



LANDSCAPE AND PLANNING

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Perceptions of Forest Landscapes

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Context and Limitations

For many centuries people have been concerned with perceptions of the natural world. Philosophers have written about it, psychologists have studied it, and, more recently, foresters have become concerned with it. However, when we speak of 'perceptions of forest landscapes' in relationship to forest science, we are typically referring to a variety of assessments and their associated methodologies applied to the quantification of some visual aspect of forested lands rather than the larger context of what it means to perceive the world around us. Because of this, perceptions of forest landscapes can be seen as a restricted subset of a larger body of generalized perception research that will not be dealt with in much detail in this article. First, the discussion will be limited to forested landscapes and will not deal with perceptions of urban or built environments, for which there is a great deal of research. Additionally, this article will focus on topics related primarily to visual perception. This is an obvious simplification/reduction of the larger construct of perception but has certainly

received far more attention over the years than all of the other senses combined. Lastly, of all of the measurable dimensions arising from these visual perceptions of forested landscapes, scenic beauty will receive more attention than a host of alternative dimensions (such as general preference, acceptability, visual impact) since it has historically been quite important to forest managers and the decisions that must be made regarding the balance of competing forest values.

Both the preponderance of research and this article concentrate on scenic beauty as a central issue of forest management. Going back at least as far as the ancient Greeks, aesthetics has been of fundamental concern to thinkers of the day. Most simply, aesthetics relates to appreciating, perceiving, or describing the beautiful. It then follows that forest aesthetics must relate to appreciating, perceiving, or describing what is beautiful about a given forest.

Object and Observer

We are often told that 'beauty is in the eye of the beholder' but, in the absence of an external world to behold, this would have little meaning. Conversely, consider this famous quote by William James (the father of American psychology):

Imagine an absolutely material world, containing only physical and chemical facts, ...without even an interested spectator: would there be any sense in saying of that world that one of its states is better than another.

(James, W (1891) The rural philosopher and the rural life. An address to the Yale Philosophical Club, published in the International Journal of Ethics April 1891)

Taken together these ideas lead to the supposition that beauty is transactional, where forest aesthetics is a perceptual state brought about by the interactions of the visible biophysical features of a forested landscape and the perceptual processes of an individual observer. Since the beauty of an object depends on the properties of that object as well as on an observer who can experience the beauty, any property in virtue of which an object is found to be beautiful or aesthetic is a relational property – it is a property of the object, but one which depends on something in addition to the object. In this case, the object must be related to a person who can experience the property in virtue of which the object is said to be beautiful. Simply stated, the experience of natural scenic beauty depends on properties of an individual and properties of an object where:

- properties of the observer include sense perception, thought, and feeling
- properties of the object are its perceived properties – sense data such as color and shape
- properties of both the observer and the object interact creating the foundation on which the experience of natural scenic beauty is laid.

Object

Let us then first turn our attention to the object. Traditionally aesthetics has been intimately tied to the study of art, but more specifically it is concerned with objects that give rise to aesthetic experiences. In the context of forest aesthetics this is rarely a constructed ‘art’ object. The more typical unit of analysis is often the view afforded by a certain location in the natural world. The term ‘landscape’ has also been used quite a bit in this field and for the most part it is synonymous with photographs or paintings of the visible portion of the topography and vegetation/landcover of a given place or region. This, however, is not without its controversy and, at times, ‘landscape’ will be used to denote regions akin to ecosystems or other logical subdivisions of an environment. In this case, the unit of analysis would be a bounded region of forest and the aesthetic qualities of that region would need to be assessed using multiple views sampled from within its borders. While this aggregation of views raises a number of problems of its own, the fundamental issue still revolves around how one might go about the business of evaluating a given view of a forest along an aesthetic dimension and so we must revert to the more restrictive definition of landscape as a view before we think about issues of

aggregation. However, it is not the study of the views themselves but the perceptions of those views that form the basis for the study of natural scenic beauty in the broader context of forest aesthetics.

