Multiple Attribute Scoring Test to Evaluate Ecological and User Capacities for National Parks. Tony Prato, University of Missouri

The National Park Service first addressed user capacity in the mid-1930s when it posed the question "How large a crowd can be turned loose in a wilderness area without destroying its essential qualities?" Amendments to Public Law 91-383 (passed in 1970) require that general management plans for national park units include "identification of and implementation commitments for visitor carrying capacities for all areas of the unit." The National Park Service defines user capacity as "the type and level of visitor use that can be accommodated while sustaining desired resources and social conditions that complement the purpose of a park unit and its management objective." There is a close relationship between user capacity and ecological capacity. The latter is the maximum population of a particular species a habitat area can support in a given period of time without reducing the future ability of the area to support the species or damaging the area, or reducing the future ability of the area to support the species.

The Multiple Attribute Scoring Test for Capacity (MASTEC) method assesses the current state of an ecosystem with respect to ecological and user capacities when there is not an exact relationship between those capacities and measured resource and user conditions (i.e., managers are uncertain about this relationship). The method integrates elements of three carrying capacity methods: Limits of Acceptable Change; Visitor Impact Management; and the Visitor Experience and Resource Protection. The MASTEC method quantitatively determines the most likely state of an ecosystem with respect to ecological and user capacities for a given set of measured resource and user conditions in a way that minimizes decision errors that can be committed in inferring the state of an ecosystem from measured resource and user conditions. In cases where the ecosystem is not compliant with ecological and user capacities, the method allows the resource manager to identify the management action having the greatest likelihood of bringing the ecosystem into compliance.

The method is described using a hypothetical example of a management unit in a national park that can be in one of four mutually exclusive states with respect to ecological and user capacities (i.e., highly unacceptable, moderately unacceptable, moderately acceptable, and highly acceptable) and for which resource and user conditions are evaluated in terms of two ecological capacity attributes (i.e., percent of native species present, and percent of ecosystem with good habitat for endangered species), and two user capacity attributes (i.e., percent of backcountry hiking trails that are not congested, and percent of the time visitors have to wait less than 30 minutes for in-park transportation).

Application of the MASTEC method requires an interdisciplinary panel composed of park managers, scientists, and technicians to select possible ecosystem states with respect to ecological and user capacities for management units and to assign prior probabilities to those states.

The MASTEC method is advantageous relative to other capacity evaluation methods when: (1) the manager is likely to make decision errors when inferring the state of the ecosystem with respect to ecological and user capacities from measured resource and user conditions, and (2) the consequences of those decision errors are unacceptable to the manager. Conversely, the MASTEC method is not advantageous relative to other capacity evaluation methods when: (1) such decision errors are unlikely to occur (i.e., the state of the ecosystem can be precisely inferred from measured resource and user conditions); or (2) such decision errors are likely to occur and the manager is willing to accept the consequences of those errors.