

Residents' urbanized landscape preferences in rural areas reveal the importance of naturalness–livability contrast

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Abstract: Urbanization has caused significant landscape changes in rural areas, leading to the emergence of urbanized landscapes (ULs), which have been generally criticized by authorities and professionals. However, perceptions of ULs among local residents have rarely been studied. In this study, we chose five typical categories of ULs from rapidly transforming villages in Fujian Province, China – hardened water bank (HWB), big pavilion (BPA), big memorial arch (BMA), big ornamental lawn (BOL), and big square (BSQ) to do the study. We identified how these ULs were rated and ranked by on-site surveys, as well as how related aesthetic and multifunctional landscape characters (LCs) played a role. The results (N=550) showed that 1) residents supported the construction of ULs, and the most preferred category was that with the most natural elements (BOL) that was simultaneously well maintained. 2) For the residents, the longer they had resided in the village and the fewer connections they had with the city, the more in favor they were of the ULs, and the more eager they were for landscape change. In addition, residents with higher education and Communist Party of China membership valued the naturalness related LCs more highly. 3) Two contradictory preference features, naturalness and livability, should be well coordinated and balanced to construct an improved favorable village for the residents, to realize a balanced and sustainable development path. This study makes great theoretical contributions to landscape research and provides new insights into rural planning and construction.

Keywords: landscape change; urbanized landscapes; residents; landscape preference; landscape characters; landscape planning; rural areas

1 Introduction

Urbanization characterizes an intense concentration of urban population, human activities,

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and extensively built-up land development (Foley *et al.*, 2005; Grimm *et al.*, 2008; Song *et al.*, 2018). Geographically, urbanization not only transforms landscape patterns of urban areas (Dadashpoor *et al.*, 2019) but also causes influential landscape changes in rural areas, such as the intensification of agricultural areas and the abandonment of grassland, together with the conversion of more infrastructure and settlement areas (Sayadi *et al.*, 2009; Schirpke *et al.*, 2021). Traditionally, rural landscape has been centered on agriculture. However, it is in the transition from productivism to post-productivism (Pinto-Correia and Kristensen, 2013), and the increased urbanization of the countryside has increased competition among more functions, such as recreational activities and tourism (Tress and Tress, 2003). These land-use changes have an ongoing impact on landscape patterns that occur with the emergence of urbanized landscapes (ULs). ULs can be summarized as all the new elements and structures being superimposed upon the traditional landscapes during the process of urbanization (Antrop, 2004; Dadashpoor *et al.*, 2019). However, according to our review of the literature, few researchers have investigated ULs in relation to the interactions between new landscapes and individuals, such as whether ULs are treated as part of rural landscapes.

Urbanization changes not only the landscape patterns of urban and rural areas but also how people perceive and live together with the surrounding landscapes. Thus, researchers have explored human-landscape relationships from the landscape preference (LP) perspective (Purcell *et al.*, 1994; Junker *et al.*, 2008; Swanwick, 2009; Kaltenborn *et al.*, 2010; Kalivoda *et al.*, 2014; Bubalo *et al.*, 2019). Many LP studies have focused on the causes and effects of landscape change, especially how rural landscapes have been changing and people's perceptions towards them accordingly (Yang *et al.*, 2021). For example, rural landscapes have been perceived to have changed from providing only production services (i.e. food and fuel) to also providing cultural services (i.e. recreation, tourism and cultural heritage) (Häfner *et al.*, 2018), and whether the traditional land-use systems should be maintained under the situation of agricultural intensification and industrialization (Anderson *et al.*, 2017; Pecher *et al.*, 2018). In addition, photo-based methods with visual indicators (i.e., historicity, maintenance and coherence) are normally used to recognize how humans prefer the physical features of a landscape (Tveit *et al.*, 2006; Martín *et al.*, 2016; Spielhofer *et al.*, 2021). These visual indicators are developed as part of landscape characters (LCs), to improve the understanding of the relationship between people and place and make informed planning decisions (Butler, 2016; Bartlett *et al.*, 2017). Except from the aesthetic characters, multifunctional characters are also assessed based on the potential supply of ecosystem services (Hölting *et al.*, 2020), which includes but is not constrained to recreation, production, habitat and tourism (Howley, 2011; Gulickx *et al.*, 2013). However, aesthetic and multifunctional characters are always studied separately because aesthetic characters are considered intrinsic values of a landscape (Jorgensen, 2011), while multifunctional characters are assessed based on the human needs (Gulickx *et al.*, 2013). Hence, combining the two aspects of aesthetic and multifunctional characters to improve the interpretation of people's preferences towards certain landscapes would make some implications.

In LP studies, strategies are often formulated by experts, and thus, the opinion of the public is insufficiently considered because experts can observe the landscape as a whole and interpret it more easily (Dupont *et al.*, 2015; Hewitt *et al.*, 2020). However, residents should

be one of the primary decision makers in their communities because they share common responsibilities for the area they live (Lee, 2020). Hence, an increasing number of researchers have expressed the need to incorporate public perceptions into landscape management processes (Tress and Tress, 2003; Vouligny *et al.*, 2009; Kristensen and Primdahl, 2019; Hölting *et al.*, 2020), especially those residents who experience certain landscapes in their daily lives. Vouligny *et al.* (2009) found that the inhabitants value ordinary landscapes on a set of criteria related to emotion and everyday experience, and the visual criteria used by the experts were not important to the inhabitants. Fagerholm *et al.* (2012) used inhabitants as key informant in the spatial assessment of landscape service indicators, and discussed the role of local stakeholders as experts in the assessment. Lee (2020) emphasized the importance of resident-led landscape management in rural areas and investigated residents' perceptions of their everyday landscapes. Among these studies, significant assessment differences between landscape professionals and lay people were demonstrated, and the value of resident preference surveys was confirmed. However, few studies have explored on how residents could evaluate the ULs, and how their related demographic characteristics would play a role.

