Public Understandings of Environmental Quality:
A Case Study of the Jefferson National Forest Planning Process

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Abstract

Environmental decision-making is a tournament of competing conservation agendas in which some values and beliefs are held up and exalted, others are dismissed and ignored, and still others are implicit and unnoticed. Stakeholders compete in the tournament to advance their value systems through the science they advocate or practice, through the constructs of environmental quality they use or study, and through the management goals they champion. It is our contention that participants who hope to compete successfully in this tournament should understand the rules of the game, which includes recognizing the values and ambiguities of the language used to discuss and describe nature—in particular the terms used to describe ecological conditions that become the goals and policies of forest management—and acknowledging the "middle nature". The purpose of this paper is to examine public understandings of EQ (environmental quality) with the hope of generating insights that might improve the sophistication of society's necessary search for sustainable and acceptable visions of EQ. Ultimately, a sustainable society depends upon that society's ability to define and negotiate a sustainable human relationship with nature. That negotiation requires a sophisticated discussion of EQ. Participants in the discussion need not agree on a given definition of EQ.

To accomplish this purpose we will interview vested stakeholders in the Jefferson National Forest planning process and organize these discussions around the values and mechanisms people use to explain environmental quality. More specifically, then, the purposes of this thesis are: (1) to illustrate the ambiguity of environmental quality buzzwords used to describe forest quality in a forest planning process; (2) to make explicit the values inherent within the definitions of these buzzwords; and (3) to make explicit the various mechanisms people use to understand and explain environmental quality.

We found that the language of nature, as well as understandings of nature, are ambiguous and vague. Different understandings and different values produce dramatically different interpretations of the same environmental quality. Most everyone we interviewed recognized the problem, while few saw a solution other than to plow ahead, slowly, incrementally, adaptively, and as a community interested in a place they value. This place, the Jefferson National Forest in our case study, blurs the separation between humans and the pristine, it is a place that is revising its *man*agement plan, and, thus, it is a "middle nature" of competing agendas and understandings of environmental quality.

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Chapter 1. Introduction

The history of nature is full of diverse scientific understandings, public expectations and management philosophies (Cronon, 1995; McQuillian, 1993; Soper, 1995, Worster 1994). At the interface among ecological science, environmental policy, environmental management, and public understanding of nature exist numerous constructs used to describe environmental quality. These interface constructs are of interest here because they 1) direct the scientific inquiry that describes environmental conditions, 2) are used to set policy goals and evaluate management outcomes, and 3) both inform and reflect public perceptions and expectations of environmental quality. They are both descriptive (scientific) and prescriptive (normative); they are used to describe what *is* and to negotiate what *ought* to be. And, they are ambiguous; there exist multiple, competing, and sometimes contradictory definitions.

Those unaware of the values and ambiguity inherent in these constructs may unknowingly bias policy deliberations when they define "nature" or the "environment" in ways that privilege some stakeholders while discouraging and eliminating other positions from consideration. This ambiguity may also deceive or obscure negotiations (Peterson 1997). Vague descriptors make ineffective planning goals if seemingly similar terms describe dramatically different environmental conditions and seemingly different terms describe remarkably similar conditions. On the positive side, Peterson (1997) argues that the ambiguity encourages discourse about issues that define and decide acceptable environmental conditions—discussions that are sorely needed about topics that have no clear right or wrong answers. That is, the ambiguity, if recognized, forces negotiators to define what they mean and how the terms apply in each unique setting. Callicott et al. (1999) survey the plentitude of buzzwords used to characterize environmental quality and recommends more precise definitions be developed: "all these current normative concepts in conservation are useful, and the more narrowly and precisely they are interpreted the more useful they will be" (p. 23).

Debates and negotiations continue in the fields of ecological science, environmental policy, and environmental philosophy over the proper definition of environmental quality. Buzzwords such as ecological health, biodiversity, sustainability, integrity and the like are found in these types of literature as the definitions and goals of environmental quality. The definitions of these descriptions (i.e., buzzwords) are topics of considerable debate in journals of applied ecology that remain unresolved. We contend that public and scientific discussion will be improved if the discourse about environmental quality is expanded beyond definitions of buzzwords by making explicit two key properties: values and mechanisms. Each of these properties (i.e., values and mechanisms) is embedded within the language used to discuss environmental quality and to negotiate the desired future conditions of nature. Values reflect the norms, agendas, and expectations of the speaker; they reflect the speaker's desired uses of nature (e.g., wilderness recreation, economic development, future generations, hunting, animal rights, etc.). The values are often not explicit but rather are embedded within the assumptions and buzzwords of the language used to describe nature. Mechanisms are conceptual models. They are people's understandings of how nature works (e.g., the "laws of nature" such as "the balance of nature"); they can range from precise scientific-based theories of ecology to vague, hard to explain, or almost mythical understandings of Mother Nature. They, too, are often not explicit but embedded within the definitions of the buzzwords used to describe nature.

1.1. Purpose and Justification

The purpose of this paper is to examine public understandings of EQ (environmental quality) with the hope of generating insights that might improve the sophistication of society's necessary search for sustainable and acceptable visions of EQ. Ultimately, a sustainable society depends upon that society's ability to define and negotiate a sustainable human relationship with nature. That negotiation requires a sophisticated discussion of EQ. Participants in the discussion need not agree on a given definition of EQ. In fact, we believe that a single, acceptable, useful definition of EQ will remain elusive. It is a Holy Grail. There is no single guiding scientific paradigm nor is there a

dominant social agenda on which to base definitive descriptive definitions of environmental quality. There will always be multiple definitions reflecting the array of values and mechanisms that people associate with nature.

Still, we believe that a sophisticated discussion about environmental issues requires that discussants recognize the assumptions, biases, ambiguities, and agendas inherent in alternative definitions. We intend to show that environmental quality can be more fully understood by making explicit the values people place on nature and the mechanisms people use to explain how nature works. We hope to enhance the dialogue needed to negotiate the management of public forests by deconstructing the values and mechanisms embedded within public forestry's understandings and discussions of environmental quality. These values and mechanisms more clearly reflect the desired future conditions that planning efforts seek to articulate and produce.

To accomplish this purpose we will interview vested stakeholders in the Jefferson National Forest planning process and organize these discussions around the values and mechanisms people use to explain environmental quality. More specifically, then, the purposes of this thesis are: (1) to illustrate the ambiguity of environmental quality buzzwords used to describe forest quality in a forest planning process; (2) to make explicit the values inherent within the definitions of these buzzwords; and (3) to make explicit the various mechanisms people use to understand and explain environmental quality.

We chose a National Forest planning process as a case study because it is a meeting ground for managers, scientists, and "the public." It is a process that not only results in a plan for future land management, but one that also educates and develops a common language for these three groups. We believe that forest planning is a process of social learning by which the public learns about forestry and the Forest Service, and the Forest Service learns about the public and their understanding of the forest. A more sophisticated understanding of environmental quality will help all parties. The "public" will be in a better position to voice their concerns and have their concerns heard. Natural

resource professionals should be better able to hear public concerns, influence those concerns through education and outreach programs, and shape their science and practices to address these concerns. We assume that our results will have power to transfer to other situations where planning of public forested areas occurs. We see no reason why environmental quality as discussed relative to the Jefferson National Forest plan should be atypical of the range and quality of concerns expressed in other public, forested environments within the region and, perhaps, the nation.

2.2. Literature Review

2.2.1. The Importance of the Language of Nature

> "When your views on the world and your intellect are being challenged and you begin to feel uncomfortable because of a contradiction you've detected that is threatening your current model of the world or some aspect of it, pay attention. You are about to learn something" (Drury, 1998, p. 201).

Ecological constructs have power in that their use influences and shapes conservation policy. It is therefore important that the language of nature be as explicit as possible in reflecting the fact that these constructs have no agency apart from the people using them (i.e., scholars, scientists, policy makers, and "the public"). Recognizing the complexity of "nature", authors of manuscripts like this one tend to preface their thoughts with cautionary statements. For instance: "Nature is perhaps the most complex word in the [English] language" is an oft-cited quotation originally penned by Raymond Williams (1976) as the first line in a six-page definition of the term "nature". In a subsequent essay, titled Ideas of Nature, Williams (1980) further explains that nature has the potential to mean many things and usually a little something different to each of us according to our situation. We believe that agendas and scientific understandings of vision(s) of environmental quality determine "the situation".

What nature is (and should be) is a question that touches at the heart of forest management. The goals of a forest plan are often based on decision-makers' ideas (and ideals) of what is natural, healthy, or otherwise "best" for nature and people, as well as often being tempered by political considerations. Yet, there is no simple answer (either for content, or for process) to the question: "What is natural?" Ecological theory suggests that many different environmental conditions are equally possible, equally natural, and equally healthy for any given place at any given time. There exist no ecologically optimum or naturally best environmental conditions that can serve as an "objective" or can set unequivocal goals for environmental management (e.g., Botkin, 1990; Callicott, 1992; Wiener, 1996; Zimmerer, 1994). In fact, nature means many different things in the conceptualizations of basic environmental quality assessments, theories, and buzzwords used in ecological science (Callicott et al., 1999). For instance, in some conceptions Native Americans were part of nature and, thus, their actions upon the land were natural, while in other conceptions nature and naturalness were and are always separate from any and all humans and human activities. In other conceptions the human-nature distinction is irrelevant to understanding environmental quality. Depending on the vision of nature incorporated, such differences can lead to sweeping effects on environmental assessment and environmental policy.

Nature is infinitely complex and can be understood through science (and hence discussed in policy) in many ways. Recognizing the complexity of nature and its understandings is not only a difficult task, but also one that meets much resistance and is the source of many environmental management conflicts (Hays, 1987; Peterson, 1997). Hays (1987) explains how debates among natural resource scientists about the qualities of nature have and will continue to occur, often on a very personal and emotional level, by illustrating the reluctance of forestry professionals to switch from commodity-orientated to natural-orientated constructs emerging from environmentalists. The resistance found by Hays (1987) focuses on the power of constructs to direct attention to the values and understandings of nature. Each side wants its nature represented in the constructs used to measure and explain nature.

Peterson (1997) explains the importance of a language of nature by illustrating the difficulties created by the distinctions between "technological discourse" and "creative discourse" during a well intentioned public participation effort over buffalo management in Canada. A technological discourse assumes specific objective standards that can be measured, the existence of a single correct nature, the value-neutrality of scientific knowledge, and the permanence of ecological constructs. Creative discourse, on the other hand, values the "appropriateness" of information, local knowledge and first-hand experience in addition to theoretical knowledge, quantifiable and non-quantifiable information, and the dependence of ecological constructs on specific situations. Peterson (1997) describes that in the case of the buffalo controversy, "hostility between aboriginal and government representatives became more overt as the hearings progressed" due to the two groups' use of different styles of discourse, different terms, and different definitions. The "tragedy" illustrated by Peterson (1997) was that well intentioned public participation efforts end up creating rather than acknowledging and resolving tensions, polarizing positions, and stalling well intentioned and sorely needed management.

We believe that the importance of a language of nature, as well as the power of ecological constructs, is dependent on understanding the values and mechanisms inherent in people's perceptions of environmental quality. The conflicts identified by Hays (1987) and Peterson (1997) suggest to us that resolutions in natural resource management must move beyond terminology by making the stakeholders' agendas and understandings of environmental quality explicit. We hope the remainder of this literature review will illustrate the ambiguity found within the ecological constructs we have chosen to study, as well as the range of values and mechanisms we hope to identify in our case study. We plan to do this by first examining the values associated with environmental ethics and the mechanisms associated with ecological science, then by illustrating that scholarly definitions (within the fields of ecological science, environmental policy, and environmental philosophy) of environmental quality's buzzwords are multiple, circular, and often vague.

1.2.2. Environmental Values

We believe that understandings of environmental quality are shaped by the specific attributes of nature that are valued (e.g., resources, wildness, ecosystem processes, stability) and why they are valued (e.g., right to life, economic, aesthetic, spiritual). Environmental ethics address the ethical responsibilities of humans for the environment as well as the rights of nature independent of humans. It is concerned with the values people grant and/or place on nature, and on what pieces of nature deserve value. It is a broad and diverse area of study, cutting across disciplines (e.g., philosophy, economics, political science), professions (e.g., forestry, engineering, architecture), and modes of scholarship (e.g., from scientific positivists to community activists). It is not uncommon to find treatises on environmental ethics published in environmental organization newsletters, peer-reviewed journals of ecological science, environmental management professional journals, and, of course, in journals devoted to academic scholarship in philosophy and environmental ethics. There are thus many ways to organize and structure environmental values. In the structure that follows we make the distinction between biocentric and anthropocentric values that reflects the distinction found in textbooks (Botzler and Armstrong, 1998; Des Jardins, 1997; Van DeVeer and Pierce, 1994) and in a book-length empirical study of environmental values in American culture (Kempton, Boster, and Hartley, 1995). We also articulate a third major category, which we call bioculturalism, that attempts to merge some of the anthropocentric and biocentric values systems (Norton, 1991; Pollan, 1993).

1.2.2.1. Anthropocentric

As the name implies, anthropocentric values focus on human welfare and comfort, ranging from the utilitarian (economic utility and enlightened self-interest) to the romantic (spiritual and aesthetic). That is, human rights take precedence over the rest of nature. Utilitarian values emphasize those pieces of nature that serve humans as economic resources or commodities (water, wood, huntable wildlife, recreation, etc.).

Enlightened self-interest values emphasize the more indirect goods and services ecosystems provide such as water and air purification, oxygen production, soil generation, and protection from ozone. Costanza et al. (1998) estimate that functioning ecosystem services are worth at least $33 trillion annually, several times the global gross national product. Related to both utilitarianism and enlightened self-interest is the value placed on the environmental quality that deals with the future. Intergenerational equity requires that current generations recognize that future generations need resources or need the ability to produce resources, and thus ascribe value to the sustained yield of natural resources and ecological processes. Another anthropocentric value (related to enlightened self-interest) emphasizes environmental effects on human health. Environmental changes producing conditions that threaten human health are hence evaluated negatively.

Considerably less tangible, but still anthropocentric, are religious or spiritual reasons to value the environment. The promise of "dominion" over nature and the charge to carefully "steward" nature are part of some of the major world religions (Botzler and Armstrong, 1998). There remains active debate about the type of environmental ethic organized religion does or should promote. Kempton et al. (1995) found that the majority of the lay people they surveyed used religious arguments to justify a more cautious and caring land ethic (i.e., "care for God's creation"). A related and equally popular value of nature is the heightened sensitivity or connectivity to spiritual insight. Often recreationalists report finding God in nature or being more aware of their spirituality when they are vast, wild places that make them feel small and humble in comparison. Related, but only slightly less tangible, values of nature emphasize the aesthetic qualities of nature. Nature's vastness and unpredictability provide experiences that are unavailable through human made art. Likewise, these experiences inspire some to find insights into a natural law or moral code of behavior. That is, by experiencing and studying wild nature, humans learn lessons about "true" values and "real" meaning. These, often Romantically inspired, values are deeply embedded in Anglo-Saxon American culture and reflected in the writings and deeds of environmental icons such as Henry David Thoreau, John Muir, and Edward Abbey.

1.2.2.2. Biocentric

Several perspectives within environmental ethics concern the moral standing or "rights" of non-human life. From one perspective, individual organisms hold rights because they are conscious, feeling, and purposeful (make decisions). A range of rights can be granted to organisms, including the right to life, happiness, pain free existence, free range, and voting. Within this value system there is ample room to debate about the types of organisms that qualify for rights and which rights they deserve. For example, from an ecocentric perspective rights are granted to systems of nature larger than the individual organism, such as species, communities, populations, ecosystems, and biomes. Given that units of nature above the organisms are somewhat arbitrary, there is again considerable room to debate which units deserve rights and which rights they deserve (i.e., integrity, stability, beauty, existence).

1.2.2.3. Bioculturalism

Bioculturalism is a "middle-ground" value system that is being reached from at least two perspectives, one predominantly biocentric and the other anthropocentric. These two perspectives may have more in common than they tend to realize (Norton, 1991). Often, there seems to exist considerable agreement about what (natural resources and ecosystems) is to be conserved, and yet disputes continue to arise as to how (natural regulation or active management) and for whom (humans or nature) conservation should take place. Bioculturalism is a way of seeing the natural landscape in which stakeholders recognize human society as an integral component of ecological systems and find ways for people to interact *with* and live sustainably *in* nature. That is, bioculturalism is a middle ground; it incorporates both anthropocentric values and biocentric values. Bioculturalism is increasingly accepted by the international conservation community,

which has long recognized the limited effectiveness of a conservation strategy that privileges "natural" biological diversity over human cultural diversity (Ghimire and Pimbert 1997; West and Brechin 1991; Zimmerer and Young 1998) and is being advocated with the design professions (Nassauer, 1995, 1997; Thayer, 1994) and forestry (Hull, Robertson, Buhyoff, Kendra, 2000).

Norton (1991) interprets Aldo Leopold's ethic as being a synthesis of the anthropocentric and biocentric value systems, which we apply here to be bioculturalism. His land ethic has four major parts: (1) acknowledging the land as part of our human community, and extending rights to it as we would extend rights to any member of our community; (2) establishing a love and respect for the land and its components; (3) developing an awareness and respect for the material harvest the land provides humans, not just directly commodified, economic resources but also the various ecosystem services; and, (4) developing an awareness and respect for the cultural harvest through recreation, tradition, and other practices that bring people into contact with nature, providing them aesthetic, spiritual, moral, and other benefits.

Bioculturalism requires that we transcend the human-nature dichotomy and accept humans as an integral, functional, and adaptive aspect of the natural world. Toward this end, one place to look for hopeful guidance is the work of contemporary thinkers such as William Jordan, Frederick Turner, and Michael Pollan. These three thought-provoking writers are among a growing contingent of biocultural activists who talk about such things as "sunflower forests," the biocolonization of neighboring planets, and the moral imperative of gardening. They see "the cultivation of a new American garden" and an attendant "garden ethic," where humans are artful agents of landscape change, as a key step toward a better and more sustainable future.

1.2.3. Mechanisms Behind Understandings of Environmental Quality

How does nature work? There is an abundance of answers to this question. We contend that people's understandings of how nature works influences their perceptions of environmental quality. For example, in a seminal study, Kempton, Boster and Hartley (1995) interviewed and polled a diverse sample of Americans about their perceptions of environmental problems such as global warming and found that their conceptual models of how nature worked influenced what they considered to be acceptable and appropriate environmental management. They found people who adopted one of two basic approaches to environmental management: adaptation and preservation. Adaptation favored progress, applying human technology to improve or repair environmental situations. Preservation favored avoiding problems, and a cautious look back in time towards what worked previously rather than forward at what might be. The people favoring adaptation were more confident that nature was robust, dynamic, and safely manipulated by humans, while the people favoring preservation believed that nature was frail, balanced, and that human technologies were limited and often worsened problems. Kempton, Boster and Hartley (1995) found that people typically offered one or more of three explanations for why they took the "nature knows best" position associated with the preservationist perspective: 1) nature has homeostatic or self-healing properties; 2) nature is vulnerable to large scale disturbance and might collapse if greatly disturbed by humans; and 3) nature is too complex and unpredictable for humans to safely modify it without the risk of causing more harm than good.

Kempton, Boster and Hartley (1995) also found that understandings of nature held by lay people were not the same as those held by "experts." Lay people, as mentioned above, tended to believe that nature was balanced, while experts perceived it as more erratic and dynamic. Lay people tended to believe nature was frail, whereas experts saw redundant systems within nature, and thus nature was unlikely to fall domino-style in a chain reaction. Finally, lay people tended to believe nature was unknowable and that human technology was more likely to create more harm than good, whereas experts believed that nature, while incredibly complex, can be understood and ultimately controlled with the knowledge that comes with time and study.

Thompson, Ellis, and Wildavsky (1990) describe four models or "myths" or conceptions of nature based on a ball (i.e., human caused change) and a line (i.e., nature) (Figure 1, adapted from Thompson et al., 1990: 27-28). In “Nature Capricious” (Figure 1a), nature is random, disturbance could happen to anything at any time, and humans are unlikely to understand (let alone control) the forces that affect nature. Natural resource managers must learn to cope with change and erratic events, because the ball can move in any direction from any force. “Nature Perverse/Tolerant” is a competing model of nature (Figure 1b). Here nature is stable enough to absorb some changes humans might cause, but somewhat vulnerable to complete collapse if humans push too far. That is, the system has some stability but is not resilient to extreme change. Land managers, therefore, must identify the limits to which the ball can be pushed and minimize the chance that such changes might occur. In the model of “Benign Nature” (Figure 1c), nature provides a stable equilibrium. The ball returns to the bottom of the basin no matter how hard humans disturb the system. Land managers, therefore, can adopt a laissez-faire attitude, because nature will ultimately repair itself no matter how much it has been disturbed. Alternatively, managers could adopt a mitigation strategy that tries to minimize, but not avoid, social disruption due to change. “Nature Ephemeral” is almost the exact opposite model of nature (Figure 1d). Ecosystems are “terrifyingly unforgiving” and fragile, where even small changes caused by human management may trigger collapse. Land managers must treat ecosystems with great care and caution, their goal being to minimize human intervention in natural processes.

