

Chapter 3

Approaches to Large Scale Conservation: A Survey

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ABSTRACT

Single and multiple use management is the classic and still dominant approach to large scale conservation. It is the embodiment of scientific management, a philosophic doctrine and formula, with supporting symbols, that is widespread. Its historical genesis is in the progressive era, but its antecedents stretch further back into American history. The formula employed in single and multiple use management and its offshoots have weaknesses that often prevent participants from identifying and securing their common interests. We describe six alternative approaches to large scale conservation—parks and protected areas, ecosystem management, integrated conservation and development, ecoregional planning, transboundary conservation, and adaptive governance—in terms of their doctrine, formula, and symbols. Most of these are modern variations on single and multiple use management, and share important elements of the doctrine and formula of scientific management. In so doing, they perpetuate a host of systemic problems. We argue that approaches based on scientific management should be replaced by adaptive governance, which is better suited to articulating the common interest, safeguarding human dignity, and promoting sustainability. Adaptive governance is more effective because it promotes fully contextual analyses, complete problem orientation, and common interest outcomes that enhance sustainability and human dignity. It eschews the rigid formulaic and doctrinaire interventions called for by scientific management. Adaptive governance evaluates decisions in terms of procedural, substantive, and pragmatic criteria and the common interest outcomes and effects.

Key words: *large scale conservation, single and multiple use management, parks and protected areas, ecosystem management, integrated conservation and development, ecoregional planning, transboundary, adaptive governance, scientific and adaptive management*

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INTRODUCTION

Various approaches to large scale conservation have evolved over time. Although significant overlap exists among the approaches and the terminology used to describe them, each one can be distinguished using doctrine, formula, and symbols. Doctrine is the set of basic assumptions (or philosophy) that grounds an approach. Formula is the set of standard operating principles and guidelines that govern project implementation and on the ground actions. Symbols are used to promote and legitimize the approach. By clarifying the distinctions in doctrine, formula and symbols that underlie each approach, participants are able to move past the array of confusing typologies and discern the true differences and similarities between large scale conservation approaches and the evolutionary development of the approaches.

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In this chapter we survey seven relatively distinct approaches. First, we trace the development of the single and multiple use approach in the United States and discuss its limitations. Next, we discuss the archetypal parks and protected areas management approach, as well as four more recent approaches to large scale conservation. We argue that the doctrines of all six approaches are rooted in scientific management and, consequently, have important limitations. Finally, we describe adaptive governance, an approach whose doctrine promotes a culture of human dignity and environmental sustainability. We argue that this approach addresses the limitations of scientific management while incorporating the strengths of the traditional approaches. Consequently, we recommend its use when engaging with problems of large scale conservation.

SINGLE AND MULTIPLE USE MANAGEMENT: PHILOSOPHY, HISTORY, AND CRITIQUE

Single and multiple use resource management, in which humans manage nature for sustained use and/or profit, is the historical cornerstone of conservation from which other approaches to conservation have evolved. It is deeply institutionalized in natural resource management organizations and is used by governments worldwide (Kaufman 1960, Pinchot 1972). It is based on scientific positivism, economic efficiency, and expert authority. It divides the world into resource cells (e.g., soil, forestry, water, range, wildlife, fisheries, crops, recreation) and attempts to maximize

or optimize outputs from each cell. The formula is typically employed by bureaucratic organizations that are hierarchical, rely heavily on task differentiation, and employ specialized, skills-based professionals to seek optimal solutions to resource management problems (Williams 2002). Implementing contextually sound large scale conservation requires understanding the history and philosophical basis of single and multiple use management. Consequently, this section explores the tradition in some detail.

Philosophical roots

The intellectual history of single and multiple use management begins in the philosophy of the 17th and 18th century Enlightenment, the same intellectual revolution that gave birth to so much of modernity's progress, including liberalism and modern democracy. The philosophy of the period—and increasingly, the culture—conceived itself in opposition to the “Dark Ages” of the preceding millennium. Progress was cast in stark contrasts as light winning over darkness, advancement over stagnation, science over superstition, and freedom over authoritarianism (Gay 1996).

Although Enlightenment philosophy, science, and technology provided new tools for cultivating and subduing nature, the urge for mastery over nature predates the period. The drive to subdue wild nature occurred for both symbolic and practical reasons. Western mythology, religion, and histories had long idealized nature in cultivation and feared wild nature (Price 1954). Even before the Enlightenment, Europeans perceived wilderness as something alien and often dangerous—or in the words of Nash (1967: 9) as “an insecure and uncomfortable environment against which civilization had waged an unceasing struggle.” To cultivate and subdue nature was to bring the boon of civilization.

The Enlightenment philosopher John Locke wrote extensively—and with real normative intent—on humanity's relation to nature. His *Second Treatise of Government*, written in 1689, would become the intellectual foundation of American liberalism and its institutions (Locke 1982). For Locke, political identity was founded on the ownership of property, which was created through the introduction of human labor to a chosen swatch of wilderness. Wild nature was useless—even vile—until converted for human use: “. . . land that is left wholly to nature, that hath no improvement of pasturage, tillage, or planting, is called, as indeed it is, waste; and we shall find the benefit of it amount to little more than nothing” (Locke 1982: 24). In Locke's view, one acre enclosed and cultivated was worth ten acres “lying waste in common” (24). In the same passage, he expands his ratio even further when he refers directly and presciently to America. Indeed, Locke's theories were dramatized as North America became the staging ground for an unprecedented experiment in political liberalism.