In China, during the past decades, most of the investment and financial support has focused on cities, while rural areas have been neglected (Li *et al.*, 2018; Yu *et al.*, 2018). To promote the prosperity of the rural economy and improve the living standards of the farmers, the Chinese government launched a proposal called *Beautiful Village* constructions since 2017. Modernized infrastructures and facilities were constructed, along with some landscapes imitating the urban forms to improve accessibility and life convenience. However, after years of construction, some criticism were raised. In an official document released in 2019 by the Department of Housing and Urban-Rural Development, Fujian Province, ULs were defined as urban-form landscapes with large-scale volumes and using industrial materials such as concrete, which are not harmonious with the original rural styles (source: https://www.sohu.com/a/300034261_671828). Criticized ULs listed in the document include hardened water bank, big pavilion, big memorial arch, big ornamental lawn, and big square. Since these ULs were constructed in the rapidly urbanizing countryside, which are under considerable landscape change, we thought exploring people's perceptions of ULs could further reflect their attitudes towards rural landscape change. In addition, despite some criticism from the outsiders, little is known of how residents, as insiders, perceive these ULs.

To these ends, the objective of this study was to figure out how residents with various demographic characteristics would evaluate ULs from their daily life perspective, as well as the different importance level of LCs being interpreted. Specifically, this study selected five typical ULs (Table 1) from five rapidly transforming villages in Fujian Province, China, to answer the following questions: (1) Among the various types of ULs, which are the most (least) preferred? (2) Among all the aesthetic and multifunctional LCs, which is valued to be more important? And are there any new patterns between them? (3) How do demographic variables influence individual preference for various types and characters of ULs? By exploring these questions, we aim to determine the residents' preferences for ULs, perceptions of LCs, and attitudes towards rural landscape change and then draw conclusions regarding the application of favorable policies and management to rural construction.

2 Materials and methods

2.1 Study area

Fujian Province was selected as the study area because its local government had reported problems with the effects of *Beautiful Village*, the construction project. Fujian is on the southeast coast of China (Figure 1). Its landscape featuring towering peaks and continuous interspersed hills, and mountains account for more than 80% of the province’s total area. Hence, the villages included in the survey were all located in basins, with a mix of mountains, agricultural lands, and compact settlements. Five villages were selected. The criterion for selection was whether a village was experiencing large-scale rural construction, and each of the five villages had experienced one of the criticized ULs reported by the Fujian government. The five villages were Zhentou (with HWB), Jiangfang (with BPA), Guanqian (with BMA), Changfu (with BOL), and Shiheng (with BSQ). The registered population in these villages was between 1000 and 2000 inhabitants. Many middle-aged residents make a living in big cities, leaving their young children and elder parents at home, and rarely go back all year round. A few people who still live in the villages rely on farmland, but they also seek temporary jobs in the nearby cities to increase income in non-farm seasons. In general, the village population is older, less educated and had lower per capita income than the average population in China.

Table 1 The characteristics of five urbanized landscapes investigated

UL types	Descriptions
Hardened water bank (HWB)	Uses hard materials such as concrete and stones to reinforce the original unstable muddy banks to avoid flooding, but this practice may destroy the growth of plants on the previous muddy banks.
Big pavilion (BPA)	Usually built in city gardens for people to recreation. People could stay to view the landscapes around. It is also a landscape to be appreciated especially for its unique shapes and roof decorations.
Big memorial arch (BMA)	In ancient China, it is used to memorize ancestors and demonstrate some achievements, but in modern city construction, arches with traditional characteristics are used as landmarks that are usually built at the entrance of scenic areas or blocks.
Big ornamental lawn (BOL)	A lawn is usually arranged with various species of trees and flowers and can be combined with, for example, path, water features, squares; sizes vary from small to big. Small ones could be in private yards, and big ones are usually in city parks.
Big square (BSQ)	An open space with hard pavement. It could be arranged with, for example, plants, fountains, and benches. It is a place for people to gather, a typical Chinese activity is square dancing.

2.2 Data collection

Photographs corresponding to the five ULs were taken on-site from five villages. To reduce potential influences on the survey result caused by weather and brightness conditions (e.g. visibility and shadow effects), all photographs were taken in late summer 2020 under consistent weather conditions and at proper positions using an iPhone X camera, without use of any special filters, effects, or any other digital manipulation that could distort the content (López-Martínez, 2017). As recommended in other studies (Foelske *et al.*, 2019), we conducted a pilot survey in Zhentou Village (n=10) to test the questions and survey



Figure 1 Location of Fujian Province and five on-site photos from the villages
Note: HWB: hardened water bank; BSQ: big square; BPA: big pavilion; BMA: big memorial arch; BOL: big ornamental lawn

design. After refining our survey, an interview survey was carried out in May 2021, with random samples of 101, 100, 118, 109 and 122, respectively. About 95% of the respondents who were approached and shown the pictures chose to participate in the survey, which highlights the positive effect of the images to trigger interest and enhance participation. The average time spent by each respondent on finishing the questionnaire was around 30 min. At the beginning of the investigation, the investigator gave a short introduction on the purpose of the survey and provided some basic information about the *Beautiful Village* proposals. Also, the importance of studying residents' LPs was emphasized. The investigator also asked some open questions, for example, *Do you have any anticipations about the future of the village?* and *Do you prefer to live in the countryside or city?* However, these question were not used in this article.

