7th Biennial Scientific Conference on the
Greater Yellowstone Ecosystem

Beyond the Arch

Community and Conservation in Greater Yellowstone and East Africa

Proceedings

Edited by
Alice Wondrak Biel

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Edited by
Alice Wondrak Biel

Yellowstone Center for Resources
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Foreword

Since Yellowstone National Park's establishment, its extraordinary resources have been protected largely through the efforts of generation after generation of park managers and friends. The challenges facing park managers have grown increasingly complex; issues such as crowding, landscape fragmentation, non-native species invasions, conflicting use demands, and grand-scale political and emotional controversies would have been largely foreign to Yellowstone's early caretakers. Today, effective protection of the park's natural and cultural treasures requires active, informed management based on good science—science conducted by researchers outside, as well as inside the National Park Service.

The purpose of the Greater Yellowstone conference series, instituted in 1991, is to encourage awareness and application of wide-ranging, high-caliber scientific work on the region's natural and cultural resources. The wealth of subjects and issues to be explored in Yellowstone National Park provides an unbounded font of research possibilities, as well as an unflagging need for their results. This biennial conference series, with the active involvement of professional societies and other institutions, provides a much-needed forum for knowledge-sharing among the hundreds of researchers doing work here, park managers, and the general public.

The Seventh Biennial Conference, *Beyond the Arch: Community and Conservation in Greater Yellowstone and East Africa,* reached beyond the boundaries of Yellowstone National Park to seek commonality and difference with parks built on the Yellowstone model, but in a wholly separate social context. Through a publicly-oriented discussion of issues that drew together national parks in the Greater Yellowstone and East Africa, managers, scientists, policymakers, and the public came together to discuss and consider the interdependence of both nature–society relations and natural and cultural history in local and global contexts.

The conference's featured speakers included eminent conservationist and political activist Dr. Richard Leakey. Historian Dr. Dan Flores eloquently explored how the national park idea has shaped our ideas about nature. Dr. A.R.E. Sinclair, who literally "wrote the book" on ecosystem processes of the Serengeti—twice—outlined ways in which uninformed management decisions can result in devastating "unintended consequences." Dr. Lee Talbot shared his early experiences conducting parks research in East Africa; Dr. Charles Preston drew connections between Yellowstone and the East African parks and the conundrums facing their managers; Dr. Steven Sanderson discussed the state of conservation in the world; and Dr. Robin Reid shared the results of recently-collected data concerning human effects on the African landscape.

Other conference highlights included panels on GYE ranchland dynamics, democratizing resource management, and the compatibility of conservation versus cultural agendas, as well as several spirited, ongoing discussions about whether conservation efforts are best directed at the local or national scale.

Beyond the Arch attracted the highest number of registrants of any biennial conference to date—more than 200 people from across the globe. They included members of the public as well as scientists, authors, media representatives, and individuals from a number of government agencies. We hope these conferences and their proceedings continue to contribute to professional knowledge and debate on the many aspects of this extraordinary area.

John D. Varley
Director, Yellowstone Center for Resources

Opening welcome

Suzanne Lewis
Superintendent, Yellowstone National Park

Ladies and gentlemen, my name is Suzanne Lewis, and I am superintendent of Yellowstone National Park. It is my pleasure and honor to welcome you to the Seventh Biennial Scientific Conference on the Greater Yellowstone Ecosystem. I bring you this welcome on behalf of all of us who work in this great park. We are at your service, and if we can help you in any way while you are here, please let us know. The team of park staff who are hosting this conference will be obvious to you, but please consider any one of us wearing the gray and green of the National Park Service to be available to answer your questions or provide you any other kind of assistance.

Before I go on, I want to reinforce a message you've probably been receiving from the moment you entered the park. This park belongs to the citizens of the United States, but it belongs even more urgently to the wild citizens of the Yellowstone ecosystem. This time of year, as you may have noticed, some of those citizens are extremely agitated about certain evolutionary imperatives, so please be very careful when you go outdoors. Our neighborhood elk have a fairly demanding agenda of their own right now, and it's up to us to give them plenty of room. If you are careless, you can easily find yourself participating in a primal wilderness experience that you would enjoy much more from a distance. And take it from those of us who live here that the cows can be just as aggressive as the bulls.

Just a few weeks ago, a thousand people gathered here to celebrate the hundredth anniversary of the Roosevelt Arch, that unique historic structure you may have driven through as you entered Yellowstone's North Entrance. In many ways, that celebration set the stage for this very exciting conference. When President Theodore Roosevelt dedicated that arch in 1903, he was reaffirming the mission of Yellowstone and the growing number of other parks, a mission that has grown more complex and vital through the years.

But the mission evolves. The very idea of a national park has come a long way since Roosevelt's time. Some of the values that now guide us here might surprise him; each generation has to reconsider and even redefine places like Yellowstone to meet the needs of the times.

But it's a sure thing that Roosevelt would have shared our excitement about this conference. Our problems, our triumphs, and even our failures would fascinate him. The glory of the national park idea is that it is so

exhilarating just as it is so demanding; we can never rest if we are to do the idea justice.

We are here to compare notes among ourselves—about:

- what we have to learn from our common experiences in managing wild lands and wild lives;
- dramatic changes in how national parks around the world relate to the rest of the planetary landscape;
- the equally dramatic changes in how national parks address the needs of indigenous peoples;
- the futures we might hope for, and the futures we might fear; and
- the great promise of a gathering like this, as the beginning of a global conversation—an essential dialogue that will help us all find our way when the meaning and importance of national parks is too easily misplaced in the headlong rush of social and political change.

That is a mighty and daunting agenda, but my reading of the list of presenters gathered here persuades me that you are up to the challenge.

One of the reasons for my confidence is that Yellowstone has proven itself a great forum for just this kind of meeting. This is the seventh conference in this series, and I think the series has flourished in good part because of Yellowstone's fame and notoriety.

Theodore Roosevelt, who never lacked in opinions that he was eager to share with the world, described the White House as a "bully pulpit." When it comes to questions of conservation and the human relationship with nature, Yellowstone is also one of the world's bully pulpits. These conferences have debuted the data, the interpretations, and the insights of many, many fine researchers and managers. Considering only the proceedings of the conference series, the first six conferences have resulted in some 118 important papers and book chapters prepared by 285 authors and co-authors—more than 1,600 pages of solid and often pathbreaking science, a sustained publication record unparalleled elsewhere in the national parks of our country.

I am confident that you will add significantly to that distinguished record, and further elevate the wisdom it represents.

"I speak of Africa and golden joys." With those words, Theodore Roosevelt began his book of African adventure, and with those words I conclude my welcome. It is, for us, a golden joy to have you all here, and to help you embark on new adventures in the study, protection, and celebration of wild places from Yellowstone to Africa and beyond.

Thank you.

An attempt to coalesce with change

Herbert Anungazuk

Abstract

This paper was part of a panel that included J. Terrence McCabe, a University of Colorado anthropology professor; lawyer Jeanette Wolfley and Idaho State University instructor Drusilla Gould, both members of the Shoshone-Bannock Tribes; NPS anthropologist Don Callaway; and Herb Anungazuk, an NPS anthropologist and Native Alaskan. The panel was submitted under the following abstract:

The creation of national parks in the Greater Yellowstone Area (GYA) and East Africa displaced mobile, indigenous tenants. Over a century has passed since Native Americans historically associated with the GYA were removed to reservations and ceased practicing traditional livelihoods, though many traditions associated with their identities, and some with their livelihoods, continue to survive. In contrast, Maasai pastoralists continue to live in protected areas such as the Ngorongoro Conservation Area in Tanzania (adjacent to Serengeti National Park), but conservation policy has changed their land use practices, among other things. They cannot hunt lions or graze their livestock in Kenyan and Tanzanian national parks/reserves, most of which are located inside Maasailand. Eligible rural native and non-native residents of most Alaskan parks, on the other hand, by federal law can continue to engage in a subsistence way of life. Fishing, hunting, and plant gathering for Alaska natives is considered integral to their cultural, economic, and physical existence. In the course of this panel, presenters will explore historical reasons for these differences; identify some examples of traditional ecological knowledge and management regimes; define "traditional;" address some commonly-held misconceptions about mobile peoples and conservation; speak to the role of ethnographic research in informing policy decisions; and explore ideas and models for ethical conservation strategies that protect wildlife as well as the interests of indigenous peoples.

The Arctic and its people have received undue attention since the onset of intrusion by man and machine from many sections of the earth. New land was instant news in far off lands, and news laundered with exaggeration spread like wildfire. In years, or in decades, were affected animal or fish populations, and the people who used them saw change but they were not heard, and the land surrendered itself without opposition to human and non-human influences. Change arrived in many forms, and the encounters included warfare between world powers, the face of exploration to map the vast Arctic realm of its mineral potential, and excessive commercial

exploitation of renewable resources from the land and the sea. The Arctic is distant from industrial nations, yet pollutants not used in this great land are found in extremes known unsafe. Many flags lay guardian to purportedly untouched lands, little realizing that countless generations of hardy groups of people have resided in the land without so much as damaging even a part of the land, since dawn immemorial.

In less than two centuries, the new ways have altered the ways of indigenous people tremendously, and in a manner never realized by our ancestors. Change has been extreme in many, many ways, and in the case of some encounters humor has been added, in pantomime or change of voice, to enhance the story. A hunter related his first encounter with an airplane in witty prose and story, much to the delight of the listeners. The hunter believed an airplane to be the entity whom everyone was being taught to worship, descending from the heavens with arms extended, amid thunderous noise, thus fulfilling what the missionaries had prophesied. The sails of tall ships that filled the horizons inspired fear in many people relating about stories of first encounters with the West.

Most rural populations are small in northern communities, and the loss of any man or woman can have a severe impact on the whole of the people. An exodus of people has been occurring from small villages that are situated throughout this vast land. Many are young men and women already possessing traditional skills taught to them by the parents and elders who in time they must replace as the leaders of their societies. The movement away from the traditional community caused the loss of men and women with the knowledge needed to rally together as hunting and family units. The warrior, the hunter, has been reduced to mull in silence within four lifeless walls, but as they are people of ancestry, the spirit will return, and the men can be absorbed back into the society of hunters. In all regard, indigenous people remain who they are because we have never cast asunder the wisdom possessed by the elders. The elders carry the wisdom of nature, the wisdom of the environment, and the knowledge of the true and right learning we needed to know about the animal and bird kingdom. To us, the elders are not just old men and old women. The men and women are our teachers, and they continue to teach us in the way of our ancestors.

Time is an important element in the heart, mind, and soul of the people, and remains so, as we are a people of season. We receive our sustenance from the land and the sea, as from the mammals, birds, and fish we receive our gift of survival. Our most profound season is that of the short spring months. The season of spring ignites the will of the hunter to perform in the duty that is expected of him. It is astounding, even to a seasoned hunter, to see the movement of the animals as they pass through our hunting territories into summer grounds and seas far beyond our boundaries. The animals follow the sunset,

ever northward, into the horizon, and for them we wait as our ancestors first learned to wait for them. It is fortunate that someone had the foresight to continue the opportunity to use lands in the manner of the hunter when rule of unfamiliar law written far from our traditional boundaries was to become a barrier to the hunter. Without the inclusion of the right to continue in the manner of the ancient hunter, dire straits would have been occasionally encountered in an effort to create a positive buffer zone between parties.

The inclusion of the right to hunt was the most suitable course inserted in recent acts of law. The land and the sea contain a wealth of animals that are hunted seasonally by the hunter, and to have ceased the ancient right of hunting would have created an undue hardship if the right to hunt were ended by an act of law. We wait from our places of origin, but steadily we have been pressed into witness that we must prove, under the prevalence of law, that we are actually of the land. Generations after ancient generations of elders have ordained themselves to share what they have learned to all who came to learn. The new ways of learning have been to learn from someone who is illiterate in our ways, and this method has begun new generations that are as illiterate as the newcomers. In an ancient system where there is only one way to survival, with few exceptions, disastrous results are occurring within the fabric of nations in the Arctic. We must learn to teach in the ways of our ancestors; otherwise my generation, too, shall pass without teaching our descendants of our ancient ways. The indigenous way is the most complex of cultures in this universe, and others who are continuing to come to us cannot teach us in the manner of our ancestors. Teaching and learning are allies, yet they have been separated without realizing that the teacher also must continue to learn even from those he is teaching.

Arctic research has gone through various stages of interest. Since the onset of ethnographic studies began over a century ago, Arctic people very quickly became some of the most studied in the field of human studies. Indigenous people are tied to land, as each and every one of them is tied by birthright to the land. A scholarly record separated the Inupiat into nations, as we are indeed nations among our own ways. Many Alaska Native interests, and not only the Inupiaq community, will be in whole agreement on this conclusion, (Burch 1994). At the onset of studies, a lot of the published material was biased, insensitive, and contained information that was not compliant with the ways of the people. Only in the last several decades, with the emergence of a new generation of anthropologists, has information been documented that is pliant with the traditions and culture of the people. The Inupiaq elder is quick to share, as he is bound to share what he has learned with others who come forward to him. Everyone—the elders, and the young—is representative of the people, as our lives depend on what we know. Our ways are based on original concepts founded by our ancestors.

