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# AIMing for Healthy Forests: Active, Intentional Management for Multiple Values

Andrew B. Carey

## Author

**Andrew B. Carey** is an emeritus research scientist, Forestry Sciences Laboratory, 3625 93rd Avenue, Olympia, WA 98512-9193.

## Technical Editor

**Annette S.B. Wilson** is a biological science specialist, Forestry Sciences Laboratory, 3625 93rd Avenue, Olympia, WA 98512-9193.

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# Preface

**Conservation:** the protection, preservation, management, or restoration of wildlife and of natural resources such as forests, soil, and water.

*-The American Heritage Dictionary of the English Language*

**Why this book?** In the last 50 years, societies everywhere have undergone rapid change in all aspects of life. New technology and globalization have accelerated use of natural resources, led to abandonment of customs and adoption of new lifestyles, and brought about changes in political systems and the roles of governments. This dynamism has produced closer ties among nations, placed nations in competition, and magnified the discrepancies in material well-being between developed and underdeveloped nations. Similarly, within nations, subcultures have drawn apart, each reacting to the challenge of meeting its own needs and perceived threats to its own values and beliefs in rapidly changing social environments. Even within the Pacific Northwestern United States, there are substantial subcultural differences that are displayed vividly in public arenas and in interactions with governments at various levels. Here, and elsewhere, differences are played out in disputes over disposition and conservation of natural resources.

Increasing human populations, large-scale immigration, large institutions, and a global economy have facilitated impersonal international exploitation of human and natural resources. Environmental problems are real, pervasive, and radically altering the conditions of life on Earth. Effects include global warming, decreasing oceanic productivity, desertification, ground-water depletion, and various forms of persistent pollution. These conditions raise substantial ethical questions of intragenerational equity and social justice (have versus have-not nations and groups within nations) and intergenerational equity (the kind of world we will leave to future generations),

as well as questions of effects on the general health and welfare of people. For example, adult asthma has increased fourfold in the Seattle area over the last 10 years as a result of particulates from diesel emissions and cargo ship bunker fuel pollutants.[1] Such problems are international in scope and will require international, national, and regional action for resolution.

A less spectacular and much less recognized problem is degradation of ecosystem function through neglect, unwise use, poor management, and lack of social consensus on how best to manage and conserve ecosystems. Not only is social consensus lacking, but there is also lack of consensus, even discourse, among the various sciences that inform the political and management processes that govern ecosystems. Ecosystem management is fragmented. Urban growth management, waste management, designation of transportation corridors, water use, and extraction of nonrenewable resources are largely made independently of efforts to conserve biological diversity and ecosystem function. The principal exceptions are instances where legislation protects wilderness, parks, refuges, or endangered species. Even within the Pacific Northwest, there is lack of coherence in management and lack of management on private, industrial, state, tribal, and federal forests. *Management of different ownerships is informed by different worldviews, values, and subsets of pertinent scientific information.*

Even the small stage of the Pacific Northwest is changing rapidly in response to globalization. Traditional low-intensity forestry on public, industrial, and family-owned forests may become economically unsustainable and, in the interim, environmentally and socially undesirable. Costs of producing wood given wages, workers' rights, and environmental protection are too high to compete with imported wood, whether from labor-intensive and publicly subsidized extraction from unmanaged forests or highly mechanized, intensively managed pine plantations.

Thus, local and regional publics are faced with a new problem, one that appears not to be amenable to national or international, top-down solutions: How do we maintain the life-support functions (ecological services) of our natural and managed ecosystems, restore function to degraded watersheds, and provide the various other values from farms, forests, and rivers that we and our fellow citizens would like to receive and keep available to future generations? How do we reconcile our increasing demands for diverse and seemingly competing values: clean air; high-quality and large quantities of water, food, wood, fiber, fish, recreation, open space, wildlife, wilder-

[1] Welch, C. 2004. Bush cut some diesel pollution but let big ships keep spewing. *Seattle Times*. http://seattletimes.nwsource.com/html/politics/2002048167_bushship28m.html. September 28, 2004.

ness, wildness, biological diversity; and respect for the rights of other species to exist (already codified in the Endangered Species Act; Migratory Bird Treaty Act; National Forest Management Act; and other federal, state, and local laws and regulations)? Can we reconceive the natural-cultural agricultural mosaics of the preindustrial age and match the new concept to our present and future needs? At best, these mosaics contributed to sustainability—clustered dwellings (villages) imbedded in forest reserves, wetlands, small fields (fallow and cultivated), and pastures matched to soils and topography and integrated into a mosaic that maintained environmental quality and renewable resources. These arrangements often contributed to intragenerational equity with a fair spatial distribution of agricultural fields and pastures—fair because fields were small and ownerships scattered providing incentive to community cooperation in planting and harvest and equitable in distances traveled for cultivation. We cannot return to preindustrial farming economies (some of our fellow citizens have and will), but we can intentionally integrate wetlands, forests, and other native ecosystem types, managed to perpetuate their natural values, into our urban, suburban, agricultural, and transportation matrix. However, as we move out from our highly developed population centers can we intentionally maintain forests managed for multiple values—to provide clean air, clean water, diverse biotic communities, wildness, and natural aesthetics and opportunities for physical and spiritual renewal? And, in the process, buffer our fragile wilderness areas and other nature reserves? Finally, can we come to some consensus on total landscape management and provide limits to the growth of urban and suburban areas and to the destruction of managed and natural forests?