In the first part of the interview, the respondents were asked some basic questions regard-

ing themselves (Table 1). A total of 550 people participated, of whom 52.2% were male; 45.3% were aged between 41–65 years and 45.6% were aged less than 40 years; almost 90.2% had not attend a college; approximately 72.6% earned less than 40,000 RMB per year (with an average of 20,880 RMB, which is far less than the average annual income of nearby city residents of 47,000 RMB). 62.7% had lived in the village for more than 20 years, and 6% had resided there for less than 5 years (Table 2).

We also considered whether the respondent was a member of the Communist Party of China (CPC), because people of this unique group in China have more opportunities than those outside this group to know about the rural development proposals. The second part of the questionnaire asked questions regarding five photos. Respondents were first asked to score the attractiveness of each UL on a Likert-scale, from 1 (least appealing) to 5 (most appealing); subsequently, they were asked whether they thought it was necessary to construct this UL in the countryside. The next set of questions was designed to assess the importance of the 11 LCs (Table 3). These LCs were chosen based on other studies of both aesthetic and multifunctional aspects. The purpose of this part was to figure out the residents' visual preferences and their actual needs based on their daily life experiences. Respondents were asked whether a particular character played an important role in assessing the overall attractiveness of the landscape. They were required to give importance scores on a 5-point scale ranging from totally unimportant (1) to very important (5). After rating the

Table 2 Respondents' demographic characteristics (N=550)

Demographic characteristics	variables	Number of participants	Percentage of participants (%)
Gender	Male	287	52.2
	Female	263	47.8
Age	17 years and below	58	10.5
	18–40 years	193	35.1
	41–65 years	249	45.3
	66 years and above	50	9.1
Education level	Elementary and below	193	35.1
	Junior	215	39.1
	senior	88	16.0
	College and above	54	9.8
Annual income (RMB)	9999 and below	178	32.4
	10,000–39,999	221	40.2
	40,000–79,999	97	17.6
	80,000 and above	54	9.8
Length of residency	4 years and below	33	6.0
	5 years to 9 years	43	7.8
	10 years to 19 years	129	23.5
	20 years and above	345	62.7
Frequency to the city (on average)	Once per day	91	16.5
	Once per week	140	25.5
	Once per month	154	28.0
	Once every three months	67	12.2
	Once every half a year and above	98	17.8
Member of Communist Party of China	Yes	65	11.8
	No	485	88.2

Table 3 Overview of 11 landscape characters and their corresponding questions in the survey

Landscape characters	References	Definitions	Descriptions in the survey
<i>Aesthetic</i>			
Coherence	Stamps (2004); Tveit <i>et al.</i> (2006); van der Jagt <i>et al.</i> (2014); Martín <i>et al.</i> (2016); Kuper (2017)	The visual elements of the scene fit together well	When constructing this UL, is it important to be in harmony and consistency with the other landscapes of the village?
Legibility	Stamps (2004); Tveit <i>et al.</i> (2006); van der Jagt <i>et al.</i> (2014)	It would be easy to find the way around; it also has synonyms as uniqueness, imageability.	When constructing this UL, is it important to be special and make the village look different from other villages?
Historicity	Tveit <i>et al.</i> (2006); Ode <i>et al.</i> (2008); Atik <i>et al.</i> (2016); Martín <i>et al.</i> (2016)	Historical continuity of different time layers, amount and diversity of cultural elements.	When constructing this UL, is it important to preserve and reproduce some historical and traditional cultural element?
Maintenance	Coeterier (1996); Tveit <i>et al.</i> (2006); Ode <i>et al.</i> , (2008)	Sense of order, reflecting active and careful management of humans.	When constructing this UL, is it important that it is well maintained and managed?
Naturalness	Coeterier (1996); Tveit <i>et al.</i> (2006); Martín <i>et al.</i> (2016)	Closeness to a preconceived natural state.	When constructing this UL, is it important not to destroy the original naturalness of the village?
Neatness	Nassauer (1995); Tveit <i>et al.</i> (2006); Zheng <i>et al.</i> (2011)	An intense human expression of the aesthetic of care.	When constructing this UL, is it important that it could help to make the village cleaner and tidier?
<i>Multifunctionality</i>			
Biodiversity	Van Den Berg <i>et al.</i> (1998); Hoyle <i>et al.</i> (2017)	There are many different types of animals and vegetation in the landscape.	When constructing this UL, is it important to provide more living space for animals and plants?
Recreation	Barroso <i>et al.</i> (2012); van Zanten <i>et al.</i> (2016); La Rosa <i>et al.</i> (2016)	A cultural ecosystem service, which provides space for people to entertain and exercise.	When constructing this UL, is it important to provide recreational space for people?
Accessibility	Voulligny <i>et al.</i> (2009); Komossa <i>et al.</i> (2018); Foelske <i>et al.</i> (2019)	The distance, the convenience of how people could approach the landscape.	When constructing this UL, is it important to be close to home?
Production	Kline and Wichelns (1996); Willemen <i>et al.</i> (2010); Almeida <i>et al.</i> (2016)	For agricultural use	When constructing this UL, is it important not to occupy the previous arable farmland?
Tourism	Tress and Tress (2003); Sayadi <i>et al.</i> (2009); Zhang and Lei (2012)	Use some landscapes to attract visitors, thus generating economic opportunities	When constructing this UL, is it important to attract more outsiders to visit here?

five photos, in the last part of the survey, respondents were asked to rank them according to their overall preference. We used this ranking method as a complement to the rating method because Sayadi *et al.*, (2005) found that in the ranking method, respondents are forced to establish ordinal differences even if they do not clearly perceive these differences as preferential elements. Thus, the results can be more convincing.

