Comparing Current and Desired Conditions of Resource Values for Evaluating Management Performance: A Cautionary Note on an Otherwise Useful Concept

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Introduction

THE GENERAL CONCEPT OF DESIRED CONDITIONS as the social, economic, and ecological attributes that management strives to attain is well established (IEMTF 1995). "Desired conditions," or "desired future conditions," are terms pioneered by the U.S. Forest Service as part of its planning process in the 1970s and 1980s, but have evolved over time as a result of criticisms and different applications (Leslie et al. 1996). For reasons discussed below, use of the term in a science context tends to imply that desired conditions be expressed specifically and measurably. In the planning process of most resource management agencies, however, the term often implies a more broad description from which more specific objectives are tiered. Still others (e.g., Sutter et al. 2001) advocate that desired conditions be expressed at multiple scales, from broad to specific. In the application of planning processes, the term generally implies a time scale that is relatively long-term (e.g., >15 years); in other applications, such a time scale may or may not be implied.

Consequently, we recognize that "desired conditions" may mean different things to different audiences. However, rather than getting lost in semantics or trying to ensure that we incorporate the multitude of alternative terms and their variations that might apply, in this paper we use "desired conditions" in a more generic context: to imply the desired attributes that management seeks to attain, regardless of the time scale or level of specificity that might be applied in a specific planning or science context.

To further set the stage for our discussion, we need to recognize some elements of the planning processes that are common to multiple agencies. Planning processes generally reflect a hierarchy of goals and objectives, ranging from a broad vision or mission statement down to specific objectives or targets (see Carter and Bennetts, this issue). This hierarchy also typically reflects time scales ranging from long (e.g., into perpetuity) to short (e.g., annual or less). Two additional elements that tend to be intertwined throughout the planning process are goals expressed in terms of desired resource conditions and goals expressed in terms of management strategies or activities intended to achieve those desired resource conditions (Figure 1).

Science plays a major role in helping to

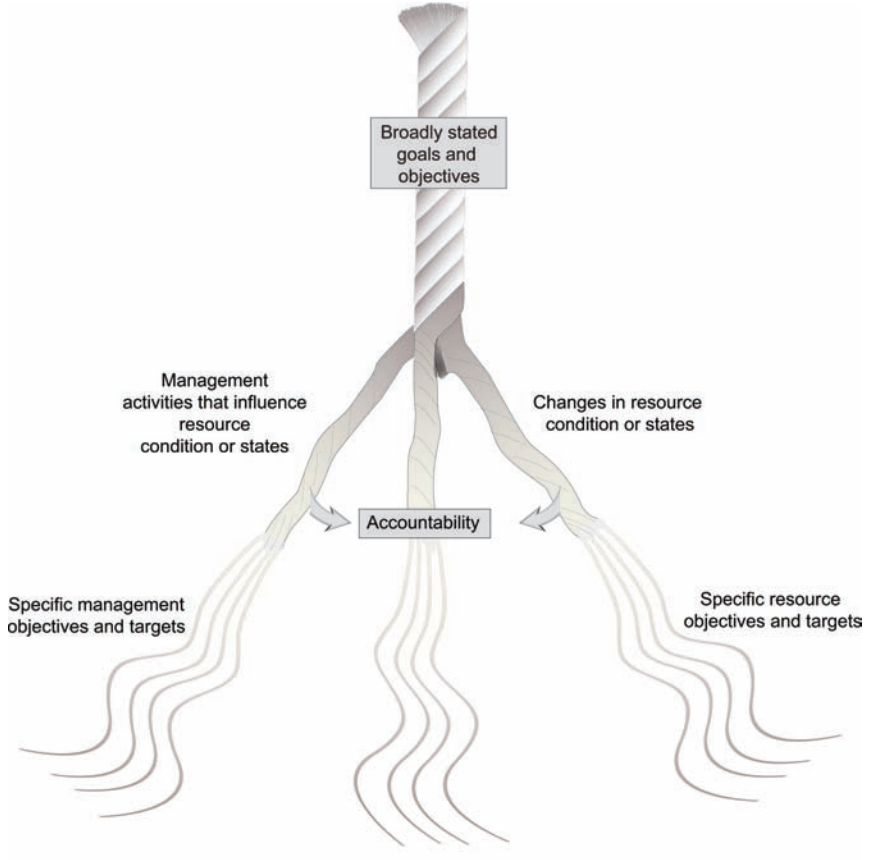

Figure 1. The hierarchy of objectives for resource management agencies (see also Carter and Bennetts, this issue) generally ranges in specificity from broad goals to specific objectives and in time-frame from long- to short-term. Embedded and intertwined within this hierarchy are objectives aimed at the desired condition or state of the resources as well as management activities intended to achieve those desired states or conditions. Accountability for management is integrally connected to both of these elements.

ensure that managers have the information they need to effectively manage and protect resources, and agencies are—and should be—held accountable for managing those resources wisely, effectively, and efficiently. However, unless we are careful about how we treat the relationship between science that informs management and accountability for management outcomes, we may compromise (1) the integrity of the much-needed science that gives us the ability to manage effectively, and (2) the responsibility we have to the public at large for managing those resources effectively and efficiently. In this paper, we describe a potential conflict between the integrity of our science and accountability for our management when that accountability is linked to a system of rewards and punishments.

