

Chapter one:

Landscape Aesthetics and Sustainability: An Introduction

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1 Part I

1.1 Issues and Questions

The public tends to judge forest management by how it looks. What happens then when forest ecologists and resource managers seek to implement ecosystem management strategies and new forest practices intended to make forestry more sustainable? Will the public like what they see? Will they understand it? Will they accept it? In short, do people prefer sustainable landscapes over less sustainable ones?

As the forestry profession and resource managers in general seek to bring their activities more into line with natural processes, under the influence of scientific, political, and public pressure on a local and global scale, these questions assume major importance. Certification schemes for forestry and land conservation seem to be the current great white hope of the resource industry in securing market share and achieving what has been termed a “social license” to harvest resources. Ecosystem management may sound fine to everyone as an overall strategy, but what if the implementation on the ground fails to measure up to popular expectation? What happens when the public becomes upset at the appearance of a certified sustainable forest?

Current conflicts in places like the Elaho Valley near Vancouver, British Columbia - the scene of blockades, violence, and much controversy over timber harvesting in old growth and second growth forests - will become test cases for these questions. It is, however, already clear that public perception tends to equate visual degradation of landscapes with unsound - and, by implication, unsustainable - management practices. Other relationships between forest ecology, landscape aesthetics, and sustainability are less clear.

Forest scientists and resource managers seem to be divided between those who see a strong association between ecological health and visual quality, and those who do not. Forest design literature abounds with claims that steps to improve ecological conditions also improve aesthetic qualities, and vice versa (as described by Sheppard in Chapter 11 of this volume). As a practical example, the British Columbia Ministry of Forests (BCMof) believes that timber supply at a Provincial level is overly constrained by the simple addition of ecological constraints from the Forest Practices Code and Visual Quality Objectives (VQOs), since these different constraints on timber harvesting would be expected to overlap geographically: ecological leave-strips and wildlife tree patches should also help significantly to attain VQOs (BCMof, 1997).

The opposite view is held by those, especially among the forest sciences fraternity, who see sustainability as too complex to be directly related to visual landscape indicators, or to be assessed by a visual analysis approach. How can long-term subterranean soil processes, foliage nutrient levels, carbon content, or population numbers of nocturnal or secretive forest creatures, for example, possibly be related to aesthetic quality?

One of this book's primary objectives is to make some sense out of these opposing views. In this volume, we begin to map out some of the patterns in the relationships between ecology, sustainability, and aesthetics: in short, *are scenic landscapes ecologically sustainable* (and if so, under what circumstances), and *are ecologically sustainable landscapes scenic* (and if so, under what circumstances)? Put even more succinctly, *if it looks good, is it good, and if it looks bad, is it bad?*

The authors in this volume present and examine a range of views on the underlying theories, research needs, and practical approaches for managing the combination of ecological and aesthetic values, as well as some of the difficulties of dealing with public knowledge, perceptions and preferences. For instance, should the public be better educated to understand that what looks bad may actually be good? Can a new aesthetic be developed to incorporate our current understandings of sustainability? What are the ethical concerns of seeking to impose a new aesthetic?

If we are successful in identifying the relationships between aesthetics and ecological sustainability, what are the implications? Why does all this matter? Without a clearer resolution of this dilemma, progress toward sustainable forestry may be seriously hampered by scientific and professional confusion over strategies for promoting sustainability to the public. Some scientists would argue that public perceptions rooted (at least partly) in past cultural norms are not reflective of current global priorities for ecological sustainability, and already stymie honest attempts to steward the forest appropriately. Is the practice of sustainable forestry itself sustainable, without public understanding and support? Certainly, those whose living, tax-base, or profitability depend on validation of sustainable forest practices will be adversely affected by public rejection of those practices.

On the other hand, given the arguments among the scientific and land management professions on the definition of sustainability, and the inadequacy of

our knowledge on the long term health of the forest environment, it is possible that the so-called sustainable practices of today may turn out to be less desirable than we think. Will it turn out that the original public aesthetic was ecologically correct all along (at least in some situations?). What if practices that are generally assumed to be good stewardship and therefore sustainable, such as tree-planting and pest control, actually receive public approval mainly because they look good (to both foresters and the public), rather than on a sound scientific rationale? For example, the visible restoration of the forest by the replanting of clearcuts in the Pacific Northwest meets with general public acceptance - rapid "green-up" is good - despite the fact that uniform monocultures of non-local genotypes of Douglas Fir are commonly used to maximize long-term timber supply and future profits, rather than to achieve clear ecological goals.

