

Commentary

Linking forestry, sustainability and aesthetics

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ABSTRACT

In forest planning, little research has been devoted towards examining how visual-impact assessment can improve the public acceptance of forest activities and augment forest sustainability. The objective of the present work is to review the methods of aesthetic assessment of forest landscapes, which will help the implementation of visual-impact assessment in sustainable forestry. From the numerous techniques of landscape evaluation that have been devised in recent years, the expert approach techniques have dominated in environmental management practices and the perception-based approach in research. The non-market economic valuation techniques are essentially trade-off methods and not aesthetic assessments by themselves. Revealed preference methods, such as hedonic-price, use actual market choices of individuals to get their preferences towards non-market attributes, and stated preference methods, such as contingent valuation method, rely on surveys to get directly the individual's willingness to pay for the non-market attributes. Psychophysical preference modelling is a popular quantitative holistic technique of landscape evaluation and if used in combination with indirect aesthetic evaluation methods might create new standards and protocols for techniques of objectively estimating public perception of aesthetic quality and thus to enhance social sustainability in forest space.

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1. Introduction

Hettinger (2007) suggest that the beauty of the environment is a significant motive for environmental protection. Dearden (1985) first proposed that the landscape should be recognized as a resource and therefore as a variable to consider in forest-management decisions. Beauty is the quality that gives pleasure to senses and is studied as part of aesthetics. The subjective experience of “beauty” often involves the interpretation of some entity as being in balance and harmony with nature, which may lead to feelings of emotional well-being.

The growth of multipurpose forest management with its increasing attention to recreation has required foresters to consider the aesthetic impact of their decisions (Panagopoulos and Hatzistathis, 1995). In many countries the obligation for preparing visual-impact assessments is increasing because unplanned landscape modifications may exert a cost in a decrease of future visitors to regions that depend largely on tourism (Panagopoulos and Vargues, 2006). Therefore, forest managers, environmental specialists, governmental agencies and non-profit environmental organizations are interested in scientifically based tools to assist in landscape evaluation (Burley, 2006). It is inevitable that the visual impact of forest development projects receives considerable attention, particularly in view of the ‘long duration’ of landscape change they incite. Besides, in forest planning, little research has been devoted to examining how visual-impact

assessment could improve the public acceptance of interventions in forest landscapes (Loures et al., 2007).

Sustainable forest management is described by Gustavsson et al. (2005) as long-term management of complex habitats in order to perform their multiple functions into the future. Criteria and specific indicators of economic, biological, cultural, social and spiritual values for sustainable forestry were delineated at the Montreal Process (Oliver et al., 2001). Since then, foresters have sought to bring their activities more into line with natural processes under the influence of scientific, political and public pressure. Although some scientific research has been carried out on scenic landscapes as social value (Schroeder, 1991; Clay and Daniel, 2000; Akbar et al., 2003), no objective and official process for measuring the aesthetic value of forests has been recognized until now. Some jurisdictions (e.g. British Columbia's standard procedures for visual landscape inventory, the USDA's visual management system, the UK forestry standard) do have standards and processes for aesthetics, but research has been limited; as aesthetics are relatively subjective and influenced by cultural norms (USDA, 1995; BCMFR, 1997; UKFC, 2004).

Aesthetics and sustainability do not always agree. Gobster (1999) advocates the development of an “ecological aesthetic”. For example, ecologically, it may be good to leave coarse woody debris, but to an untrained eye it looks messy and some would question the practice; or if harvest blocks were cleaned up to appear to be attractive, they may lose some of the ecological components necessary for local habitats. Nassauer (1995) suggests that it is necessary to provide “cues to care”, whereby harvested landscapes appear to be cared for, or teaching the public what to look for.

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Sustainability originated as a conservation concept (Aplet et al., 1993) emerged from the field of biology and is associated with the preservation of the natural environment in a given landscape. However, with the rise of socio-biological concepts, such views proliferated even at the core of the social sciences (Simberloff, 2003) and served as an ideological base for populist movements like the war against exotic species and genetically modified organisms (Russell, 1996; Burdick, 2005; Larson, 2005). The sustainability concept of the Brundtland report demand the combination of ecological, economic, social and – something that is often ignored – organizational aspects of social development (Brundtland, 1987). In this process, civil society organizations play a bridge role among social, economic and ecological aspects of sustainable development (Fig. 1).

