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PROTECTED AREA PLANNING PRINCIPLES AND STRATEGIES

William T. Borrie, Stephen F. McCool, and George H. Stankey

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INTRODUCTION

Protected areas play an important role in the evolving challenge of maintaining a sustainable world. Not only do they provide refuges for biological diversity, but they play an equally significant role in the changing economic and social basis of local communities and nations. That protected areas are increasingly becoming a source of tourist revenue is not surprising. In many cases, such as the community baboon sanctuary in Belize or Kinabalu Park in Malaysia, entrance fees and other revenues from visitors not only maintain the cost of management but also provide the local community with additional income that then provides incentive for continued protection. The income derived from the protected area, and the attachments people form with the area, often become an important component of the local community. However, the cultural and economic effects of protected areas and their management may disproportionately impact the local community, perhaps leading to resentment toward the park. Actions affecting the protected area may be controversial because of those effects. Conducting consultation and achieving the support of local constituencies will be essential to the success of any protected area planning effort.

These social, cultural, and economic dimensions remind us that natural resource planning and management in general, and protected area management in particular, occur within highly politicized contexts. The objective of preserving natural areas is frequently impacted by the desire to encourage recreational use, particularly with respect to government goals for economic development and the role of nature-based tourism or ecotourism within those programs. The two goals of preservation and use are frequently in conflict, with disagreement about which should receive priority. Protected areas represent a legitimate and important source of income and stability, but the increasing recognition and capacity of protected areas to generate revenue can lead to economic dependency, which in turn increases pressures to maximize financial returns. In the face of this pressure, protected area managers still must act as guardians of the values for which the area was established, and as well as the biophysical and social impacts of increased tourism. These are the kinds of contentious contexts in which protected area managers increasingly, but inevitably, conduct and implement planning processes. It is through planning that managers can provide not only technical expertise, but also interact collaboratively with affected publics to ensure support and implementation of actions to protect the natural resource values of protected areas.

Designating and identifying boundaries does not guarantee protection of the values for which the areas were established. A significant literature has shown the myth of the non-consumptive visitor, demonstrating that use of an area will impact many of the values for which the area was established (Cole 1987, Hammitt & Cole 1987; Hendee, Stankey & Lucas 1990; Speight 1973; Wall and Wright 1977; Wilkes 1977). Understanding how to manage the impacts that come with increased visitation is therefore an essential component of any protected area's obligation to conserve its significant resources. Various planning and management frameworks have been developed to explicitly consider the issues of visitation.

The concept of carrying capacity is one such framework dealing with the issue of visitor impact (most recently see Butler 1996). However, despite a substantial history of attempts to apply it as a management framework and a large body of research literature, carrying capacity has provided protected area managers with little practical direction. In large part, this is because both ecological and social impacts of recreation and tourism use are often influenced by variables other than amount of use. Moreover, the predominant focus on carrying capacity has unfortunately misdirected attention almost solely at controlling numbers of visitors, deflecting attention away from many more useful actions based on an understanding of relationships between visitation levels, impacts, area goals, and local community expectations (Lindberg, McCool and Stankey 1997; McCool 1996; McCool and Stankey 1989). Essentially, carrying capacity focuses attention on the question, "How many is too many?" when the question confronting protected area managers is, "What are the appropriate or acceptable conditions for visitation and how do we achieve them?"

In this chapter, the challenges of protected area planning are explored by addressing the latter question. The chapter focuses on maintaining protected area values in face of increasing recreational pressure, although these general concepts and principles can be applied to other "threats" as well (Machlis and Tichnell 1985). First, the social and political contexts within which such planning occurs are outlined. It is to these complex contexts that an interactive, collaborative-learning based planning process would seem most appropriate. Next, an overview of eleven principles of visitor management is presented. These principles must be acknowledged and incorporated in any protected area planning system. Following this section, the conditions needed to implement a carrying capacity approach are reviewed; these requisite conditions lead us to conclude that, despite a resurgence of interest, the carrying capacity model does not adequately address the needs of protected area management. The final section briefly outlines the Limits of Acceptable Change planning system, an example of an approach that can incorporate the eleven previously described principles and has a demonstrated capacity to respond to the needs of protected area managers. The ideas in this chapter have been variously presented in Malaysia, Venezuela, Canada, and Puerto Rico (McCool 1996, McCool and Stankey 1992, Stankey and McCool 1993) and have benefited from the positive interactions and feedback received from protected area managers in those countries.

PROTECTED AREA PLANNING IN AN ERA OF CHANGE

That protected area planning has moved from a time of apparent stability to an era of social and political change and turbulence should come as no surprise to protected area

managers. The growing diversity of communities claiming interest in management of protected areas translates into new voices articulating an ever widening range of visions and functions for protected areas. These new voices are increasingly apparent in a political system that not only allocates funds for protected area management, but must also resolve complex management problems.

Cultural and spiritual values that once were considered inconsistent with the protected area's mandate for protection are now often accommodated. For example, areas which were originally established to exclude many extractive uses now recognize pre-existing and legitimate claims of indigenous peoples for subsistence. This legitimization of prior uses and values has made the protected area manager's job more complex and difficult. Managers are now confronted with balancing these uses with the objective of preserving biological diversity, ecological processes, and habitats for threatened and endangered species.

