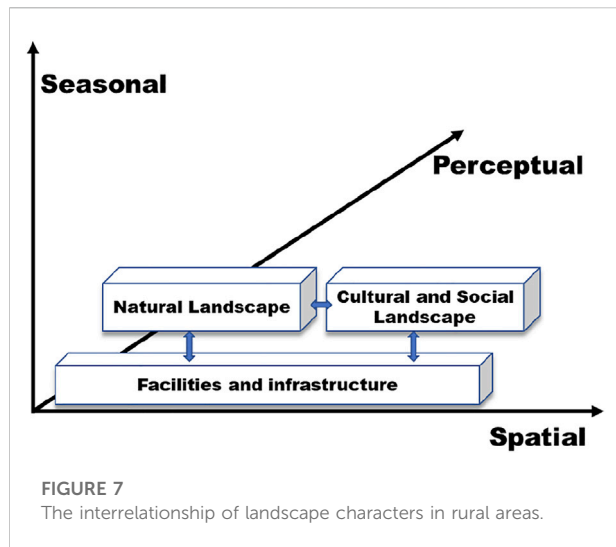
4.4 Seasonal landscape

As this village is located in the north temperate zone, where the climate varies significantly over the year, a seasonal character of the landscape appears to be noticeable by tourists.

In spring, visitors can feel the vitality recovery through new buds of the willows and the blooming apricot flowers, while the green will cover all over the village in summer. Autumn is a special season with harvesting sceneries, for example, "This time, it was autumn, and the village carefully arranged the scene of a harvest festival, with corn, garlic, pumpkin and other crops to make a variety of shapes and agricultural buildings." Visitors can experience the harvesting and picking fruits, such as hawthorn, persimmons, and walnuts. A different landscape character appears in winter, "Green pine trees, russet reeds, red persimmon, blue sky, and white birds form a colorful winter scenery, depicting a beautiful mountain village picture." The white snow in winter also adds a different charm.

4.5 Facilities and infrastructure

There are 13 references related to the facilities and infrastructure, accounting for 4% in all characters. These 13 references are about a navigation system, gallery landscape, road landscape, and river-corridor landscape. From the tourist reviews, we can find that Yayou Gou lacks a guide map for the whole village and travelling route. The sign for direction is unobvious as well, especially in the across, which makes it impossible for tourists to choose the right way to travel, thus the navigation system needs to improve for a convenient tourist guide. Gallery landscape, road landscape, and river-corridor landscape, refer to the specific interesting and unforgettable landscape, represented by wind-bell gallery, millstone road,

and kapok river corridor. While the millstone and stone road offers interest for most tourists, it is difficult for the movement of baby carriages and wheelchairs. It is not friendly to parents with a baby or for the elderly.

5 Discussion

In the introduction, we establish our research aims, which can be summarized as methodological (how to select and collect online tourist reviews about rural landscape?), thematic (what rural landscape characters can be found through the characterization?), and potential (how can these results be applied for further landscape conservation and management?) perspectives. We discuss these aims in turn now, exploring not only the strengths and weaknesses of each question but also more general implications for further study.

5.1 How to select and collect online tourist reviews about rural landscapes?

First, we aimed to acquire reliable online reviews in terms of the rural landscape. In this study, we collected reviews from the perspective of tourists who have visited Yayou Gou Village as the research data, which is in accordance with Carneiro et al. (2015) to some degree. They suggested that a rural landscape is vital to tourism experience and the perception research based on photographs may not be reliable. They argue that contact with the landscape should be included in identifying the features of rural areas. However, visitors with an incomplete visit could not identify as many of the main characteristics that affect tourism experience as possible. Thus, reviews of tourists who have not completed their travelling were chosen to be ignored to decrease that limitation. The final review collection contains 2,600 individual texts and around 120,000 words in Chinese after the cleaning process according to specific rules. A qualitative approach of a grounded theory which is an acknowledged and widely-used method around the world (Bazeley, 2013), was used to conclude the characters from the crude reviews. Through analysis in this study, five main landscape characters and their secondary characters related to Yayou Gou Village were obtained finally. It is confident that this approach can be suitable for landscape characterization.

However, limitations exist in online data gathering. Because the capturing of online data may influence the fluency of website working, some websites have applied technical strategies for anti-capture. This situation could increase the difficulty in acquiring multiple and accurate data. Besides, fake reviews from tourists and advertisers may influence validity. Some tourists may not have expressed their true feelings but just filled in the review to meet the websites' requirements. In addition, some advertisers may have disguised themselves as tourists and posted their advertising to sell tickets or tour guide services.

In addition, the different amounts of sources of characters demonstrate a difference in reliable data collection between various comment provider websites. This may be affected by visitors' perceptions about a landscape tour or their willingness to express encouraged by websites. This study shows more sources of online comments collected and included could provide more reliable identification of the characteristics of rural areas.