Our ways are unique. Others who are unaware of who we are cannot grasp the realities we have established within our universe amid an environment otherwise known as inhospitable to others. The ways of survival pry into the realm of the animal species we hunt for our sustenance as we place an effort to learn and form a bond with them, thus increasing our chances of harvest. We understand some of the mammals and bird species of the Arctic to be messengers in our interest as hunters. To see and observe the activities of birds or mammals announces the arrival of specific species, and the hunters prepare when they are seen. The growth of some plants or berries can prophesy the success of the hunters. In August 2003, Faye Ongtowasruk, who actively pursues her role as an elder in my community, stated that some elders decline to acknowledge the growth of the kipmiq, or cranberry, because to see them grow predicts an unsuccessful whaling season (Ongtowasruk 2003).

I bear the profound pride of having heard Ken Isaacson, of Australia, state that the indigenous elder is the "professor of the world" (Isaacson 2003). His statement bears truth and merit among the indigenous community, as our elders are indeed learned in our ways, and in the manner of the land and the sea that provides for our well-being. I am testimony, among many others, to being graced with the knowledge bestowed upon us by the elders so unselfishly. "The sea is our garden," is an apt comment from an elder from St. Lawrence Island (Tungiyan 1999). Conrad Oozeva made this comment to portray from his heart our lasting alliance with the sea and its creatures. Rapid change has been seen or encountered by many people in a short time, and change has had a life-and-death influence upon the people since the first dawn. There is an adage that states that if you use a resource to its fullest extent, more of that resource used would return to you in the coming years. Our resources are the mammals, birds, and fish that ply into the reins of the observant hunter during the course of their seasonal migration.

We are a sharing nation. Other groups within my cultural group are sharing nations; all indigenous people are. The Inupiat inhabits the largest land, in area, of any indigenous group in the world. Our land stretches from Ongalaliq (Unalakleet) on Alaska's Norton Sound clear into Greenland. We are coastal people; we are river people; we are mountain people. We share the same language, although distance has made the language so extreme that we find ourselves in utter loss when we fail to understand differences in dialects created by separation from one another through distance and the passage of time.

The culture and traditions of the people are alive, as our ways were established on the virtue, wisdom, and compassion of our ancestors. Culture is learned phenomena, and it is an element among people that is important. The traditions and customs of indigenous people contain intense standards, and they cannot flourish successfully without language. It is difficult to talk

about culture in the manner as it is lived by people. Language is the most critical component among people, and with its demise, we begin to find whole groups of people fade away. The elders are under constant trial in their attempt to communicate with the new generations. The young generations cannot see the difficulty that the elders encounter in their effort to communicate with them. The loss of song and dance occurred under the influencing direction of various sects of missionaries. Some religious groups allowed the continuance, but others adamantly believed that they must be stopped as the people came under forced spiritual separation from the onset of the arrival of the missionary. The missionary overthrew the ancient beliefs, rituals, and ceremonies that were observed by the people on the pretense that undue suffering of the human soul would ensue following death. The revival of song and dance has produced a unifying effect in my country, and many people are living proof that the qualities of traditions are strong and that they are important to the human soul.

The people who accepted the challenges of making their residency in the frigid north are a class of people incorrectly called Eskimos. We are the Inupiat, and we define ourselves as "Real People." Several distinct groups fall under the "Eskimo" category, and they are the Inupiat of Alaska, the Inuit of Canada, and other groups who stretch into the far reaches of Labrador and Greenland. This group includes the Yupiaq of southwest Alaska, plus the distinctive Bering Strait Yupiq of St. Lawrence Island. There are several meanings that can be applied to the term Inupiaq. Inupiaq is a singular term for a person, while it also defines the language spoken by the people. As stated, the term translates as "Real People," "Genuine People," or "Original People." We are not the only people who define themselves as real, genuine, or original. Others, such as the Ojibway (Chippewa), Lenape (Delaware), and the Iroquois, and surely many other groups bear the distinction of calling themselves "Real People" (Bruchac 2003).

There are two types of settlements found in Alaska: urban and rural. The rural settlement is the least known, and yet this settlement is found throughout Alaska. The history of each village will be profound, yet when most were founded is generally unknown because the history of the settlement is so ancient. The village will, by tradition, be bounded nearest the flyway of migratory birds, coastal sites, rivers, or mountain passes, and the settlements and the surrounding countryside within the boundaries of the people will be alive in place names.

Will the Arctic continue to be sustainable to both man and mammal if global warming is considered over? I doubt that anyone can ever attempt a prediction, as no one can guess what the consequences to global warming can be. Our story tells that there was a period in our unwritten history when summer failed to return, and it has not yet come to pass. This prophecy is yet to be

fulfilled, and it is still ahead of us. It is told also that man and mammal lived together in our timeless period with no wont for clothing. Our story includes all auspices of a perfect world that mankind now strives for today, but at much expense to the environment. No one knows how long the warming trend can continue. Coastal people started to see unnatural change beginning to occur as far back as three decades ago, and possibly even sooner. Thirty years is a long time, but in considering how long we have been in the land, this is but a tiny hash mark in our unwritten history. Change can occur overnight, and to see continual change in a span of three decades is certainly not beyond the eye of the resident, as change in the sequences of time and what happened has never been invisible. The seas are noticeably rising, and in a land where most villages are situated in coastal lands rarely exceeding 25 feet in elevation, you see and feel the effects of flood waters that are cast upon you by winds not normal to season. You become a lesser being very easily when you see the ponderous strength of the environment as she expends her massive power through earth, wind, or fire. The international reports that global warming may be occurring is no longer an unknown thing of the high Arctic. Industrial interests had an understanding that the Arctic was beyond the reach of pollutants that were unceremoniously released into the atmosphere in far off industrial points, and yet lethal, dangerous byproducts were found in unsafe levels in Arctic lands.

Conservation is preservation, and it noticeably harbors a human element that is usually brushed aside in the guise of philanthropic interest, or political contributions. It is an alliance between man and the earth, and continues to remain an alliance in the north country despite the imbalances that have been applied upon it in this day and age. Among indigenous people it is an unwritten measure to insure that change alone can occur from the powers within. The environment is sovereign, it is an empire within itself, and life in the north cannot be sustained adequately without the forces of this natural state while the indigenous resident has learned to live with it instead of altering it in the manner that it is being done today. The term has been sustained into many varying levels of definitions, as may be outlined into natural resource management issues, or development of sensitive or sacred lands despite continual opposition from indigenous people. In a hunter/gatherer society it is the will of the people to hunt to survive, and it is the only alternative for survival in the harshest region on earth with no resources as seen by Western means. It is astounding that my ancestors found the ways and means to survive in a land that others see as barren. Let it remain barren in their eye, while to us the land remains a gift from the Creator. Everyone has faith in land, and I believe that a person needs not to be born into the land to have any form of faith of land. Why would someone clash over land if their ancestry is not of the land? It is from such faith that place names are bestowed upon land. The land and

the sea are Beings, and that may be why science and organizations call them ecosystems, inadvertently citing that they are indeed a part of life.

What is conservation in the mode of environments that appear noticeably unchanged in the mind of an indigenous person? In the heart and mind of the hunter, it is a routine understanding that very little change occurs as it would apply with the changes of season, and what each season ponders in the mind of the hunter to support his people. Change in northern climes is extremely noticeable, as change in season never fails, and as it is obvious that winter will be followed by summer after a period of pristine spring. The Arctic spring is always pristine; although almost always, "pristine" is a favored expression, as change in wind or ice condition can occur very quickly. The seasons are always in place, and virtual faith rests in the mind of the hunters—virtual faith as in the polar star that has never moved since our first ancestors. The stars disappear, and they fade from the view of the people for many months during the spring and summer months. The sun spinning above you for weeks on end is a virtual reality for northern people during the spring and summer.

In very recent times, my ancestors understood that if more of a resource is used, the resource would increase and just one sustaining thought needed to be observed. This thought was a commandment that you shall observe respect to the animal forms that you harvested, down to the minute forms that inhabit the earth with us. The levels of respect that were observed by the people before the advent of foreign beliefs were indeed many, and many of these intricate systems were considered abnormal to the roving eye of the missionary. Our ancestors, and we, the new generations, readily grasp the new. We accept the new as it will enhance our harvest effort, even amid thought from those who do not favor that we should change. Whenever we found a new weapon, or an instrument that could increase our opportunity as hunters, we accepted it. Some newcomers of narrow disposition feel that we should not accept the use of firearms, outboard motors, or snow machines, but we take them because in doing so we can harvest beyond the range of our harpoons, or go vast distances, thus increasing our chances of harvest. The whale and the seal; the swan, and other avian species; and the noble king salmon are creatures whose arrival we anticipate as they are species given to us by the Creator to sustain us, and for generation after ancient generation we have been sustained by their substance. There are possibly no people who have witnessed more change than the traditional hunter, but we will continue to remain reliant on the ancient standards as determined for us by our ancestors. No one speaks for a people unless they have been properly designated to do so. As an Inupiaq, I will always be hesitant to make any expression for the Kingikmiut of Wales, Alaska, of whom I am member, unless a proper induction as someone who may speak is applied in proper form occurs. Designation as a leader is an elaborate process, and in the traditional manner,

it cannot occur without the people gathering together to apply the right as a speaker. The new way says that Arctic lands were never capable of taking care of multitudes of people. Why were there countless numbers of birds that obliterated the skies? Why were there [such] countless numbers of walrus and other sea mammals that the hunters had to temporarily halt their seaward journey until they pass? Vast numbers of mammals, birds, and fish had to be in the land and sea to support vast numbers of people. We knew, that is why we were on the land when we were "found" to be there.

Are some of Arctic cultures placed into a senescent state so that they can in time fade away? It has been over two centuries for some, and over a century for others, but everyone has persevered. There have been dark ages encountered by the people, but we continue to yearn to breathe in the cold, crisp air that freezes the cilia in your nostrils. We tend to dive into a stream that robs you of your breath after testing the water, little realizing that just below was water just at the point of freezing. The chilled air is warmth, and much warmer than the water you sped from to the fire. The distant mountains are sapphire hue from the effects of distance, and not from the poisons of industry supposedly far, far away. In terms of description, the Arctic lands are of knightly serenity, known for brazen harshness, yet known for their aura of splendor. Our grandparents lacked the treasure of speaking the tongues of others that would have offset the plight that our fathers confronted in the face of meeting authority from afar. The generation of my father met in honor some of the sometimes rancid decisions made for us without just consultation, yet meeting the barriers in the same honorable manner as our grandfathers. My generation continues on with hopes that suitable consultation processes currently being used between the Native American and various federal agencies will pave justifiable solutions to the seemingly never-ending bureaucracy.

In this day and age, you can no longer pursue an issue without consulting at the onset of intent with organizations that may be likely to show concern in areas that were never confided with in the recent past. Conservation is an additive to defray loss of habitat, assisting in the return of animals, avian, or fish, or resisting the will of industry to continue plundering delicate land without knowledge of any lasting effects that can occur without simple environmental impact statements. Indigenous people are no longer standing still when mechanisms of industry persist in continuing their rape, ruin, and run tactics. Large government departments are now confronted to clean environmental damage that has occurred at the expense of world peace. It is slow, but it is occurring, and yet the lasting impact will be that the land cannot ever return to what it was during the time of our ancestors. As recent as five years ago, President Clinton signed Executive Order 13084, which stated that a unique legal relationship exists with Indian tribal governments as defined in the Constitution of the United States, treaties, statutes, executive orders,

and court decisions. This executive order has had a substantial impact on furthering the requirements of consultation with the indigenous community nationwide.

The will to survive is a cause, and in the most sincere cases, the will to survive becomes an advocate of the people when the people become hard-pressed to preserve their ways. Changes in the least suspected areas are the most noticeable. Abnormalities in skins, hides, or internal organs of mammals, birds, or fish are telltale evidence that something in our land or seas is amiss. The hunters will reveal what has been seen or found through word of mouth between hunters, but we bear only so much strength in the world community between hunter and science and the media. It can take years for science to react, but hunter and media bears great strength when they unite in similar interest, and although animals, plants, and insects may be silent in their pain, the world begins to listen. The world is beginning to wait through the eyes of the hunter, and yet, the hunter hopes silently that it is not too late.

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Long distance migrations: Yellowstone in a global context

Joel Berger

Abstract

Among our planet's most striking but imperiled ecological phenomena is long distance migration (LDM). Although scientists attempt to understand how and why animals migrate, few long-term conservation strategies have been implemented to maintain LDM for terrestrial species. I collated information on migration for 29 mammals representing 103 populations from five continents. The goal of this paper is to summarize information on species and migration distances, and to outline a relatively simple plan to conserve migration in at least a part of the Greater Yellowstone Ecosystem. In the western hemisphere, south of the subarctic, the migrations that traverse the greatest distances are all situated in the Greater Yellowstone region. These include mule deer, pronghorn, bison, elk, and moose. The pronghorn migration, up to 550 km roundtrip annually, is the longest for any mammal between Tierra del Fuego and subarctic Canada, and it (1) requires use of historic, exceptionally narrow corridors (0.1–0.8 km wide) that have existed for at least 5,800 years, (2) exceeds that of elephants and zebra, and (3) is on par with the LDMs of Asian chiru and African wildebeest. Nevertheless, the accelerated leasing of public lands for energy development has the potential to sever this migration and ultimately cause the extinction of this species from Grand Teton National Park. One way to prevent this is for government agencies to develop a landscape-level solution by creating a national migration corridor. Strategies developed for the Yellowstone region may, however, not work in other parts of the world. In the absence of a more generalized conservation approach, site-specific tactics may have to be applied on a regional and species or population-by-population basis. Otherwise, many truly stunning long distance migrations will be lost within many of our lifetimes.