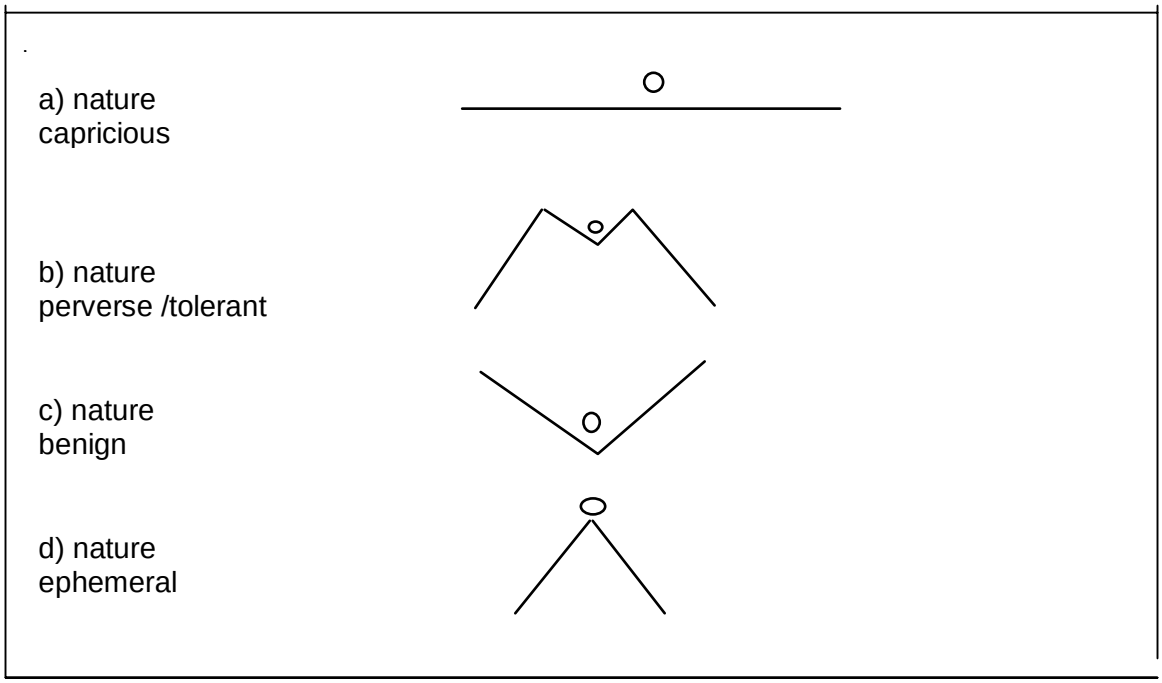

Figure 1. Understandings of Nature

Wiener (1996) examines how different understandings of nature have shaped U.S. environmental policy. When nature was viewed as stable and resilient, U.S. policy encouraged the distribution and exploitation of land. When nature was viewed as stable but balanced and fragile, land use policies changed to conserve nature, minimize waste and practice sustained yield management. When nature was viewed as possessing rights, policy sought to preserve pristine, untrammeled nature in order to protect the rights of these special units of nature. It is not clear what policy trends will emerge now that nature is "viewed" to be dynamic but interconnected.

The three studies by Kempton, Boster and Hartley (1995), Thompson, Ellis, and Wildavsky (1990), and Wiener (1996) serve to illustrate how understandings of nature (or what we call the mechanisms of EQ) shape conservation policies and behaviors endorsed by the public. Different understandings of how nature works are by no means restricted to the lay public. Historians of ecology (i.e., Barbar, 1995; Bocking, 1994; Botkin, 1990;

Christensen, 1989; Sagoff, 1988 Schrader-Frechette, 1995; Worster, 1994) have well documented the changing understandings of nature that dominated, at various times, ecological science. We are now well familiar, for example, with the shift in ecology from a Clementsian view of ecosystems as supra-organisms that have homeostatic properties and balance to the Gleasonian model of ecosystems as collections of individuals. The shift has produced dramatically different ecological theories and management practices.

We have identified several themes in literature from the fields of ecological science, environmental policy, and environmental philosophy that we categorize as various understandings of nature: nature as balanced or dynamic; nature as evolutionary content or ecosystem process; nature as pristine or humanized; as well as the spatial, organizational, and temporal scales of nature. We believe that these mechanisms are behind most understandings of nature and, thus, environmental quality. We use these themes (i.e., mechanisms) that seem to promote different understandings of nature as guides to structure our data analysis in subsequent sections of this report. Further, we place these mechanisms on "continuums of thought" to illustrate that although shifts in understandings may take place, there exists a middle ground between the mechanisms.

1.2.3.1. Balanced – Dynamic Continuum

To no surprise, ecological scientists build, test, and challenge conceptual models and theories of their understandings of how nature works. Here we contrast two seemingly opposing mechanisms, "balanced" and "dynamic", because they seem to represent two ends of an extreme. Neither mechanism is necessarily "more true" than the other. We resist suggesting that one paradigm has replaced another because we believe that the "new" ecological paradigm (i.e., dynamic, changing) has not discredited the contributions to understandings of nature made by the "old" ecological paradigm (i.e., balanced, stable).

The balanced model of ecosystems explains natural forces as ordered and harmonious, and looks for ecological systems to return to a previous equilibrium in response to disturbance (Wu and Loucks, 1995). This understanding of nature as balanced, stable and made up of definable, homeostatic communities was developed during a time when the social conditions of the United States fostered sentiments of strong community ties and social balance. Neither the Great Depression nor the Second World War challenged the understandings of balance, rather they "were seen as sicknesses or departures from a normal condition and treated accordingly without overwhelming feelings of hesitation or uncertainty" (Ehrenfeld, 1992: 139).

It became more popular for ecological scientists to focus attention on the dynamic qualities of nature when the social conditions of the nation were experiencing great political movements (e.g., civil rights movement). The dynamic ecological model (non-equilibrium, disturbance, chaos ecology) suggests that no single best, optimal, or correct nature exists; rather it suggests that there are many possible natures that could exist and which one should exist is open to discussion (Botkin, 1990; Pickett et al., 1992; Zimmerer, 1994; Zimmerer and Young, 1998). Although this understanding of nature has moved away from looking for balance toward explaining change (Wu and Loucks, 1995), it often acknowledges that there probably exist "meta-scale" properties such as hierarchical patch dynamics that have stabilizing mechanisms that do resist disturbance and change on a large scale (see, for example, Koetsier et al. 1990).

As noted above in the review of work by Kempton, Boster and Hartley (1995) and by Thompson, Ellis, and Wildavsky (1990), the idea that nature is balanced is still a popular lay understanding of nature. A case study of public responses to management alternatives for the Quabbin Reservoir in Massachusetts illustrates this point. Dizard (1994) found, among other things, that many of the people opposed to active management (in the form of a deer hunt) used a "balance of nature" argument to justify their preferred non-management alternative. These people believed that the deer herd would balance itself out through forces of nature such as survival of the fittest. Others involved in the controversy (and Dizard himself) dismissed the balanced nature argument

as romantic idealism and a view of nature that is inappropriate for the dynamic environment of the watershed where previous management removed predators (see also Hull, Robertson and Kendra, 2001).

1.2.3.2. Evolutionary – Ecosystem Continuum

The two ecological schools (evolutionary and ecosystem ecology) that we contrast in this section generate different understandings of nature, have fundamentally different assumptions about the role of humans in nature, and are used to support dramatically different conservation decisions and agendas. Our review of these schools of ecology was heavily influenced by an article by Callicott et al. (1999), in which the authors refer to people who understand nature through evolutionary ecology as compositionalists and people who understand nature through the ecosystem approach to ecology as functionalists.

"*Compositionalists* perceive the world through the lens of evolutionary ecology, an essentially entity-oriented, biological approach to ecology that begins with organisms aggregated into populations" (Callicott et al. 1999:23). Evolutionary ecology begins with organisms forming into populations, which then continuously change through modification of their structure and function over generations in response to the features of their environments. Although "the principles of thermodynamics and population dynamics do not change, their expression in each particular ecological system never ceases to evolve" (Ricklefs 1993, p.12). Humans are considered to be distinct from nature and thus environmental quality is best when human modification is least. Conservation decisions based on the evolutionary school of ecology emphasize the conservation of species and historically natural conditions (e.g., ecological restoration, biological integrity, native species).

In contrast, "*Functionalists* perceive the world through the lens of ecosystem ecology, an essentially process-oriented, thermodynamical approach to ecology that begins with solar

energy coursing through a physical system that includes but is not limited to the biota (Odum, 1968)" (Callicott et al. 1999:23). The ecosystem approach to ecology unifies organisms in terms of their commonality, their contents of energy and chemical elements (Ricklefs 1993; Callicott et al. 1999). Humans are embedded within and, thus, not easily distinguished from nature. Human management is therefore viewed to improve, or at least not degrade, environmental quality. Conservation decisions based on the ecosystem approach to ecology emphasize efforts to provide sustainable ecosystem services and processes (e.g., ecosystem health and sustainable development).

The debate over which school (evolutionary versus ecosystem or some combination of both) is the correct way of knowing and valuing nature is evidenced in the rebuttals and rejoinders that followed publication of Callicott et al.'s 1999 article (Callicott et al., 2000; Hunter, 2000; Willers, 2000). According to Callicott et al. (1999) most conservationists lie somewhere toward the middle of this continuum, "moving back and forth in emphasis depending on circumstances" (p. 24).

1.2.3.3. Nature – Human Continuum

The question of whether or not humans should be viewed as separate from nature dominates many discussions of natural area management, policy, and ethics. Science also struggles with the distinction, as Callicott et al. (1999) point out in their comparison of functionalism to compositionalism in the previous section. Functionalists emphasize ecosystem functions, and humans are just one of many factors influencing those functions. Compositionalists, in contrast, emphasize the content of the ecosystem, and humans, and human caused change, stand out in bold relief from the "natural" elements.

Ideas about nature and naturalness are deeply embedded in our sciences, policies, and cultures. A few examples serve to illustrate the pervasiveness and high value these ideas have in contemporary culture. Ecological science uses *naturalness* as a baseline for measurement of core concepts such as integrity and health (Angermier and Karr, 1994;

Schrader-Frechette 1995; Hull and Robertson, 2000). Federal landscape management policies set goals for production of *naturally appearing* landscapes (USDA, 1995). Ecological restoration projects strive to create pre-Columbian, *natural ecosystems* (Katz, 1997; Helford, 1999; McCann 1999). Environmental laws mandate and environmental organizations promote a *natural balance* (e.g., Luke, 1995; Kaufman, 1994; Weiner, 1996). The public finds forest management actions more acceptable if the actions mimic *natural causes* (Brunson, 1993). Advertisements sell and people buy *all natural* soap, *100% natural* cereal, and medicine made of *natural ingredients*. Entire scholarly journals are dedicated to understanding the relationship between *society and natural resources*. Yet, what does it mean for something to be natural?

Speaking about nature, trying to define it and/or distinguish it from humans is a notoriously difficult task: "The nature-culture dichotomy … is so deeply ingrained in our everyday language that anyone trying to work around that dichotomy sounds at best idiosyncratic and a worst mystical" (Ingerson, 1994: 44-45). Its prevalence in the literature we reviewed increasingly demonstrates that because nature can mean so many things it can mean nothing it all. Social constructivists debate the extent to which nature can be known and shared independently of the social context that shapes the process and purpose of knowing (Bird, 1987; Evernden, 1992; Escobar, 1999; Proctor 1998). The literature of ecological science, environmental policy, and environmental philosophy is full of examples of alternative and changing definitions of nature. Magill (1994) found that many people misinterpret the cause of landscape features, believing, for example, forest clearings to be the of from "natural" (i.e., non-human) causes when in fact they are the result of deliberate management practices. Historical ecology and environmental history are full of examples of landscapes that once were thought to be pristine but are now known to be the product of extensive and intensive management (e.g., Crumley, 1994; Fried and Huntsinger, 1998). Habron's (1998) study of Scotland residents found that most people believed *wildness* exists in the Highlands of Scotland, even though that area has been highly manipulated and shaped by human activity since the last ice age.

Literature that we have reviewed suggests that people are able to recognize a range of landscape conditions that count as natural. Several recent studies have examined public perceptions of nature at the primitive, wild, dehumanized end of the continuum. MacNaghten, Brown, and Reicher (1992) found that people could discriminate between a humanized type of naturalness, where signs of human activity have the visual appearance of being in balance with non-human elements, and a more *wild* type of naturalness, where nature is unmarked by human intrusion. Mausner (1996) found that people effectively use five different construals (or schema) of naturalness: "totally natural," "civilized natural," "semi-natural," "quasi-natural," and "non-natural." But, Purcell et al. (1994) found that people are more likely to agree on the naturalness of landscapes at the extremes of the continuum (e.g., forests vs. city street scenes) than on landscapes in the middle (e.g., agriculture and canals). In recognition that there exists a continuum of naturalness in popular discourse about the environment and that most landscapes exist somewhere in the middle, many land management systems have abandoned the more simplistic human-nature dichotomy (whereby the mere presence or absence of human influence is the criterion for naturalness) for a more incorporating (i.e., humans within nature) and realistic understanding of naturalness (e.g., Crumley 1994; Jacques 1995).

Brunson (1993) examined what it is that makes the management of nature socially acceptable. He concluded that acceptability depends on the cause of the environmental condition as much as it depends on the quality of the environmental condition itself: "A basic conclusion of this analysis has been that people try to discern meanings in their environments. We judge an outdoor setting not only based on what we see, but also on how it got that way, and why" (118). He further found that "natural causes" are generally more acceptable than intentional human causes. Thus, when the cause of an environmental condition is more natural, the condition itself is evaluated as more acceptable. "Wind damage in an old growth stand is inevitable, and therefore acceptable. Wind damage alongside a clear-cut is preventable (by not cutting, if by not other means) and is therefore less acceptable" Brunson (1993).

1.2.3.4. Scales: Ecological, Temporal, Geographical

Nature is infinitely complex. It exists at many spatial scales (from the microscopic to the biosphere), many temporal scales (from the diurnal to the glacial), and many ecological scales (e.g., organisms, populations, ecological processes). Which scale one chooses determines the ecological attributes one studies as well as its spatial and temporal boundaries. Because nature can be conceptually organized at many scales and multiple units of nature exist, no one unit is more correct or objective than another (Levin, 1992; Norton, 1995; Norton, 1998; Ross et al., 1997). We contend that the constructs are meaningless without making the specific scales contextually explicit during negotiations over management (Pendley, 1995).

1.2.3.4.1. Geographical Scale

According to Poiani et al. (2000) geographical scale can consist of the local, intermediate, coarse, and/or regional levels. In the same order, the measurement of these levels increase from meters to thousands of hectares, from hundreds to tens of thousands of hectares, from tens of thousands to millions of hectares, and millions of hectares or greater. Poiani et al. (2000) also explain this hierarchical scaling in terms of species and ecosystem scales and characteristics. Starting with the local geographical level, the smallest scale is the local-scale species whose habitat is restricted or specific then increasing to small-patch ecosystems which are geomorphologically defined and have spatially fixed and discrete boundaries. Within the intermediate geographical level, the smallest scale is the intermediate-scale species which utilizes large patches or multiple habitats then increasing to large-patch ecosystems which are defined by physical factors or regimes and have internal structure and composition that are either homogeneous or patchy. At the lower end of the coarse geographic level are the coarse-scale species that are area-dependent and habitat-generalists. The coarse geographic level then increases to the matrix ecosystems that have a successional mosaic, a large spatial extent, and have amorphous boundaries. Finally in the regional geographic level is the regional-scale

species, which are wide-ranging (e.g., migrating ungulates and top-level predators). Without making explicit the specific geographical level of an ecological construct during discussions and debates regarding natural resource management, the term can be widely misunderstood by participants in the discussions or debates.

1.2.3.4.2. Ecological Scale

Understandings of nature are dependent upon the specific biological unit (i.e., ecological scale) inherent to constructions of ecological buzzwords. According to Ruggiero et al. (1994) "[t]he term ecological scale implies hierarchical levels of ecological organization: individuals, demes, subpopulations, populations, metapopulations, subspecies, and species" (p. 366). In addition, Ruggiero et al. (1994) caution that "[d]isparity between the scale of a proposed management action [geographical scale] and the scale at which the corresponding ecological response is evaluated [ecological scale] can result in viability analyses that are questionable" (p. 366). Munkittrick and McCarty (1995) explain that "ecologists have attempted to first define an effect or response, and then to search for a cause afterwards" (p. 79).

> "Ecological studies generally began with descriptive studies at the population, community, community or ecosystem level and often continued as far down in the organizational levels as individual performance characteristics. Each ecological study represented a case study, and when changes were evident at the population or community level, attempts were made to mechanistically link responses at this level to the original cause, or at least to responses at lower levels of biological organizations" (Munkittrick and McCarty, 1995, p. 79).

Thus, in order to make understandings of environmental quality explicit, the biological units (i.e., ecological scale) of the construct under discussion and/or negotiations must be made abundantly clear to all participants.

1.2.3.4.3. Temporal Scale

Understandings of nature are dependent upon specific conceptual understandings of the temporal scale embedded in ecological constructs. As we discussed previously in this literature review, historical benchmarks or reference dates can determine understandings of naturalness. Temporal scale must also be made explicit, especially in reference to geographical scale and ecological scale, because of the differences in the length of time it can take for different size areas and different biological units to respond to stress. That is, effects from management and non-management actions may not be known or detectable for a range in temporal scale.

> "Communities and ecosystems also have three analogous levels of detectable responses to stress. Primary responses represent a rapid, easily reversible change detectable at the community level, such as changes in population sizes, energy flow, and productivity. Secondary responses would be slower to occur and more difficult to reverse, such as changes in community dynamics, diversity, or overall community size. Tertiary level changes would take the longest time to occur, be the most removed from the stressor, and be the hardest to reverse, such as changes in the function and structure of an ecosystem. These changes would integrate the responses of communities at several trophic levels" (Munkittrick and McCarty, 1995, p. 83).

In other words, at the individual level changes in the neuroendocrine can take seconds, changes in the physiological structure can take minutes, and integrators can take hours to days. Once changes in the integrators of individuals occurs, the population level becomes stressed, where changes in the population dynamics can take hours, days, or weeks, and changes in the population production can take days to weeks to detect. When changes in the population level take hold, the community becomes stressed and changes in community production can occur in days or weeks, changes in community dynamics can to months, and changes in the community's ecosystem function can take years to detect (Munkittrick and McCarty, 1995, p. 84). Thus, it is vital not only to know the specific scale of time embedded in perceptions of environmental quality (i.e., ecological constructs); it is equally critical to know the ecological and geographical scales.

1.2.4. Environmental Quality's Buzzwords

As new ideas, understandings, and theories emerge in the fields of ecology, environmental policy, and environmental philosophy, the ecological scientists who are not resistant to change, are actuated to operationalize, test, and redefine their constructs. At the turn of the last century the scientific journals debated the definition and classification of species taxa. Community, energy flow, and ecosystem became the topic of heated debate in the early and mid-part of this century (e.g., Clements, Gleason, Odum). Presently the journals are full of theoretical, empirical, logical, and emotional arguments for competing definitions of health, integrity, biodiversity, sustainability and the like. It is these "buzzwords" that are the constructs we use to measure and talk about our understandings of environmental quality. Further, it is within these buzzwords that we find the array of embedded values and mechanisms used to describe environmental quality.

We will review some of the current debates below to introduce these concepts and to illustrate and confirm the variability of their definitions within current ecological science, environmental policy, and environmental philosophy literature. Although we will focus on the current constructions of health, sustainability, biodiversity, and integrity, Table 1 illustrates the wide variety of words and phrases used to describe various aspects of EQ. The idea for this table was inspired by a figure in Callicott et al. (1999) to use as a guide for our interviews, and our expansion on it and inclusion of it is to demonstrate the array of environmental quality's constructs within the fields of ecological science, environmental policy, and environmental philosophy.

Table 1. Conservation Buzzwords

Abundant (plentiful)	Adaptive Management
Air Quality	Authentic (old, original, pristine) conditions
Baseline	Best Management Practices
Biodiversity	Biogeography
Biological Diversity	Biological Integrity
Climate Change	Climax
Continuous (not fragmented)	Corridor
Critical Habitat	Cumulative Effects
Ecological Diversity	Ecological Integrity
Ecological Rehabilitation	Ecological Restoration
Ecological Services	Ecological Sustainability
Ecosystem Functions	Ecosystem Management
Ecosystem Processes	Endangered (threatened, rare) Species
Environmental Rehabilitation	Environmental Restoration
Exotic (alien, noxious, invasive) Species	Fragmentation
Focal Species	Health
Historic Range of Variability	Indicator Species
Integrity	Interconnected Web
Keystone Species	Landscape Ecology
Native Species	Natural (undisturbed, not managed)
Natural Processes	Nutrient Cycle
Productive	Reforestation
Resilience (resilient to change)	Resistant (to change)
Regulated (managed)	Scientific Management
Soil Stability (to erosion)	Stable
Sustainable Development	Sustainable Resources
Wild (untrammeled)	Water Quality

1.2.4.1. Health

Particularly within the last decade the concept of ecosystem (or forest) health has received a great deal of literary attention in the fields of ecological science, environmental policy, and environmental philosophy. Unfortunately these discussions and debates about the proper use and definition of health have yet to reach any conclusions due to the subjectivity, ambiguity and tautology of the term. Chapman (1992) reported that:

> "It appears that the term 'ecosystem health' is not subject to unambiguous definition. Even in the present Symposium, involving less than 100 persons, most of them professionals, emotional and subjective factors obviated definitions or even a consensus that a definition was possible" (75).

The susceptibility of health to multiple definitions is due to any number of the following attributes associated with and debated about the buzzword: the health metaphor (analogous to human health); the specificity needed in health's definition; the role of values and mechanisms in health's definition; the lexicon utilized to define health; and the role of health in natural resource management.