Meanwhile, the most important reason to resist making aesthetics central to a defence of the forest landscapes is the common assumption that beauty is in the eye of the beholder and that therefore aesthetic responses are significantly relative. Many authors noted that visual-impact assessment is regarded as a subjective process (Daniel, 2001), with the greatest problem being the use of cartographic representation methods for assessing scenic beauty, which involve the subjective selection of landscape features and their two-dimensional recordings on maps to illustrate the scenic beauty of views seen in elevation (Appleton, 1994). However, some techniques that ensure that investigations can be undertaken in a systematic, consistent mode were developed, making the assessment as objective as possible (Tyrväinen et al., 2003; Ramos and Panagopoulos, 2007).

The objective of the present work is to review the methods of aesthetic assessment of forest landscapes which may help the promotion of visual-impact assessment in sustainable forest management. Emphasis will be given on why it is important to consider aesthetics, and on some of the challenges of incorporating relatively subjective assessments into what are typically objective planning and management processes.

2. Aesthetics in forest planning and management

Aesthetics, as a complex subject, has been a topic of debate for philosophers, artists and architects since at least the time of Socrates (Thorne and Huang, 1991; Lothian, 1999), and more recently for other professionals such as psychologists (Daniel and Boster, 1976; Kaplan, 1987) and landscape architects (Hanna and Kulpepper, 1998; Burley, 2001; Santos et al., 2006). At present, aesthetics is being taken into consideration by environmental managers/policy makers (Canter, 1996).

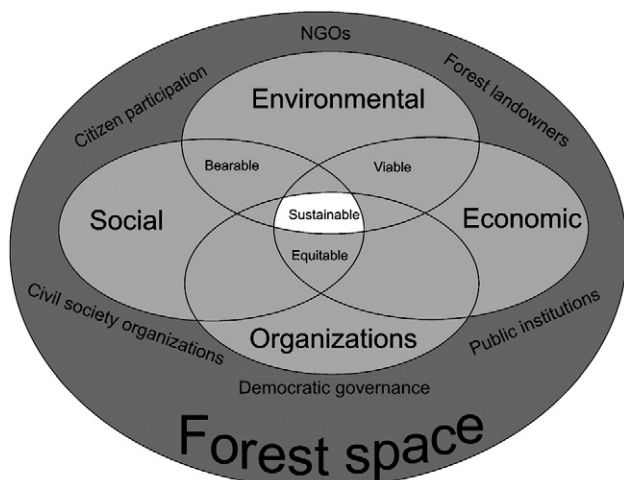


Fig. 1. Exemplification of the bridge role of organizations between the three pillars of sustainable forest space development.

The idea of beauty in landscapes has changed during the history of civilisation and since antiquity art was viewed as a mirror of nature (Kemal and Gaskell, 1993; Carlson, 2002). Symmetry and other classical rules such as the ‘golden mean’ were the most important components of landscape beauty in Greek and Roman gardens two thousand years ago (Botkin, 2001). The English garden, a much later development, represents the naturalistic (natural-like) idea of landscape beauty, and in the early Renaissance the wilderness and the power of nature symbolised the power of God and sublime beauty. Botkin (1990) suggests that a connection exists between scientific discoveries, religious beliefs and ideas of landscape beauty.

Aesthetic expectations ought to be considered as part of a thoughtful design. To achieve this, a careful understanding of visual and non-visual environmental aesthetics is needed, knowing that colour, form, line and texture are characteristics that define visually and aesthetically any object or landscape (USDA, 1995; Garcia et al., 2006). Forest-planning processes frequently involve conflicting opinions about the extent to which forests should be managed. Traditionally, scenic quality has been viewed as an externality of well-managed forests (Ribe, 1989). On the one hand, sustainable management is needed to deal with the intensive use of forests, as well as unfavourable growing conditions, forest-fire security factors and aesthetic variables. On the other hand, based on ecological arguments, there is an increasing demand for areas managed for values other than timber harvesting or other commercial activities. Kimmins (1999) observed that forests judged as beautiful and sustainable by an ecologist may be ugly to the average citizen or may not be sustainable for the very ecological and social values of future generations.

Perception is the starting point for the aesthetic experience (Bell, 2001). For Schopenhauer (1969), a great sense of beauty is to be obtained if the scene expresses what he calls the ‘idea’, the essence of the place or perhaps its spirit (*genius loci*). Order and diversity are the necessary ingredients for an impulsive response to beauty, but the key ingredient is the knowledge of the essence of the place (Bell, 2001), and this is what is missing from the forests managed in a sustainable way.