Alexis de Tocqueville, a particularly astute observer of American culture, perceived the depth of America's dominionistic and utilitarian relation to nature. In 1835, almost a century-and-a-half after Locke, he wrote,

“The wonders of inanimate nature leave [Americans] cold, and, one may almost say, they do not see the marvelous forests surrounding them until

they begin to fall beneath the axe. What they see is something different. The American people see themselves marching through wildernesses, drying up marshes, diverting rivers, peopling the wilds, and subduing nature. It is not just occasionally that their imagination catches a glimpse of this magnificent vision. It is something which plays a real part in the least, as in the most important, actions of every man, and it is always flitting before his mind (de Tocqueville 2000: 485).”

De Tocqueville’s vision—one of a people valuing land for its utilitarian purpose—is essentially the large scale enactment of Locke’s views.

America’s dominionistic and utilitarian approach to managing nature was reinforced as efficiency was adopted as a core, almost sacred, American value by the Progressive movement of the early 20th century (Hays 1972). The gospel of efficiency, as applied to natural resources, held that the principles of scientific management could be used to optimize economic output and solve pending natural resource problems (e.g., perceived imminent shortages of food, water, and timber). A management system based on Frederick Winslow Taylor’s model of scientific management—known as the Taylor System or Taylorism in the United States, and as “rationalization” in France and Germany—was adopted. The system claimed to increase industrial efficiency and output through the scientific study of labor and production, the elimination of waste, and a search for the single, best way (Kanigel 1997).

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If the single and multiple use method was ontologically rooted in scientism (Stenmark 1997), its ethical roots were utilitarian (Bentham 2000) and its epistemology was based on positivism. As we will see, Jeremy Bentham’s principle of utility (i.e., act so as to produce the greatest happiness for the greatest number) was firmly entrenched in the minds of Progressive leaders in the conservation movement. Positivism holds that that scientific methods are the only means of obtaining authentic knowledge and that correct answers will emerge once a subject is understood in sufficient detail. In the words of Cortner and Moote (1999: 78), “the quantitative replaces the qualitative. . . . Knowledge that can be quantified, verified by empirical methods, and reduced to unified laws is prized.” The failure of the reductionistic methods favored by positivists to adequately address some conservation problems would eventually spur the development of other approaches to large scale conservation. However, scientific management and positivism remained firmly entrenched in American politics and decision making (Lee 1995).

History

Well into the 19th century, the frontier mentality described by de Tocqueville played out as European settlers moved westward: forest and range land was converted to

agricultural uses; wildlife was harvested; mineral deposits were located and extracted. When forested land was unsuitable for agriculture, it was often managed using a strategy of “cut out and get out.” Standing timber was rapidly cut and sold before the population moved to a new location (Cox 1985). Under the belief that “rain follows the plow” attempts were made to cultivate arid grasslands that were ultimately found to be incapable of supporting rain fed agriculture. Wildlife populations were exploited, sometimes to the edge of extinction. Perhaps the most famous examples are the passenger pigeon, the last of which died in 1914, and the American bison, brought back from the brink of extinction over the course of the 20th century.

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By the latter half of the 19th century, however, de Tocqueville’s vision of Americans as incapable of seeing a forest until it began to fall under the ax was starting to be challenged. In a book that reviewed the effects of civilization on the natural world, George Perkins Marsh (1965: 29) wrote,

“Man has too long forgotten that the earth was given to him for usufruct alone, not for consumption, still less for profligate waste. Nature has provided against the absolute destruction of her elementary matter, the raw materials of her works; the thunderbolt and the tornado, the most convulsive throes of even the volcano and the earthquake, being only phenomena of decomposition and recombination. But she has left it within the power of man irreparably to derange the combinations of inorganic matter and of organic life, which through the night of aeons she had been proportioning and balancing, to prepare the earth for his habitation, when in the fullness of time, his Creator should call him forth to enter into its possession.”

Marsh went on to assert that (1965: 36), “Man is everywhere a disturbing agent. Wherever he plants his foot, the harmonies of nature are turned to discords.” Widespread concern over excessive and wasteful consumption—stimulated, in part, by the familiar imagery of wanton bison massacre and smoldering clearcuts—would fuel a nascent interest in developing new ways to relate to nature.

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Amid rising concern that America’s inexhaustible natural abundance might soon be depleted, Theodore Roosevelt’s administration prescribed a conservation strategy that would stabilize and prolong resource productivity in the nation’s long-term economic interest (Box 1). In 1905, the U.S. Forest Service was established within the Department of Agriculture. Both Gifford Pinchot, the first chief of the Forest Service,

and the Forest Service itself have been closely associated with the development and implementation of single and multiple use management (Miller 2001).

Box 1 Excerpt from a letter (dated February 1, 1905) from Secretary of Agriculture James Wilson to Forester Gifford Pinchot officially informing the later of the transfer of Forest Reserves from the Department of the Interior to the Department of Agriculture. The letter was actually composed by Pinchot and his assistant Frederick Olmstead.