Incorporation of a wider variety of goals into protected area management creates a tension or conflict for which traditional rational-comprehensive models of planning are ill-equipped. Such models are well-suited for identifying the most technically-efficient path to a single goal which is founded upon substantial social consensus. However, when one confronts the wide array of goals currently attributed to protected areas and the frequent lack of consensus over these competing goals, the appropriateness and utility of such traditional planning models is questioned. Increasingly today, we see a shift in conditions which planning models must respond to from one in which scientific and technical expertise dominate to one where affected publics play an increasingly significant role. In the latter context, quality scientific and technical information remains essential, it can describe current conditions and ecological processes; it can help provide understanding of causation, it can identify consequences and implications, and it is essential to defining alternative solutions. But, progress on implementation cannot begin until there is agreement on goals, which are fundamentally social-political statements of desired ends. The specification of goals is not a scientific or technical matter. Thus, while rational-comprehensive and scientific methods of inquiry are necessary to the planning process, they are not sufficient. In fact, it is not uncommon that traditional rational-comprehensive approaches to planning (McCool, Ashor and Stokes, 1986), conducted in a comprehensive and technically competent manner, lead to more, not less, disagreement. At the root of this lie conflicting values among various interests.

In these situations, the principal planning problem is not so much how to achieve a particular vision of the future but rather which future to select. Expert-driven models of planning do little to help resolve this conflict, because the choice of a desired future is fundamentally political and social, not technical. These "wicked problems" are ones in which there are no right or wrong answers, just more or less useful ones (Allen and Gould 1986). Technical approaches to planning require managers to provide scientifically proven answers to justify decisions. "Wicked problems," conversely, cannot be resolved solely through science.

Political conflicts are resolved through a process of negotiation. This process incorporates learning, representation of interests, and dialogue, and must ultimately lead to a consensus (here defined as "grudging agreement") about a desired future and appropriate pathways to it. However, while the tension created by the presence of conflicting goals provides an excellent

impetus for mutual learning, such learning also requires acceptance of others, multiple types of knowledge, and opportunities to test and evaluate ideas. Learning is an important objective because our level of knowledge concerning management of recreation in protected areas is limited. Actions undertaken to reduce impacts are, by and large, experiments -- particularly at the larger spatial scales and longer time frames. Learning provides the feedback necessary to change actions when outcomes do not occur as expected (Lee 1993). As the future of protected area management unfolds, it may be that these outcomes were not as attractive as originally conceived.

Given this context, approaches to protected area management must combine technical-scientific data with social learning in order to develop plans that can be effective. While the following sections focus on the more technical aspects of protected area management, it should be noted that this discussion occurs only within the context of engaging affected publics in dialogue about the area.

PRINCIPLES OF VISITOR MANAGEMENT

We commence our discussion of protected area planning with an examination of eleven guiding principles which have emerged from research on visitor impacts and from the management of protected areas to minimize those impacts. These principles provide a sound basis for any systematic planning system for natural area management. They illustrate important concepts of planning, such as the need for an explicit statement of management objectives that are even more applicable within an era of change.

This chapter then goes on to examine two visitor management approaches that aspire to protect the ecological and social conditions of protected areas. Whereas the Limits of Acceptable Change approach has proven to be a highly adaptable and applicable framework, the carrying capacity approach, while explicit and rational, can be seen as less useful. While intuitively attractive, the implementation of a recreational carrying capacity too casually assumes workable conditions for its application. We describe some of the severe limitations of the carrying capacity approach as an illustration of the implications of the eleven principles of visitor management. The Limits of Acceptable Change process is then presented as a more useful approach to protected area management.

PRINCIPLE 1. APPROPRIATE MANAGEMENT REQUIRES EXPLICITLY STATED OBJECTIVES.

Explicitly stated objectives are of utmost importance in natural area management. The need for such objectives has been a clear and consistent theme throughout the literature on visitor management in protected areas (Brown, et al. 1987; Schomaker 1984). Objectives provide definitive statements of desired social and environmental conditions, recreational opportunities, and benefits from managing the area (Stankey and McCool 1984). These objectives derive from legislative or administrative policy direction, or from explicit assertions in the management plan for the area. Formally stated objectives will help identify the appropriateness of various management actions and provide managers criteria by which to judge the success of management

actions they have been using to resolve protected area issues and problems. Manning (1986, p. 44) argues that

Management objectives provide an answer to the question of how much change is acceptable by deciding what types of recreation experience a particular recreation area should provide, the feel of naturalness of environmental conditions, the kind of experience offered, and the intensity of management practices.

Good objectives are time-bound, specific, quantifiable and attainable (Brown et al 1987). However, writing good objectives is not easy. While people tend to agree about general values and concepts, specific and explicit objectives are likely to evoke considerable disagreement about what it is to be accomplished or produced at a protected area. It should be noted that the process of establishing objectives is an intrinsically political one. Methods that include interaction with affected parties will help the manager develop objectives upon which a consensus can be developed and enhance the likelihood of their successful implementation.

PRINCIPLE 2. DIVERSITY OF RESOURCE, SOCIAL, AND MANAGERIAL CONDITIONS IN AND AMONG PROTECTED AREAS IS INEVITABLE AND MAY BE DESIRABLE.

