
Environment & Society Portal


The White Horse Press

Full citation: MacQuillan, Alan G., "Cabbages and Kings: The Ethics and Aesthetics of New Forestry." *Environmental Values* 2, no. 3, (1993): 191-221. http://www.environmentandsociety.org/node/5495

Rights: All rights reserved. © The White Horse Press 1993. Except for the quotation of short passages for the purpose of criticism or review, no part of this article may be reprinted or reproduced or utilised in any form or by any electronic, mechanical or other means, including photocopying or recording, or in any information storage or retrieval system, without permission from the publishers. For further information please see http://www.whpress.co.uk.

Cabbages and Kings: The Ethics and Aesthetics of *New Forestry*

ALAN G. McQUILLAN

School of Forestry
University of Montana
Missoula, MT 59812, USA

ABSTRACT: The advent of *new forestry* in the United States represents a traumatic shift in the philosophy of national forestry praxis, a broadening of values to include aesthetics and sustainability of natural ecological process. The ethics of traditional forestry are shown to be 'Stoic utilitarian' and positivist, while the ethics of *new forestry* adhere closely to the 'land ethic' of Aldo Leopold. Aesthetics in traditional forestry are shown to be modernist, and to have developed from, and in opposition to a Romantic aesthetic of the late nineteenth century. This transition is traced from the first U.S. landscape architect, Frederick Law Olmsted Sr., to the first U.S.-born forester, Gifford Pinchot. The language and precepts of *new forestry* are shown to parallel those of postmodernism, and the possibility of a broadened aesthetics of forestry, developed through postmodernist criticism, is outlined. The language of gardening is used as a model of forestry praxis, with traditional forestry adhering to the principles of vegetable gardening, while *new forestry* offers an opportunity to flesh out an entire spectrum of gardening genres.

KEYWORDS: Environmental ethics, aesthetics, forestry, forest policy, postmodernism.

INTRODUCTION

Forestry in the last few years has undergone traumatic transformation. Since Forest Service ecologist Jerry Franklin coined the term *new forestry* in 1989[1] the profession has been in turmoil. His work might have had minimal impact if his ideas had not struck chords that reverberated throughout a disgruntled and melancholic profession. Despite scientific incompleteness, and traditionalist criticism that is not without merit,[2] Franklin's *new forestry* seems to have

Environmental Values **2** (1993):191-221
© 1993 The White Horse Press, Cambridge, UK.

become firmly rooted in the psyche of practising foresters in North America.[3]

The prime management agency of publicly-owned forestlands in the U.S., the Forest Service, rapidly embraced the concept and developed a policy initiative, *new perspectives,* within which to locate *new forestry*. Today, the terms are becoming interchangeable;[4] the pervasive theme is to redefine forestry in terms of maintaining biodiversity for sustaining ecological systems in a 'kindler, gentler' manner, and with regard for aesthetic considerations.[5] *New forestry* , like perestroika, has attained a level of popular support within the profession's public sector from which there can be no retreat.[6] Surprisingly perhaps, this enthusiasm seems to have carried over to professional foresters within the traditionalist bastions of privately-owned forest industry: it appears that *new forestry* combines industry's perceived need for improved public acceptability of its operations with an up-beat rejuvenation of what today's foresters thought forestry was supposed to be about when they first chose the subject in school.

What *new forestry* ***is*** is best described by first stating what it is not. *New forestry* is an ending or transcending of the traditional ideal of the 'regulated' forest. From its inception in the U.S. almost exactly a century ago, forestry's aim was the conversion of the continent's vast expanses of old-growth, 'mixed up messes' of inherited forest canopy, into regulated, regimented, uniform stands of 'thrifty' young trees, vigorous producers of wood fiber in perpetuity.[7] This utopian model of forestry was imported from Prussia,[8] and reflected I shall argue a truly modernist vision that blossomed from Stoic, Calvinist and utilitarian rootstock.

With *new forestry*, the vision of the perfectly-regulated forest vanished.[9] Management plans that had been painstakingly developed during a decade of hard labour for the nation's 122 national forests, in accordance with crisis-averting legislation known as the National Forest Management Act of 1976 (NFMA), were produced still-born in the late 1980s, as the very premises upon which the plans were based became suddenly null and void.

This was because no one before or during the 'planning decade' (that began in 1976), at least no one I know within the forestry profession, seriously considered old growth forests as possessing any redeeming features outside of the preserves known as national parks or designated wilderness areas. Further, forestry viewed as 'over-mature' any tree that was beyond 'culmination of mean annual increment' or maximum average rate of growth – the floral equivalent of faunal veal. In practical terms in the Pacific Northwest (where the preponderance of old-growth forests remained), this meant the demise of physiologically mature trees – trees that can reach diameters exceeding ten feet (3 m) at ages exceeding 300 years, and their replacement by a regulated forest where most trees would not exceed two feet (0.6 m) at rotation ages of 50 to 100 years, and most of the forest would be stocked with juvenile trees most of the time.

Almost overnight it seemed, sustained high-level timber production as a

correlate of the perfectly regulated forest vanished as the ideal. It had dawned on a hitherto unsuspecting public that 'sustained yield' of forest production did not equate to a sustained stock of 'forests' as the American public had come to know and love them.[10] Indeed, the terms were polar opposites, since, as every forester knew from school, a high-level perpetual (sustained) yield was obtained only when the old growth was at last converted to vigorous and usually homogeneous stands of young timber. Perhaps not surprisingly when viewed historically, the forestry profession had provided the public with no warning that sustained yield (a popularly-accepted term) implied the demise of what came to be known as 'ancient forests'.

So what *is new forestry*? Classic regulation is abandoned; in its place are generally-stated concerns for biodiversity, ecological system complexity, aesthetics, protection of all indigenous species of flora and fauna (including those that depend on an old-growth habitat), clean air and water, respect for those who find spiritual values in the forest, a re-emerging 'ethics of nature', holistic or systems-oriented approaches to management, coupled with older but not abandoned desires for commodity production, economic prudence and humanistic concern for rural communities disrupted by the vicissitudes of a rapidly-changing forestry praxis. Along with *new forestry* comes a whole lexicon, "rewriting", as postmodernist critic Fredric Jameson described, "all the familiar things in new terms and thus proposing modifications, new ideal perspectives, reshuffling of canonical feelings and values".[11] If there were a prize for the phrase repeated most often at recent professional forestry meetings it would have to go to 'changing values'.

Still, *new forestry* cannot be succinctly defined. The desire for biological diversity, ecological system complexity and the continuance of evolutionary processes, in and of itself is insufficient to prescribe any ideal forest of the future. *New forestry* abandons utopian ideals.[12] Its essence lies, paradoxically perhaps, in its eclecticism, its shifting focus, its multi-faceted and not necessarily mutually compatible concerns. It has, as another critic, Charles Jencks, ascribed to postmodern culture, "a strong sense of its departure point, but no clear sense of destination".[13] Describing the shifting focus of postmodernism, Jencks continued:

> The ambivalence accurately reflects this double state of transition, where activity moves away from a well known point, acknowledges the move and yet keeps a view, or trace, or love of that past location. Sometimes it idealizes the security of this point of departure, with nostalgia and melancholy, but at the same time it may exult in a new found freedom and sense of adventure.[14]

Today's new foresters display some of this freedom and adventure; they frequently concern themselves with creating a data-based image of the 'pre-settlement' forest primeval, while exulting in an expanded vision of forestry, choosing from a vast range of 'desired future conditions'. (It is the approach to

selecting 'desired future conditions' that is a prime concern of this paper.)

The remarkable congruence of the language of postmodernism with the language of *new forestry* (seen in terms like 'diversity', 'eclecticism', 'plurality', 'landscape', 'multi-cultural', 'multi-faceted' and other 'multi-' prefixed words) leads me to suggest the latter is emerging as a concrete expression of the former, that *new forestry* is a postmodern phenomenon. This supposition is strengthened when one realizes the similarly remarkable congruence of traditional forestry with the ideals of modernism (argued below), and how these arose in reaction to and attempted negation of an earlier Romantic Transcendentalist view of nature.

Having made this connection, it becomes possible for new foresters to seek in postmodernist works how Western thought in general and forestry in particular is engaged in the uncertain process of redefining its relationship with nature. The discourse that surrounds and defines this relationship cuts to the very quick of forestry. We have the view expressed by Linda Hutcheon:

> [I]t seems reasonable to say that the postmodern's initial concern is to de-naturalize some of the dominant features of our way of life; to point out that those entities that we unthinkingly experience as 'natural' (they might even include capitalism, patriarchy, liberal humanism) are in fact 'cultural'; made by us, not given to us. Even nature, postmodernism might point out, doesn't grow on trees.[15]

This interpretation squares off against a popular, though I believe misguided, ascetic environmentalist position which sees nature as a virginal *otherness*, an object of deification, an Eden from which sinful humans must be excluded. A postmodern forestry might seek instead a re-engagement of humankind with the natural world, freeing people to participate without shame in actions or inactions which transform or do not transform the earth. That any transformation should not destroy the earth is axiomatic to survival – a stance necessary for the continuation of the human and, therefore, the postmodern condition also. But Hutcheon is correct in asserting that "the dominant features of our way of life … are in fact cultural".[16]

Bringing nature discourse back to focus presents an opportunity to overcome what is currently an impasse for the profession, even given its recent shift toward *new forestry*. This impasse is forestry's concentration on the scientific method to the exclusion of almost all else. Science, like reason, informs but does not itself motivate action.[17] Motivation may be economic, but foresters are now well aware that many values escape the economic net. Ethics considers other forms of value, and it is no accident that *new forestry* coincides with the Society of American Foresters' adoption of a *land ethic* canon.[18] My thesis goes further: while science informs of what is *possible*, and ethics and economics circumscribe what is *prudent*, I believe humans continue to operate largely within the realm of what they *want*. Our wants, both collectively and individually, arise in a cultural context; they are shaped by our sense of aesthetics (in the broadest construction of the word).[19] Only by making room for other established means of academic

discourse, such as literary and artistic criticism, can *new forestry* hope to accommodate the expressed concerns of its clientele, the increasingly postmodern American public. Accordingly, my premise is that forestry is first and foremost a *discourse*, a language-based expression of relationships between forests and foresters, between foresters and the public at large, and, not least, between the public and its forests.[20]

THE ETHICS OF TRADITIONAL FORESTRY

If *new forestry* reflects first and foremost a radical shift in values, then it is appropriate to begin with a consideration of ethics in traditional forestry. For many years I have described foresters as adhering unconsciously to what I have called a gardeners ethic: The gardener is a worthy soul who does not count the hours spent doubled over among the rows, back bent to the sky – planting and mulching, weeding and cultivating, caring or tending for the future crop – a walking and breathing definition of the much-loved term *stewardship*. The best gardens have their cabbages in straight rows, disease, insect and weed-free; when the cook descends from the kitchen, cabbages most in need of removal are harvested, leaving a beautiful still-ripening crop; and, when summer is over, the entire garden is stripped for winter.