Discussion of issues and ideas such as these was the *raison d'être* for an international workshop (described next), which formed the genesis of this volume.

1.2 Linking Forest Sustainability to Aesthetics: The Peter Wall Institute Exploratory Workshop

In the early spring of 1999, an interdisciplinary panel of leading ecologists, forest resource scientists, landscape architects, philosophers, perceptual psychologists, sociologists, and computer scientists gathered together at an Exploratory Workshop held at the University of British Columbia (UBC) in Vancouver, Canada. Sponsored by the Peter Wall Institute for Advanced Studies (PWIAS) and the Faculty of Forestry at UBC, with support from IUFRO and other organizations, the purpose of the Workshop was to debate and explore, for the first time at this level, relationships between ecology and public preferences, and to examine the interactions between aesthetic quality and sustainability of forest resource management. The Workshop also explored the potential of computer visualization of forested landscapes to cross disciplinary boundaries in research on perceptions of sustainability, and perhaps to help resolve some of the difficult issues identified in the debate.

The establishment of the Peter Wall Institute for Advanced Studies has permitted interdisciplinary research groups led by UBC members to explore and examine fundamental issues concerning the advancement of knowledge. The focus of the research efforts is that of basic research rather policy oriented. The exploratory workshops that are made possible by the PWIAS allows distinguished external experts and UBC researchers to jointly work toward assessing the research possibilities in a new area and to the development of a research agenda.

The four-day Exploratory Workshop stimulated a lively debate between disciplines which rarely sit down together to hammer out forest landscape issues. It also turned the spotlight on to some of the human dimensions issues of forest ecology and management which often receive less thorough academic and professional attention in forestry circles. Its intended outcomes included a discussion of research needs and approaches to help resolve some of the complex theoretical and practical questions.

The Workshop format was varied to facilitate open communication amongst the participants and to provide for an opportunity for discussion with the interested public. The Workshop was divided into moderated sessions that began with lectures from participants and were followed by open discussions. A public day allowed for people from academia, industry and private practice to interact with the Workshop participants and view demonstrations of visualization-based decision tools for forested landscapes (Peter Wall Exploratory Workshop, 1999).

1.3 Scope and Definitions

Before launching into in-depth consideration of the relationships between sustainability and aesthetics, it is important to define the scope of the book and some key terms used (fairly consistently) throughout. It is also hoped that it would be helpful to those readers who are new to some of these subjects to provide a general introduction to some of the aesthetic and ecological dimensions of forest management to be discussed in the following pages.

The discussion in this volume is focused on forest resources and forested landscapes, although many of the arguments are applicable in some way to other types of broader working landscapes and natural resource/land management activities. The scope of the discussion on forestry is international, and not restricted to the Pacific Northwest or Canada, though several chapters are illustrated with several examples from the front-line of forestry in these and other locations, wherever issues of aesthetics and sustainability are debated.

The book is intended to offer something for resource managers, scientists and lay people interested in a socially sensitive and environmentally responsible form of forestry. The intended readers include professionals grappling with real world problems, who may be able to distil new approaches and techniques from these chapters, and scientists in various disciplines interested in human dimension research and the interplay of ecological and social factors in forestry practice. Policy-makers may find fresh insights and new perspectives on the practical dilemmas stemming from differing perceptions of forest values. Moreover, the book would be of interest to anyone concerned with the aesthetics of sustainability, in any land use type or context.

The central notion of *sustainability* and what it can mean is defined in several chapters, notably those by Daniel, Oliver *et al.*, Burley, and Kruger. For the purpose of this introduction, it is sufficient to note that the primary use of the term in this book focuses on ecological sustainability, rather than the broader definition of economic and social sustainability; nonetheless, the importance of these other aspects of sustainability is not ignored, and is addressed in most depth by Kruger in *Part III*.

