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Visual Preferences Assessment of Landscape Character Types Using Data Mining Methods (Apriori Algorithm): The Case of Altınsaç and Inkoy (Van/Turkey)

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ABSTRACT

Nowadays, in environmental planning and management, the approach to protect visually diverse landscapes has been an important component in planning decisions. Visual quality analysis is a method to determine the visual quality and visual preferences of the landscape, by correlating its physical characteristics with perceptual parameters, whereby it is possible to demonstrate the visual potential of a field by converting qualitative definitions into quantitative data. The visual quality of the landscape is widely considered as an important resource worth preserving. Despite making a great effort to determine the factors that guide aesthetic preferences, the consensus in the judgments of people is neglected in most of such surveys. This study examines various types of landscape characters in Altınsaç and Inkoy Regions (Gevaş/Van) with spatial heterogeneity, because of the region's topographic structure and location. The characteristic structure of the region consists of mountains, lakes, forests, natural vegetation landscapes, and wildlife as natural landscapes. Also, road, rural settlement, agricultural landscapes, and historical structures are considered as cultural landscapes. In order to determine the participants' visual preferences of various landscape types with perceptual parameters, this study focused on consensuses through the Apriori algorithm, which is a data mining tool. Giving reference to define perceptual parameters, a survey with 202 participants was conducted using 9 different landscape character types selected. With questions about the appreciation of the beauty of the landscape scene, the consensuses on the landscape and its relationship with perceptual parameters, such as mysteriousness, typicality, vitality, safety, impressiveness, silence, perspective, degradation, and worth being protected, were examined. It was proven that the higher the visual quality of the landscape, the higher was the observers' consensus rate. Some suggestions and objectives are presented, based on the data derived from this study.

Keywords: Cultural landscapes, **O**bservers' consensus, Rural landscape, Visual aesthetic quality.

INTRODUCTION

The visual landscape is the aesthetic outcome created in the human mind, through the perception formed by human psychology, for natural and cultural landscape (Kaplan and Kaplan, 1989; Müderrisoğlu and Eroğlu, 2006; Zuazo *et al*., 2014). According to Meitner (2004), while landscape quality assessment is a substantial component of environmental planning and management, it has been a contemporary methodological approach used by various professional disciplines such as landscape architecture, forestry, and psychology, which are developed after 1950's (Kaplan and Talbot, 1988; Daniel, 2001; Ayoubi *et al*., 2011). Visual aesthetic

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evaluation is considered a reliable method to increase the Visual Aesthetic Quality (VAQ) of a landscape through design and management (Arriaza *et al*., 2004; Zhao *et al*., 2013; Gülgün *et al*., 2014). In accordance with these definitions, visual landscape quality is a common product, in which certain landscape characteristics interacting with individuals' perceptual and psychological processes are evaluated by means of individuals' appreciation (Lothian, 1999; Daniel, 2001; Kalın, 2004; Kıroğlu, 2007). Inquiries in visual quality studies are generally assessed through research methods such as questionnaires. In these studies, the researcher asks the respondents to choose and grade the pictures they like most, in order to determine the range of their landscape preferences (Tveit, 2009; Yazici *et al*., 2017; Eroğlu and Acar, 2018).

Rich landscape areas are considered important both for the visitors and local community and for economic development in terms of their natural, cultural, and historical source values. Therefore, the determination and preservation of the VAQ (Visual Aesthetic Quality) play a crucial role in landscape sustainability.

Visual quality assessment studies on various habitat types until the present day are available. Wetlands, rivers and lakes (Meitner, 2004; Zhao *et al*., 2013; Yazici, 2018), forests (Eroğlu and Acar, 2011), agricultural lands (Lindemann-Matthies *et al*., 2010, Acar and Eroğlu, 2010), rocky habitats (Sarı, 2013), coastal landscape areas (Ak, 2010; Aşur and Alphan, 2018; Aşur, 2019), and mountainside areas (Eroğlu, 2012; Kalın *et al*., 2014) can be named. As for the literature research, most studies attempt to evaluate different environments in a single habitat or determine seasonal variations. Case studies to determine consensuses on visual quality preferences of the landscape in heterogeneous environment of a certain region are rather few (Kalivoda *et al*., 2014; Düzgüneş and Demirel 2015; Wang *et al*., 2016; Aklıbaşında and Bulut, 2018).