Untold hours are spent in this virtuous toil, so that an accountant with a stop watch would be most unwelcome; the devoted gardener does not wish to be told that, based on vegetable prices at the local market, his labour returns a bare fraction of minimum wage. This is the wrong scale, he contends, for measuring such valuable work in husbandry of nature. A wilderness advocate would be equally unwelcome: the gardener seeks no wild nature, no overrun wilderness, he seeks only the co-operation of nature in his organization and ordering of nature's productive forces.

Gardeners, when they meet, lament the latest outbreak of insects or disease, argue over use of artificial chemicals, or whether or not a drought is really upon us. They will discuss the relative merits of different tools, crop species, or government restrictions. But, their discourse fits comfortably within the framework of their paradigm; they know, and will defend against all comers, that theirs is a noble task, sweating their brows in the raising of food for human-kind, a challenging, needed and tangibly important position in the great outdoors.

Forestry, as it came to be practiced in the U.S. (by public foresters beginning in the 1890s and by industry foresters beginning in the 1930s) reflects a curious combination of ethical values. Traditional[21] U.S. forestry has often been described as utilitarian, and this is a good starting place. Besides the general orientation of professional foresters to produce utilities, the acclaimed 'first U.S.-born forester' and founder of the Forest Service, Gifford Pinchot, adopted as his maxim for forest management, "the greatest good of the greatest number

in the long run."[22] This is a minor variant of a phrase canonized by the founder of the utilitarian movement, Jeremy Bentham.[23] Pinchot passionately shared Bentham's humanism, his concerns for alleviating the pains of industrial and rural poverty, and for a social engineering[24] designed to make the material rewards of labour substantial and attainable by all. Furthermore, Pinchot's forestry, like utilitarianism, was teleological, or goal-oriented. Pinchot's goal was to bring the inherited natural forests of the U.S. under productive management, or, as a Society of American Forester's bumper sticker proudly proclaimed in the 1980s, "Happiness is a well-managed forest."

However, in its original conception, utilitarianism's goal was maximization of *pleasure*, and minimization of *pain*. This has been called hedonistic utilitarianism;[25] and, in Bentham's time (1748-1832), when the pain of proletarian life during an early period of the industrial revolution was so obviously acute, the work of social reformers was clearly defined, and arguments concerning the finer points of pleasure were probably redundant. Later, John Stuart Mill refined the telos of Bentham's ethic to maximizing *higher* pleasure, and Hastings Rashdall expounded a form of the ethic which recognized a pluralistic concept of pleasure, known as *ideal* utilitarianism,[26] a forerunner perhaps to the multiple-use doctrine of post-war U.S. forest policy.

Implicit in the utilitarian ethic is the need to quantify and place on a common scale the various *pleasures* and *pains* that make up the collective good,[27] and this is reflected in the historical development of U.S. national forest planning. Pinchot's notion of social good was thoroughly materialistic. The primary good was timber,[28] accompanied by other commodities such as water for irrigation or power, and forage for livestock grazing. These outputs could be readily quantified and valued. As other demands expanded to where they could not be ignored,[29] the utilitarian net was expanded to catch wildlife and recreation, and the 'willingness-to-pay' concept[30] was pressed into service so that *dollars* could remain the common currency in which all forest outputs were to be measured and maximized. This 'calculus of pleasure' or benefit-maximization dominated forestry management and economic texts in the 1970s[31] and became the pivot of public forest planning methodology during the 1980s.[32]

To suggest however that U.S. forestry *practice* has been characterized by pleasure or benefit maximization, or by any other *telos* would be to ignore fundamental metatexts that have influenced forestry praxis, and caused abiding resistance to expanding professional concern into such hedonistic subjects as outdoor recreation, caring for non-game wildlife, or leaving things alone (as, for example, in wilderness areas). Even with regard to commodities, the profession has shown more concern for the *exercise* of forestry than for efficient production of outputs.

One of these metatexts, which has important implications for the notion of development *per se*, rotates around the glorification of labour and the repudiation of idleness that has characterized Western life since well before the Enlighten-

ment. It has been well described by Michel Foucault:

> As for that power, its special characteristic, of abolishing poverty, *labor* – according to the classical interpretation – possessed it not so much by its productive capacity as by a certain force of moral enchantment. Labor's effectiveness was acknowledged because it was based on an ethical transcendence. Since the Fall, man had accepted labor as a penance and for its power to work redemption. … 'The land had not sinned, and if it is accursed, it is by the labor of the fallen man who cultivates it; from it no fruit is won, particularly the most necessary fruit, save by force and continual labor.' … The theme was constant among Catholic thinkers, as among the Protestants … Here is Calvin's admonition: 'Nor do we believe, according as men will be vigilant and skillful, according as they will have done their duty well, that they can make their land fertile; it is the benediction of God which governs all things.' … The poor man who, without consenting to 'torment' the land, waits until God comes to his aid, since He has promised to feed the birds of the sky, would be disobeying the great law of Scripture: 'Thou shalt not tempt the Lord thy God.' Does not reluctance to work mean 'trying beyond measure the power of God', as Calvin says? It is seeking to constrain the miracle [of productivity], whereas the miracle is granted daily to man as the gratuitous reward of his labor … [I]t is true that idleness is rebellion – the worst form of all, in a sense: it waits for nature to be generous as in the innocence of Eden, and seeks to constrain a Goodness to which man cannot lay claim since Adam.[33]

Forestry, like gardening and farming, has been pursued deontologically as an 'end-less' opportunity for virtuous labouring. As a labour of love, an avenue of redemption, the action has been seen as more important even than the outputs produced.

Furthermore, it is characteristic of Western life (in contrast to, say, Taoist practice) that evidence of *activity* is necessary to prove concerned engagement with any perceived situation. Once a problem is recognized (impending insect infestation let us say) it is imperative to *do* something about it. The Taoist notion that calculated inaction can be as powerful as action is usually anathema to Western praxis. In national parks for example, no kudos is given for just 'minding the store' or the ecosystem; rewards go to *improvers* who build visitor information centres or engineer rehabilitation of habitat. A corollary is that averters of crisis go unrecognized; recognition comes to those who react to crisis after it has occurred.

Labour's virtue accrues also from its characteristic as a Stoic self discipline. In this Stoic vein, concern for the simple necessities of life (food, fuel and clothing) is virtuous, while more than passing concern for luxuries is hedonistic even to the point of sinfulness. It is unsurprising that forestry, as a cultural construct of the early twentieth century, developed a distinct hierarchy of supposedly need-based concerns: timber for building, water for consumption and forage for livestock led by virtue of their characteristic as necessity.[34] As the century developed, it mattered little that people did not *need* 2,000 square-foot

homes, newspapers that weighed several pounds, irrigated lawns or T-bone steaks from any perspective of survival. Managing wildlife for hunting, and recreation as an economic activity had long been on the official books, but were slow to gain the attention of 'true-blooded' foresters. Maintaining habitat for fuzzy-feathered owls or other endangered species, unroaded watersheds for their sheer visual delight, and any number of other 'luxuries' never were truly embraced within the annals of traditional forestry.

For these reasons, I characterize traditional forestry as *Stoically* utilitarian. This banishes any lingering notion of the Epicurianism inherent in Bentham's *pleasure* maximization, keeps intact the utilitarian attribute of maximized utility production and infuses a deontological, or duty-oriented, element of hard work.[35] There is yet one more concept necessary for this characterization of ethics in traditional forestry: addition of the term *positivism.* This relates to forestry as science.

The philosopher of the Enlightenment David Hume provided the Western world with the foundation of empirical science when he explicated the impossibility of any a priori knowledge of physical being. Knowledge of the *real* world could be obtained by human beings only through sensory perception, and this sense-based data, operated on by the logical dictates of *reason* provided us with a powerful empirical science and technology. Unless one wished to invoke religion or extra-sensory perception, physical empiricism was logically undeniable. However, the dazzling achievements of technology (with all the appearance of magic) led some to regard science as a quasi-religion. Logical positivists, who started from a correct Humean premise, went on to believe that in reason (and its physically-oriented correlate, science) a locus of normative value could actually be found. In this, they ignored the essential disinterestedness of science (which posits cause and effect, or predicts likely outcomes without passing judgment) and the necessary disinterestedness of reason (which deals non-normatively with if-then propositions).[36] Indeed, in this disinterestedness of reason had lain a prime virtue of the Enlightenment: a key to release from monarchical or religious tyranny.

Reason, as Hume wrote in 1739, "is perfectly inert, and can never either prevent or produce any action or affection".[37] His famous dictum is: "Reason is and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them." Not wishing to soften the *hard stuff* of science with anything as potentially hedonistic as emotions or passions, the positivists chose to ignore Hume and view science as self-justifying (knowledge for the sake of knowledge, engineering in response to intellectual challenge, … *because it's there*). Employment was readily available from the utilitarians, who needed technology for achieving their telos, and positivist science was ready, willing and able to assist. The ultimate irony was the degree of passion with which positivists pursued dispassionate objectivity.

In forestry, this was not without consequence. Traditional forestry had a

clearly-defined telos: the establishment of regulated forests as described above. During that era, scientific positivism did not often conflict with forestry's *Stoic utilitarianism.* The positivists' "these trees *need* thinning" or "this herd *needs* culling" coincided nicely with the social goal. However, as soon as a clearly-defined telos disappeared with the advent of *new forestry*, positivism has been found standing naked in the open.[38]

THE ETHICS OF NEW FORESTRY

With no clearly defined social objective – timber production is a by-product of *new forestry* we are now often told, and *multiple use* never has been sufficiently well defined to make it function as a driving force – scientists have been quick to fill the void. Researching and managing the forest ecological system for maintenance of biodiversity and system stability is today's scientific interpretation of *new forestry*.