The term *aesthetics* is taken in its broadest sense, to encompass much more than just visual quality: it is used here to express the full range of aesthetic and perceptual qualities received by the senses and appreciated by the mind, including the meanings to be found in the landscape, such as the symbolism of

timber harvesting practices and forest stewardship. More specific definitions and explanations are provided by several authors, particularly Daniel, Carlson, and Bell. The term *perception* can be used in two ways: as sensory perception, *i.e.* the mechanisms of vision; or more loosely, as opinion or preference based on an understanding of the characteristics of a situation. *Preference* is again a more specific term (see also Daniel in Chapter 2) for the degree to which a person or group prefers an situation or feature over other situations or features; used here, it generally applies to aesthetic and related preferences for forest conditions and landscapes, not the full range of possible types of preferences which could be explored in human dimension research. While we can expect some correspondence between landscapes which are aesthetic and those which are preferred, there can be many other reasons for overall preference, beyond its aesthetic qualities.

The term *landscape* can have some distinct meanings, depending on the discipline of the reader. To a forester, it refers to a geographic scale above that of the forest stand, but below that of the region: it often coincides with medium or large watersheds, and incorporates all the elements of the ecosystem. In landscape architecture, the word *landscape* more explicitly includes consideration of the aesthetic (and often visual) characteristics of the environment, sometimes taken together with the biophysical conditions.

1.4 Structure of this Volume

This volume therefore presents a unique collection of papers by distinguished authors interested in exploring the relationships between forest ecology and aesthetics. New research on public attitudes to forestry and ecological models for sustainability are combined with reviews of sustainability indicators which address amenity values, and the clash between visual resource management and emerging theories of an ecological or stewardship-based aesthetic. New techniques of virtual forest visualization that convey the complexities of spatial and temporal landscape change are illustrated by some of the world's experts in this rapidly growing field.

The remainder of this book is structured in five parts, as described next.

2 Part II: Seeing and Knowing: Approaches to Aesthetics and Sustainability

Part II refines the questions posed by the relationships between aesthetic considerations and ecological sustainability of the forest, and sets out some basic arguments on, and understandings of, these potential relationships.

In Chapter 2, Daniel addresses the central topic of the book in terms of the ecological aspects of sustainability and the largely visual aspects of aesthetic preference. In seeking to determine the psychophysical basis for aesthetic preferences (*i.e.* human responses to landscape stimuli), psychologists typically differentiate two principle mechanisms: expressed preferences as the outcome of

rational processes based in part on environmental information (*e.g.* information on sustainability); and expressed preferences resulting from reflexive emotional responses to environmental stimuli. The degree to which the one can overpower the other in responding to forest management activities is a crucial question. Daniel goes on to consider a number of fundamental and operational challenges to be overcome in attempting to resolve relationships between aesthetics and ecological sustainability, themes that are developed later in the book by several of the authors.

Carlson, in Chapter 3, further distinguishes the differences between preferences in general, aesthetic preferences, and aesthetic value by redefining the Exploratory Workshop research question as: “Do people prefer *the look* of sustainable landscapes?”. His philosophical argument suggests that people may indeed aesthetically prefer sustainable landscapes, by explaining how knowledge of a landscape’s nature (*e.g.* its ecological status) informs the perception of it: two similar landscapes that have different natures will strike us as aesthetically different.

Aldo Leopold (1968), referring to largely deforested, agricultural landscapes, noted that if something looks bad, then it probably is “bad” ecologically. Kimmins, in Chapter 4, suggests that this simple maxim has been widely embraced, but is in conflict with ecological realities in many forested landscapes. Although visual landscape quality is an important forest value, it must be balanced by the ecological requirements of the other values we wish to sustain. Kimmins argues that there are no simple relationships between readily visible indicators of forest ecosystem condition and various measures of sustainability.

Some of the connections between aesthetic values and other human and social values, and the relationship between these values and attitudes, are illustrated and explored by Tindall in Chapter 5. Drawing on recent original survey research, Tindall examines the human values associated with forests, and attempts to define who “the public” is. By understanding intergroup differences regarding aesthetic and other value preferences, it is suggested that we can begin to discern why certain forestry issues, such as hiding forestry behind leave strips and especially the practice of clearcutting, lead to such rancorous debate over what is appropriate for sustainable forest management.

3 Part III: Perspectives on Forest Sustainability

This section of the book delves deeper into our understanding of sustainable forestry, with fresh perspectives on current criteria and indicators used in determining levels of sustainability, and some suggestions for more robust, appropriate, and inclusive standards.