Should the definition of health be based on an analogy to human health? Using human health as an analog for environmental health is based on the organismic theory (Clement's) of ecosystems as superorganisms (Sutter 1993). Calow (1992) refers to the health metaphor as possessing a weak form and a strong form. The weak form of "health might simply signal normality and hence the converse, ill-health, signals abnormality" (Calow, 1992: 1). Although this form of the metaphor may be weak, it has been found that it is much easier to define health as the absence of certain qualities rather than the presence of certain qualities (Costanza, 1995; Leopold, 1941; Mageau et al., 1995; Rapport, 1995). The strong form "…is where 'health' defines a condition favorable (i.e., optimum) for the functioning of the whole organism that is actively defended by homeostatic processes" (Calow, 1992: 1). Yet this "strong form" has been found problematic as well. Costanza (1992) states that the "normal" criterion of health as homeostasis (i.e., measurable and consistent ecosystem functions and processes, like

nutrient cycles, life cycles, water cycles, etc.) applies less well or not at all, because it is too severe in its incorporation of any stress on the system. Wicklum and Davies (1994) further explain that the health metaphor is invalid because it "necessitates the acceptance of scientific principles [e.g., ecosystems as organisms] that are not supported by empirical evidence" (997).

Should the definition of health be site and scale specific or general and consistent in its applications? According to Ehrenfeld (1992) the term health should be defined generally without connection to any ecological theories:

> "[A] general word such as 'health' can end up with all kinds of narrowing qualifications and can lose some of its original meaning if we apply it too rigorously to examples of specific communities. Because communities vary greatly, with some occurring at the equilibrium end of the range, some at the nonequilibrium end, and others at all degrees in between, the unifying idea of health can vanish as we redefine it from case to case" (Ehrenfeld, 1992: 141).

Conversely, Kolb et al. (1994) explain that "[m]uch of the current ambiguity about forest health has arisen from attempts to take a concept developed at the individual organism level and apply it to a landscape process" (13). They suggest that defining the term health each time it is used will help resolve the increasing ambiguity created by applying health to systems with increasing complexity (Kolb et al., 1994: 11). Debate also exists about whether the construct of health applies best to highly modified landscapes (Karr, 1995; Rapport et al., 1998) or that health can and should be applied to all landscapes (Callicott, 1995; Meyer, 1997).

What are the roles of values and mechanisms in health's definition? According to Callicott (1995): "health is in the eye of the beholder" (104). The incorporation of values in defining health is widely recognized (Callicott, 1995; Calow, 1992; Chapman, 1992; Costanza, 1995; Ehrenfeld, 1992; Kolb et al. 1994; Meyer, 1997; Rapport, 1989; Shrader-Frechette, 1994; Steedman, 1994; Wicklum and Davies, 1994). For example, Meyer's (1997) conception of health "explicitly incorporates societal values which include but are not restricted to productivity" (440). Costanza (1995) believes that as we learn more

about the particular system under study the values inherent in the construct of health "can range from subjective and qualitative to objective and quantitative" (104). However, the influence of values as compared to mechanisms in defining health remains debatable. Only Wicklum and Davies (1994) discount the influence of mechanisms all together and rely entirely on values to define health. The remaining authors add varying degrees of mechanisms, mainly types of ecosystem functions and processes, to the array of values (intrinsic to instrumental) in their definitions of health. For example, Calow (1992) explains that people may use mechanisms when defining health to defend their specific agendas. Ehrenfield (1992) explains that "a determination of ecosystem health can be a function of which process you are looking at, which in turn is determined by your own values" (141). Meyer (1997) explains the need for ecological theories of nature in health's definition to clarify societal values. Further, Meyer (1997) explains that "the concept of health will broaden the ecological perspective and will not diminish the rigor of science" (445).

What is the role of other buzzwords in definitions of health? Virtually every definition uses other conservation buzzwords. For instance Costanza (1992, 1995) and Rapport (1989, 1995) view health as sustainability, while Callicott (1995) and Chapman (1992) view health as normality of ecosystem functioning and processes. Calow (1992), Costanza (1992, 1995), and Kolb et al. (1994) include resilience, resistance, and/or stability in their definitions of health. Measures of species diversity, biodiversity, and/or biological organization were included in definitions of health by Cairns and Niederlehner (1995), Calow (1992), Chapman (1992), Costanza (1992, 1995), and IUCN/UNEP/WWF (1991, cited in Chapman 1992). Rapport (1989) and Meyer (1997) associated health with system integrity. In addition, Costanza (1992, 1995) incorporated the concept of vigor, as well as balance (1992) into his definitions of health.

Is the concept of health constructive in aiding communication between scientists, policy makers, and the public? Acknowledging the ambiguity in defining health, many authors display confidence in the utilization of the construct as a meeting ground for these three

distinct stakeholders (Callicott, 1995; Ehrenfeld, 1992; Meyer 1997; O'Laughlin, 1994). For example, O'Laughlin (1994) explains that:

> "Although definitions are a necessary first step in communicating, words are not as important as the concerns they represent … Forest health is a useful communication device for building interdisciplinary bridges among professionals and for relating biological and managerial complexities to something people can understand" (13).

Despite our finding that the majority of the literature in the fields of ecological science, environmental policy, and environmental philosophy finds the health construct useful in public planning, it remains debatable. For example Chapman (1992) expresses his concern that "it seems counterintuitive to base a society and a goal on concepts that are neither universally defined nor universally understood… [but] decision-making in the environmental field is not controlled by those with the most knowledge of the subject" (73). Sutter (1993) explains that the adoption of the health metaphor fosters the reluctance of environmental managers to clearly define their goals (1538). Although Kolb et al. (1994) recognize the importance of "building interdisciplinary bridges" and relating "complexities to something people can understand" by using the construct of health in forest planning, they caution that the present concerns may reflect a failure to define publicly accepted management objectives (13, 15). Thus, "there is no silver bullet that will allow us to assess ecosystem health … without ambiguity" (Costanza 1992: 252).

1.2.4.2. Sustainability

The ambiguity of the construct sustainability is clearly evidenced in its values and mechanisms. Mann and Plummer (1999) report that an independent (not government agency sponsored) scientific committee attempted to provide a more coherent vision for public lands management by offering "more quantitative methods for measuring sustainability," but conceded that using the term "inevitably involves a host of value judgments" (1996). "[T]he committee's report and the reaction to it illustrate the complex, sometimes uncomfortable roles played by scientists in land-use and

conservation decisions" (Mann and Plummer 1999: 1996). According to Dixon and Fallon (1989), "careful thought must be given to clarify [sustainability's] exact meaning or alternative meanings; only in that way can [it] be useful as a touchstone for sound policy making" (83).

What are the "inherent" values of sustainability? Gifford Pinchot sparked the beginning of the integration of sustainability in forestry with his famous statement: "the greatest good for the greatest number for the longest time." Noss (1995) made distinct Pinchot's anthropocentric, utilitarian value of sustainability by stating that "Pinchot, who also wrote that there are just two things in the world – people and natural resources – clearly had the "greatest number" of people, not species in mind" (62). Tracing the development of sustainability as a global and international focus, Noss (1995) believes that current efforts towards sustainability will not be reached until there is a fundamental societal change from utilitarian values of the concept to valuing sustainability for intrinsic reasons. Salwasser (1990) believes that sustainability will be best achieved as a middle ground between those who value people first and those who value earth first:

> "The timeless search for prudence and balance in simultaneously protecting nature and producing resources is what should distinguish conservation biology from either its more crop-oriented or more preservation-oriented professional relatives" (214).

Rather than focusing on only one of the polar values of utilitarian and intrinsic and relying on only one definition for sustainability, Gale and Cordray (1994) developed nine separate sustainability definitions, "each with a different vision of what should be sustained" (312). The nine sustainability types include: dominant product (yield of high-value products), dependent social systems (social systems), human benefit (diverse human benefits), global niche preservation (globally unique ecological systems), global product (globally important high-value products), ecosystem identity (general types of ecosystems or resource uses), self sufficient (ecosystem integrity), ecosystem insurance (ecosystem diversity), and ecosystem benefit (undisturbed ecosystems). Associated with each of these definitions, Gale and Cordray (1994) identified the values attributable to the

resource to be sustained. Among the values identified were the following: "economic efficiency", "lifestyle values", "human rights to resource abundance", "global human-ecosystem interdependence" "human need for products even if few areas produce them", "commitment to general ecosystem diversity", "commitment to ecosystem autonomy and naturalness", "insure against ecological disaster and diversity loss", and "respects rights inherent in natural systems" (Gale and Cordray 1994: 314).

What mechanisms produce sustainability? Noss (1995) explains that sustainability "seems to have been co-opted by commodity and pro-growth interests … [and] when development and conservation are combined as goals, as they often are under the banner of sustainability, development takes priority and biodiversity is usually diminished" (60-61). Current constructions of sustainability focus on combining the value of meeting human needs without compromising the mechanisms of ecosystem health (Callicott et al. 1999) or ecological integrity (Mann and Plummer 1999). Mann and Plummer (1999) also stress the identification and protection of "native species whose abundance and well being would be indicators of the functioning of the larger ecological system" (1997). Gale and Cordray (1994) include these ambiguous buzzwords as measurements of sustainability, as well as several others. Following the order of the above list of sustainability types constructed by Gale and Cordray (1994), their list of mechanisms include: "quantity produced", "social system persistence", "range of ecosystems products and uses", "ecosystem health", "price and supply fit of local products into international market", "persistence of global ecosystem diversity", "ecosystem integrity without external input", "vitality and amount of insured resources that are resistant to ecological crises", and "ecosystem continuity". In addition, Noss (1995) cautions that: "Continuing conflicts over public lands management in the United States suggest that little "common ground" has been established so far between those who want public lands devoted to private profit and those who want them managed for broader values such as biodiversity conservation. Furthermore, there is no evidence to suggest that current and proposed timber harvests on national forests – including those sanctioned as New Perspectives or Ecosystem Management projects – can be sustained without degrading

ecosystems (Noss 1991, Frissel et al. 1992, Alverson et al. 1994, Noss and Cooperrider 1994)" (61).

This range in definitions, values, and mechanisms comprising the reviewed literature on ecological sustainability exemplifies the construct's ambiguity. That is, sustainability can be interpreted in more than one way when used in natural resource management.

1.2.4.3. Biological Diversity and Biological Integrity

Although the term "biodiversity" did not emerge until the mid-1980's when Walter G. Rosen took the "'logical' out of 'biological'", ecologists (e.g., Leopold, Elton, Carson, Ehrenfeld) had been discussing biological diversity since mid-century as an integration of science and values (Takacs 1996: 37). Creating a podium for ecologists to express their non-humanistic, non-anthropocentric, intrinsic, biocentric values of nature, scientists' talk of biodiversity has shaped public perceptions, and feelings about and actions towards the natural world. Despite the wide public acceptance [i.e., use] of the construct, ecologists have used a range of values to appeal to laypersons as the mechanisms, which formulate biological diversity, are accepted, applied, and contested. In addition the popularity of biodiversity in media and public documents "has obfuscated its meaning as a scientific concept" (Angermeier, 1994: 600). Without a clear, concise definition of biodiversity the ambiguity that plagues the concept due to the varying mechanisms and values used by its constructors, Angermeier (1994) cautions that "policy built on flawed conceptions could contribute to the erosion rather than the conservation of biodiversity" (600).

Why do people value biodiversity? Takacs (1996) provides an elaborate analysis of the values that encompass biodiversity (including debates on the subject that predate the coining of the term in 1986). Among the values identified by Takacs (1996) are scientific, ecological, economic, social amenity, biophilic, transformative, intrinsic, spiritual, and aesthetic values. These values inherent in definitions of biodiversity add further complication to the construct; their explicit use by ecologists resulted in an end to

the exalted objectivity and value-neutrality of science (Takacs 1996: 332). In addition, Sagoff (1991) explains that although there exist moral and ethical sentiments for the protection of biodiversity, "one is hard pressed to find credible instrumental arguments for protecting endangered species and their habitats" (36).

What mechanisms are embedded in definitions of biodiversity? Zimmer (1994) explains that "[s]ystems ecologists assume that the relations of biological diversity and temporal stability are inextricable and determinate (Laszlo 1972; Margalef 1968; H. Odum 1983)" (114). Accordingly, Takacs (1996) traced the understandings of nature by biodiversity's founding ecologists (Leopold, Elton, Carson, and Ehrenfeld) who emphasized stability, balance, richness, variety, and complexity. This understanding of the role of nature's stability in providing for biodiversity was challenged by the emergence of the "new ecology" (i.e., dynamic, disturbance ecology). According to Zimmer (1994) the "new ecology" emphasizes the enhancement of biodiversity because of changes in temporal conditions, such as natural ecological disturbances.

In addition to these competing understandings of nature's role in producing and providing biodiversity (i.e., stability vs. disturbance), there also exist competing understandings of the appropriate scale to measure biodiversity. Callicott (1995) restricts biodiversity's definition as being "the variety of *components* (or elements) at every level of biotic *community* organization" (110). As defined by Wilson (1992), biological diversity "is the variety of life at every hierarchical level and spatial scale of biological organization: genes within populations, populations within species, species within communities, communities within landscapes, landscapes within biomes, biomes within the biosphere" (p. 25). Noss (1990b) explains that the concept extends beyond the scope of just "diversity" with its inclusion of ecological and evolutionary processes, as well as its emphasis on specific organizational levels (the variety of genes, species, communities and ecosystems). It is interesting that while Grumbine (1994) emphasizes that environmental management "must seek the connection between all levels" of the biodiversity hierarchy, he explains it as a "systems" perspective (29). Thus, biodiversity is more ambiguous with the blurring of ecological schools of thoughts and scale

dependencies. To further complicate the ambiguity of biodiversity, there is the role of exotics (which often revolves around values) in discussions of the construct's definition (Angermeier 1994; Angermeier and Karr 1994). Most ecologists and environmental philosophers believe that measures of biodiversity should exclude exotic species. For example, Angermeier (1994) explains that "artificial diversity is no substitute for native diversity in terms of societal value or ecological function, and it should not be considered a substitute for native diversity in conceptions of biodiversity" (601).

What are the distinctions between biological diversity and ecological integrity? Although Noss (1990a) includes ecological and evolutionary processes in his definition of biodiversity, Angermeier and Karr (1994) "contend that processes are more appropriately considered as components of integrity" (692). Concurring with this distinction between concepts, Callicott et al. (1999) note that biological diversity is a limited concept because it does not follow the interpretation of ecological processes associated with biological integrity. In fact, Noss (1995) states that "I believe native biodiversity is one of the best expressions of ecological integrity, though I agree with Angermeier and Karr (1994) that integrity is the broader of the two concepts" (67). Despite this agreement on biodiversity as a measure of ecological integrity, the construct remains ambiguous in regards to the values and mechanisms used in its definitions.

What are ecological integrity's values? Integrity emerged into ecology when Aldo Leopold (1949) explained: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends to do otherwise" (224-225). Karr (1992) explained that this moral ethic of integrity, which he refers to as "the broader perspective of the conservation biology movement," incorporates both Pinchot's wise use ethic and Muir's preservation ethic (225). Although Sagoff (1995) explains that "the integrity of biological communities or systems could be an instrumental good, an intrinsic good, or both," he focuses on the importance of integrity's intrinsic value (162). The instrumental value of integrity is dependent upon current states of technology and is therefore always socially constructed, whereas the intrinsic value of integrity is dependent upon ahistoric and/or historic qualities and is thus not likely to be

affected by advances in technology (Sagoff, 1995). Callicott (1995) not only discusses the instrumental and intrinsic values of integrity, but also includes aesthetic values as being dependent upon the ahistoric and/or historic qualities of integrity. Noss (1995) comments on the emphasis of integrity's value being explicitly non-anthropocentric, but cautions that the concept "has suffered from vagueness and sometimes from a lack of consideration for the inherently dynamic and variable nature of ecosystems" (61). Criticizing ecologists' perceptions of a separation between ecocentric or non-anthropocentric values of integrity and the "dynamic interaction of humans with their environments", Norton (1995) emphasizes "building links between social valuation and ecological science" (234; 228).

What are the mechanisms used to define ecological integrity? The range and variability of mechanisms describing integrity within current literature is enormous, which underscores the ambiguity of the construct. The following list outlines some of these mechanisms: completeness, wholeness, undivided, or unimpaired (Angermeier, 1994; Angermeier and Karr, 1994; Karr, 1992); community structure and function (Angermeier and Karr, 1994; Cairns, 1977; Karr, 1991; Karr and Dudley, 1981; Noss, 1990b;); spatio-temporal scale (Angermeier, 1994; Angermeier and Karr, 1994; Norton, 1995; Noss, 1990b); particular locale / site specific / specific ecosystems / regional landscapes (Cairns, 1977; Karr, 1991; Karr and Dudley, 1981; Noss, 1995); hierarchical theory (Norton, 1995) or organizational levels (Angermeier, 1994; Angermeier and Karr, 1994; Karr and Dudley, 1981; Rapport et al., 1998); balanced (Angermeier and Karr, 1994; Karr, 1991; Karr and Dudley, 1981); stability (Noss, 1990b) and stable "not in Clementsian view" of community (Karr, 1992); evolutionary (Angermeier, 1994; Angermeier and Karr, 1994; Callicott, 1995; Noss, 1995; Rapport et al,. 1998); historical benchmarks or data, reference condition, natural, little or no "modern" human influence, or pristine (Angermeier, 1994; Angermeier and Karr, 1994; Callicott, 1995; Karr, 1991; Karr, 1992; Karr and Dudley, 1981; Noss, 1995; Rapport et al.. 1998; Sagoff, 1995; Woodley et al., 1997); lack of exotics (artificial diversity), biodiversity, and/or native species criteria (Angermeier, 1994; Angermeier and Karr, 1994; Callicott ,1995; Karr, 1991; Karr and Dudley, 1981; Noss 1990b); dynamic (Noss, 1995); and human caused

change that does not change variation, functions, or processes (Angermeier and Karr, 1994; Noss, 1995).

Ecological buzzwords are ambiguous in scholarly literature; that is, there exist multiple, competing, and often vague definitions. Further, embedded within these buzzword's definitions are the values and mechanisms that reflect the users' agenda(s) and understanding(s) of nature. Despite the lack of clear, concise definitions, these buzzwords are currently in use by people discussing, debating and negotiating forest management. In the following sections we plan to expose the ambiguity of these buzzwords, and the embedded values and mechanisms as they are construed by stakeholders in the Jefferson National Forest, in hopes to better understand people's perceptions of environmental quality.

1.3. Methods

1.3.1. Overview

We chose to study participants currently engaged in the planning of a National Forest because it is a meeting place for vested stakeholders. People involved in public forest planning tend to hold different, multiple and often competing values and they tend to understand nature through different, multiple and often competing mechanisms of environmental quality. With the ambiguity of ecological constructs used in forest planning we believe that quantitative research may not ascertain the full range of values and mechanisms inherent in participants' understandings of environmental quality. By selecting people actively involved in developing a forest plan we could ask them questions about environmental quality as it pertains to the planning process in which they were engaged. Thus, instead of asking abstract questions about general environmental quality, we were able to focus our study by asking questions on a place and a time, as well as a people. We concur with Shrader-Frechette and McCoy (1994) in that "important

ideals for ecological method and its associated 'logic', classical testing and use of null models sometimes fail to address the uniqueness of many ecological phenomena and the ambiguity of many ecological concepts" (244-245). Thus, we believe that a case study based on qualitative research and analysis can make the values and mechanisms inherent in current ecological constructs explicit.

1.3.2. The Setting

We chose the Jefferson National Forest (JNF) planning process as our case study to examine the values and mechanisms embedded within the constructs its participants use in their understandings of environmental quality. As previously mentioned, public forest planning is a meeting ground for managers, scientists, and other lay people. It is a process that can facilitate education and development of a common language, as well as one that results in a plan for future management. Currently, the JNF is involved in its ten-year forest management plan revision. The JNF began its revision in 1993, but it was put on hold until 1996 to coordinate its planning with other National Forests in the Southern Appalachian Assessment area. In the plan's early stages, an initial round of meetings and letter writing identified major issues that the plan should address. At the time of our study, the planning process was engaged in active public participation. Numerous public meetings were held to share information about the forest and devise a "rolling alternative" that reflected the major concerns of meeting participants. At the writing of this thesis, the planning process was temporarily on hold once again to await new National Forest planning regulations and to update the forest's roadless area assessment, and the delay could be prolonged due to budgetary constraints.

An additional reason we selected this situation is that the JNF is local. It is the forest that surrounds our community; it is where we recreate; where our water comes from; it employs people in our community; it is our backyards; it is in the local news. We hope that our relations with the Forest Service employees, as well as with our neighbors, will

facilitate and encourage future alliances between the university and its surrounding community.

1.3.3. The Participants

20 individual, semi-structured interviews were conducted with key stakeholders in the Jefferson National Forest planning process. The vested stakeholders are not representative of any population, rather they were chosen based on their involvement in the planning process by either being members of the JNF's Interdisciplinary (ID) Planning Team (3 Female, 7 Male) or regular attendees at JNF public planning meetings (1 Female, 9 Male). Respondents from the JNF's ID Team were chosen from the Forest's web page, while public respondents were snowballed from initial contacts with 2 known active, public members. Despite our sample not being representative due our sample size of 20, we did try to interview people with various backgrounds, whether it was place of employment, job title, affiliation, or association (e.g., citizens, committee/coalition/conference members, committee/coalition/conference chairs, ecologists, educators, engineers, environmentalists, planners, policy analysts/specialists, scientists, silviculturalists, state/federal agency employees wildlife biologists).