Admittedly, it is established that maintenance of biodiversity is conducive to the long-term health (and therefore *sustainablity*) of forested ecosystems. But to manage a forest for biodiversity is akin to devoting one's life entirely to fitness exercises. Presumably, we all wish to remain fit and well in order that we can *do* other things with our lives, or *enjoy* certain things, or carry out some perceived *duty*.[39] Admittedly too, there is benignity in managing a forest to keep it healthy; at least this is not destructive. But human nature abhors a vacuum, and those with other agendas will not stay away. People still want wood products and other commodities, people still want to recreate (some quietly and others noisily), people still wish to protect endangered species of flora and fauna, and people still find intense aesthetic and even spiritual value in the forested landscape. *New forestry* has not diminished these wants (resisting any temptation to write *needs*), and in some cases has probably increased them, by legitimizing diverse values in forestry. Responding to this expanded decision space demands that foresters formulate an expanded set of criteria for evaluating activities and forest conditions in light of an entire spectrum of forest-centred values.

An important metatext of new forestry speaks to the relationship between humans and nature. Unquestionably, the ascendent author on this topic for at least twenty years has been the wildlife biologist, forester, ecologist and ethicist, Aldo Leopold.[40] Leopold's *Sand County Almanac* and its chapter on *The Land Ethic* have been quoted so extensively by environmentalists seeking to inculcate new or rejuvenated nature-based values as to need almost no repetition. Five brief quotes from the book published in 1949, a year after his death, serve to recapitulate:

> The ordinary citizen today assumes science knows what makes the community clock tick; the scientist is equally sure that he does not. He knows that the biotic mechanism

> is so complex that its workings may never be fully understood.[41]
>
> An ethic may be regarded as a mode of guidance for meeting ecological situations so new or intricate, or involving such deferred reactions, that the path of social expediency is not discernable to the average individual … Ethics are possibly a kind of community instinct in-the-making.[42]
>
> Examine each question in terms of what is ethically and esthetically right, as well as what is economically expedient. *A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community.* It is wrong when it tends otherwise.[43]
>
> In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such.[44]
>
> A land ethic of course cannot prevent the alteration, management, and use of these 'resources,' but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state.[45]

Leopold's thesis is a sympathetic combination of Oriental humility and community-centring, with Romantic nature-love and transcendence of the teleological-deontological dichotomy.[46] His role for people within the land community, his acknowledgement of the need for man to use resources, in conjunction with the preservation of some 'natural' areas, call for a sympathetic engagement of humans with the natural world that is Romantic, in so far as it places humans *within the realm* of nature. As a scientist, Leopold respects the value of empirically-based scientific knowledge, while recognizing the abiding incompleteness of the same. In the interests of survival of the human species, he urges adoption of a conservative ethics- or rule-based cautiousness grounded in love for the land: for example, the first rule of intelligent tinkering, he tells us, is to keep all the pieces – which translates, among other things, to an emphasis on protection of habitat for endangered species. His goal is survival, but given an uncertain science, his means are closer to the deontological than the utilitarian. He despairs of finding sufficiency in economic incentives and urges, therefore, an ethic of conscience.[47]

Leopold's characterizing of ethics as "community instinct in-the-making" harks back to Hume, according to a view shared by authors as diverse as Baird Callicott and Frederic Hayek.[48] This view sees ethics as a cultural trait that can and should be cognitively and rhetorically encouraged in order that it may be 'selected for' in a Darwinian process of natural selection.[49] Callicott sees Leopold continuing a lineage from Hume via Darwin, and Hayek views culture as an evolutionary product which lies *between* instinct and reason.[50]

The fleshing out of Leopold's ethic in terms of *integrity, stability and beauty*

displays an interesting synthesis of science and aesthetics. For Leopold, natural biological systems organize themselves along increasingly complex lines which humans coincidentally (or sympathetically) find beautiful. This complexity also provides a degree of stability (defined as *resilience* or ability to recover from external disturbance)[51] that has become a cornerstone of *new forestry*. The naturally complex system has *integrity* (internal or self-referential wholeness) that we not only find beautiful, but which we destroy at our peril. The self-organizing nature of nature has found recent explication through the emerging science of *chaos*, with potential avenues for investigation using fractal geometry.[52] Hayek contends that human society is similarly self-organizing and credits Hume's contemporary, Adam Smith, with the early development of this notion.[53]

In Leopold's description of natural biological process we find clear compatibility with a view of life as a negentropic agent, organizing itself as a braking mechanism, slowing the inexorable progress of the Second Law of Thermodynamics. Describing the chronology of transmutation of an imaginary particle of matter, X, that eventually makes its way into an eagle's feather, Leopold continues:

> An Indian eventually inherited the eagle's plumes, and with them propitiated the Fates, whom he assumed had a special interest in Indians. It did not occur to him that they might be busy casting dice against gravity; that mice and men, soils and songs, might be merely ways to retard the march of atoms to the sea.[54]

Leopold's ecocentric holism links beauty with integrity and stability in an ethical trilogy. The aesthetic and the scientific have long been joined at a fundamental level: the criteria by which emerging scientific theories are judged admissible are aesthetic by nature.[55] The synchronicity of a stabilizing biological complexity and human-perceived beauty has potential for cutting through the uncertainties of ecology, finding practical application in the *land ethic* by identifying benign courses of action through their aesthetic appeal. Elegance has long been an aesthetic of mathematics, and biologist Edward Wilson has endorsed this synthetic of Leopoldian pragmatism, stating: "Mathematics and beauty are devices by which human beings get through life with the limited intellectual capacity inherited by the species."[56] According to Wilson, even physicists have been guided by beauty in their development of theory.[57] Aesthetics, then, along with ethics and even mathematics, are cultural constructs which have assisted humans in making strategic decisions in the face of an uncertain and ultimately unknowable future.[58]

New forestry is thoroughly Leopoldian. It comes to terms with nature neither by endorsing the Stoic utilitarian, traditionalists' disdain for the undeveloped natural world (and its concomitant desire for objectification of the future), nor by embracing a reactionary disdain for human intervention of any kind – a disdain often espoused by some misanthropic preservationists who have turned

Calvinism inside out and seek to prevent humans from any intercourse with nature. The Leopoldian position locates value in proper[59] functioning of biologic process and health of ecologic communities. In so doing, it avoids the arbitrariness of lines drawn within the animal rights movement, which seeks to extend a Kantian emphasis on individual rights to some uncertain point in the domain of living forms.[60] Instead, Leopold seeks to integrate the human with the natural in a context of *respect*, which I would describe as a call for aesthetic participation with nature, *whatever* we perceive nature to be.[61]

Having proposed that science deals with the realm of the *possible*, while ethics (like economics) circumscribes what is *prudent*, and that both make reference to the *beautiful*, it is appropriate to turn our attention to aesthetics and to criticism.

THE FOREST AS TEXT: AESTHETICS IN TRADITIONAL FORESTRY

As Ronald Hepburn acknowledged in 1968, "serious aesthetic concern with nature is today rather an unusual phenomenon."[62] He saw the challenge as one of developing a language and a discourse: "If we cannot find sensible-sounding language in which to describe them, experiences [of nature] are felt, in an embarrassed way, as off-the-map – and since off the map, seldom visited."[63] As the ship of criticism moves away from modernism, it is hopeful that this discourse will emerge. If Hutcheon is correct in asserting that "even nature … doesn't grow on trees", then nature can *only* be treated as text. And if the point be contested, nature emerges nonetheless as a focus of critical discourse.[64]

Forestry in the U.S. dates only to the 1890s, but the image of the forest primeval that colours much environmental discourse dates to the Romantic-Transcendentalist artists and writers of the mid-nineteenth century. The essentially secular sympathetic imagination of the English and European Romantics[65] became fused with the intuition of New England Transcendentalists, such as Emerson and Thoreau, to savour nature as a glimpse of Heaven on Earth. Without benefit of automobile, airplane or television, and with the bulk of the American populace concentrated on the east coast, the national image of the great American wilderness was forged by artists who travelled west, alone, with settlers or officially attached to companies of explorers. Cole, Bierstadt, Durand, Moran and others painted the forested landscape from the Hudson River to the Rocky Mountains in the glorious Romantic style.[66] Mountains soar towards the heavens in a blaze of golden sunsets; storm clouds boil across windswept prairies; cataracts tumble as if unleashed by Sophoclean Furies; trees twist and struggle to maintain rooting on precipitous rock-faces. (Despite the aura of naturalism, a viewer might be forgiven for imagining that Watteau could slip in at any moment to add a cherub or two.[67]) Wild animals graze the water's edge with antediluvian innocence, or raise antlers to the sun from rocky promontory, claiming royal domain over vast territories. If the landscape is peopled at all, it is with

Rousseauean noble savages,[68] minute Jeffersonian settlers dwarfed amidst a new-found Eden,[69] wagon-laden settlers on pilgrimage of manifest destiny,[70] or erudite aesthetes savoring the fine line of a meandering stream.[71]

Despite perpetuation of these Romantic images in writings of Sierra Club founder John Muir and their abiding symbolism in today's environmental movement, this view of the great Western wilderness began to wane toward the end of the nineteenth century. The Romantic aesthetic came to be associated with privilege, while the interests of the poor city dweller, settler, or homesteader were thought to be better represented by the utilitarian movement of social reform. The new view glorified labour over aesthetic participation; industry and the violence of industrial development over Arcadian languorous harmony. The proletarian became fashionable, as the aristocratic fell increasingly into disfavour. Consider, for example, this description of a garden in Utah published in an 1877 edition of *The Art Journal:*

> In some instances, the utilitarian element, being in the ascendant, has boldly brought the vegetable-garden forward into public notice. I like the sturdy self-assertion of those potatoes, cabbages, and string-beans. Why should they, the preservers of mankind, slink away into back-lots, behind a board fence, and leave the land-owner to be represented by a set of lazy bouncing-bets and stiff-mannered hollyhocks, who do nothing but prink and dawdle for a living.[72]

It was in this atmosphere of utilitarian ascendancy that Gifford Pinchot, American-born scion of French and English aristocratic stock, heeded his father's advice and became the first native U.S. forester. Returning in 1890, after brief forestry training in France, he set out to destroy the image of lumbering as forest devastation and to establish the practice of forestry as a sustainable and decidedly agricultural activity.[73] He encountered opposition on all sides: lumber and livestock men cried foul as he and the Federal administration moved to stem the uncontrolled exploitation of public forestlands; John Muir and the wilderness preservationists were equally incensed by his emphasis on development. Between 1891 and 1905 the system of National Forests was established, and, although many others were involved, most of the credit traditionally and rightfully goes to Pinchot and his close friend, President Theodore Roosevelt.[74]

Pinchot, always politically volatile, was dismissed by President Taft in 1910, but he fought on for decades, and his spirit has continued to energize the forestry profession since the outset.[75] *Conservation*, as he wrote in 1910, had three great principles:

> The first principle of conservation is development, the use of the natural resources now existing on this continent for the benefit of the people who live here now. There may be just as much waste in neglecting the development and use of certain natural resources as there is in their destruction.[76]

The second principle was the prevention of waste,[77] and the third was that

"natural resources must be developed and preserved for the benefit of the many, and not merely for the profit of a few".[78]

The birth of U.S. forestry coincided with an era of barely-challenged optimism regarding the ability of man to transcend his dependence on nature with the use of technology. Science became more firmly aligned with the positivism of technological development. This ascendency of technology was reflected in art and architecture, which rejected the Romantic in favour of the modern.[79] Industrial architecture was raised in glorification of labour,[80] and scientific application reached new heights with artists like pointillist Georges Seurat,[81] capping a period that Kenneth Clark has dubbed 'heroic materialism'.[82] Concern for anti-human excesses of the industrial revolution had begun with Romantics such as William Blake and Robert Burns, but Romanticism had escaped into pastoralism, while the cause of the oppressed had been taken up by hard-headed social reformers like Bentham, Engels, and Dickens.[83] It was this tradition that Pinchot sought to emulate.