Dronova (2017) argues that in landscape management, planning, and design, heterogeneity plays a role as a bridge between ecosystem service and visual quality goals (Table 1).

This study takes into account spatial heterogeneity, which is an aspect of environmental heterogeneity, in participants' visual landscape preferences. Within this scope, by means of the Apriori algorithm, the aim is to find out the consensus on perceptual parameters of different landscape character types that influence participants' visual preferences. The Apriori algorithm is a data mining method, developed by Agrawal and Srikant in 1994. Data mining is the search of correlations that provide access to information out of large-scale data, mining data or predicting the future in a sense through big data stacks, by means of computer programs. Another definition is: to

Table 1. The aspects of environmental heterogeneity in visual quality assessment (Dronova, 2017).

Spatial heterogeneity		Land cover composition. Vegetation heterogeneity and biodiversity. Physical environmental heterogeneity (Heterogeneity in topographic, climatic and soil properties). Edges and ecotones (Transitional zone between distinct environments or habitats) Vertical and 3-D heterogeneity (Composition and configuration of natural and man-made elements above the ground surface).
Temporal heterogeneity	Short-term heterogeneity	Attractive seasonal events (Flowering, leaf color etc). Weather events (Snow, fog).
	Long-term heterogeneity	Succession of vegetation, physical changes in man-made structures and broader-scale land cover and land use transitions. Anthropogenic effects, loss or change of source and species.

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extract unknown, valid, and applicable information from large databases and use this information when taking certain decisions. Data mining is used for general purposes such as classification, association rules, and clustering (Han and Kanber, 2012).

The research area, Altınsaç and Inkoy Regions, contains multifunctional and visually attractive landscapes of a heterogeneous environment with background mountains and skies, lakes, forests, natural vegetation of landscapes, and wildlife as natural landscapes; and roads, rural settlement landscape, agricultural landscapes, and landscape of historical structure as cultural landscapes.

In this context, the goals through participants' views were to determine landscapes with highly attractive or beautiful aesthetic features, characterize sceneries with various landscape types, convert the area to an ecotourism destination by means of the many landscape types in the field of research, and gain attraction to the region. Since the integration of people's preferences is an important element in current landscape planning (Kaplan *et al*., 1998; Daniel, 2001, Breuste, 2004), this study aimed to be beneficial for regional policy decisions and sustainable landscape development.

MATERIALS AND METHODS

Research Area

The region chosen as a research area is the southern lakeshore of Lake Van, located in the provincial borders of Van and Bitlis in Turkey. The principal materials of the research consisted of natural and cultural resources of Altınsaç and Inkoy Regions, located in the Gevaş County of Van. Gevaş, which is within the borders of the research area, located at the southwestern part of Van, with an elevation of 1,750 meters from sea level. The county area is 727.5 km² in total, located at 42° 40' and 44° 30' east longitudes and 37° 43' and 39° 26' north latitudes (Figure 1). Within the borders of the research area, Lake Van Basin has a

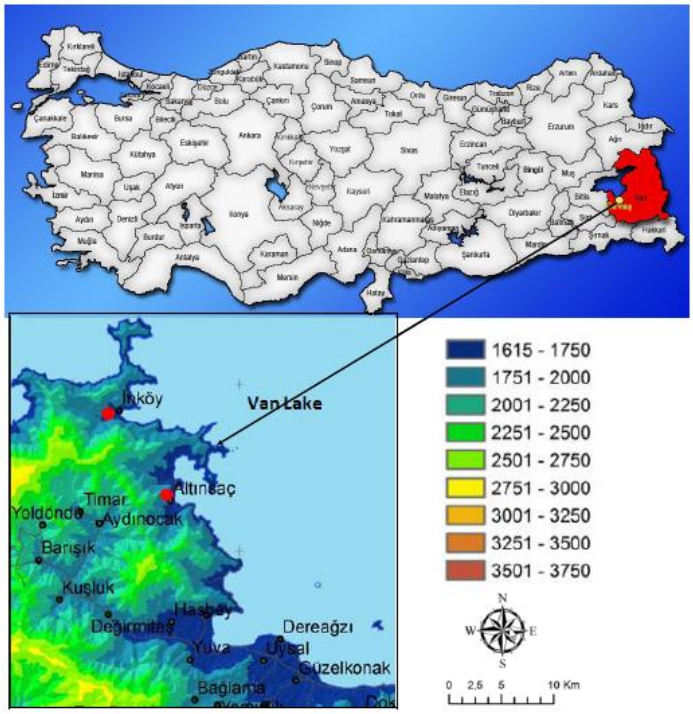

Figure 1. Location of the research area.