Introduction

Despite increasing attention to biological treasures, much of Earth remains unprotected. One such treasure is not the land itself, nor even the diversity of species, but instead, the extraordinary events and processes that play out across vast landscapes. Long distance migration (LDM) is among these, serving to capture the public imagination. LDMs involve not only birds and butterflies that move from and well beyond boreal or arctic landscapes, but also the journeys of whales that navigate seas from Arctic to Mexican waters (Baker 1978).

Nevertheless, massive changes characterize many regions of the world, and among the ecological casualties have been overland treks by herd-dwelling mammals. Well-known losses include those by bison, springbok, wilde-

beest, elephants, and saiga from Asian steppes, African savannas, and North American grasslands. Problematic for today's conservation is the development of effective strategies to maintain these events. While a well-known goal of national parks and other protected areas is to retain some semblance of biological diversity that includes "natural" processes, events beyond protected borders alter the efficacy of reserves (Newmark 1987; 1995), and changing environments impede knowledge about the relative importance of fixed areas on species persistence (Wilcove 1999). Although LDMs are far from the centerpiece of conservation biology, in areas like Yellowstone, Serengeti, and central Asiatic steppes, it is still possible to observe remnants of mega-wildlife and the processes needed to sustain them.

The larger challenge today, however, is not to chronicle the change nor loss of wildlife processes, but to find ways to sustain it. In this paper, I (1) summarize analyses of where and what mammalian LDMs have been lost and remain, and (2) offer a simple, site-specific plan to retain the longest LDMs in the Western Hemisphere that involve species other than caribou. A more detailed analysis is available from Berger (2004).

Methods

Rationale and definitions. Although migration has been defined in various ways (Sinclair 1983), I use here a simple operational definition: seasonal round-trip movement between discrete areas not used at other times of the year. Therefore, a wolverine covering a 1,000-km^2 region between mountain ranges throughout the year would not be migratory, because it fails to show seasonal use of discrete ranges. On the other hand, if two discrete regions were used, one in summer and another in winter, and the same patterns of regional use characterized multiple years, these movements would be considered migratory.

Many researchers have discerned between distinct areas of seasonal use and formal geometric centers of seasonally-discrete home ranges. I have relied on these and additional values from the peer-reviewed and gray literature to evaluate migration in terrestrial mammals (Berger in press). The definition, however, of LDM remains problematic, because what may be "long" to some people is not to others. For instance, both European and North American biologists studying moose have suggested a provisional definition that infers "long distance" when one-way movements exceed 10–12 km (Fuller and Keith 1981; Sandgren and Sweanor 1988). Rather than suggesting a one-definition-fits-all approach, I suggest that readers decide for themselves what is "long," and what is not pertinent relative to their own conservation objectives.

Data and species limitations. I used information on migration from both published and gray literature. The latter were included because of the many state agency reports and bulletins that contain information on the

movement of radio-collared animals. Nevertheless, the data I report are limited because I have not attempted to summarize all data from all agencies. The measurements I report are average distances for round-trip migrations and, where possible, for the distances traversed by the migratory portions of populations. Data are reported as species' mean (Figure 1) and, when relevant, standard errors (SEm) and 95% confidence intervals (CI).

For the ~10.8-million-ha Greater Yellowstone Ecosystem (GYE) (Noss et al. 2002), the number of migration routes that have changed or been lost during the last 100 years were estimated by relying on recent historical records and published and agency data. There are limitations to the accuracy of some of these data, specified by Schullery and Whittlesey (1995). It is possible, at some fairly coarse level, to indicate what losses in migration have occurred because interest in migration has been great, yielding analyses of track counts, sightings, and estimates of travel routes since the 1950s (Anderson 1958; Craighead et al. 1972; Smith and Robbins 1994; B.L. Smith personal communication). Although pronghorn and bison remain less studied, I have based my estimates of routes lost or retained on point counts of discrete win-

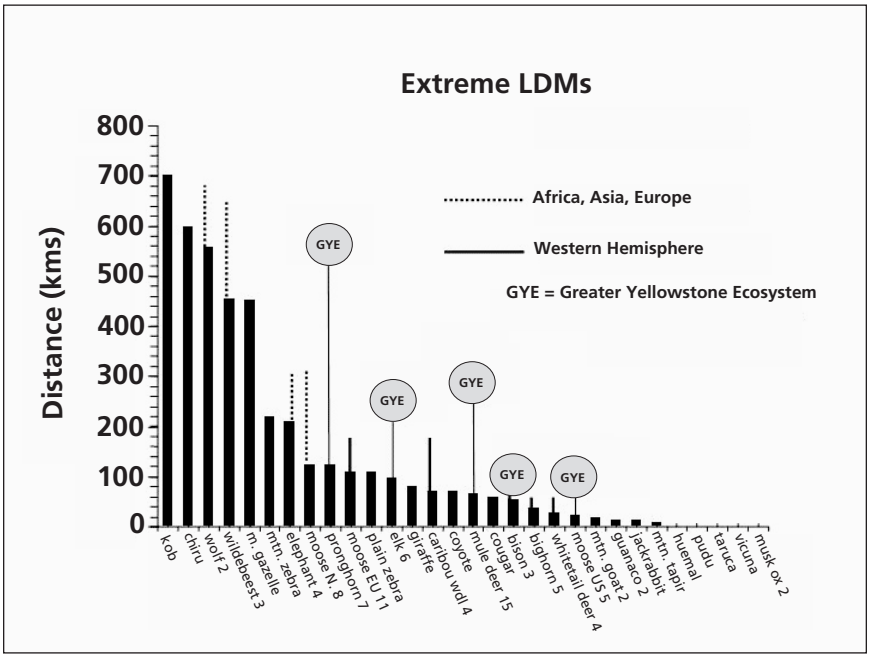

Figure 1. Mean and extreme (extended lines) long distance migration (LDM) round-trip distances for terrestrial mammals (excluding barren-ground caribou). Numbers after name represent studies/species. If un-numbered, data are based on one study (see Berger in press for full references). Moose from geographically disparate regions are: Northern Alaska and Yukon; EU, Scandinavia; U.S., south of Canada.

ter and summer ranges, which in turn were derived from past known locations coupled with landscape-level analyses (see Berger in press).

Results and discussion

The geography of extant long distance migrations. Not surprisingly, there is much variation in the distances that mammals migrate (Figure 1). Although wildebeest and Mongolian gazelles migrate more than 450 km (round-trip), for species that may differ in size by more than 40-fold, distances can be both small and similar. Mountain tapirs and black-tailed jackrabbits both move <12 km, but within-species variability can also be great [e.g., mule deer average 66 km (± 12.7 [SEm]; 95% CI = 38–93; n = 15 studies), but in the Upper Green River Basin of Wyoming, distances exceed 285 km (Figure 1)]. At a broader level are barren-ground caribou, with extreme LDMs that average 673 kms (± 491; n = 3; longest = 2,500). By contrast, woodland caribou move far less (km = 71; ± 28; n = 4; see Figure 1).

If caribou were to be excluded, of 57 remaining populations representing 17 species, the five with the extreme LDMs rely on lands within or adjacent to the GYE. These include the longest movements for five respective species—pronghorn, elk, mule deer, moose, and bison in North America, and the longest for a terrestrial mammal, pronghorn, between subarctic Canada and Tierra del Fuego.

The challenge of maintaining ancient bottlenecks in a modern world. The application of site-specific conservation measures is highly relevant for the sustenance of long distance migrations. Globally, as well as in the GYE, many spectacular LDMs have been lost. Although causes vary, the routes lost by migratory bison, elk, and pronghorn from the GYE can be traced to four primary factors: (1) little tolerance for bison outside protected areas; (2) concentrations of elk on 23 winter feeding grounds in Wyoming; (3) a 20% increase in human population size since the 1990s in the last decade to currently; and (4) associated habitat loss. This last point is central if extreme and highly fragile LDMs are to be retained in the southern part of this ecosystem.

Energy extraction on public lands in southwestern Wyoming, coupled with animal movements through narrow natural bottlenecks, has the capability of disrupting or severing the distinct pronghorn migration that connects the Upper Green River Basin to Grand Teton National Park. This migration has passed through at least some of the same geographically narrow points for at least 6,000 years (Sawyer and Lindzey 2000; Miller and Saunders 2000), but with the recent development of the natural gas industry, hundreds of wells have been constructed, with at least 3,000 more requested during the next few years. Most of the development has occurred so far on pronghorn wintering ranges, but neither these regions nor the bottlenecks have any formal protection. The migration route winds through at least four narrow

corridors that vary in width from a 0.8-km constriction at an elevation of 2,226 m, to a 5-km-long sagebrush gap between floodplain and forest that narrows to a strip only 100–400 m wide. And, before reaching summering ranges in Grand Teton National Park, the migrating herds must pass through a 100- to 200-m constriction between sandstone cliffs, a road, and the Gros Ventre River.

A simple plan for conservation

Conservation efforts beyond the formal Yellowstone National Park boundary emerged well before the ecosystem concept did. In 1898, a plan was advocated to protect important wintering habitats some 300 km to the south (Dunham 1898). Perhaps a more modest plan to protect the migration of pronghorn is to enhance protection for highly sensitive wintering regions, as well as the bottlenecks. These migration routes traverse existing U.S. public lands under the jurisdiction of the Bureau of Land Management and U.S. Forest Service, and can receive true protection if a broader and more formally-designated national wildlife migration corridor is instituted. Although precedent in the U.S. exists for some form of national designation (e.g., scenic highways, historic trails, and rivers), the conservation of an ecological process such as migration, coupled with land and habitat, will remain challenging. It should not. If we wish to sustain treasures that have operated for millennia and have compassion for species other than our own, we will have to do more. Otherwise, we will marvel at another passing event and have little other than stories to share with our children about what our precious heritage once contained.

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Uncommon properties: the historical ecology of cooperation in a ranching valley

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Abstract

As in many areas of the New West, the environmental and social character of southwest Montana's Madison Valley are changing rapidly as traditional ranchers are replaced on the landscape by retirees, vacationers, and hobby ranchers. Characterizations of ranchers and their relationship to the land vary widely, pointing to the need for an ethnography that addresses what is at stake in the transformation from a ranching economy to a tourist one. I describe the development of land use and tenure patterns in the valley after European settlement in order to situate the family ranch of southwestern Montana within the spectrum of pastoral societies in terms of its use of physical and human resources. I then explore the disturbances to the ranching lifestyle that have led to the competitive replacement of ranchland with recreational development. Finally, I examine how ranching families have reacted to these disturbances and the strategies they have employed to maintain their lifestyle. In particular, I discuss the emergence of cooperative structures among ranchers and compare them with theoretical models of common property institutions.

Conservation efforts around the world have been patterned after the "Yellowstone model" of natural resource management. Particularly after the 1970s, innumerable parks were established to serve as refuges of biodiversity, with few or no human residents. These efforts have resulted in significant protections for many threatened species. However, anthropologists have documented a spectrum of problems related to parks managed with a strictly top-down, autocratic approach. Too often, parks are created without full consideration of the rights, knowledge, and informal institutions of local people, making them socially unsustainable. At the same time, ecologists have noted that many ecological processes cannot be adequately managed within parks, even those as large as Yellowstone. In response to these limitations of the park model, the conservation community has searched for ways to involve local people in conservation efforts, as well as to link the management of parks with the matrix of land uses that surround them.

The theme selected for the Seventh Biennial Scientific Conference on the Greater Yellowstone Ecosystem indicates an eagerness to bring some of the lessons gained through implementation of the Yellowstone model abroad, quite literally, back home. Indeed, the importance of ecosystem management underlies the entire Greater Yellowstone Ecosystem (GYE) concept. In recent years, conservationists have been searching for ways to manage the collage

of public and private lands outside Yellowstone National Park in a way that addresses their ecological unity. The challenge facing the conservation community in the GYE is to determine how the interests of people living and recreating in the park's ecosystem can be reconciled with the maintenance of wildlife habitat and ecosystems services across this landscape. In short, the question is how broad cooperation in natural resource management can be promoted and facilitated.

In Greater Yellowstone, East Africa, and many other settings around the world, livestock grazing is an important land use in the areas surrounding parks. Parks tend to be found in remote, marginal lands incompatible with crop agriculture, but suited to either ranching or pastoralism. There is much literature, therefore, about the relationship of livestock-raising people to conservation interests, both within and outside parks. It is time that we bring lessons home from that literature, given the often vitriolic debate about livestock grazing in the United States. Since the West did not become "cow free" in '93 [under the Clinton administration's "Rangeland Reform" program] or even 2003, it would seem appropriate to examine how cattle ranchers in the GYE could be brought into the conservation fold. To do so, we must ask all of the same questions we pose about local communities around the world. What types of practices and institutions can minimize the negative environmental impacts of ranching? In what ways do the values of ranchers and environmentalists overlap? What types of incentives would convince ranchers to modify their practices for conservation benefit? And finally, what role does ranching currently play in the maintenance of ecological and landscape qualities?

Environmental historian Donald Worster (1992) made a similar observation in an essay titled "Cowboy Ecology," in which he called for a history that would place U.S. ranchers into a broad context of human ecology. Worster invoked Robert Netting's (1981) study of a pastoral corporate community in Törbel, Switzerland, as a model that could inform the evolution of sustainable ranching in the United States. Netting described a system of pastoral transhumance, in which herds are moved seasonally to take advantage of altitudinal variations in climate. Diverse examples of this adaptation are still found in Europe and throughout the world. In Törbel, dairy cows grazed communal pastures of the high elevation alp during the summer, under the supervision of a small group of shepherds. The majority of the population, meanwhile, made intensive use of lower-elevation private lands during the short growing season to raise grains, vegetables, and winter feed for livestock. Only members of the corporate community, established as early as 1224 A.D., had rights to graze their livestock on the alp. Any animal that was grazed on the alp during the summer had to be supported through the winter on private land in Törbel, or its owner would be subject to community-imposed fines. This simple rule, and the community pressure associated with it, linked

the use of common land with the use of private land, lending social and ecological stability to livestock production.