As the twentieth century proceeded, modern art and architecture moved toward a geometric simplification, a proliferation of Euclidean forms, which accurately reflected industrial evolution and mechanization. This reached its zenith at the Bauhaus school of art, architecture and design in the Germany of the 1920s. The Cubism of pre-World War I Paris, the Constructivism of revolutionary Moscow, and related influential movements led to Bauhaus artists such as Moholy-Nagy, Kandinsky, Feininger, and Klee.[84]

The Bauhaus is perhaps best known for having given us modern architecture and furnishings. The ubiquitous offices and apartment blocks of simple rectangular glass prisms that are familiar to all came from the Bauhaus founder Walter Gropius, Mies van der Rohe, Le Corbusier, and colleagues; the matching rectangular metal and *formica*-style furniture came from Gropius, Breuer, and others. That the simplified forms of modernism frequently coincided with economies of production is perhaps due to its basing of form in functionality, allied with its essentially proletarian emphasis.

The Bauhaus' aim, true to the cause of Clark's 'heroic materialism', was thoroughly humanist. Bauhaus architect, Ludwig Hilberseimer designed cubic skyscraper cities which he envisioned as "a way out of the chaotic absence of order and the paralyzing effect on the individual of the vastness of the city".[85] Hilberseimer's city looks exactly like a series of huge match boxes arranged uniformly on graph paper squares.[86] Hans Wingler explains:

> He wanted to reduce the area covered by a building radically in favor of green areas, hence the possibility of communicating with nature… His guiding principle was always the idea that the city would again have to become an organism able to function, not just technically but also with consideration for the people living in it. In addition, he thought that one of the main tasks of the planner was to take precautions against the danger of the city deteriorating into slums.[87]

Today it is widely acknowledged that green rectangles of close-cropped grassy carpet bear little resemblance to nature, and that the very uniformity, predictability and monotony of these housing projects would likely lead to the very slum conditions that Hilberseimer was so anxious to avoid.[88]

When Hitler drove the Bauhaus out of Germany in 1933, it moved to a receptive Chicago and continued to flourish. Perhaps the greatest flowering of Bauhaus modernism occurred in the post-World War II United States. It was during this post-war period of rapid development that the U.S. Forest Service also came into its own as a supplier of timber and practitioner of modern forestry. Using Veterans Administration monies to build logging roads, harvests soared in the 1950s and 60s to levels ten times higher than pre-war figures, and the agency was finally able to achieve its utilitarian aspirations.[89] By around 1960 the American forestry paradigm was shared by public and private-sector foresters nationwide.

Given the ubiquitous acceptance of modernism – exemplified by the Bauhaus, its concentration on geometric simplification, its dictum that *form* should follow *function*, its utilitarian humanism and its often convenient economy of execution – it is hardly surprising that the modern forestry paradigm envisaged the ideal forest as a well-managed orchard. Forestry moved in the direction of establishing monocultures of even-aged trees, disease-, pest- and deformity-free, growing in lines, in stands with rectangular boundaries. The triumph of technology over nature's chaos was confidently expected, but the confidence was short-lived. Since the 1970s, public outcry at the superimposition of rectangular grids of clearcuts (along with a zig-zag pattern of logging roads) on the fractally-complex visual landscape of natural mountainsides has constituted the single greatest criticism of traditional forestry.[90]

Although Pinchot started out by advocating selection logging and the Forest Service did not rely heavily on clearcutting before World War II, Pinchot had set the modernist stage in 1910 when he wrote: "Today we understand that forest fires are wholly within the control of men… The first duty of the human race is to control the earth it lives upon."[91] He instituted a very effective program of fire suppression in U.S. forests. Today, forest ecologists spend considerable time explaining to everyone else how this preoccupation with fire suppression has led to dangerous fuel buildups, stagnated trees, and associated problems with insects and disease. Reinstituting the natural role of fire in U.S. forests is a prime focus of *new forestry*. If there is one difference more than any other, that separates the modern from the postmodern, it is surely the debunking of Hilbersheimer's notion that *order*, in the form of Euclidean geometric simplification, is harmonious (whether for humans or in nature), and the concomitant acceptance that harmony is much more likely to be associated with *complexity*.[92]

For over twenty years now, there has been popular dissent over traditional forestry's apparent absence of aesthetic concern. Surprisingly perhaps, U.S. forestry did not start out this way. In the folklore of American forestry, Pinchot's

first success on returning from France in 1890 was to prove the validity of agronomic forestry on the grounds of the Vanderbilt Estate at Biltmore, North Carolina: from this heroic achievement, his rise to fame began. While Pinchot's accomplishments were substantial, the major work of laying out Biltmore was in fact performed by the aging Frederick Law Olmsted, Senior.

Olmsted was the renowned originator and grand master of American landscape architecture. His first achievement had been Central Park in New York city. If Pinchot had been old enough to witness this project,[93] he would undoubtedly have approved: bringing refreshing air and greenery to the trapped masses of an urban desert was certainly beneficial social reform.

At the end of a distinguished career, Olmsted embarked upon the Biltmore project.[94] Three years later, a young friend of Olmsted's distant cousin was sent to see him by the young man's father, James Pinchot. The enthusiastic Gifford was there to sell Olmsted on the idea of trying out *forestry* at Biltmore. Olmsted needed little convincing since he had reached this conclusion several months earlier,[95] but he was unimpressed by Gifford's approach which lacked specificity.[96] He sent him packing, with instructions not to return unless he had a proper plan.

Pinchot set to work immediately and produced a detailed plan. The goal, he wrote, was to "prove selective cutting of mature trees can improve timberland, and at the same time provide a long-range steady income from lumbering".[97] Olmsted hired Pinchot in December as Forester for Biltmore, where he would later adopt the silvicultural practices first tried out by Olmsted in California – tree thinning (in 1886[98]), and tree planting (in 1888[99]). Gifford launched his illustrious career while Olmsted, in failing mind and health, lost control of the Biltmore project in 1895.[100] From this point on, the sympathetic congruency of aesthetics with forestry dissolved rapidly, as the Romantic ideals of Olmsted gave way to the utilitarian pragmatism of Pinchot and other founders of American forestry.[101]

Throughout his life, Olmsted had infused his work with an intense passion for *cultivating* the beautiful.[102] He wrote:

> What artist so noble as he who, with far-reaching conception of beauty and designing power, sketches the outlines, writes the colors, and directs the shadows of a picture so great that Nature shall be employed upon it for generations, before the work he has arranged for her shall realize his intentions.[103]

Elsewhere, Olmsted opined that "inability to appreciate the value of artistic training is the essence of vulgarity".[104] His interest in landscape aesthetics was not especially elitist; his career was devoted to improving the aesthetic lot of all people. Expressing his Romantic naturalism, he railed against the formalism of France and Italy, preferring to find beauty "in commonplace and peasant conditions".[105] But, with utilitarianism's displacement of Romanticism, as Olmsted's biographer summarized, "popular interest in the role that landscape architecture might play in directing and civilizing America's physical development was lacking".[106]

It remained lacking until around 1970, when popular revolt against the 'mangy-dog' appearance of spasmodically clearcut hillsides erupted from Montana to West Virginia, from Wyoming to Alaska. For two decades now, the public has been sensitized to aesthetic concerns in the forest; given a lack of language and an almost complete absence of decision-making criteria that embody aesthetic considerations, however, its vocalized concerns have focused on instrumental values such as endangered species or water pollution.

Postmodernist critic Jean Baudrillard has blamed Bauhaus modernism for an annihilation of aesthetics:

> In fact, aesthetics in the modern sense of the term no longer has anything to do with the categories of beauty and ugliness… Contemporary aesthetics, once the theory of forms of beauty, has become the theory of a generalized compatibility of signs, of their internal coherence (signifier-signified) and of their syntax. Aesthetic value … simply translates the fact that its elements *communicate* amongst themselves according to the economy of a model, with maximal integration and minimal loss of information… This aesthetic order is a cold order. Functional perfection exercises a cold seduction, the functional satisfaction of a demonstration and an algebra. It has nothing to do with pleasure, with beauty (or horror), whose nature is conversely to rescue us from the demands of rationality…"[107]

Although the Forest Service has employed landscape architects for two decades now, they appear to have been rather ineffective in the public eye. Perhaps they adopted a cold, functional, modernist aesthetic that the public found unfitting to the natural landscape. More recently, foresters shifted from a proud stance of "as long as we are practicing good scientific forestry, we have nothing to hide" (aesthetic of functionalism), to defensive attempts to mask management activities whenever possible. Use of visual buffer strips and other simulations maybe represents a transitional state, a *late* or *high* modernism.[108]

TOWARD AN AESTHETIC OF *NEW FORESTRY*

An examination of articles in the *Journal of Forestry* reveals that, coincident with the birth of *new forestry* about three years ago, there was a broadening of forestry literature to embrace ethics and emotions. One headline asked "Can Foresters Romance a Land Ethic?" and a two-part article examined forests as they were portrayed by the Romantic Transcendentalist artists of the nineteenth century.[109] This would have been unimaginable in the *Journal* five years earlier.