Observer

Perceptions require an observer and few people would argue with the statement that people (observers) are complex. We are driven by an often conflicting array of needs, wants, and desires to which each of us reacts/responds in a variety of ways. Our attitudes and motivations are influenced by our upbringing, our culture, our self-image, our need for recognition, etc. We possess the capacity for both rational and irrational thought, at times motivated by emotion, while other times we act in a cold and calculating manner. All of this variation in the human condition makes the study of environmental perception a challenging one. Current psychological research has shed some light on this complexity and indications are that perception follows a certain time course as percepts travel through various regions of the brain.

For example, imagine you are out walking and a grizzly bear (*Ursus arctos horribilis*) suddenly crosses your path. Initially, light from the bear strikes your retina. Shortly thereafter, your body reacts by activating your sympathetic nervous system (the so-called ‘fight or flight’ response). As you begin to move, you become aware that you are frightened as evaluations of the percept in conjunction with internal indicators of body state become available to the emotional centers of your brain. Now you are aware that you are scared and moving but have yet to fully appreciate why. You begin to access the higher centers of cognitive brain activity and are able to retrieve linguistic representations of the object in question (the bear). It would not be until that point that you would be able to formulate the utterance ‘That’s a scary-looking bear. I’m getting out of here.’

While it might be said that there is a somewhat innate aesthetic response given the affective (emotional) components of the aesthetic experience mentioned above, it cannot be expressed, nor even consciously experienced, without some form of cognitive apparatus and as a result cannot wholly be considered innate. This leads us to conclude that the fundamental aspects of an aesthetic response, which some have argued are evolutionarily driven, must be affected by our learned understanding of what it means to ‘be’ beautiful. More simply put, both ‘nature’ and ‘nurture’ are necessarily implicated in the assessment of forest aesthetics. One possible explanation for how our evolutionary history might be relevant in the assessment of forest aesthetics can be found in the savannah hypothesis. This postulation

states that humans lived for nearly 2 million years on the savannahs of East Africa where certain features of the landscape offered greater chances for both individual and group survival. Therefore evolution should have predisposed us to prefer these landscape features that are beneficial to our survival. Experimentally there is some evidence to support this including a tendency for children to prefer savannah-like environments over all other biomes, our collective tendency to create gardens with savannah-like characteristics and cross-cultural studies that have shown amazing similarities in our landscape preferences.

Common definitions of environmental perception include cognitive, affective, interpretive, and evaluative components, all operating at the same time across several sensory modalities. However, these components of environmental perception have historically been approached from a great diversity of intellectual viewpoints. The expert approach to environmental perception has attempted to develop formal rules for the quantification of forest aesthetics while the psychophysical and cognitive paradigms have traditionally focused on studying perceptual processes to gain insights into how our evaluations of forest aesthetics are derived. In simple terms, the psychophysical and cognitive paradigms have mainly differed in subtleties of this debate with the former ascribing more weight to the mostly passive sensing of our external world and the later focusing more on how information is given meaning by our mental processes. Lastly the experiential model sees humans as integral parts of the world around them deriving their understanding of forest aesthetics by a set of transactional experiences. Certainly each of these perspectives has something unique to offer, but despite these differences the field of environmental perception remains focused on understanding how we move through time, from state to state, influenced by what came before and our visions of what is to come, attempting to make sense of our internal condition (thoughts and feelings) in light of our evaluations of the external world. It is in these evaluations of the external world that we are concerned in the study of forest aesthetics but we must always keep in mind that these seemingly overt valuations are responses to complex conditions of perception.

Assessment and Evaluation

Most perplexing to those who devote their careers to studying the aesthetic experience in a natural setting is the difficulty of arriving at adequate methods for assessing the relative merits of one forested landscape configuration versus another. This is related to the fact that the aesthetic experience is a complex one.

