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Evaluating the aesthetic quality of the landscape in the environment: A Review of the Concepts and Scientific Developments in the World

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Abstract

Landscape will affect people's perception of the environment, so people's behavior will change in the environment. Landscape recognition and accurate assessment of this area provide optimal planning and management of the land and have provided extensive studies in recent years around the world. While this article has observed various stages of scientific research, it also has pursued micro or macro ideas containing in previous works and has sought how changes in the aesthetic quality estimation of landscape methods over time in various scientific fields. landscape beauty is the result of the interaction between the biophysical characteristics and human observation, which leads to methods based on perception (subjective) and expertise (objective) to assess landscape beauty. Since there is a complicated relationship between landscape perception and landscapes experiencing through a range of personal perspectives and perceptions, mental evaluation is usually dealing with challenges. The most significant benefit of assessment is based on its specialized efficiency, which uses automated methods to evaluate at a wider level. However, expert-based evaluations do not achieve high accuracy since they are highly dependent on specific knowledge and evaluator's judgment. Assessing the aesthetic quality of the landscape by integrating approaches and using comprehensive methods will lead to favorable results. Implementation of advanced tools and techniques such as GIS, Remote Sensing, Mathematical modeling, and Artificial intelligence in assessing the aesthetic quality of the landscape will enhance the accuracy and speed of the results.

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INTRODUCTION

Recently, increasing challenges in environmental quality have influenced the importance of landscape quality to the public (Nassauer, 2012). Understanding different values and feelings in landscape structure is essential since people have a two-way relationship with the landscape. How landscape effects people's perceptions mark the way, people act and behave in a landscape environment (Tress and Tress, 2001).

The aesthetic value of a landscape for human welfare has gained a particular place not only in public perception but also in socio-environmental research (Howley, 2011). Studies on the importance of beauty and landscape have begun since 1960s, (Purcell et al., 2001), and the goal of policies and environmental actions is to minimize

the effects impacts of development on natural resources. To protect ecosystems, management programs are necessary. Landscape management programs include identifying, evaluating, designing, and monitoring natural landscapes. Assessing the aesthetic quality of landscape can be a practical step for optimal and sustainable use of the environment. The purpose of this study is to conduct a comprehensive international study on evaluation of esthetic quality to achieve the challenges and advancements of researchers in this field.

MATERIAL AND METHOD

Experimental design

This paper is a scientific-analytical article. It is about large-scale analysis and research evaluation. Authors follow the progress of current international research to clarify the concepts, developments, and challenges of landscape aesthetic quality by classifying, integrating, and evaluating previous works. This paper follows the micro or macro ideas in previous works and seeks to explore changes and developments of aesthetic quality assessment over time.

RESULTS

Definition of Landscape

In the EU, the landscape is a region perceived by humans, and its characteristics are the result of the action and interaction of human and environmental factors (Council of Europe, 2000). Landscape includes a diverse range of visual, cultural, and environmental components. Landscape is a complicated concept, but it can only be defined as the appearance of land and water from a certain distance. Landscape contains the perception that is not only touchable things in the world but also is the subjective interpretation of people, and there is a clear difference in interpretation among people. For example, in the first attempts, Zube et al. (1982) divided landscape research into four sections: ecological, psychological or phenomenological, empirical and cognitive that still have covered the broad range of concepts. Landscape can be synonymous with the environment or the ecosystem. To evaluate landscape aesthetics in land -use planning, psychology approach is considered to be the most potent method of theory because "the beauty is in the eyes of the beholders."

Evaluating the aesthetic quality of landscape

Based on many types of research, there are various ways to assess the aesthetic quality of landscape. Over the past half-century, landscape quality assessment has been recognized as a competition between physically designed approaches and public perceptions methods. Lothian (1999) provided a comprehensive review of the philosophical evaluation of aesthetic quality. He also divided different approaches into two main patterns: Objective or physical (object) and subjective or psychological (subject). Daniel (2001) called these two types of approaches, based on expertise and perceptional, respectively. The objective approach assumes that beauty lies in the objects. According to objective model, aesthetic quality is what found in the features of that object (Lothian, 1999). A subjective approach is based on the empirical evaluation of perceived attributes from the perspective that is evaluated by experts (Franco et al., 2003). With the subjective model, the main aesthetic place is the the human or user mind. Perceptual methods are derived from subjective philosophy. In a subjective approach, the quality of landscapes is determined through psychological analysis. Perceived indices by human observation will influence selection, ranking, or grading of landscapes. Psychological study has a landscape specification classification for assessing aesthetic quality (Brabyn, 2015). Unlike the objective approach,

subjective evaluation often entails high levels of assurance (Daniel, 2001). This approach is taken from the tradition of psychophysics in psychology in which based on perceptual responses , quantitative criteria are used as a measure of the properties of objects. Cognitive principles are returned directly to objects.