Aldo Leopold had wished for the end of modernism in forestry as far back as the 1940s. Using the gardening analogy, he referred to what he called the *A-B Cleavage:*

> In my own field, forestry, group A is quite content to grow trees like cabbages, with

> cellulose as the basic forest commodity. It feels no inhibition against violence, its ideology is agronomic. Group B, on the other hand sees forestry as fundamentally different from agronomy because it employs natural species, and manages a natural environment rather than creating an artificial one. To my mind, Group B feels the stirrings of an ecological conscience.[110]

And Baird Callicott comments:

> Leopold's land *ethic* is yet another set of rules or limitations. It calls for obligation, self-sacrifice, and restraint and thus could be unappealing… [Leopold's] land *aesthetic*, on the other hand, might be more palatable since it emphasizes [sensual] assets and rewards.[111]

However, Leopold's popularity arises neither from the prohibitions of his land ethic nor from any particular insights in his expository chapter on aesthetics. Throughout the bulk of the *Almanac* Leopold relies on the poetry of his prose and the constructive use of rhetoric. He appeals to a Romantic sympathetic imagination; his calls to reason do not deny this Romanticism (grounded as that is in the early Enlightenment[112]), but his unprecedented popularity among environmentalists lies, I am convinced, in his command of language. His implicit acceptance of ecology as *discourse* reveals an innate postmodernism.

New forestry is in the throes of defining a new lexicon, assigning signification to new signs. Foresters, like all other human beings, are language-based creatures, and the words chosen for use will have profound effect on the praxis and, thence, on the forest itself. Ever since Heisenberg revealed the uncertainty principle in physics,[113] the essential Humean truth has become harder to ignore: that all inquiry pertains not to any pure objectification of form, but to a discursive relationship between observer and observed. Nature is then reopened to the possibility of the 'religious, magical, symbolic' as Baudrillard would have it,[114] or to restoration of 'compleat garden' from its modernist reduction as 'map'.[115]

If the language of traditional forestry has been starkly modernist, there have been exceptions: for example, in the area of wilderness management.[116] Society has made explicit aesthetic choices about the style of *gardening* that is admissible in legally protected wilderness areas.[117] I call this *romantic rusticism.* For trail maintenance, the Forest Service allows the use of double-buck hand saws, pack horses and dynamite. Structures such as log bridges and wooden signs are acceptable. We have had few aesthetic qualms about accepting the rustic technology of the nineteenth century, despite the logical arbitrariness of this decision. Technology that was foreign to the wilderness primeval, that arrived only with white settlers, is acceptable because our cultural notion of wilderness was forged by the Romantic artists of the mid-nineteenth century, as explained above. Implicitly at least, we have long recognized that wilderness is text.

Returning to the forest at large, the function of *planning*, concentrating as it does on rational *design*, is an essentially modernist activity.[118] However, if one

broadens planning from a strictly reductionist calculus, to embrace the emotional intent of designers like Olmsted, it can yet escape the cold modernist fold. Today's planning technology centers around computer-based Geographic Information Systems (GIS). As little more than electronic means for drawing maps and displaying complex spatial information, this technology is infinitely more flexible and open-ended than the earlier generation of 'black box' optimization models used in forest planning.[119] Indeed, an early proponent of the conceptual system embodied in GIS, Ian McHarg, displayed a thoroughly anti-modern, Romantic notion of landscape planning.[120]

Many important questions in *new forestry* have yet to be addressed. For example, biodiversity and complexity have been identified as desirable attributes for maintaining system stability. Stability, in turn, has been equated with resilience (the ability to 'bounce back' or recover from disturbance). That the relationship is not always this simple has been pointed out by Mary Clark: ecosystem integrity and function can depend more on the survival of a few *key* species than on a simple proliferation of diversity *per se*.[121] Despite avowed interest in resilience, it remains true that ecologists are as concerned as the general public with protecting the *delicate* and the *fragile* in the forest. A dilemma arises, since a resilient system cannot depend on the survival of fragile or delicate elements. Concentration on ecosystem resilience will not by itself protect the delicate: the most resilient system might be one that is weed-infested and devoid of anything fragile.[122]

In terms of aesthetics, complexity has been linked to level of interest,[123] and according to Hepburn, "we know also that in all aesthetic experience it is contextual complexity that, more than any other single factor, makes possible the minute discrimination of emotional qualities; and such discrimination is accorded high aesthetic value."[124] Sheer complexity and associated high level of interest, however, do not sufficiently account for aesthetic appeal. There is often need for some particular unique characteristic, focal point, or disequilibriating feature to make an image come alive.[125] The post-glacial landscape of Scotland and other places used to be scattered with *rocking stones* – large boulders perched precariously so that a finger's touch might gently tip and rock several tons of stone. Although they endured for millennia after the ice retreated, few have survived vandalism of the past century. Shoved down the hillside, these boulders now enjoy a more stable and safer resting place, and ecosystem impact has doubtless been minimal; yet, few would deny that interesting and beautiful phenomena have been destroyed.

The importance of fragile, delicate elements might be to represent a system in unstable rather than stable equilibrium, as symbolized, say, by a bottle balanced on its top, or a rocking stone. Safety-oriented stability maximization ignores the aesthetic exquisiteness of systems maintained in unstable or dynamic equilibrium.[126]

Maybe postmodernism can come to the aid of *new forestry* in this regard:

Among the principles of postmodernism laid out by Charles Jencks (who roots postmodernism in architecture and art) we find the concept of the 'difficult whole', the paradox of 'unfinished wholes' or 'fragmented unity', and acceptance of dynamic evolution.[127] Other principles of Jencks which might pertain include: cultural and political pluralism, balance (or 'urbane urbanism'), 'Anamnesis' (which for Jencks is *acceptance* of history and historical continua), 'divergent signification' (which allows 'multiple readings' through 'enigmatic allegory'), and new stylistic formulae which accommodate "paradox, oxymoron, ambiguity, double-coding, disharmonious harmony, amplification, complexity and contradiction".[128] The postmodern aesthetic is unlike any before in that it is not continuous with modernism and Romanticism; it is fragmented and non-utopian, questioning and ironic, yet optimistic. In total, as Jencks states, in "the age of eclecticism, we have the freedom to *choose."*

It is in designing environments for exercise of choice that the role of the architect again enters. Certainly there is an aesthetic of architectural praxis, but, intimately linked to this, there is also an aesthetic of *participation in* the physical environment, whether urban or rural. At least one forester, Bill Ticknor has pointed out that architecture provides an appropriate role model for *new forestry*,[129] and the pre-eminent U.S. silviculturalist, David Smith, recently remarked that "silviculturalists manipulating stands of vegetation are like artists painting pictures".[130] Since 1971 or earlier, the Society of American Foresters has defined forestry as both art and science,[131] and fuller acknowledgement of the artistic side of forestry would assist in bridging the rift between arts and science first highlighted by C.P. Snow.[132]

In closing, my aim has not been to develop a cohesive aesthetic of *new forestry*, but rather to suggest that the utilitarians threw out the baby with the bath-water when they so utterly rejected the Romantic-Transcendentalist aesthetic. However, I am not for a moment suggesting that we should set the clock back to the days of Romanticism. Where modernism and modernist forestry repudiated its Romantic past, *new forestry* would be better advised to acknowledge the lingering relevance of its modernist predecessor, which, as Jencks has suggested, is a postmodern trait.

Gardening has developed as a language in the west since mediaeval times.[133] Where modernist forestry has valued only one kind of gardening – utilitarian vegetable gardening – gardening has in fact an entire spectrum of genres. There is nothing *wrong* with vegetable gardening; it is simply not the *only* form of gardening. From the vegetable garden to the orchard; from the tennis court to the lawn; from the formal gardens of Versailles to the informality of an English cottage garden; from the wild mystery of the wilderness garden to the tranquil mystery of a Japanese Zen garden; from the water-lilied pools of Monet to the fast-flowing streams of the mountains … And so on.

Postmoderism intends not to debunk modernism but to transcend it; not to replace one narrow aesthetic with another, but to accept the past, to retain as

much of the modern as we desire, and to reacquaint ourselves with classical, Romantic and other pre-modern conditions. It is not necessary for *new forestry* to emasculate either traditional forestry or wilderness management. Tree farms can continue to play a primary role in commodity production, just as we still need farms, factories and vegetable gardens. Wilderness, as the minimally-managed nexus to the untamable *wild* is still important as a referent of the human condition. Rather than eradicating these polar opposites, *new forestry* offers the opportunity to flesh out an entire spectrum of 'gardening' styles in between.

The bulk of public forestlands will likely remain neither wilderness nor tree farm. Instead they will be managed eclectically, in accordance with specific conditions and desires. This will require tolerance. Just as we do not expect ourselves, as individuals, to like every piece of art that is produced, we should not expect to like personally every acre of forest.

Traditional forestry avoided aesthetics in part because it was thought to be a chaotic morass, a Hobbesian no-man's-land in which taste is entirely unpredictable. (The commercial world has long known this to be untrue.) This viewpoint arose within a scientific positivism that deemed literary and artistic criticism inadmissible. Aesthetics is a cultural construct that is properly a subject of education and academic investigation; it is no less and no more *real* than science. If *new forestry* is to succeed, I believe, it must acknowledge the natural as cultural, and in doing this, it might find the established discourse of criticism as helpful as the science of ecology.

Perhaps Linda Hutcheon was right, that even nature doesn't grow on trees; or maybe Steinbeck was closer when he wrote in *The Log From The Sea Of Cortez:*

> We were curious. Our curiosity was not limited, but was as wide and horizonless as that of Darwin or Agassiz or Linnaeus or Pliny. We wanted to see everything our eyes would accommodate, to think what we could, and out of our seeing and thinking, to build some kind of structure in modelled imitation of the observed reality. We knew that what we would see and record and construct would be warped, as all knowledge patterns are warped, first by the collective pressure and stream of our time and race, second by the thrust of our individual personalities. But knowing this, we might not fall into too many holes – we might maintain some balance between our warp and the separate thing, the external reality.

Not falling into 'too many holes' is what *new forestry* is all about.

NOTES

An early version of this paper was presented at the *Mansfield Forum,* The Mike and Maureen Mansfield Center, University of Montana, March 31, 1992.

[1] Franklin, 1989.

[2] For example Atkinson, 1990.

[3] The implicit allusion to Canada is by intention. At least British Columbia, which is a part of the Western Forestry Conservation Association, seems to be affected by the *new forestry* movement.

