4 Scenic beauty: Visual landscape assessment and human landscape perception

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CHAPTER OUTLINE

4.1   INTRODUCTION

Landscapes are important to people. They form the backdrop of our everyday lives as dynamic expressions of the interaction between the natural environment and human activities (Antrop, 1998; Council of Europe, 2003). If you ask people to describe their favourite landscape or to tell you about a landscape they have lost, you will find that everyone has a story to tell and that landscapes can evoke strong feelings. Landscapes are important for people's identity and well-being, and exposure to landscapes can even help you restore from stressful or challenging situations (Velarde, Fry, & Tveit, 2007; see also Chapters 5 and 6).

The European Landscape Convention defines a landscape as 'an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors' (Council of Europe, 2003). Human **perception** is thus a central part of the definition of a landscape. The Convention is aimed at promoting landscape protection, management and planning in both extraordinary and everyday landscapes. It includes people's landscape perception as well as their **landscape preferences** and **scenic beauty** assessments in policy and planning.

As in other parts of the world, increasing urbanisation and changes in agricultural practices and policies have drastically changed European landscapes. Near-urban productive areas have become large scale, while abandonment and reforestation occurs in marginal and less productive areas (Antrop, 2004; Gómez-Limón & Lucío, 1999; Jongman, 2002). As a result of these developments, the concern for visual landscape quality in policy and planning has become stronger over the last decades, which has stimulated a rising interest in the scientific study of people's landscape perception.

In the following sections, we will first discuss different approaches to studying the visual quality of landscapes, followed by an overview of theories explaining landscape preferences as either innate or learnt. Then approaches to measuring and mapping scenic beauty are presented, followed by methodological developments in this field.

4.2   VISUAL QUALITY ASSESSMENT

There are several approaches to studying visual landscape quality (Daniel, 2001). Lothian (1999) proposed a distinction between the **objectivist approach** on the one hand, in which visual quality is viewed as inherent to the landscape and the **subjectivist approach** on the other hand, in which visual quality is considered a construct of

the observer. This distinction parallels the long-standing debate in the philosophy of aesthetics whether beauty is 'in the object' or 'in the eye of the beholder' (Meinig, 1976). The practice of landscape aesthetics in environmental management has been largely dominated by an objectivist approach, in which visual landscape quality is assessed by experts based on formal knowledge. Research on visual landscape quality, however, has been dominated by the subjectivist approach, in which visual landscape quality is derived from lay people's perceptions and preferences.

Within the subjectivist approach, a distinction can be made between **positivistic models** that consider measurable physical features of landscapes as drivers of preference, and **phenomenological models** that focus on individual's personal experiences as a way to understand the underlying meanings of human–environment transactions (Ohta, 2001; Thwaites & Simkins, 2007). Both positivistic and phenomenological approaches generally accept that landscape quality derives both from what is in the landscape and from the observer. These approaches differ, however, in the relative importance they ascribe to these two components (landscape versus observer). Daniel and Vining (1983) have summarised the different approaches to studying visual landscape quality into five 'models' that can be placed on a dimension ranging from objectivistic to subjectivistic (see Box 4.1).

4.3 THEORIES EXPLAINING LANDSCAPE PREFERENCES AS INNATE OR LEARNT

Evolutionary theories explain landscape preferences as a result of human evolution, with landscape preferences of today being innate reflections of landscape qualities enhancing survival in early humans. First, the **biophilia** hypothesis (Wilson, 1984) states that humans possess an 'innate affinity for life and lifelike processes', which motivates them to seek contact with animals, plants and landscapes. The biophilia hypothesis links diversity of species and landscape types to optimal human functioning, but does not specify which species or landscape types comply best with people's biophilic needs. A second evolutionary theory explains environmental preferences as the results of the search for a suitable **habitat** (Orians, 1980). This habitat theory states that humans have an innate preference for savannah-like environments, as this was a suitable habitat for our ancestors. A third evolutionary theory is the prospect–refuge theory of Appleton (1975), focusing on the role of early humans as both predator and prey, thus needing to see (**prospect**) without being seen (**refuge**). According to Appleton, the presence of prospect and refuge in a landscape was favourable to survival in primitive human communities, which is still reflected in contemporary landscape preferences. Finally, the preference matrix developed by Rachel and Stephen Kaplan is probably the most quoted psychological theory

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BOX 4.1 FIVE MODELS OF VISUAL LANDSCAPE QUALITY

Daniel and Vining (1983) have distinguished five approaches or 'models' to studying visual landscape quality, which can be placed on a dimension ranging from objectivistic to subjectivistic:

- The *ecological model,* an objectivist approach, defines landscape quality as independent of the observer and entirely determined by ecological or biological features in the landscape. Within this model the observer is seen as a user of the landscape and a potential disturbance.