2.3 Data analysis

We used SPSS 26 for data analysis. First, the overall preference was calculated according to the mean scores for each category. Despite this process implying a simplification, it has been used in several previous studies to interpret preference surveys (Strumse, 1996; Van den

Berg and Koole, 2006; López-Martínez, 2017; Manyani *et al.*, 2021). Second, because factor analysis can transform a larger set of correlated variables into a smaller set of uncorrelated variables without losing much information (Soini *et al.*, 2012), we used the factor analysis with principal component extraction to check if the residents’ preference for the 11 LCs could still follow the patterns of dividing the variables into two groups of aesthetic and multifunctionality. At the same time, the Bartlett’s test of sphericity and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy were employed to determine the fitness of the factor analysis (Verbrugge *et al.*, 2018). Multiple linear regression analysis was used to examine how socio-demographic variables could influence on preferences with predictors extracted from the factor analysis. The mean importance scores for the extracted factors of LCs were entered as dependent variables, and individual demographic characteristics were the independent variables. Finally, one-way ANOVA was used to examine how demographic factors influence the ratings and rankings of the five ULs (Figure 2).

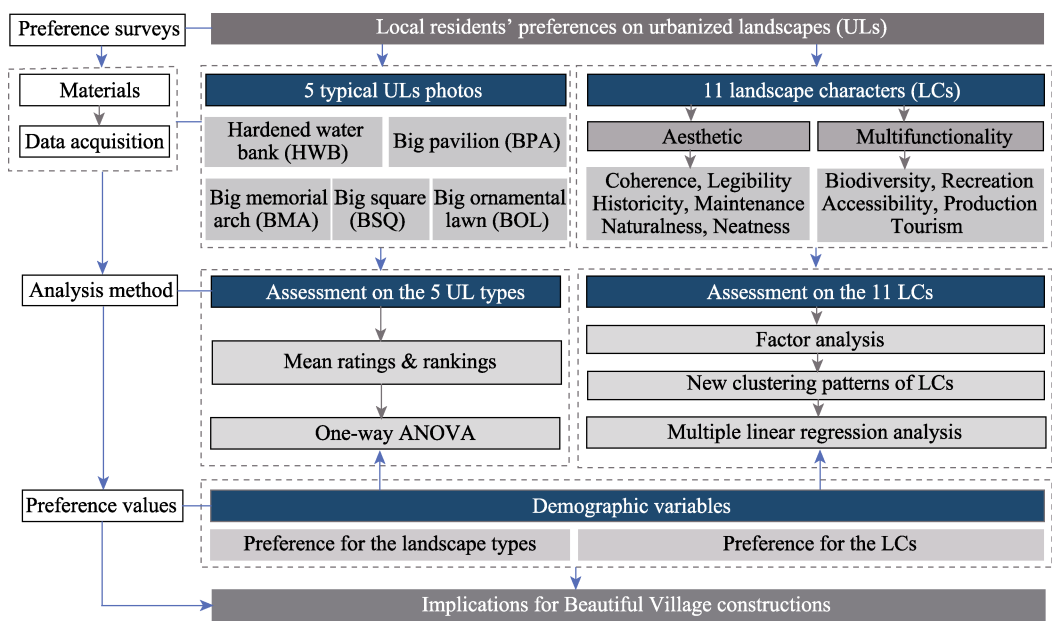


Figure 2 Method flowchart

3 Results

3.1 Overall ratings for urbanized landscape types

The results showed that a high proportion of respondents responded positively to the construction of ULs (Figure 3). HWB and BOL got the highest and the same number of supports, while BMA received the lowest. The overall preference ratings based on the mean scores had similar outputs (Table 4). BOL was the most preferred and got the highest preference score (mean score=4.35), while BMA was least preferred and got the lowest preference score (mean score=3.96). At the same time, standard deviations showed the respondent’s high consensus for BOL (sd=0.81), while there were some controversies for BMA (sd=1.00). Besides, the BSQ, BPA, and HWB were rated in descending order, with mean scores of 4.16,

4.12 and 4.06 respectively. Notably, despite the highest number of respondents thinking it was necessary to build HWB, it got a relatively low preference score regarding the photo type of HWB being surveyed, indicating a significant improvement in the future ways of construction. When it comes to five villages separately, BOL was still the most preferred UL, except for villagers who had a BOL, who prefer a BPA the most (mean score=4.33). However, villagers who had a BPA gave the lowest scores to the BPA (mean score=3.59).

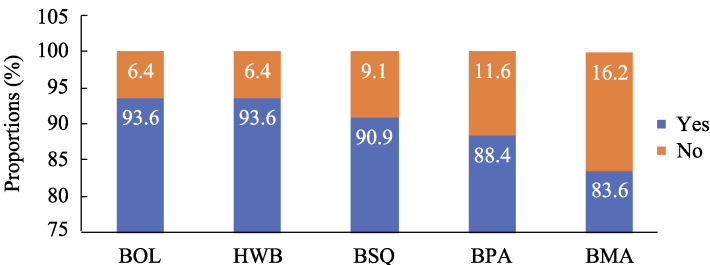


Figure 3 Proportions of respondents answering whether the ULs should be constructed in the village or not
 Note: HWB: hardened water bank; BSQ: big square; BPA: big pavilion; BMA: big memorial arch; BOL: big ornamental lawn

Table 4 Mean preference scores of respondents in total and from the five villages (standard deviations in parentheses)