This can be explained intuitively if you think about your own personal reactions to the world around you. For example, at any given time a researcher might ask you to verbally characterize or explain your current aesthetic experience. After being given some reasonably detailed explanation of what this means (similar to the one you have just read) you would then need to come up with a story of how you perceive, make sense of, and then report on your reactions to the world around you, even though you are now somewhat removed from that experience by a new one (namely the researcher asking you the question in the first place). You then need to remember your experience and relate it back to the question being asked of you. Surprisingly enough, people are actually quite good at tasks such as this and measures of reliability point to a degree of consistency in these evaluations not intuitively expected.

Common Methods

Common quantitative methods for measuring these subjective evaluations include forced choice (choose which one of these is more beautiful), Q-sort (placing relevant images in categories), rank order (highest to lowest on some dimension), or some form of scaled response (rate the images on a scale from 1 to 10 representing low to high scenic beauty). This is generally done using photographs (or more recently computer images) as surrogates for onsite experiences of forest aesthetics, though field assessments can also be conducted. A variety of qualitative methods have also been employed, such as open-ended survey type questions, naturalistic observation, and a multitude of ethnographic methods including the camera method (e.g., give out disposable cameras and have recipients take photographs of what they think are the most beautiful views in the area). When combined these methods allow forest aestheticians a great diversity of tools with which to approach a multitude of research questions.

Temporal Integration

In order for us to respond to a researcher's questions we must typically access our memory. This opens the door to possible misattribution of the cumulative effects of past experience (both cognitive and affective). For example, in the case of a slide presentation where we are rating images on a 10-point scale (relative to one another), we must remember the context of the slides that have come before and assign a rating based on our perceptions of where the current image falls on that scale. Even more problematic in this regard are survey methods, which may ask us to recall a walk down a forest trail or a recent camping trip, causing us to need to integrate information over

longer periods of time. Recent research by Daniel Kahneman and others has uncovered some interesting effects that may begin to explain how accessing memory representation could affect our perceptions and ultimately our expressed assessment/evaluation of a given forest scene. This research can be summarized by briefly explaining the peak–end rule. This rule states that the affective value (preference rating) of a given moment is a simple average of the most extreme affect in a set (peak) and the affective state that is present near the end of an experience (end). While this research has focused mainly on our perceptions (and evaluations) of pain, it may likely extend to the visual assessment of forest aesthetic dimensions.

Experts versus the Public

Additionally, aesthetic experiences of forests are not limited to formal visual rules but are also colored by our scientific understanding of the underlying systems. In other words, visual beauty is but one component of a fully fleshed out aesthetic experience, which may also be affected by differing frames of perception based on dissimilar experiences in one's life. For example, a forester may find a particular ecosystem quite beautiful due to its rarity, while the average observer may be unaware of this and may judge the ecosystem on its visual characteristics alone. There is no a priori reason why the aesthetic value of a forest could not be intellectual in addition to being perceptual, or even intellectual rather than perceptual as some ecologists advocating a move to an 'ecological aesthetic' would suggest. However, this raises a number of normative issues and to date no method has been suggested to evaluate who among us is sufficiently qualified to determine what that new aesthetic might be. This premise of 'unique perceptions' has led to the formulation of the idea that 'experts' should be employed in the evaluation of forest aesthetics. To that end, the US Department of Agriculture Forest Service, having become the largest US employer of landscape architects in the early 1970s, tasked these 'forest aesthetics experts' with categorizing the scenic resources of the National Forests based on formal aesthetic features of the landscape (e.g., form, color, texture, etc.) (see **Landscape and Planning**: Visual Analysis of Forest Landscapes).

This expert-based method can be contrasted with a competing perception-based approach of forest aesthetics assessment where groups of ordinary citizens are enlisted to evaluate landscapes rather than individual expert assessors. Intuitively, the perception based approach is less susceptible to individual variation because evaluations of landscape aesthetics are based on numerous individual evalua-

tions. This leads to greater confidence in our estimates but comes with some cost as well due to the increased burden of deriving multiple measures for every landscape assessed. For this reason the expert-based approach has historically been applied more to the practice of public land management while the perception-based approach has been employed predominately in landscape assessment and environmental perception research.