The case study of Törbel has become a classic example of a well managed common property regime. In response to Garrett Hardin's (1968) essay "The Tragedy of the Commons," an enormous literature has addressed the gap between individual rationality and collective outcomes inherent in shared resources (Knudsen 1995). Cases have been documented from around the world of communities that have established and enforced rules to prevent individuals from overexploiting resources to the detriment of the common good. Common property theorists have worked to understand the conditions under which such cooperation emerges, the resilience of common property institutions under changing conditions, and the potential relevance of "traditional" common property institutions to increasingly complex environmental conflicts. Because of its broad applicability to environmental issues, common property theory has become a popular framework for understanding the challenges facing conservation efforts.

Worster (1992) used the case study of Törbel and the lens of common property theory to examine the implications of tenure relationships for the sustainability of livestock grazing in the United States. He noted that various surveys have shown that range conditions have historically been superior on national forest lands, as opposed to private lands or unregulated public domain. He argues that the "community" of stakeholders interested in range health on the national forests (public resource managers, ranchers, and environmentalists) may guide grazing toward sustainable levels of use in a way similar to the corporate community of Törbel. Worster's application of common property theory to rangeland management in the U.S. is an important step toward employing comparative human ecology in our understanding of domestic environmental issues. However, as Worster recognized, the analogy between a corporate community and stakeholder groups in national forest management is imperfect. In his broad analysis, Worster attempted to extract "big picture" lessons for conservation by focusing upon the ways in which these two situations were similar. However, there may be as much to learn from a careful analysis of how resource management in the West departs from classic common property regimes. In order to truly understand the implications of different institutional arrangements, detailed studies of particular resource "communities" in the West must be undertaken with an eye toward underlying tenure relationships and cooperative strategies.

My dissertation, in part, takes up this challenge by comparing the development of land tenure, grazing systems, and social institutions in a valley of southwestern Montana with those that Netting observed in Törbel. The Madison Valley sits within the northwestern part of the Greater Yellowstone Ecosystem. With a valley floor at about 6,000 feet above sea level, and alpine

meadows above 8,000 feet, the Madison Valley is physiographically similar to Törbel. The social history of these locales, however, has differed in various ways that have important implications for patterns of cooperation in resource management. The focus of my study are the family ranchers who own, work, and gain their living from land in the valley, as opposed to the hobby ranchers who are largely nonresidents. Netting (1981) speculated that the degree of social and ecological stability evident in Törbel was maintained because no one had an interest in turning the place into a ski resort. The Madison Valley case study, where family ranchers share the landscape with hobby ranchers, flyfishers, and assorted others speaks to how cooperative strategies may change as demographic and land use patterns shift.

Netting made the key insight that the resources in Törbel that were controlled as private property and those held communally differed in ecological characteristics, such as density and predictability of resource production, as well as difficulty of enclosure. Patent data from the General Land Office shows that this ecological logic of resource control also held true in

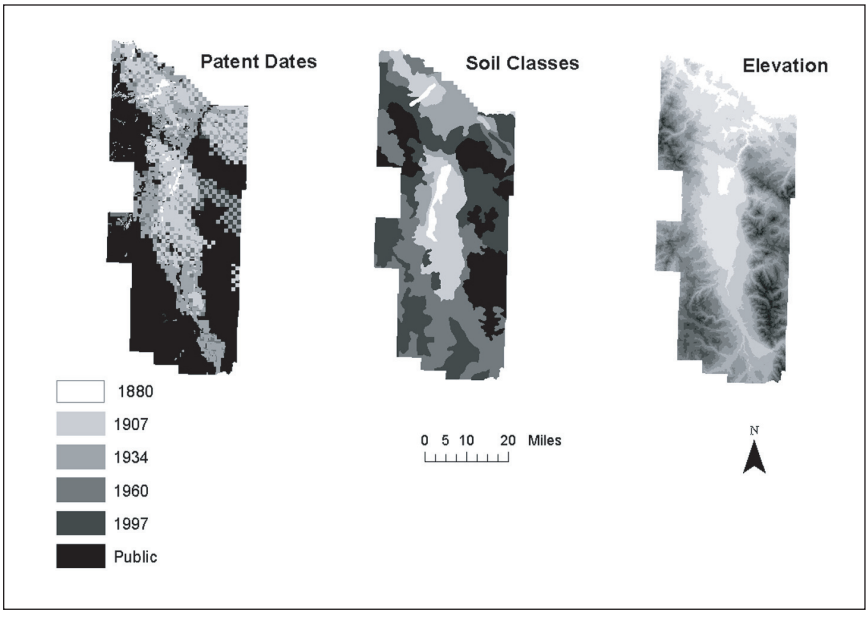

Figure 1. The map on the left shows land parcels as they were historically patented with the General Land Office. The parcels depicted in the lightest shades were patented earliest, and the darkest shade patented last. The soil classes in the center map were generated using the National Resource Conservation Service land use capability classes. The darkest shades indicate soils that are most compatible with agricultural uses. The map of elevation on the right was generated using the National Elevation Dataset. The dark shades indicate the lowest elevations, from 1,280–1,495 meters; the white indicates the highest elevations, from 3,221–3,437 meters.

the Madison Valley. The lefthand side of Figure 1 is a map of parcels in the Madison Valley as they were patented from the public domain. When this land patent map is compared with maps of soil classes and elevation, it is clear that the lands patented before 1880 by the first agricultural settlers were in the low elevation areas with the best soils, making them suitable for intensive agriculture. In contrast, the public domain that remained after lands were closed to homesteading is at high elevation with poor soils. Much of the land with intermediate ecological characteristics was not patented directly to ranchers or farmers, but to the Northern Pacific Railroad by an act of Congress. The company would then sell these lands in order to finance their capital investment in the railroad. The tendency for lands at lower elevations with better soils to be patented first is still evident in these railroad lands, however at a coarser scale. It is worth noting that much of the land patented to the Northern Pacific at the highest elevations was never purchased from the railway by ranchers or farmers. Instead, this acreage was eventually purchased by real estate development corporations.

Aside from land ownership, the development of seasonal grazing patterns in the Madison Valley also mirrored the pattern of transhumance common in Europe. As the beef cattle industry took hold in the Madison Valley in the 1860s and 1870s, the land remaining in the public domain was used seasonally as a grazing commons. In late spring, ranchers drove herds into the upper Madison, where the cooler microclimate provided ideal summer grazing conditions. As more people and animals entered the valley, ranchers began to trail their livestock up into the mountain foothills and eventually to alpine meadows for summer grazing (Wyckoff and Hansen 1991). Associations of ranchers hired a couple of riders to supervise the combined herds of cattle on the summer pastures. In late fall, the ranchers cooperatively rounded up the cattle and cut them from the large herd by brands. Each rancher drove his cattle to a home ranch, where they could be more closely cared for through the winter.

It is not surprising that much of the ground in the upper valley and the mountains tended to remain in the public domain. Heavy snow and low winter temperatures made these areas unsuitable for year-round livestock husbandry. With such a short growing season, these areas were also not conducive to raising crops. However, the summer forage available in the upper valley and alpine meadows was instrumental in the success of ranch operations. By herding their livestock into the public domain in late spring, ranchers freed up their private land for intensive use during the summer growing season to raise winter feed. As early as 1864, the settlers of the Madison Valley were cutting and stacking hay for their cattle (Yeckel 1966). This precaution would prove critical in years of drought and harsh winters.

It is important to note the very significant differences between the system

of transhumance that characterized the beef cattle industry in the Madison Valley from its inception and the open range "beef bonanza" that has received so much attention in Western literature. Many authors have described the pattern of private land claims on the northern plains that served to control access to water in order to monopolize use of vast areas of rangeland in the adjoining public domain. In this type of operation, cattle were essentially left to roam freely year-round, and the uses of private land and public land were indistinguishable. In contrast, the use of private and public domain land in the mountain valleys of southwest Montana were coordinated seasonally in order to produce diverse commodities and to reduce the risks associated with an unpredictable environment.

It almost seems that the early mountain ranchers foresaw the devastation that would grip the plains two decades later, in the 1880s, when ranch operations were not prepared to feed their cattle through a bitter winter. Their practices of establishing significant private lands, investing in improvements on those lands, and feeding hay through the winter would eventually become standard throughout the U.S. livestock industry. There are no historical documents that explain why these settlers chose to take such precautions. However, most of those who took up land in Madison County during this period had been raised on farms either in the East, Midwest, or in Europe, and had teamed overland across the plains to reach Montana (Bancroft 1885). It is reasonable to speculate that these settlers were imitating traditions of pastoralism passed down from Europe, such as those that Netting observed in Törbel. They certainly did not carry the tradition of open range grazing that would characterize the later migration of stockmen from Texas and the Southwest to the northern plains. The local market in Virginia City also encouraged early settlers to focus livestock raising on dairy production, because milk and cheese were scarce, wild game still plentiful. Due to the nutritional requirements of lactating cows and the labor requirements of milking them, dairy cows must be kept close to the home ranch and fed hay. It is likely that the practice of feeding hay naturally carried over to beef cattle as settlers gradually converted their dairy stock to beef herds.

Finally, although the early ranchers of the Madison Valley were certainly market-oriented entrepreneurs, they were not speculators. Most of the early ranches in the Madison Valley were owned, operated, and lived on by families. By comparison, the owners of livestock operations on the northern plains were the nineteenth-century equivalent of venture capitalists. They were seduced by the notion of easy profits requiring little investment. These owners were widely separated from the hired labor that ran their livestock operations, both in terms of geography and information flow. Like the tulip craze or any other bubble in international markets, the beef bonanza would also bust, with severe economic and ecological consequences. During the

harsh winter of 1886–1887, the cattle barons on the plains lost up to 75% of their herds. However, the more conservative ranchers in the Madison Valley only suffered losses of about 6% during these years (Montana Livestock Journal 1887).

Despite these differences, there were also important similarities between the transhumant pattern of early ranch operations in the Madison and the open range livestock industry. Unlike the corporate community in Törbel, neither the ranchers in the Madison Valley nor the cattle barons of the plains had any legitimate means of excluding other users from the public domain, since the land was by law federal property. Nor could they regulate how many animals each rancher sent to the summer pastures. Because both the mountain and plains ranchers were market-oriented, periods of low beef prices encouraged them to hold over animals for another year rather than selling. Indeed, low prices in 1885 and 1886 contributed to the overstocking of the northern plains and left the herds there more vulnerable to the harsh weather of 1886 and 1887. The public domain in the Madison Valley may have been somewhat less susceptible to this phenomenon because the early ranchers knew they could only support a certain number of cattle through the winter on their home places. However, crowding of the public domain became a problem in the valley as settlement progressed.

While federal tenure precluded community regulation of a grazing commons in the Madison Valley, the government also initially did little to actively manage the public domain. Although a leasing program was initiated in the early twentieth century, federal policies favored the disposal of land and wide distribution of public lands benefits for many decades thereafter. Hence, the public lands in the valleys were more open access lands than commons, just as they were on the plains. At the same time, the public domain continued to shrink as new private claims were made under the Homestead Act. While early Madison Valley ranchers may have cooperated in order to mix, care for, and later round up their animals with a minimum of social conflict, they could neither enclose nor regulate a grazing commons as did the herdsmen in Törbel. While they never saw the kind of devastation that occurred on the northern plains in the 1880s, there were significant ecological consequences of this weak tenure system. Beginning in 1919, and with increasing frequency after 1923, the U.S. Forest Service (USFS) reported chronic overgrazing of the Madison ranges.

Faced with irrefutable evidence of resource damage across the West, the USFS suspended further distributions of grazing privileges after World War II. The agency arrived at a rule of use similar to the one in effect in Törbel through its commensurate property policies. The particular commensurability rule in use differs among the various USFS regions. In Region One, ranchers with USFS leases must demonstrate that they own enough private land

in the immediate area to provide at least two-thirds of the forage and hay requirements of their herd during the nine months of the year that the forest is closed to grazing. The similarity of this rule to the governing of the commons in Törbel is striking. However, the privilege to graze public land in the U.S. extends from the government, rather than from community membership. The USFS arrived at a pragmatic sharing of tenure with local populations that Leigh Raymond (2000) has called "refined property." Ranchers enjoy secure long-term leases with very moderate fees. However, their use of the public ranges is subject to being revoked or altered at the discretion of USFS land managers. In practice, the USFS typically shortens the length of the grazing season when resource damage is apparent, but rarely revokes permits.

The development of public lands grazing in the Madison Valley essentially mimicked a common property regime in its use of physical resources, but not in its social relations. Third party management has had important implications for patterns of cooperation in the management of the USFS ranges. During my fieldwork in the Madison Valley, I observed that most ranchers view cheating by their fellow ranchers on public ranges (sending too many animals, for example) as something to be handled by the USFS. There is very little peer pressure, or what Hardin (1968) called "mutual coercion," among ranchers who share the public domain, although they recognize the potential for resource damage when their cohorts cheat. Despite this lack of peer control among ranchers, there is much evidence that USFS regulations have improved range health since World War II in most national forests.

