Out of Africa: Lessons from Park Management in South Africa

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Introduction

THE UNITED STATES TAKES GREAT PRIDE IN ITS NATIONAL PARKS. As Phillips (2003) wrote, the U.S. was a pioneer in establishing "protected areas in their classic form, as government-owned, government-run areas set aside for the protection and enjoyment" of the public. Yet it would be presumptuous to assume that the U.S., and specifically, the National Park Service (NPS), has the only successful model for establishing and managing protected areas. The past several decades have seen a proliferation of protected areas outside of the U.S. Many of these new sites have not had the level of government funding or support that U.S. parks typically get; therefore, park proponents and managers at these sites have had to be creative in order to succeed. These new approaches have created what Phillips (2003) calls a "new paradigm" for protected areas. Under this new paradigm, park goals, operations, and policies contrast markedly with past approaches, and with what is currently practiced, in U.S. parks.

In this paper we discuss the goals, operations, and policies of park management in South Africa—specifically in regard to wildlife management—and how they contrast with park management in the U.S. Our discussion is especially relevant to protected areas in grassland, savanna, and shrubland biomes because both countries contain those habitat types (Licht et al. 2008). We focus on seven issues that may stimulate thought among U.S. managers. It is our hope that an understanding and appreciation of the approaches used in South Africa leads to better wildlife conservation in protected areas in the U.S.

Lessons from Africa

Capitalism can help establish protected areas and conserve wildlife. Protected areas in the U.S. have typically been developed from lands that contain grand and inspiring scenery, are sparsely populated, and/or have little commercial value (Sellars 1997). Establishing these protected areas was often justified with intangibles such as therapeutic, spiritual, or existence values (Harmon 2004). All of these non-economic attributes are meritorious, but sometimes they are insufficient to establish or protect a site, especially when such justifications must compete against conventional economic uses of the land.

In contrast, many protected natural areas in South Africa were justified and established in large part on economics. Some of the recently established natural areas were formerly occupied farmland and ranchland. It was determined that the economic benefits of natural areas—which center on wildlife and ecotourism—were great

enough to justify converting these sites to parks and reserves. Wildlife continues to be a primary economic driver in these parks. The irony is that in the U.S., economic development is often seen as impeding the establishment of protected areas and the conservation of wildlife (Czech 2000).

The Madikwe Game Reserve, about 150 miles northwest of Johannesburg, provides a case study of how capitalism and wildlife conservation can work together. Prior to establishment of the reserve in 1991, the site was mostly white-owned ranchland in a degraded condition. When apartheid ended, it was proposed that the shrublands be turned over to black ranchers and farmers. However, a feasibility study found that the best use of the land, from an economic standpoint, was not conventional farming or ranching, but rather wildlife conservation and ecotourism. A partnership of the state, local communities, and the private sector was established to develop and manage the reserve using a "people-based" approach to conservation (see www.madikwe-game-reserve.co.za/management/). From 1991 to 1997, more than 8,000 animals were reintroduced to the site as part of an ambitious restoration project known as Operation Phoenix. The 150,000-acre site now attracts international visitors from throughout the world to view wildlife. Just as importantly, the protected area now employs hundreds of local people as managers, rangers, guides, lodge employees, and in other capacities.

The Madikwe example is not a singular event in South Africa. Ecotourism, driven primarily by wildlife, is so successful that many private landowners have converted their livestock operations to private game preserves for economic purposes (Cloete et al. 2007). In some cases the government sites were a catalyst for regional change. Once neighboring landowners saw the economic success of the wildlife parks, they converted to ecotourism operations. Thus, small public sites that were originally islands in a sea of agriculture became part of larger conservancies with enhanced biodiversity value. In some cases the fences have been dropped between the adjoining sites, allowing for more natural processes. Throughout South Africa there are protected areas of varying sizes that support the complete assemblage of native species, including large and dangerous predators, and many were established for economic development. In some cases hunting is a component of the revenue generation, but in many others it is not.

To be fair, economics and ecotourism are usually analyzed as part of the planning process in the development, management, and protection of parks in the U.S. However, such benefits are typically viewed as indirect and are not the primary motivation for establishment or protection of a site. As a result, revenue that could be generated from a site is often not collected (e.g., entrance fees) or is deposited in government treasuries where it does not directly benefit local communities (Miller 1998).