In the administration of the forest reserves it must be clearly borne in mind that all land is to be devoted to its most productive use for the permanent good of the whole people, and not for the temporary benefit of individuals or companies. All the resources of forest reserves are for use, and this use must be brought about in a thoroughly prompt and businesslike manner, under such restrictions only as will insure the permanence of these resources. The vital importance of forest reserves to the great industries of the Western States will be largely increased in the near future by the continued steady advance in settlement and development. The permanence of the resources of the reserves is therefore indispensable to continued prosperity, and the policy of this department for their protection and use will invariably be guided by this fact, always bearing in mind that the conservative use of these resources in no way conflicts with their permanent value. You will see to it that the water, wood, and forage of the reserves are conserved and wisely used for the benefit of the home builder first of all, upon whom depends the best permanent use of lands and resources alike. The continued prosperity of the agricultural, lumbering, mining, and livestock interests is directly dependent upon a permanent and accessible supply of water, wood, and forage, as well as upon the present and future use of their resources under businesslike regulations, enforced with promptness, effectiveness, and common sense. In the management of each reserve local questions will be decided upon local grounds; the dominant industry will be considered first, but with as little restriction to minor industries as may be possible; sudden changes in industrial conditions will be avoided by gradual adjustment after due notice; and where conflicting interests must be reconciled the question will always be decided from the standpoint of the greatest good of the greatest number in the long run.

These general principles will govern in the protection and use of the water supply, in the disposal of timber and wood, in the use of the range, and in all other matters connected with the management of the reserves. They can be successfully applied only when the administration of each reserve is left very largely in the hands of the local officers, under the eye of thoroughly trained and competent inspectors.

Very respectfully,
[signed]
James Wilson
Secretary [US Department of Agriculture]

Under this formula, managers divided the world into resource cells, which were abstracted from complex natural systems for conceptual and administrative ease. Individual cells were targeted and sorted by their economic value. For Pinchot, forestry amounted to scientifically-managed tree-growing. While other uses (e.g., water, grazing) of the national forest lands were recognized as important in theory, their economic value was usually assumed to be less than the value of timber and, consequently, they tended to be discounted in practice (Clary 1986). The Forest Service, under Pinchot's leadership, adopted a utilitarian creed: the greatest good for the greatest number in the long run. The agency's doctrine also reflected the fixation of newly industrialized nations on efficiency, technology, and positivistic science. By the late 1930s, this approach to conservation had been applied to other resource cells and had contributed to the creation of specialized agencies for managing specific resources at both the state and federal level (e.g., U.S. Fish and Wildlife Service, Bureau of Land Management, state Bureaus of Fish and Game).

Statutory standards promulgated in the mid-20th century (e.g., Multiple-Use Sustained-Yield Act of 1960, National Environmental Policy Act of 1970) called for agencies to satisfy the increasingly diverse interests of the public by managing multiple resource cells relative to one another and taking into account public comments. While the symbols (especially the symbolic language) and formula changed somewhat, these updates did not fundamentally alter the doctrine subscribed to under the original model. The doctrinal underpinnings of the single and multiple use tradition remain deeply institutionalized in government and academia although, in practice, the doctrine is often veiled in the language and symbols of newer paradigms.

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Critique

The single and multiple use approach has faced criticism, both from practitioners and outside groups (Kohm and Franklin 1997), for failing to be sufficiently contextual as it tries to adapt to a rapidly changing world and demands from a more diverse array of interests. The proliferation of specialized resource-based agencies has also been criticized for contributing to fragmented decision making and interagency competition (Brunner et al. 2005). While some practitioners of scientific management have looked for better ways to measure and rigorously quantify resource cells, critics have asked whether it is even possible to quantify all important attributes of resource systems (Ascher 2001). In some cases, organizations have responded by adopting the symbols of a new tradition while maintaining the same basic doctrine and formula (Hohl 2009). When this occurs, the adaptations that do take place are minor and at the margin; innovations are restricted to things that are congruent with the embedded doctrine and formula (Rutherford 2003). This defensive response

allows the organization to maintain its cultural structures and formula while deflecting pressure to make additional systemic changes (Kaufman 1960).

Historically, the doctrine of single and multiple use management encouraged the growth of bureaucratic conservation organizations that subscribed to scientism and positivism. In such organizations, it is assumed that natural resources can and should, be managed using reductionistic, quantitatively-based methods that strive to make the inherent “messiness” of natural resource management more “legible” (Scott 1998). Cortner and Moote (1999: 15) have noted that, “the legacy of the last 100 years of resource management is a politics of expertise, of maximum sustained yield, and of [special] interests.” A reliance on experts and focus on technical issues restricted participation by other valid participants—in part because they were perceived to lack the requisite skills, experience, resources and technical training. Ultimately, the creation of arenas in which values could be shaped and shared was minimized and the decision process was turned over to anonymous experts whose decisions were perceived to be rational, efficient and objective.

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Taylor’s scientific management formula ignored the complexity of human nature and psychology in its quest to control human labor and interaction with the precision and efficiency of a machine. Problems were viewed as technical issues to be resolved by reasoned experts. Knowledge not easily quantified (e.g., local or indigenous knowledge) was discounted or excluded from consideration. Normative questions that could not be answered using empirical methods (e.g., about social justice, human dignity, and the decision making process) were marginalized. Instead of taking contextual factors into account and developing common interest goals, efficiency in progress toward preconceived ends became the basic value. Ordinary citizens were left frustrated and alienated by the ascendancy of remote, insulated, and idealized professionals; decisions veiled defensively in the technical language of objectivity; and a seemingly misanthropic government that ignored real world problems.