Although we stress that our sample is not representative in any statistical sense, we assume that the results will have power to transfer to other public forest planning situations, because we believe the diversity of stakeholders' affiliations to be typical of people involved in public forest planning. That is, we do not believe that the range of environmental quality understandings and concerns as explained by stakeholders in the JNF would be atypical of those expressed in other forest environments due to the range in stakeholder affiliation.

1.3.4. The Method

In the early months of 2000, a semi-structured interview guide emerged from our discussions with a few Forest Service staff and among members of the research team (four people, including the author). The interview process began shortly after the formulation of the interview guide, in March of 2000. The interview guide evolved during the course of the interview process as our ideas and understandings of perceptions of environmental quality solidified, as well as our experience in this type of research. A copy of the final interview guide can be found in Appendix A. Although the final interview guide did not change dramatically, it differs from the earlier versions in that several questions producing vague answers were deleted, a few questions were reworded and reorganized to improve the flow and clarity of the interview, and one question was added to collect quantitative data for multidimensional scaling (not reported here). Four interviews were conducted with earliest version of the guide, while six interviews were conducted without specifically stressing environmental quality of the *forest* and without specifically asking about forest health. The remaining half of the interviews were conducted with the finalized version of the interview guide.

Through the questions we chose to include in our final interview guide, we wanted to explore cover several main points. First, we tried to warm up our respondents by getting them to expose their and other participant's involvement in the JNF planning process. We also tried to uncover how their understandings were or were not being used to influence the forest plan. Second, we wanted to focus on discovering their understandings of *forested* environmental quality as related to the Jefferson National Forest by asking them "What is good environmental quality of the forest". We chose to use environmental quality as an umbrella term to extract the specific conservation constructs used by the JNF planning participants. We listened for the conservation buzzwords (see Table 1, page 24) in their understandings of environmental quality. Then, we asked the respondents to expand on the constructs they mentioned by defining them, explaining their relationship to forested environmental quality (i.e., mechanisms), explaining their importance (i.e., values), and offering examples demonstrating where

they are and are not found within the JNF. Third, we wanted to discover whether our respondents found the concept of environmental quality to be different from other conservation buzzwords, forest health in particular. Finally, we wanted to discover if the participants we interviewed recognized the ambiguity of the constructs used to understand environmental quality. We also wanted to find out if ambiguous constructions of environmental quality were problematic to the planning of the JNF and if there were ways that the Forest Service, or others, could resolve the ambiguity problem.

After initial contact via telephone or e-mail explaining our study and requesting participation, a time, date and place (of accommodation to the participants) was determined. In addition to note taking, each interview, lasting from thirty minutes to two hours, was taped and transcribed to limit chance of misinterpretation during the qualitative analysis. Near the end of one interview a participant requested that the tape recorder be turned off. Despite efforts to explain the rationale for the taping of the interview, the participant preferred that the recorder remain off, but did express faith in our reconstruction of the un-taped portion of the interview. Extensive note taking commenced and transcription occurred the same day; thus the entire interview is included in the results of this study.

1.3.5. The Analysis

Each taped interview was transcribed verbatim as its own document to avoid misinterpretation of individual participants' understandings of environmental quality. The documents, ranging from fewer than ten pages to more than twenty pages of single spaced, ten-point font, were imported into QSR NUD*IST, a qualitative data analysis computer software program. In total approximately 95,640 words were transcribed to form the database for this study. Before coding of the interviews occurred, the research team created an initial coding scheme (referred to as an index tree in NUD*IST) from prominent themes we saw emerging from the interviews and the literature. During the early coding phases three members of the research team were independently coding

interviews. We each assigned sections of text (a sentence, a paragraph, or a phrase, whatever represented a coherent thought on the part of the respondent) to a particular coding element and met to discuss and negotiate these assignments. The purpose of the meetings was to develop rules and understanding for coding that the team shared and understood. After the initial round of coding, several initial interviews were double coded as a way to communicate and check understandings of the coding scheme. During the process, definitions and descriptions of the coding categories emerged from our discussions and were recorded for later use in the writing of the results section. Additional codes were developed during this phase. When one member of the team found a section of text that he/she felt referred to some aspect of environmental quality not captured in the current coding scheme a new category was added. During our coding process, the research team met repeatedly to discuss, negotiate, and modify the coding scheme, and these new categories reflect our evolving understandings of environmental quality. A copy of this coding scheme is included in Appendix B. This triangulation of the data analysis continued into August of 2000 during the ongoing cycle of meetings, coding scheme revisions, and data recording.

Ultimately the author coded most of the interviews herself, by carefully rereading each interview multiple times, each time identifying (i.e., coding) sections of text as referring to one or more of the coding categories. That is, each interview was broken down into elements of text. These data elements were assigned a code reflecting one or more of the coding categories. Thus, each text element could be coded multiple ways. For example, a section of text might be coded as referring to "health" and as referring to the value "enlightened self-interest". After the initial coding, the author collapsed and reorganized the initial coding scheme into the categories that are reported here. The collapsing and merging of previously distinct categories was discussed and modified by the research team. The collapsed, reorganized coding scheme was then used as the backbone for the results reported here and is included in Appendix C. The NUD*IST software allowed the user to generate reports of the textual data elements (i.e., direct quotes) associated with each code or each intersection of codes across all interviews. That is, there were individual reports for "health", "balanced nature", "geographic scale", etc. These reports

were printed and exported to a word processing file. The team read and reread the quotes coded as representing similar concepts, looking for ways to collapse, organize, and summarize the main points being made by multiple respondents. A narrative reflecting our understandings of these quotes emerged, punctuated with many direct quotes, producing the Results section that follows. The numbers reported here show how often they were used in this sample of people we chose to interview. The range of buzzwords, values, and mechanisms reported here can, perhaps, be transferable to other public forest plans (i.e., region or nation), not the strength of their use.

The rigor of this coding scheme and the interpretation of results depends on the research team's ability to accurately capture a speaker's intent. We did not have the resources for each member of the research team to independently code each interview; hence we do not have a quantitative measure of inter-coder reliability. Instead, we focused our resources on negotiating the coding categories and interpreting the multiple quotes coded into each category. Here we triangulated among three members of the research team by repeatedly reviewing the emerging document that described each category, returning to the raw quotes and to the original interviews to confirm our interpretations. We believe the analysis was exhaustive and represents the range of understandings of forested environmental quality as explained by the people we interviewed as perceived, defined, and interpreted by us.

Chapter 2. Results and Discussion: Understandings of Environmental Quality

2.1 Environmental Quality's Buzzwords

The buzzwords respondents used to describe and define environmental quality were provided in response to the first major question we asked: "What is good environmental

quality of the forest?" (Question 3, Appendix A). In descending order of frequency, the majority of respondents mentioned health, naturalness, biodiversity, and sustainability in their understandings of EQ. Other constructs identified, though by a minority of people, included exotic species, water quality, air quality, soil quality, normal processes, and ecological integrity. We asked people to explain what each of these terms meant to them (Question 3A, Appendix A). The remainder of this section contains a brief compilation of the descript ions offered by respondents for each construct they identified. The sections that follow deal more carefully with the values and mechanisms embedded within these buzzwords.

2.1.1. Health

Because environmental "health" has such currency in contemporary discourse we planned to ask respondents specifically about "health" at the conclusion of the interview, just to make sure we gave everyone a chance to comment on it. However, the majority of respondents volunteered "health" when we asked them, in the open-ended question, to define environmental quality. Some people specifically noted that health was a vexing construct because it means "*so many different things*". When pressed to define it, our participants provided a variety of vague and often circular definitions, defining health with health-like terms such as "*fully functioning*" or "*normal*." The following list summarizes the range of definitions we heard people use:

(1) Health was defined as wildlife populations that are in their "*native*" assemblages, living in harmony with all other plant and animal species, "*normally functioning*", and free to carry on their life processes (i.e., not constrained by roads, fragmentation, or other human caused change);
(2) Health was defined as plant populations that are "*normally functioning*", "*native*", in harmony with wildlife and humans, as typified by old-growth or climax communities;
(3) Health was defined as "*resilient*" natural processes that are maintained, restored, and generally capable of responding to disturbances such as those

caused by "*exotics*", "*insects, disease, fire, windstorms, ice, glaciers*", and/or "*humans*";

(4) Health was defined as the dynamic equilibrium of nature, the dynamic and "*changing*" processes that occur "*without human influence*" and/or are "*cyclical*";

(5) Health was defined as a human style of management that respects, accommodates, and tries to live "*harmoniously*" with plant and animal populations;

(6) Health was defined as trees that were "*vigorous*", "*growing*", "*young*", "*reproducing*", having diversity in "*age*", "*species*", and "*canopy*", and/or managed or "*tended*" on a "*rotation*" for timber or wildlife habitat;

(7) Health was defined as "*clean air*";

(8) Health was defined as "*clean water*"; and

(9) Health was defined as "*rich soil*".

Half of these definitions (i.e., 1-4) define health as a natural, dehumanized condition. More specifically, health is a condition that occurs when plants, wildlife, ecosystem processes, and changes occur independently of human influence. One of these definitions (5) suggests that human management can produce healthy forests, but only a style of management that tries to reflect and respect natural processes (i.e., live "*harmoniously*" with nature). Definition 6 also finds human management acceptable, if that management produces socially desired outcomes such as diversity, timber, and wildlife habitat. The remaining definitions could, presumably, occur with or without human intervention. As we see below in the next definition of EQ, and then later in the discussion of mechanisms behind EQ, lack of human influence (i.e., naturalness) is a primary guide to some people's understandings and definitions of EQ.

To some people ecosystem health and forest health were interchangeable. These people seem to have shifted from an "old" timber resource emphasis of forest health to the "new" ecosystem management emphasis (Hays, 1987). To other people (e.g., # 6 above) there were clear differences between forest and ecosystem health:

(Interviewer) "*You mentioned health before, do you see a difference between ecosystem health and forest health?*"
(Interviewee) "*Yes, I do … what they call forest health is cutting, reseeding, and replanting and that does not help the ecosystem …*" (Public Informant #4)

"*Ecosystem health is more encompassing than forest health… Well it's the … there is the worldwide ecosystem and then there's all the little parts, the sub-ecosystems. If you look at it in the big picture there is the ecosystem of the planet in general and you have all the mini ecosystems based on the all the different kinds of habitats you have and only part of that, all those habitats, are forested habitats. And of course the forest habitats are going to have sub-ecosystems relating to them depending on what kind of vegetative types they are and where they are in the world and all that stuff.*" (Forest Service Informant #7)

One person specifically suggested that:

"*Forest health is a widely misapplied term and that really it grew out of the forest pest management side of the Forest Service as it related to insects and disease*" (Forest Service Informant #8).

Another person exemplified this understanding of forest health:

"*Again as a specific answer to better quality is younger, early-successional forests and their more efficient contribution to air quality in their conversion of carbon dioxide to oxygen. So if we let the forest stagnate, then it becomes stagnated, old, mature, less productive from a resource standpoint, less productive from a health standpoint in as much as it is not contributing to air quality to the degree that a younger forest would. An older, over-mature forest would limit early-successional habitat species that need that habitat and without replacing those areas with the diversity then those species become threatened. So that goes back to my answer about diversity and forest health and how it contributes to environmental quality.*" (Public Informant #3)

So, for some, "health" focuses mostly on trees as a resource, in a manner consistent with the Forest Service official definition of "Forest Health" that emphasizes the impacts from insects, disease, and fire on timber and related resources (http://www.fs.fed.us/foresthealth/). For others, "health" focused on other components of the forest/ecosystem.

2.1.2. Natural

Seventeen people suggested that naturalness or natural conditions produced environmental quality. Stated quite simply:

> "*Natural defines environmental quality, for some of us at least.*" (Public Informant #8)

Yet, as with health, there were multiple, circular and vague definitions of natural. And, as with health, people expressed frustration that the term was difficult if not impossible to define.

Perhaps one of the vaguest and most tautological definitions, but one mentioned by several people, referred to natural as being the processes and things that "*belong*" or are "*supposed to be*" in the forest. Naturalness, in this manner, is used synonymously with "*normal*", and what is normal has high EQ. It is not clear how people justify this assumption. "*Normal*" connotes the existence of some ideal, established or balanced state of nature. As we will see in the section on Mechanisms, many people explained environmental quality using a balance of nature metaphor:

> "*If it is natural, it belongs here. If a dandelion thing is floating around in the air and if there is a milk plant floating around in the air, I'm hoping, I'm putting all my prayers and all my mojo and everything on the milk plant and hopefully a car will get the dandelion. Nothing against dandelions, they're lovely and they taste delicious and they are good for you, I don't want them growing, not here. Just not here, I'm sorry, just not here*." (Forest Service Informant #9)

Others defined natural, also tautologically, as the condition where "*natural*" ecosystem events occurred such as natural disturbances (e.g., "*fire*", "*insects*", "*disease*") and natural functions and cycles ("*water*", "*nitrogen*", "*energy*", "*life*", "*food chain*"). This definition clearly embraces the notion of a dynamic and changing nature, rather than a stable and balanced one.

> "*It's all lumped. It encompasses all of those concepts and everything from the water cycle to food webs and food chains and succession. It's that myriad of events that take place in an ecosystem*" (Forest Service Informant #8).

Naturalness also was defined as a condition, much like health, where plant and wildlife populations are unconstrained by human presence, activities, management, and/or manipulation (e.g., wildlife and vegetation having "*all habitat requirements*", successional trends occurring unhindered, and "*trees living on their own*").

> "*Well what would make a natural ecosystem acceptable would be one where wildlife species and plant species… where wildlife species can move from one area to another without a great deal of disturbance. They can reproduce. They find all their habitat requirements: food, water, shelter, cover, etc… in an area that does not subject them to undue hazard when they are trying to find those habitat requirements."* (Forest Service Informant #2)

Naturalness was also defined, but only by a very few, as the absence of any previous human impact. In fact, the term pristine was not used at all and "*virgin*" used only once. Most people seemed to recognize that humans had heavily modified the forest. A few people commented about the impacts of Native Americans, but suggested that these impacts were minor and acceptable. "*Wild*" or "*untrammeled*" are related descriptions of nature provided by some our informants. Rather than referring to a state of nature never touched by humans they refer to a condition being relatively free from current human control. This lack of human control and meddling was a more commonly offered explanation of "natural." A forest previously manipulated by humans could regain its wildness merely by people leaving it alone. For most people naturalness also implied limited perceptual evidence of humans in the landscape. The absence of man-made or artificial structures, sounds, smells, and regimes, the absence of ecological processes humans have set in motion (e.g., free of exotics), as well as the absence of humans, themselves, living in the landscape.

> (Interviewer): "*Can you define natural?*"
> (Interviewee): "*Probably not."*
> (Interviewer): "*Can you attempt to define it?"*

(Interviewee): "*It's probably easier to define artificial in which you would have a totally man-man, manipulated landscape*." (Public Informant #8)

Many if not all of these definitions seem to have at their core a belief that nature knows best. Natural processes are the "*normal*" processes of an ecosystem and thus assumed, without question, to also be of high EQ. There were a few people who recognized that "*natural*" disturbance (ice, fire, insects) dramatically alters a setting, causing great harm to the individual organisms. But, for most, even that change was acceptable because the cause was non-human. In contrast human-wrought change was assumed more likely to produce lower environmental quality. Brunson (1993), reviewed above, reports a very similar finding.

We cannot tell from our data why people place this faith in Nature. Perhaps they believe that nature has some special property (balance or homeostasis) that corrects and heals whatever change disturbances have caused. Thus, if left alone by humans, wildlife and plant populations return to some state that is best for them. Or, perhaps people just don't trust human technology, and fear that changes wrought by human management might produce unsustainable conditions. Thus, rather than place their trust in human technology, people rather place it in processes that have stood the test of time. These and other mechanisms behind environmental quality are discussed in the section on Mechanisms:

"*I have no idea what the forest that we have will evolve into. I can't say that it will go back. I know that at least indications are if we had not done what we did at the turn of the century we would likely have very much the same kind of forest that was there at the time, but we've upset so many things … will it have a tendency to want to stabilize and go back to that condition, I don't know. But I trust that the natural processes will find their equilibrium better if we leave the forest alone*." (Public Informant #7)

There was no discussion of how these natural forces in which people trust might change nature. That is, there seemed no explicit articulation or vision of the conditions that dynamic and ever-changing nature might create independently of human control.

Perhaps there is an implicit assumption that either nature is balanced and does not change, or that the dynamic equilibrium of nature will produce conditions that are not too different from the conditions we see today, and that humans will find these conditions acceptable. These contentions are not founded on our data; they are speculations for why people trust nature. We raise these issues because we find it worthy of note that the people we interviewed, although clearly associating natural conditions with high environmental quality, did not possess easily accessible or highly articulate reasons justifying their beliefs.

2.1.3. Biodiversity

Half of our respondents defined environmental quality using the term "biodiversity" or some term related to the "*variety of life*." Various types of variety or diversity were described:

(1) landscape types ("*abiotic*" and "*biotic*" qualities);
(2) "*habitat types*" ("*aggregations*", structure, and age);
(3) ecosystem types (structure and age);
(4) types of tree stands (structure and age);
(5) "*species composition*" and/or "*proportions of species*" (in particular plants and/or animals); and
(6) "*species abundance*" and/or "*species richness*" (in particular plants and/or animals).

Explicit in some people's definition of biodiversity was the expectation that diversity leads to stability or to the ability to resist or recover from large perturbations:

> "*Generally the more diversity you have in the biologic world the better able and more resilient the ecosystems are to respond to different stresses and not collapse because of monocultures and things like that*" (Forest Service #9).

2.1.4. Sustainability

Half of the respondents defined EQ using the buzzword "sustainable." In general, informants defined sustainability as the ability to meet society's various needs over a long span of time. The forest was described as:

> "*The only resource that we really have that we can manage for sustainability. It is infinite. If we are good stewards of the land then certainly we can achieve sustainability*" (Public Informant #3).

As would be expected given the range of answers given thus far, there exists a wide range of descriptions of which environmental qualities should be sustained, making the definition of sustainability at least as vague as any other construct. That is, it could be timber, water, ecological processes, scenic quality or wilderness that is sustained. Some people, recognizing and trying to circumvent this ambiguity, focused on the "*productivity of the soil*" or the "*regenerative capacity*" of the ecosystem as key criteria of sustainability. If the soil and the regenerative capacity of the system are maintained, so goes this reasoning, then the forest will be able to produce a variety of goods and services in the future. This definition of sustainability is similar to the definition of resilience, as explained above.

People had difficulty specifying the time span over which something must be sustained. Some people specified "*hundreds and hundreds of years*", and others offered no time limit (i.e., the flow of goods and services must be "*continual*"):

> *"I'll introduce a term to you: dynamic sustainability. What that means is that in an entire area, like a watershed, you may have a stable amount of forest cover and so forth, but over the long term, hundreds and hundreds of years, where that exists shifts but it is stable in a sense that most plants and animals can't deal with change that is too fast. They can adapt and move over long periods of time by not … not human time … and that the result is that there … like if you do something like if you have an ice-age where climate changes over tens or hundreds of thousands of years, species diversity tends to increase, because things change so slowly that plants and animals adapt or physically move populations. What you have to do is produce a land situation where the entire situation in the*

> *watershed is such that things don't change so quickly so that you stop dropping out species in the mix, which is basically what we've been doing for the last 150 years, which is the biggest problem in the Jefferson*." (Public Informant #1)

Again, the "appropriate" role of humans in nature cut through this definition of EQ. Some respondents defined sustainability as something that could be produced through human management, for example by "*recycling*" and using "*longer timber rotations*" or by restoring or "*fix[ing]*" management activities.

> *"We could talk about sustainability with the timber resources where we are regenerating stands of timber over periods of time. Something which we are sustaining those ecosystems and still using the products of the land and contrary to that or in contrast to that would be using our mineral resources where we are not sustaining things. We are depleting them. I guess most of the resources where we are … most of the resources that are organic related certainly have the potential for being sustained. Probably more easily than the inert resources, such as the minerals, but even those in a way through recycling and all and reuse can be sustained with I think a certain degree even though it wouldn't be in their original form. So the use over and over of products perhaps, recycling of products whether it be inert or biological based or organic based*." (Forest Service Informant #7)

> "*You can man something of perpetuity without any big, serious adverse affects or if you have some adverse effects you study it and what went wrong and you fix it*." (Forest Service Informant #3)

Others suggested sustainability could be produced by humans "*doing nothing*" or by "*restoring*" nature to previous, pre-human conditions.

> *"In my opinion sustainable would be a forest that is taken care of for the long run. Fertilization and planting trees are not reinvestments for forest health. They're just investments in the next commercial stand and there is no substitute for the real thing. Sustainable would be to let the forest live and thrive on their own. I see that being the only way they can sustain themselves and if we don't stay out of it there won't be any."* (Public Informant #4)

2.1.5. Other Buzzwords

For some people (3), the presence of exotic species was used to define poor EQ:

> "*If it's whole, if it's complete of native species and free or damn near so of exotic weeds or aliens or whatever you want to call them, then I think the environmental quality is okay*." (Public Informant #9)

These unwanted species were defined as being "*non-native*," "*imported to the area*," species that haven't "*evolved*" in these ecosystems, and "*trees not native to our ecosystems*".