Visitors to a particular protected area often expect the area to satisfy a variety of recreation activities, specific recreation experiences, and various beneficial outcomes from their recreation. However, it is unlikely that their demands for such a wide variety of recreation opportunities can be met by a uniform set of conditions across the area. Further, it is unlikely that resource and social conditions within any relatively large protected area will be uniform. Bio-physical conditions, use impacts, use levels, and expectations of appropriate conditions tend to vary (for example, see Martin and others 1989 concerning variability in acceptable campsite impact conditions in the periphery vs. the center of a wilderness). Visitor use is frequently unevenly distributed, and development focused at particular sites. Topography, vegetation and access influence use densities and level of impact.

The diversity of conditions is inevitable, and can be desirable. The availability of a variety of setting conditions provides visitors with a choice and allows them to consider their requirements and expectations for a site. Furthermore, providing a diversity of opportunities influences future use and may provoke demands for a broader array of recreation opportunities. It is a means to protecting uniqueness and suitability in the management of protected areas. For example, in large protected areas it generally would not be desirable to have development spread evenly across the area, leaving no place untouched. The interior areas of protected areas often display fewer human-induced impacts than the periphery. Managers can identify this diversity and then make decisions on its desirability, based on such considerations as visitor preferences, environmental values, and relative availability, thus separating technical decisions from judgmental ones. Finally, Haas and others (1987) argue that managing for diversity through some type of explicit zoning is more likely to lead to preservation of protected area values than existing implicit or de facto zoning.

PRINCIPLE 3. MANAGEMENT IS DIRECTED AT INFLUENCING HUMAN-INDUCED CHANGE.

Many protected areas were established to protect unique and valuable natural features and conditions, and natural processes. Rather than directly managing these natural processes, protected area managers usually work to minimize and manage human-induced impacts on these natural processes. Human-induced changes can lead to both environmental and social conditions that visitors and/or managers find unacceptable or inappropriate. In addition to helping determine how much change is acceptable, managers should concern themselves with actions that are effective in influencing the amount, type, time, and location of these impacts.

PRINCIPLE 4. IMPACTS ON RESOURCE AND SOCIAL CONDITIONS ARE INEVITABLE CONSEQUENCES OF HUMAN USE.

A variety of research has shown that relatively small amounts of use produce most of the biophysical impact that occurs on any site (Cole 1987). Any recreational use of a protected area has some environmental impact, the severity of which depends on both the environment's ability to resist and to recover from such impact. Typically, the ability to resist and recover is rapidly outpaced by the frequency, intensity, and nature of recreational use. Thus, the decision to allow human use in a particular area is a de facto decision to accept relatively high levels of visitor impact. The principal question that managers must therefore ask is, "How much impact is acceptable in this area?" Once this question has been addressed, managers must then deal with the appropriateness of various techniques or actions to manage this level of impact. In a similar way, social impacts often occur with relatively small amounts of use. For example, a few people behaving in a rowdy manner can impact another visitor's experience far more than many people being quiet.

PRINCIPLE 5. IMPACTS CAN BE TEMPORALLY OR SPATIALLY DISCONTINUOUS.

Impacts from visitor use or management activities can occur off-site and/or might not be visible until a later time. Displacing the management problem temporally or spatially can create two problems. First, a management strategy eliminating camping around a lake, for example, might simply displace impacts to other areas, perhaps even more environmentally sensitive, thereby creating two sets of impacts needing attention. Second, impacts can have effects that only become evident long after recreationists leave the site. For example, soil and vegetation impacts can have long-term implications such as increased soil erosion or reduced tree vigor. Both temporal and spatial displacement of impacts make understanding and managing impacts significantly more difficult, demand substantial knowledge about use-impact relationships at different scales, and require managers to carefully design appropriate monitoring strategies.

PRINCIPLE 6. MANY VARIABLES INFLUENCE THE USE/IMPACT RELATIONSHIP.

The relationship between visitor use levels and degrees of impact is an exceedingly complex, non-linear one. That is, managers cannot simply assume that as use levels increase so too will impacts, or conversely, that reductions in use levels lead to proportionate reductions in impact. A variety of other variables affect the use/impact relationship. It has long been observed that the behavior of recreationists heavily influences the amount of impact they cause. For

example, in marine settings, snorkelers treading water with flippers can stir up sand which then impacts coral and other marine life. Similarly, changes to the rules and regulations imposed upon visitors will change the degree of impact. For example, requiring or educating visitors to camp a certain distance away from lakes and streams not only lowers the impacts at the immediate lake or stream-side but also lowers the visual and social impacts upon other visitors, human and animal. Other variables, such as travel method, group size, season of use, length of stay, and a variety of soil and vegetation characteristics will influence the use/impact relationship as well. Furthermore, even under simplified conditions, the use/impact curve has been found to be more curvilinear than linear (Hammit and Cole 1987). For instance, while per visitor impacts on campsite condition might initially be very low, they can rapidly increase until reaching a plateau at which most of the damage has already been done; thereafter, per person impacts are incrementally small. This complexity of the use/impact relationship suggests that attempts to control human-induced impacts solely through use limits or carrying capacities have only a low probability of success. Education and information programs and rules and regulations aimed at changing visitor behavior might be more effective. For instance, encouraging use concentration on already impacted sites is one well-known technique for limiting visitor impacts.