Landscapes are experienced by people as places. A place is more than a physical piece of land and according to Kruger (2001), space becomes a place through the meanings it is given by people who interact with it over time. Forest managers who apply sustainable forestry also create places by giving them meaning. The sense of a place is a sense of a time according to Jackson (1994). Consequently, in our time that the idea of sustainability dominates political speech, the sense that a specific forest is managed by sustainable principles gives this critical sense of our time in the place. ‘What are we hiding behind the visual buffer strip?’ asked Bruce et al. (2000) in an attempt to review the implications of forestry and aesthetic policies. Meanwhile, what is essential for sustainable development is invisible to the eye, and only the social understanding of the role of the place will lead to sustainable landscapes. Kumar and Kumar (2008) stated that there is missing a link of psychological dimension in the valuation exercise and that the interrelationship between man and nature which has strong bearing on the psychological well-being of the individual still remains uncaptured by most of the conventional valuation methods.

3. Objectivity in environmental aesthetics

The term landscape focuses upon the visual properties of the environment, which include natural and man-made elements and physical and biological resources that could be identified visually but also include non-visual biological functions, cultural/historical values, wildlife and endangered species, wilderness value, opportunities for recreation activities and a large array of tastes, smells and feelings. Landscape quality assessment includes a wide range of environmental/ecological, socio-cultural and psychological factors (Daniel, 2001). Hull and Revell (1989) argued that landscape is the outdoor environment,

natural or built, which can be directly perceived by a person visiting and using that environment; meanwhile, a scenic landscape is the subset of a landscape and is viewed from one vantage point, looking in one direction.

The visual impact on landscape quality concerns physical changes introduced to a site by a new development activity (Amir and Gidalizon, 1990). Visual impact can be of an adverse or a beneficial nature, depending upon the circumstances; however, the visual effect of forest management tends to be perceived as predominantly negative. The exception to this is when sustainable forest practice leads to the creation of new and more vigorous landscapes than what existed prior to intervention.

Numerous techniques of landscape evaluation have been devised in recent years that can be subdivided in several ways. Arthur (1977) splits them into descriptive inventories and public-preference models. Other authors subdivide the models in subjective/objective, quantitative/non-quantitative or in ecological, formal aesthetic, psychophysical, psychological and phenomenological models (Briggs and France, 1980; Daniel and Vining, 1983). In the present work the methods of aesthetic evaluation of landscapes were grouped into direct and indirect.

4. Direct techniques for aesthetic evaluation of landscapes

In all descriptive inventory methodologies used in the past landscape features are analysed, described and combined in order to obtain a total value, implying that overall scenic quality is the sum of its parts (Arthur et al., 1977). These methods of landscape evaluation can provide quantitative assessments of landscape quality and a landscape inventory based on subjectively selected but objectively applied criteria. In those perception-based approaches the scenic preferences of members of the public are valued for landscapes or components of the landscape in order to reach a consensus.

In the design expert approach, landscape is evaluated and inspected with respect to a combination of abstract design parameters that are considered relevant to landscape aesthetics (forms, lines, colours, textures and their interrelationships). The relationships among these elements are used to classify each area in terms of variety, unity, integrity or other complex formal characteristics. The method is applied by an expert, usually a landscape architect, owing to the formal training required (Daniel and Boster, 1976).

In the ecological expert approach, landscape is characterised in terms of species, ecological zones, succession stage or other indicators of ecological processes. Ecological models are bio-centric, designed for specific areas only, favour undisturbed environments and differentiate between natural and human-influenced landscapes (Daniel, 2001).

Both approaches generally accept that landscape quality derives from an interaction between biophysical features of the landscape and perceptual processes of the human viewer. These approaches differ only in the relative importance of the landscape and the traits of the human viewer (Canter, 1996; Hanna, 1999). The expert approach technique has dominated in environmental management practice, and the perception-based approach has dominated in research (Daniel, 2001).

Psychophysical preference modelling is a popular, quantitative, holistic technique of landscape evaluation and might create new standards and protocols for techniques of objectively estimating public perception of aesthetic quality and thus to enhance social sustainability in forest space. Psychophysics is the study of measurement that attempts to relate environmental stimuli to human sensations, perceptions and judgments (Hull et al., 1984). In the psychophysical approach, biophysical and human-perception components are even-handed. In this approach, public-preference surveys and landscape-feature inventories are combined and weighted. Weights for landscape components are estimated from preference ratings collected from the public. The weights, multiplied with a set of

measurements of landscape components, produce an overall scenic quality score for other, similar landscapes. Those methods use a statistical technique (multiple regression analysis) to establish a mathematical relationship between landscape components and scenic preferences of observers (Wherrett, 2000; Real et al., 2000). This type of evaluation has been shown to give accurate results in different landscapes and observers; however, it is expensive and time consuming because it requires that all possible scenes should be selected in a way to represent all physical characteristics that will be used as predictors of scenic quality (Hull and Revell, 1989).