These improvements, however, have been enormously costly when the infrastructure of the USFS bureaucracy is compared to the simple and direct social controls employed in Törbel. The management of the national forests has become increasingly costly since the 1970s, as more people nationwide take an interest in these lands for a variety of reasons. USFS land managers must not only ensure adequate production of forage for livestock, but also healthy streams, abundant game animals, access to trails and campsites, and innumerable other conditions that the public demands.

The ability of the federal bureaucracy to address a large sphere of interests is certainly an advantage for ecosystem management that traditional common property regimes lack. We hear nothing from Netting (1968), for example, about the impact of highly cooperative pastoralists on the wolf population of Törbel. Yet, in the Madison Valley and nationwide, USFS employees complain that their resources are wearing thin. Range specialists report that they spend so much time processing paperwork related to public comments, environmental impact statements, and lawsuits that they cannot keep up with the monitoring tasks that are vital for good management. There are few incentives or models for how various stakeholder groups might cooperate and negotiate with each other in order to reduce the burden on the fed-

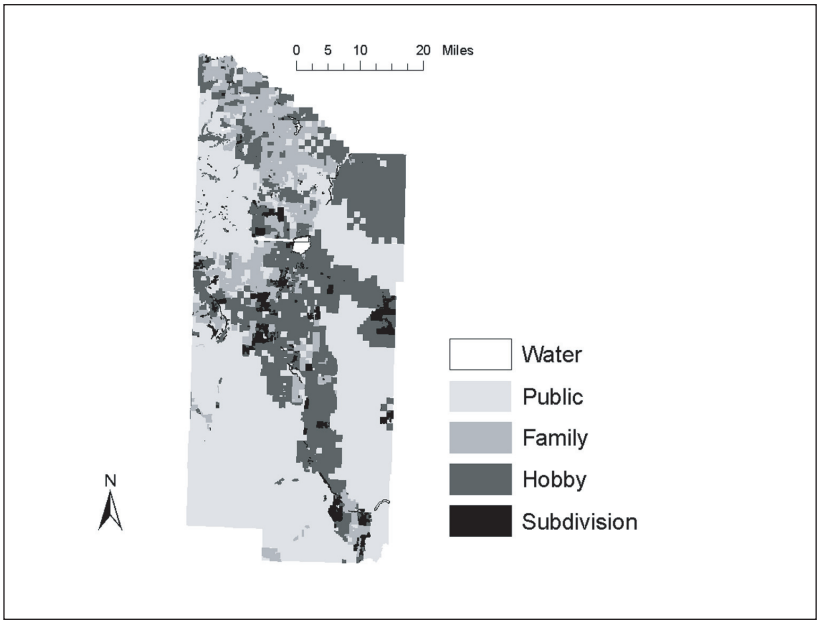

Figure 2. Land ownership patterns in the Madison Valley for the year 2002. Family ranches are those lands owned and operated by families who gain a significant portion of household income from ranching. Hobby ranches are properties larger than 40 acres that do not qualify as family ranches. Subdivisions are residential properties that are less than 40 acres. Most of the public lands at elevation are managed by the USFS, with some Bureau of Land Management and State of Montana lands in the valley floor. The base data of parcels and owner names is from the Montana Cadastral Mapping Project and the Sonoran Institute. Information for classifying the parcels was obtained through interviews with Madison Valley residents.

eral bureaucracy. Efforts to do this have often been challenged in the courts as attempts to undermine the public interest in federal lands. However, there may still be ways to infuse resource management in the West with some of the direct and personal methods of cooperation and control of a traditional common property regime.

In fact, the same demographic changes that have made USFS management more costly have motivated new types of cooperation among family ranchers in the Madison Valley. Since the 1970s, the economics of ranching have been deteriorating, while land prices have risen sharply as vacationers, retirees, and hobby ranchers buy property in the valley. The map in Figure 2 depicts land ownership patterns in the Madison Valley in 2002. Family ranches only account for 33% of the private land area, while hobby ranches make up 59% of private lands and subdivisions account for 8%. The conversion of family ranchland to hobby ranches, and especially to subdivisions, has

various negative impacts for the family ranchers that remain. Socially, these land use changes represent the deterioration of a community that values and supports a ranching lifestyle. The transition also has economic implications for family ranchers, such as a scarcity of pasture land available for lease. Ecologically, new land development contributes to the spread of noxious weeds that degrade the forage value of grasslands. However, my interviews with ranchers reveal that the most profound impact of family ranch conversion may be an aesthetic one. While not essential for ranching as an economic pursuit, the open space provided by an agricultural landscape appears to be vital to the persistence of ranching as a preferred lifestyle.

Many authors have noted that people choose to become or remain ranchers for quality of life reasons, rather than to maximize their income. However, unlike hobby ranchers, the family ranchers of the Madison Valley cannot afford to operate without an eye toward profitability. The calculus of how much economic sacrifice is worth the lifestyle amenities of ranching obviously differs among individuals. Some have opted out of ranching more quickly as landscape conditions change and the potential profits of selling their land increase. Their choice almost inevitably results in the conversion of family ranchland to either subdivision or hobby ranching. Each rancher who opts out, particularly those who sell to developers, makes the landscape that much less attractive for remaining family ranchers.

The viability of the ranching lifestyle, then, depends upon social, economic, and ecological conditions on a landscape scale. Even those ranchers who operate entirely through the use of private land have an interest in the patterns of land use that surround their ranch. Essentially, family ranchers share a common pool resource, made up of the landscape conditions generated through their private ownership of ranchland. However, while ranchers might prefer to return to a landscape populated exclusively by fellow family operations, this is clearly impossible. Much land has already been converted to hobby ranches and subdivision, and there is virtually no way for family ranching to recover ground. The only possible solution to the cycle of ranchland conversion lies in increasing the compatibility of other land uses with the maintenance of family ranches.

Family ranchers in the Madison Valley, then, find themselves embedded within a double commons. They have an interest in the commons of remaining family ranches, but also in the "mixed commons" of landscape-scale conditions generated by all types of land ownership and use. It is easy to imagine a common property institution that ranchers might devise to prohibit each other from subdividing their land or selling to outsiders. Family ranchers are reluctant, however, to impose limitations on each other's use of private land in a setting where they have limited economic and political power. The viability of their ranching lifestyle is already highly dependent upon the conditions

generated by other land uses. For example, much of the open space in the valley that family ranchers value is currently provided by large hobby ranches. It would make little sense to limit their own land use flexibility if they could not also influence their other neighbors.

A traditional common property regime, made up of peers who use and value resources similarly, is not an option for the preservation of family ranches in the Madison Valley. Instead, family ranchers must create institutions that address the maintenance of family ranches through cooperation with other types of landowners. The actors in this mixed commons tend to share some of the same interests as ranchers, but not others. Most notably, almost all landowners in the Madison Valley express a concern for the maintenance of open space as an aesthetic value. In other cases, the values of family ranchers may complement, but not precisely overlap with, the values of other landowners. For example, many "newcomers" are concerned about the maintenance of wildlife habitat in the valley. The family rancher's strong interest in rangeland health for forage production may allow for cooperation on this front.

A group of family ranchers, called the Madison Valley Ranchlands Group (MVRG), has been experimenting with an eclectic set of strategies to negotiate the imperatives of this mixed commons. Their efforts are aimed at lobbying for the value of preserving family ranchland and the conditions that support it in the valley. In order to do this, they communicate the ways in which family ranches address the values of other landowners, most notably through the maintenance of open space and wildlife habitat (see Table 1). This group also tries to encourage newcomers to adopt some of the attitudes and values of family ranchers. The strategies of MVRG establish direct personal responsibility between family ranchers and other landowners in working toward common or complementary goals.

Table 1: Examples of prevalent family rancher and hobby rancher values in a variety of domains.

	Social	Economic	Ecological	Aesthetic
Family rancher	rural community	ranch profit	forage production	open space
Hobby rancher	quiet retreat	tax concerns	wildlife habitat	open space

The clearest example of this is the Collaborative Land Stewardship (CLS) program, in which MVRG facilitates land leases between family ranchers and hobby ranchers with available pastures. The program addresses the economic concerns of family ranchers who are finding it more difficult to lease land when they are short on spring or fall pasture. The financial aspects of the lease are left to the two parties. However, MVRG develops stewardship plans for the leased land, as well as for the family rancher's home ranch, with the help of a range advisory board that includes resource managers from the

public and private spheres. The success of the program is dependent upon convincing hobby ranchers that family ranches are an important part of the landscape, and that a grazing program can improve the ecological condition of their own land. For their part, family ranchers agree to expose their operations to outside scrutiny and make management changes based on ecological values that may have little to do with putting pounds on cattle.

Through strategies like the CLS program, MVRG has made significant progress toward bridging the values of family ranchers and other landowners. They have convinced many landowners in the Madison Valley of the benefits of preserving family ranches. As the group has evolved, several hobby ranchers and subdivision residents have become actively involved in the group's work. The family ranchers involved with MVRG have also increasingly come to perceive themselves as stewards of whole ecosystems, rather than simply livestock husbands. While most farmers and ranchers take pride in caring for their land, the family ranchers of MVRG are steadily incorporating a broader range of ecological conditions in their assessment of land health. Of course gaps still remain, but it is notable that MVRG has not made any kind of overt protests about the recovery of wolves in the Madison Valley. While underlying values may be slow to change, opportunities for collaboration like the CLS program provide incentives for family ranchers to modify their practices in ways that benefit ecosystem management. These locally-brokered modes of cooperation involve very few transaction costs, making them an efficient way to promote conservation.

Despite its successes at promoting cooperation, MVRG cannot be called a true common property institution. The family ranchers and their collaborators cannot enclose the landscape-scale conditions that they seek to influence. Because of this inability to establish strong tenure arrangements, most of MVRG's strategies rely on voluntary cooperation, rather than enforced rules. The one program sponsored by MVRG that is rule-based and most resembles a common property institution has been slow to progress. MVRG has sponsored a series of meetings and studies aimed at developing a community-initiated land use plan for the North Meadow Creek area, where several family ranches have been subdivided in recent decades. So far, the mix of family ranchers, hobby ranchers, and subdivision residents have not been able to arrive at any consensus about where the boundary of the land use planning district should be drawn, nor what specific rules should govern growth within it. Ironically, although the program was spearheaded by MVRG, the family ranchers within the North Meadow Creek area are most reluctant to sign off on a plan.

It is tempting to say that a difference in cultural values separates the family ranchers from the newcomers in the North Meadow Creek area. It would be easy to write them off as private property-crazed Sagebrush Rebels with no

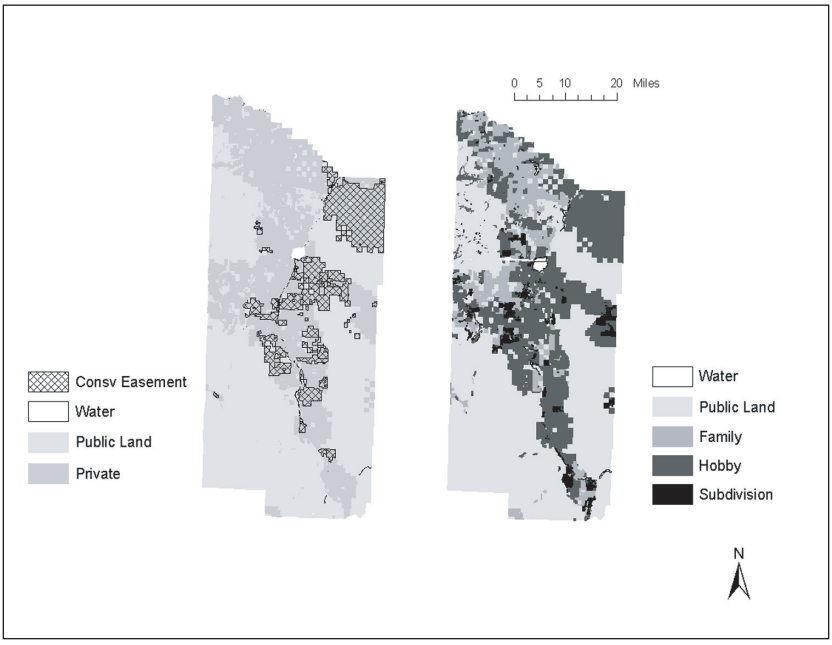

Figure 3. The land ownership map from Figure 2 is compared with a map of conservation easements in the Madison Valley. Data was obtained from the Montana Cadastral Mapping Project, the Sonoran Institute, and the Madison County Planning Office.

interest in conservation. However, I think that the preoccupation with property rights among family ranchers in the Madison Valley can be better understood as a result of their position within the mixed commons. Land and the flexibility to make decisions about its use represent something very different for family ranchers—not in cultural terms, but in political economic terms. While family ranchers enjoy many amenities of rural land ownership, their land typically represents the sum total of all the capital they accumulate in their lives. For most other landowners, their property represents a decision to purchase a luxury good. For those with large hobby ranches, it may even be a way to address a tax problem. Family ranchers face more risk than their other neighbors in giving up rights to development through land use planning.

Few conservation tools have addressed this reality of family ranches. Conservation easements have often been touted as a way of preserving family lands. However, Figure 3 shows that this is not the case in the Madison Valley. Conservation easements are used almost exclusively by hobby ranchers, typically as donations that generate tax write-offs. With so many hobby ranchers willing to donate easements, there are few incentives for conservation groups to purchase easements from the family ranchers who cannot afford to donate them. While Figure 3 shows a large amount of "protected" land in the

Madison Valley, lessons from around the world impel us to investigate that classification in greater depth. The most resilient environmental protections appear to come from the strong local interests of people whose livelihood is rooted to the land. The fact that family ranchers have been the most active in promoting cooperation in ecosystem management in the Madison Valley attests to the importance of working landscapes for conservation.