PRINCIPLE 7. MANY MANAGEMENT PROBLEMS ARE NOT USE DENSITY DEPENDENT.

There are only a few management problems that do directly relate to the number of people using the area. These issues, such as sewage, water supply and parking problems, tend to have relatively simple technological solutions. However, with respect to the provision of social conditions, focusing on density of use might not be useful in solving management problems. For example, many visitors to backcountry areas of nationally protected areas may not be seeking solitude (Stankey and McCool 1984). Thus, in this situation, controlling use levels to optimize solitude would be inappropriate. This is further exacerbated by different visitors having different perceptions of solitude, different expectations of crowding, and different tolerances for privacy.

PRINCIPLE 8. LIMITING USE IS ONLY ONE OF MANY MANAGEMENT OPTIONS.

Controlling use should not necessarily be the first management tactic chosen to manage visitor impacts. Other management actions that should be considered include those that focus on improving visitor behavior, redistributing or containing use to less sensitive locations, and enhancing resource durability. Even if controlling use levels is the primary concern, efforts should be made to discourage use (e.g., through fees or more inconvenient access) rather than enforcing outright limits on use. Simply controlling the input of visitors into a park system will not necessarily lead to the optimum mix of outputs or the best achievement of the protected area's objectives. The costs (social, economic, and ecological) to implement use limits might be greater than the benefits gained. A use limit policy is one of the most intrusive and disruptive approaches a manager can use.

The emphasis on controlling use levels as a means to limiting impacts stems from the carrying capacity approach, originally adopted from the range management literature (Stankey and McCool 1991). Because carrying capacity invokes the question, "How many is too many?," it tends to view imposition of use limits as an end in itself. Use limit policies historically have carried with them a host of additional problems, such as choosing appropriate allocation and

rationing techniques. These techniques have been among the most controversial actions protected area managers in the United States have ever taken (McCool and Ashor 1984), in large part because they address distributional and equity questions relative to who gets what.

PRINCIPLE 9. MONITORING IS ESSENTIAL TO PROFESSIONAL MANAGEMENT.

Monitoring, can be defined as the periodic and systematic measurement of key indicators of biophysical and social conditions. Historically, it has been an important component of the protected area manager's job. However, monitoring generally has been conducted informally, with little systematic planning and implementation. Monitoring performs two major functions. First, it allows managers to maintain a formal record of resource and social conditions over time. In serving this function, data points can inform managers of changes in these conditions rather than relying solely on informal perceptions of changes that might have occurred. This is particularly important in situations where managers frequently move around to different areas or where effects are slow to develop. Secondly, monitoring helps assess the effectiveness of management actions, thus helping managers understand, in a relatively objective way, if actions address the problem. (It should be noted that there may be factors other than management actions that influence the changes in conditions that a monitoring program might document). However, despite its acknowledged importance, support for, and execution of, monitoring programs is often poor.

PRINCIPLE 10. THE DECISION-MAKING PROCESS SHOULD SEPARATE TECHNICAL DECISIONS FROM VALUE JUDGMENTS.

Many decisions confronting protected area managers are simply technical in nature, such as the number of toilets needed in a campground, the ecologically preferred location of a trail, or the design of a visitor center. However, many other decisions reflect judgments about values -- such as objectives for an area, optimal spacing between campsites, the types of facilities or the kind of recreation opportunities to be provided. It is important in decision-making that these means-versus-ends decisions are not confused. Decision processes should separate questions of "what is" from "what ought be." For example, the task of identifying the range of diversity in resource or social conditions *that exists* within a protected area defines 'what is'. Whereas, determining the *preferred range* of diversity chooses 'what ought to be'. Existing conditions may influence preferred conditions, but the two tasks should be kept separate. Even those decisions that are seen as largely technical are seldom value-neutral. Deciding 'what ought to be' should be an explicit process, open to public examination and negotiation.

PRINCIPLE 11. CONSENSUS AMONG AFFECTED GROUPS ABOUT PROPOSED ACTIONS IS NEEDED FOR SUCCESSFUL IMPLEMENTATION OF PROTECTED AREA MANAGEMENT STRATEGIES.

In many situations, political polarization and conflict over natural resource management has hindered progress in planning and management. Within the highly charged social and political contexts that protected area manager frequently work, technical planning processes often create more disagreement than agreement. Technical solutions may adversely affect well-defined values expressed by a group within the public. The ensuing law suits, decision appeals, protests and other disruptive activities can lead to increased stagnation and uncertainty of

outcomes. Successful planning, therefore, needs to incorporate public participation as a fundamental and on-going component. Moreover, the citizenry expect to be involved and to be noticed. As the public grants the authority for an agency to operate in a protected area, so, too, is the political power ultimately held by the wider public. This necessitates their involvement in, and commitment to agency planning processes and decisions. An inclusive and collaborative approach builds understanding so that everyone can make progress.