This book seeks to inform the deliberations of dedicated and well-informed citizens interested in the conservation of forest ecosystems at the local, state, and regional scales by using the Pacific Northwest as an example. Citizens are defined here as the various interested private individuals, interest groups, land managers, technical staffs, regulatory agency staff, local governments, tribal representatives, and other active agents who are likely and disposed to participate in collaborative learning and collaborative management efforts. Many of these people will be paid professionals in the various disciplines related to conservation, natural resources management, community development, organizational development, governance, and economics. But many will also be citizen volunteers (often professionals in unrelated or related fields as well) who operate at a professional level in collaborative management efforts. This book is not designed, however, to be used as a how-to recipe or tool for col-

laborative management. Instead, it is meant to provide an overview of collaborative management, forest ecology, and conservation at a professional or postgraduate/continuing education level.

It is at the local and within-state level that collaborative learning and collaborative management can take place and that a social consensus can be achieved, which will restore trust among parties now in adversarial relationships. Forestry, like collaborative learning, collaborative management, and consensus building is based in social sciences. Success in integrated management rests on understanding cultures, worldviews, modes of communication and learning, personalities, personal development, and group dynamics as much as they depend on understanding biogeography, landscape ecology, ecosystems, evolution, ecotypic adaptation to local conditions, and self-organizing biotic communities. Few are equipped with the cognitive breadth to pay adequate attention to the details of sociology, psychology, and ecology in conflict-laden natural resource arenas. Often the mind that revels in technical, ecological detail is refractory to psychology and sociology. Mutual understanding of environmental, economic, and social challenges in natural resource management, restoration of trust, and consensus on what constitutes environmental, social, and economic sustainability must be achieved before the general public can be motivated to support sustainable forest management through their market and political decisions. This might include the willingness to pay higher prices for products, subsidize sustainable management through higher taxes to compensate socially minded land managers and state-land trusts for their contribution to general well-being, and purchase valuable forest ecosystems (or their development rights) that are no longer perceived by their owners to be economically viable wood-producing enterprises. People value and benefit from forests, whether as individuals or part of private, industrial, state, tribal, or federal organizations. The ecological services derived from forests—clean air and water, open space, waste assimilation, climate regulation, wildlife habitat, recreation opportunities, and so on—have more value than the marketable commodities. We must recognize and pay for these services if we are to maintain our quality of life and to provide options for equivalent quality lifestyles to future generations (fig. i).

## AIMing for Healthy Forests

The focus of this book is active, intentional management (AIM) of forest ecosystems: taking AIM so as to provide general sustainability

and to achieve the full range of social, economic, and environmental goals society has for its forests. Management is active when it uses the full range of tools available for landscape, watershed, and local ecosystem management, including a variety of tools beyond the scope of this work: (1) removing roads and/or improving roads, establishing effective transportation systems, and other ecological engineering practices; (2) removing or replacing culverts, stabilizing eroding road cuts, placing instream structures, and other hydrological management; (3) identifying areas of soil or geologic instability, limiting activities to those appropriate to these areas, and other geomorphological planning; (4) identifying and protecting unique ecological or biological areas and other site-specific conservation of unique elements of biological diversity; and (5) identifying and establishing nature reserves, wildlife refuges, and wildernesses. These activities are becoming institutionalized in agency regulations and state forest practices rules, and many will be cited as sources in this book. This is not to say that issues surrounding roads, unstable slopes, and preservation of biological diversity have been resolved; they have not, and this book will not attempt to resolve them either. Instead, the book focuses on ecological forestry that includes silviculture, direct wildlife habitat improvements, restoration of biological diversity, and maintenance of dynamic local ecosystems in mosaic landscapes where biological diversity and ecological processes are maintained by (1) a composition that emphasizes biologically complex stages of forest development and (2) a dynamic condition in which locations of seral stages change with time as local ecosystems go through cycles of development and renewal.

**Figure i** Aiming to conserve biodiversity for future generations—Calum Maki, the author's grandson, enjoys a day hiking and hanging out with his grandparents near Granite Lake in the Gifford Pinchot National Forest, Washington. Photo by R. Carey.

The focus is also on intentionality—developing management systems that purposefully set out to address the values of a pluralistic public, reconcile various conservation philosophies, and integrate multiple scientific disciplines. In the last two decades, substantial research and practice in organization function and business practices have led to some general conclusions about how to organize any management effort—for example, decentralized management, with resources going to the front line where lead managers can most clearly identify the stakeholders and the nature of their demands. The relationships among people at each step in management processes need to be carefully and fully negotiated, such that each side of the junction has rights, responsibilities, and accountability for

the decisions made. And, importantly, people must be free to make decisions. For instance, neither environmentalist, nor regulator, nor manager can sit back and demand—all must put forth, engage, and contribute to resolution. No "line officer" or executive higher-up in an agency or organization hierarchy can violate the social and psychological contracting such hard-won consensuses entail with an imperious veto. It is this kind of veto that contributes to developing the present air of intense mistrust. To be intentional, management must be collaborative and based on collaborative learning. No one, nor any one group or group of agencies, has a monopoly on facts or truth or the capacity to integrate various social and economic public values and effectively communicate that integration. Nor can such values be aggregated regionally and then homogenized and directed downward again and still be appropriate. National and regional priorities can be transmitted downward by the actions of legislatures and auditors appointed for that purpose. Regional inventories, analyses, and policies provide useful information, but multilayered planning just gets in the way. In multilayered planning scenarios, most of the resources go to regional planning and to support technical staff at the regional level, well-removed from local specifics.