- The *formal aesthetic model,* also an objectivist approach, characterises landscapes in terms of formal properties, such as form, line, unity and variety. These properties are seen as inherent characteristics of the landscape that can be assessed by appropriately trained individuals (e.g. landscape architects).

- The *psychophysical model* takes a position between the objectivist and subjectivist approach. It aims to establish general relationships between measured

physical characteristics of a scene (taken from photographs or geographical databases) and landscape preferences.

- The *psychological model,* a subjectivist approach, characterises the landscape in subjective terms by relying on human judgements of complexity, mystery, legibility, etc. These judgements are then related to an array of cognitive, affective and evaluative dimensions of landscape experiences.

- The *phenomenological model* is the most subjectivist model. It focuses on how each individual assigns personal relevance to landscape attributes in personal interpretations of landscape encounters.

After reviewing the strengths and weaknesses of each approach, Daniel and Vining (1983) concluded that a careful merger of the psychophysical and psychological approach 'might well provide the basis for a reliable, valid and useful system of landscape-quality assessment' (p. 80).

explaining landscape preferences (Kaplan & Kaplan, 1989). Building on insights from prospect–refuge theory, this theory specifies two basic human needs that influence landscape preferences: the need for exploration and the need for understanding (see Box 4.2 and Figure 4.1).

In contrast to the evolutionary approaches, **cultural theories** explain preferences as learnt and shaped by social, cultural and personal characteristics. These theories often emphasise cognitive evaluation of functions offered by the landscape to individuals, instead of immediate affective responses (Bell, 1999). Much quoted cultural theories include **topophilia** and the **ecological aesthetic**. First, topophilia implies that humans have a tendency to bond with what one knows well, meaning that familiarity and experience are important drivers of landscape preference (Tuan, 1974). Second, the ecological aesthetic states that knowledge about the ecological functions of a

BOX 4.2   THE PREFERENCE MATRIX

For pre-humans who depended on hunting and gathering, the spatial understanding of the areas they inhabited as well as the ability to explore new areas was probably highly important. Building on these insights, Kaplan and Kaplan (1989) proposed that visual information facilitating understanding and exploration has been very important in shaping human preferences, because appreciation of such landscapes would have been favoured by natural selection. The *preference matrix* combines these two informational needs with two different levels of immediacy or the degree of inference that is required in extracting the information (two-dimensional versus three-dimensional space). The resulting matrix, as depicted in Figure 4.1, identifies four landscape characteristics predicting landscape preference:

- *Coherence:* Immediate understanding of how elements in the environment fit together.
- *Complexity:* Visual richness that can be immediately explored.
- *Legibility:* Understanding of what lies ahead and how you could find your way and not get lost.
- *Mystery:* The promise of new things to explore if moving further into the landscape.

In a review of preference studies, Kaplan, Kaplan and Brown (1989) found mystery to be the most consistent predictor of landscape preferences.

Level of interpretation	Informational needs	
	Understanding	Exploration
Immediate (2-dimensional)	Coherence	Complexity
Inferred (3-dimensional)	Legibility	Mystery

Figure 4.1 *The preference matrix.* See Box 4.2 for explanation.
Adapted from Kaplan & Kaplan (1989).

landscape will lead to preference for it, making knowledge an important driver of preference (Carlson, 2009; Gobster, 1999; Nassauer, 1992; see also Chapter 7). Other cultural theories include theories of sense or spirit of places, also known as **genius loci,** emphasising the uniqueness and visually striking features of landscapes (Bell, 1999; Norberg-Schulz, 1980), **landscape heritage approaches** emphasising visual signs

of cultural heritage (e.g. Fairclough, Lambrick, & McNab, 1999) and **aesthetics of care** emphasising the importance of signs that a landscape is taken care of (Nassauer, 1995, 1997).