Values derived from forested landscapes are dynamic. Oliver *et al.*, in Chapter 6, question whether the evolution in perceptions of desired forest values, which has resulted in the reduced importance of traditional Western values (such as timber

supply and employment), has significantly enhanced emerging forest values such as biodiversity. This chapter presents a theoretical framework for measures and perceptions of forest sustainability, and promotes a systems management approach that allows for the dynamic nature of forest values to be incorporated while balancing the range of desired values. Oliver *et al.* argue that the current debate over forest values is not so much concerned with what values to provide, as it is with how these values are to be provided.

A number of international attempts have been made to address the management of sustainable forests and to balance this with the provision and maintenance of human welfare. *Agenda 21*, the *Rio Declaration* and the *Forestry Principles*, developed at the *United Nations Conference on Environment and Development* in 1992, are examples of such attempts. In Chapter 7, Burley compares international forest management initiatives in order to indicate the requirements for identifying criteria and indicators of forest sustainability, and proposes that quantifiable indicators be included in the political processes. More specifically, Burley also examines the way in which these criteria and indicators address public preferences and aesthetics, and outlines possible approaches to incorporating amenity or landscape values into these sustainability frameworks.

As suggested in earlier parts of this volume, the influence of culture on aesthetic appreciation (both seeing and knowing) cannot be denied. However, this influence is generally discussed in terms of Western concepts of beauty. Umeek (Dr. Richard Atleo) presents another approach to perceptions and ecology in Chapter 8. The Tloo-qua-nah principle of the Nuu-chah-nulth Nation is to remember reality, that “everything is one”. From a First Nations perspective then, the question is not whether aesthetics or sustainability is preferred, but whether destructive harvesting practices are effectively replaced by more creative and respectful forest practices. Atleo argues that within the unity of existence, physical and spiritual forces are in constant opposition, and must be managed, balanced, and harmonized in order to enhance life within both the ecosystem and the culture dependent upon it.

4 Part IV: Theories Relating Aesthetics and Forest Ecology

Part IV turns from the consideration of sustainability itself to an in-depth review of relevant aesthetic theories on preferences for forested landscapes, as they relate to ecological conditions.

Botkin, in Chapter 9 of this volume, builds on the idea of cultural legacies in aesthetics by exploring key historical transitions in how we have perceived forests and landscapes, as illustrated in art and in the testimony of lay people and practitioners. Botkin suggests that the landscape painters of the 17th and 18th centuries helped to shape modern attitudes to landscape, through their depiction of a somewhat idealized nature. He also warns against the influence of predisposition’s based on inadequate scientific evidence, and argues for deeper ecological understanding in formulating opinions on the landscape.

Bell further examines several historical theories on aesthetics in Chapter 10 beginning with the senses and their use in perception and then moves on to consider Marr's primal sketch theory, Gestalt psychology and Gibson's ecological theory of perception; from this, an understanding of landscape pattern recognition is presented as a fundamental basis for the aesthetic experience. In the second part of Chapter 10, Bell explores the nature of landscape aesthetics, particularly the role that knowledge about the perceived scene plays, and the exact nature of an aesthetic experience as presented by Foster. A review of the ideas of Leopold and Gobster considers the manner in which aesthetics and ecology interact; Bell concludes that an understanding of preferences alone is insufficient to guide managers.

The exploration of various aesthetic theories and the potential relationships (or lack of relationships) between visual quality and indicators of forest sustainability, raises a number of questions for Sheppard in Chapter 11. He reviews the contribution of visual resource management (VRM), as connected by agencies such as in the US Forest Service and the British Columbia Ministry of Forests, in promoting a *scenic aesthetic*. He contrasts this with the emerging *ecological aesthetic* (as discussed in Gobster's Foreword), and proposes a refined theory of visible stewardship, as a partial solution to adverse public reactions to forestry management practices that ecologists might wish to promote.

From a social perspective, landscapes encompass far more than ecological and aesthetic values. Kruger, in Chapter 12, posits that there is more to landscapes than meets the eye, through an exploration of landscapes as places with which people develop relationships and to which they ascribe meaning. This chapter argues that civic engagement of a variety of stakeholders in social learning, stewardship activities and other collaborative processes are needed to explore options and potential outcomes successfully. Kruger argues that the development of frameworks is also needed to bring together local knowledge of places with scientific knowledge to help inform decision-making and to provide for the assurance of broad-based sustainability.