At the same time, the administration of the resource bureaucracies became concentrated in government centers (e.g., Washington, D.C.). Under the bureaucratic governance formula, citizens found it “difficult to identify the remote officials and non-officials most responsible for policies that affect their interests and to hold them accountable amid the growing number and complexity of issues” (Brunner et al. 2002: 23). The concentration of decision making power in distant cities permitted special interests to wield more influence on decision making. Managers and administrators soon felt pressure to approve liberal resource harvests. In some cases, as in fisheries and wildlife, the intended beneficiaries of

Table 1 The myths associated with seven approaches to large scale conservation. Examples of symbols, overarching formula, key doctrinal points, and a representative user are listed for each approach.

Approach	Symbols	Formula	Doctrine	Example
Single and Multiple Use Management	“Greatest good for the greatest number in the long run”	Employ science-based expertise and knowledge to maximize extractive utility in an economically efficient manner.	Natural resources should be rationally managed to benefit society.	U.S. Forest Service
Parks and Protected Areas	Wolves in Yellowstone	Enforcement/policing strategies and scientific management used to preserve culturally, aesthetically, or biologically significant areas for recreational, educational, and scientific purposes.	“Man is everywhere a disturbing agent. Wherever he plants his foot, the harmonies of nature are turned to discords.” (Marsh 1965:36)	Yellowstone National Park, USA
Ecosystem Management	Adaptive management plan	Balance utilitarian and political demands with ecosystem processes and functions.	The integrity of ecosystems is paramount and includes social, ecological and economic values.	Greater Yellowstone Ecosystem
Integrated Conservation & Development	Biosphere reserves	Integrate nature conservation, poverty alleviation and sustainable development goals.	Poverty, under-development and resource degradation are inextricably linked.	Annapurna Conservation Area Project (ACAP), Nepal
Ecoregional Planning	Spatial analysis technology (GIS, satellite imagery)	Designate, connect, and manage ecological zones that represent distinct assemblages of natural communities.	Protecting biodiversity from human from human damage requires maintaining/ restoring connectivity between protected areas.	World Wildlife Fund for Nature (WWF) Global 200 priority ecoregions
Transboundary Management	Peace Parks	Integrate conservation and development via coordination & collaboration across political boundaries in order to link fragmented ecosystems or processes.	Natural resources persist across political and administrative boundaries.	Great Limpopo Transfrontier Conservation Area Southern Africa
Adaptive Governance	Interdependent goals	Management is contextual, practical, interdisciplinary and collaborative. Focused on substantive issues, procedural norms.	Human social relations are part of the solution. Uncertainty is expected, and flexibility is obligatory.	MendoFutures

resource management agencies became benefactors as license sales became a major revenue source. Withdrawal of governance from conflicted localities to distant cities made it more difficult to secure common interest solutions to local problems and left a legacy of distrust between local communities and resource management agencies.

The single and multiple use management approach to large scale conservation has often failed to identify and secure the common interest because it relies too heavily on science and scientific management at the expense of rigorously analyzing and incorporating the social context and value dynamics of particular resource management decisions. No matter how technical or allegedly impartial the expert's conceptions, decisions are ultimately grounded in human values. Under the single and multiple use approach, conservation fails in its primary goal—fulfilling a broad national interest, or, as Pinchot would have it, providing the greatest good for the greatest number in the long run.

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ALTERNATIVE APPROACHES TO LARGE SCALE CONSERVATION

A range of alternatives that attempt to rectify the perceived inadequacies of single and multiple use management have been proposed. However, most of these approaches have reproduced the problems of single and multiple use management because they have not adequately changed the fundamental doctrine. We profile several of the major alternatives below, paying particular attention to their doctrine, formula, and symbols (Table 1). Many of the innovations embodied by the newer approaches are beneficial. For example, incorporating knowledge of ecosystem processes (Ecosystem Management) and economic interests (ICDPs) into resource management decisions should result in decision making that is more contextual. However, we feel that fundamental doctrinal change is also necessary. A reductionist, instrumental, and positivistic science must be augmented by a holistic and integrative approach that can accommodate normative questions and non-traditional knowledge sources. Although the proposed alternatives summarized below share a notion of systems-level, holistic resource management, at their core many still remain grounded in a bureaucratic, positivist science-based approach. Consequently, we recommend adaptive governance as an approach that prioritizes cultural change, and addresses fundamental philosophical issues (Brunner et al. 2005). Adaptive governance focuses on developing practical, collaborative solutions that are sensitive not only to substantive issues, but also to procedural norms.

Parks and protected areas management

The national park model is typically traced back to the establishment of Yellowstone National Park in 1872, however the formula has antecedents in both Western and Eastern culture that date back to the earliest written records (Perlin 1991, Winters 1974, Nash 1967). Almost from their inception, tensions existed between the competing formulas of the Forest Service and National Park Service (Box 2) and bureaucratic rivalry became a permanent feature. Early conflict between the two amounted to an argument about formulas of use, not basic doctrines. The parks and protected areas approach to large scale conservation shares the strongly utilitarian aspect of single and multiple use approach. Sellars (1997: 16) noted, “the national park movement pitted one utilitarian urge—tourism and public recreation—against another—the consumptive use of natural resources, such as logging, mining, and reservoir development.”

The parks and protected areas approach to large scale conservation shares the strongly utilitarian aspect of single and multiple use approach.