[4] *New perspectives* is described by Salwasser, 1990. Technically, Franklin's *new forestry* relates specifically to a new approach to silviculture, while Salwasser's *new perspectives* is the more general term that refers to a new philosophy of forest praxis – one that could mix *new forestry* with more traditional methods. However, as so frequently happens, popular usage has taken to *new forestry* as the general epithet; I shall follow the popular lead. A Forest Service Northern Region pamphlet (R1-92-11) calls *New Perspectives* "a philosophical approach", and cites four principles: three of these are not new (public participation, integrated management and scientific collaboration); the fourth states: "We must *sustain* ecological systems to maintain the land's resilience and productivity, and to produce desired resource uses and values over time. Our activities must be environmentally sensitive and aesthetically acceptable." A similar publication from the Siskiyou National Forest in Oregon stresses "biological diversity", Aldo Leopold and "ethical land stewardship", and "mimicking nature's change-and-renewal cycle".

[5] Since writing the first draft of this paper, the term *new forestry* has evolved once again, and is now known as *ecosystem management.* In summer, 1992, this became official Forest Service policy. (USDA Forest Service, 1992. See also memos from Forest Service Chief Dale F. Robertson to Regional Foresters and Station Directors, June 4 and 26, 1992, on "Ecosystem Management" with attachments.)

[6] Specifically, I would cite Western Forest Economists' Annual Meeting, Wemme OR, May 1990; Western Forestry Conservation Association Annual Meeting, Coeur D'Alene ID, December 1990; Montana Society of American Foresters Annual Meeting, Missoula MT, March 1991; U.S. Forest Service Northern Region *New Perspectives* Workshop, Missoula MT, October 1991; Wilderness Society *Defining Sustainable Forestry* Workshop, Washington D.C., January 1992; Western Forestry Conservation Association *Seeking Common Ground* Conference, Portland OR, February, 1992; and the Montana State Meeting of the Society of American Foresters, Kalispell MT, March 1992.

[7] More completely, the regulated forest has timber stands arrayed in a succession of age classes from the youngest up to harvestable age in such a way that "an approximately equal annual or periodic yield of products of desired size and quality may be obtained" (Davis, 1966). A simple model is to imagine the forest as a chess board. Each square contains a stand of a different age, with every age represented from one to 64 years. Each year, the oldest square would be logged and new trees regenerated, ad infinitum.

[8] German-born and educated Bernhard Fernow is credited with the birth of forestry and forestry education in the U.S. (Robbins 1982). He was appointed head of the Division of Forestry in the U.S. Department of Agriculture in 1886, a post which passed to Gifford Pinchot when Fernow resigned to start the nation's first U.S. university-based school of forestry at Cornell, New York in 1898. The system of national forest reserves had begun in 1891, but their management did not come under the auspices of the Department of Agriculture until Pinchot and President Theodore Roosevelt together brought this about in 1905.

[9] 'Forest regulation' has been a mainstay class in every forestry school for most of this century. Essentially, the task was to calculate optimal timber harvest age, optimal cultural practices and maximum cutting rates so as to stabilize timber production at the highest rate that could be indefinitely maintained (sustained yield).

[10] Richard Alston alluded to this notion of sustainability shifting from *flow* to *stock* at the

Wilderness Society *Defining Sustainable Forestry* Workshop, Washington D.C., January 1992.

[11] Jameson, 1991, xiv.

[12] It is tempting to suggest a new ideal derived from the Second Law of Thermodynamics: that the optimal ecosystem is that which minimizes the production of entropy. Although this notion has been gaining ground in theoretical biology (for example, Brooks and Wiley 1988), it has not yet made headway in forestry. If it is shown that natural systems evolve so as to minimize entropy production, then it would still be necessary to show that humans should emulate nature in this regard, although a strong case could probably be made in that direction.

[13] Jencks, 1987, 346. A current preponderance of endings is reflected in recent titles from *The End of History* to *The End of Nature*, including an environmental video called *Evolution's End.* This itself is a postmodern phenomenon (Jameson, 1991).

[14] Jencks, 1987, 346-349.

[15] Hutcheon, 1989, 2.

[16] Reviewing one hundred years of forestry literature, one marvels at the rapidly changing perspective. Stands of trees that take centuries to mature physically nevertheless undergo astounding transformation in the way they are *seen* by foresters and other people every decade or so. See Raup, 1979.

[17] An incomplete, but nonetheless significant, insight was offered in a Journal of Forestry editorial:

> "The problem comes in seeking values from science. Because science is not a religion, but rather a technique for attempting to understand cause-and-effect relationships, it can only predict outcomes from specified actions. It cannot tell us whether the results are desirable or not." (Baird, 1991).

The incompleteness lies in thinking that only religion can be a source of value. Value can also arise in the market place (economics), in individual passions (as discussed in relation to David Hume), or collectively in culture as in, say, aesthetics.

[18] Society of American Foresters' Committee on Ethics, 1991.

[19] An overwhelming proportion of people's income in the U.S., I would maintain, is spent satisfying what are essentially aesthetic (sensual) desires, from choice of clothes to automobiles, food, entertainment, lifestyle and location. A bowl of rice and some cardboard or plastic sheets would keep us alive, as the homeless or refugees could attest. Obviously, aesthetics is more than the foresters' notion of scenery.

[20] Locating *new forestry* (along with Leopold) in the postmodern implies compatibility with an ecofeminist view of intersubjectivity or reciprocity of relationship between humans and nature. In this vein, while forest *management* connotes a dominating hand (Latin, manus) of man lording itself over nature, stewardship (Old English, sty-ward) is increasingly offered as a more reverential alternative expressing care and husbandry. However the paternalism inherent in stewardship has brought this word also under attack, as for example in Rowe,1990. Similarly the possessive (as in 'the public and *its* forests') might offend some 'Earth Firsters' and ecocentric holists who express an anti-anthropocentrism and oppose the very notion of land ownership. The existence of such criticism displays the discursive nature of forestry.

[21] It could be called simply *U.S. forestry* since there has been no other enduring forestry paradigm in the U.S.; Atkinson (1992) calls it *traditional forestry* to distinguish it from *new forestry*, a practice which I adopt here, although I would be equally inclined to call it *modern forestry*, since its development peaked in the post World War II era and represented, I maintain, an application of high modernist thinking in the arena of forest

management.

[22] Pinchot used this clause in several places, including the letter that he wrote to himself for his supervisor's signature when he became first chief of the Forest Service in 1905 (U.S. Government, 1978, 138-139).

[23] Lockridge, 1989, 130.

[24] Pinchot was an ardent supporter of Theodore Roosevelt's *new progressivism.*

[25] Lockridge, 1989, 130.

[26] Lockridge, 1989, 141.

[27] The necessity for and difficulty of *measurement* (particularly on a common scale) to facilitate the goal of maximization is a particular weakness of utilitarianism and of its contemporary offshoot, 'benefit-cost analysis'. (Wenz, 1988).

[28] Clary, 1986.

[29] The Multiple Use-Sustained Yield Act was passed at the Forest Service's behest in 1960.

[30] The willingness-to-pay concept values goods and amenities for which little or no price is actually charged in the market. Various methodologies exist for assigning dollar values, such as the 'travel cost method' and the 'contingent valuation method'. Validity is still controversial, and the Forest Service is considering dropping this approach to planning.

[31] For example, Duerr et al., 1979.

[32] The FORPLAN computer model (Barber and Rodman, 1990), which was the core analytical tool in Forest Service planning, used an objective function of maximizing discounted 'net public benefit'.

[33] Foucault, 1965, 55-56. The reference to the winning of fruit from the land only by "force and continual labor" (which Foucault cites to Bossuet) illustrates the now-criticized notion of the land as 'niggardly' and in need of domination by the hand of man. Other critiques of the condemnation of idleness by Western society, and its connection to commerce and colonialism are found in Russell,1932, and Coetzee,1988.

[34] Even while espousing concern for beauty, biodiversity and ecosystem complexity, the Forest Service continues to cling to it language of need; for example "ecosystem management … is a means we will use to meet society's *needs* …" (Chief Robertson's memo of June 26, 1992, p. 2. See note 5 above.)

[35] Fernow also wanted *every acre* to do its *duty*.

[36] An interesting critique of logical positivism is found in Russell (1956).

[37] Hume, 1978, 458.

[38] For example, and despite occasional disclaimers, the Forest Service in its draft Charter for Wilderness Management (October, 1992) clearly views wilderness problems as essentially scientific in nature.

[39] Conceivably, one might so enjoy fitness exercises as to decide that is all one wants to do, but that at least would be for *pleasure* and not the tautology of staying well for wellness' sake.

[40] See generally Nash, 1989.

[41] Leopold, 1970, 240-241. The woeful lack of knowledge of ecosystem complexity was iterated in 1974 (Farnworth and Golley, 1974, 145) and reiterated recently (Atkinson, 1992). It was a topic for several speakers at the Wilderness Society's *Defining Sustainable Forestry* Workshop, Washington D.C., January 1992. We can be confident of the sustainability of this theme.

[42] Leopold, 1970, 239.

[43] Leopold, 1970, 262.

[44] Leopold, 1970, 240.

[45] Leopold, 1970, 240.
[46] For a discourse on the ethics of Romanticism see Lockridge, 1989, generally, and for the argument that Romanticism synthesizes the teleological with the deontological, see particularly p. 149.
[47] In this, Leopold differs from some (for example, Wilson, 1984, 131) who share his aims but place greater faith in society's ability to invent contractual mechanisms for individualizing the collective good (to capitalize on Adam Smith's 'guiding hand of providence', which purportedly brings together the goal of society with that of the individual).
[48] Callicott (1989) is an American environmental philosopher who has attempted to formalize the philosophical basis of Leopold (who was writing as an ecologist and concerned citizen rather than from a position of formal philosophy). Hayek (1989) was a libertarian Austrian economist and Nobel laureate. Callicott and Hayek both trace Darwin to Hume and ground ethics in culture.
[49] Ethics then is a species survival mechanism of humans, no different than, say, the turtle's shell or the leopard's speed.
[50] Hayek argues that the simple dichotomy of *nature* (the physical, instinctual) and *artifice* (product of human cognition and design) is overly restrictive. Culture, he argues, arises within a slow process of tradition – an evolutionary dialectic, although not Hayek's words – that transcends the dichotomy and is profoundly important in affecting human economic organization.
[51] This notion of stability as resilience is generally accepted today and has been attributed to ecologist E.P. Odum (Farnworth and Golley,1974, 124).
[52] The fractal mathematics of natural systems has been developed by Mandelbrot, 1983. For an example application in forestry, see Zeide and Pfeifer, 1991.
[53] Hayek, 1989. Charles Peirce's synechism is also pertinent to this notion.
[54] Leopold, 1970, 113. See also note 12.
[55] These criteria (or *virtues*) of the scientific method include *conservatism, modesty, simplicity* and *generality* (Wenz, 1988, 261-262).
[56] Wilson, 1984, 61. Wilson is comfortable with the synthetic basis of beauty: "Elegance is more a product of the human mind than of external reality" (p. 60).
[57] Wilson stated: "To a considerable degree science consists in originating the maximum amount of information with the minimum expenditure of energy [a clearly negentropic notion]. Beauty is the cleanness of line in such formulations, along with symmetry, surprise, and congruence with prevailing beliefs. This widely accepted definition is why P.A.M. Dirac, after working out the behavior of electrons, could say that physical theories with some physical beauty are also the ones most likely to be correct, and why Hermann Weyl, the perfecter of quantum and relativity theory, made an even franker confession: 'My work always tried to unite the true with the beautiful; but when I had to choose one or the other, I usually chose the beautiful.'" (Wilson, 1984, 60-61).
[58] For an excellent treatment of uncertainty, see Malte Faber et al., "Humankind and the Environment: An Anatomy of Surprise and Ignorance," *Environmental Values* **1**(3): 217-41, 1992.
[59] The Wittgensteinian identification of the *proper* (correct) with the *aesthetic* is perhaps appropriate in this context.
[60] This criticism of the animal rights movement is not intended to extend to the essentially utilitarian theorists (such as Peter Singer) who follow in Bentham's footsteps. Bentham included all sentient creatures in his concern for reduced suffering, but thoroughly disparaged the notion of natural rights (Wenz, 1988).
[61] Consistent with Hume, the objectification of nature cannot escape the subjective sphere.