The type of "mixed commons" found in the private lands of the Madison Valley and countless other settings in the New West could be very useful to ecosystem management efforts across working landscapes. If we can arrive at institutions to govern mixed commons, they could combine the best aspects of our public lands with the advantages of traditional common property institutions. The assemblage of landowners represented in the Madison Valley reflects the broad interest groups that clamor for attention in the management of public land like national forests. However, because these individuals share a particular landscape, there may be sufficient incentives for them to negotiate and cooperate with each other in the direct and personal way that makes traditional common property institutions so effective. In this way, we might devise models of community-based conservation that address ecosystem services and integrity, rather than merely the abundance of a particular resource.

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Landscapes of tradition, landscapes of resistance

Don Callaway

Abstract

This paper was part of a panel that included J. Terrence McCabe, a University of Colorado anthropology professor; lawyer Jeanette Wolfley and Idaho State University instructor Drusilla Gould, both members of the Shoshone-Bannock Tribes; NPS anthropologist Don Callaway; and Herb Anungazuk, an NPS anthropologist and Native Alaskan. The panel was submitted under the following abstract:

The creation of national parks in the Greater Yellowstone Area (GYA) and East Africa displaced mobile, indigenous tenants. Over a century has passed since Native Americans historically associated with the GYA were removed to reservations and ceased practicing traditional livelihoods, though many traditions associated with their identities, and some with their livelihoods, continue to survive. In contrast, Maasai pastoralists continue to live in protected areas such as the Ngorongoro Conservation Area in Tanzania (adjacent to Serengeti National Park), but conservation policy has changed their land use practices, among other things. They cannot hunt lions or graze their livestock in Kenyan and Tanzanian national parks/reserves, most of which are located inside Maasailand. Eligible rural native and non-native residents of most Alaskan parks, on the other hand, by federal law can continue to engage in a subsistence way of life. Fishing, hunting, and plant gathering for Alaska natives is considered integral to their cultural, economic, and physical existence. In the course of this panel, presenters will explore historical reasons for these differences; identify some examples of traditional ecological knowledge and management regimes; define "traditional;" address some commonly-held misconceptions about mobile peoples and conservation; speak to the role of ethnographic research in informing policy decisions; and explore ideas and models for ethical conservation strategies that protect wildlife as well as the interests of indigenous peoples.

Introduction

This paper has two objectives. The proximate goal is to present a case study on the cooperative management plan for the Western Arctic Caribou Herd (WACH) in Alaska. It is hoped that the details from this case study will provide guarded optimism for answering the question, "Can Conservation and Cultural Agendas Co-exist?" This issue arises from the considerable tension between the formation of "protected areas" and the status of indigenous populations that are, or were formerly, affiliated with these protected areas.

This paper will also suggest that conservation goals and the legitimate rights of indigenous people are not only compatible, but also intrinsically related. Justifying this assertion is not entirely clear cut. Conservation ethics

span a broad range of constituencies, and it might be difficult, for example, to see how proponents of "wilderness" values can be reconciled with indigenous entities that wish to reconnect with their traditional lands. However, it is hoped that an awareness of the underlying commonalities between these positions will prevail over the existing tensions and suspicions. The following brief digression with an example from Alaska of "traditional" versus "commodity" views of the environment will indicate an ethical, political, and cultural solidarity between the conservation values espoused by the National Park Service and many indigenous groups, particularly those in North America.

Conservationists and indigenous entities: a shared ethic of non-commodity values of the landscape

One aspect of a multi-method research methodology designed to study the social and cultural impacts of the Exxon Valdez oil spill involved the interviewing (and re-interview) of some 2,728 informants from communities in the Gulf of Alaska. This research indicated that personal, psychological, and community impacts resulting from the spill varied dramatically depending upon values imputed to the landscape.

Jorgensen (1995), in a telling analysis of the consequences of the Exxon Valdez oil spill, demonstrated empirically that Natives and non-Natives, with respect to environmental ethics (among other ethics), are organized very differently on key social features—ideas, sentiments, and acts. These differences had important effects on how the outcomes of the spill were perceived. Jorgensen noted that in the same environment, Natives had greater knowledge about species within the landscape than do non-Natives, and that Natives more frequently identified spiritual values rather than commodity values as the environment's preeminent attribute (Table 1).

Table 1. Ethics and significant symbols associated with environment.

	Natives	non-Natives
Environment or its features (rivers, forests, coal seams, oil deposits, fish, sea mammals) are viewed as commodities, i.e., items whose value is established in the marketplace and are available for purchase or sale.	0%	31%
Environment or its features are viewed as being endowed with spirits with which significant cultural symbols are associated. The general environment is not conceptualized as a commodity.	46%	9%
Combination of commodity and spiritual views.	54%	60%

The frequency responses in different cells of the table indicate that no culture exhibits a homogenous response from all its members. What is clear from the survey research results is that nearly half the indigenous respon-

dents viewed the landscape as solely possessing spiritual and non-commodity values, whereas less than 6% of the non-natives felt the same way. One might speculate that the minority 6% of non-natives held values similar to those of wilderness advocates.

Conservationists and indigenous entities: other reasons for solidarity

The pragmatic justification for such solidarity in Alaska is substantiated by a number of facts, including the size of Alaska's conservation areas, the presence of regulatory incentives (ANILCA, to be discussed below), modest enforcement budgets, and a lack of political support for enforcement actions. All these factors contribute to a situation where the actual management of natural resources often devolves to local rural communities. These communities use traditional knowledge and values to create an indigenous management regime. Thus, the absence of a formal western management regime does not mean the absence of resource management.

In Alaska, many rural/indigenous communities actually hold the NPS in high regard. They believe the NPS holds values similar to their own concerning the non-commodity and spiritual values of the resources they depend on. In addition, many (but not all) regard the NPS and its bureaucratic infrastructure as a buffer between themselves and the competition for resources from other interest groups, such as sports hunters. The legislative structure of the Alaska National Interest Lands Conservation Act (ANILCA) provides access to parks only for rural, traditionally-affiliated, subsistence users. Parks can thus be a kind of refuge for natural resources harvested by indigenous communities in Alaska. Under ANILCA, sports hunters have access only to preserves. The resource management issues in Alaska between indigenous communities and western management regimes provide an exceptional testing ground for the NPS to develop its skills in creating partnerships, in consensus building, and to engage in what has been termed "ecosystem management."

Ecosystem management

The proximate goal of this paper is also embedded in a larger intent, a polemic in support of "ecosystem management." In 1994, as part of the Vail Agenda, a draft report entitled "Ecosystem Management in the National Park Service" was published (Dennis 1994). This report defined ecosystem management as "a collaborative approach to natural and cultural resource management that integrates scientific knowledge of ecological relationships with resource stewardship practices for the goal of sustainable ecological, cultural, and socioeconomic systems." The report outlines nine principles of ecosystem management for the NPS:

- Multiple boundaries and scale;
- Natural resources, biodiversity, and conservation biology;
- Cultural resources and traditions;

- Social, cultural, economic, and political factors;
- Information management/scientific basis for decisions;
- Partnerships;
- Interdisciplinary management approaches;
- Long-term ecosystem management foci; and
- Adaptive and flexible management.

These principles appeal because they convey the complexity involved in resource stewardship. For example, although Alaska is blessed with parks, preserves and wildlife refuges of considerable scope, many of the species that call Alaska parks home are migratory. Neo-tropical migrants form a huge proportion of Alaska's avian inventory, and the status of their winter habitat (and stopover areas) is of enormous, intrinsic concern for Alaska parks. For the state as a whole, 60% of the subsistence harvest biomass comes from anadromous fish.

With respect to caribou, the subject of this paper's case study, many herds migrate across park boundaries. In fact, some caribou herds traverse international, state, private, native, various federal, and multiple park jurisdictions. In many cases, the actions of no single park can insure the conservation of a resource. Effective management depends on negotiation and facilitation of a consensus among multiple actors. Such cooperation is often difficult to obtain as different actors have different mandates, values, and attitudes.

In addition to conflicts over the goals and values of resource management, many differences exist as to the interpretation and meaning of seemingly straightforward concepts. Whereas the park service may view the concept, "natural and healthy," in terms of biological processes leading to an equilibrium state or carrying capacity (independent of human manipulation), local indigenous communities may view some resources, e.g., brown bears, as historically being "natural and healthy" at levels far below carrying capacity. In addition, they may prefer to maintain this lower threshold through means of human harvest.

Other facts point to the permeability of Alaska's park boundaries. The impact of global warming in Alaska is profound. A one-degree rise in the mean temperature at the equator becomes a three-degree rise in subarctic and arctic latitudes. Park ecologies are literally changing under the feet of resource managers as the discontinuous permafrost melts and boreal forests move north. Profound changes in the pack ice impact access to and the availability of marine mammal species for subsistence hunters and place increasing pressure on park-managed land mammals (see Callaway 1999). As habitat rapidly changes, even the Western Arctic Caribou Herd is moving south and west into areas in which it has not been seen for centuries.

Integral to all this discussion is the awareness that management of natural resources is a process framed by social attitudes, cultural beliefs, multiple

jurisdictions and a variety of vested economic and political interests. The NPS has long realized that catalyzing the sub rosa values of stewardship inherent in our neighbors is critical for the survival of protected areas, as was ably enunciated in a draft report generated for the Vail Agenda: "The most troublesome complication to the National Park Service stewardship efforts is the increasing number and severity of human-induced threats to NPS resource stewardship. Widespread land development, increasing human population and global demand for natural resources, and changing dynamics of communities and economies place enormous stress on natural and cultural resources" (Dennis 1994). With respect to ameliorating the tensions between indigenous cultures and the conservation ethic of protected areas, the draft, "Ecosystem Management in the National Park Service," Dennis (1994) makes a number of suggestions:

- Reduce the barriers to ecosystem approaches that result from artificially separating cultural and natural resources and strive to replace them with collaborative planning, research, and resource management efforts that reflect real-world integration of material, human, and natural features;
- Gather intimate knowledge of traditional resource use that will allow NPS managers to respond to stakeholders in culturally appropriate ways;
- Initiate broader data collection to assess better the needs, attitudes, and values of local communities;
- Develop an ethnographic information base, in collaboration with traditional resource users, to help NPS managers understand the cultural dynamics that affect the resource goals and decisions of peoples with traditional associations with park resources;
- Develop the capacity of employees and partners to understand the social, economic, and political factors influencing ecosystem stakeholders and resources; and
- Develop a broad training program to assist managers in initiating and maintaining partnerships, including social learning, conflict management techniques, legal requirements, and capacity to understand cultural values and traditions, including ethnography.

This paper contends that the principles of ecosystem management form a grounded philosophy for many of the major issues faced by protected areas in Alaska, Yellowstone, East Africa, and beyond. The paper also contends that cooperative management, decision analysis, and value-based decisionmaking are important tools in implementing this philosophy.

Alaska parks versus national parks in the lower 48

Protected areas have become, in many regions of the world, synonymous

with what is now termed the "Yellowstone model." That model, as described by Stan Stevens (1997, 28), consists of protected areas where strict nature protection is the primary goal, and where settlement is prohibited and both subsistence and commercial uses of natural resources are banned. A contrast to this "exclusionary model" is the theme "benefits beyond boundaries," from the IUCN World's Parks Congress, the goals of which range from ensuring that communities living around protected areas receive economic benefits from those areas (South Africa) to those communities' getting their land and resources back (Koro 2003).

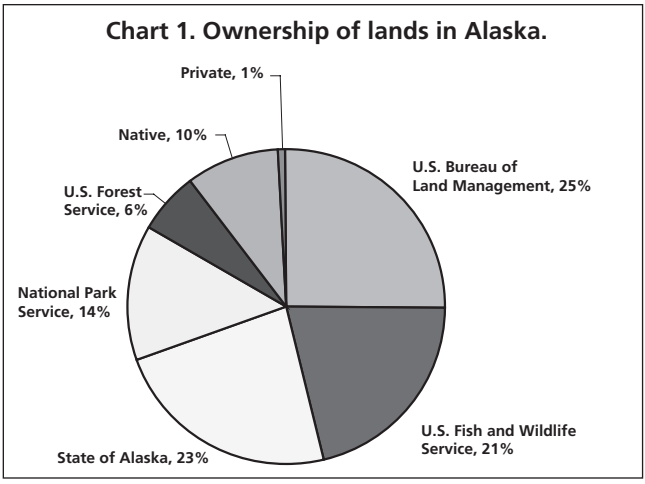
To understand the details of the Alaska case study, it is crucial to realize the historical and legal circumstances that make "benefits beyond boundaries" integral to the Alaska conservation experience. As Jim Igoe (2004, 48) has noted, "The NPS in Alaska is dealing with large areas of wilderness from which people have never been removed. With a few exceptions, Native Alaskans *(sic)* were never placed on reservations." This historical fact, coupled with the legislative background of the disposal of Alaska lands, provides the context for this case study.

Background

Two thirds of Alaska's 364 million acres are in conservation units (Chart 1). With respect to National Park Service (NPS) lands, one park, Wrangell-St. Elias, is over 13 million acres. Seven additional parks and preserves are larger than Yellowstone's 2.2 million acres (Table 2). Total park lands in Alaska are triple the acreage of the 16 million acre Greater Yellowstone Ecosystem. Serengeti National Park is about 3.7 million acres, not including the biosphere reserve or other contiguous conservation areas such as Ngorongoro.