THE USE OF CARRYING CAPACITY FOR PROTECTED AREA MANAGEMENT

One popular approach to visitor management is carrying capacity. Borrowed from the range and wildlife management professions, it was hoped that a maximum number of visitors could be specified above which appropriate ecological and social conditions could not be sustained. For a good number of reasons, determining recreational carrying capacity is neither simple nor particularly useful (Hammit & Cole, 1987). Part of the problem is that managers using a carrying capacity approach are mixing means with ends. Carrying capacity is viewed as a means of protecting protected area resources. Frequently, however, it becomes an end in itself. Limitations on visitor use are then implemented as a means towards achieving the set carrying capacity. Whether these limitations are effective in protecting ecological and social conditions in the park is overlooked or forgotten.

The resurgent interest in carrying capacity as a management framework has its roots in several factors: (1) the increasing complexity of management, (2) accelerating demands on natural resources to provide a wider diversity of goods and services, and (3) the search for a defensible answer that can be implemented in a wide variety of settings. For example, Butler (1996) argues that, "to avoid at least some of the negative impacts associated with visitation, it must be ensured that capacity limits are identified and not exceeded." But establishing such capacities still represents a simplistic and inappropriate response to a "wicked problem," a problem that is more social and political than technical and therefore require a social rather than technical solution.

Given the resurgence of interest in carrying capacity, we now introduce some of the trade-offs which must be made for successful application to protected area management. It is rare that all of these conditions for implementation would be met. However, it is important for managers to be aware of the limitations and assumptions they are adopting by setting recreational carrying capacities. It will become obvious that many of the previously presented principles are not well met by a carrying capacity approach. Stankey and McCool (1992) and Shelby and Heberlein (1986) describe the necessary conditions for the application of carrying capacities and subsequent use limits in recreational settings. These conditions have been modified somewhat to make them more appropriate for the variety of resources and social conditions found in national parks and protected areas. The first five describe conceptual conditions; the last four pertain to practical conditions. All nine not only point out the limitations of the carrying

capacity approach, but also expose the level of thought that managers must bring to their planning efforts.

CONDITION 1. THERE MUST BE AGREEMENT ON THE TYPE OF DESIRED SOCIAL AND RESOURCE CONDITIONS, INCLUDING THE TYPE OF RECREATION OPPORTUNITY.

Relevant stakeholders (e.g., managers, users) must agree on the types of opportunities to be provided. If, for example, one group feels that the area should provide opportunities for motorized recreation on roads and another argues for non-mechanized recreation without roads, no carrying capacity can be established because of the immense differences in allowable use levels. Agreements on type of recreation or desired conditions are essentially political decisions, in which science's role is limited to understanding the consequences and range of alternative choices. Following Principle 1, these agreements on desired conditions should be explicitly stated at the outset.

CONDITION 2. THE RECREATION ACTIVITIES/EXPERIENCES TO BE PROVIDED MUST BE DENSITY DEPENDENT.

As Alan Wagar's seminal report (1964) on recreational carrying capacity noted over 30 years ago, and has been documented on numerous occasions since, many recreational experiences are either independent of, or even positively associated with, use level. For some opportunities, such as sunbathing or beach going, use level might have no effect whatsoever upon the experience. Indeed, if the beach goers are teen-agers, it is likely "the more, the better." However, other opportunities, such as visiting wilderness to enjoy solitude or watching wildlife in natural settings, might be very sensitive to changes in use density.

CONDITION 3. THERE MUST BE AGREEMENT ON THE ACCEPTABLE LEVEL OF IMPACT.

With any recreational use in an area, some impact occurs. That is, impacts cannot be eliminated or avoided, only managed. Thus, the key question is, "How much impact is acceptable, given agreement on the type of recreation opportunity to be provided?" For example, this question might focus on the amount of vegetation loss permitted at campsites, the level of diver-caused damage to coral, or how much development is acceptable on an island or cay. Although science can provide information on the consequences of vegetation loss or development, acceptability is inherently a judgmental decision based on a complex set of political, social and ecological trade-offs. It is likely that the various groups with an interest in the protected area will have different perspectives on what would be an acceptable level of impact.

CONDITION 4. A CLEAR, SPECIFIC, AND KNOWN RELATIONSHIP MUST EXIST BETWEEN USE LEVELS AND SOCIAL AND RESOURCE CONDITIONS.

In order to answer the question, "How many is too many?," the relationship between use and impact (or use and conditions) must be known, explicit and specific. That is, managers must develop explicit measures that quantify the link between amount of recreational use and level of

biophysical or social impacts. Such measures would indicate increases or decreases in impact given changes in amounts of recreational use. Simply assuming increasing impacts given increasing use is insufficient. As stated in Principle 6 & 7, the relationship between use levels and degrees of impact upon the experience (and upon the environment) are rarely linear. And in many cases, such a relationship may not exist at all.

CONDITION 5. USE LEVEL MUST BE MORE IMPORTANT THAN VISITOR BEHAVIOR IN DETERMINING THE AMOUNT OF IMPACT.

For carrying capacity to work well, the relationship between use and impact must be relatively simple, with a minimum of other variables influencing impact levels. Unfortunately, the literature now documents many situations where the relationship between use and impact is non-linear, complex, variant and influenced more strongly by the behavior of the individual or group rather than by the numbers of visitors (Cole 1987, Graefe et al. 1987).