The scientific basis for comparing current and desired resource condition

The notion of comparing current and desired conditions has a long and solid sci-

entific history; one of the cornerstones of management-oriented science is comparing the current condition of a resource with that which is desired. This is a foundation upon which concepts such as adaptive management are based. A generalization, as well as the origin, of this concept lies in the comparison (i.e., difference) between alternative models. This notion is deeply rooted in sciences such as physics, thermodynamics, and statistics, and has emerged in a variety of theoretical and applied contexts, such as information theory, decision theory, gene sequencing, and economics. Even the well-known chi-square and likelihood-ratio statistical processes are based on the difference between observed and expected values, where "current" condition can be considered what is observed and "desired" condition can be considered what is expected. The practice of comparing current and desired conditions in land-management situations is also widely accepted, perhaps in part because it is an intuitive means of evaluating changes in resource condition and is easily communicated to the public at large.

The punitive paradox

In an adaptive-management context, the comparison of current and desired conditions is commonly used as a means of evaluating alternative management strategies. Thus, at first, the idea of measuring management success by comparing the difference between current and desired conditions would seem a reasonable solution to the need for both management-oriented science and management accountability in parks and protected areas. As indicated above, this approach has a solid scientific foundation as well as intuitive appeal for its simplicity and comprehensibility. Thus, extending its application to accountability for resource managers would seem ideal—that is, if it were not for the resulting "punitive paradox": if the comparison of current versus desired conditions is used as a basis for evaluation of management performance or as a criteria for the distribution of funds, then managers who honestly report increasingly impaired conditions may be professionally punished, and subject their park units to potential budget cuts.

Our concern is based on a very simple principle: *if someone is punished for telling the truth, don't expect them to tell the truth*. In a science context, the relative difference between current and desired conditions is used as a basis to compare alternative management actions or strategies (Figure 2). Consequently, there is no "punishment" for being honest; rather, honesty is a pathway for learning. In contrast, when the disparity between current and desired conditions is used as a basis for evaluating management performance or for distribution of funds, there is a reward for minimizing that disparity (better performance evaluation and/or additional funding) and, conversely, a punishment for a bigger disparity.[1]

This problem arises, in part, because it is difficult to factor in the "achievability" of a desired condition when using it as a measure of performance. Under this punitive paradigm, managers may be penalized for not achieving targets (i.e., desired conditions) that they had no realistic chance of achieving. The following sections describe some factors that might make it highly difficult, if not impossible, for a manager to achieve desired conditions.

Lack of information. When a manager's performance is linked to desired conditions, the evaluation process typically involves two questions: (1) Did the manager commit and implement adequate and

Figure 2. Being able to report changes in resource condition without fear of reprisal is essential to our ability to effectively preserve and manage resources. NPS photo, Virgin Islands National Park.

appropriate (management) resources (including staffing and funding) toward the problem at hand as per any planning or prescriptions for doing so? (2) Was the desired outcome achieved? If management actions were intended to achieve a desired condition over a specified time period, and that condition was achieved, then there is no problem. If the desired condition was not achieved, then there are two likely reasons for the failure. First, the appropriate management resources were not allocated or implemented—a situation for which a manager certainly should be held accountable. The second likely reason, however, is that our understanding of how the system would respond to the management actions was not correct. In this case, where the information necessary for effective management was lacking, we need to ask ourselves whether a manager should be held accountable for failing to achieve something that we lacked the knowledge to accomplish. In other words, additional science, rather than punishment, is probably needed.

Lack of management control. Many of the deleterious changes that are occurring in our parks may be the result of external forces (drivers and stressors) that park managers cannot control. Such things as climate change, upstream or upwind air and water pollution, and land use change all may dramatically influence park resources, but originate outside of the parks. Climate change is an emergent global issue that affects virtually all of our parks and protected areas. Air and water pollution may originate hundreds of kilometers away from parks but still have a dramatic influence on park resources, depending on the flow pathways of air and water. Land use change, such as development, may influence migra-

tory pathways or habitat use patterns of wildlife resources. Similarly, a reduction in permeable land surface due to increased amounts of pavement in an area may alter hydrologic regimes.