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continental climate in general and is hot and dry in summers, and cold and rainy in winters. Water temperature on the lake surface varies between 16-23ºC in the summer months (Anonymous, 2019). The difficulties of the topography's transport and settlement have played a key role in preserving the natural environment. Some characteristics of the region are the proximity of mountains to the coastline, the considerably limited transport and settlement due to topography, the absence of pressure from the population for pollution, the great number of clean lake coves, including the only forestland of the basin (albeit poor), the high numbers of its historic buildings, and the access to the coastlines being only through the lake in most place.

Obtaining and Choosing the Visual Material

Photographs are acknowledged as valid sources for visual landscape quality judgment research (Palmer and Hoffman, 2001; Aşur and Alphan, 2018). A study of photography about the area was performed on different days in the spring of 2018. For the questionnaire to determine participants' visual landscape preferences, the selection of three photographs was made as follows: 243 photographs were scored with 5-point Likert scale by the 5 landscape architecture experts (%). Then, reliability analysis, namely, Cronbach's Alpha (α) value was found. Also, 243 photographs (9 items per group) of 9 groups were analyzed for reliability. Alpha (α) value of R^2 was greater than 0.60. According to the results, 3 photos were found appropriate. Special attention was paid so that the photographs presented the relevant landscape character types (Table 2).

The relevant photographs were questioned by persons in different demographic structures in terms of various landscape components. The demographic features were 202 respondents who were chosen according to the simple random sampling method. The sampling model was studied with 5% error margin and 95% reliability. The sample size was determined according to the annual number of tourists (2017 year).

Participants were asked for a two-level judgment for the photographs representing each landscape character type. In the first level, they were asked to rate each landscape type from 1 to 5, according to scenic beauty. In the second level, the visual preferences for different landscape types were determined through the Apriori algorithm and consensuses in perceptual parameters. The participants were asked to mark one of the "yes" or "no" options for the perceptual parameters chosen for each landscape character.

Perceptual parameters in the visual landscape preferences were examined in the study and the 10 relevant parameters and their references are given in Table 3.

Data Analysis

The method of this study was to determine consensus through the Apriori algorithm modeling in visual preferences of the observers' for different landscape types. The Apriori algorithm is created without the transactions of the database, only by using the item sets found significant in the preceding scan. The principal logic of the Apriori algorithm is that any subset of a significant object set is also important. An object set consisting of K items can be obtained by combining significant sets with k-1 objects and removing those with insignificant subsets. Combination and removal transactions are applied to create fewer candidate object sets.

The association rule algorithm includes the followings:

1 Determining minimum support and minimum confidence values;

2. Determining the support value of all items in the sets;

3. Comparing the minimum support value with the found support values and removing the items lower than the minimum support value, from the algorithm;

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Table 2. Landscape characters and images for judgment.

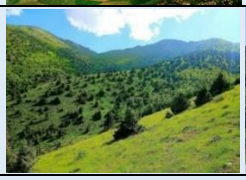
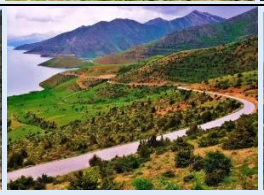
Natural Landscape	Mountain Landscape							
	Lake Landscape							
	Forest Landscape							
	Natural Plant Landscape							
	Wild Life							
Cultural Landscape	Road landscape							
	Rural Settlement landscape							
	Agricultural Landscape							
	Landscape of Historical Areas							

Table 3. The relevant visual evaluation parameters and their references.