Box 2 Excerpt from *The Yosemite* by John Muir (1912)

“The making of gardens and parks goes on with civilization all over the world, and they increase both in size and number as their value is recognized. Everybody needs beauty as well as bread, places to play in and pray in, where Nature may heal and cheer and give strength to body and soul alike. This natural beauty-hunger is made manifest in the little window-sill gardens of the poor, though perhaps only a geranium slip in a broken cup, as well as in the carefully tended rose and lily gardens of the rich, the thousands of spacious city parks and botanical gardens, and in our magnificent National parks—the Yellowstone, Yosemite, Sequoia, etc.—Nature’s sublime wonderlands, the admiration and joy of the world. Nevertheless, like anything else worth while, from the very beginning, however well guarded, they have always been subject to attack by despoiling gainseekers and mischief-makers of every degree from Satan to Senators, eagerly trying to make everything immediately and selfishly commercial, with schemes disguised in smug-smiling philanthropy, industriously, sham piously crying, “Conservation, conservation, pan utilization,” that man and beast may be fed and the dear Nation made great. Thus long ago a few enterprising merchants utilized the Jerusalem temple as a place of business instead of a place of prayer, changing money, buying and selling cattle and sheep and doves; and earlier still, the first forest reservation, including only one tree, was likewise despoiled. Ever since the establishment of the Yosemite National Park, strife has been going on around its borders and I suppose this will go on as part of the universal battle between right and wrong, however much its boundaries may be shorn, or its wild beauty destroyed.

These temple destroyers, devotees of ravaging commercialism, seem to have a perfect contempt for Nature, and, instead of lifting their eyes to the God of the mountains, lift them to the Almighty Dollar.

Dam Hetch Hetchy! As well dam for water-tanks the people's cathedrals and churches, for no holier temple has ever been consecrated by the heart of man."

The parks and protected area approach focuses on geographically well-defined areas, which are designated, regulated, and managed to achieve specific conservation objectives. The approach rests on a doctrine that preserves protected areas as places of intrinsic biological, cultural or scenic value. Accordingly, the model often treats human agency as a threat—as opposed to an integral element—of nature. In its most conservative form the protected area approach was characterized as a “fences and fines” model that “locked up” landscapes and relied heavily upon coercion and force to achieve its objectives. When this approach proved unsustainable, a more liberal form of the model emerged (e.g., biosphere reserves) that permitted resource use and extraction within certain management zones. The IUCN has now established a classification system (IUCN 1994) that recognizes the legitimacy of diverse uses of protected areas. The categories range from strict wilderness areas and national parks that restrict human agency (categories I and II) to sustainable use areas, which allow human occupation and resource extraction (category VI).

The model relies almost exclusively on professionals and agency experts to inform decision making. There have been criticisms, especially in developing areas, that parks and protected areas have profound negative impacts on how local residents access, use, and interact with natural resources (West and Brechin 1991, Western and Wright 1994). Charismatic megafauna (e.g., bears, wolves) have also played important symbolic roles in both the defenses of and attacks on this approach (Clark et al. 1999). Critics argue that the establishment of protected areas has resulted in the displacement of local residents, exacerbated existing inequalities within communities, disrupted social structures and cultural traditions, and threatened the overall health and well-being of local communities (Ghimire and Pimbert 1997 Redford, Kent H. and Fearn, Eva (2007) “Protected areas and human displacement: A Conservation Perspective.” Wildlife Conservation Society working paper no. 29. Bronx, NY). More recently professionals have sought to adapt this tradition in response to people’s demands to access and use protected areas for farming, timber harvesting, grazing, or hunting. Adaptations have also been proposed that are designed to devolve authority over resources to the local level, and distribute benefits to those who bear the costs associated with parks and protected areas. As this happens, this tradition becomes more similar to the “integrated conservation and development” tradition described below. In each case, the protected areas model remains embedded in a doctrine that privileges scientific management and positivism over contextual data such as values, identities, and perspectives of people involved. The use of participation for example, as a means to a pre-determined end, and not a goal unto itself, exemplifies how little the doctrine has changed over time.

Ecosystem management

The ecosystem management tradition is a rapidly evolving approach which originated during the 1980s and 90s in response to perceived limitations of the single and multiple use approach (Meffe 2002). Instead of utilitarianism, the approach is grounded in the land ethic of Aldo Leopold (Box 3). The approach draws upon modern ecology as it attempts to conserve ecosystems while at the same time providing multiple resource values in ways that are ecologically appropriate and socially acceptable (Mirovitskaya and Ascher 2001). One of the broadest definitions of ecosystem management concludes that it “integrates scientific knowledge of ecological relationships within a complex sociopolitical and value framework toward the general goal of protecting native ecosystem integrity over the long term” (Grumbine 1994: 31). However, no universally accepted formula for operationalizing the concept exists and different practitioners of ecosystem management almost certainly ascribe to different doctrines. Yaffee et al. (1999) identified three major variations of the ecosystem management formula currently in use: (1) environmentally sensitive multiple use, (2) ecosystem-based approaches to resource management, and (3) ecoregional management. Symbols employed by practitioners of this approach include adaptive management plans; attempts to incorporate a range of stakeholders concerns—including socioeconomic concerns—often via public meetings or workshops; and a privileging of large scale temporal and spatial dynamics of ecosystems (e.g., FEMAT 1993, Rutherford 2003).