ULs	Respondents from the five villages respectively					
	All villagers (N=550)	Villagers from BOL (N=109)	Villagers from BSQ (N=122)	Villagers from BPA (N=100)	Villagers from HWB (N=101)	Villagers from BMA (N=118)
BOL	4.35 (0.81)	4.32 (0.86)	4.39 (0.75)	3.96 (0.86)	4.45 (0.81)	4.57 (0.66)
BSQ	4.16 (0.87)	4.05 (0.94)	4.24 (0.76)	3.87 (0.83)	4.29 (0.86)	4.31 (0.86)
BPA	4.12 (0.94)	4.33 (0.83)	4.16 (0.84)	3.59 (1.10)	4.10 (0.91)	4.35 (0.84)
HWB	4.06 (0.92)	4.13 (0.89)	4.04 (0.87)	3.85 (0.88)	3.99 (0.95)	4.26 (0.94)
BMA	3.96 (1.00)	4.11 (0.89)	4.01 (0.94)	3.87 (0.99)	3.62 (1.16)	4.15 (0.94)

Note: HWB: hardened water bank; BSQ: big square; BPA: big pavilion; BMA: big memorial arch; BOL: big ornamental lawn

3.2 Factor analysis of LCs

We calculated the average importance scores of the LCs attached by respondents (Figure 4). Neatness got the highest mean score (4.41), followed by maintenance (mean score=4.39). This indicated the residents value a clean, well-cared living environment, and tend to give higher preference scores when they think the landscape is in order and has good management. In contrast, biodiversity was the least preferred item (mean=3.47), which means the villagers do not concern much about the habitat of animals and plants.

To find out if there is a new pattern beyond the two dimensions of aesthetic and multi-functionality, we applied a factor analysis on the respondents' mean importance ratings for

the eleven LCs. The factor analysis fulfilled the requirements of the $KMO > 0.7$ and Bartlett's test was $p < 0.001$, which validates the rationality of using this method. Factor loadings greater than 0.50 for one factor and lower than 0.40 for the others were kept in the analysis, and we finally got five new groups of factors which explained 79.53% of the variance in total. We named the five factors attractiveness, livability, naturalness, biodiversity, and accessibility, respectively (Table 5). Attractiveness explained the highest variance of 24.87%, indicating that respondents thought the most attractive landscape in rural areas not only showed the local characteristics and thus became landmarks of the village but was also well maintained and could attract visitors. The second factor, livability, contained characters of becoming a more comfortable living space for people to entertain, which is clean and full of recreational space. The third factor, naturalness, involved characters regarding preserving the natural scenery and farmland, which explained 15.56% of the respondents' preference for ULs. The last two factors, biodiversity and accessibility, were set up as two factors of their own, which suggested they had no correlations with the other LCs.

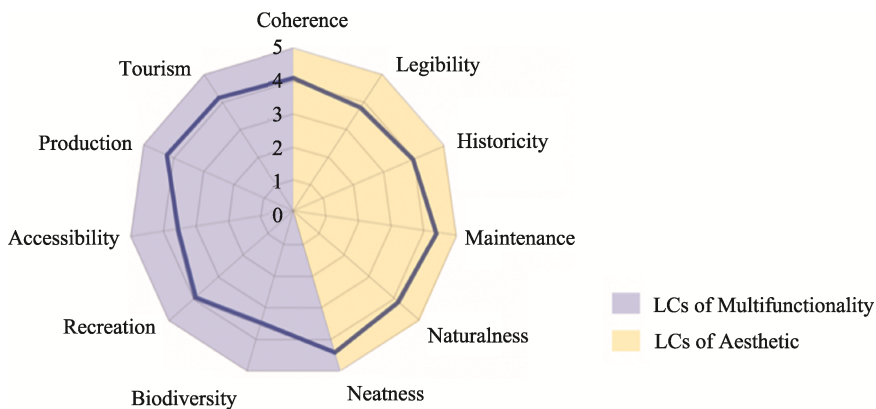


Figure 4 Average scores of the importance levels of different landscape characters (LCs)

3.3 Influence of demographic characteristics

3.3.1 Preference for new factors of LCs

To examine how demographic variables affected the respondents' ratings on the importance of LCs, especially the new patterns of LCs extracted from the factor analysis, we further used multiple linear regression analysis (Table 6). The results showed that only the gender variable was insignificant across all categories, while other variables yielded significant differences for one or more of the character categories. Specifically, the variables of age, educational level, and city frequency were connected to biodiversity. People with older age, lower education level, and higher frequency to cities were less sensitive to the biodiversity, while young people, higher education level, and those who went to cities less frequently gave higher importance score on the habitat and living conditions of the animals and plants. In addition, the length of residency was the only variable that influenced the preference for naturalness. The longer someone lives in the village, the less he (she) cares about the original landscapes, such as the past natural scenery and farmland, which indicates that they are eager to change. Annual income, which represents an individual's socioeconomic status,

Table 5 Factor loadings for the two key dimensions of participants’ perceptions (N=550) emerging from factor analysis with principal components analysis (values>0.5 are highlighted in bold)

Questionnaire item (individual's importance scores to- ward each landscape attribute)	Factor scores					Variance	Mean scores
	<i>AT</i>	<i>LI</i>	<i>NA</i>	<i>BI</i>	<i>AC</i>		
<i>Attractiveness</i>							
It is important to make the village look different from other villages (legibility)	0.685	0.235	0.040	0.273	0.353	24.87	3.79
It is important to preserve and reproduce some traditional cultural elements (historicity)	0.602	0.345	0.310	0.361	0.163		3.98
It is important to be well cared for and managed (maintenance)	0.818	0.148	0.243	0.111	−0.013		4.39
It is important to attract more people to travel here (tourism)	0.786	0.201	0.077	0.048	0.198		4.16
<i>Livability</i>							
It is important to be consistent with the other landscapes of the village (coherence)	0.243	0.864	0.136	0.024	0.148	15.99	4.11
It is important to make the village cleaner and tidier (neatness)	0.450	0.543	0.376	0.151	−0.315		4.41
It is important to provide recreational space for people (recreation)	0.370	0.566	0.110	0.468	0.268		3.93
<i>Naturalness</i>							
It is important to protect the natural scenery of the village (naturalness)	−0.007	0.372	0.778	0.226	0.136	15.56	4.18
It is important not to occupy the arable farmland (production)	0.360	−0.008	0.831	0.090	0.131		4.24
<i>Biodiversity</i>							
It is important to provide more living space for the animals and plants (biodiversity)	0.170	0.070	0.199	0.920	0.126	12.71	3.47
<i>Accessibility</i>							
It is important to be close to my home (accessibility)	0.246	0.130	0.205	0.177	0.842	10.40	3.53