CONDITION 6. THE PROTECTED AREA MANAGEMENT AUTHORITY MUST CONTROL ACCESS IN THE AREA.

If conditions one through five are fulfilled, the agency still must have control over access to the area in order for a carrying capacity limit to be implemented. Without such control, the agency possesses little capacity to influence entry into the protected area and the carrying capacity figure represents little more than a number on paper. Although such control is found in many North American protected areas, the extent to which it exists in many other locations is questionable.

CONDITION 7. THE PROTECTED AREA MANAGEMENT AUTHORITY MUST HAVE THE RESOURCES (PERSONNEL, FINANCIAL, INFORMATION, ETC.) TO ADMINISTER THE CARRYING CAPACITY LIMIT.

Ultimately, a recreational carrying capacity is implemented by imposition of a limit (of some type) on recreational use. In North America, the financial and personnel resources required to administer use limits have proven considerable; indeed, they are formidable enough to prevent many organizations from implementing them even when they have identified such limits in management plans (Washburne and Cole 1983). Clearly, implementation of carrying capacity implies a long-term, sustainable financial commitment that many organizations are unable or unwilling to make. In addition, the level of political understanding and support for implementing use limits is often not forthcoming.

CONDITION 8. THERE MUST BE AGREEMENT ON THE OBJECTIVES OF A RATIONING SYSTEM IN IMPLEMENTING CARRYING CAPACITY.

In situations where the demand exceeds capacity, use must be rationed through some management action (Stankey and Baden 1977). Objectives for this rationing system must be explicitly identified prior to design of the system (Shelby 1979). For example, it must be

decided whether the purpose of the system is to make the allocation of opportunities for entry equitable or, alternatively, to make sure the opportunities are awarded to those for whom they are most beneficial. Principle 11 describes the importance of a process by which to achieve consensus on management actions. The lack of such agreement on clearly specified objectives has been one reason for the significant litigious and political activity initiated against carrying capacities in North America. In other social-political systems, such consensus might not be as important.

CONDITION 9. THERE MUST BE AGREEMENT THAT THE CARRYING CAPACITY LIMIT REPRESENTS EITHER THE MAXIMUM OR THE OPTIMUM NUMBER OF PEOPLE VISITING AN AREA.

Although this condition never has been explicitly addressed in settings in North America where capacities/limits have been established, it carries significant implications for administration of the limit. For example, if the carrying capacity level represents the *maximum* number of visitors permitted, and capacity exceeds actual demand (use), then any inefficiencies in how the rationing system operates can be easily tolerated. If, on the other hand, the capacity level represents a measure of *optimum* use, then managers would need to take action to ensure that the protected area capacity is filled whenever possible. This question is particularly significant for protected areas that are strongly dependent on user and entrance fees, for there will always be pressure to increase visitation and revenue.

THE LIMITS OF ACCEPTABLE CHANGE (LAC) PLANNING SYSTEM

The Limits of Acceptable Change (LAC) planning system was developed in response to an increasing recognition in the United States that the conditions under which recreational carrying capacities could be defined and implemented were few and far between. The LAC system, in contrast, focuses on identifying acceptable and achievable resource and social conditions. LAC acknowledges the value judgments involved in determining appropriate levels of impact and use intensity, understanding that these levels are derived from social judgments about appropriate conditions and the amount of change that will be allowed (or not allowed) to occur. The decision-making process thereby separates technical decisions from value judgments, and makes the process leading to those judgments open, explicit, and accessible. LAC recognizes the need for crystallization of judgments among various stakeholders before management can proceed. In this way, the LAC approach matches and endorses the eleven principles of visitor management mentioned earlier. It is a process through which many of the conditions (eg. #1, #3, and #8) can be met.

In the U.S., LAC was first implemented in designated wilderness managed by the USDA Forest Service. Since that time, additional work has been conducted in other protected areas and with other land management agencies. Similar systems have been developed, such as the Visitor Activity Management Process (VAMP) used by Parks Canada (Graham 1989), the Visitor Impact Management (VIM) framework of Graefe, Kuss & Vaske (1990), and the Visitor Experience and Resource Protection (VERP) planning process (Manning and others 1997)

developed by the USDI National Park Service. Each of these systems emphasizes the conditions desired for the protected area rather than how much use an area can tolerate. This provides interesting validation of the conclusion that a simple numerical solution fails to meet the needs of protected area managers.

As originally conceived (and described in greater detail in Stankey and others (1985)), LAC consists of nine steps designed to incorporate the idea of "acceptability" and diversity in resource and social conditions. While not an entirely new idea, LAC sought to improve wildland recreation management by defining and managing towards more explicit, measurable objectives (Stankey and others 1985). LAC seems well placed to face the complexities of protected area management, particularly in this era of social and political change. The nine steps presented below demonstrate LAC to be a planning system that is well suited to modification for current and specific needs; it's potential for contributing to improved management of areas managed for nature-based tourism seems high.

STEP 1. IDENTIFY AREAS' SPECIAL VALUES, *ISSUES*, AND CONCERNS.