Unavoidable circumstances. In some cases, protection of healthy resources, or restoration of degraded resources, may be within the potential control of management, but the ability to achieve those goals is beyond realistic expectations given the circumstances. For example, protection of a given resource may require a level of law enforcement or technology well beyond existing budgets, or the time required for restoration of a fragile ecosystem may require decades or centuries rather than the time between management evaluation periods. In still other cases, ecological thresholds may have been crossed that are irreversible.

Trade-offs based on societal values. In other cases, managers may be in situations that require trade-offs in order to balance natural resource protection and alternative values (e.g., preservation and use; see also Lewis, this issue; Figure 3). For example, snowmobiling in Yellowstone National Park probably has no positive impact on natural resources, but may have a negative influence on natural soundscapes, air quality, visitor experience (i.e., of visitors not using snowmobiles), and wildlife. However, snowmobiling may also have a positive economic influence for manufacturers and local tourism industries, and is a valued recreational opportunity for a segment of the public. Clearly, a true desired condition

Figure 3. Management decisions often need to take into account a variety of values, including ecological, societal, and economic. NPS photo courtesy of Mike Quinn.

would not include increased noise and air pollution or negative impacts to wildlife, but managers often face complex situations in which they are forced to determine the best balance of values, which will, by necessity, result in some shifts away from a truly desired condition of some resources. While managers should be held accountable for the decisions they make in regard to that balance, we question whether they should be held accountable for shifts away from desired conditions when the act of balancing natural and societal values forces them to accept some compromise.

Desired condition or achievable condition?

A seemingly simple solution to the problem of using desired conditions as a yardstick for performance evaluation might be to ensure that desired conditions are achievable. However, the problem is that desired conditions should reflect the state of the resource that we truly "desire" to attain or protect. We would argue that the definition of a desired condition also should reflect the mission of its respective organization—for example, with the National Park Service, to leave our natural and cultural resources unimpaired for future generations. Although some might argue that this idea is just semantics, it quickly transcends semantics as the approach becomes the operational standard for what we aim to achieve through management.

Presumably, from a natural resources perspective, the ideal desired condition would imply an intact and fully functional ecosystem (although such a condition may not be desirable for some cultural resources). Recognizing that such a goal is not likely to be attained, desired condition often ends up being defined somewhere in the gray area between that which is truly desired and that which is attainable (Figure 4). Thus, what was intended as a "desired" future condition often is reinvented as an "easily attainable" future condition. They are not the same, however, and the net result can be lowered expectations and possibly lower achievement of goals.

One of the sad results of this phenomenon is that those who are most honest about real or potential deterioration of park and protected area resources (i.e., who define desired conditions that reflect a truly desired state of a park) can be penalized through performance evaluations, or even by a loss of funding. Under such a framework, the motivation to "cheat" could become overwhelming—not because resource

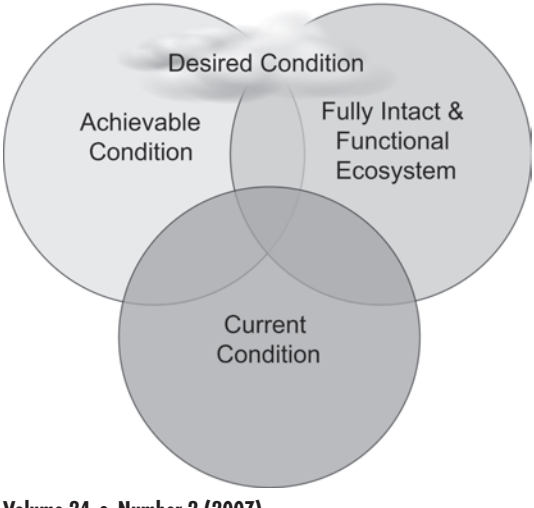

Figure 4. The ideal desired condition for natural resources probably relates to a fully intact and functional ecosystem; however, because such a condition may not be attainable for natural resources, and may not even be desirable for some cultural resources, an alternative usually lies somewhere in a gray area between that which is truly desired and that which is attainable.

managers would willingly trade the condition of resources for their own gain, but rather because a loss of funding is perceived to be even more detrimental to the loss of the resource that they are trying to preserve. Hence, when managers are faced with this punitive paradox, various strategies for protecting their reputations (e.g., against poor performance evaluations) and funding tend to emerge.