Kaiser-Meyer-Olkin measure of sampling adequacy=0.877, Bartlett’s test of sphericity, $p=0.000$

Note: AT: attractiveness, LI: livability, NA: naturalness, BI: biodiversity, AC: accessibility

Table 6 Multiple regression analysis examining demographic variables influencing preference for landscape characters

Coefficient	<i>Attractiveness</i>	<i>Livability</i>	<i>Naturalness</i>	<i>Biodiversity</i>	<i>Accessibility</i>
Adjusted R^2	0.022	0.018	0.031	0.059	0.021
Gender	−0.081	−0.109	−0.292	−1.303	−0.468
Age	−0.727	−1.838	−1.182	−3.973***	−2.355*
Education	−0.936	−1.389	1.830	2.005*	−0.351
Length of residency	−0.875	1.270	−2.299*	−0.190	−0.586
Frequency to city	−0.109	0.059	−0.561	3.268***	2.192*
Communist party	−2.818**	−3.153**	−1.277	−2.035*	−2.327*
Annual income	−2.936**	−1.648	−0.544	−0.018	−1.290

significantly affects residents' preferences for attractiveness. People with higher incomes are less concerned about the village's attractiveness. The most powerful variable in the LCs ratings was whether the respondent was a CPC member: it significantly affected four of the five factors to varying degrees. Overall, CPC members gave higher importance scores to all LCs, which means they had higher requirements for the construction of ULs in the countryside.

3.3.2 Preference for urbanized landscape types

Although the mean ratings illustrate general patterns of preference for landscape types, they do not provide sufficient evidence on how demographic variables influence this preference. Therefore, we conducted the one-way ANOVA (Table 7). The respondents' preference rankings were also listed here as complements to the preference ratings, and the results showed that these two methods of assessing would together reflect more than when only the rating method was used. Notably, BOL, which was the most preferred UL, showed no differences across all demographic variables. This further proved that resident's preference towards BOL had a very high consensus, regardless of their individual characteristics. The preferences regarding HWB was influenced by the vast majority of demographic variables, and the rankings showed similar results. Males, older adults, people with longer residency in the village and less frequency to the cities, and CPC members tended to give higher preference scores and rankings on HWB. However, the same groups of people gave lower rankings to BPA, despite no statistical difference being found when rating this UL. There were no unified patterns for BMA and BSQ. In general, young people gave lower rankings to BMA, but specially like BSQ.

Table 7 One-way ANOVA examining demographic factors influencing preferences for landscape types

	HWB		BPA		BMA		BOL		BSQ	
	Ratings	Rankings	Ratings	Rankings	Ratings	Rankings	Ratings	Rankings	Ratings	Rankings
Gender	10.962***	12.651***	0.752	7.947**	0.402	1.068	0.313	2.018	2.223	1.285
Age	4.437**	6.104***	3.891**	8.716***	3.064*	2.803*	1.782	1.531	1.192	7.753***
Education	2.428	0.489	1.781	0.711	3.750**	0.866	1.453	0.011	2.075	2.221
Length of residency	3.945**	2.587*	1.328	2.624*	0.377	0.751	0.713	1.335	4.909**	2.138
Frequency to city	2.413*	2.731*	1.428	2.411*	3.470**	3.357**	2.207	1.242	0.582	1.546
Communist party	12.169***	11.416***	2.054	4.627*	9.669**	0.920	0.009	1.769	0.543	1.794
Annual income	0.515	1.347	2.231	1.447	1.061	0.727	1.323	0.231	0.650	1.018

* Significant at 5% level; ** significant at 1% level; *** significant at 0.1% level

Note: HWB: hardened water bank; BSQ: big square; BPA: big pavilion; BMA: big memorial arch; BOL: big ornamental lawn

4 Discussion

4.1 Can ULs be treated as part of the rural landscape?

In this study, we found a contradiction between residents and outsiders (in this study, represented by the government of Fujian Province), who had different expectations concerning

what landscapes in villages should be like. From the outsiders' perspective, ULs are intruders of the rural landscape, destroying the original rural appearance that should be preserved for economic, ecological, and cultural values (Tieskens *et al.*, 2017; Li *et al.*, 2018; Lee, 2020), thus, they should not exist in the countryside. In contrast, residents who had already treated ULs as part of the rural landscape were acceptable of rural landscape change and supported the construction of ULs. This result is similar to that of Soini *et al.* (2012), who found a high degree of adaptability to landscape changes among farmers, and that farmers' valuation was mainly determined by the utilitarian perspective, from the point of view of economic development and modernization (Pecher *et al.*, 2018; Lee, 2020; Marciniak *et al.*, 2020). Hence, it can be a big challenge to find tradeoffs between insiders and outsiders, who have different attitudes concerning whether ULs can be considered as part of rural landscapes and should be developed in rural areas.