Just as cookbook silviculture cannot achieve diverse goals in the diverse Pacific Northwest landscape, neither can top-down socioeconomic formulations. Thus, we need to begin to decentralize planning and management by shifting human and financial resources to the front lines and drawing on the diverse local publics and their knowledge of needs, wants, desires, and ecology. Collaborative management means incorporating representatives of all stakeholders and management by consensus, not by compromise. It will be difficult when there are so many groups at odds with each other; the redeeming feature of such conflict is that it can only be overcome by true creativity.

This is not a book on psychology or sociology, but conservation and forest management entail as much, if not more, social science as ecological and economic sciences. Thus, the book covers cognitive psychology, the psychology of personality, psychological contracting, worldviews, cultural streams, social contracting, and the roots of conservation philosophies, in hope that understanding the sources of differences in perception, learning, knowing, communication, beliefs, and values will help ease the pain and increase the joy of collaboration. The pain will diminish as fear, distrust, poor communication, unwarranted assumptions, and defensiveness wane, and joy will increase as discovery reveals the unique human qualities, life experiences, and sincerity of each of one's collaborators. Not all per-

sonalities will function well in collaborative management settings; ones that do not can still play valuable roles in collaborative learning and information providing. Here again, we do not have to start from scratch. There is a huge literature, a variety of methods, and a profession of facilitation that has developed over the past 50 years to bring together individuals and groups in conflict. The Pacific Northwest has a decades-long history of attempts at collaborative management, including the Quincy Library Group, the Applegate Partnership, and various Forest Service provincial advisory committees.

Finally, this book seeks to fill the need for integration across scientific disciplines whose various worldviews suggest profoundly different priorities and approaches to ecosystem management. A landscape ecologist expresses the need to manage landscapes within the range of historical variation; a conservation biologist sees the world as composed of reserves and connecting corridors; forest ecologists emphasize biological legacies, biodiversity, ecosystem processes, and management of various "structures;" an evolutionary biologist fears loss of genetic diversity, even within a subspecies or an individual tree; a forester dreams of highly efficient fiber production and technological agroforestry; wildlife biologists variously focus on snags, elk and deer, Neotropical migratory birds, or spotted owls. Traditional economists have their views, quite different from those of the ecological economist. Social scientists hover around the edges, working with communities and other social institutions. How can such a cacophony be brought into some kind of harmony?

Systems theory helps. Pragmatists have always turned to systems concepts, and there is a long history in ecology from Eugene P. Odum to C.S. Holling, with the current version being called Panarchy theory. Beyond Panarchy is Ken Wilber's holarchy in which everything is a whole in itself, composed of parts, each part a whole in itself, and each whole contributing to a larger whole, which, again, is a part of yet another large whole; thus, everything is a whole/part and can be placed in hierarchy that is free of subordinate-dominant relationships. A characteristic of holarchies is that complexity increases with each level, and one can distinguish between levels in that the lower level is essential to the higher, but the higher is not essential to the lower. For example, the natural environment is essential to an economic system of resource use, but if the economic system is removed, the environment remains. An economic system of resource sharing is essential to developing a complex society, but the nature of that society could change markedly while the economic system remains intact. Markedly change the economic system and society must change. Panarchy insists ecosystem management must

be viewed within the context of human social and economic systems. Holarchy suggests that not only is such hierarchy appropriate but that ecosystems, individual humans, and cultures exhibit patterns of development. These patterns suggest that collaborative management not only necessitates understanding ecosystem function and human wants and needs but also requires personal growth and social development. This means moving away from self-centered thought on a personal level and tribal- or interest-centered thought on social and scientific-discipline levels and moving toward decentered views. When the individual and group can step away from self and their natural tendency to pursue a dominator hierarchy and observe the world in its whole-parts—a move from magic-mythic, mythic-rational, and economic rational thinking to what Wilber calls vision-logic—then we have a chance of achieving a common vision and consensus on solutions to complex problems. Therefore, there is a systems focus to this book. This book is not offered as a panacea or a difficult and complex solution to our conservation problems, or even a handbook of methods. Rather, this book provides hopefully one basis for collaborative learning and collaborative management of forested ecosystems (figs. ii, iii).

I dedicate this book to Robert H. Giles Jr., who in the late 1960s taught me how to think—systems thinking, hierarchical structures, and deconstructing complex problems; to Robert G. McLean, who introduced me to ecological fieldwork and invited my participation in multiple investigations of complex ecological systems (pathobiogeocenoses); to Jerry F. Franklin, who introduced me to Pacific Northwest old-growth forests and who has been a 20-year source of inspiration and discussion; and to Chuck DeRidder, who taught me the value of openness to others, teamwork, understanding cognitive differences among people, and the need for examining the structure and function of human organizations.