[62] Hepburn, 1968, 49.
[63] Hepburn, 1968, 50.
[64] This view is shared in biological science by Wilson for example (1984), who praises the role of the critic (p. 58) and sees cultural discourse as a biological entity: "The mind is biologically prone to discursive communication that expands thought." (p. 74) "Culture in turn is a product of the mind, which can be interpreted as an image-making machine that recreates the outside world through symbols arranged into maps and stories." (p. 101)
[65] Lockridge, 1989.
[66] Tyler 1983.
[67] As, for example, in Watteau's *The Pilgrimage to Cythera* (Clark, 1969, 232-6).
[68] For example, Paul Kane's *Falls at Colville* (c. 1848).
[69] For example, Thomas Cole's *Genesee Scenery (Mountain Landscape with Waterfall)*, 1847.
[70] For example, Albert Bierstadt's *Emigrants crossing the Plains*, 1867.
[71] For example, Asher Durand's *Kindred Spirits*, 1849.
[72] Woodward, 1877, 165, quoting Fitzhugh Ludlow.
[73] McGeary, 1960, 23.
[74] A debate arose recently over the relative importance of Fernow and Pinchot (Twight, 1990, Miller, 1991).
[75] Pinchot headed a Society of American Foresters committee investigating 'Forest Devastation' in 1919 (Pinchot 1919), and in 1937 he fought to keep National Forests under control of the Department of Agriculture on the grounds that trees are first and foremost an agricultural crop (Pinchot, 1937). See also Heinrich, 1985.
[76] Pinchot, 1967, 43.
[77] Still today, salvage logging of dead trees can sometimes *only* be justified on the basis of preventing waste.
[78] Pinchot, 1967, 46. Pinchot wrote speeches for Roosevelt, fighting the trusts and conglomerates of capitalism, advocating first 'New Nationalism' and then Bull Moose Progressiveism (McGeary, 1960, 192-215). In any other country Pinchot's politics would have been identified with state-controlled socialism. See also note 101.
[79] If impressionism formed the transition in Europe, an organicism represented by, say Frank Lloyd Wright, perhaps better represented the American transition. The influence of Wright on the earlier work of Bauhaus founder, Walter Gropius is evident in the 'Summerfield House'. See Wingler, 1978, 224-225 and 239. See also Silverman, 1990, 4.
[80] Wingler, 1978, 226.
[81] Britt, 1989.
[82] Clark, 1969, Chapter 13.
[83] Clark, 1969, 327. Silverman (1990, 5) states: "Surely Hegel, Marx, Mill, and Comte are also modern – but they are modern with a twist, or several twists. Dialectic, the utilitarian principle, and positivism give a new look to Kantian critical philosophy."
[84] See generally, Wingler, 1978 and Britt, 1989. The Bauhaus mechanization of the human form, marrying the body with the machine, can be traced to origins as diverse as the cotton mill, the slave ship (Clark, 1969, 323) and Bentham's design for the ideal prison (Foucault, 1979). This synthesis flourished, particularly in modern dance (Wingler, 1978, especially p. 367, also Clair, 1991) and was reflected more recently in the popularity of children's *transformer* toys for example. Where Romantics shunned the machine, moderns embraced it to the point of emulation.
[85] Wingler, 1978, 496.

[86] Wingler, 1978, 497.
[87] Wingler, 1978, 496.
[88] The recent film *Straight Out of Brooklin* comes to mind.
[89] Wilkinson and Anderson, 1987.
[90] As late as the 1970s, fisheries biologists shared with foresters their passion for landscape simplification. They cleared streams, channelized and straightened them, believing this would improve fish habitat, while ignoring their own intuition which took them to complex streams and log-trapped pools when catching fish for recreation. (James Sedell, Research Ecologist for U.S. Forest Service PNW Research Station, Corvallis, Oregon, speaking at Western Forestry Conservation Association *Seeking Common Ground* Conference, Portland OR, February 25, 1992).
[91] Pinchot, 1967, 45.
[92] Again, the development of fractal geometry comes to mind, with Mandelbrot's finding that Euclidean dimensions are just special cases along an infinitely-divisible spectrum of fractal dimension (Mandelbrot, 1983). Also Francis Hutcheson's theory that beauty and harmony arise from direct (inner) sense perception of 'uniformity amidst variety' (Hutcheson, 1725, 15-18).
[93] Pinchot was born in 1865, two years after completion of Central Park (McGeary, 1960, 7, and Fabos et al., 1968, 3).
[94] Roper, 1973, 406.
[95] In January,1891, Olmsted recommended to Vanderbilt that, since the soils were poor and the trees had been logged "until nothing remained but runts and ruins and saplings," the best disposition of the majority of the acquired property would be as a European-style forest, this being "a hunting preserve for game, mainly with a view to crops of timber" (Roper, 1973, 415).
[96] White, 1957, 82.
[97] White, 1957, 84.
[98] Roper, 1973, 410.
[99] Roper, 1973, 412.
[100] Roper, 1973, 469-474.
[101] Olmsted has been described both as a Romantic engineer (Fabos et al., 1968, 10) and as a 'Utopian Socialist' – referring to a movement quite popular among some of New York's social and literary elite. (Fein, 1972, 16). Pinchot's own sympathy with the underdog is displayed in his description of Biltmore House as a "magnificent chateau … But in the United States of the nineteenth century and among the one-room cabins of the Appalachian mountaineers, it did not belong. The contrast was a devastating commentary on the injustice of concentrated wealth." (Fein, 1972, 13.)
[102] Roper, 1973, 421-422.
[103] This thoroughly Romantic quotation appears in Fabos, et al., 1968, 15.
[104] Roper, 1973, 460.
[105] Roper, 1973, 433, 464.
[106] Roper, 1973, 475. In August,1885 (Fein, 1972, caption 28 and p. 151), when Olmsted's memory was failing and he was losing control of affairs (Roper, 1973, 469), he wrote a letter to the Biltmore horticulturalist, Warren Manning (with whom Pinchot and others had been having trouble – Roper, 1973, 465) in which he most uncharacteristically stated: "I want you to recognize… that the ruling interest of the estate is not … agricultural; it is not landscape gardening; it is simply *industrial forestry;* the management of trees with reference to commercial profit." (Fein, 1972, caption 28.) Two months later, Olmsted felt that he had been set aside by his partners and had been betrayed in a business coup (Roper,

1973, 469).
[107] Baudrillard, 1981, 188. See also, Hepburn, 1968, 49.
[108] Jencks, 1987, 230-233, and 327. 'High' modernism is seen, for example, in the 'clothes hanger' pediment of the AT&T Headquarters in Manhattan or the garland-festooned walls of the Public Services Building in Portland.
[109] Baird, 1991, McGrath , 1991.
[110] Leopold, 1970, 259.
[111] Callicott, 1989.
[112] For the grounding of Romanticism in 'sympathetic imagination' and its original compatibility with the Enlightenment see Lockridge, 1989. Lockridge sees the overriding thrust of Romanticism as a 'will to value'.
[113] Heelan, 1965. Also Gribbin, 1984.
[114] Baudrillard, 1981, 186.
[115] Vernon, 1973.
[116] The very term 'wilderness management' has been called an oxymoron (Nash, 1978). However, when *wilderness* is understood in a textural sense as symbolic nexus of wild otherness, rather than as absolute form (the closest knowledge can come to the unknowable), the contradiction vanishes. That such an interpretation was intended is clear in the language of the 1964 Wilderness Act ("… *protected* and *managed* so as to *preserve* its natural conditions and which [1] generally *appears* to have been affected primarily by the forces of nature, with the imprint of man *substantially unnoticeable* …") [Emphasis added]. The intervention of man in wilderness preservation harks back as far as the Colonus of Sophocles. Although the Grove of the Furies was "not to be touched, no one may live upon it; Most dreadful are its divinities, most feared, Daughters of darkness and mysterious earth" (Sophocles, 1949, 84), authority over access to the sacred grove was nevertheless under control of the state, a matter for the 'city government' (p. 84) or the king, Theseus (p. 85). In a strict sense, managed wilderness is truly simulacrum.
[117] Within the limits set by law, forest managers and wilderness users work out joint aesthetic and ecological standards on an area-by-area basis through a process known as Limits Of Acceptable Change (Stankey et al., 1984).
[118] Baudrillard, 1981.
[119] For example, the FORPLAN linear programming model used by the Forest Service in the 1980s.
[120] McHarg, 1973.
[121] Clark, 1992.
[122] For example, a mountain meadow vegetated with hard-to-eradicate spotted knapweed will be considerably more resilient in the face of trampling (by hikers or cattle) than the meadow populated with rare and delicate species of alpine flowers.
[123] "It remains none the less true that the quest for monistic simplification, whether in a religious and metaphysical or in a scientific, technological and utilitarian guise … is utterly antagonistic to interestingness" (Kolnai, 1968). There is maybe an exact analog between interestingness as it pertains to aesthetics, and information as it pertains to negentropy.
[124] Hepburn, 1968, 55.
[125] For Roland Barthes, this would be the 'punctum' amidst the more general 'studium' (Barthes, 1981).
[126] *Walking* has been described as a process of moving from one point of unstable equilibrium to another. In walking, one neither wants to stand still nor to stumble. I believe that the process of walking provides for a more acceptable forestry praxis than does the

search for stability or 'sustainability' of anything specific.