On the other hand, our study found that despite residents were positive on ULs which are fairly modernized in rural areas, they still prefer ULs with more natural elements, and at the same time being well cared-for. This finding is consistent with those of other studies, which have demonstrated that residents prefer natural-looking but managed landscapes (Van Den Berg *et al.*, 1998; Zheng *et al.*, 2011; Nassauer *et al.*, 2021). For example, the most preferred category was BOL, which occupied the most natural elements (i.e. grass, trees, and flowers) and showed signs of care in the picture. From the residents' utilitarian attitudes toward the ULs, BOL was a good place for relaxation, and those natural scenes were thought to provide some restorative functions (Ulrich *et al.*, 1991; Van den Berg *et al.*, 2016). Residents' utilitarian perspective was also proven in their least preferred category, BMA. Of all the ULs, BMA demonstrated the greatest numbers of local features and cultural characteristics. Though someone stated that they needed BMA to act as an important landmark and be the identity of the village, larger majority of the residents expressed strong opposition that it did not have any practical functions, especially when the other ULs, such as BPA and BSQ, could at least serve as recreational spots.

4.2 Predictors for urbanized landscape preferences

4.2.1 New classifying patterns of LCs: natural and livable features

In LC studies, scholars have attempted to divide LCs into sub-groups to better communicate between human and nature. Atik *et al.* (2016) analyzed 35 LCs as variables with aesthetic, cultural, value, perceptual and natural features, where aesthetic features were involved in all sub-clusters. Lee (2020) also found that residents responded to many other factors other than visual and aesthetic factors. Our study had similar results: all aesthetic characters were combined with other multifunctional characters in the subgroups of attractiveness, livability and naturalness. For example, among the factor of attractiveness, legibility, historicity, and maintenance are aesthetic characters, while tourism is a multifunctional character. This suggests that from the residents' perspective, ULs in rural areas should not only be a visual construct but also a means to fulfill the needs of daily use (Atik *et al.*, 2016). In a further analysis of the five factors, we found that the two factors of naturalness and biodiversity showed some natural features, whereas the three factors of attractiveness, livability and accessibility showed some livable features (Figure 5). The two features suggested the residents' needs for their living environment, which enlightens us that the most important

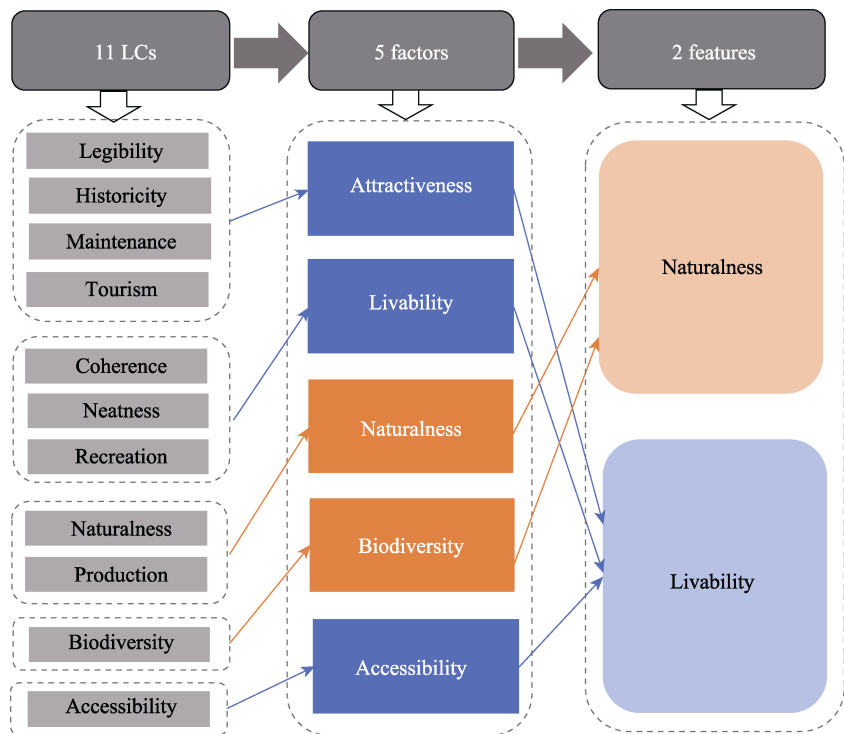


Figure 5 The 11 LCs finally showed two features of naturalness and livability in ULs preference

relationship to be carefully handled in the context of urbanizing villages is that between naturalness and livability. In this study, naturalness means emphasizing more on the ecological values of the rural areas, which included not only the presence and proportion of vegetation and other natural elements (e.g. water, rock etc.) (Lamb and Purcell, 1990), but also some agricultural landscape that is production related, such as the cultivated field. It suggests the absence of human intervention, where “pure wilderness” was found to be the most preferred scenario of rural landscape for the city dwellers (Bobiec *et al.*, 2021). In contrast, livability implies the processes of human power on nature, which could satisfy their diverse needs for country life, both visually, psychologically, and culturally. Here, ULs represent human practices of pursuing livability, with anthropogenic features. Theoretically, the features of naturalness and livability are contradictory. On the one hand, the overemphasis on naturalness means it could be too wild to be livable; On the other hand, the pure pursuit of livability may cause the loss of naturalness, and even encourage ecologically damaging anthropogenic landscape changes (Gobster *et al.*, 2007). Practically, the two features should be combined and well balanced into a better alignment for landscape management. Since residents prefer ULs with more natural elements, it is feasible for a landscape designer to explore ways to make the rural constructions livable enough but at the same time with well managed naturalness.