5 Part V: Visualization of Forested Landscapes

At the same time that our awareness of sustainability issues has been developing, there has been rapid growth in our ability to understand ecosystem processes and to make them known to people using a variety of media. The role of image-making by painters from the 17th to the 20th century (as discussed by Botkin in Chapter 9) has been to some extent replaced by landscape photography as a means of revealing attitudes to the ecological health of the environment: Walker-Evans' evocative images of the dust-bowl disaster of the 1930s, Ansel Adams' and David Muench's celebration of natural landscape beauty, and Peter Jennings' "God's own Junkyard" compilation spring to mind. The work of photographers such as these has now in turn been complemented by a new wave of powerful, analytically-

oriented imagery. Just as the naturalists' descriptive studies of nature have been replaced by the scientists' quantitative data and dynamic modelling, so the static photograph has been superseded by computer-generated scientific visualization and interactive visual simulations of ecosystem processes. The potential contributions of these parallel advances in technology, in bringing both scientific knowledge and public sensibilities together on natural resource decision-making, form the subjects addressed in *Part V*. This section also explores the potential role of landscape visualizations in improving our understanding of how people perceive sustainability, and charts some of the limitations and concerns raised by the use of these media.

Can the employment of visual simulations help to understand and interpret public preferences for sustainable landscapes? The answers to this question depends upon our understanding of aesthetic preferences and our ability to accurately depict and interpret sustainable landscapes. Luymes, in Chapter 13, suggests that advances in visualization technology which now allow forest managers to portray realistic-appearing outcomes, will increase both their use and the dependence on them by forest managers to get their point across to the public. The increased importance of visual simulations, however, may have both positive and negative consequences, including the likelihood that they will carry with them an assumed authority not necessarily supported by scientific rigour or objectivity. Luymes argues that these problems may be most acute in the more sophisticated visual simulations, highlighting the risks and potential of these powerful tools when used with explicit rhetorical intent. In particular, he considers the role of visualization in exploring the spatial and visible forms of new (or ecological) forest management practices, and shaping (rather than merely measuring) the public's aesthetic preference for landscapes.

The potential for the interactivity that visualization and simulation can allow offers opportunities to engage the public in meaningful forest management participation; however the full potential of these opportunities has not been realized. Orland and Uusitalo, in Chapter 14, examine in more depth the suitability of virtual reality in supporting forest-land managers in their involvement with the public in forest planning. One of the leading examples of state-of-the-art visualization tools that aid forest management, *SmartForest*, is examined and evaluated using a case study.

If 17th and 18th century landscape painters were able to interpret and influence the scenic aesthetic using technologies of the day, can we assume that modern visualization and modelling techniques can do the same for the development and refinement of an ecological aesthetic? Danahy, in Chapter 15, returns to this theme, and suggests that the most important factor governing the selection of a visualization technique is the identification of the specific aesthetic and ecological meanings one is attempting to communicate or replicate in a simulation. The techniques available for visualization provide a diversity of high quality representations, yet the true potential of these techniques lies in properly matching them to our capacity to systematically associate abstract knowledge with visually

explicit representations: in short, do people have the necessary visual literacy to make the appropriate connections between the simulated image and the ecological reality?

Wherrett, in Chapter 16, describes the use of psychophysical landscape preference models (as outlined by Daniel in Chapter 2) for the prediction of scenic beauty and notes that few models have been validated and fewer still used in a real landscape planning context. She describes an experiment that applies a landscape preference model using a selection of landscape visualization techniques, and assesses the realism and validity of the visualizations themselves, as an example of some of the issues mentioned by the preceding authors in *Part V*.

6 Part VI: Reconciling Forest Sustainability and Aesthetics

The volume concludes with a synthesis of key conclusions and unresolved dilemmas, drawn from the individual chapters, from additional points raised at the PWIAS Exploratory Workshop, from the combination of authors' views, and from previous research. It presents an initial research agenda to address the fascinating and under-explored area of sustainability, ecology, and aesthetics, as well as some implications for forest resource managers.

It is hoped that this book will catalyse academic, practitioner, and lay person curiosities on the subject of linking sustainability to aesthetics, and encourage debate among and between the many disciplines involved in the subject areas of forestry, ecology, socio-economics, philosophy, psychology, landscape architecture, and computer science. Further, we hope that the research agenda developed here can form a platform for new research to clarify further the relationships between forest sustainability and people's aesthetic responses.

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