Consistent with evolutionary theories, empirical research has shown a high degree of universality in landscape preferences (Bell, 1999, p. 82; Kaplan & Kaplan, 1989; Ulrich, 1986; Van den Berg & Koole, 2006). However, these evolutionary-based preferences are modified and shaped by cultural influences and experience, resulting in variations in preference ratings between groups and subcultures (Strumse, 1996; Tveit, 2009; Van den Berg, Vlek, & Coeterier, 1998; Yu, 1995; see also Chapter 7). Some landscape elements, such as water, seem to be rather universally appreciated whilst other aspects such as openness are evaluated differently according to observer characteristics (Sevenant & Antrop, 2010; Tveit, Ode, & Fry, 2006). These findings underline the importance of developing integrated theories that combine evolutionary, cultural and personal bases for landscape preferences (Bell, 1999; Bourassa, 1991).

4.4   MEASURING AND MAPPING SCENIC BEAUTY

Several methods and frameworks for the assessment of scenic beauty and landscape quality have been developed to provide tools for decision support and landscape monitoring (see overviews in Ode, Tveit & Fry, 2008; Tveit et al., 2006). Such methods and frameworks should be transparent, repeatable and transferable between landscapes (Ode et al., 2008; Tveit et al., 2006). Some of these methods are largely expert based with rather weak links to the perception-based models explained above. However, other methods have explicitly taken people's preferences as a starting point. We will briefly discuss some of these latter models below.

The **scenic beauty estimation (SBE) method** is a psychophysical method developed by the US Forestry Department (Daniel & Boster, 1976). The SBE method estimates scenic beauty judgements for (images of) various natural scenes. These judgements are then statistically related to measurable landscape characteristics through regression analysis. The relationship between measurable landscape characteristics and perceived scenic beauty is used to predict or evaluate landscape management alternatives for their impact on scenic beauty. The SBE method has been applied mostly to forest stands. For example, Buhyoff, Hull, Lien and Cordell (1986) used the method to predict the scenic beauty of American southern pine stands. Results showed that physical variables related to age and size of the trees, such as the age of the dominant stand in years and average diameter at breast height of all trees in the plot stand are positively related to scenic quality assessments by the general public. In total, 50 per cent of the variance in the beauty ratings could be explained by these age and size related variables.

A more recent method is the **VisuLands framework** (see Tveit et al., 2006; Ode et al., 2008). This framework links visual indicators to theories of landscape perception and preference. It identifies nine key visual landscape aspects: naturalness, **stewardship**, **disturbance**, **historicity**, **visual scale**, **imageability**, **ephemera,** coherence and complexity (see Box 4.2 for definitions of the latter two aspects). For each of these aspects, landscape attributes and elements contributing to its expression in the visual landscape are identified, as well as currently used visual indicators to assess it. The VisuLands framework presents a comprehensive approach to describing visual landscapes and assessing visual effects of landscape change using data sources such as photographs, land cover data, airborne photographs and field observations (Ode, Tveit, & Fry, 2010). Research has identified strong relationships between the nine key aspects and landscape preferences, although their relative importance and interpretation may vary across groups (Ode et al., 2008). For example, disturbance is generally perceived as negative. However, thresholds for when a change is perceived as disturbance may differ according to expectations, background and motives (Pâquet & Bélanger, 1997; Shang & Bishop, 2000; Sheppard & Picard, 2006).

4.5   METHODOLOGICAL DEVELOPMENTS

The majority of landscape preference studies have used photographs as visual stimuli to assess preferences. On-site surveys are time consuming, and photographs have been found to be efficient and valid representations of real landscapes (Daniel & Meitner, 2001; Palmer & Hoffman, 2001). Recent developments include the use of computer visualisations and virtual environments in landscape preference surveys and scenario assessments (Bishop & Rohrmann, 2003; Bishop, Ye, & Karadaglis, 2001; Ode, Fry, Tveit, Messager, & Miller, 2009). The use of **virtual reality** allows for a high degree of control over the environment while at the same time ensuring a high immersion and realistic experience through motion and sound (Orland, Budthimedhee, & Uusitalo, 2001).

Significant advances in computer capability and improved access to high resolution geo-data have led to increased use of geographical information systems in landscape assessment. A recent development is the possibility to project map-based data onto a 3D terrain to create panoramic scenes of the visible area from certain points in the landscape, so-called **viewsheds** (e.g. Dramstad, Tveit, Fjellstad, & Fry, 2006).