Parameters	References
Landscape beauty: high taste sensations created by the landscape	Nasar (1988), Kim and Kang (2009), Sevenant and Antrop (2009), Aşur and Alphan (2018);Yılmaz *et al*., (2018)
Mysteriousness: The desire to find more when going further in the place, desire to discover the place	Nasar (1988), Kaplan *et al*., (1998), Bell (1999),
Typicality, Specificity, Characteristic: The composition of the image is unique	Özbilen (1983), Sevenant and Antrop (2009), Acar *et al*., (2013)
Vividness: Perception of living space, perception of social activity	Nasar (1988), Clay and Smidt (2004)
Safety: Feeling fear and uneasiness in the visible field	Nasar (1988), Kim and Kang (2009), Zhang and Lin (2011)
Impressive, Flashy: The view is spectacular,	Özbilen (1983), Nasar (1988)
Silence, Calmness: Creating the perception of calmness and tranquility of the landscape	Nasar (1988), Kim and Kang (2009), Sevenant and Antrop (2009);Junge *et al*., (2015)
Visibility, Perspective: Remote view position and effects of view according to observer	Val *et al*., (2006), Fry *et al*., (2009), Kim and Kang (2009), Polat and Akay (2015)
Intactness: The elements in the landscape are not distorted by man-made elements, consistency	Tveit *et al*., (2006), Fry *et al*., (2009), Ode *et al*., (2009), Sevenant and Antrop (2009), Acar *et al*., (2013)
Worth being protected: the necessity of preserving the landscape due to the elements	Richard and Gobster (1990), Sevenant and Antrop (2009), Matthies *et al*., (2010), Aşur and Alphan(2018)

4. Determining 2-itemset associations considering 1-itemset associations;
5. Removing item sets lower than the minimum support value;
6. Generating associations;
7. Removing the associations apart from those exceeding the minimum support value,
8. Setting rules (Tapkan *et al*., 2011; Figure 2).

In short, the main approach is as following: "if the k-item set meets the minimum support criteria, the subsets of this set also meet the minimum support criteria." This method has been widely used in many professional disciplines (engineering, medicine, education, banking, finance, telecommunication, marketing, e-commerce, insurance). This study is expected to contribute to the literature, due to the lack of studies on visual quality analysis in landscape architecture. The questionnaires were examined through WEKA (Waikato Environment for Knowledge Analyses) program, which is a data-mining tool. WEKA is a Java based open source platform, developed at Waikato University of New Zealand. The software is free of charge for non-commercial use.

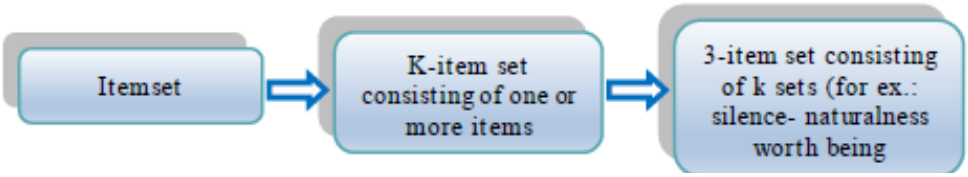


Figure 2. Flow diagram in the Apriori algorithm.

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RESULTS

Them of the questionnaire conducted in this study are as following: 51% (103 persons) male and 49% (99 persons) female, 43.6% (88 persons) of 25–35 age, 23.3% (47 persons) of 18–25 age, 17.8% (36 persons) of 35–45 age and 15.3% (31 persons) over 45 of age. The highest rate of participants was from the 25–35 age group. With regards to the educational background of the participants, most were considerably well-educated, with 59.4% (120 persons) bachelor, 24.8% (50 persons) postgraduate, 12.4% (25 persons) high-school graduate and 3.5% (7 persons) secondary school graduate.

The results of the various landscape character types in terms of the beauty of landscape scenery in the first level of the questionnaire are shown in Table 4. One of the most important findings in this study was the visual preference levels of lake landscape with a rate of 79.7%. This is in accordance with Kalın *et al*.'s (2014) positive results that among different landscape characters, most preferred are landscape habitats close to water, such as riverbanks, lakes, and wetlands. Although both the historic area and agricultural landscapes, which were presented as landscape types, include sceneries created by human activity, historic areas were ranked second with a rate of 68.8% while agricultural landscape had the lowest rate with 34.2% (Table 4).

According to the Apriori data analysis results in the second level, the consensus in perceptual parameters of participants' visual preferences for different landscape character types is presented. Thus, the sceneries of the lake landscape and wildlife were perceived by the participants as impressive, worth preserving, and vital, and gained the highest consensus with a rate of 99%.