In the subjective approach, criteria for the conclusion will come back to the responder. According to Brown and Brabyn (2012), visual perception is recognized as an essential part of understanding of landscape, which has strong cultural and psychological dependencies. There are no standard methods to assess and monitor landscape aesthetics (Kroll et al., 2012). A systematic assessment of the aesthetic quality of visual landscape of occurs within modern environmental management. Response to the common needs of the community, which is based on environmental management, will assess the quality of landscape more technically and quantitatively. landscape quality assessment should be evaluated with accuracy, reliability, and validity (Palmer & Hoffman, 2001). There is a consensus that both objective and subjective aspects are important and receive required scores to evaluate the landscape correctly. Daniel (2001) emphasizes that unlike perceptual methods, or purely expert-based methods, the integration of these two opposing approaches can lead to a more effective approach which has a better connection between landscapes properties and people's judgment.

Evaluation of landscape features

Landscape features make a region unique and is a distinct and understandable pattern of elements that occurs continuously in a particular environment (Turner, 2005). Landscape features assessment, mapping process, describing, and evaluating landscapes are based on the presence and order of landscape features (Jellema et al., 2009). Land use management and planning are increasingly being undertaken by a wide range of landscape assessment studies. These decisions are valid at the regional and national levels (Swanwick, 2009). The results of the reviews on the assessment of landscape features include natural, cultural, physical, and visual aspects which are analyzed and used in different countries. In New Zealand, the evaluation of landscape features will separate units and management areas from determining land use of the rural regions, based on vulnerabilities and landscape strengths (Atik and Ortac¸ 2010). In Iran, the assessment of landscape features, in local studies, has been focused on visual elements of the environment (Jahani & Mohammadi Fazel, 2017; Jahani, 2016). Most college articles on landscape features assessment are mainly from England and Ireland (James and Gittins, 2007) some European (de Groot et al., 2010) and a few of them from other countries (Brown & Brabyn, 2012; Mesbahzadeh et al., 2017).

Challenges

The beauty of landscapes is the interaction between the biophysical features of human, which leads to perception (subjective) and specialized (objective) methods to assess the beauty of the landscape. However in some subjective assessments (Tveit, 2009) there are differences between groups based on age, gender, social class, or cultural background. But many studies (Ode et al., 2009) confirm the compatibility of different groups. Perceptual assessments are so realistic, but relatively expensive and timeconsuming. Also, evaluation is difficult on the site.

Moreover, complex assessments of landscapes are limited to linear phenomena such as roads, trails, and rivers (Jahani, 2016; Saffariha et al., 2014). Since there is a complicated relationship between landscape perception and the landscape experienced through a wide range of personal perceptions, subjective evaluation is usually dealing with challenges. Although the subjective approach is closer to the criteria of the ideal assessment system, it is challenging to implement. Participants in a subjective evaluation usually can only evaluate a small

fraction of the photos. But in this method, polling results can be generalized to other areas with similar characteristics. According to Roth and Gruehn (2005), there is a clear correlation between photos and real pictures, which were ranked by people. The most significant benefit of expert-based assessment is that it is possible to use automated methods for the large-scale evaluation . However, expert-based assessments do not achieve high accuracy in perceived methods because they are highly dependent on proprietary knowledge and evaluator judgment. The landscape is widely recognized as a multilayered concept that recognizes both objective and subjective dimensions (Nassauer, 2012). There are some ways that could be used to link these two groups to aware policy makers (Beunen & Opdam, 2011). By studying these challenges, it would be understood that studying the relationships between human and physical environment will provides valuable knowledge to improve future managing and planning of landscape. Changing to more comprehensive ecosystem management would be accompanied by more specific challenges to evaluate landscape quality assessment. As a result, visual information about landscape performance, planning, and landscape management is dealing with difficulties. But rapid advances in geographic information systems, environmental modeling (Aghajani et al., 2014) and environmental simulation technologies (Jahani, 2017a; Jahani, 2019a) have provided the tool to do so. The Methods commonly used to assess landscape aesthetics include mapping, simulated evaluations, and questionnaire. Drawing-related methods include selecting landscape features and choosing them on the maps to describe the scenic beauty of an area. The biggest problem in this method is the difference in the selection of variables to represent the quality of the landscape as well as the general challenges of the two-dimensional view of the landscape. In a simulated evaluation, a group of observers will evaluate photos, slides, or short films from a perspective. In this method, there are some challenges such as professional misconduct in photography, wrong way of choosing landscapes and photos, and inappropriate method for questioners. Choosing individuals is also a serious challenge because the social and professional backgrounds of observers may affect their judgment. But surveys are widely used as a tool to record descriptive statements about the superiority of an instance of a community. As a result, it provides an opportunity to evaluate different issues by collecting favorite views with various social, economic, and geographical backgrounds. It offers the opportunity to evaluate the different problems by collecting favorite views with various social, economic, and geographical contexts.