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*Andrew B. Carey*

**Figure ii**

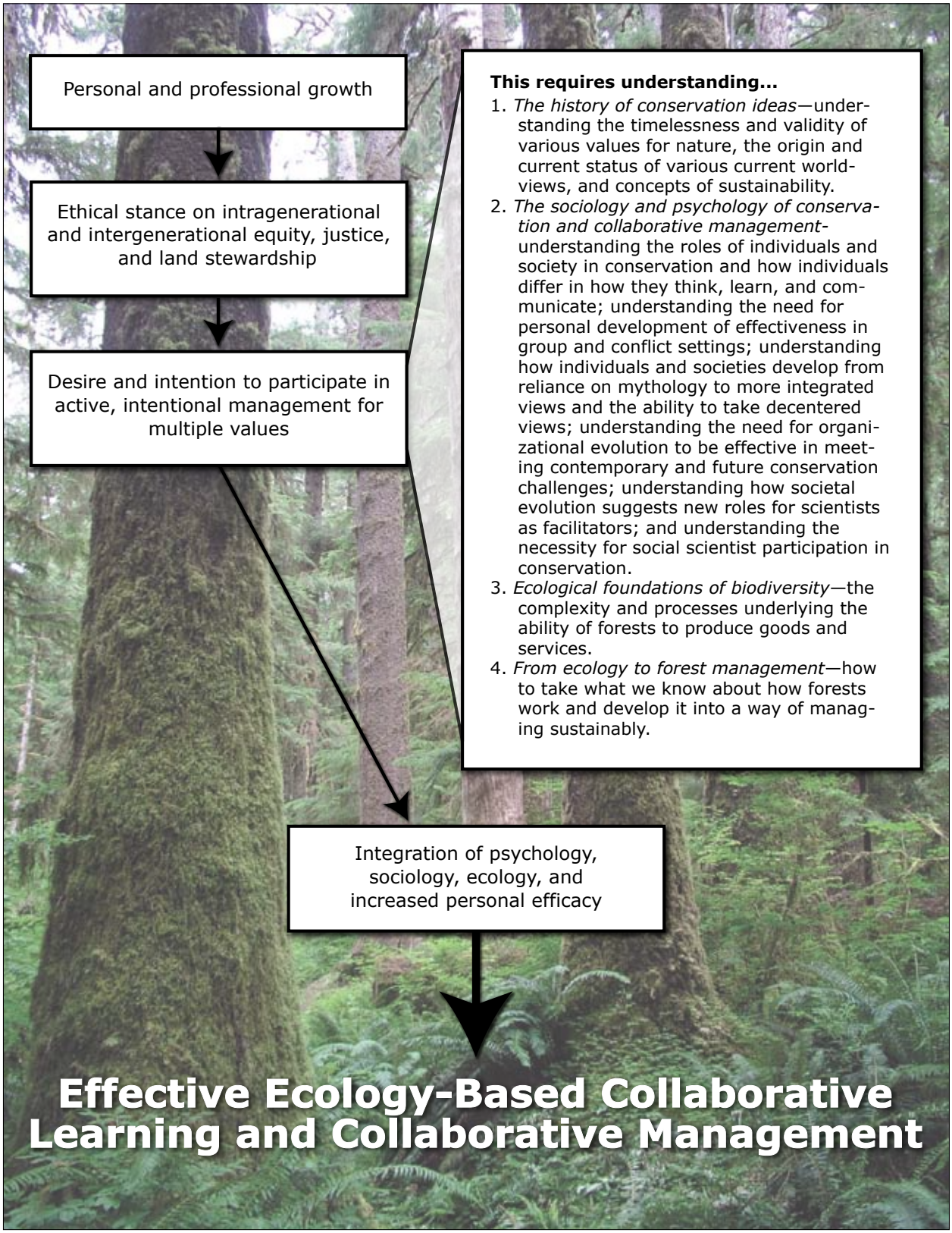
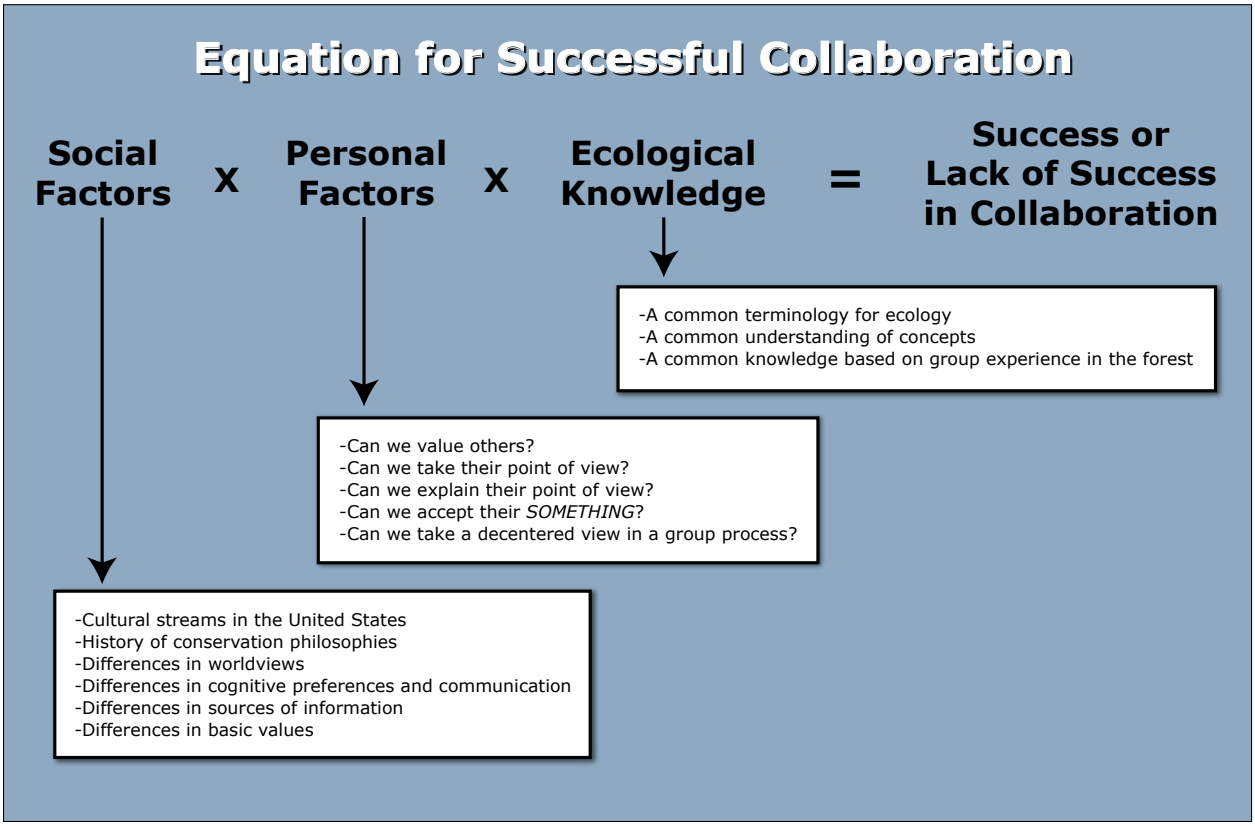
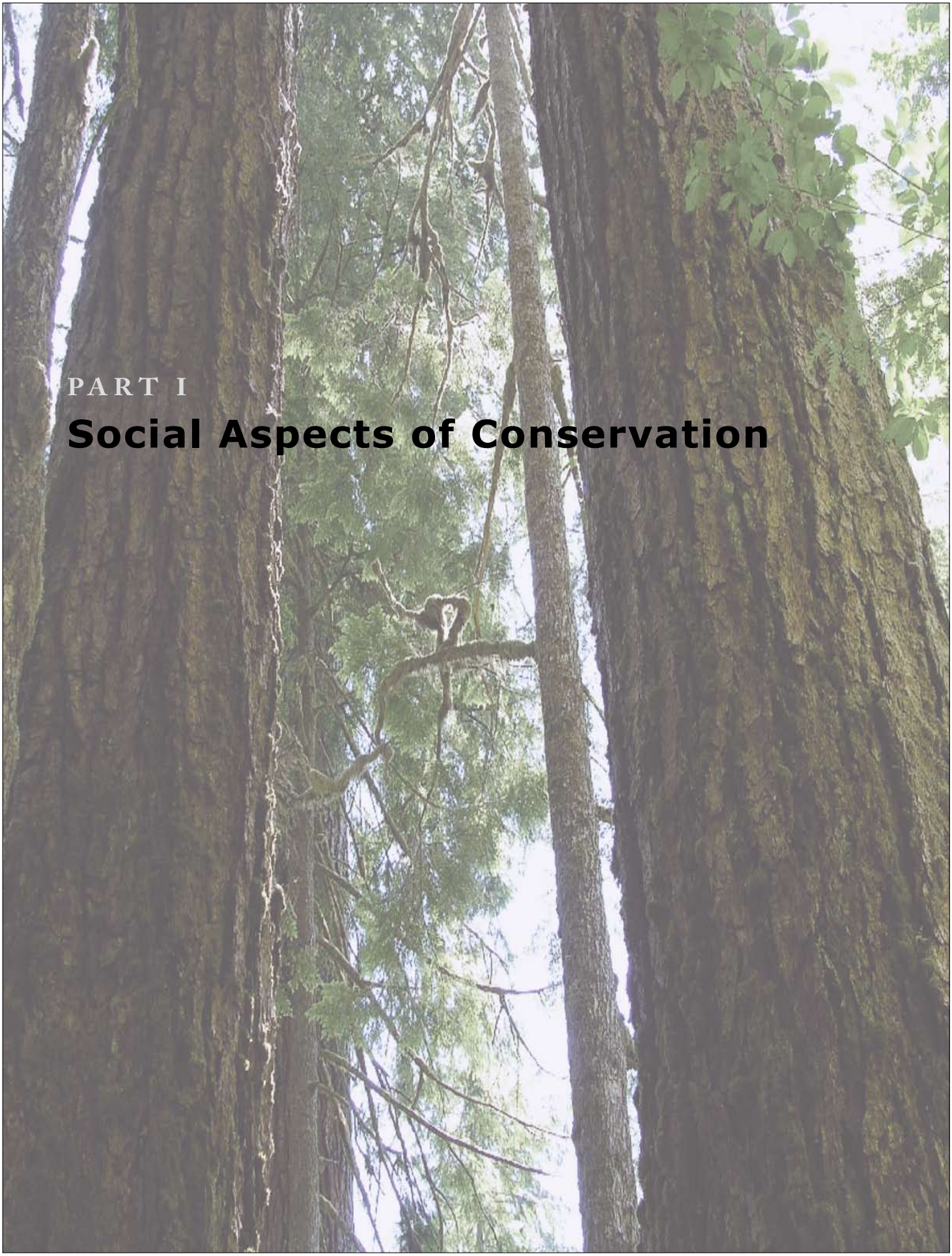