The ecosystem management tradition is a rapidly evolving approach which originated during the 1980s and 90s in response to perceived limitations of the single and multiple use approach (Meffe 2002).

Box 3 The land ethic as defined in an excerpt from *A Sand County Almanac and Sketches Here and There* by Aldo Leopold (1989, original edition 1949).

“The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.

This sounds simple: do we not already sing our love for and obligations to the land of the free and the home of the brave? Yes, but just what and whom do we love? Certainly not the soil, which we are sending helter-skelter downriver. Certainly not the waters, which we assume have no function except to turn turbines, float barges, and carry off sewage. Certainly not the plants, of which we exterminate whole communities without batting an eye. Certainly not the animals, of which we have already extirpated many of the largest and most beautiful species. A land ethic of course cannot prevent the alteration, management, and use of these ‘resources,’ but it does affirm their right to continued existence, and, at least in spots, their continued existence in a natural state.

In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such.”

Critics have argued that the concept is not clear enough for public policy or specific management applications (Fitzsimmons 1996). Additionally, the tradition has been criticized for not adequately taking into account the multiplicity of interests and values represented (Bissix and Rees 2001). Typically, ecosystem management has been implemented by natural resource management organizations that have traditionally stressed biophysical sciences (e.g. U.S. Forest Service, Bureau of Land Management). Consequently, it is not surprising that many retrospective studies of ecosystem management projects have found that practitioners have not sufficiently integrated social and economic dynamics with ecological concerns (Butler and Koontz 2005, Charnley 2006, Dekker et al. 2007).

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Ecoregional planning

Ecoregional planning emerged during the 1990s as a strategic, “performance-based” planning tool for large scale conservation (Groves 2003). The approach has been widely disseminated and is now used by several large non-governmental organizations (including The Nature Conservancy, the World Wildlife Fund for Nature, and the Wildlands Project). Such planning would be almost impossible without ready access to large amounts of data, and Geographic Information System (GIS) maps play a prevalent role both in the formulation of plans and as symbolic representations of the approach. An ecoregion is defined “a relatively large unit of land or water containing a geographically distinct assemblage of species, natural communities, environmental conditions” (WWF 2009). The doctrine of ecoregional planning rests on the perception that protected areas were historically established based on an ad hoc process guided by the presence of charismatic megafauna, scenic values, or large concentrations of wildlife, and less by the principles of landscape ecology. The result was the establishment of protected areas “too small to sustain the full spectrum of processes that sustain diversity” (Soule and Terborgh 1999: 6). In order to more effectively and efficiently conserve large landscapes, the ecoregional formula identifies and prioritizes the ecological attributes of a landscape including habitat types, ecosystem services, and the richness of biodiversity and then selects a set of target elements (i.e., species and communities) and levels of representation for each target (TNC 1994). Described as a “science-based approach” or “conservation by design,” the tasks of classification, priority setting, and decision making are often

dominated by conservation practitioners and other experts. The overall management goal is to maintain or restore natural ecosystem processes, ecological resiliency, and biological diversity.

Ecoregional planning is often criticized for being technologically narrow and mechanistic in its planning, and not fully contextual (Brosius 2003). Proposals often ignore the very real and ongoing uses to which the landscape is being put; in its most extreme form, it has justified the exclusion of human activities from large portions of the landscape as the most appropriate way to preserve nature. Because of the fundamental disconnect between what is proposed and the complex context of the landscape, ecoregional planning can overlook the ongoing social and decision making processes. Critics also argue that the approach privileges technocratic skills, and devalues local knowledge and experience (Box 4). Given that ecoregional plans are often insufficiently contextual, they have encountered stiff resistance at the local level by participants who feel excluded from the decision making process (Chapin 2004).

Box 4 Excerpts from the website of the Wildlands Network (2009) which (A) outlines the organization's conservation methodology and (B) provides details about stakeholder involvement.

A. Each WND [Wildlands Network Design] is generated through a systematic process that adheres to five key principles:

1. Establish planning boundaries based on ecological features.
2. Compile existing data on biological resources and identify those that are most of biodiversity.
3. Set clear biodiversity conservation goals and carry out explicit and objective conservation area design in support of those goals.
4. Evaluate the degree to which conservation goals are currently being met in existing areas and identify new areas needed to meet those goals.
5. Involve a broad array of stakeholders in design and implementation.

B. Involve a broad array of stakeholders in design and implementation

It is critical to involve regional stakeholders, scientific and otherwise, in the process of designing and implementing a network design. The draft network design should undergo a series of rigorous expert reviews before a final design is released. This process should be guided by a scientific advisory committee made up of committed scientists who are familiar the region or with the Wildlands Network's scientific methods, who can guide and direct necessary research, fieldwork, and data collection by staff, interns, and volunteers. At the same time, we work closely with our partners to integrate the network design process with local and regional efforts to identify and protect conservation areas.