5. Indirect techniques for aesthetic evaluation of landscapes

For some, the sustainability problem is an economic problem, and economists have not been slow to capture the debate and make important conceptual and practical contributions to it (Benson and Roe, 2000). According to Fanariotu and Skuras (2002) the full value of a good or a service can be calculated by estimating the demand for it, or by estimating how much of the good or the service people would use at varying prices. In addition, Mazure and Burley (2005) reported aesthetic, economic and ecological landscape evaluations as covariates and thus as perceptual variables and not independent values. Therefore, economists have developed various indirect evaluation approaches that measure demand for landscape aesthetics. Those methods of assessment are essentially trade-off methods and not aesthetic assessments by themselves.

The most important indirect landscape aesthetic-valuation methods are usually split into two major groups: a) revealed preference methods, which uses actual market choices of individuals to get their preferences towards non-market attributes, and include popular methods such as hedonic-price and travel cost (Clawson and Knetsch, 1966); b) stated preference methods relies on surveys to get directly the individual's willingness to pay for the non-market attributes, include contingent valuation method (Mitchell and Carson, 1989) and choice modelling approach (Hanley et al., 1998). These methods are often apply together to measure aesthetic and recreational attributes (Adamowicz et al., 1994; Earnhart, 2002).

The hedonic-price method is a process of constrained maximisation in which systems of equations involving both prices and quantities for the composite commodity and its attributes are constructed and then solved (Adamowicz et al., 1998). In this method, landscape components are valued against people's willingness to pay to live in particular types of landscape (Willis and Garrod, 1993).

The travel-cost method is based on the idea that a quantity of visitors to a site would diminish as the cost to get there increases. This method uses a sample of visitors to a site that embodies desired environmental attributes and asks them factual questions about the origin of their journey to the site, their mode of transport and perhaps about other costs incurred and their own socio-demographic characteristics (Bergin and Price, 1994). The contingent valuation method is a stated preference method for placing monetary values upon environmental assets that do not have market prices. This is achieved by constructing a hypothetical market and asking individuals what they are willing to pay towards preservation of a particular environmental good (Price, 2000). In choice modelling, several goods or attributes of goods are evaluated simultaneously, whereby the respondents express their priorities of different combinations of attribute levels, including price (Rolfe et al., 2000). The choice of modelling methods includes the contingent rating (respondents rate the different alternatives according to their preferences), contingent ranking (the alternatives have to be ranked) and contingent choice (the most preferred alternative is picked by the respondent).

The main advantage of those 'willingness-to-pay' methods is that they attempt to value the benefits that residents and visitors might derive from alternative landscapes, which could arise at some time in the future (Willis and Garrod, 1993). The main disadvantages are their

linearity and overestimation (Arthur et al., 1977). Willis and Garrod (1993) stated that the impact of a landscape feature does not increase in proportion to its size, and that willingness to pay to gain a commodity is generally less than willingness to accept compensation for losing it.

6. Final remarks

The present work reviewed the methods of landscape aesthetic assessment and their relationship with forest sustainability. The author urge starting research in the use of statistical tools like geostatistics and principle component analysis (Panagopoulos and Antunes, 2008) to assist in the discovery of appropriate criteria and map-based indicators of ecological change that identify where the relationships with aesthetic and landscape preferences occur.

For aesthetics to be properly addressed, the landscapes being assessed need to be experienced as places. Aesthetics is a philosophical idea that changes in time according to the evolution of civilisation. In our time, sustainability is a major subject and can be used to manage forests as places. Public involvement in forest-management decisions will give meaning in the place and consequently will give value in the landscape and make sustainable forest recognisable. As people begin to understand the dynamic nature of landscapes, they will change the way they see the landscape as a static scene, which does not address ecological sustainability and will embrace the new ecological aesthetic idea.

This article does not agree with Kimmins' (1999) opinion that beauty and sustainability cannot coexist in forest landscapes, because short-term visual characteristics cannot be the basis for forecasting medium- and long-term consequences. This article follows the desire of Bell and Apostol (2008) for designing sustainable forest landscapes that optimise the balance between human intervention and natural evolution. Also, the author believe that modern forest management should lead people to form emotional attachments to the land and thereby develop a greater appreciation for sustainability goals and recommend the investigation of techniques that will help the public to participate in sustainable forest planning and management, and create partnerships with stakeholders and developers in order to achieve a higher recognition of the complex interrelationships between environmental, economic and social processes.

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