Personal and professional growth
Ethical stance on intragenerational and intergenerational equity, justice, and land stewardship
Desire and intention to participate in active, intentional management for multiple values
This requires understanding...
1. The history of conservation ideas—understanding the timelessness and validity of various values for nature, the origin and current status of various current worldviews, and concepts of sustainability.
2. The sociology and psychology of conservation and collaborative management-understanding the roles of individuals and society in conservation and how individuals differ in how they think, learn, and communicate; understanding the need for personal development of effectiveness in group and conflict settings; understanding how individuals and societies develop from reliance on mythology to more integrated views and the ability to take decentered views; understanding the need for organizational evolution to be effective in meeting contemporary and future conservation challenges; understanding how societal evolution suggests new roles for scientists as facilitators; and understanding the necessity for social scientist participation in conservation.
3. Ecological foundations of biodiversity—the complexity and processes underlying the ability of forests to produce goods and services.
4. From ecology to forest management—how to take what we know about how forests work and develop it into a way of managing sustainably.
Integration of psychology, sociology, ecology, and increased personal efficacy
Effective Ecology-Based Collaborative Learning and Collaborative Management

**Figure iii**


Equation for Successful Collaboration
Social Factors
X
Personal Factors
X
Ecological Knowledge
=
Success or Lack of Success in Collaboration
-A common terminology for ecology
-A common understanding of concepts
-A common knowledge based on group experience in the forest
-Can we value others?
-Can we take their point of view?
-Can we explain their point of view?
-Can we accept their SOMETHING?
-Can we take a decentered view in a group process?
-Cultural streams in the United States
-History of conservation philosophies
-Differences in worldviews
-Differences in cognitive preferences and communication
-Differences in sources of information
-Differences in basic values



PART I

# Social Aspects of Conservation

## PART I **Key Points**

- Conservation of nature has a long history in human societies and is common to virtually all philosophies of the use of natural resources.
- Society derives diverse values from forests, and forests form a large part of the life-support system for human societies.
- Groups differ in value emphasis in forest management, but practically all recognize sustainability as key to human welfare.
- Reconciliation of differences in values may be achieved best by collaborative learning and collaborative management at the local level.
- The ability of individuals to participate effectively in collaborative management not only depends on their willingness to do so, but also on their ability to take a decentered view of conflicts that arise.

CHAPTER 1

# Conservation and Biodiversity

This book is about conservation in the context of sustainability—environmental, economic, and social. Before addressing the environmental and economic aspects of conservation, I must first place conservation in a larger, overarching social context of the United States and, more particularly, the Pacific Northwest. Conservation calls for more than the application of technology; it requires a collective purpose (Leopold 1949). But our society is diverse. Perhaps our society's most fundamental aspect is its promotion of each individual's right to define his or her self—personally, socially, occupationally, culturally, politically, spiritually, and philosophically. Each of us is free to perceive and report reality in our own way. Our common language, English, promotes such individualism. The conceivers of the Oxford English Dictionary, the first comprehensive dictionary of the English language, recognized and accepted English as an ever-changing language, and they made their dictionary a continuing effort (1879-present) to inventory, not prescribe the language (Winchester 1999). To them, word meanings were not static but continuously wandering, twisting, and turning over time. Human diversity, dynamic language, and different ways of learning prompt defining reality in terms of one's self over reliance on scholarship and formal discourse to achieve a shared view. Even our tendencies toward safekeeping

**Sidenote 1**—Four types of restorationists participated in three widely separated river restoration efforts (Woolley and McGinnis 2000):

- **Categorical:** regards restoration as factually necessary and ethically mandated to a state prior to human settlement; sees restoration as an article of faith
- **Conditional:** believes restoration may be justified and technically feasible only if competing claims can be addressed; emphasizes private property rights, local control, tradeoffs, and cultural values
- **Ecophilosopher:** distrusts science and technology and is critical of values for restoration and community needs; has the deepest feelings for wilderness and preservation; does not believe nature can be restored; believes restoration is impossible and its products false; sees restoration as an act of human domination over nature
- **Ecosocietal:** thinks restoration is a philosophy and political enterprise and must involve society and community restoration

**Sidenote 2**—Many find conservation concepts ambiguous; this ambiguity, however, may be perceived because many of these concepts are multidimensional and metaphoric. Pickett (2000) defines ecosystem as "an ecological community together with its environment, functioning as a unit." Pickett and Cadenasso (2002) found that "ecosystem" is a fundamental ecological concept that is complex and subtle with

and cultural conservatism, determinants of our past evolutionary fitness, fail to stem this drive toward autonomy.

Our emphasis on individualism extends into science, where rejecting an existing hypothesis and creating new theories are valued over affirming hypotheses and synthesis (Wilson 1998). Furthermore, "For every expert there is an equal and opposite expert" (Clarke 1998). Even more problematic, ecology is grounded in words, not in the precision of mathematics. Because of the imprecise and changing nature of words in English, the science of ecology has been slow to advance in comparison to mathematical sciences and their precise, unvarying definitions (Haskell 1940). Disputes become based on semantics and caricatures of concepts developed by embellishment, selective editing, and oversimplification (Partridge 2000). Furthermore, scientific perception is theory bound—two different and equally objective scientists can observe the same natural system and provide very different descriptions of what they observed, depending on the language they choose, the assumptions they make, and the values that motivate them. These descriptions may or may not be contradictory. Because scientific claims are not value free, science, especially ecology, is rife with disputes rooted in conflicting values and epistemologies (Woolley and McGinnis 2000) (sidenote 1). Furthermore, the imprecision of the English language led an eminent and well-published psychiatrist, Stoller (1985), to conclude that no matter how mightily he strove for clarity, there would still be *multiple*, *valid* interpretations of what he wrote.