The agricultural landscape's perception of vitality, silence, and feeling safe by participants were created by a consensus of 95%. Based on perceptual parameters in visual preferences, the landscape type with relatively low consensus proved to be the agricultural landscape in this study (Table 5).

Table 4. Ratings of various landscape character types in terms of scenic beauty.

Landscape character types	Top likes %
Lake Landscape	79.7
Landscape of Historical Areas	68.8
Wild life	52.5
Natural Plant Landscape	50.5
Forest Landscape	48
Road Landscape	47
Rural Settlement Landscape	41.6
Mountain Landscape	38.1
Agricultural Landscape	34.2

No landscape scenery or cultural factors stemming from human activity were included in the lake landscape of this study. The landscape type contained very beautiful aesthetic features and consisted of landscape characteristics suitable for human survival, like water element. The fact that this region was surrounded by lakes on three sides also affected the visuals of other landscape groups. Transportation is done from the coastline in Inköy.

The lake landscape most admired by the participants in terms of scenic beauty is also perceived as impressive, worth preserving, and vital with the highest consensus. This means that it represents the ideal mental image of most observers. It can be concluded that in case the three most effective perceptual parameters – impressiveness, being worth preserving, and vitality– that build consensus in the admiration of the lake landscape are maintained together, the observer's admiration will be at the highest rate. For the mountain landscape, which is a natural landscape, 97% of the participants answered "no" for deterioration perception for the mountain landscape and considered silence with absence of deterioration. Thus, in order to attain sustainability of visual preference and more admiration, it is necessary to pay attention to avoid deterioration and maintain

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Table 5. The consensus rates of the perceptual parameters effective in the visual preferences of the participants.

landscape classes	Landscape character type	Perceptual parameters	% Consensus
Natural Landscape	Mountain Landscape	Intactness, silence	97
	Lake Landscape	Impressive, worth protecting, vividness	99
	Forest Landscape	Perspective, Worth preserving	97
	Natural Plant Landscape	Typicality, worth protecting, impressive, perspective	97
	Wilde Life	Impressive worth preserving vividness	99
Cultural Landscape	Road Landscape	Impressive, perspective, Worth preserving	97
	Rural Settlement Landscape	Impressive, vividness	98
	Agricultural Landscape	Vividness, silence, reliability	95
	Landscape of Historical Areas	Mysteriousness, worth protecting, impressive	98

silence, which are effective perceptual parameters.

The set that item occurred in the lake landscape image (impressiveness, being worth preserving and vitality) supports the first hypothesis of Clay and Smidt (2004); Sevenant and Antrop (2009),

Lindemann Matthies *et al*. (2010); Huang, (2014) stating that "natural landscapes are more admired". "Landscapes with very attractive or very beautiful aesthetic features build higher consensus than landscapes with mediocre features" supports also the second hypothesis. Also, results support the findings of other researches (Van den Born *et al*., 2001; Dramstad *et al*., 2006) which indicate that, in western countries in general, the people awareness of the nature is increasing natural vegetation landscape. With regards to natural vegetation landscape, those who think that it has a typical look, is worth preserving, and those who perceive its visibility form a consensus of 97%. When these three factors are considered together, more appreciation would be gained. Since the forest landscape led to a perception of visibility and preservation with 97% consensus in the participants' visual preference, these two factors need to be preserved together.

The high appreciation of the natural vegetation and forest landscape proves that the first and third hypotheses are true. The landscape created by wildlife ranks third in terms of scenic beauty and the participants' consensus of 97% creates the perceptions of impressiveness, being worth preserved, and vitality, therefore, the sustainability of the visual preferences must be protected with these three factors. Cultural factors play a role in the formation of rural settlement landscapes and historic area landscapes, but these are not completely natural landscapes.

However, in terms of scenic beauty, agricultural landscape has the lowest rank of appreciation. The historical landscape is the

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second most admired. In line with this, the landscape of the historical area has a high consensus of 98%. Preserving the secrecy, protection and impressiveness of these areas will enable this kind of landscape to be preferred.