Eye tracking is a rather novel approach within landscape research (De Lucio, Mohamadian, Ruiz, Banayas, & Bernaldez, 1996; Nordh & Hägerhäll, 2009), capturing the viewer's exploration of an image. Eye movements, including the order and length of fixations on specific parts of the image, are recorded as the respondent assesses the landscape image on the screen. This method gives direct information about the features upon which the respondent bases the assessment. Pupil size gives an indication

of relaxation and arousal responses, which can give information about the **restorative potential** of landscape elements (see also Chapter 6). The information from eye tracking strengthens the interpretation of results from preference surveys and complements them with more implicit, automatic measures of which landscape factors are important for perception and preference.

4.6   SUMMARY

People's landscape perception is at the heart of the European Landscape Convention, which aims at promoting landscape protection, management and planning. This chapter presents some of the main approaches and theories of landscape perception and preferences. A distinction can be made between objectivist and subjectivist approaches which interpret landscape quality as either inherent in the landscape or in the eye of the beholder. Different models for studying visual landscape quality ranging from an objectivist to a subjectivist approach have been presented, along with evolutionary and cultural theories explaining landscape preferences as either innate or learnt. This chapter also provides an overview of methods for measuring and mapping scenic beauty, along with some recent methodological developments. The chapter shows that there is a substantial and growing knowledge base to meet the challenges of integrating knowledge about people's landscape perception in planning and policy according to the demands from the European Landscape Convention.

GLOSSARY

aesthetics of care   an approach to studying visual landscape quality that emphasises the importance of signs that a landscape is taken care of, such as fences, mown edges and tidy plantings.

biophilia   people's innate tendency to seek connections with nature and other forms of life.

cultural theories   theories that view human nature as the result of social and cultural influences.

disturbance   lack of contextual fit and coherence.

ecological aesthetic   an approach to landscape aesthetics which assumes that the more people learn about ecosystems, the more they will appreciate them.

ephemera   changes with season and weather.

evolutionary theories   theories that view human nature as a universal set of evolved psychological adaptations to recurring problems in the ancestral environment.

eye tracking   measuring eye movements; either the point of gaze or the motion of an eye relative to the head.

genius loci   a location's distinctive atmosphere, or the 'spirit of place'.

habitat   the natural home or environment of an animal, plant, or other organism.

historicity historical continuity and historical richness, different time layers, amount and diversity of cultural elements.

imageability landscapes or landscape elements making landscapes distinguishable and memorable, creating a strong visual impression.

landscape an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.

landscape heritage approach a cultural approach to studying visual landscape quality that emphasises the importance of visual signs of cultural heritage, such as archaeological ruins, ancient towns, grave sites and sacred places.

landscape preference the degree to which a landscape is liked.

objectivist approach an approach to studying visual landscape quality that views scenic beauty as inherent to the landscape.

perception the process by which an individual receives, selects, organises and interprets information to create a meaningful picture of the world.

phenomenological models models that focus on the individual's landscape experiences as a way to understand the underlying meanings of human–environment transactions.

positivistic models models that consider measurable physical features of landscapes as drivers of preference.

prospect an outlook or view over a region or in a particular direction (direct prospect), or the promise that such an outlook or view can be attained if one could reach points further off in the landscape (indirect prospect).

refuge a place that serves as a shelter or as a hiding place.

restorative potential the capability (of a landscape or other environment) to promote recovery from stress, mental fatigue or other adverse conditions.

scenic beauty the aesthetic experience of visual landscapes through perception.

scenic beauty estimation (SBE) method a psychophysical method for the assessment of scenic beauty and landscape quality developed by the US Forestry Department as a decision support tool for government agencies.

stewardship perceived human care for nature and landscape through active and careful management.

subjectivist approach an approach to studying visual landscape quality that views scenic beauty as a construct of the observer.

topophilia a term used to describe emotional connections between human beings and places.

viewshed area visible to the human eye from a fixed view point.

virtual reality computer-simulated environments that can simulate physical presence in places in the real world.

visual scale degree of openness, size of perceptual units.

VisuLands framework a decision-support model that predicts visual landscape quality from nine visual landscape characteristics: naturalness, stewardship, disturbance, historicity, visual scale, imageability, ephemera, coherence and complexity.

SUGGESTIONS FOR FURTHER READING

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REVIEW QUESTIONS

1. What is the main difference between objectivistic and subjectivistic approaches to visual landscape quality assessment?
2. List the five models of visual quality as distinguished by Daniel and Vining (1983).
3. The preference matrix by Kaplan and Kaplan (1989) distinguishes two basic informational needs that guide people's landscape preferences and four characteristics that fulfil these needs. Describe these needs and characteristics.
4. Which are the nine key aspects of visual landscapes according to the VisuLands framework?