While both of these paradigms are alive and well in forest aesthetics research, the remainder of this article will deal exclusively with the perception-based approaches. The tradition of landscape architecture approaches is described in detail elsewhere (see **Landscape and Planning**: Visual Analysis of Forest Landscapes).

Results and Applications of Research

Much as artworks presuppose artists who produce them, and audiences who can be aware of them, forestry presupposes foresters who produce altered landscapes, in light of public opinion which serves to critique these management actions. Therefore, foresters must be conscious of the intent to do something, thereby creating a new object for evaluation, which ultimately becomes the public's primary means to understand and interpret the underlying properties of that landscape that the forester hopes to maximize. In the case of forestry, these underlying properties are typically multidimensional and are often in conflict; attempts to resolve conflicts involving aesthetics need to be grounded in the results from perceptual research.

Rules of Thumb

Over the years, a great deal of research has been done (particularly in the Western world) to aid foresters in understanding the linkages between manageable landscape characteristics and predictions of perceived scenic beauty. While this research area is still an active one, with many unanswered questions, a number of rules of thumb can now be derived from this body of knowledge. Overwhelmingly, people prefer natural to urban scenes. In addition, this principle has been extended to more natural scenes though indices of naturalness, such as 'evidence of humans,' common in current recreation management frameworks (see **Recreation**: Inventory, Monitoring and Management; User Needs and Preferences). Visible evidence of facility development and site modifications (denoting human use) are typically seen as negative contributors to scenic beauty.

Another of these rules of thumb can be derived from perceptual studies that have investigated the configural aspects of landscape. This line of research

has been quite productive. People of diverse cultures, languages, or experiences, tend to prefer open areas with fairly low groundcover punctuated by clumps of trees and shrubs, as demonstrated for example in Western public parks and green spaces. This is not to say that there are not significant individual or group differences, but that they have typically been small in magnitude when compared to the degree of concurrence. A similar convergence is found in our clear preference for water in a forested landscape. This can be evidenced through direct means such as a lake or stream but can also be realized indirectly through indications of the presence of water such as abundant greenery and flowering plants.

More generally, mature trees are preferred to saplings; this is especially true in even-aged stands but there remains a great deal of variation in preferences when considering highly complex multi-aged stands. Dead and downed wood has also been shown to negatively impact preference where live plants are always preferred with a minimum of visible debris. However, caution should be used in interpreting this finding since downed wood that is sufficiently decomposed to support other plant life will appear as live plant material in a purely visual assessment. This is also related to the finding that the presence of low groundcover (grass and forbs) is often implicated in positive forest evaluations.

Research into the preference for the form of individual trees may also be of value in understanding this topic. Researchers have consistently found that deliquescent tree form is preferred to excurrent tree form. Furthermore, deliquescent trees that bifurcate closer to the ground, like the acacia tree, also seem to be preferred. These findings can be thought of in terms of preferred biomes, where some researchers have suggested that savanna-like environments are most preferred, followed by deciduous forests, coniferous forests, tropical rainforests, and deserts. These findings have also been shown to be mediated by experience, where the trends in preference are most clear for younger participants, whereas adults tend to elevate biomes with which they are more familiar when compared to the average. However, it should be noted that, while experience seems to have some effect on landscape preference, resulting differences are rather small in comparison to the larger similarities as evidenced by the bulk of empirical studies in this area.

The Promise of Visualization

Fundamentally aesthetics can be seen as related to quality of life or a more generalized sense of well-being so far as a life lived in the absence of beauty

would certainly leave much to be desired. So far, we have seen how perceptual assessments of current forest conditions may offer advice to foresters in incorporating visual aesthetic components of the landscape into a multi dimensional management framework common in today's era. However, if we are to truly manage forest aesthetics, we must be able to project the likely aesthetic outcomes of our proposed management alternatives so that perceptual evaluations might be employed as input to the planning process rather than simply reacting to past management and attempting to uncover rules of thumb to guide future management. One exciting technology that offers promise in this regard is data-driven environmental visualization (*see Landscape and Planning: The Role of Visualization in Forest Planning*). Currently we are able to create near photorealistic images based solely on data descriptions of possible management alternatives. This may allow for the development of an entirely new method for incorporating public evaluations of forest aesthetics in the near future beyond its use in research.