Creative semantics as a means of gaining reward or avoiding punishment

One of the most difficult, and sometimes frustrating, parts of implementing a framework based on the comparison of current and desired conditions is actually defining the "desired" condition. We argue that at least part of this frustration stems from the paradox we have described. When it is inevitable that a manager will be evaluated based on circumstances that are not realistically achievable, then several strategies for self-protection may emerge (described below), ranging from consciously trying to circumvent the intended result to merely rationalizing a more realistic set of desired conditions.

Identify fuzzy desired conditions. Setting a clear and concise desired condition is an essential element for sound science. That the clarity of the results will be a direct reflection of the clarity of the initial conception of the problem (in this case, the difference between current and desired condition) is the first principle of study design described by Green (1979) in his book on sampling design for environmental biologists. However, when managers are faced with the prospect of being held accountable, what should be clearly stated desired conditions often are expressed as broad, ambiguous (i.e., "fuzzy") goals. While this outcome is often couched in terms of allowing for "management flexibility," in actual fact it also allows for considerable flexibility in interpreting the results. From a science standpoint, this severely weakens the validity and credibility of the process.

Spin off a subset of "achievable" desired conditions for accountability. Another common strategy is to define an "achievable" subset of desired conditions that will serve to satisfy the accountability requirements while the "real" work gets done outside of that which is generated for accountability. Under this strategy, elements that are difficult or unrealistic to achieve will be left out of any "official" reporting that will be used for accountability. They may or may not be retained within internal documents or plans less subject to scrutiny. The idea is to continue doing the work that is needed, while giving the "bean counters" what they want to see.

Redefine desired condition for success. Fuzzy desired conditions enable ambiguous interpretation of results; however, it is also common for the measurement of success to be defined *a priori*, to ensure that it is achieved. For example, a measure of success such as the number of management units meeting or exceeding desired conditions might be redefined to the number of units showing improvement (for which "improvement" also may be left fuzzy).

Lower the bar. A more extreme version of redefining success is to actually "lower the bar": that is, change the desired condition itself so that it is less difficult to achieve. This is often done in recognition that a truly desired condition is not attainable; thus, a "more realistic" expectation is

generated to serve—presumably—as an interim goal.

However, we must also acknowledge that setting expectations too high can lead to lower achievement, if the task of protecting resources is perceived to be inconceivable and managers give up. For this reason, we are not advocating that we abandon the notion of having realistic and achievable interim goals; rather, that we clearly distinguish such interim goals from a truly desired condition (see below).

Resolving the paradox: Do we throw the baby out with the bath water?

It is important to note that these "self-protection strategies" are only necessary when the comparison of current and desired conditions is linked to accountability and/or funding. A German proverb from the 1500s warns against throwing the baby out with the bath water; put another way, "fools who by trying to rid themselves of a bad thing succeed in destroying whatever good there was, as well" (Mieder 2001). Here, we must consider whether the pitfalls inherent in comparisons of current versus desired conditions warrant their being "thrown out" of the accountability process based on the paradox and concerns we have expressed here. In our view, the answer is "no," given their value and utility. However, we do contend that the paradox described here is real, and that it has the potential to undermine scientific credibility as well as the efforts of those who strive to attain high expectations. Thus, in our view, we must find ways to throw out the bath water (resolve the paradox) while hanging onto the baby (striving for both scientific integrity and accountability). The question is, how do we do this?

We believe that to a large extent, this paradox can be resolved by recognizing the pitfalls and knowing the consequences of how planning and decision-making processes treat the distinction between assessments of resource condition and those of performance. Clearly, the planning, monitoring, and performance reporting processes used by the National Park Service and other organizations are designed to support comparisons between current and desired resource conditions. As such, the monitoring and reporting of natural resources management performance must be based on indicators that provide measures of the degree to which a desired outcome has been achieved, as opposed to whether an activity has been accomplished, such as restoring a certain number of miles of stream habitat. This means that the indicators used for evaluating attainment of long-term performance goals should measure the effectiveness of overall management strategies in moving natural resources toward their desired condition, as opposed to necessarily achieving that desired condition within a management evaluation period. Otherwise, comparing outcomes with goals will not be truly informative.

Just as critical as the selection of performance indicators is the description of desired conditions for natural resource values. If the desired conditions are either unrealistic or unsustainable, then managers will never achieve the established goals. Lastly, we need to consistently recognize and be aware of whether we are monitoring or assessing changes in resource conditions, or in the effectiveness of management actions and activities intended to influence those resource conditions. They are not the same, and the consequences of treating

them as such may compromise the integrity of both science and management effectiveness—which is clearly an undesirable condition.

Acknowledgments

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Endnote

1. It is important to note that the concerns we describe throughout this paper do not require a formal system of punishment. Rather, even the perception of punishment is sufficient to generate the responses we discuss.

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