Mysteriousness, worthiness of preservation, and impressiveness, which are the three most effective perceptual parameters, must be protected together in order to provide the sustainability of visual preferences of historical areas landscapes. For the sustainability of visual preferences for rural settlement landscape, the two most effective parameters, impressiveness and vitality, must be protected together.

Again, the rural settlement landscape was the preferred landscape type perceived by the participants as impressive and vital, with a high consensus of 98%. According to the results of the study, the road landscape, which is a cultural landscape, built a consensus of 97% with perceptual parameters of impressiveness, perspective, and worth being preserved, and therefore must be highlighted by protecting these three factors together. As a result, the first hypothesis in the studies of Clay and Smidt, (2004), Sevenant and Antrop, (2009), Lindemann Matthies *et al*. (2010), and Huang (2014); Polat and Akay (2015) that "natural landscapes are more appreciated" is not supported. The judgment that landscapes with very attractive and very beautiful aesthetic features build a higher consensus than landscapes with mediocre aesthetic features is supported (Wang *et al*., 2016).

DISCUSSION

In order to meet recreational needs with the growing urban population, one way of creating multifunctional landscapes is to increase participation in rural planning and management. Landscape beauty increases the attractiveness of an area in touristic and recreational activities, and directly affects the quality of that activity (Clay and Daniel, 2000). Therefore, the determination and protection of Visual Aesthetic Quality (VAQ) play a crucial role in landscape sustainability. Consensus on visual landscape preferences is very important for the justification of legal protection of the landscape scene. The fact that people build higher consensus for positively perceived landscapes provides a valid argument for the legal protection of valuable landscape scenes in terms of sustainable landscapes.

In accordance with the results of this study, the most effective perceptual parameters in the visual preferences of different landscape types are worth being preserved, impressiveness, and vitality. Soliva and Hunziker (2009) and Yılmaz *et al.* (2018) emphasize that some appreciated areas are determined as protected areas. This study found that lake landscapes, forest, natural vegetation, wildlife, road landscape and historical structure landscapes deserve more protection and have a higher visual preference.

Özbilen (1983) and Nasar (1988) point out that the impressiveness of a landscape enables higher preference. According to the result of this study, lake landscape, natural vegetation, wildlife, road, rural settlement landscape and landscape of historical structure are perceived by the participants as very impressive.

In lake landscape, wildlife, road landscape, rural settlement landscape and agricultural landscape gained preference from participants with a perception of vitality. Similarly, the studies of Clay and Smidt (2004) and Eroğlu and Acar (2011) also identify that the vitality factor in visual preferences is effective.

Clay and Daniel (2000) point out that perspective and visual depth increases perceptiveness and are in direct proportion to landscape beauty, and therefore have more preference. In the forest landscape, natural vegetation, and road landscape, the perceptual parameter of perspective was prominent in the study and gained participant preference.

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The perceptual parameter sets obtained with the Apriori algorithm are shown in Figure 3.

CONCLUSIONS

The main goal of this study was to collectively present the preferences of visual quality appreciation based on the perception of the users in the area to the planning platform. According to the results from the questionnaires, the most appreciated landscape character type was lake landscape coast. And the landscapes that absolutely need protection are lake landscape, forest, natural vegetation, wildlife, road landscape, and historical structure landscape. Nonetheless, it is important to notice that higher consensus of positively perceived landscape scenes does not lead to the need of protection by itself.

As a result of this study, some suggestions and goals could be presented, based on relevant data, as follows:

- Sustainability of landscape aesthetic requires also the preservation of the ecosystems that provide this visually. Therefore, it is important to determine the consciousness level of people for preserving land, water, and sea areas in order for the protection and sustainability of biological diversity, natural resources, and its relevant cultural resources.
- For landscape clustering and by means of the Apriori algorithm, the perceptual parameters for which natural and cultural elements occur in people's visual memory should be determined, and from this point of view, the area must be evaluated in terms of ecotourism.
- The use of the Apriori algorithm must be generalized for effective solutions in sustainable landscaping.
- Protection policies must be developed by determined which identities become prominent in study areas.
- In Van Province, awareness about Inkoy and Altınsaç must be raised with the use of visual perceptual parameters.
- The determined landscape identity of the Inkoy and Altınsaç Regions can be taken under preservation as part of a sustainable environment with participants' perception.