Water quality was mentioned by five of the people we interviewed. It was defined as water being free of the pollutants caused by timber cutting and road building:

> "*I think of water quality where you prevent pollution from occurring through various methods. Where you have to be careful with certain kinds of activities. Any that are occurring anywhere around a stream. Cutting may need to be modified or maybe even in excluded in some critical areas where you have critical soils right above the stream. Road building is one thing that would have probably the most impacts, but if that's well thought out and plan a good location of road that's back far enough from the streams and the roads are on decent and reasonable grade that they can be maintained. And a lot of the time, in fact most of the time now, right after the timber sale the road is closed and there need to be certain practices taken to stabilize the road such as seeding the surface of it. If there are any major culverts in them, have them checked on a regular basis from time to time. See that they are not stopped up and that the road doesn't … when the stream overflows that it won't spill over and wash out part of the road. Things like that.*" (Public Informant #5)

Water quality was also described as:

> "*The natural infiltration of water both below the surface and flowing into the streams.*" (Forest Service Informant #4)

Similar to water quality, respondents (3) identified air quality to be free of "*heavy metals*," and pollutants that could be deposited and created "*health problems*" for humans, animals, vegetation, and/or soil. Soil quality was defined by the lack of "*erosion*", "*siltation*", or any management disturbance that would "*reduce the capacity of the land to grow certain [species of] vegetation*":

> "*If there is an area of big soil disturbance it would certainly affect environmental quality, which ultimately affects water quality.*" (Public Informant #5)

Ecological integrity, to our surprise, was identified (explicitly) as a construct of environmental quality only during one interview and was defined as a forest with:

> "*The full complements of structures and components functioning as they should in a healthy manner.*" (Public Informant #10)

Given that integrity is a term increasingly found in biological conservation research and environmental group literature, we thought it might be more prevalent in our discussions with participants in the planning of the Jefferson National Forest.

2.2. Values

> *"… what we value in the forest is so different. We are supposedly seeing the same thing, but we are seeing totally different things. It's all through that cultural lens of what is important, what we are pulling out. So when you are listening to people in these meetings about what is important, these tend quite often to be statements that go to the very root of human values …"* (Public Informant #4)

We specifically asked people to explain their values for nature (Question 3C, Appendix A) by asking them to explain why the buzzword they identified (e.g., biodiversity) mattered to them or to others. In addition to the specific answers to this question, we found evidence of the values people hold for environmental quality embedded in their answers to other questions asked during the interview.

Appendix D displays the intersections between the buzzwords people used to define environmental quality and the values they associate with the constructs. The numbers reported describe how many people used a certain value when defining a specific construct. Because any one person can express any number of values in their definitions

of environmental quality's constructs, each number in the table is independent of all other numbers. That is, within each category of values (i.e., anthropocentric, biocentric, or synthesis) the specific sub-categories are independent of each other and all subsequent sub-sub-categories. For example, three people used the anthropocentric, utilitarian value of recreation in their definitions of health, while ten people used the anthropocentric, utilitarian value of economic utility in their definitions of health. Appendix D does not decipher whether or not the three people who value recreation are mutually exclusive from the ten people who value economic utility. In addition, many of the values listed as anthropocentric and biocentric could be placed in the synthesis category. We attempted to keep them separate.

Several respondents noted that no one person has the right or wrong definition of environmental quality because *"environmental quality is an emotional issue rather than a scientific issue,*" and that in order to have one's own "*value system be respected … [one has] to respect other folks' value systems"* (Public Informant #3; Public Informant #7). One respondent also commented that since society's values for nature "*change with time,*" forest management plans are necessarily temporary because they must aim at a moving target. The following is a discussion of the explicit values for environmental quality that emerged from our respondents during the interview process.

2.2.1. Anthropocentric

2.2.1.1. Utilitarian and Enlightened Self-Interest Values

The flow of goods and services from forested lands was recognized and appreciated by everybody we interviewed. Perhaps more so than for any other topic covered in the interview, people had ready access to a language allowing them to discuss these issues. The language of multiple uses was quickly and confidently introduced to describe why

forests are valued (i.e., "*wood*", "*water*", "*range*", "*recreation*", "*wildlife*", "*forage*"). As one interviewee noted:

> *"We are tasked with managing … in a way that will provide the goods and services for the public and give them goods and services, everything from recreational opportunities to wildlife to timber resources, visual quality"* (Forest Service Informant #8).

People (3) also mentioned the "*educational*" and scientific benefits forests provide. Forest management was seen, by most (15), as the way to provide these resources and to protect human property and human life from the hazards and risks of uncontrolled nature: "*fire, floods, landslides*." Of the people who expressed enlightened self-interest values, some of them (6) noted the possible links between environmental quality, especially water quality, and human health:

> *"We need to respect our natural environment, …[so] we don't pollute it and end up hurting ourselves."* (Forest Service Informant #9)

Some people (4) also expressed concern not just for the resources that benefit current generations but also for intergenerational equity:

> "*Because anything less is shortsighted … I think we have a duty to assure that we will leave the environment in at least as good as shape as there is now*." (Forest Service Informant #1)

Most people (15) also noted that human life depends upon a functioning forest (e.g., the "*conversion of carbon dioxide to oxygen*") and that it is thus in our own best interests to maintain these functions because it's "*our life support system*". Humans are part of an interconnected system and degrading this web of life eventually degrades the quality of human life.

> "*To me it's a self-evident truth. It's hard to put into words. It's one of [the] things if you're not concerned about being healthy then you are not really concerned with life. I guess if you are suicidal or something you are not going to be concerned with your health*." (Pubic Informant #10)

2.2.1.2. Spiritual, Aesthetic and Recreational Benefits

The American environmental literature, especially early American transcendental writings by icons such as Muir, Thoreau, and Emerson, are full of references to nature as a "conductor of divinity." However, only five people, all of whom were public participants, explicitly mentioned the spiritual connections people make with forests, and only one of them described their personal connections: "*it also provides me with a spiritual uplifting*". The rest of the respondents who mentioned spiritual values of the forest described the connections experienced by other people. Perhaps the interview's emphasis on precisely describing environmental quality biased people (especially Forest Service employees) to feel they needed to be dispassionate and objective, thus making them feel uncomfortable expressing these very personal feelings. Or, perhaps, as the person below suggests, the people who have these feelings tend not to be intimately involved in the forest and hence were not captured by our small sample that emphasized those intimately involved in the planning process:

> "*I think it is a reaction to our industrial, post-industrial society and there is an attempt to link with something that is regarded as natural rather than human created. That's a myth, it's a very important myth. This idea of being rooted in nature, relating to nature seems to be an important cultural trademark. The people who go and say this represents my church, my cathedral, this is my sacred music I can hear the wind blowing. I don't want to dismiss that; it is very important in psyche of not just individual people but cultural. I think it's interesting that some of the strongest proponents of natural forests are people that live in urban environments and basically don't get to see and live in and experience that forest very often. As opposed to people who might be woodworkers or who would be working in the forest on a day to day basis. That cultural significance of something that is other than what surrounds us on a day to day basis is really a strong magnet. And it's the importance for the wilderness societies not whether we actually have a wilderness but that we have the myth of wilderness. That we have pictures that we can put in magazines that people can enjoy or television programs that people can enjoy vicariously, something that is out there somewhere else. That is powerful food for the soul for modern human beings*." (Public Informant #2)

Many people (8) articulated desirable aesthetic qualities of the forest. That is, these informants identified their values of specific visual qualities. There were differences of

opinion as to the aesthetic impact of timber harvesting and similar management actions that disrupt the canopy and/or expose soil. Although most felt the impact was negative, some people felt it only temporary and, thus, not a problem:

> "*It could be visually. You can definitely see stands that have been cut. It's not pretty, but it is temporary. You could have some short-term erosion.*" (Forest Service Informant #5)

Others felt the change was more significant, whether or not it was temporary:

> "*I don't like to see muddy streams and hillsides with eroded gullies. I think it is bad for people. It's bad for the environment. It's bad for everybody*." (Public Informant #8)

Recreation in the form of hunting, fishing, hiking, camping, biking, bird watching and the like were recognized by many interviewees (12) as legitimate benefits that flow from the forest. Increasing recreational use, however, has created new problems for forest planning:

> "*The demand for, again Mt. Rogers there are a lot of people interested in recreation there and the Forest Service developed a fair number of trails and has just attracted such attention. I mean people are coming from Charlotte, Atlanta, Charleston WV, Knoxville, and it has developed such a high use that it has degraded the recreational experience. It's not really the Forest Service's fault, but it's just the number of people. There are so many people now there is such a demand. Demand is growing for that, so it's not really that it's the site that has been degraded. I guess in some cases it has, but not permanent. You can remove the people*." (Public Informant #6)

Not only are some sites being degraded from recreational use, but also conflicts erupt when recreational users compete for the same area (e.g., off road vehicles and bird watching):

> "*…[It's the] kind of issue like ATVs, where you have a high potential like degradation, but we have to recognize that this is a legitimate use of the National Forest at least in the theory. But the question is how do you reconcile that use with lots of other uses that it's in conflict with and the high potential for degradation of wildlife habitat, of water, of compaction of soil, erosion. So we believe that careful planning and selection of trails and enforcement could resolve many of those conflicts, but that's where good planning comes in to account*." (Public Informant #2)

2.2.2. BIOCENTRIC

Most people (16) expressed respect for the rights of non-human life, and recognized these rights as values associated with a natural forest environment. But the discussion of these rights and values was much less direct and explicit than the discussion of human-centered values and benefits that flow from the forest.

Some people were explicit about the need to protect *"…all the other living creatures in the world besides ourselves*," suggesting a concern and respect about the rights of individual organisms. That is, each organism has a right to life, and to take that life is comparable to the murder of a human. But, most expressed a more ecocentric perspective, granting rights and value to ecologically significant units such as species or ecosystems. The grazing by large and growing deer herds provides a case in point. It was recognized that the deer are preventing some forest regeneration, endangering some rare plants, and otherwise damaging parts of the ecosystem that also have a right to exist:

> "*We need to kill more deer in there, well that may be true and, animal rights people excuse me, it might even be good to kill deer… The deer herds have gotten to a point now that they are running plants to extinction … native plants to extinction. It's a shame we can't get them to eat weeds, but they won't eat weeds*." (Public Informant #9)

Statements like this one, we believe, reflect the extension of granting rights and values to all components of the natural environment, not just to traditionally charismatic creatures like deer.

2.2.3. Bioculturalism

> "*It's important to me because it is looking at how the forest functions as opposed to looking just at what the forest can provide to people, although that's obviously very important because we are here and we rely on forest*

> *a great deal. But somehow we have to learn how to live with the forest, work with the forest*. " (Forest Service Informant #10)

Bioculturalism deals with the tensions between valuing natural, dehumanized conditions and recognizing the necessity of managing nature for the material resources and ecosystem services on which humanity depends. Most people (17) defined good environmental quality in term of "*natural*" processes; that is, most people believed that natural, dehumanized conditions are good conditions for the forest. This does not imply that they necessarily believe the strong organismic view that nature is balanced, but it does imply that they have more confidence that natural forces and natural change will produce better environmental conditions than human management and human technology. Despite this belief, everyone recognized and valued the flow of resources on which humanity depends, a flow that requires us to manage and extract these resources. Thus, people are faced with a tension created by competing goals and beliefs. They believe environmental quality is best if we "*leave nature alone*;" they recognize that their lives requires resources to be "*extracted*" from nature; they realize that this extraction requires "*human presence*" and "*management*" of nature; and they realize this presence and management "*may degrade*" the environmental quality on which their lives depend. A few people (2) seemed to negotiate the competing goals and beliefs by suggesting that management should be "*cautious*," or "*careful*," and seek to "*minimize*" human impacts on natural processes. Similarly, people suggested management should "*closely mimic the natural process*."

This cautious approach to human intervention in nature, both to respect nature and to protect the flow of goods and services, reflects a sort of synthesis of the previous value systems. Most of the people we interviewed expressed both biocentric and anthropocentric values. They valued both the resources and services that improved human well-being and they valued and respected the rights of some units of nature to exist:

> "*It's hard to say. I don't know why it matters to me, I know it does matter to me for matters of fairness and justice and selfishness and spiritual qualities and our responsibility to others that we share the planet with, and who will come after us be it human or non-human. To me it's a matter*

of fundamental life importance there. If the environment is degraded, well then we are degraded and everybody else, be it human or non-human, is degraded also that they can't have a good life. I mean life, liberty, and the pursuit of happiness. You're not going to be happy and you're not going to be at liberty with a degraded environment. Freedom for animals and for plants and for natural processes it's part of our fundamental life structure that we are not in a test-tube. It's a system that sustains our very lives so therefore it must important if you are interested in life itself. If you're not interested in life itself well then you are not going to be interested in environmental quality." (Public Informant #10)

The bio-cultural conservation literature has explicitly evoked the idea of a tended or gardened nature as a way to describe the careful, cautious and respectful relationship between nature and society (e.g., Hull et al., 2000; Nassauer, 1997; Pollan, 1993). One of the people we interviewed evoked this metaphor describing what the Forest Service seeks to achieve:

"*You can actually use the word tending, like a garden, so you can go through … depending on the markets and the access and whatever you'd keep it thinned out and be growing the trees faster. So you'd be looking at mass production, you'd be looking at wood quality, you'd be looking at species of trees and trying to … it would be just like growing a garden for practical purposes, not to the intensity as on industrial land. We've got a little different objectives than industrial forestry, but from the standpoint of wildlife management, typically mass production and growing fiber. So that's what I would look at from a forest health standpoint, now you know we know we're going to lose trees, you don't have to utilize every tree. So from that standpoint we'd be managing stands pretty much the way we are doing it now*" (Forest Service Informant #4).

This relationship between humans and nature was described as a type of stewardship (6) that consists of "tending" and "working at the margins":

"The relationship of the people to the things surrounding them and the relationship of those other aspects in that big picture is very, very important especially when you are trying to create that as a created thing. In looking at the land of the Jefferson National Forest I tend to think of myself as a conservationist rather than an environmentalist. And I've often thought about that time to time and I guess it has to do with a conservationist and the term conservation has also been taken over by the wise-use people, and wise-use now has a bad connotation by many people, but in going back to the root of conservational conservative, this notion of

> ***tending*** *to be good stewards is something that a lot of us take very seriously and it sees the importance of what kind of management … the relationship of people to what it is that is out there is something that you have to take very seriously. I think there is a sense that you are working with it, that there is a notion of* ***tending something*** *that you're* ***working at the margins****. Granted, with forest management you could* ***work at the margins*** *and cumulatively have a substantial impact over time. But it is a sense that there is something much bigger going on and you are working at the large mosaic and you are trying to make certain that your actions are wise, that your using this notion of stewardship that is related to future generations.*" (Public Informant #2) (Emphasis added in bold)

Rather than fall at an extreme of the human – nature dichotomy that pervades so much of the understandings and discussions of nature, this bio-cultural synthesis transcends the dichotomy creating a continuum, where humans and nature have a relationship.

2.2.3.1. Faith in Technology

Another theme emerged in our discussions, one that reflected the degree to which people believe that human technology can solve current and future environmental problems. Those (2) with less faith in technology tended to believe that humans are "arrogant" for thinking they can manage a forest:

> *"[Management/technology] could [make things worse]. It could [go] the other way instead of making things better, of course anytime management has error in it and you don't see the results of it for 10 or 15 years. You can overcompensate or under-compensate*." (Forest Service Informant #5)

These respondents felt that it is best to be "cautious," to mimic rather than control nature because the complexity and randomness of nature defy prediction and control:

> "*Personally I think that man tends to be enormously arrogant and we ought to be humble enough to understand that we have a very limited grasp on what goes on in natural ecosystems*." (Public Informant #1)

One's faith in technology, then, influences one's confidence in human control of nature and may be used to justify a position not just of caution, but of allowing nature to take its

course. We categorized this "faith in technology" here as part of the bioculturalism value system because peoples values could fall anywhere on the nature – human continuum.

2.3. Mechanisms

We specifically asked people to explain their understandings of how nature worked (Question 3B, Appendix A) by asking them to explain how the buzzword they identified (e.g., biodiversity) produced or influenced environmental quality. In addition to the specific answers to these questions we found evidence of the functions and processes people invoked to explain and justify their understandings of how nature works embedded in their answers to other questions asked during the interview. Some of these understandings about nature's mechanisms were described in precise, scientific terminology, while other understandings of nature's mechanisms were vague and difficult for people to describe. These mechanisms may or may not conform to contemporary scientific understandings of ecology, yet they do describe how the people we interviewed think nature works. People use these mechanisms/understandings to justify their positions about what determines acceptable EQ. We organized people's responses using the major categories reviewed in the introduction.

Appendix E illustrates the specific mechanisms people used in their definitions of environmental quality's constructs. As with Appendix D, the numbers in this table describe how many people used a specific mechanism during discussions of a specific construct. The numbers in this appendix are independent of all numbers because any one person can understand environmental quality through any number of mechanisms.

2.3.1. Balanced – Dynamic Continuum

Nature was described as being balanced, or dynamic, or as possessing both balanced and changing attributes by most (15) people we interviewed. Ideas related to nature's balance cut through most people's understandings of nature. Fourteen people implied that some type of balance exists in nature. Some used the word "*balance*" explicitly in their explanations of an equilibrium theory, while others used words and phrases like: ecosystems in "*harmony*," forests that are "*not changing*," "*similar*" forest conditions through time, "*equilibrium*," and "*repeatable [processes] inherent to [forest] systems*."

In addition to these descriptive phrases, eight of the people we interviewed explained that high EQ results from an environment being "*resilient*" or "*resistant*" to change. For example:

> "*Well to me if something has environmental quality, if those processes are occurring so that the forest is resilient and can deal with various things that happen to it, whether it is human disturbance or natural disturbance. By that then all the pieces remain there*." (Forest Service Informant #10)

People used ideas and phrases such as the "*web of nature*" (10) and "*nature's cyclic behaviors*" (4) to describe the natural forces that cause nature to resist change and/or somehow return back to a preferred state.

> "*Although it might be changing, it's going through a process that is repeatable [and] inherent to the system. For example, a hurricane … hurricane Hugo might come through here and blow down a hundred acres of poplar and that's a change and it's going to take some time to grow back, but it would more or less with the same species and same processes*." (Public Informant #6)

Concerns about exotic species similarly echoed a balance of nature argument. Eight people suggested that exotics disrupted nature's balance or distorted the web of life. They described exotics as "*an aggressive pioneer*" that "*is taking over*" or "*… kind of out of control*". For many people, exotics degraded EQ because exotics disrupted the natural balance:

> "*Exotic plant species, exotic insects, and exotic animals that muck up the ecosystem*". (Forest Service Informant #2)

Previous research (Dizard, 1994; Norton, 1995; Ross et al., 1997) suggested that the Clementsian view of ecosystems as self-regulating, maturing, living organisms that have definable properties was widely shared among lay and scientific communities. Only a few respondents explicitly used this strong organismic analogy to explain nature's balance. One person used the analogy of a wounded arm that eventually would return to its healthy state, but not before a scab temporarily covers the wounded area:

> "*Actually I think this forest is a scab because the chestnut was pretty damn prevalent here especially on some these dryer slopes, dryer ridges and stuff the chestnut was a real dominant factor. Maybe not everywhere, I mean you don't go into hemlock bottoms and find chestnuts dominating the stand or you would call them chestnut bottoms. And in some of these places chestnuts were the big deal. Now the chestnuts are gone and I feel like if I would look at my arm and I would say okay skin and hair dominants and then I'd burn myself or cut myself real bad the scab is what forms and until that scab is gone and the skin and the hair comes back then I'm just dealing with the scab. I think that is what they are doing here on this forest is just dealing with the scab and now they are saying that you can pick at the scab and more scab will grow and everything will be okay. They are trying to push this oak regeneration and to me the Forest Service has been run into court on pine conversions because now they say you can't just convert all these forests to pine. So what the Forest Service has done by saying we don't do conversions any more, they are still doing it by forcing oaks to grow everywhere where they might not be the dominant species over a period of a couple hundred years. But that's the thing about management is it is man-age and you are looking at roughly 90 years…*" (Public Informant #9)

Most people did not to push the organismic analogy that far and instead referred to general "*forces*" (i.e., mechanisms) that guide nature towards some balanced or healthy state. The metaphor of the interconnected web of life (10) and biological diversity (4) were used to explain one such mechanism that holds everything together and creates a balanced or resilient nature:

> *"… generally the more diversity you have in the biologic world the better able and more resilient the ecosystems are to respond to different stresses and not collapse because of monocultures and things like that."* (Forest Service Informant #9)

> "*It goes back to that concept of rare communities and unusual features. Again the Leopold quote about the first step to intelligent tinkering is to save all the pieces and that all the pieces in this case would be the total array of plants and animals that are found in the biota*." (Forest Service Informant #8)

Although most people understood nature to tend toward balance, they did not all assume that this balance produces a static condition. Half of the people we interviewed explicitly described nature as being dynamic ("*changing*," "*disturbance regimes*," "*cyclical*"):

> *"… anybody who knows a great deal about forests knows that they are constantly changing. That there is no such thing as that kind of permanence. It's a myth."* (Public Informant #2)

Most (9) of these people also understand nature to be balanced. They explained that change and disturbance were "*natural*" or "*important*" properties of ecosystems and hence good and acceptable:

> "*And I often think about the role of fire, all natural disturbances, insects and diseases, those sorts of things. The forest growing, changing, maturing, dying, regrowing. And the interaction of all the species through that*" (Forest Service Informant #10).