5.2 What rural landscape characters can be found through the characterization?

Our second contribution builds on the selected tourist review collection, which was to identify the rural landscape characteristics from the perspective of tourists. In this study, we identified that the rural landscape of Yayou Gou Village has significant features in a combination of cultural and social landscape elements, natural landscape elements, perceptual landscape elements, seasonal landscape, and facility and infrastructure. Cultural and social landscapes have an overwhelming role in Yayou Gou's landscape than other elements perceived by tourists. Similarly, Swanwick (2002) and Tudor (2014) proposed that landscape characteristics that make a landscape distinctive were constituted of natural, cultural and perceptual and aesthetic elements. Our research from the tourists' view seems to support their argument. According to Callau et al. (2019), facilities and infrastructure were also important attributes distinguished from photograph content analysis in this research. Besides, we identified seasonal characteristics between different seasons, which present different landscapes to visitors. This character was perceived through the time change and relatively rare found in other researches.

Figure 7 shows the interrelationship between those characters identified through the online comments of visitors. The natural landscape interacts with the cultural and social landscape, which form the main landscape in rural areas. Meanwhile, they are all affected by facilities and infrastructure in rural areas. These landscape elements have three dimensions of influence, namely: space, season, and perception. As the seasons change, those landscape elements would present different appearances for visitors. With the spatial and seasonal transformation of the landscape, the perception of the landscape will vary.

5.3 How can these results be applied for further landscape conservation and management?

Our last question was about the potential of this research to address the problem of using the characterization results for landscape management, monitoring, and conservation. From the

characterization process, not only the landscape characteristics have been identified but issues that need improvement were also mentioned and exposed. These main and secondary landscape characters supported by tourists in Yayou Gou Village are the elements that need the most conservation and monitoring. Some problems and weaknesses are also exposed for improvement in management, as follows:

(1) The important characters of cultural and social, natural, perceptual and seasonal perspectives, as well as the facility and infrastructure were identified. These landscape characters were well experienced and recommended by numerous tourists. Therefore, special consideration should be paid to for a better conservation in Yayou Gou Village. These characteristics should be promoted as the strengths for rural landscape development.

(2) From the result of characterization through online review texts, we can easily find that natural landscape elements in Yayou Gou were relatively less developed than cultural and social landscape, which shows a landscape developing direction in natural elements. There are rich natural landscape elements including hills, rivers, Chinese chestnut forests, and so on. However, not all of them are well developed for tourist utilization. Therefore, strategies and guidelines in terms of natural landscape utilization on the condition of good preservation are urgently required.

(3) There are obviously different sceneries among seasons according to the number of tourists. The landscapes in summer and autumn are extremely attractive, while visitors can enjoy less in winter except for the special snow sceneries. Therefore, an extension of landscape resources is urgent for Yayou Gou Village. Since the natural landscape elements are less utilized in winter and spring, the cultural landscape elements can be fully explored to fulfil the gap. For example, the folk shows in the period of the Chinese Spring Festival are popular and welcomed.

(4) Finally, several reviews have mentioned that the facility and infrastructure, especially the walking road, need more improvement taking into account the needs of various groups. Currently, the roads in the village are mainly built with irregular stones, making them difficult to use for baby carriages and wheelchairs. This means that the roads are not friendly to parents with young babies and the elderly. Thus, more improvements or smooth roads are needed to achieve a better tour experience for visitors.

6 Conclusion

Our initial point was to conduct landscape characterization in a relatively convenient way using online reviews generated by those visiting the landscape. We used reviews from five tour Internet websites as a source to extract valid texts, analyze them

qualitatively, and capture the rural landscape characteristics. Our results demonstrate that it is possible to generalize rural landscape characters from the perspective of tourists' reviews about their experience. Natural, cultural, and social, as well as perceptual landscapes are identified. These landscape characters vary not only in spatial and seasonal but also in perceptual dimensions. Weaknesses that require urgent improvement are also exposed in the characterization process. These weaknesses include infrastructure drawbacks, inadequate natural landscape resources and differences between seasons.

This study provided an innovative approach for landscape characterization with online review data from various tourists and filled the gap in this field. It demonstrated that online social media data contain abundant information about landscape that they have visited and could be well used for exploring the landscape characters in rural areas. Large numbers of tourists were involved in landscape characterization in this study and various perceptions were identified. Compared with traditional method, this approach improved the reliability of landscape characterization. This approach can be effectively and practically applied in landscape monitoring, conservation and management by landscape researchers and management members toward a better landscape resource protection and improvement.

The results of study reflect that through tourists' review and comments on social media platforms, landscape characters can be acquired and used for landscape conservation and management. However, to widen the research spectrum, further studies should be taken into consideration in the following fields. First, the spatial character of landscape, which was an important attribute for a landscape and was not considered in this research, should be included. It was difficult to extract the spatial information from the text; however, the affiliated pictures with review texts may help solve this weakness. Thus, a combined collection of recommended pictures and review texts could be conducted and analyzed in the future study. Second, in contrast to the common qualitative data collection methods; for example, interview, these review text from tourists may not reflect their true opinions, but merely facial and casual ideas for websites. This will influence the reliability of the research. A more careful cleaning process is necessary to discard these texts. More varied methods (e.g., surveys supported by information and communications technology), should be tried for objectivization in the characterization. Finally, a more legitimate and efficient way to extract the texts needs to be developed due to the hindrance from the providers of the online websites.

Data availability statement

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation.

Author contributions

ZQ and MH contributed to conception and design of the study. ZQ conducted the data collection and analysis. ZQ wrote the first draft of the manuscript. MH, NA, MY, and CS reviewed and revised the manuscript. All authors contributed to manuscript revision, read, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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