[127] Jencks, 1987, 329-350.

[128] The French landscape architect, Louis Benech alluded to such paradox when he said: "Nothing is more exciting than spontaneity, even if it is deliberately created." (De Gourcuff, 1991)

[129] Ticknor, 1992.

[130] Dr. David Smith, Professor Emeritus of Silviculture, Yale University, speaking at the University of Montana, Missoula, October, 1991.

[131] Ford-Robertson, 1971.

[132] Snow, 1959.

[133] Harvey, 1981.

REFERENCES

Atkinson, William 1992 "Silvicultural Correctness: The Politicalization of Forest Science", *Western Wildlands* **17**(4):8-12.

Baird, Linda 1991 "Can Foresters Romance a Land Ethic?" *Journal of Forestry* **89**(4).

Barber, Klaus and Susan Rodman 1990 "FORPLAN: The Marvelous Toy", *Journal of Forestry* **88**(5): 26-30.

Barthes, Roland 1981 *Camera Lucida: Reflections on Photography.* Translated by Richard Howard. New York, Hill and Wang. 119 p.

Baudrillard, Jean 1981 *For A Critique of the Political Economy of the Sign.* Translated by C. Levin. St. Louis, Telos Press.

Britt, David, editor 1989 *Modern Art: Impressionism to Post-modernism*. Boston, Bulfinch Press.

Brooks, David and E.O. Wiley 1988 *Evolution as Entropy.* 2nd ed. Chicago, University of Chicago Press.

Clair, Jean 1991 "The 1920s, Age of the Metropolis: Modernism, Mechanization, and the Birth of the Multiple", *The Journal of Art*, October: 10-11.

Callicott, J. Baird 1989 *In Defense of the Land Ethic*. New York, SUNY Press.

Clark, Kenneth 1969 *Civilisation: A Personal View.* New York, Harper and Row.

Clark, Mary 1992 "Tasks for Future Ecologists", *Environmental Values* **1**(1): 35-46.

Clary, David 1986 *Timber and the Forest Service.* Lawrence, University Press of Kansas.

Coetzee, J.M. 1988 "Idleness in South Africa", *Harper's Magazine*, **276**(1655): 22-6.

Davis, Kenneth 1966 *Forest management regulation and valuation.* 2nd ed. New York, McGraw-Hill.

De Gourcuff, Alain 1991 "Benech in Bloom", *France Magazine* **20**: 22-5.

Duerr, W.A., D.E. Teeguarden, N.B. Christiansen and S. Guttenberg 1979 *Forest Resource Management: Decision-Making Principles and Cases*, Philadelphia, W.B. Saunders.

Fabos, Julius, Gordon Milde and Michael Weinmayr 1968 *Frederick Law Olmsted, Sr.: Founder of Landscape Architecture in America*. Boston, University of Massachusetts Press.

Farnworth, Edward and Frank Golley, editors 1974 *Fragile Ecosystems: Evaluation of Research and Applications in the Neotropics.* New York, Springer-Verlag.

Fein, Albert 1972 *Frederick Law Olmsted and the American Environmental Tradition.* New York, George Braziller.

Ford-Robertson, F.C., editor 1971 *Terminology of Forest Science, Technology, Practice and Products.* Washington D.C., Society of American Foresters.
Foucault, Michel 1979 *Discipline and Punish.* New York, Vantage Books.
Foucault, Michel 1965 *Madness and Civilization.* New York, Pantheon Books.
Franklin, Jerry 1989 "Toward a New Forestry", *American Forests* **95**(11 & 12): 37-40.
Gribbin, John 1984 *In Search of Schrödinger's Cat: Quantum Physics and Reality.* London, Black Swan Books.
Harvey, John 1981 *Mediaeval Gardens.* Portland, Timber Press.
Hayek F.A. 1989 *The Fatal Conceit. The Collected Works of F.A Hayek* **1.** Edited by W.W. Bartley III. Chicago, University of Chicago Press.
Heelan, P.A. 1965 *Quantum Mechanics and Objectivity: A Study of the Physical Philosophy of Werner Heisenberg.* The Hague, Martinus Nijhoff.
Heinrich, Jay 1985 "Pinchot's Heirs", Journal of Forestry **83**(5): 277-9.
Hepburn, Ronald 1968 "Aesthetic Appreciation of Nature", in *Aesthetics in the Modern World*, edited by Harold Osborne, pp. 49-66. New York, Weybright and Talley.
Hume, David 1978 *A Treatise of Human Nature*. 2nd. ed. Oxford, Clarendon Press.
Hutcheon, Linda 1989 *The Politics of Postmodernism.* London, Routeledge.
Hutcheson, Francis 1725 *An Inquiry into the Original of Our Ideas of Beauty and Virtue.* London, John Darby.
Jameson, Fredric 1991 *Postmodernism or, the cultural logic of late capitalism.* Durham, Duke University Press.
Jencks, Charles 1987 *Post-Modernism: The New Classicism in Art and Architecture*, New York, Rizzoli.
Kolnai, Aurel 1968 "On the Concept of the Interesting", in *Aesthetics in the Modern World*, edited by Harold Osborne, pp. 166-87. New York, Weybright and Talley.
Leopold, Aldo 1970 *A Sand County Almanac.* New York, Ballantine Books.
Lockridge, Laurence 1989 *The Ethics of Romanticism.* Cambridge, Cambridge University Press.
Mandelbrot, Benoit 1983 *The Fractal Geometry of Nature*. New York, W.H. Freeman.
McHarg, Ian 1973 "The Place of Nature in the City of Man", in *Western Man and Environmental Ethics*, edited by Ian Barbour. Reading, Addison-Wesley Publishing.
McGeary, Nelson 1960 *Gifford Pinchot: Forester, Politician.* Princeton, Princeton University Press.
McGrath, R.L. 1991 "The Tree and the Stump: Hieroglyphics of the Sacred Forest", Parts One and Two. *Journal of Forestry* **89**(7): 12-16, and **89**(8): 17-21.
Miller, Char 1991 "The Prussians are Coming! The Prussians are Coming!", *Journal of Forestry* **89**(3): 23-7.
Nash, Roderick 1978 *Wilderness Management: A Contradiction in Terms?* Wilderness Resource Distinguished Lectureship Series **2**. Moscow, University of Idaho Wilderness Research Center.
Nash Roderick 1989 *The Rights of Nature.* Madison, University of Wisconsin Press.
Pinchot, Gifford 1919 "Forest Devastation: A National Danger and a Plan to Meet it", *Journal of Forestry* **17**(8): 911-45.
Pinchot, Gifford 1937 "Old Evils in New Clothes", *Journal of Forestry* **35**(5): 435-8.
Pinchot, Gifford 1967 *The Fight for Conservation*, Americana Library Edition. Seattle, University of Washington Press.
Raup, Hugh 1979 "Beware the Conventional Wisdom", *Western Wildlands* **5**(3): 2-9.

Robbins, William 1982 *Lumberjacks and Legislators: Political Economy of the U.S. Lumber Industry, 1890-1941.* College Station, Texas A&M University.

Roper, Laura 1973 *FLO: A Biography of Frederick Law Olmsted.* Baltimore, John Hopkins University Press.

Rowe, Stan 1990 *Home Place: Essays on Ecology.* Edmonton, NeWest Limited.

Russell, Bertrand 1932 "In Praise of Idleness", *Harper's Magazine* **165**: 552-9.

Russell, Bertrand 1956 *Logic and Knowledge: Essays 1901-1950.* New York, MacMillan.

Salwasser, Hal 1990 "Gaining Perspective: Forestry for the Future", *Journal of Forestry* **88**(11): 32-39.

Society of American Foresters' Committee on Ethics 1991 "Land Ethic Canon", *Journal of Forestry* **89**(2): 30, 38.

Snow, C.P. 1959 *The Two Cultures and the Scientific Revolution.* New York, Cambridge University Press.

Sophocles 1949 "Oedipus at Colonus", In *The Oedipus Cycle* translated by D. Fitts and R. Fitzgerald. New York, Harvest Books (Harcourt, Brace & World).

Stankey, George, Stephen McCool and Gerry Stokes 1984 "Limits of Acceptable Change: A New Framework for Managing the Bob Marshall Wilderness Complex", *Western Wildlands* **10**(3): 33-7.

Ticknor, William 1992 "Sustainable Forestry: Redefining The Role Of Forest Management", paper presented at the Wilderness Society *Defining Sustainable Forestry* Workshop, Washington D.C., January.

Twight, Ben 1990 "Bernhard Fernow and Prussian Forestry in America", *Journal of Forestry* **88**(2): 21-5.

Tyler, Ron 1983 *American Canvas: The Art, Eye, and Spirit of Pioneer Artists.* New York, Portland House.

USDA Forest Service 1992 *Taking an Ecological Approach to Management: Proceedings of a national workshop, Salt Lake City, April 27-30, 1992.* Washington, D.C., USDA Forest Service, Watershed and Air Management, WO-WSA-3.

U.S. Government 1978 "Letter from Secretary of Agriculture James Wilson to Chief, February 1, 1905", in *The Principle Laws Relating to Forest Service Activities*, Agricultural Handbook 453.

Vernon, John 1973 *The Garden and the Map: Schizophrenia in Twentieth-Century Literature and Culture.* Urbana, University of Illinois Press.

Weiss, Allen 1990 "Lucid Intervals: Postmodernism and Photography", in *Postmodernism: Philosophy and the Arts*, edited by H.J. Silverman, pp. 155-72. New York, Routledge.

Wenz, Peter 1988 *Environmental Justice*, New York, SUNY Press.

White, Dale 1957 *Gifford Pinchot: The Man Who Saved The Forests.* New York, Julian Messner.

Wilkinson Charles, and Michael Anderson 1987 *Land and Resource Planning in the National Forests.* Washington D.C., Island Press.

Wilson, Edward 1984 *Biophilia*. Cambridge, Harvard University Press.

Wingler, Hans 1978 *Bauhaus: Weimar, Dessau, Berlin, Chicago.* First MIT paperback edition. Cambridge, The MIT Press.

Woodward, J.D. 1877 "Scenery of the Pacific Railway VI", *The Art Journal* **30.** New York, D. Appleton. pp. 165-8.

Zeide, Boris and Peter Pfeifer 1991 "A Method for Estimation of Fractal Dimension of Tree Crowns", *Forest Science* **37**(5): 1253-65.