Progress Analysis

To take advantage of different methods of assessing the aesthetic quality of landscape, different authors attempted to discover the relationship between perceptual (subjective) approaches and specialty (objective) approaches (Jahani, 2017b). Exploring this relationship is done by testing the relationship between landscape priorities and landscape patterns that are related to landscape criteria. Schirpke et al. (2013) presented an innovative method based on GIS modeling approach for mountainous regions, which combins objective methods with perceptual methods. Based on this view, landscape patterns were analyzed by landscape criteria. In recent decades, significant research has been done to identify landscape values using GIS (Jahani et al., 2011) remote sensing and artificial intelligence (Jahani and Mohammadi Fazel, 2017) . Landscape assessment research has increased due to the urgent need for land use planning and environmental management. For example, a combination of landscape assessment methods has been developed and applied for proper planning in forest management (Clement & Cheng, 2010; Jahani et al., 2012), Regional management (Brown & Weber, 2011), Urban Park Planning (Jahani and Mohammadi Fazel, 2017; Tyrvainnen et al., 2007; Khaleghpanah et al., 2019); Recreation and tourism development (Raymond & Brown, 2007; Jahani, 2019b), coastal management (Alessa et al., 2008), Rural Development (Pocewicz et al., 2010) and climate change risk (Raymond & Brown, 2011). Authors believe that analysis of advances shows that a wide range of resources has been used for identifying, mapping the physical, biological, and human-made landscape in geosciences using remote sensing techniques

and GIS technology. But direct mapping has received little attention in assessing the social or human landscape which is arguably the most fundamental source of land use and user competition.

DISCUSSIONS

The results show that integration of objective and subjective approaches has the practical and useful results in landscape assessment in the framework of a comprehensive approach. A comprehensive approach in assessing landscape is a combination of public understanding (subjective) and expert opinion (objective). Chen et al. (2009), Jahani and Mohammadi Fazel (2017) have used a comprehensive quantitative method for comprehensive aesthetic assessment of urban green space. Having active research in landscape and environmental assessment, accurate human assessments in the real environment should be considered. The most direct way of evaluating landscape for a researcher is to gather observers and take them to different locations to show them environmental variables like landscape beauty. In many studies (Meitner, 2004), colors or colored slides are replaced by a direct environmental assessment. Many studies (Stamps, 1990) have reported a high correlation between perceptual judgments and expressed preferences based on parallel images and responses. However, some studies have found that pictures and slides are not an excellent alternative to on-site experiences. Hetherington et al. (1994) have shown that to estimate river view adding motion (through a fully animated video showing the length of the river) and adding sound of water are some features that cannot be explored solely through the photo and video equipment will also be needed. Hull and Stewart (1992) found that landscape quality in the mountains is understood differently as it rises and falls from the slopes. Therefore, the authors believe that images cannot create thoughts and feelings when people face a real place so they cannot be sufficient for landscape assessment.

In some cases where the visual aesthetic quality is assessed from the natural landscape, the evaluation with photos and slides is closely related to the evaluations based on the direct experience of the landscape. But it seems that slides and photos can be useful in a particular circumstance (Ghajari et al.,2015). In the end, assessing the aesthetic quality of the landscape by combining the mentioned approaches is recommended. Using advanced tools such as GIS, remote sensing, mathematical modeling, and artificial intelligence in aesthetic quality of landscape assessment will enhance the accuracy and speed of the results.

CONCLUSION

In some cases where the visual aesthetic quality is assessed from a natural landscape, the evaluation with photos and slides is closely related to the evaluations based on the direct experience of the landscape. But it seems that slides and photos can be useful in a particular circumstance. In the end, assessing the aesthetic quality of the landscape by combining the mentioned approaches is suggested. Using advanced tools such as GIS, remote sensing, mathematical modeling, and artificial intelligence in aesthetic quality of landscape assessment will improve the accuracy and speed of the results.

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Competing Interests

The authors declare there are no competing interests.

Author Contributions

Jahani Ali conceived the experiments, analyzed the data, authored or revised drafts of the paper, approved the final draft. Saffariha Maryam wrote the manuscaript and edited the last version.

Data Availability

All the data are shown in the article.

Ethics Statement

The study was conducted by national and international guidelines (Directive 2007/526/EC of the European Commission) for the protection of animal welfare. Also approved by Scientific Association of Environmental Education and Sustainable Development(EESD) http://www.ac.ir/environment

Supplemental Information

There was no supplemental information for this article.

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