Integrated conservation and development projects (ICDPs)

Integrated Conservation and Development projects (ICDPs) attempt to ensure the conservation of biological diversity while attending to the needs of local people (Box 5). The approach is grounded in the paradigm of sustainable development and is particularly prevalent in developing countries. It gained popularity in the 1980s and '90s as the protected area formula fell under increased scrutiny for its negative impact on local livelihoods (Western et al. 1994). As practitioners searched for a substitute for the “fences and fines” approach to conservation, the ICDP model was proposed as a participatory and contextually sensitive method for balancing the needs of conservation with the demands for poverty alleviation and sustainable development. Common ICDP formulations include: biosphere reserves, buffer zones, multiple use areas, and regional development programs. The goal of most ICDP efforts is to educate and benefit local communities through a mix of nature conservation and socio-economic development. Often the formula requires including local peoples in intelligence gathering and decision making. Ideally, it mitigates or deflects pressure on conservation areas by devolving decision making and/or benefits to local residents. The approach seeks behavioral change by compensating people living in and around parks and other conservation areas who have lost access to natural resources or are negatively impacted by wildlife populations (McShane and Wells 2004). Eco-tourism and other resource-based income generating projects and developments are oft-cited symbols of the success of this method.

Integrated Conservation and Development projects (ICDPs) attempt to ensure the conservation of biological diversity while attending to the needs of local people.

Box 5 Articulating the doctrine, formula and symbols of Integrated Conservation and Development Projects (ICDPs).

Doctrine

“Protected areas are under increasing pressure from the expanding scale of human activities, they are underfunded, and traditional “fences and fines” approaches are unable to balance the competing objectives between protected areas and local people. In response ICDPs attempt to ensure the conservation of biological diversity by reconciling the management of protected areas with the social and economic needs of local people. . . . Efforts to promote local social and economic development activities among communities adjacent to protected areas distinguish ICDPs from other conservation approaches. The underlying (and often unsupported) assumption is that people who are made better off as a result of development projects will refrain from the illegal exploitation of a nearby protected area” (Wells et al.: ix-x).

Formula

1. *Conceptualization*: biological, socio-economic surveys conducted by technical experts.
2. *Endorsement*: Participatory meetings held with local residents to explain ICDP objectives.
3. *Funding*: Donors and host governments establish project agreements and fund ICDP.
4. *Capacity Building*: Buildings constructed, project staff and equipment procured, capacity building and educational activities undertaken in project villages.
5. *Implementation*: sustainable income generating opportunities launched based on the sustainable use of natural resources.
6. *Evaluation*: wildlife censuses, attitudinal studies, socio-economic surveys, Log Frame ‘outputs.’

Symbols

—1980 World Conservation Strategy and the 1982 World Parks Congress in Bali

—Biosphere reserves, bufferzones, multiple-use areas, large scale development projects with links to nearby protected areas and integrated sustainable use projects.

ICDPs have received considerable criticism in recent years, even from some of the model’s originators (Brandon et al. 1998, Chapin 2004). The criticisms include a general lack of success in practice, unclear objectives, vague linkages between the twin goals of development and conservation, and ambiguous definitions of community (Barrett and Arcese 1995). Critics also suggest that ICDPs overlook the limitations of government, fail to target key ecological threats, and underemphasize the utility of law enforcement (Terborgh 1999). Despite these criticisms, the doctrine that underpins the ICDP model—namely breaking ecosystems into resource cells in order to balance conservation with poverty alleviation—continues to inform many large scale conservation interventions in the developing world.

Transboundary management

A transboundary protected area is “an area of land and/or sea that straddles one or more political boundaries . . . whose constituent parts are especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed cooperatively through legal or other effective means” (Sandwith et al. 2001: 3). The doctrine of transboundary conservation assumes that ecosystems and their attendant functions (for example wildlife migration routes) transcend political and administrative boundaries, and therefore their use and

management requires cross-boundary cooperation and coordination. The concept of connectivity, both spatially and rhetorically, is integral to the transboundary conservation formula (Goodale et al. 2003). The formula includes identifying biologically significant but fragmented habitats, which are then connected via corridors or contiguous protected areas, or indirectly through complimentary policies or the cooperative management of resources across a border. The approach acknowledges the role of social and political realms in managing landscapes—though it may underemphasize the complex and contested social and political landscape of international border regions. Transboundary conservation efforts also have significant implications for national security and territorial sovereignty (Ali 2007).

The doctrine of transboundary conservation assumes that ecosystems and their attendant functions (for example wildlife migration routes) transcend political and administrative boundaries, and therefore their use and management requires cross-boundary cooperation and coordination.

Transboundary conservation deploys a range of symbols to convey a shift from the original protected area approach to a model that is (at least rhetorically) concerned with promoting participation, benefit sharing and collaboration (Box 6). GIS-based maps are frequently used to illustrate the need for increased ecological connectivity and to rationalize the approach based on scientific principles. Critics argue that while the ecological benefits of transboundary conservation have been well articulated, the dynamic social context of border regions—including colonially constructed boundaries, vulnerable populations, and a history of armed conflict—are often overlooked. Transboundary approaches are also subject to many of the same critiques of the ICDP and protected areas approach including displacement, inadequate local participation, and the exacerbation of existing inequities (Wolmer 2003). While a relatively new approach, transboundary management appears to be most successful where local support is strongest. In such settings, top-level leaders can foster, encourage, and nurture these sentiments and efforts (Zbicz 2003).

Box 6 Transboundary conservation in practice: Vision and mission statements of the Great Limpopo Transfrontier Park in southern Africa (Great Limpopo 2009). The park is a joint initiative between Mozambique, South Africa, and Zimbabwe.