Citizens, managers, and others with a vested interest in the area meet to identify what special features or distinctive qualities within the protected area require attention, what management problems or concerns have to be dealt with, what legal and administrative constraints exist for the area, what issues the public considers most important in the area's management, and what role the area plays in both a regional and national context. Scientists can help provide and compile information not readily available to managers and the public. This step encourages a better mutual understanding of the natural resource base (such as the sensitivity of particular environments to recreation use and tourism development), a general concept of how the resource could be managed, and a focus on principal management issues. LAC is very much an issue-driven process. Issues identified in this step will need addressing throughout the planning process.

STEP 2. IDENTIFY AND DESCRIBE RECREATION *OPPORTUNITY CLASSES*.

Most protected areas contain a diversity of biophysical features, as well as a range of human occupation and use. As mentioned earlier, the type of management appropriate for these differing features and areas likely will vary throughout the area. Opportunity classes describe subdivisions or zones where different social, resource, or managerial conditions will be maintained. The classes that are developed represent a way of defining a range of desired conditions within the protected area. The definition of opportunity classes might follow the basic specifications of the Recreation Opportunity Spectrum system, commonly utilized by the U.S. Forest Service (Clark & Stankey 1979) to produce narrative descriptions of resource, social, and managerial conditions defined as appropriate and acceptable for each opportunity class.

The Recreation Opportunity Spectrum specifies six classes ranging from the primitive (a fairly large area characterized by an essentially unmodified, natural environment) to the urban (an area characterized by urbanization and substantial modification). Each class describes a consistency between the social, managerial, and environmental conditions. For example, high levels of visitation would correspond to a highly visible management presence and to a more

developed recreation site. Managers seek to not only describe the conditions within each class, but also the distribution of these recreation opportunity classes across the protected area. As Principle 3 stated above, a diversity of opportunities is an important objective of protected area management.

STEP 3. SELECT *INDICATORS* OF RESOURCE AND SOCIAL CONDITIONS.

Indicators are specific elements of the resource or social setting selected to represent (or be "indicative of") the conditions deemed appropriate and acceptable in each opportunity class. Because it is impossible to measure the condition of, and change in, every resource or social feature within a protected area, a few indicators are selected as measures of overall area health, just as blood pressure is often monitored to gauge physical health. Indicators should be a direct measure of the conditions specified by the opportunity classes and, therefore, reflect the unique and important qualities of the visitor experience and environmental resource. Indicators should be dependable, reliable and repeatable; they should also be easily subject to quantitative, nondestructive measurement; and adequately reflect and respond to changes in recreational use. Indicators are an essential part of the LAC framework because their state is taken to reflect the overall condition found throughout an opportunity class area. An individual indicator might not adequately depict the condition of the whole area. Rather, it is the bundle of indicators that is used to monitor conditions, and assess the effectiveness of various management practices.

STEP 4. INVENTORY EXISTING RESOURCE AND SOCIAL *CONDITIONS*.

Inventories can be time-consuming and expensive components of planning. In the LAC process, the inventory is guided by the indicators selected in Step 3. For example, level and type of development, use density, and human-induced impacts on park resources might be measured. Other variables, such as location of different features, facilities, and access points, can also be inventoried to develop a better understanding of area constraints and opportunities. Inventory data are mapped so that the condition of indicators in different locations are known. The inventory also helps provide a shared database of known conditions which can help in the establishment of realistic and attainable standards.

STEP 5. SPECIFY *STANDARDS* FOR RESOURCE AND SOCIAL CONDITIONS IN EACH OPPORTUNITY CLASS.

In this step, the specific, measurable range of conditions for each indicator is identified. Defining those conditions in measurable and specific terms provides the basis for establishing a distinctive and diverse range of recreational settings. Standards serve to define the "limits of acceptable change." They represent the maximum level of impact judged acceptable in a specific opportunity class; they are not necessarily objectives to be attained. While the standards defining the range of acceptable conditions in each opportunity class must be realistic, they must also do more than mimic existing (perhaps unacceptable) conditions. They are not to be seen as explicit standards of degradation; rather, if existing conditions are minimally acceptable, they should be seen as an opportunity to improve conditions through establishment of more stringent standards (Stankey and others 1985).

STEP 6. IDENTIFY ALTERNATIVE OPPORTUNITY CLASS ALLOCATIONS.

Most protected areas could be managed in several different ways. Parks and protected areas often differ significantly in the amount of development, human density (both residents and visitors), and recreational opportunities available. In this step, different types of alternatives are identified. Using information from Step 1 (area issues and concerns) and Step 4 (inventory of existing conditions), managers and citizens begin to jointly explore how well different opportunity class allocations address the various contending interests, concerns, and values. That is, examining how well the division of land into the different opportunity classes meets the demands and needs of the various stakeholders. Different combinations and permutations should be considered as a means to making explicit the allocation preferences. This is a prescriptive step, establishing what should be, and should therefore involve input from policy makers, managers, and the public. The provision of allocation alternatives will allow follow-up review, evaluation, and selection.

STEP 7. IDENTIFY *MANAGEMENT ACTIONS* FOR EACH ALTERNATIVE.