The wildlife-conservation-for-economic-development model has not been tried in the U.S. to any significant degree. However, there may be opportunities for employing such a model in certain regions, such as the Great Plains (Licht 1997). This region has a dearth of protected natural areas due in part to the absence of majestic scenery, the fact that most land is in private ownership, and the perception that agriculture is the best economic use for the land. However, the past century has shown that most of the rural parts of the region are

becoming depopulated and that the land is only marginally profitable for agriculture, especially in the absence of government succor (Popper and Popper 1987; Licht 1997). In that respect the region is similar to parts of South Africa, such as the site of the Madikwe Game Reserve. Numerous scholars, conservation organizations, and rural development organizations have proposed a wildlife-based model for enhancing the rural economy of the Great Plains (see Popper 1987; Licht 1997; Forrest et al. 2004; Glasshein and Nagel 2006). A nonprofit organization known as the American Prairie Foundation has made significant progress pursuing such a model in central Montana (see www.americanprairie.org) and other groups are pursuing similar models (e.g., Great Plains Restoration Council). However, it is important to recognize that the most successful models in South Africa include the conservation of large charismatic species.

People like big furry things with teeth. In South Africa, "wildlife must pay its way." In other words, wildlife must generate revenue in order for it to be conserved. This is especially true for species that can cause conflicts with conventional commercial uses and human welfare. Five species that are especially effective at generating revenue are collectively known as the "big five." They are the African lion (*Panthera leo*), leopard (*Panthera pardus*), elephant (*Loxodonta africana*), buffalo (*Syncerus caffer*), and rhinoceros (actually two species, *Ceratotherium simum* and *Diceros bicornis*). The group was originally labeled the "big five" by hunters because of the danger involved in hunting them. Although hunting these and other species is still a revenue option, especially on private sites, most protected areas in South Africa have found that the "big five" and other wildlife can generate more revenue through nonconsumptive means such as ecotourism. Large predators such as lions and the African wild dog (*Lycaon pictus*) are often at the top of must-see lists for tourists.

The parallels between the wild dog in South Africa and the gray wolf (*Canis lupus*) in the U.S. warrants further discussion. Both predators were historically considered vermin and exterminated wherever possible. While wolves have been reintroduced only to wilderness-type areas in the U.S. (i.e., far away from people), in South Africa wild dogs have been reintroduced to many smaller parks and preserves where they have become flagship attractants for ecotourism. Besides enhancing the economic success of such protected areas, and contributing to the conservation of the species (they are endangered), the presence of wild dogs within small fenced preserves has changed the perspectives and attitudes of lay people. Whereas the species used to be reviled, it is now appreciated and valued. This cultural shift likely enhances conservation in general.

Lindsey et al. (2007) found that management for charismatic species, such as large predators, often aligns with biodiversity objectives, and therefore the charismatic megafauna of South Africa serve as flagship species. Lindsey et al. (2007) also found that visitors returning to parks subsequently became more interested in biological diversity and focused more on the less high-profile species, suggesting that large charismatic species can foster a deeper appreciation and understanding of nature. Kruger (2005) evaluated case studies from the scientific literature and concluded that ecotourism associated with flagship species was typically sustainable whereas those

sites that did not have charismatic species were less likely to be sustainable.

Wolves, bears (*Ursus* spp.), mountain lions (*Felis concolor*) and a few other North American carnivores fit the definition of charismatic megafauna. Of these, wolves are most similar to the African carnivores in that their presence can generate ecotourism and economic development (Duffield et al. 2006). However, no one has tried restoring wolves to small fenced sites for purposes of revenue generation (or for any purpose) similar to what is done with lions, wild dogs, and other large carnivores in South Africa.

Fences can conserve wildlife. Fences are occasionally used to contain wildlife within protected areas in the U.S. For example, all of the protected areas in the northern Great Plains with bison (*Bison bison*) are fenced. Likewise, fences have been constructed in Hawaiian parks to keep exotic species out. However, there is still a great reluctance in the U.S. to construct fences for purposes of conserving wildlife in protected areas. We acknowledge that there are ecological, ethical, aesthetic, and monetary issues associated with fences, yet the use of fences is one reason why South African protected areas are more successful in conserving the full assemblage of native species and biological diversity. Fences contain and conserve species (e.g., lion, elephant) that would not otherwise be tolerated by neighbors (they also preserve wildlife by keeping poachers out of protected areas). Arguably, the larger the fenced area the less significant the ecological, ethical, and aesthetic issues become. The cost to establish and maintain fences can be considerable, yet in South Africa the benefits still outweigh those costs. For example, all of Kruger National Park (nearly 6 million acres) has been fenced since 1976. Madikwe Game Reserve has 90 miles of fence around its boundary to prevent elephants and large predators from impacting neighbors (Figure 1). These fences are remarkably successful in

Figure 1. Boundary fence at Madikwe Game Reserve in South Africa. Photo courtesy of Daniel Licht.

their ability to manage conflicts. Without them, too many conflicts would develop, and therefore conservation opportunities would be lost. We believe that fences, including fences to contain predators, should be given due consideration in the establishment and management of protected areas in the U.S.