*Ecology*, the science of relationships between organisms and their environment (Pickett 2000), has progressed through iterative compilations of natural history observations, verbal conceptual models, and mathematical formulations, with occasional important contributions from experiments. Imprecision and a variety of words have led to hypotheses and theories that are often challenged because of superficiality, circularity, and infallibility (Peters 1976, 1978; Quinn and Dunham 1983). This considerable ambiguity in the use of terms has produced a science that lacks clear baselines, boundaries, explicated concepts, and theoretical rigor (Partridge 2000) (sidenote 2). Such concerns led the distinguished ecosystem ecologist, R.V. O'Neill (2001) to ask, somewhat tongue-in-cheek: "Is it time to bury the ecosystem concept?" citing backlash from the "apocalyptic fervor of the environmental movement of the past decades." It is now too late for science to define authoritatively concepts related to conservation; science no longer has the moral authority to do so in our culture. The privilege accorded science in the modern world relied on science being objective in describing how the world works; in the postmodern world, a single truth does not exist.

Science of intrinsic quality now needs narratives with explicit values—not just facts—particularly as it faces multilevel complexity in environmental issues (Allen et al. 2001). Traditionally, scientists and conservationists have worked independently of each other, as well as the people affected by their decisions (Adams and McShane 1992). Today, various "concepts are at large in the world, shaping conservation thought and policy" (Callicott et al. 1999) (side note 3). Many find the terminologies of conservation to be ill-defined, nakedly value laden, irritating, and even contentious, whereas others find them normative, meaningful, and even uplifting. Often conservation concepts are described as buzzwords and rhetorically dismissed as lacking substance. Even so, these terms are in the public lexicon, the culture of conservation, written policy, laws, and treaties, and they have inescapable consequences for stakeholders, regulators, managers, and policymakers.

Humans search for simple and clear principles, without uncertainty. Our behavior is shaped of necessity by concerns that are personal, immediate (short term), and certain (Daniels 1989, Ornstein and Ehrlich 1989). These characteristics reflect an intuitive tendency to parse our environment and experiences into discrete, bounded wholes. Some of this may be "hard-wired" in our brains and is one reason that umbrella concepts have such appeal (Anderson 2001) (sidenote 4). Nature, however, is simultaneously mechanistic and stochastic, and thus, presents substantial ambiguity and complexity, just as many conservation concepts do.

Ambiguity is unsatisfying and can lead to unwarranted rejection of concepts and searches for nonexistent certainty and specificity. Thus, *conservation of biodiversity* can be a useful concept to some (e.g., Carey and Curtis 1996, Hansen et al. 1991, Reid and Miller 1989),

The Procession of Species, a yearly artistic pageant where community members celebrate their relationships with each other and with the natural world. Photo by A. Carey.

layers of meaning. Ecosystem has three uses: meaning, model, and metaphor. Its meaning is usually a technical definition, which requires detailed definition for each application. As a model, it embodies details that are needed to address real or hypothetical situations. As a metaphor, it informs scientific discussions, common parlance, and public dialogue. The earliest definition of ecosystem is "a biotic community and its associated physical environment in a specific place" (Tansley 1935). This implies a nested hierarchical system—size can vary, but it must have an explicit spatial extent, specified and bounded—and this is the way that prominent ecologists of the past (Tansley, Odum, and Likens) perceived ecosystems. In modeling, ecosystem has been used for diverse foci, including energy and nutrient cycling, autecology of organisms, community ecology, biodiversity, and ecological economics. Thus, ecosystems have four domains that need to be specified: components, spatiotemporal scale, physical boundaries, and connections among components. These components can be geophysical, biological, and social. Boundaries can be chosen as a matter of convenience to follow geomorphological divides (most common), to understand a political entity, to recognize changes in rates of ecosystem processes, or to measure changes in frequency of some ecological phenomena.

**Sidenote 3**—Concepts at large in the world shaping conservation thought and policy that are generally either ill defined or defined differently by various groups (Callicott et al. 1999):

- Adaptive management
- Biological diversity
- Biodiversity
- Biological integrity
- Conservation
- Ecological integrity
- Ecological restoration
- Ecological services
- Ecological sustainability
- Ecosystem health
- Ecosystem management
- Flagship species
- Functional groups
- General sustainability
- Keystone species
- Habitat fragmentation
- Minimum viable populations
- Source-sink dynamics
- Survey and manage species
- Sustainable development
- Umbrella species

only to be rejected in the same scientific arena as useless because it lacks a universal specific meaning (Lautenschlager 1997). Similar treatment has been accorded to *niche*, *habitat*, *ecosystem*, *keystone species*, *ecosystem management*, *conservation*, and most other terms in the debate over disposition and management of our natural resources (Carey 1981, Morrison 2001, Whittaker et al. 1973). Therefore, common words used in this book are defined according to their primary definition in the fourth edition of *The American Heritage Dictionary of the English Language* (Pickett 2000) but with reference to the online *Oxford English Dictionary* for history of usages. Additional definitions of technical terms are provided in the text, sidenotes, and glossary. The purpose in providing these definitions is to give participants in collaborative learning and collaborative management a source of common language, if they care to use it. No one should presume to mandate definitions.