The alternative allocations proposed in Step 6 are only the first step in the process of developing a preferred alternative. Both managers and citizens need to know what management actions will be required to achieve or maintain the desired conditions. In a sense, Step 7 requires an analysis of the costs (broadly defined) that will be imposed by each alternative. For example, people might wish to protect a specific area from all development and restore any impacts that might compromise the area's pristine condition. However, this alternative might require such a huge commitment of funds for acquisition and enforcement (e.g., virtual closure to public use for an extended time) that the alternative might not seem as attractive. Note that management actions should be specific and consistent with the opportunity classes previously identified and the conditions inventoried. Managers could choose to provide protection in part of an opportunity class above and beyond the minimum standards mentioned previously. As Stankey and others (1985) suggest, "by maintaining conditions better than the standard requires, further diversity" is achieved. Cole and others (1987) provide a useful assessment of alternative actions for managing wilderness recreation use.

STEP 8. EVALUATION AND *SELECTION* OF PREFERRED ALTERNATIVE.

With the various costs and benefits of the several alternatives before them, managers and citizens can proceed to the evaluation stage. The managing authority, based on guidance from the public, can then select a preferred alternative. Evaluation must take into account many factors, but examples would include the responsiveness of each alternative to the issues identified in Step 1, management requirements from Step 7, and public preferences. It is important that the factors figuring into the evaluation process and their relative weight be made explicit and available for public review. It is also essential to analyze the various costs and benefits and to whom they would accrue.

STEP 9. IMPLEMENT ACTIONS AND *MONITOR* CONDITIONS.

With an alternative finally selected and articulated as policy by decision-makers, the necessary management actions are put into effect and a monitoring program instituted. Often, an

implementation plan, detailing actions, costs, staffing, timetables, and responsibilities, will be needed to ensure timely implementation. The monitoring program focuses on the indicators selected in Step 3, and compares their condition with those identified in the standards. This information can be used to evaluate the success (or lack thereof) of actions, and provide systematic feedback regarding performance of the management program. If conditions are not improving, the intensity of the management effort might need to be increased or new actions implemented. Cole (1989) and Marion (1991) provide methods for monitoring wilderness campsite conditions.

The LAC process, in summary, provides a framework for thinking about issues of recreation development and management. It is a framework that recognizes the intrinsic complexity of development issues, yet provides a process to deal competently with this complexity without being excessively reductionist. By combining the technical expertise of planners and scientists with valuable personal knowledge held by the local public, together with an explicit recognition of the importance of public involvement in the decision making process, LAC can result in more defensible decisions that have greater chances of implementation.

LAC has proven to be a highly adaptable framework that has seen application in a variety of protected areas. The procedure laid out in LAC was not meant to be mandated for every situation. Rather, managers have found it to be an appropriate statement of principles from which to develop their own similar or derivative planning systems. By wrestling with the conditions under which the planning approach must operate, managers avoid being naive about the complexity and consequences of the planning process. By grounding their own planning process in the principles described in this chapter, managers can still develop a process that fits the capacity and/or ability of their organization and setting.

An example of a planning system that builds upon the framework of LAC is the Tourism Optimization Management Model (TOMM) developed in Australia (Mandis Roberts Consultants, 1997). TOMM is a management approach designed to monitor and manage tourism on Kangaroo Island, a resort and farming island off the coast of South Australia that attracts some 150,000 visits per year. Like LAC, the first component of TOMM is an analysis of the context in which the planning must occur. Just as step 1 of LAC identifies the social values, issues and concerns, the first phase of TOMM identifies the community values, as well as the policy and planning directives of the various stakeholders. TOMM's contextual analysis also includes examination of the island's tourism products and the trends and opportunities for the tourism market, much as step 2 of LAC maps out recreational opportunities. While LAC emphasizes the quality of the environment and visitor experience, TOMM places more emphasis on the sustainability of the tourism industry. Towards that end, TOMM goes on to identify and inventory potentially optimal conditions for tourism to occur (economic, market, environmental, experiential, and socio-cultural). The second component of TOMM then sets up indicators and acceptable ranges for those indicators within an annual performance monitoring program, similar to LAC's 3rd step. In response to the data generated by the monitoring program, TOMM's third component generates management response options for the tourism industry.

TOMM, like LAC was designed to meld the technical expertise of industry and government with community and conservation group knowledge. "TOMM was designed to

serve a multitude of stakeholders with a multitude of interests” (Mandis Roberts Consultants, 1997, p. 9). TOMM also demonstrates the ability of a planning process that follows the principles laid out in this chapter to operate a regional level over a multitude of public and private land tenures. Both TOMM and LAC move from setting limits or carrying capacities to a focus on desired conditions and an open and explicit process towards achieving and maintaining those conditions.

CONCLUSION

The Limits of Acceptable Change planning process, and its derivative approaches like TOMM, represent an effective evolution of problem conceptualization compared to the recreational carrying capacity approach. However, in and of itself, LAC provides only a framework for identifying appropriate management actions. It does not determine what should be done, by whom, or where. Managerial, public, and scientific expertise is still required. LAC helps frame management questions more effectively than in the past. Understanding the principles upon which LAC is based, and the conditions under which visitor management of protected areas must operate, will help lead to planning systems more compatible with specific agency needs and capability, and more suited to the complexities of protected area planning in this era of social and political change.

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