As a result of this study, users' visual preferences of various landscape types with

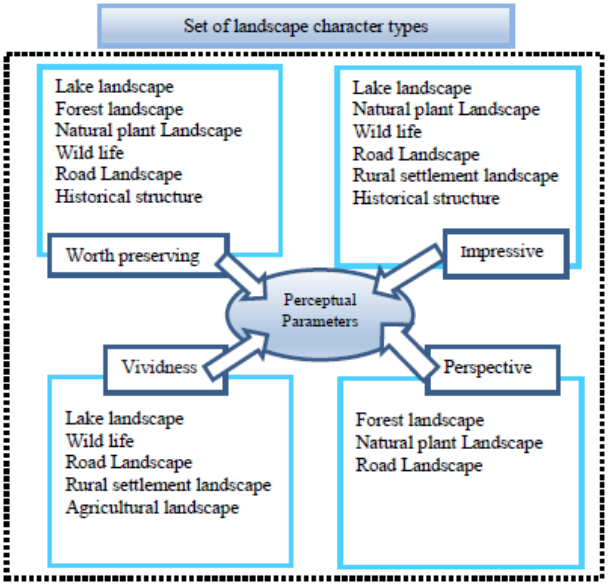

Figure 3. The most effective perceptual parameters in visual preferences and the set landscape character types.

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perceptual parameters were put forward by using Apirori application. This study may serve as an example on a universal scale of using Apirori to help other researchers working on similar topics to determine users' consensus.

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ارزیابی ترجیحات بصری انواع کاراکترهای منظر با روش کاوی داده (الگوریتم آپریوری): مورد التین ساچ ـ این کوی (وان / ترکیه)

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چکیده

در برنامه ریزی و مدیریت زیست محیطی امروزه ، رویکرد محافظت از مناظر متنوع از مؤلفه های مهم در تصمیم گیری های برنامه ریزی شده است. تجزیه و تحلیل کیفیت بصری را به روش تعیین کیفیت بصری و تنظیمات بصری از چشم انداز، از طریق ارتباط ویژگیهای فیزیکی آن با پارامترهای ادراکی است. از این طریق می توان با تبدیل تعاریف کیفی به داده های کمی ، پتانسیل بصری یک زمینه را نشان داد. کیفیت بصری چشم انداز به طور گسترده ای به عنوان یک منبع مهم در جهت حفظ آن در نظر گرفته شده است. با وجود ساخت یک تلاش بزرگ برای تعیین عوامل که راهنمای تنظیمات زیبایی، اجماع در قضاوت مردم در بسیاری از چنین تحقیقات نادیده گرفته شده است. این مقاله به دلیل ساختار توپوگرافی و موقعیت منطقه ، انواع مختلفی از کاراکترهای منظر را در منطقه گواش / وان(التین ساچ ـ این کوی) با هتروژنیته مکانی بررسی می کند. ساختار مشخص منطقه شامل کوه ها ، دریاچه ها ، جنگل ها ، مناظر گیاهی طبیعی و حیات وحش به عنوان مناظر طبیعی است. همچنین جادهها ، مسکنهای روستایی ، مناظر کشاورزی و ساختار تاریخی به عنوان مناظر فرهنگی. به منظور تعیین ترجیحات بصری شرکت کنندگان از انواع مختلف چشم انداز با پارامترهای ادراکی ، این مطالعه بر روی اجماع از طریق الگوریتم آپریوری ، که یک ابزار داده کاوی است ، متمرکز شده است. با استفاده از پارامترهای ادراکی تعریف شده ، یک نظرسنجی با ۲۰۲ شرکت کننده با ۹ نوع کاراکترمختلف منظر انتخاب شده است. با سؤالاتی در مورد خوشنودی از زیبایهای یه منظر ، اجماع موجود در منظره و ارتباط آن با پارامترهای ادراکی از قبیل رمز و راز ، ویژگی ، سرزندگی ، ایمنی ، چشمگیر ، سکوت ، چشم انداز ، تخریب و ارزش محافظت از آن ، بررسی می شود. در این تحقیق ثابت شده است که هرچه کیفیت بصری چشم انداز بالاتر باشد ، میزان اجماع ناظران بالاتر است. بر اساس داده های بدست آمده از این تحقیق ، برخی از پیشنهادات و اهداف ارائه شده است.

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