Some cautioned that these natural disturbances made management difficult. More specifically, management is made difficult because 1) humans *"lack … control over natural influences*" that dominates ecosystem change and 2) the "*unpredictability of evolutionary change*" and other causes of change make the task of forecasting future conditions difficult or impossible. But this lack of faith in human technology was by no means universal:

> "*I think we, as scientists, can predict and relatively be certain of how nature will respond to different activities be them good or bad, being managed or non-managed*." (Public Informant #3)

Several people used terms such as "*dynamic equilibrium*" or "*dynamic sustainability*" to describe their understanding of nature that includes both change and balance. When viewed from a larger scale of time and space nature appears to be balanced. Disturbances

are the norm at the small scale, but when viewed from this larger perspective the same sorts of systems reemerge and there appears to be some stability:

> "*When people talk about stable ecosystems, many people scoff and say 'well nothing is stable and the forest is going to change all by itself', but on a larger scale you have to have that stability.*" (Public Informant #1)

2.3.2. Evolutionary – Ecosystem Continuum

Fifteen of the people interviewed explained how nature works using indirect references to an evolutionary and/or to an ecosystem approach to ecology. Evolutionary ecology is an entity-oriented approach to ecology that focuses on organisms and their aggregations (i.e., populations). Conservation decisions based on this school emphasize the conservation of species and historically natural conditions (e.g., ecological restoration, biological integrity, native species). In contrast, ecosystem ecology is a process-oriented approach to ecology that focuses on energy, nutrient, water and other flows and processes that make up the physical system. Conservation decisions based on this school emphasize efforts to sustain these flows. Callicott et al. (1999) suggested that the schools represent ends along a continuum rather than distinct paradigms and that explanations of nature often merge both schools. We found evidence of this "middle ground" in our data; often the same people used both schools of thought to explain their understandings of nature.

Ten of our respondents understood the role of nature in an evolutionary context. If someone expressed concern about an exotic species we classified that as an evolutionary ecology (compositionalist) concern when the statement referred to some natural or idealized composition of species. More specifically, explanations were classified as evidencing evolutionary ecology if they made explicit references to the benefits of native or natural species:

> "*… the full complement of natural species defines environmental quality.*" (Public Informant #8)

We found people to believe that:

(1) Exotics are bad because they did not evolve naturally with the area (i.e., they create a "*change in the natural processes*" of the forest); rather they were "*brought in*", "*imported*", "*introduced*", and "*not native*;"

(2) Exotics are a problem because they are "*aggressive*" (i.e., they are a "*growing problem*," "*reduce diversity*," and take resources away "*from other species*"); and

(3) Exotics are bad because they are associated with human management that disrupts natural processes (i.e., exotics "*cannot survive without the presence of humans*" and exotics "*cannot survive in mature forest conditions*").

We categorized a response as an ecosystem ecology (functionalist) (13) concern if someone emphasized nutrient cycles (3), the interconnected web of life (10), flow of energy (2), or similar functional characteristics of ecosystems (2). For example, one person understood naturalness as the continuing of ecosystemic cycles without human influence:

> *"I think in the sense that we are talking about, the number of exotic species or the processes that are going on there and whatever cycle, like energy or nutrient or whatever cycles …would they continue in the absence of people. If you took people out of them, what would happen. Everything would continue pretty much like it was, but on the other hand, but if you took people out of here a lot of these exotic species couldn't make it."* (Public Informant #6)

Nutrient cycling was further explained by one of the people we interviewed as a process that builds soil and keeps nutrients for other organisms in the area:

> "*So its okay for the tree to fall down and just rot on the ground because that gets back into the nutrients and all that and there is a place for moss and salamanders and all that*." (Forest Service Informant #4)

2.3.3. Nature – Human Continuum

The distinction between humans and nature, and the appropriate role of humans in nature, cuts through most (19) of the explanations of how nature works offered by the people we interviewed. We expected this finding. Callicott et al. (1999) found naturalness to be a primary criterion that organizes the major conservation constructs in use today. As noted above, naturalness was one of the most frequently offered definitions of environmental quality during our interviews. Also, the role of humans in nature is one of the major issues confronting conservation management. At one extreme it is believed that human technology can only defile nature, degrade environmental quality, and generally muck up what Nature does best. At the other extreme, human management is and has been an intricate part of nature for millennia, can improve and repair nature, and is both necessary and acceptable. Yet given these extremes, many of the people we interviewed described a middle ground between the two extremes where human management and natural processes coexist to produce acceptable environmental quality:

> "*Some people feel that humans aren't part of the environment and they try to divorce humans from it, whereas I firmly believe that we are an integral part of it.*" (Forest Service Informant #1)

2.3.3.1. Nature Knows Best

We found that many people (18) just assume or accept on faith that natural conditions generate good environmental quality. As one person stated:

> *"I have a great deal of faith in natural systems to heal and improve themselves.*" (Public Informant #1)

Yet, few people were able to explain why or how nature does this. Natural conditions were assumed, by default, to possess good environmental quality. Some of our interviewees who did try to explain why natural conditions produce good environmental quality used "*evolution*" as the basis of their argument. This reasoning emerged during people's justifications to why natural changes (e.g., ice damage) are better for environmental quality than human-wrought changes:

> "*You can talk about disease processes in the forest that are part of the ecosystem that evolved there. I don't view that as unhealthy forest.*" (Public Informant #6)

> "*The critters that evolved, and of course they are not all here now, but the critters that evolved in the natural flow regime. I think it is important that we provide them with the kind of habitat in which they've evolved*" (Public Informant #7).

For those adopting this position, human presence degraded environmental quality. To these people the best environmental quality occurred in a nature where humans were not influencing ecosystem functions and processes. Some people suggested that something natural consisted of any single one or combination of the following criteria: "*historical*" (i.e., pre-human) conditions, "*not-human made*," "*without human influence*," without "*roads*" or "*trails*", and "*wilderness areas*." These criteria allow little conceptual room for humans to be part of nature.

2.3.3.2. Modest Human Intervention in Nature is Acceptable

Other interviewees (10) were less extreme in their desired separation of humans and nature and in their preferences for removal of human management. They argued that natural processes could co-exist with modest human intervention:

> "*I think that human influence needs to be managed to a degree so you can maintain that balance between natural processes being sustainable and humans getting what they need*." (Forest Service Informant #1)

> "*I think you could if it was managed correctly by careful … reduced timbering, the way that you timber and … you can take some out of the forest without damaging it if you desire to do so. But money wise they just don't look at it that way. They just want to cut the quickest way, but I think it could be done, maybe manually. Carefully it could be… So with care then management would be more expensive, but in the long run it would pay off. We'd have more forest*." (Public Informant #4)

The idea of "*balance*" and "*harmony*" to describe the ideal relationship between humans and nature is common in contemporary culture (MacNaghten, Brown and Reicher, 1992). From this moderate perspective good environmental quality can be produced by management that has minimal impact and/or mimics natural processes:

> *"… usually when I think of the word natural process it is sort of the disturbance regimes or successional trends or successional pathways in a vegetative community that are operating with minimal human influence*." (Forest Service Informant #8)

> "*I think if we recognize natural processes and strive through our laws and policies and implementations of activities that we can create acceptable environments that aren't totally natural that are still compatible with life and existence and with natural processes*." (Forest Service Informant #7)

2.3.3.3. Humans Can Improve Nature

Other people we interviewed (13) explained that human management improves the quality of a forested environment. One reason offered for this position is the belief that nature is dynamic. Because nature is going to change, no ideal or balanced state exist that can serve as the benchmark or goal of management. That is, nature does not know best, rather it is constantly changing and no one state of nature is better than another state. Humans must be prepared to respond to change this change:

> "*It's going to change; we (humans) can't stop it from change. We can just manage the way that it (nature) changes in a more productive, scientific manner*." (Public Informant #8)

Many argued that that the "nature knows best" argument is not relevant because nature does not know what is best for humans. These people argue that out of necessity forests must be managed to produce the qualities that humans require.

> "*That is my main concern and wildlife management means forest management. We could leave the forest alone, we could do nothing with the forest and we would still have wildlife populations, but we would not have the same wildlife populations, we wouldn't have the density of some of the species that people like to see and like to hunt frankly. I'm not a*

> *hunter myself so I don't have that ax to grind. I don't feel like I need to go out and shoot 5 deer a year so I'm not excited about creating giant deer populations so I can go out and kill. I don't shoot. My interest is providing what the general public wants and I think that's the sort of thing they want. They want a decent deer population, they want a decent turkey population, and they would like to have a decent worm-eating warbler population as well.*" (Forest Service Informant #2)

> "*I would think that, again, healthy forests, healthy ecosystems make environmental quality occur naturally. I believe that if you are actively managing the resource that environmental quality would be just a natural byproduct of those activities.*" (Public Informant #3)

Several examples were given to demonstrate that management is a necessity: fire is increasingly dangerous as people settle forested environments; large deer herds overgraze and destroy forest regeneration; rare species require forest conditions (such as the high altitude grassy balds) that would disappear without active management to maintain the openings; and, most importantly, people desire commodities such as plentiful fiber, huntable wildlife, accessible recreation, and controllable water flows, all of which require active and repeated management efforts.

A few people were even more extreme, explicitly suggesting that humans can improve upon nature, creating better environmental quality than is possible in unmanaged nature:

> "*Good forest management [can] achieve sustainability and health in a forest ecosystem in a much more efficient and calculated manner than a non-action alternative*." (Public Informant #3)

An example of this reasoning was the use of silviculture to create a diverse age-class distribution that will, in turn, increase the diversity of species and habitat types, and, in turn, increase the ability of the forest to resist catastrophic changes caused by insects, diseases, fire, wind and ice that can produce erosion, fire, wildlife displacement and other undesired effects:

> "*I think diversity is a good sign of health. If you've got diversity then you've accomplished certainly early-successional stages in which you are promoting regeneration and re-growth and reproduction, as well as managing for the health of the mid-range stands… and you're also*

managing for your old-growth and your old-forests, which in and of them selves will eventually become early-successional." (Public Informant #3)

Finally, it was noted that human management can often more quickly repair past (natural or human caused) damage:

"*We have some areas of land on the forest that are so badly damaged that unless we do something it is going to take more time, not less time, for it to recover*." (Public Informant #1)

2.3.4. Geographical Scale

Fifteen people expressed the need for environmental quality to be defined spatially in order to effectively communicate and negotiate their and other peoples' desired forest conditions. Recognizing that there are differences between geographic areas, respondents explained that ecosystems are nested hierarchies, with decreases in scale from planet to habitat to forest to geographic location to vegetative type:

"*Well again, an ecosystem is such a concept it's kind of a nested hierarchy it depends on what ecosystem you are talking about and what forest you're talking about and at what level that you are talking about. You can have some such component however that ecosystem is defined that it would be relative to whatever, another area of similar size, it could be very healthy in and of itself if you didn't look at its context and you didn't look at some other overall factors like air coming in and atmospheric acid deposition and things like this. Again it gets into what exactly is the forest that you are talking about and what is the ecosystem at what level you are going to define that. In general I would say that the smaller an area that we look at, the healthier it can appear to us*." (Public Informant #10)

We found perceptions of forest management that requires an acknowledgment of such differences between these scales:

"*That's a very important factor in environmental quality, because things you do, for example, in the headwaters of a watershed could affect people downstream outside of your immediate area. Again it's a very important factor in environmental quality is taking as large a look as you can to see if you are affecting areas beyond the area your management is in. In other words, you're managing this particular area, but some of the things*

> *you are doing might have an effect much larger. It might affect the environmental quality in a larger area.*" (Forest Service Informant #9)

Many people applauded the Forest Service's recognition of the importance of managing on a broad landscape scale, especially with its coordination of planning and setting goals with neighboring National Forests. The Southern Appalachian Assessment's scale starts at a regional level consisting of five National Forests, then narrows down to each National Forest. The geographic scale of the JNF, specifically, is a division into five geographic provinces (consisting of different biotic and abiotic features), and then into specific management units. Respondents explained that this explicit attention to geographic scale allows the Forest Service to customize the management of different geographic provinces to achieve the same goals, in addition to examining management effects on areas outside of the provinces and forest:

> *"Well within the Jefferson it is all different levels that we are managing … different geographic scales we are managing for. We [are] doing the Southern Appalachian assessment area is a scale where we are taking similar natural resources under similar geographic provinces in sections and sub-sections and all. We are trying to manage them wisely and similarly so that's a geographic scale we are dealing with there. Within the Jefferson itself we have 5 provinces or subsections within the geographic hierarchy.*" (Forest Service Informant #7)

A few people commented that with the forests being so "*fragmented*" management must look at ecosystems on the landscape scale and include private lands as well as public lands. Likewise, the JNF must look beyond its borders because it is impacted by factors outside its control (e.g., air pollutants affecting the JNF that originate hundreds of miles away). One person explained that "*technology*" (i.e., geographic information systems) has allowed management to better account for scale; it assists viewing environmental quality on a landscape scale as well as on a stand level scale.

In addition to influencing understanding of the planning and management of the JNF, geographic scale permeated people's understandings and concerns of nature ranging from wildlife habitat to worldwide impacts:

(1) The survival of species is dependent upon the size of required habitat patches. They need: to be large enough to "*support their populations*"; to have connected "*matrices*" to allow for safe ranging between a diversity of habitat patches; and to consist of some "*large interior habitats*";
(2) The concept of wilderness areas is dependent upon the size of the area. They must be larger than current Eastern Wildernesses in order to be "*unfragmented*", "*intact*", "*wild*", "*old*", and "*self-functioning forests*" so that they will not require management and will allow for "*true wilderness experiences*";
(3) The "*local scale of individual watersheds*" is extremely important for specific management planning because of the influences from both public and private lands;
(4) The need for timber harvesting on public lands to consist of "*large-scale rotations*" of "*small forest patches*";
(5) The importance for the forest matrix to include "*all sizes of patches*"; and
(6) The need to recognize the "*worldwide impacts*" of management actions and policies.

One interviewee expressed the need to understand the ramifications associated with protecting our forests' resources by importing timber from the other areas:

> "*So it comes down to what the American people want from the public land, it's their land, and do we want to sustain timber management production along the national forest. What we are not looking at from a worldwide standpoint is that we can get that timber from Canada or that paper or that fiber from South America. Okay, they don't have the environmental rules and regulations that we do, so we screw up down in South America or we screw up in Canada, but we protect our own land and don't cut anything on our own land, we don't manage our own forests. Then to me that's been a very … I don't what we'd say about the American people … but that's being very selfish or not concerned about the environment from the worldwide standpoint so we can save our trees here and get our wood and paper from somewhere else. Destroy the habitat for whatever in some other country and not manage our own forest, or we can manage our own forests and have it all.*" (Forest Service Informant #4)

2.3.5. Ecological Scale

Ecologically significant units, or biological units of nature, structure all descriptions and understandings of nature and were implicit in all our discussions about environmental quality. There exist fundamental differences in the units people used to describe and explain nature. These differences likely increase ambiguity in the public planning process that strives to negotiate and agree on the desired future conditions of nature. As the literature review suggests, this dilemma is a consequence of nature's infinite complexity (Levin, 1992; Norton, 1998). This complexity, as well as other factors, makes it possible for different people to describe the same piece of land in very different ways, each way appropriate, each way dependent upon the theories and organizational strategies employed by the perceiver.

Many different ecological units were mentioned in our interviews. Listing a few should suffice to illustrate the diversity: "*species*", "*ecosystems*", "*habitats*", "*populations*", "*roads*", "*resources*" (e.g., "*wood*", "*water*", "*recreation*", "*wildlife*"), specific places requiring "*unique*" management strategies (e.g., the high altitude forest clearings known as "balds"), "*ages*", and "*ecological processes*" (e.g., "*nutrient recycling,*" "*food chain,*" "*water transport*").

Demonstrating how the choice of an organizational unit influences the understanding and discussion of nature is perhaps best illustrated by examining, in more detail, the differences in how "diversity" is construed. At least two different strategies were used to conceptually organize diversity: structural and species. Structural diversity emphasized the variety in nature found measured by "*age-classes,*" "*habitat types,*" "*communities,*" "*ecosystems,*" canopy structures (e.g., "*under-story, mid-story, and over-story*"), and "*successional st*ages" (e.g., "*early, middle, and late*"). Species diversity emphasized "*the variety of life*" measured as "*species types,*" "*species abundance,*" "*species richness,*" species rarity (or "*commonness*"), as well as "*exotic*" and "*native*" qualities of species.

This distinction between structural and species diversities parallels, somewhat, Callicott et al.'s (1999) distinction between functionalists and compositionalists. Functionalists emphasize ecological processes, such as those that produce variety in age-class distribution and canopy structure. They are more concerned that ecological processes are functioning well than they are concerned about which type of nature (e.g., exotic or native) make the processes function. Compositionalists emphasize states of nature, such as the specific distribution and abundance (i.e., composition) of species characteristic present at a pre-Columbian time. Functionalism and compositionalism produce different conservation agendas. Thus, for example, those who use structural diversity to describe nature are concerned with management strategies that keep the forest having a variety of age-classes, and thus recommend regular and large-scale silviculture action. Those who use species diversity to describe nature, in contrast, might recommend management strategies that enhance or remove specific species (e.g., rare and exotic species, respectively).

2.3.6. Temporal Scale

Fifteen people explicitly qualified their understandings of environmental quality using references to time, mostly in discussions about ecological disturbances and sustainability. Sustainability has an obvious time dimension, and people described it as "*ecological processes*" and "*resource productions*" that take place "*today, tomorrow, and hundreds of years from now*." Some people explained that short-term change (i.e., "*two to five years*") would be acceptable, while long term or irreversible degradation would be unacceptable. Disturbances (commonly referred to as "*change*"), human and natural, were generally qualified with a temporal dimension, with natural disturbances typically having a longer time frame (e.g., "*geological changes*," "*evolution*," "*ice age*," and "*hundreds and hundreds of years*"). Human caused changes occurred more rapidly: *"… most plants and animals can't deal with change that is too fast. They can adapt and move over long periods of time but not … not human time…"* (Public Informant #1)

Contrary to the understandings provided by most of the people we interviewed, one person explained that the naturalization of exotics grants them rights because other species have adapted to them through time and management of them may cause greater harm to environmental quality:

> "*They are species that are brought in from another place to be planted here or to be put here, for instance like I just mentioned the white pine. It has been here for years and years and years, but it is not native. And the russian olive is not native. It really does damage to the forest when you eliminate these, for instance on the Bart Camp area there will be about 6 acres of these white pine that will be clear-cut. Getting rid of the white pine from the habitat … the animals and things that depend on that is going to be bad, plus the clear cut is going to be awful, a drastic impact on the land. Then they spray these herbicides which drips off of the leaves, it runs down and into the ground, and eventually winds up into the ground water and when the little birds and things come along and see insects on … or something there that's been on those, they don't know they're poisoned. And we tend to lose a lot that way I think*." (Public Informant #4)

Chapter 3. Discussion and Implications

Environmental decision-making is a tournament of competing conservation agendas in which some values and beliefs are held up and exalted, others are dismissed and ignored, and still others are implicit and unnoticed. Stakeholders compete in the tournament to advance their value systems through the science they advocate or practice, through the constructs of environmental quality they use or study, and through the management goals they champion. It is our contention that participants who hope to compete successfully in this tournament should understand the rules of the game, which includes recognizing the values and ambiguities of the language used to discuss and describe nature—in particular the terms used to describe ecological conditions that become the goals and policies of forest management.

We believe that forest planning participants must not only recognize that a great deal of ambiguity exists in the buzzwords of environmental quality, as demonstrated in this study, but that they also understand the reasoning behind people's preferences and definitions of EQ. This thesis focuses on ecological constructs that exist at the interface between science and policy: constructs that are both descriptive (scientific) and prescriptive (normative); constructs that are used to both describe what is and prescribe what ought to be. Because these constructs are associated with "science," many participants in the forest-planning tournament might assume that the constructs have moral or cognitive authority that is beyond debate, that these constructs are objective, agreed upon, precise and value-free:

> "*I guess the biggest problem is when we communicate in these words, we [the Forest Service] mean them scientifically since that is the way we communicate. The public communicates back to us with those words, but they are really talking about their emotions and values*." (Forest Service Informant #5)

Such is not the case. The findings of this study illustrate that the buzzwords used by both Forest Service and public participants to describe environmental quality and guide forest planning are subjective, ambiguous, and value-laden. People used different buzzwords to describe environmental quality. They provided different definitions of the same construct. Their definitions were often circular and tautological. Embedded in the definitions were different understandings of nature and different agendas for valuing nature.

3.1. Problems with Ambiguity

We asked our informants if they noticed different understandings of environmental quality being used during the JNF planning process (Appendix A, Question 5). All respondents answered affirmatively, recognizing the difficulty inherent when discussing environmental quality. The minority of respondents suggested that the ambiguity was not a problem. They believed that forest planning deals with a variety of resource issues and,

thus, requires input from multiple perspectives, and that these perspectives need not necessarily agree. Some people explained that the Forest Service's interdisciplinary planning team exists because there are disciplinary and professionally dependent understandings of environmental quality:

> "*I think everyone of the specialists, based on their particular area of expertise, can put a little bit different spin on it [i.e., EQ]*." (Forest Service Informant #1)

Thus, some informants believed that the planning team exists, in effect, to ensure that these differences influence the planning process. One person we interviewed explained that the different perceptions of environmental quality enhanced the multiple-use mandate for the Forest Service:

> "*It is critical that you have all of these different viewpoints because we have all these different resources out there that we want to try and do the best job with management that we can. And we have to have multiple input and input from all fields of expertise*." (Forest Service Informant #2)

All of the six respondents (5 Forest Service employees and 1 public attendee) who explained that ambiguity was not a problem explained that the different definitions of environmental quality merely reflect different values and opinions about the desired future conditions of the forest. These people do not expect a consensus to emerge around any one definition of EQ. There will always be different definitions of EQ because people will always desire different forest conditions:

> "*The quality that is regarded as high on the forest is changing over time and will continue to change*." (Public Informant #2)

The majority (fourteen) of the respondents considered the ambiguity to be a problem because "*it caused communication barriers*". Overall, these respondents felt that the ambiguity was problematic because it hindered participation, destroyed trust, and provided too much power to the planning officials and scientists who control the language. The next few sections are dedicated to exploring these problems that our informants identified with ambiguous understandings of environmental quality.