Table 2. National Park Service-administered acreage in Alaska.

Major national parks/ preserves	Park acreage	Preserve	Total
Aniakchak NM & Preserve	137,176	465,603	602,779
Bering Land Bridge National Preserve		2,784,960	2,784,960
Cape Krusenstern NM	649,711		649,711
Denali NP & Preserve	4,741,910	1,334,618	6,076,528
Gates of the Arctic NP & Preserve	7,523,888	948,629	8,472,517
Glacier Bay NP & Preserve	3,225,284	57,884	3,283,168
Katmai NP & Preserve	3,674,540	418,699	4,093,239
Kenai Fjords NP	670,642		670,642
Kobuk Valley NP	1,750,736		1,750,736
Lake Clark NP & Preserve	2,636,839	1,407,293	4,044,132
Noatak National Preserve		6,569,904	6,569,904
Wrangell–St. Elias NP & Preserve	8,323,617	4,852,773	13,176,390
Yukon–Charley Rivers National Preserve		2,526,509	2,526,509
Total	**33,334,343**	**21,366,872**	**54,701,215**



Despite their prodigious size, parks in Alaska receive less than 5% of the total National Park Service budget. The NPS in Alaska has nearly 1,000 permanent and seasonal employees, with an annual operating budget of over $115 million. Yellowstone's budget is about $32.5 million, and its full-time equivalent employment of 556 individuals is about half that of the entire Alaska region. While not flush, Alaska's (and Yellowstone's) fiscal resources and dedicated staff are still at the very high end of the distribution of human and fiscal resources for the world's conservation areas. Parks in Alaska differ from most similar lands in the contiguous U.S. in their allowance of human harvest and consumption of wildlife populations. The considerable park acreage in Alaska supports a variety of flora and fauna that have been harvested for subsistence purposes for millennia. Rural communities continue to depend on these resources, and the continuity of their harvest practices on NPS-managed lands are guaranteed under ANILCA.

The Alaska National Interest Lands Conservation Act

A key component in developing the huge oil deposits on the North Slope of Alaska was the construction of a 700-mile pipeline that would bring the oil to Valdez, an open water port. Critical to these construction plans was closure and "quit claim" to existing or pending land claims. Under the statehood act of the 1950s, Congress provided for the selection of 104 million acres by the state of Alaska, but did not resolve native aboriginal claims. The Alaska Native Claims Settlement Act (ANCSA) of 1971 addressed the issue of native claims, providing a cash settlement of nearly one billion dollars and the right to select some 44 million acres. The distribution of money and the selection of lands was to be conveyed to 200 villages and 12 regional corporations established by the Act. ANCSA terminated existing land freezes resulting from litigation, and permitted further filing of state selections, and the development of the

North Slope oil fields. Because conservation and environmental groups were concerned about the disposition of lands within Alaska, section 17(d)(2) of ANCSA authorized the Secretary of the Interior to withdraw up to 80 million acres for parks, wildlife refuges, forests, and wild and scenic river systems.

The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 was a negotiated Congressional compromise between Native, state, mining, sports, and environmental interest groups. Environmental groups saw a doubling of the National Park and Wildlife Refuge systems and a tripling of the National Wilderness Preservation system. Mining interests saw the opening of Prudhoe Bay with concomitant huge profits. The state benefited from development of oil; 85% of its revenues currently come from royalties and taxes on North Slope oil development. Native groups were allowed to continue hunting and fishing for subsistence purposes in any area traditionally used in the past, regardless of whether that area now existed as a "conservation system unit" (CSU). CSUs include parks, wildlife refuges, wilderness areas, and forests. Sports hunting interests also benefited from ANILCA, which amended the National Park Service Organic Act of 1916 to permit hunting in areas designated as national preserves.

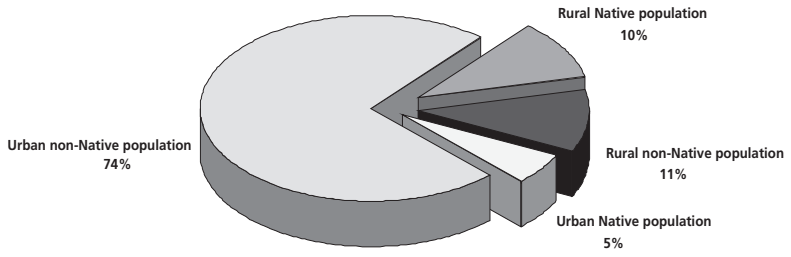
Critical to all of this was an accommodation between the federal and state governments as to who would manage fish and game on federal lands. Key to Native negotiations in ANILCA was the provision for a subsistence priority (over sports and commercial activities) for rural (not just Native) residents in the harvest of fish and game on public lands. Under ANILCA, the State of Alaska could manage wildlife resources on all public lands, as long as it granted a subsistence priority to rural residents. In 1982, the State Boards of Fisheries and Game adopted regulations creating a rural subsistence priority.

Sports hunting interests, mostly drawn from urban areas, were unhappy with the priority given to rural residents. For a variety of reasons, they classified rural residents as being essentially similar to themselves, and framed their self-interest as a debate over civil rights. Thus, despite the many compromises inherent in the negotiation of ANILCA, this interest group wished to reopen discussions about who had the right to harvest resources, especially limited resources. Based on a lawsuit strongly supported by sports hunting groups, e.g., the Alaska Outdoor Council, the State Supreme Court in 1989, in *McDowell v. State*, ruled that state laws granting a subsistence priority based solely on residency were unconstitutional under Alaska's constitution. In July of 1990, as a result of the *McDowell* decision, the federal government assumed management of subsistence activities on federal public lands.

What is subsistence?

Alaska's population of 550,000 is extremely skewed with respect to residence (Chart 2). About 80% of the population lives in urban areas, and around 120,000 rural residents qualify for subsistence hunting and fishing on federal

Chart 2. Alaska's population, rural/urban by ethnicity, 1990.



Note: About 117,000 (21%) rural residents qualify for subsistence hunting and fishing on federal lands.

lands. Thus, the State Supreme Court's decision to enfranchise both rural and urban residents has the potential to exert tremendous harvesting pressures on wildlife populations. Section 803 of ANILCA defines subsistence as "the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools or transportation; …or sharing for personal family consumption." The current harvest of fish, game, and other wildlife resources by both sports and subsistence entities in Alaska is considerable (Chart 3). And while sports interests usually focus on a few species such as the high profile land mammals of moose, caribou, and trophy species such as brown bear, Dall sheep, and mountain goat; subsistence harvesters, as documented below, take resources from a wide variety of species, with fish (including salmon and various non-anadromous species) being the keystone resource category. Chart 4 documents the resource composition of subsistence harvests for the state.

The contribution of wildlife resources, both from the standpoint of nutrition and economics, to rural individuals within Alaska is enormous. Chart 5 indicates the per capita contribution, in pounds, for various regions of Alaska. Note the average U.S. per capita consumption of meat, fish, and poultry is about 225 pounds per year. Chart 5 also shows the high dependence on wildlife resources for regions within Alaska. Consumption of wildlife resources in the Arctic region, primary residence of the Western Arctic Caribou Herd, averages about 650 pounds per person per year. It is apparent that the most substantial part of an individual's diet comes from subsistence products.

Rural Northwest Arctic communities are accessible only by air. Bulk items such as food are extremely expensive to transport. Anchorage's food costs are about 25% greater than food costs for an average city in the U.S., and food costs in the rural communities of Northwest Alaska are more than twice those of Anchorage. With per capita incomes ranging from $5,000 to

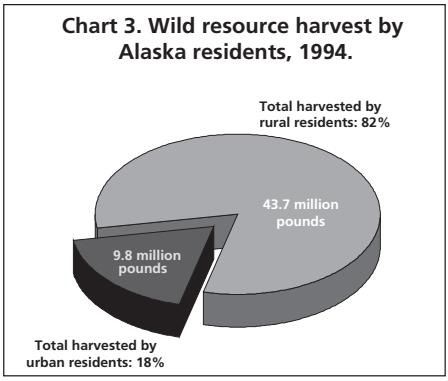


Chart 3. Wild resource harvest by Alaska residents, 1994.
Total harvested by rural residents: 82%
43.7 million pounds
9.8 million pounds
Total harvested by urban residents: 18%

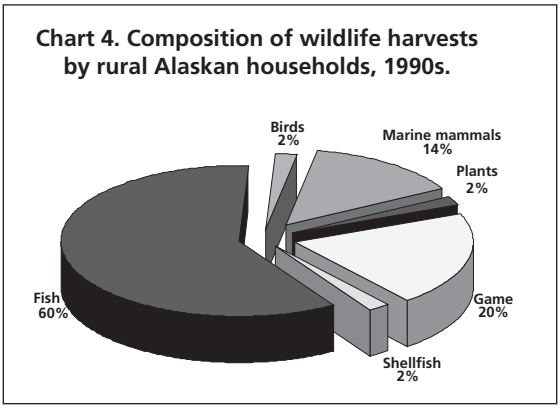


Chart 4. Composition of wildlife harvests by rural Alaskan households, 1990s.
Birds 2%
Marine mammals 14%
Plants 2%
Fish 60%
Game 20%
Shellfish 2%

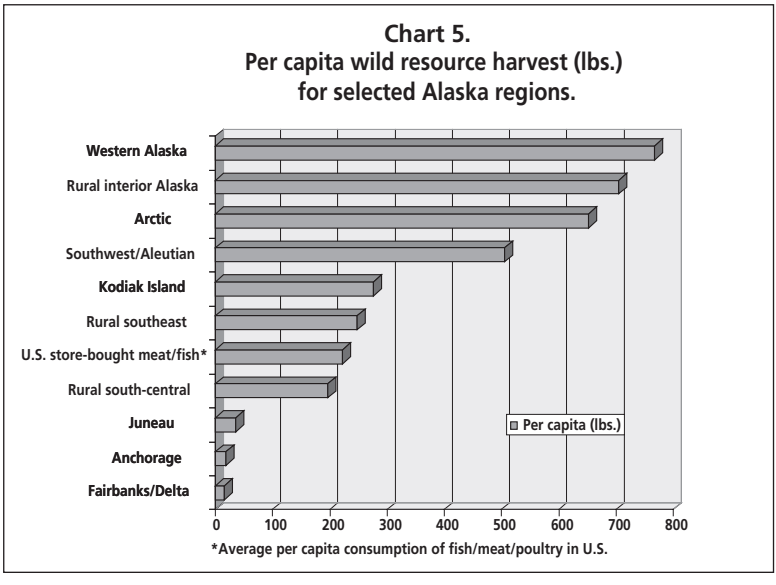


Chart 5.
Per capita wild resource harvest (lbs.) for selected Alaska regions.
Western Alaska
Rural interior Alaska
Arctic
Southwest/Aleutian
Kodiak Island
Rural southeast
U.S. store-bought meat/fish*
Rural south-central
Juneau
Anchorage
Fairbanks/Delta
Per capita (lbs.)
0
100
200
300
400
500
600
700
800
*Average per capita consumption of fish/meat/poultry in U.S.

$14,000, the total replacement cost of wildlife resources in the four communities detailed ranges from 13% to 77% of the total per capita income of those communities (Table 3). However, while the nutrition and economic aspects of wildlife harvests seem the critical issue, in fact, it is the social relations in the harvest, processing, and sharing of these resources that are of paramount concern to the rural Native Alaskans of the region.

Table 3. Substitution costs of wildlife resources in northwest Alaska.

	Kotzebue	Deering	Noatak	Kivalina
Per capita income	$13,906	$7,272	$7,089	$4,968
Replacement cost @$3/lb.	$1,779	$2,016	$1,383	$2,283
percentage of per capita income	*13%*	*28%*	*20%*	*46%*
Replacement cost @$5/lb.	$2,965	$3,360	$2,305	$3,805
percentage of per capita income	*21%*	*46%*	*33%*	*77%*

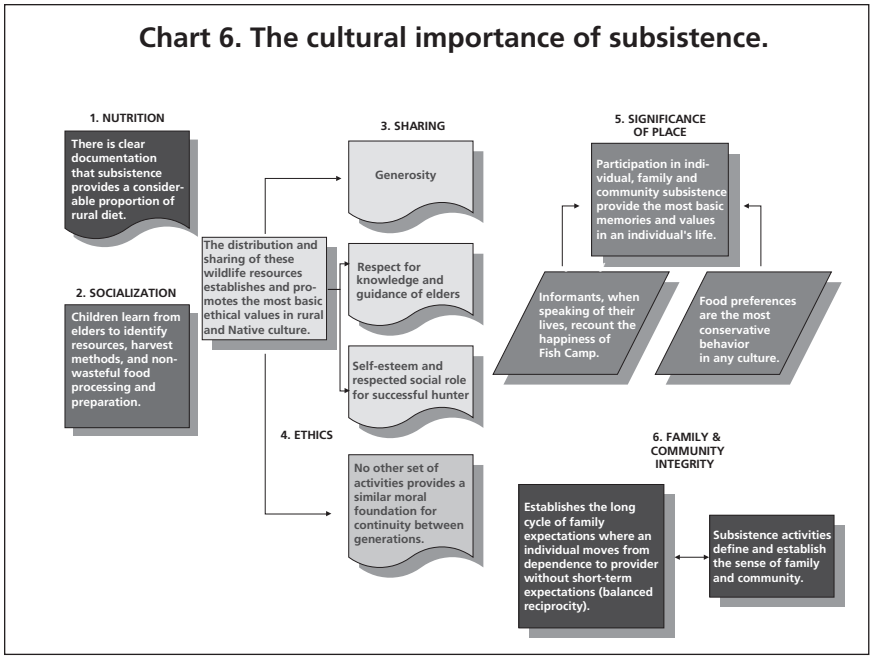
Subsistence resources and the activities associated with the harvest of these resources provide more than food. Participation in family and community subsistence activities, whether it be clamming, processing fish at a fish camp, or seal hunting with a father or brother, provides the most basic memories and values in an individual's life. These activities define and establish the sense of family and community, and teach how a resource can be identified, harvested, processed in an efficient and non-wasteful manner, and prepared as a variety of food items.