Small populations are okay. In small protected areas, managers must often choose between supporting a small (and perhaps unviable) population or no population at all. In the U.S., managers generally choose the latter. Reintroduction and management of small populations of wildlife in NPS units is currently discouraged by agency policies (National Park Service 2006). Specifically, the policies state that the National Park Service

> will strive to restore extirpated native plant and animal species to parks whenever … adequate habitat to support the species either exists or can reasonably be restored in the park and … once a natural population level is achieved, the population can be self perpetuating.

The requirement that a population be "self perpetuating" in order for it to be reintroduced profoundly limits the ability of NPS units to restore the full suite of native species and natural processes. Of the 270+ parks in the United States with significant natural resources, probably less than 10 can claim to support all of the indigenous large fauna, and all of those are extremely large (e.g., Yellowstone National Park) or situated within or adjacent to large natural areas. This self-imposed policy of reintroducing species only when they can be "self perpetuating" means that many important native species are absent from parks in North America (see Landry et al. 2001).

In contrast, protected areas in South Africa have no such policies or paradigms requiring a wildlife population to be self perpetuating. Many of the protected areas in South Africa contain predator and prey populations that number fewer than 50 individuals, and in some cases, fewer than 10 individuals (Licht et al. 2008). Some public and private reserves are so small that they can support only one pride of lions. The Makalali Conservancy provides a good case study. In 1994, a single lioness and 4 cubs were introduced into the fenced 34,580-acre site (Druce et al. 2004). Since then, more than 30 lions have been produced, with many surplus individuals being translocated elsewhere because the carrying capacity in the park had been reached. Obviously, small populations require a hands-on approach and there are additional fiscal and management challenges. Yet as a general statement, South Africa protected areas have decided that those costs are outweighed by the economic, ecological, and recreational benefits.

Active management and intervention is generally counter to current NPS policies and attitudes. Yet a hands-off approach for purposes of "naturalness," as promoted by NPS, sometimes necessitates more intervention than the South Africa approach. For example, several NPS units support populations of bison and elk (*Cervus elaphus*). In the absence of large predators the agency must cull the herds to keep them within park objectives. This intervention can include lethal control, live-trapping and translocation, and/or the use of contraceptives for hundreds of animals. In contrast, the South Africa approach is to manage a small population of top-level predators.

We believe that small-but-important-populations deserve greater consideration in U.S. parks. The Wildlife Society (1991:8) recognized the need and potential for reintroducing small populations of wildlife such as wolves: "if national parks and other protected areas cannot provide large enough areas for self-perpetuating populations of wolves, systematic and periodic reintroduction of wolves from outside may ensure population survival." The same paper stated that populations which are "ecologically functional" may be a more suitable goal in some cases than those that are "minimally viable." Even small populations of wolves may, in addition to having economic benefits, provide ecosystem services such as limiting the spread of disease, providing carrion, and fostering genetic fitness of prey species (Licht, in prep.).

Multiple parks can be used like a functional metapopulation. The downside to conserving small-but-important-populations in closed systems (e.g., a fenced park) is that managers must replenish populations when they are extirpated, manipulate animals to preserve genetic fitness, maintain desired sex and age ratios, manage for disease, and intervene for other needs. Yet a hands-on approach is the norm in South Africa and the monetary costs of such actions are outweighed by the economic and ecological benefits of having the species present, even in small numbers. To help conserve these small populations, the numerous noncontiguous natural areas in South Africa essentially manage some of their wildlife as subpopulations of multi-park metapopulations. If a park needs new animals due to local extirpation, genetic concerns, sex ratio imbalances, or other needs, they translocate animals between units. With the exception of imperiled species (e.g., wild dog; see Gusset et al. 2006) this multi-park approach is implemented with minimal government oversight.

In contrast, National Park Service units in the United States have a high level of central planning and authority, yet virtually no between-park exchanges of animals or metapopulation approach to conservation, even for species such as bison that could benefit from translocations (Halbert et al. 2006). This reluctance to use a metapopulation approach is likely due in part to the hands-off culture of the NPS. We acknowledge that non-intervention is preferable, and is especially warranted in larger areas such as Yellowstone National Park. However, on smaller sites a hands-off approach means that some species simply will not exist, that inbreeding will occur, and that natural processes such as predation and natural selection will not occur.

Animal demographics are important. Wildlife culling strategies in natural areas typically focus on population abundance. This is understandable since the primary objective of culling is usually to reduce overabundant populations (see McShea et al. 1997). Consideration of other demographic variables, i.e., sex and age composition, are usually considered only within the context of their effects on population recruitment, genetics, and future population trends. Only rarely do managers give strong consideration to the importance of herd age and sex structure as it relates to behavior and ecological processes. Lessons from South Africa show why herd composition is important.