3.1.1. Limits Participation

One of the key concerns about ambiguity was that it created barriers to communication among stakeholders. In one public meeting (attended by the research team before the interviews began) a high-ranking Forest Service employee wrote on a board for all to see eight issues summarizing the "*common ground*" that had been identified thus far in the planning process: "*provide clean water, help threatened and endangered species, conserve biodiversity, maintain scenic quality, protect Appalachian Trail and Blue Ridge Parkway experiences, provide for a variety of recreation opportunities, promote forest health, continue multiple use*." The speaker then commented on the three issues that speak directly to environmental quality—biodiversity, health, and clean water—and explained problems with the first two that limited the group's ability to discuss them. The speaker explained that biodiversity had two definitions (i.e., diversity of "*species that [1] can or [2] cannot tolerate disturbances*") and that there was no consensus to which definition to adopt. The speaker also noted that most everyone agreed with "*forest health*" as a goal, but that "*nobody knows what it means*."

Thus, neither the speaker nor the other stakeholders knew how to talk about environmental quality, so they did not. Instead, the public meeting moved on to defining and negotiating the other top goals, leaving environmental quality (at least as represented by health and biodiversity) effectively off the table. To illustrate this problem one of our informants explained that:

> "*The most vexing one is the term forest health. When they started the forest planning process, they had this process by which we had these meetings with all these diverse publics and we talked in broad, sweeping generalities. No one talked about anything specific in these meetings. They (the Forest Service) were looking for where the common ground in all the forest stakeholders were, and one of the few things that everyone could agree is that everyone wanted a healthy forest… It just meant completely different things to different people*." (Public Informant #1)

An additional barrier to full participation in public forest planning is created by the technical language that requires an enormous investment to master and keep current. The technical language of nature is built on years of expertise and evolves continuously with advances in scientific understandings and policy:

> *"'Ecosystem management', again, if they can define them so we, as us lay people [understand] -- I'm not talking about scientists getting out here with all the little graphs and j-curves and flow charts, I'm talking about where lay people can say I understand that. You [need to get someone in the Forest Service to] say 'I'm going to follow you around until you understand me because that is my job. I have to make it so you understand.' And if that person finally says 'you know I understand what you are doing and sure I think it's a good idea,' then damn it I think the Forest Service has done their job. … They can't define these terms. They can't, … they are more than we can understand … like I said I don't understand the damn things. I'm fairly smart, but I'm really stupid about the complexities here."* (Public Informant #9)

Trying to decipher and negotiate this technical language takes a lot of energy, effort, and time. Some of the people we interviewed felt that the ambiguity hindered planning because it slowed the participation process. Stakeholders, especially scientists, get bogged down in debating alternative definitions:

> *" When you get scientists involved there seem to be a lot of discussions as to philosophically how to approach things or philosophically how things are classified. I think that slows the process down… I think a certain amount of that needs to take place, that kind of discussion, but sometimes to me it appears that that slows down the process of getting the plan done more than it should."* (Forest Service Informant #7)

3.1.2. Trust and Accountability

Another concern about the ambiguity was that it undermines the trust critical to successful planning. Peterson (1997) explains the tremendous disappointment and animosity that a public planning process can create:

> "The real tragedy of these hearings is that they failed to achieve their purpose. Hostility between …[parties] became more overt as the hearings

> progressed. The two groups never even approached a level of understanding which would have facilitated public participation in deciding how best to manage the [land]…" (113).

One of our informants was so frustrated by the planning process that they bluntly challenged the integrity of planning officials:

> *"They use words, then won't define words in their prescriptions … the management prescriptions…. They will say this is [a management] area that is to be free of human disturbance and then they go in there and log … and say that's free of human disturbance. Or they'll say this is a roadless area and the average human, the average English speaking person if you would say this is fat-free or this sugar-free or this is roadless, they would think that there is no fat, no sugar, no roads but they don't do it like that. So they use words to confuse the issue and then refuse to define the words. So that makes it easier for them to be criminals and to justify criminal behavior. At least [it's] bad behavior... If you operate from a place of deception then you are at least an ethical criminal and I think the Forest Service is chockfull of ethical criminals."* (Public Informant #9)

This same person extended their distrust of forest management and planning to the appeals process:

> *"The courts have their problem -- they've got blood on their hands, because judges as a general rule aren't ecologists and a lot of this is cutting edge stuff and [they] don't understand, and a lot of times they defer to the expertise of the agencies involved. Well let's ask the fox if the hen house is okay. That's what it gets down to."* (Public Informant #9)

Some people were especially concerned with the ambiguity because different definitions of EQ produce dramatically different natures. They feared the ambiguity evidenced in public discussions of EQ rendered useless the planning process because the terms left so much room for interpretation. In essence, people feared that those implementing the plan might not interpret the definition with the same intent as the plan negotiators:

> "*In some cases yes, there needs to be some standardization. Of course nobody trusts the Forest Service. I shouldn't say nobody. It's just so mind-boggling, because you're dealing with your committee of scientists, you're dealing with all these upper levels in this whole grand scheme of things and we try to apply that stuff down on the ground, go to a public meeting, it's very difficult to try to get everybody talking the same*

> *language. Pick any of these prescriptions at random, set up …[a meeting among two active public stakeholders], the local landowners, the adjacent landowners and you would get a different interpretation on what …[the management prescriptions] mean. We are getting down to arguing about words, because a word can change the flavor of an entire prescription*." (Forest Service Informant #3)

One interviewee argued the need to eliminate the discretion provided to the Forest Service by these ambiguous terms in order to make the agency more accountable:

> *"[The planning process needs to] …define our terms in sentences that are very clear but also in our prescriptions and application of these prescriptions to remove as much discretion as possible from the Forest Service*" (Public Informant #10).

In the eyes of some, the planning process is not just polarized but deceitful, with participants using ambiguity to their advantage. A more precise language, they believe, would require all parties to be more accountable:

> *"Because the definitions are changing over time, we really need continuity. We need to stick by the terms that we define. We need a book of definitions, and once we have that we need to stick by that. Of course you can't make everything black and white, but you've got to make it as black and white as possible, such as this is what this means and this is what that means. Put everybody on the same page, then how to allocate is a different decision."* (Forest Service Informant #3)

Forest Service planning team members recognize this problem and struggle for solutions to build the trust necessary to make the planning exercise effective:

> "*Well we pretty much have open public meetings and I think a lot of the public was a little bit open-minded, at least I think some of them understood a little bit better and realized now about how complicated this is. It is not as easy you'd think necessarily, the management of 1.8 million acres with particular objectives and everybody wanted their own little slice of the pie. I guess it really comes down to public education again*." (Forest Service Informant #4)

Despite these difficulties and recommendations for improvement, several people explicitly complimented the forest supervisor, the district rangers, and the planning team

on their ability to blend all views of environmental quality together. For example, one person complimented on of the JNF's planning techniques:

> "*At least the meetings that I've been to they break up people into a group of ten sitting around a table. Most of all of those have different values and they talk about one piece of land where you can't have all ten values, you can only have one or two and how do we deal with that. I think that for the most part it has been very effective. Everyone has the opportunity to share. Everyone has the opportunity to say I can live with this, I can't live with that. Often times we have come to some agreement at least that those ten of us at the table can live with. Not every time, but many times."* (Public Informant #7)

3.1.2. Power

Peterson (1997) describes the "technological" approach to land use decision-making that dominates natural resource planning as one that ignores information not conforming to ridged and narrow specifications, hence excluding many people from the process and ignoring what many people know about the forest:

> "Its fundamental assumptions exclude evidence and arguments drawn from nonnumerically defined experience. It provides its users with a rationale for excluding those whose competencies fall beyond the predetermined, technologically defined realm of expertise from the decision making process" (101).

Some stakeholders in our study explained that the Forest Service exercised unfair power by controlling the language of nature. The professional and scientific (technocratic) approach to Forest Service planning and management tends to dismiss some understandings of the forest as "*emotional*" and "*nonscientific*" and thus not deserving serious consideration in the planning process. Because many issues are considered beyond or outside the "*scope*" of the issues that the planning effort can or should deal with, they could be ignored. Without the power of a recognized language, people cannot have their issues heard, let alone have them included in the negotiations. Clearly, some people within and outside the Forest Service think it appropriate to exercise this power:

> "*I don't believe that all points of view are equally valid or that everyone comes to the table with information that is correct factual information, that is correct. And that to regard all points of view and all speakers as equal is counterproductive I think. There are some points of view or some presentations or some people who have less to contribute than other people and this notion of how you make certain that you have a spirit of listening, but not granting equal stamp of approval to everything that was said is very difficult. There is also a tendency for people to come to the table to express their point of view without any reference to the forest planning process and to have expectations that are unrealistic about what it is that the Forest Service can do or should do or must do.*" (Public Informant #2)

Another barrier to participation caused by the requirements of a technical language was explained as the exclusion of many people who have neither the time nor the resources to master this language:

> *"The public will tend to lose interest after a while except for the more vocal, more subsidized [i.e., privately funded] proponents or critics will be there, but the average common person they cannot put that time in. When a logger is trying to make a living he doesn't have that much kind of time to spend a day a week working on this process with us, even though his livelihood may depend on it more than others… I guess what really it comes down to these laws need to be changed, we need to clarify the mission of the Forest Service as a society."* (Forest Service Informant #4)

A different Forest Service employee recognized the challenge to public participation caused by the Forest Service's technological approach:

> "*We've [the Forest Service] tried to make them [definitions of ecological constructs] really clear. We try to really clear so we are playing all on the same basis, same ground, same playing field. We try that but it takes a lot of education and communication to do that so everybody knows what certain terms mean and a lot of times we'll define those… and that's one reason we try to massage these prescriptions and the write-ups and desired future conditions connected with them and the standards and guides, try to word them in such a way that is understandable so everybody can see what we're talking about."* (Forest Service Informant #7)

The call for educating the public is a classic appeal made by those with the power of professional technical knowledge (Peterson 1997). It assumes that the lay person will change their unscientific and emotional land-use preferences once they understand and discuss nature in the same manner of the professionals. This attitude was evidenced in our study:

> *"…some of these public interest groups that think they understand stuff, but based on some of the things I've heard them say I don't think they do. I don't think they have a good grasp on a lot of ecological concepts and say wildlife management concepts or timber management concepts and stuff like that. I just don't think they do."* (Forest Service Informant #2)

3.2. Solutions to Ambiguous Understandings of Environmental Quality

We specifically asked people to comment on how to improve discussions of environmental quality in the planning process (Appendix A, Questions 6 and 7). Everyone had suggestions, regardless of whether they viewed the ambiguity as problematic. Two main solutions emerged, each with many varying details: education and more explicit definitions.

3.2.1. Education

> *"I think that most people tend to see the forest in terms of their interests and what they are interested in and the things they want from the forest and by education and communication with others they can understand the other demands of the forest."* (Public Informant #6)

We found many people who stressed the need for greater education to foster successful public forest planning. Although many people applauded the JNF's current means of education during its planning process, they made many poignant suggestions:

> "*To get information out to public ahead of time, which they are doing, but [it] needs to be more efficient*." (Forest Service Informant #3)

Explaining the need for members of the public to see all sides of an issue before jumping on any one "bandwagon", one person expressed the need:

> *"[We need] to be able to communicate the information in a way that folks can understand, because the reason the propaganda and the rhetoric is successful is because it is easy to understand… To [communicate] all the reasons why forest management is important is hard."* (Forest Service Informant #10)

Several people noted that experts brought in by the Forest Service to explain some of the subject matter related to specific meetings resulted "*healthy*" debates with a lot of participation. One person explained that listening to experts is better than reading because:

> *"I read all the time and it just makes my head spin … all of the information that is out there. I mean it is better for people to be able to listen to somebody and take that in…"* (Forest Service Informant #10)

Another person suggested that this type of education on ecological principles needs to be done by experts not affiliated with the Forest Service because:

> "*Frankly a lot of the public, maybe even most of the public that attends our meetings don't trust us. They don't trust people that work for the agency because they think our opinions are biased and some of them probably are biased, but they would probably trust somebody else from a university or a private consulting firm or something like that to provide some basic ecological education to some of these public interest groups that think they understand stuff, but based on some of the things I've heard them say I don't think they do*." (Forest Service Informant #2)

Although these discussions led by scientific experts would enhance understandings of environmental quality, one person added that the Forest Service should make more publications available that help participants learn the language and science of EQ. Compliments were also offered by several people on the JNF's use of the Internet to communicate information about the forest plan and the planning process. In addition, one person further applauded technology by explaining that:

> "*I think the use of GIS has been a big aid and that it will continue to be a big aid, because people can relate to maps. It's a way of displaying information that is meaningful to a lot of people, that's a good thing, the*

> *use of computers, Internet as a way of disseminating information that's by and large helpful."* (Public Informant #2)

Despite the compliments attributed to the Forest Service's current education process, most people felt that more could and should be done. Some people explained the need for further hands-on education by means of field trips, photographs depicting good and poor environmental quality, and demonstration areas on both public and private lands. One person suggested that:

> *"… People need to go out and look at areas that have been managed and have people go with them and explain what has happened. Maybe with a number of demonstration areas, both on private and public land. People could have an opportunity to see just why this was done and why that was done and maybe look at stands of timber in different stages and they can maybe make an intelligent connection with the idea of why timber is being managed and possibly the need for it. I'm sure that won't convince everybody, there are some that will also be against it for many reasons, but I think that would be a good step in the education process."* (Public Informant #5)

Another person suggested that the Forest Service needed to do a better job at helping the public understand the Forest Service's objectives:

> *"… The public doesn't understand what our objectives are and some of them don't even care. They just want their little piece of the action whether it's a wilderness area or hiking along the AT, they don't want to see anything that's visually distracting even though even in three years you won't even tell its there. We get into those kinds of problems."* (Forest Service Informant #4)

3.2.2. More Precise Definitions

Several people suggested the need for concrete and explicit definitions of environmental quality's buzzwords to make forest planning more effective, productive, and efficient. One person explained that the Forest Service should take the initiative of defining

environmental quality's constructs. This person offered two different approaches to formulating the definitions:

> *"I think we need to be up-front if they are going to use a term that is many different things to many different people, the Forest Service as an agency should just come out and say here's our definition. Here's … based on a policy this is our definition of this term and when we use this term this is what we are talking about. You may have different definitions. You being the public or you even employees within the agency have different definitions. If we are going to say if we are going to manage for a certain level of environmental quality than this is what we are talking about. I guess that's the top down approach. I guess the bottom up would be to have a lot public input and then have that sort of be defined. Have those concepts without definitions up front and have them be defined during the public input planning process. Then at that level, what may be acceptable environmental quality in one forested plan on one National Forest that is developed by one group of individuals may be much different from what is done on a different National Forest with a different set of people."* (Forest Service Informant #8)

Others suggested that the Forest Service must make sure members of the public "*clarify what they mean*" in their understandings of environmental quality during meetings. In addition, people expressed the need for the language to be explicit about what the Forest Service can and can't do when they apply environmental quality's buzzwords to the management plan to avoid misunderstandings and potential conflicts:

> *"I can read a term and think it means one thing and somebody else will look at it and think it means something else. That is why it is so important that the language be as … it doesn't say exactly what the Forest Service can do that's what I'm really concerned about. If the language doesn't say precisely what they can do and what they are restricted from doing then my experience has been that they will do things that you didn't think they were going to be doing because you interpreted something one way and they're going to interpret it something entirely another way and the other way is always to get chain-saws and heavy equipment in the woods. You see the words restoration of stream quality, let's say, and I'm thinking they have a road there that is dumping sediment into a stream. My response to that would be to get rid of that road. Their response may be to pave that road so as to get rid of the sediment problem if it is a dirt road. So what I'm saying is that unless it is very clear what they can't do out here, meaning they the Forest Service, they will do it. That's why I'm saying we need to take as much discretion away from that agency as possible to make it very clear to them and the public what indeed they are going to do out here.*" (Public Informant #10)

3.3. The Conflict between "New" and "Old" Language

Hays (1987) describes how controversy and conflict are both caused by and reflected in the language used to describe nature. He examines, for example, the Forest Service's transition from an older, multiple use understanding and language of nature to a newer "ecological," understanding and language. As the section describing environmental quality illustrates, we witnessed the emerging language of ecosystem management (e.g., biodiversity, ecosystem, integrity, dynamic stability). We also witnessed the more traditional language of multiple resource management (e.g., timber productivity, water, wildlife habitat). And, as the quote below illustrates, we witnessed the conflict between the two that manifests itself in ideas like "forest health." We asked a Forest Service employee, who had just noted the ambiguity in environmental quality terms, whether they saw any problems caused by this ambiguity:

> *"Well yes, forest health definitely because a lot of people equate forest health to tree health. On both sides. Lots of times people who have grown up in the forest industry or forestry profession [believe] tree health is very important and they'll view that as the same thing as forest health. By the same token the more preservationist oriented people pigeon-hole people and think that all of the foresters and timber industry people just view it as tree health. And of course everybody is different in how they view this and without interviewing every single one of them … there are some people who really [believe] forest health and tree health are the same thing. I'm a forester and I don't believe that and I doubt very many foresters really do, but that just throws up a big problem when we are talking about forest health."* (Forest Service Informant #10)

Chapter 4. Conclusions

(Interviewer:) "*Do some definitions of environmental quality work better than others to guide forest planning and management?"*

(Respondent:) "*Yes. And my definition of course would be the best… (laughter) … and I'm sure that's what everybody would tell you. I go [to] these meetings and I hear what various people think environmental quality mean, and its all over the map, so obviously depending on what you think is best for the forest your going to end up with a different definition*." (Public Informant #1)

The language of nature, as well as understandings of nature, are ambiguous and vague. Different understandings and different values produce dramatically different interpretations of the same environmental quality. Most everyone we interviewed recognized the problem, while few saw a solution other than to plow ahead, slowly, incrementally, adaptively, and as a community interested in a place they value. This place, the Jefferson National Forest in our case study, blurs the separation between humans and the pristine, it is a place that is revising its *man*agement plan, and, thus, it is a "middle nature" of competing agendas and understandings of environmental quality. Rapport et al. (1998) explains that: "it is the intersection of societal values and ecological processes that is the key to motivating positive change for the common good" (p. 12).

Based on the results of this thesis it is recommended that negotiations about nature seek to define a common ground (as is the ostensible purpose of planning public forest), explicitly emphasizing the mechanisms and values of nature. By making explicit these implicit understandings people might be more likely to recognize the differences and similarities in their goals. The question that remains is: how is this understanding best expressed, explained, and defended in a context such as forest planning where multiple parties must use a language of nature to negotiate future conditions?

4.1. Values Embedded: All Definitions Consist of All Three Value Systems

A challenge for ecological science is to develop constructs that are not just descriptively precise (hence powerful scientifically at describing situations) but also evaluatively thick

(hence powerful politically at making trade-off decisions about which situations are best). Regardless of how descriptively precise, reliable, and theoretically rigorous a measure might be, it is likely to be ignored or ineffective at influencing conservation decisions if it fails to reflect environmental qualities that society understands and deems valuable. Conservation decisions require society to make trade-offs, not just between environmental conditions producing different types of environmental qualities, but between environmental quality and other socially valued qualities such as education, human health, and the economy. To be effective in the arena of conservation decision making, the terms describing ecological conditions must describe conditions valued by society and explicitly connote those values to the people using the terms to negotiate land-use decisions (Norton 1998).

We certainly found an evaluative component to the language of environmental quality. Most of the values embedded in the descriptions of environmental quality were anthropocentric; they reflected concern for the present and future well being of humans. There was considerably less discussion of biorights or ecocentric values (i.e., the rights of nature independent of human uses). Some of the values discussed seemed to reflect a middle ground, or bioculturalism, respecting both the rights of nature and human culture on the same piece of land. Every buzzword was found to be associated with each value system (Appendix D).