The focus on semantics is not whimsical (Hardin 1969). Semantics, rather than logic or science, accounts for much of the current debate about *conservation*—the protection, preservation, management, or restoration of wildlife and of natural resources such as forests, soil, and water (Pickett 2000). In this debate, terms become *normative*—of, relating to, or prescribing a norm or standard (Pickett 2000). Thus, there is active competition to have one's definition become accepted by a majority because thereby a social standard comes into being. Partisans of a single normative concept try to vanquish the rest in a battle of definition of buzzwords in the arena of power politics (Callicott et al. 1999). Commonly, "good science is that which supports one's political position and interests" (Woolley and McGinnis 2000).

Freudenburg (2002) refers to this politics of language as "navel warfare" (as in gazing at one's navel), concluding that exaggeration of differences between both environmental and resource sociology produces a divide where synergy could exist. Viewing the environment in terms of profit produces resource managers instead of environmental managers. Viewing a need to preserve broader ecosystems fosters protection and restoration over environmental management. Academics exhibit the "best of minds, the worst of minds" in the debate. At best, they use highly developed abilities to spot patterns, think abstractly, construct models, and work and play with models. At worst, they take mental models too seriously and forget the original purpose. Debate over management choices, rather than focusing on opportunities for synergy, often focus on false dichotomies (Haynes and Monserud 2002, Haynes et al. 2002). Conflict over policy has evolved into nonlistening conversations with the same

nearly century-old arguments of Gifford Pinchot and John Muir being restated with little new in the way of reconciling principles (Callicott et al. 1999). Realizing the futility in searching for decisive terminology and, instead, embracing ambiguity and seeking understanding and communality will help achieve consensus in management debates. In the following sections, this book will offer some temporary clarity in terms and concepts.

Conservation inescapably entails some aspect of conserving biodiversity. *Biodiversity* is the variability among living organisms on the earth, including the variability within and between species and within and between ecosystems (Pickett 2000). Many variations on this definition exist that are reflective of various worldviews and conservation priorities. The definition of biodiversity prompts the question: Why conserve biodiversity? The simple answer is multifold: legal mandates; social and cultural mandates; instrumental values such as wood products, medicines, and ecosystem services; and importance to sustainability. Loss of biodiversity, along with ozone depletion and greenhouse warming of the Earth's atmosphere, are global environmental problems dominating environmental discussions (Norton 1994).

The most common related questions are: What should we save—genes, species, or ecosystems—and how many, where, when, for how long (Amaranthus 1997, Franklin 1993b)? To many, deciding what elements to preserve is a policy decision to be based on societal priorities. To others, it is a profoundly ethical and moral question. Are any species superfluous? We do not know, and it is possible we will never know for sure. Most species are unknown. And as Tacitus (54–119 AD) said "*Omne ignotum pro magnifico*," or anything unknown is assumed wonderful (Bigg 2000), at least by a significant proportion of stakeholders. Based on current knowledge, the odds are that there is enough redundancy that loss of a species could be inconsequential (to species other than itself and its obligative symbionts). Are some species more influential than others? Of course, they are. In any case, given our vastly incomplete knowledge of species, conservation must focus on surrogates for the totality of genes and species. Even if we do the impossible and identify and describe the ecologies of all species, it would be far beyond our cognitive capabilities (even aided by computers) to use all that information; we must formulate and apply some first (general, basic) principles.

A less common question, but perhaps more important is: How can we restore and maintain biodiversity in our humanly inhabited natural-cultural mosaic landscapes? In other words, how do we manage for biodiversity? There are four basic options: ecological reserves;

**Sidenote 4**—Anderson (2001) describes three pairs of evolved abilities and their corresponding difficult cognitive tasks:

- **Packaging information: recognizing things as discrete; classifying and naming categories**

  Difficult task: Dealing with continuous processes (working across scales; managing problems without clear boundaries)

- **Focusing on frequencies: counting instances; interpreting counts as frequencies**

  Difficult task: Using decimal probabilities (estimating probabilities of single events; working with probability theory)

- **Telling stories: telling stories to share experience; using cases as a basis for decision-making, problem-solving, and learning**

  Difficult task: Making decisions in the absence of experience (solving unique problems; communicating theory and abstractions)

Interestingly, the evolved abilities and corresponding difficult cognitive tasks also relate to the IQ measure, with lower, initial points earned for recognizing types and using past experiences to solve similar problems and applying past experience to novel problems (evolved abilities) and subsequent additional points earned for creating novel solutions to novel problems (more difficult cognitive task). In other words, evolved abilities form the basis for low to average IQ, and the corresponding difficult cognitive tasks are characteristic of high IQ.

active, intentional, ecosystem management; reserves and management in combination; and total landscape management (Carey 2003a, 2003c). The belief that we can achieve our conservation goals simply through passive management, however, is fallacious (Agee 2002). And finally, how do we measure success? Here, the answer is least clear. There is no single measure. There is no agreement on a suite of measures. Various people suggest monitoring species persistence (often rare, cryptic, and threatened species), invasion by exotic species, diversity of various groups of vertebrates and fungi, functional groups of plants and invertebrates, keystone species, biotic integrity, ecosystem structure, ecosystem processes, or landscape structure and dynamics. Norton (1994) said: "Whilst it is not seriously questioned that there is an incumbent moral obligation for us to sustain biological diversity for the benefit of future generations, we still have to find the rationale for consensus and to articulate it in a specific and operational manner." Dombeck (1997) added: "Just how do we maintain the health of the land? By working with people who use and care for the land."