Between 1981 and 1993, 82 elephants were relocated to Pilanesberg National Park (as part of a massive restocking program for the recently established park similar to that

described above for Madikwe Game Reserve). The elephant restocking did not include mature bulls due in part to the difficulty of transporting them. Young bull elephants, once sexually mature, became unruly and subsequently killed more than 40 white rhinoceros (Slotow et al. 2000). In this case, the absence of mature bulls and the social hierarchy they maintain was the reason that the young elephants exhibited abnormal behaviors. The killing of rhinoceros ceased after six older male elephants were introduced into the park (Slotow et al. 2000). This sequence of events repeated itself at Hluhluwe-Umfolozi Park in eastern South Africa.

There is evidence that the behavioral patterns of some North American game populations are changing due to unnatural demographics (e.g., hunters disproportionately selecting mature males; Noyes et al. 1996). The Pilanesburg example and our knowledge of animal behavior suggest that the conservation of biological diversity and functioning of natural systems requires that natural area managers follow National Park Service policies that call for the conservation of natural demographics (National Park Service 2006). Some progress is being made. For example, Millspaugh et al. (2005) recently completed a study on natural bison and elk demographics in the northern Great Plains and developed tools to assess the demographic responses of various culling strategies. Their results demonstrated that some culling strategies adopted by NPS can significantly alter the age structure of bison and elk populations. We believe that natural age and sex structures be given full consideration in wildlife management in U.S. parks.

Artificial water can be bad. Kruger National Park has approximately 36 species of large animals. This suite of megafauna richness likely results in narrow habitat niches and specialized adaptations for some species. Mills and Funston (2003) describe a case where establishment of artificial water—intended to promote wildlife—led to a dramatic decline in an ungulate species. Following the introduction of artificial water points, zebra (*Equus burchelli*) and wildebeest (*Connochaetes taurinus*, a water-dependent species) moved into areas occupied by roan antelope (*Hippotragus equinus*, a more water-independent species), which resulted in increased competition for forage. However, increased competition may not have been the primary factor in the subsequent decline of the roan since there was little change in calf natality; however, there was an increase in adult mortality. Researchers studying the decline of the roan suggested that the anthropogenic water, which enticed zebra and wildebeest to the area, also increased lion numbers. Lion predation was the proximate cause of the roan's decline; however, the provision of the artificial water was the ultimate cause.

Some NPS units historically developed water sources for wildlife purposes, perhaps to the detriment of biological diversity. For example, some units developed artificial water to distribute grazing pressure, thereby creating a more uniform use of forage. However, such practices reduce the natural spatial heterogeneity of grazing which is important for conserving the full suite of grassland species (Fuhlendorf and Engle 2001). In some cases the establishment and maintenance of artificial water within National Park Service units is driven by other agencies' missions, the imperiled status of some species, personal philosophies, and politics (Broyles 1995). But based on incidents from South Africa (see also Owen-

Smith et al. 2006), and from biodiversity principles and concepts, it seems prudent to avoid artificial water sources unless: (1) it is absolutely necessary, (2) there is a good understanding of potential advantages and disadvantages, (3) there is acceptance of those potential impacts, and, (4) a monitoring program is undertaken to study the potential impacts.

Summary

According to Phillips (2003), protected area management is entering a new paradigm. It appears that countries such as South Africa are a part of this new paradigm, whereas the U.S. still operates under the old paradigm. For example, Phillips (2003) stated that in the old paradigm one of the objectives for protected areas was to have land "set aside for conservation," whereas in the new paradigm an alternative objective is to have the protected area run "with social and economic objectives." Likewise, under the old paradigm protected areas were "run by a central government," whereas in the new paradigm a protected area may be "run by many partners." Lastly, under the old paradigm parks were managed as "islands," whereas under the new paradigm they are part of a network or system (Phillips 2003). Assigning the U.S. to the old paradigm does not denigrate or belittle past and current efforts. And as Phillips observed, the new paradigm is not without its challenges and criticisms.

The U.S. National Park Service and the conservation community would benefit from an understanding and awareness of lessons from other countries and by using these lessons to reassess policies and operations. The question for the NPS becomes: should hands-off "naturalness" come at the expense of biological diversity and natural processes? We don't believe so. Based on lessons from South Africa we recommend that the NPS and conservation agencies and organizations in the U.S.:

- More strongly consider and use the ecotourism and economic potential of wildlife to develop and protect natural areas;
- Recognize that large animals, including large predators, have high ecotourism and conservation value even when abundance might be low;
- More strongly consider the use of fences as a tool in conserving the full suite of native species, including large predators;
- Revise policies so that small-but-important-populations of wildlife can be reintroduced and conserved when conditions and objectives warrant;
- Strongly consider managing parks in a metapopulation context and translocate individuals between closed populations to improve genetic vigor and achieve other desirable attributes;
- Manage for natural demographics, including sex and age ratios whenever possible; and
- Refrain from the establishment and maintenance of artificial water sources unless absolutely necessary.

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