Description

The establishment of the Great Limpopo Transfrontier Park is a process that will link the Limpopo National Park in Mozambique, Kruger National Park in South Africa, Gonarezhou National Park, Manjinji Pan Sanctuary and Malipati Safari Area in Zimbabwe, as well as two areas between Kruger and Gonarezhou, namely the Sengwe communal land in Zimbabwe and the Makuleke region in South Africa. The total surface area of the transfrontier park will be approximately 35,000 km². The

establishment of the Transfrontier Park is the first phase of creating a bigger trans-frontier conservation area measuring a staggering 100,000 km².

Once open, tourists will be able to drive across the international borders of the three countries within the boundaries of the park. In addition to the usual game-viewing opportunities, visitors will have a broad range of new attractions including bird-rich tropical wetlands, lake cruises, tiger-fishing, rugged 4 x 4 adventure drives, and much more. A mix of cultural experiences will be offered, with traditional healers explaining their trade, story-telling, foods, dance, music, handicraft and art to explore and enjoy.

The Great Limpopo Transfrontier Park will be a world-class eco-tourism destination, with extensive private sector involvement, but managed to optimize benefits for sustainable economic development of local communities and biodiversity conservation.

Vision

To achieve inter-state collaboration in the conservation of trans-boundary ecosystems and their associated biodiversity, promoting sustainable use of natural resources to improve the quality of life of the peoples of Mozambique, South Africa and Zimbabwe.

Mission

To collaboratively establish and manage, on a sustainable basis, a viable Great Limpopo Transfrontier Park with full stakeholder participation, including local communities, fostering regional cooperation, biodiversity conservation, and cross-border socio-economic development.

Adaptive governance

Adaptive governance is the latest and most comprehensive of the large scale conservation approaches we examined. It is not to be confused with adaptive management, often associated with single and multiple use management and positivism. The tradition of adaptive governance is intellectually rooted in the policy sciences (Laswell and McDougal 1992). Unlike other approaches, which focus more on substantive than procedural issues, the basic unit of attention in adaptive governance are the social and decision making processes (Brunner et al. 2005). The tradition's doctrine holds that large scale conservation should strive to secure the common interest, which includes a healthy present and sustainable future for both people and the environment. It assumes that securing the common interest requires effective social processes that permit timely, open, fair, and comprehensive use of information, people, and resources. The social and decision processes must be open to all reasonably interested parties and must allow all participants—even disparate and opposing interests—to feel respected.

Adaptive governance is the latest and most comprehensive of the large scale conservation approaches we examined.

The formula advocates fully contextual analysis and eschews rigidly formulaic interventions. This involves evaluating individual decisions in terms of procedural, substantive and pragmatic criteria (Steelman and DuMond 2009). While scientific reasoning is recognized to have an important role (Ascher 2004), science is not privileged above all other considerations. Decisions must be open to multiple scientific methods and forms of knowledge, and also, importantly, to uncertainty. Decisions must account for local context and complexity. Finally, decisions must be coupled with meaningful monitoring so that adjustments can be made if desired outcomes are not being achieved. Symbols of this method include inclusive arenas in which information is shared and discovered, transparent analyses, rigorously analyzed alternatives, and participatory decision making.

Unlike other approaches, which focus more on substantive than procedural issues, the basic unit of attention in adaptive governance are the social and decision making processes (Brunner et al. 2005).

Few groups focus on the adaptive governance approach, per se. However, proponents of all the other traditions seek to change decision outcomes, even if they remain entrenched in narrow, techno-rationalistic approaches. In some cases, adaptive governance-like solutions have been arrived at independent of any explicit reference to the adaptive governance approach (Brunner et al. 2002, Brunner et al. 2005, also see Box 7). In a sense, this tradition targets the very foundation of large scale conservation – the human dimension at both individual and community levels and in the most fundamental relationship of people and nature.

Box 7 Vision statement of MendoFutures (2009), a grassroots organization in Mendocino County, California.

MENDO Futures

Our Vision

We are a community of people, resources and unique beauty. We produce economic vitality that is highly visible, is good for people and is good for the ecology. MendoFutures' vision is to be a catalyst in creating:

- A healthy community that engages in the ecological, economic and equity (E³) issues of our community.

- Locally sustainable and renewable.
- A community that has a shared identity and sense of ownership for its activities and its commitment to creating a future together.
- A place that mobilizes and focuses its resources toward its future through sustainable practices
- A place that knows how to work together. A place that has an “infrastructure” of effective community engagement and communication processes. A community that values diversity of opinions and culture.
- A community that values education as a way of building awareness and connections to our diversity, our resources and possibilities. We teach the old ways in new ways.

CONCLUSION

Sustainability and human dignity are important societal goals, but achieving them in large scale conservation has proven to be difficult. Despite a century of symbolic updates, the basic formulae and doctrine of natural resource management have remained relatively static. The core weaknesses of the single and multiple use approach has been an over-reliance on scientific management and its purely positivistic worldview. As a result of these two doctrinal elements, the approach has been largely technical and bureaucratic. Approaches based on the single and multiple use doctrine are inadequate for addressing problems in social and decision processes and incapable of addressing constitutive problems. Consequently, they are not sufficient to address the complex challenges of large scale conservation. We must look elsewhere for innovations and solutions. Sound leadership and change at technical, political, and cultural levels is required to bring about wide-scale change. Adaptive governance offers a holistic and fully contextual approach, but implementation proceeds slowly and incrementally.

Adaptive governance offers a holistic and fully contextual approach, but implementation proceeds slowly and incrementally.

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