Beauty necessitates and fundamentally relates to experience. This can be seen as the gold standard for the application of research findings in the area of perceptions, and as a result we must always strive to understand how this body of research relates to the larger issue of the human condition. The appropriate management of our forested environments obviously has a large part to play in that concern. Forest aesthetics has a long tradition of importance in this context and research into the interactions of human perception and forested landscapes will hopefully lead us to a better understanding of the fundamental principles related to its management. A great deal of advancement has been made in this area and technological advances offer new opportunities for exploration of these issues. The challenge now is to continue to develop research questions that adequately address the complexities of our experiences of forest aesthetics, while attempting to maintain a link from theory to practice.

See also: Landscape and Planning: Perceptions of Nature by Indigenous Communities; The Role of Visualization in Forest Planning; Visual Analysis of Forest Landscapes. Recreation: Inventory, Monitoring and Management; User Needs and Preferences,

Further Reading

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2. It provides systematic support for project planning and design where aesthetic values are important
3. It can be used to monitor visual qualities and VRM performance (at the regional to project level), as part of social sustainability assessments and forest certification efforts.
4. It can provide an indicator or predictor of public perceptions about some forest management issues, which can be useful as background for developing effective public involvement strategies.
5. It can provide visual documentary evidence for monitoring visible conditions over time (e.g., vegetation growth, human uses, etc.) that are important to various sustainability values or management issues other than aesthetics.

Visual Analysis of Forest Landscapes

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Introduction

This article examines the broad concepts and methods underpinning the management of visual resources in forestry, and describes some of the key scientific methods of addressing the often difficult issue of aesthetics and public perceptions of forested landscapes. It draws on accumulated research knowledge on public perception (*see Landscape and Planning: Perceptions of Forest Landscapes*) and provides general concepts and methods employed in more specific procedures for managing landscape values under visual resource management (VRM) (*see Landscape and Planning: Visual Resource Management Approaches*) and other multiple-value forestry programs. The topic of visual analysis focuses on the main human perceptual sense of vision, rather than appreciation of other aesthetic values such as sound and smell, which can also be very important in their own right though typically less critical than visual values in forestry.

What is the purpose of visual analysis? There are a number of reasons to conduct visual analysis or to be aware of its methods and underlying theories:

1. It can provide support for rational VRM and broader forest management decision-making, supplying credible scientific data on human perceptions, scenic quality, and visual design that can be used on an equal basis with ecological, economic, or other social data.

The history of visual analysis as applied today in forestry can be traced back most clearly to the practice of landscape architecture in Great Britain, where deliberate design of larger-scale somewhat naturalistic landscapes for aesthetics began in the eighteenth century. Certain principles of landscape design and analysis were first systematically applied to forestry by Sylvia Crowe, an English landscape architect working for the Forestry Commission in the 1960s. Since then there has been a tradition of landscape architects developing visual analysis and management approaches in forestry, incorporating both design principles and a growing body of research on aesthetic responses to forest landscapes. Researchers, most notably R.B. Litton Jr., and other landscape architects in the USA, developed the field of visual analysis in the 1960s and 1970s. The introduction of the National Environmental Protection Act (NEPA) in 1969, which recognized the need to protect the rights of Americans to aesthetic enjoyment, and the ‘clear-cut crisis’ in the US National Forests, led to the implementation of a major program of VRM in the US Forest Service, adapting Litton’s work. This in turn has led to development of visual analysis procedures and VRM programs in other regions and jurisdictions, such as British Columbia in Canada. Other systems of landscape assessment and visual analysis have developed somewhat independently in various parts of the world, though mostly in the more developed and affluent nations.

Visual Landscape Description and Inventory

This section reviews some basic principles of visual perception and landscape characteristics, which govern how observers see landscapes. It represents the first stage of visual analysis, which permits