The following quote illustrates how different values and agendas create different definitions of EQ, and how these values are believed by some to confuse and derail discussions about desired future conditions of the forest. A self-admitted "tree hugging" environmental activist argued that those with an utilitarian interest in forests describe a burned area as "destroyed" (i.e., unacceptable EQ) and describe a similar area cleared for commercial timber harvest as "regenerating" (i.e., acceptable EQ). The different definitions of EQ result, our interviewee suggested, because "foresters" and, in turn, the "media" under the presumed guidance of foresters, think the burned trees were wasted if not logged, sold and put to human use. In contrast, the interviewee expressed more of a biorights perspective and thereby viewed the burned area as having higher EQ than the

logged area. Different evaluations of EQ result for essentially the same piece of land and the same management actions, the only difference is the reasons for which the forest is valued:

> *"You can ride up there on I64 up on Afton mountain and if you [are] headed east there is 400 acres up there that got hit. There was a guy up there burning brush to build a house and he walked away from the damn brush pile and it caught on fire and it burned like 400 acres up there. And that area looks so much nicer than the area right across on the I guess the western side of I64, … [where] they just logged the hell out of it. The newspapers and the media, because the media is stupid … I think they are criminal too. We've had some problems with getting the media to do certain stuff because of their relationship within the Forest Service is that the media passes on the same undefined, confusing words to the general public … [They] told us those 400 acres were* ***destroyed****, but yet if you have those same foresters they'll look down on those clear-cuts and say that's a* ***regenerating*** *forest. And aesthetically the burned area is much more aesthetically pleasing and biologically it is much more intact because the biomass hasn't been removed, the soils aren't compacted, the salamanders haven't been smashed, the snakes are still there, sure you'll get turtles that will die but turtles have been around fire probably a lot longer than humans have been around fire. They can deal with it. They've dealt with it for millions of years. They can deal with it for millions more if we could leave them alone. Again, [how] all this ties in is that a forester says that area of the fire* ***destroyed*** *that area because he wants to get in and log it. And then that area that he gets in and logs, that's reforestation he's doing there.* ***Reforestation*** *with a chain-saw.*" (Public Informant #9, emphasis added in bold)

Despite the need for normative and descriptive conservation concepts, generating this language is a difficult task. As one person noted:

> "*If you ever sit in on a meeting with scientists and planners, ewweee, that the planners are trying to ask the scientists to put what they are conveying in terms that they can explain to the public. This is a very difficult task and a large problem*. " (Forest Service Informant #3)

4.2. The Human – Nature Dichotomy as a Primary Understanding of Nature

> " The nature-culture dichotomy may not be a universal structure of the human mind, as Claude Levi-Strauss suggested, but it is so deeply ingrained in our everyday language that anyone trying to work around that dichotomy sounds at best idiosyncratic and a worst mystical. Yet in the long run, our capacity to manage nature and culture as a single system depends on our finding a way to see, and discuss, nature and culture as quantitative variations along a single spectrum rather than as an either/or dichotomy. And describing that spectrum requires us to disassociate qualities and characteristics that are closely and even unquestionably associated in our everyday language" (Ingerson 1994; p 44-45)

We buy "All Natural" cereal, "100% Natural" soap, and "Naturally Pure" drinking water. We practice natural remedies to cure what ails us. We reside at Woodland Hills, Evergreen Ridges, Quail Point, and Deerfield Meadows. We make billions of visits each year to "natural" parks and gardens. Obviously we value many things that are natural. Likewise, what is artificial, man-made, or developed tends to have negative connotations. Often, to refer to something as "unnatural" is the harshest critique one can apply.

But what does it mean for something to be natural or to possess naturalness? The concepts of nature and naturalness have been aggressively deconstructed, reinvented, reconstructed and recreated (Angermeier, 2000; Callicott and Nelson, 1998; Cronon, 1995; Escobar, 1999; Hull and Robertson, 2000; Proctor, 1998; Soper, 1995; Vernon, 1992). Among the many points made by these scholars is that discussions about nature tend to polarize at the extremes: natural or artificial. It seems difficult to discuss conditions of nature that exist in between these extremes. Many people believe that natural conditions are unquestionably good conditions (i.e., possessing high environmental quality as found in this study). Naturalness, thus, becomes a powerful benchmark for evaluating environmental conditions (Angermeier, 2000; Hull and Robertson, 2000) and any deviation from natural conditions is considered, by definition, a degradation of environmental quality. Following this logic, human management can only have a negative impact on environmental quality. Humans can only befoul the environment. In contrast, others believe that there is nothing special about natural conditions. Humans improve nature through management. They tame the wildness to

minimize disease and hardship and to maximize comfort and wealth. Humans can nurture nature to improve the "Garden". Nature, by itself, is worthless; it becomes valuable through human attention and care.

The paralyzing effect of the human-nature dichotomy can be seen in Senecah 's (1996) account of efforts to plan Adirondack Park in upstate New York. The people promoting development and improvement of nature were characterized by the other side of the debate as environmental "rapists" promoting "unbridled, unwarranted, irresponsible, and massive" development. These "greedy" developers were "marring" vistas, "maiming" shorelines, "contaminating" water and pristine beauty, and otherwise threatening a "vulnerable" nature. The people wanting to exclude or minimize human impacts argued for the "spiritual" retreat, the "timeless" splendor, the green "oasis," the "forever wild" jewel that was a biological "treasure chest." The pro-management side characterized the pro-nature side as "nature nazis," "forest faggots," and "watermelons" (green on the outside, red on the inside), trying to create a "scenic gulag" that did not value the human history and culture. Throughout the Adirondack controversy documented by Senecah potential for compromise existed all along the vast middle ground of the human – nature continuum. Despite an official planning effort that clearly articulated this area of compromise, public debate remained polarized at the extremes and the planning effort languished. Dizard (1994) uncovered a similar polarization in his study of controversy over deer hunting and forest regeneration.

Although the rhetoric was not as lavish, we found evidence of a similar polarization in our interviews. On one side people had "*faith*" in nature, that environmental quality is best "*without human influence*," that management only "*degraded*" or "*destroyed*" environmental quality. On the other side, people reasoned that nature was "*going to change*," regardless of what humans did, so why not manage the change. And, that through "*good*" or "*scientific*" management the forest could be "*more productive*," "*achieve sustainability*," have more "*health*," and have more "*diversity*" than the "*non-action alternative*" of removing human control:

> "*Well the principal conflict is those people who say that the only healthy forest is a harvested forest and those who say the only healthy forest is one that has not been cut down... The only thing they [the FS] can do is take a middle ground and make everybody angry*." (Public Informant #8)

4.3. Searching for a Language of Middle Nature

Despite these clear extremes, there emerged in some people's discussions an articulation of a middle nature, one where humans and nature "*co-exist*," but where humans have "*minimal*" impacts on nature by, perhaps, "*mimicking*" nature and natural processes. Searching for a language to describe this middle nature is one of the primary challenges facing the natural resource management community. Pollan (1993) calls it a "second nature" and Sutter (1993) calls it "a more mature and realistic goal for environmental regulation and management" (1538).

We found two pieces of evidence that the search for a language of middle nature was occurring in Jefferson National Forest Planning process. One piece of evidence came from the growing recognition of the interdependencies between humans and nature. Most everyone we interviewed recognized and valued the direct economic benefits and the indirect ecosystem services the forest provides and on which human culture depends. These people commented that humans must manage forests to produce the qualities humans desire (i.e., manage fire in the urban-wildland interface, control overgrazing deer herds, reintroduce expatriated species, protect rare species, and produce fiber, water, and recreation). Most everyone also recognized that demand for these goods and services will only increase with increasing population pressures. These people recognized that the ability of the forest to provide them with resources will be increasingly challenged as a growing human population clears forests for human settlement. Likewise, people recognized that the Eastern US forests are no longer pristine, without human impact. The Eastern US forests have been extensively and intensively managed. Thus, the past and future forest conditions have been and will continue to be deeply intertwined with human use and management. For example, several people pointed out the impacts on "*our*"

forest from acid rain and exotic/invasive species migrations caused by forces outside the forest and/or the outside region. Such forces effectively eliminate the possibility of letting nature "take its course," requiring locals to intervene, and creating a middle nature perspective that accepts human management of nature.

The second piece of evidence that the search for a language of middle nature was occurring in Jefferson National Forest Planning process comes from the adoption of "adaptive management" as a management policy. We concur with Holling (1995) in that the features of adaptive environmental and resource management consist of "flexible, diverse, and redundant regulation, monitoring that leads to corrective responses, and experimental probing of the continually changing reality of the external world" (30). Norton (1995; 1996) argues that the language of middle nature will be found not in the science or philosophy of nature, but in the applied management and negotiation of nature. That is, middle nature is being negotiated in applied settings such as the Jefferson National Forest planning effort. In these settings people converge to negotiate which nature should occur on the ground. Because the JNF is a "public" forest, the management resolutions must reflect the diverse and often polarized views of numerous stakeholders. The compromises that result from these negotiations are constructing the language and understandings of this middle nature. Incremental actions are negotiated, implemented, monitored on the ground, and then evaluated based on expectations. We learn from what works, what is acceptable, and what can serve as an example or ideal for future management actions from mistakes and successes. By being adaptive and responding to this feedback the language and understandings of middle nature are constructed:

> "*In the forest plan, again depending on which view of forest health is adopted, there will be the management actions that need to be taken and the standards and guidelines and there will be something called desired future condition and that's going to describe what the forest is should look like over say the next 10, 15, 20 years. And it's going to say, from a forest health standpoint, what those components are and what they should be looking like after the plan is in operation. So that's what you would check on the ground as part of monitoring. Monitoring the forest plan that's when you can say: 'Is this meeting our forest health or are we going off and is it destroying forest health?' The way you would determine that is*

> *by what you've adopted in the plan, whether you are meeting the desired future condition or not and then you can see if you are deviating from what your goals and objectives for forest health.*" (Forest Service Informant #9)

Several of the planning participants we interviewed recognized the planning process as an important venue for constructing the local and professional understandings and expectations of nature. We described above how the "newer" language of ecosystem management was being used by many people to describe the forest and environmental quality, while the "older" language of multiple uses and resources remains an important way for many people to describe and understanding nature. Conflict or miscommunication can occur when the two rhetorics collide. Thus, the process of constructing the language and understandings of nature is slow and incremental. A great deal of learning is required of all parties:

> *"The kind of work that people like me do is an inch at a time. It's never dramatic. It is always cumulative, an inch by an inch by an inch. Well we just had a major setback. We went back several yards because the budget this year has been slashed for planning purposes. It's a major setback, but we'll just keep going inch by inch by inch. You cumulatively change over time and it sometimes is hard when you're in a day-to-day working relationship, week-to-week, month-to-month to see how big that change is over time. It is sometimes really very useful to go back and to say 'Gee, well a decade ago, 15 years ago it really has changed.' So the perceptions that the Forest Service and that the public will have in what that working relationship is and what constitutes that balance in the public of the desired future conditions of that environment out there, it's always going to change. And because it is largely a product of compromise among competing views, everybody is always going to be unhappy. That's also a part of the nature of the beast. So you tend to have relatively few people that are defenders of the process or defenders of the plan. Everybody is able to point what's wrong with the plan, what's wrong with the process because you never get everything that you want with the process. It never operates as smoothly as you want it to operate. But I think that's the nature of dealing with complexity that's competing interests, competing visions, changing visions and we're living with conflict and muddied and it never has any clarity of ultimate … having achieved that goal where everything is perfect. It doesn't work like that. Forests never achieve that status."* (Public Informant #2)

As noted previously, some interviewees did not find problematic the ambiguity in definitions of environmental quality. One of the more articulate justifications of this position, offered by a seasoned participant in Forest Service planning efforts, explicitly noted that definitions of abstract constructs like environmental quality, biodiversity, or health were neither necessary nor important to forest planning efforts. What matters, instead, are the specific management prescriptions and planning alternatives for specific pieces of land that evolve over the course of the planning process. These specific prescriptions and descriptions become part of the final plan. They represent the conditions of socially acceptable nature and, thus, possess acceptable environmental quality.

> " … *You know the word 'environmental quality' is not an issue per say directly. What is an issue is the 12 SAA-wide [Southern Appalachian Area context in which the Jefferson's plan is embedded] issues and so the word environmental quality is something that you [the interviewer] are bringing to this discussion. It is not something that is … What we are dealing with in the forest plan are specific examples or parts of environmental quality. To me what we are dealing with are examples or components of environmental quality and they are all spelled out in the 12 Southern Appalachian Area issues, plus the ones that are specific to our forest. And you can look at those and you'll see what those are. Now to talk about environmental quality is such a broad subject that obviously people may have different ideas of what that means, but that's neither here nor there as far as the planning process is concerned. We are focused on specifics of environmental quality, not the word environmental quality. We are focused on specific concerns dealing with environmental quality, not our definitions of environmental quality*." (Forest Service Informant #9)

Peterson (1997) makes similar arguments for "sustainable development." She commends the inherent tension between "sustainable," which connotes constant, and "development," which connotes change. Because this tension is a factor in the prevention of a precise definition of sustainable development, it encourages discussion and negotiation among interested parties about specifics. Thus, rather than attempting to develop precise definitions of environmental quality, we should instead focus our energies on the language and understandings of nature that emerge in the final prescriptions that are

considered acceptable by stakeholders in public forest planning, such as the Jefferson National Forest. Here we will find the language of a middle nature.

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Appendix A. Interview Guide

(1) What has been your involvement with the JNF Planning Process? Why are you involved? What is your purpose?

(2) How are yours or other peoples' concerns about Environmental Quality being used (in positive and negative ways) to influence the Planning process? Explain. Can you give a specific example?

(3) What is Good ENVIRONMENTAL QUALITY of the forest? What makes forested EQ acceptable or unacceptable? How do you define forested EQ?

(A) What exactly is __x__? Or what exactly do you mean by _x__ [i.e., biodiversity, sustainability, management, cutting, soil stability...]? (define it)

(B) How does ___x__ produce/relate to EQ? How do you explain the link between __x__ and EQ (mechanism or process behind it: what is the role of humans, scale, balance, etc.)?

(C) Why does this specific type (___x___) of EQ matter? Why should the JNF try to plan for _____ (value system)?

(D) How do you recognize ___x__ on the ground (how is it measured?)?

(E) Can you suggest one example of one management prescription in the Forest plan's rolling alternative where __x__ is found? What, specifically, is it about this management prescription that will produce/create/exemplify ___x___?

(F) Can there be acceptable EQ without _____x_____? How?

(G) Can you suggest one example of one prescription where __x__ is not found? Is EQ found here? (good/bad, acceptable/unacceptable)

[Repeat 3 until exhausted. Are there any other ways that good environmental quality is defined or known?]

(4) What is forest health, and how does it differ from EQ?

(5) There seem to be many different ways EQ has been defined by you, by others we interviewed, and in the Forest Plan itself.

(A) Did you notice some of these different definitions during your participation in the planning process?

(B) Was it a problem that different definitions existed? If so, how and why? [What were some of these different definitions? Was having so many definitions a problem?]

(6) Can you suggest what the FS or others can do to help resolve some of these problems [you identified that result from conflicting/differing definitions]?

(7) Do you have any other ideas about how information about EQ can be made more effective in a planning process such as the JNF that involves participation by specialists, scientists, advocacy groups, and the general public?

Appendix B. Early Version of Coding Scheme

"FREE NODES"

1 Problems Defining Environmental Quality
2 Human – Nature Dichotomy
3 Complete Utilization
4 Overpopulation
5 Other People's EQ Understandings
6 Other People's EQ Misunderstandings
7 Economy over EQ
8 Can Humans Improve upon Nature
9 Additional – Better Information Needed

"INDEX TREE ROOTS"

AFFILIATION OF INFORMANT

1 USFS
2 Environmental NGO
3 Land Owner
4 Logger
5 Forestry Consultant
6 Scientist

VALUES

1 Utility, Economic Resource
2 Uncertainty and Indeterminacy of Information

3 Enlightened Self-Interest
4 Spiritual
5 Aesthetic
6 Recreation
7 Ecocentric
8 Low Faith in Technology
9 Community Image and Identity
10 Living Simply
11 Human Health
12 Education and Scientific Study

MECHANISMS

1 Geographic Scale
2 Time
2 1 Age: Ancient, Old Growth
2 2 Other
3 Exotic species
4 Reproduction & Regeneration
5 Migration
6 Scarce Resources
7 Natural (no human influence)
8 Active, Intensive Human Management
9 Some Human Impact OK
10 Balanced
11 Dynamic, Disturbance, Change
12 Resilience, Self-healing Ability of Forest
13 Diverse Species
14 Structural Diversity
15 Abundant Species

16 Nutrient Cycling

17 Flow of Energy

18 Societal Malaise

INDICATORS

1 Indirect

2 General Human Presence

3 Historic Reference Condition

4 Stream Quality

4 1 Clear Water

4 2 Stream Banks

5 Erosion

6 Species

6 1 Non-game

6 2 T&E Species

6 3 Charismatic Species

6 4 Sensitive Indicator Species

6 5 Tree Species

6 6 Exotic Species

6 7 Invasive Species

7 Roads

8 Diversity

8 1 Abundant Species

8 2 Structural Diversity

8 3 Age – Time

8 4 Species

9 Nothing Specific – Can't Tell

10 Trees, Vegetation

10 1 Large Trees

10 2 Junk Species

10 3 Favored Species

10 4 Other

10 5 Rare

11 Chemical Application

12 Fire

13 Insects

14 Disease

15 Reforestation

15 1 Plantations

15 2 Natural

16 Grazing

17 Silvicultural Tree Removal

18 Large Scale Projects (dams, etc.)

19 Specific Place

20 Management Prescription from Plan

21 Climax Stage of Succession

22 Waste

23 Sprawl, Housing

24 Wilderness Designation

25 Clean Air and Water

Acid Rain

Large Scale Die-back

EQ CONSTRUCTS

1 General EQ

2 Biodiversity

3 Health

4 Sustainable Timber

5 Sustainability: General

6 Natural

7 Habitat

8 Soil Quality

9 Air Quality

10 Site Productivity

11 Integrity

12 Water Quality

Appendix C. Final Coding Scheme

"FREE NODES"

1 Problems Defining Environmental Quality
2 Human – Nature Dichotomy
3 Complete Utilization
4 How Did You Come to this Understanding
5 Overpopulation
6 Other People's EQ Understandings
7 Other People's EQ Misunderstandings
8 Economy over EQ
9 Can Humans Improve upon Nature
10 Additional – Better Information Needed
11 Forest Management
12 Problems with Planning Process

"INDEX TREE ROOTS"

AFFILIATIONS OF INFORMANTS

1 1 USFS
1 2 Environmental NGO
1 3 Land Owner
1 4 Scientist
1 5 Public
1 6 Industrial Forester
1 7 VA Dept. of Game and Inland Fisheries

VALUES

1 Anthropocentric

1 1 Utilitarian

1 1 1 Economic Utility

1 1 2 Enlightened Self-interest

1 1 2 1 Human Health

1 2 Romanticism

1 2 1 Aesthetic

1 2 2 Spiritual

1 3 Recreation

Biocentric

2 1 Organismic

2 1 1 Maintain and Encourage Life

2 1 1 1 Human Duty

2 2 Ecocentric

Bioculturalism

3 1 Nature Part of Greater Community

3 1 1 Human Duty

3 2 Stewardship

3 2 1 Future Generations

3 3 Nature Provides Culture

3 3 1 Humans as Natural

3 3 2 Education and Scientific Study

3 4 Pride in Public Lands

3 5 Legality

3 6 Faith in Technology

		3	6	1	Caution (low faith in technology)
		3	6	2	Uncertainty and Indeterminacy of Info.

MECHANISMS

Geographic Scale

1 1

Temporal Scale

2 1 Age: Ancient, Old Growth

2 2 Other

Ecological Scale

3 1 Diverse Species

3 2 Structural Diversity

Balanced versus Dynamic

4 1 Balanced

		4	1	1	Equilibrium Theory
		4	1	2	Resilience, Self Healing

4 2 Dynamic

		4	2	1	New Ecology
		4	2	2	Web: All Aspects of environment Linked
		4	2	3	Cyclic

Evolutionary versus Ecosystem

5 1 Evolutionary Ecology

		5	1	1	Reproduction and Regeneration
		5	1	2	Evolution

5 2 Ecosystem Approach

5	1	1	Nutrient Cycling
5	1	2	Flow of Energy
5	1	3	Web: Aspects of Environment Linked
5	1	4	Photosynthesis

Nature versus Human

6	1	Natural
6	2	Some Human Impact
6	3	Active Human Management

EQ CONSTRUCTS

1	General EQ
2	Biodiversity
3	Health
4	Sustainability
5	Natural
6	Habitat
7	Soil Quality
8	Air Quality
9	Integrity
10	Water Quality
11	It’s Relative
12	Whatever Science Says
13	Normal Processes
14	Whatever the Public Says
15	Exotic Species

Appendix D. Intersections of Buzzwords and Values

	Health	Natural	Biodiversity	Sustainable	Other
Anthropocentric					
Recreation	3	4	3	4	5
Economic Utility	10	5	3	9	18
Enlightened S-I	8	10	4	3	8
Human Health	2				5
Aesthetic	3	2	1		7
Spiritual	1		2	1	1
Biocentric					
Human Duty		1	1	1	2
Ecocentric	4	8	3	1	17
Bioculturalism					
Future Generations	1	1	1	1	1
Stewardship	2	2		2	1
Uncertainty of Info	4	1		1	
Caution		1			1
Humans Natural	1	3		1	1
Education/Science			1	1	1
Public Land Pride	3	1		1	3
Legality	4	1	1	1	5

Appendix E. Intersections of Buzzwords and Mechanisms

	Health	Natural	Biodiversity	Sustainable	Other
Geographic Scale	8	3	5	1	9
Migration		1			2
Temporal Scale	3		1		2
Time: Age			1		1
Time: Other	2	4	2	3	11
Ecological Scale					
Species	1	2	3		1
Structural	1		3		1
Balanced	5		2	1	3
Resilience	3	2	2	1	1
Cyclic	2	2			
Dynamic	4	4	1		2
Evolutionary		1			1
Reproduction	1	3			3
Exotics	2	3			8
Ecosystem					
Nutrients	1	2			
Energy	1	1			
Resources	1	1			2
Web	7	5	2	1	8
Nature	11	12	3	2	12
Some Human	2	5		1	7
Active Mgmt	7	4	5	3	16

Vita

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