

## Carrying Capacity and Visitor Management: Facts, Values, and the Role of Science

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For close to a century, concerns have been voiced about both the biophysical and experiential impacts of recreational use on parks and protected areas. In response, managers have grappled with the task of deciding where and how to manage visitor use and scientists have sought to help them. This effort has often been referred to as defining and managing “recreational carrying capacity.” The carrying capacity literature is voluminous. However, there are widely divergent opinions on the value of this research and on the utility of the carrying capacity concept (Cole 2001). Some champion its use as an organizing concept (e.g., Manning 1999), while others argue that the concept is misleading and counterproductive (McCool and Lime 2001). This paper attempts to assess progress in grappling with the carrying capacity issue, barriers to and opportunities for further progress, the distinction between facts and values, and the role of science.

Wagar (1964) developed the first formal exploration of the recreational carrying capacity concept. Among the important ideas he presented were the following: (1) in contrast to earlier characterizations of carrying capacity as an inherent property of a place that can be determined, carrying capacity is not an absolute value; (2) carrying capacity depends on the needs and values of people and can only be defined in relation to some management objective; and (3) the need to limit use can be reduced through other management actions such as zoning, engineering, persuasion, and the management of biotic communities. This latter point led to a substantial expansion of the meaning of carrying capacity—from a focus on numbers of visitors to the entire topic of “how to plan and manage a particular recreation resource” (Lime 1976). In this paper, I equate carrying capacity with the prescriptive aspects of visitor management generally. Defining carrying capacity means making prescriptive decisions about what ought to be done in our parks and protected areas—what recreational opportunities should be provided, what conditions should be maintained, and how recreation use should be managed.

### Description and Evaluation, Facts and Values

Wagar’s first two conclusions point out the

centrality of human values within the carrying capacity concept. Shelby and Heberlein (1986) subsequently elaborated on the importance of human values, suggesting that there are both descriptive and evaluative components to the establishment of carrying capacity. The descriptive component is concerned with how the recreational system operates (with what is), while the evaluative component is concerned with how the system should operate (with what ought to be). It is in this latter component that human values operate. Shelby and Heberlein (1986) go on to propose “a scientific process” (p. 17) for arriving at decisions about evaluative standards (statements of what ought to be). With evaluative standards in place, and descriptive information on relationships between use, management, and impacts, it is a relatively simple matter to prescribe a visitor management program (i.e., establish a recreational carrying capacity).

Shelby and Heberlein’s division of the carrying capacity process into descriptive and evaluative components has been highly influential and has never been challenged, although Manning (2001) has recently referred to the evaluative component as the “prescriptive component.” The research process they propose (usually referred to as the “normative approach”) has been the dominant paradigm for empirically deriving evalu-

ative standards (e.g., Vaske et al. 1993; Manning et al. 1999). Within the past decade, however, critiques of this approach have emerged. Some are of a technical nature. For example, empirical studies have shown that within-subject and within-population variability in norms (evaluative standards) can exceed between-area variability (Williams et al. 1992; Cole and Stewart 2002). Others question whether normative research actually gets at people's values (Roggenbuck et al. 1991). Questions have been raised about the population that is sampled, usually current on-site visitors. When subpopulations are mixed, management may inappropriately be directed at the needs and desires of an average visitor who does not exist (McCool and Cole 2001). Equity issues are raised when studies only give voice to certain populations (Stewart and Cole, in press).

More fundamental are concerns about the scientific objectivity of normative research and its claim to provide a scientific basis for the evaluative decisions inherent to defining carrying capacity. Several decades ago, Burch (1981, 1984) and Becker et al. (1984) judged many carrying capacity studies to be irresponsible and dishonest, having "more to do with coinciding lines of ideology held by the manager and the researcher than by the empirical data" (Burch 1981:227). More recently, Tom More (2002) reminded us that, since the 18th century when David Hume drew the distinction between facts and values, it has been a general established point of logic that "you cannot derive 'ought' statements (values) from 'is' statements (facts)" (p. 115). Perhaps divergent opinions about both the value and the ethics of carrying capacity research come from divergent beliefs about the relationship between science, facts, and values.

### The Role of Science

Clearly, science has been tremendously helpful to park management, both in developing decision-making frameworks (e.g., Limits of Acceptable Change and Visitor Experience and Resource Protection) and in building a factual basis for visitor management. We know a lot about the relationships between use char-

acteristics and both ecological and experiential conditions and about the efficacy of diverse management techniques. This is Shelby and Heberlein's descriptive component—factual information about how the recreation system works. Science is well suited to developing descriptive information and facts.

This descriptive information can only be developed into management prescriptions (carrying capacity) in the context of a series of value-laden decisions. Explicit decisions need to be made about park purposes, clienteles to be served, and experiences and conditions to be provided. These decisions about values constitute Shelby and Heberlein's evaluative component and this is the step that seems to give managers the most trouble. The controversy that has developed around the normative approach is largely a debate about the ability of that research approach to provide a scientific basis for decisions about park purposes, clienteles to be served, and experiences and conditions to be provided, decisions that are ultimately codified in specific evaluative standards of acceptable decisions. Moreover, this debate can be expanded to an assessment of the role of science generally in making value-laden decisions.

The limitations of a science-based approach to making evaluative decisions are more obvious when considering carrying capacity as it relates to limits on the ecological impacts of recreation use. There have been no significant attempts to generate evaluative standards regarding ecological impacts based on the normative approach and surveys of current visitors. It is clear in this case that (1) current visitors are only one of many relevant stakeholders; and (2) they seldom have the knowledge and perspective to make wise decisions about how much ecological impact is too much.

### Conclusions

Protected area managers have been grappling with the issue of carrying capacity (how to manage visitor use) for decades. Science has been tremendously helpful to management, both in developing decision-making

frameworks and in building a factual basis for management. We know a lot about the relationships between use characteristics and both ecological and experiential conditions and about the efficacy of diverse management techniques. However, at the core of the carrying capacity issue are value-based decisions about what ought to be, and managers still struggle with these decisions. The ability to make these decisions appears to be the limiting factor in progress related to carrying capacity.

Science is less equipped to contribute to decisions about values. The scientific method can be employed to describe the values of individuals or social groups. However, science is about describing what “is” and, as Hume noted, it is impossible to derive “ought” statements from “is” statements. Describing values and making decisions about values are not equivalent. Shelby and Heberlein’s (1986:17) statement that the normative approach provides “a scientific process for carrying capacity” is misleading at best. Value-laden decisions can be informed by science, but science cannot make those decisions, nor can science make those decisions easier. Moreover, unless the values implicit in most normative research are made explicit, science may not even make those decisions better. Descriptions of values will vary greatly depending on which population is sampled, how results are displayed in means and distributions, the context of specific questions, and the amount and type of information given to respondents.

Park managers will continue to grapple with issues of carrying capacity, prescribing management actions intended to meet management objectives. Science will continue to inform those decisions. Further insight into relationships between visitors, management, park conditions, and experiences will add to the descriptive foundation for management. Normative research will continue to build the knowledge base regarding park visitors, an understanding that is valuable when making prescriptive decisions. Hopefully, new types of research into societal needs and values will also inform value decisions. In my opinion, however, the rate of future progress on the car-

rying capacity issue will be determined more by the willingness of managers to make value judgments than by the ability of science to build an empirical foundation for those decisions.

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