4.2.2 How demographic characteristics affect preference for ULs?

Though the effect of gender has repeatedly been found in LP studies (Strumse, 1996; Liu *et al.*, 2021), our result was in line with Svobodova *et al.* (2012) that gender does not influence the respondents’ LPs. Besides, Van den Berg and Koole (2006) found that old people and

those with low education levels showed lower preferences for wild nature and that younger people with higher education levels exhibit relatively high preferences for wild nature. Our study showed a similar pattern in residents' preferences for biodiversity, indicating that ecological function is not readily recognizable to those who are not educated to recognize it (Nassauer 1995); thus, education is necessary to coordinate the aesthetic and ecological landscapes values (Zheng *et al.*, 2011; Li *et al.*, 2019). In addition, place attachment is thought to be a positive emotional bond that develops between individuals and their environment, and several studies have suggested that residents are more likely to be adverse to landscape changes when attached to a place (Kaltenborn and Bjerke, 2010; Lokocz *et al.*, 2011; Anton and Lawrence, 2016). However, our survey showed the opposite result: longer-term residents (which indicated higher levels of place attachment) had a more positive attitudes toward the village's landscape change and higher acceptance of ULs. Lee (2020) explained that long-term residents perceive the landscape as a constantly changing “dwelling place” rather than a “static view”, and are thus less sensitive to the physical characteristics of the landscapes than outsiders are. Since the length of residency implies the residents' familiarity with the surrounding rural landscapes and the potential landscape change, the frequency of visiting the city suggests the residents' familiarity with the ULs. Generally, the more often people go to the city, the more familiar they are with ULs. Though Van Den Berg *et al.* (1998) found that people prefer things with which they are familiar, our survey had the opposite result for HWB and BMA that people who went to the cities less frequently give them higher scores. We inferred that part of the reason for this phenomenon is that people with fewer city connections are more dependent on their farm works and thus would pay more attention to the safety of the farmland, which is protected by infrastructures such as HWB. Two variables, length of residency and frequency to the city, showed a consistent preference tendency that people who had lived longer in the village and had fewer connections with the cities were more welcoming to the ULs. Surprisingly, the CPC membership was one of the most influential variables in this study. Actually, several studies have found environmental organization membership to be a significant variable in LPs study (Lindemann-Matthies *et al.*, 2010; Sevenant and Antrop, 2010; Zhang *et al.*, 2011). CPC members are more likely to know about Chinese government policies and development proposals and thus pay more attention to some issues such as environmental protection and cultural continuation. Hence, they could be more critical and have higher requirements when constructing the ULs.

4.3 Implications, limitations, and further study

This study has theoretical and practical implications. Theoretically, urbanization has brought considerable land-use changes in rural areas, which exert ongoing impacts on landscape patterns, with the emergence of urbanized landscapes (ULs). However, few studies have focused on the new landscape pattern or the interactions between those landscapes and people, such as whether ULs are treated as intruders or as part of rural landscapes. Therefore, this study explored residents' preferences for ULs by using a combination of aesthetic and multifunctional LCs, providing a more comprehensive view than merely performing visual preference surveys based on landscape photos, which was thought to be insufficient (Dupont *et al.*, 2015). In addition, this research focused on the residents' perceptions rather than those

of experts, which further confirms the necessity of studying LPs from insiders' daily life perspectives. Practically, our findings show that residents hold a generally supportive attitude for the ULs, with some differences regarding specific landscape types. This can be an alert for the government officials to make decisions by conducting in-depth investigations, especially when deciding whether specific ULs such as BMA should be constructed. In addition, this study provides instructions for rural landscape decision-makers to equip more well cared natural elements when constructing ULs and maintain a neat environment. Regarding the demographic differences, increased attention should be paid to the group of residents who have lived in the village longterm, go to cities frequently, and are members of the CPC when making construction decisions. Additionally, the two preference features of naturalness and livability, which are contradictory to some extent, should be well coordinated and balanced to construct a more favorable village for residents.

However, this study has some limitations. First, the five villages investigated are homogeneous that they have the same level of development, with similar income structures. Various types of villages with different development levels, ecological resources, cultural characteristics, and even booming tourism villages should be included. Thus, in future research, more than one landscape photo of one UL type should be included for comparative studies. However, controlling the variables of landscape elements is difficult; thus, they must be carefully designed. Secondly, though we had 550 samples in the survey which were enough to do a preference study, it could be better to include more respondents. Although we know the general attitude of the outsiders (i.e. government officials), further work is needed to investigate the specific preferences of other groups such as the experts and city residents to make comparisons with those of local residents. Third, other LCs that may have potential confounding effects on the predictors of ULs could be considered in future work, such as openness, vividness, variety, and unity (Clay and Smidt, 2004; Sevenant and Antrop, 2010; Wartmann *et al.*, 2021).

5 Conclusions

Urbanization has caused great landscape changes in rural areas, which have contributed to the emergence of ULs. Our research was conducted in the context of China's *Beautiful village* construction and offers insights into the ULs preferences reported by rural residents in rapidly transforming villages. Our results revealed that residents hold positive attitudes toward landscape changes and support the construction of ULs, among whom lived longer in the village and had fewer connections with the cities were more welcome of the ULs and were eager for landscape change. This view differs from the outsiders' view that rural landscapes should be preserved for their ecological and cultural values. Nonetheless, residents preferred to have ULs that have the most natural elements and are under good maintenance. In addition, we found that residents with a high education level and CPC members gave higher importance scores to naturalness-related LCs, explaining the necessity of providing additional knowledge streams being passed onto low educated residents. This study also found that LCs extracted from two aspects of aesthetic and multifunctionality had new classifying patterns with some natural and livable features. Naturalness and livability have an intimate yet complex relationship. Overemphasis on one aspect can be harmful; thus, further research should explore how to connect the two aspects, making the rural constructions liv-

able enough and simultaneously with enough well cared naturalness. This study advances the study of ULs and provides new insights into rural planning and construction.

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