The distribution of resources establishes and promotes the most basic ethical values in Native and rural culture—generosity, respect for the knowledge and guidance of elders, self-esteem, and family and public appreciation through the distribution of the harvest. No other set of activities provides a similar moral foundation for continuity between generations. The single most respected and reinforced role for young men in the community is to be a successful hunter who distributes the fruits of his success widely within the community.

Food preferences are the most conservative behaviors in any culture. The unique preparation and special taste of foods encountered by children as they grow up stays with them forever. Years later, the taste and smell of certain foods evoke memories of family and belonging (Chart 6).

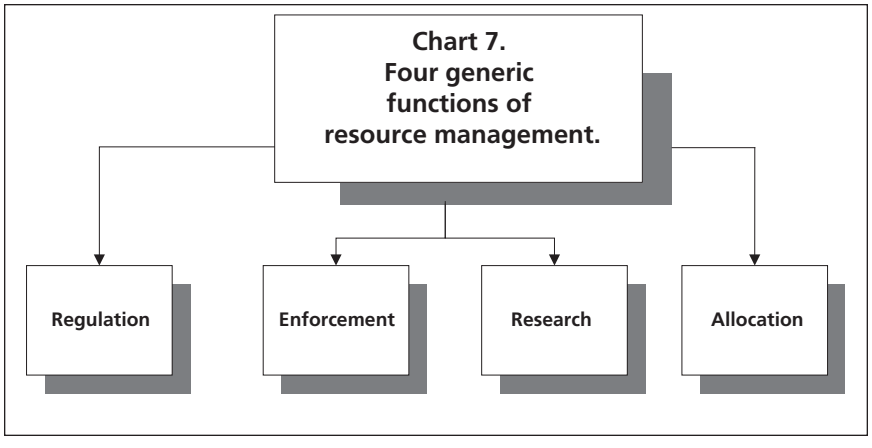
Basic concepts in cooperative management

The terms "cooperative management," and especially "co-management," often cause a sense of uneasiness among agency land managers. Some of this may be attributable to the perception that co-management is the culminating step in a loss of control for the agency. The expectation of such a loss is viewed by agencies as an abdication of their fiduciary responsibilities. These concerns are often captured by the statement, "by statute or regulation we are



unable to delegate these responsibilities." Nothing could be further from the truth, for several reasons.

First, management is not one single strand of power and authority, but rather a complex rope woven from a number of different functions and activities. These functions may be independent, and the "level" of community authority may vary between each function. In a perceptive analysis, Eric Smith postulates four major management functions—regulation, enforcement, research, and allocation (Chart 7). Mixing and matching the scale of



"control" for these four management functions (or any of the subsidiary activities subsumed under these broad categories) can lead to a multidimensional co-management regime that is far less threatening to the perceived prerogatives of agency land managers whose main concerns are often allocation and enforcement. In fact, the Western Arctic Caribou Herd management plan mirrors this distribution of authority.

Second, few if any co-management agreements abdicate the right of final approval, i.e., the power of the state as manifested in its ministries or bureaucracies, to management boards or local communities. Of course, recommendations from management boards or other local entities are seldom overturned because of the political costs associated with abrogating the often hard-fought negotiated settlement among the regional or local entities vested with this responsibility.

Finally, in Alaska, the on-the-ground impacts of agency control and authority can be nebulous at best. In some cases, the regulations, allocation, and enforcement prerogatives of the land managing agency represent a sort of virtual reality. In the huge areas of the subarctic and arctic regions, few land management agencies have the personnel or political will to enforce their own regulatory schemes. With respect to the harvesting of wildlife resources in these areas, management, on a day-to-day basis, often devolves to local communities and their customary and traditional practices. The issue of whose management regime actually controls practices such as access or hunting is of key significance. It is the contention of this essay that overall agency objectives—the conservation of healthy resource populations—are best met by negotiating co-management regimes that integrate agency and local perspectives into a legitimate, self-regulating system.

An important component of such a system in rural Native communities is the awareness and utilization of traditional ecological knowledge (TEK). TEK is important because it is often required by local communities as part of a co-management process; in addition, any management regime must incorporate the consequences of local perceptions and behaviors to be effective in their management objectives.

Any resource management agency, at some level, has to count on the public understanding and sharing some of their conservation values and objectives. A management regime that relies on enforcement as the sole avenue to resource protection is doomed. Whether it is former pastoralists harvesting bush meat for economic or nutritional purposes, or ranchers and small businesses reacting to NPS policy and regulations, the threat of sanctions, by themselves, is not sufficient to deter behavior. A key factor in any discussion of values is the need to be sure the cognitive categories of both actors are understood, even if not agreed to, by both parties.

The social and cultural categories with which indigenous people and

others organize and understand their environment are critical for any agency involved in ecological stewardship. An understanding of how other cultures categorize the natural world and their relationship to it is crucial for communication and legitimate dialogue on resource management issues. Most importantly for the caribou case study, it is crucial for the conservation of the resource.

There are innumerable examples in Alaska where agency personnel and local community members talk past each other. One brief example shows how the conservation values and practices of one actor can be interpreted as an environmental disaster by another. In our culture, it seems indubitably clear that catch-and-release fishing is a conservation practice. Setting aside the issue of some fish mortality from this activity, it seems unassailable that letting fish live helps ensure the survival of the fish population. However, in the Togiak drainage of Alaska, local Yup'ik communities are incensed at this practice, because it is disrespectful—literally refusing a gift. In their view, this refusal will lead to the eventual disappearance of the fish, as the rejected, sentient fish tell relatives of their treatment and discourage them from returning.

In Alaska, federal agencies are charged with managing consumptive uses of natural resources on federal lands. The regulatory framework, including the determination of eligibility, access, seasons, and bag limits, may have little overlap with traditional practices. In fact, research conducted by Georgette (1994) and others indicates that rural communities located on or adjacent to federal lands continue to harvest resources in a manner that largely ignores the federal regulatory framework. This discrepancy between the virtual reality of the regulatory framework and actual behavior has serious consequences for all parties involved. This paper provides description and analysis of some traditional behaviors, and the knowledge, values and attitudes that underlie these behaviors. It is hoped that an understanding of these behaviors and values will create an awareness that allows for a constructive dialogue between land managers and local community members. In turn, this dialogue may help to bridge the gap between regulation and practice and provide a legitimate process for ensuring the health of the resources in which we all share a vested interest.

What is Traditional Ecological Knowledge (TEK)?

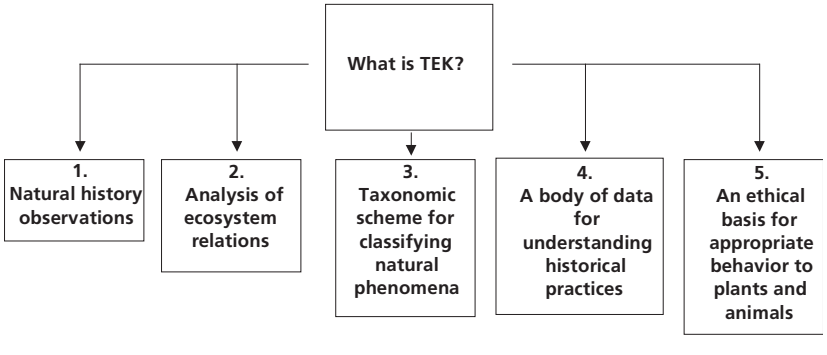
Traditional Ecological [or Environmental] Knowledge (TEK) is a term used to describe any organizing epistemology as it relates to Native (i.e., traditional) cultures, although Western cultures obviously have their own traditions (e.g., Linnaean classificatory schemes). An extensive literature has developed on the issue of TEK. For example, a recent annotated bibliography concentrating on the arctic and subarctic regions of North America has over 200 citations (see Johnson et al. 1995).

Barry Lopez has defined TEK as a "vast and particular knowledge ...garnered from hundreds of years of...patient interrogation of the landscape." Martha Johnson (1992), from the Dene Cultural Institute in Canada's Northwest Territories and editor of a book entitled *Lore: Capturing Traditional Environmental Knowledge,* has offered the following definition: "Traditional Environmental Knowledge, or TEK, can generally be defined as a body of knowledge built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of empirical observations about the local environment, and a system of self-management that governs resource use. The quantity and quality of traditional environmental knowledge varies among community members, depending upon gender, age, social status, intellectual capability, and profession (hunter, spiritual leader, healer, etc.)." Additional insight comes from the Alaska Native Community. In September 1994, an Alaska Native Traditional Knowledge Workshop considered TEK to have these aspects:

1. It is a goal for cultural survival; elders must pass it down to children.
2. It is wisdom—the passing of knowledge from generation to generation.
3. It is for others; it is to be shared with others, including Russian and Alaskan Inuit.
4. It is Native education; it creates a set of standards for the community for dealing with the world.
5. It provides life values, allowing the individual to appreciate the world.

Numerous other definitions exist for TEK; however, for the purposes of this discussion, a general taxonomy has been developed (Chart 8). This taxonomy is heuristic; it does not pretend to be exhaustive, nor are the taxa necessarily mutually exclusive. The rest of this paper will focus on two of the

Chart 8.



topics: 1) TEK as natural history observations, and 5) TEK as an ethical basis for appropriate behavior.

TEK as natural history

Native hunters have extraordinarily detailed knowledge of their environment, derived from extensive experience on the land. For example, in a critical debate between Native whaling captains and western biologists, estimates of existent bowhead whale populations varied by a factor of 500%. Using survey techniques that included overflights, sonar readings, and visual enumeration, western biologists estimated the bowhead whale population to be between 600–2,000 whales. Native whaling captains were dumbfounded, pointing out that the biologists had surveyed only in near-shore open leads. These trenchant observers noted that in their experience, bowhead whales, unlike gray whales, traveled on a front at least 10 miles wide. Far out on the pack ice (familiar territory to Inupiat hunters), bowhead whales used their huge mass and rounded heads to create breathing holes in the meter-deep ice far from the open leads. These observations came from individuals camped out on the ice who observed and heard this phenomenon. In addition, traditional observations noted that there were two whale populations, one that traveled west to the Chukchi sea, and one that traveled east in the Beaufort. Traditional knowledge indicated that there might be over 8,000 whales in total from both populations.

This was not a trivial debate; using western biologists' figures, regulatory commissions were prepared to shut down traditional whaling, which formed an activity intrinsic to Inupiat culture. Not only was the whale meat crucial to an economy distant from markets, but the meat itself was viewed as more healthful than western foods. In addition, sharing of the meat was a crucial factor in social relations in the community (e.g., between hunters and elders). It also provided the foundation for task groups and legitimacy for social and political leadership, and was the lynchpin for ceremonial activities. Subsequently, the biologists, after they set up their sonar and acoustical microphones away from the shore fast open lead, confirmed the TEK estimates.

TEK as an ethical basis for appropriate behavior to plants and animals

In her essay, "Original Ecologist? The Relationship between Yup'ik Eskimos and Animals" (Fienup-Riordan 1990), Ann Fienup-Riordan offers a concise and powerful distillation of Central Yup'ik views on the ethical relationship between man and animals. Of course, a limitation of such a concise summary is that it provides an idealized view of such a relationship, especially when one considers the dynamic nature of these beliefs and views. In one household that I talked with in the Yukon/Kuskokwim region of Alaska the values discussed by Fienup-Riordan were held to (in the main) by the senior

members of the household, respected but not necessarily practiced or agreed to by some middle aged and younger adults and hardly reflected upon by the majority of teenage and younger members. It is important to keep this caveat in mind when the discussion in this section talks of the "Yup'ik" cultural view. According to Fienup-Riordan, the essence of Yup'ik beliefs about animals is that they are "persons" in their own right. Both humans and animals possess souls that are not affected when either sheds its corporeal body. Animals, when faced with respectful and appropriate behavior by humans, will give their flesh. Thus, humans and animal persons engage in a balanced reciprocity with one another.

This belief in a profound reciprocal relationship between human and animal persons has important implications for western game management. Many Yup'ik believe that the more animals that are killed, i.e., that have offered themselves to humans, the greater the number that will be available. When animal persons offer themselves in great numbers, it is a clear indication that humans are fulfilling their side of the bargain by showing respect. Therefore, in the Yup'ik belief system, there is no relationship between a decline in an animal population and overkill. This contrasts dramatically with western concepts of game management. In fact, many Yup'ik hunters are often conflicted in their decisions when they come across any animal, including those species whose populations have declined in the view of western biologists. Federal management practice encourages the recovery of such animal populations by imposing seasons and bag limits, i.e., only a specific class of animal (e.g., young males) may be harvested in limited quantities during a specific short season (e.g., September to November).

A Yup'ik hunter who is out looking for caribou but comes across an older male moose out of season is required by Yup'ik belief to harvest that animal. Failure to do so—failure to avail oneself of the gift presented—is a profound mark of disrespect, which will be noted by the animal person and then communicated to other animal persons (moose), eventually leading to the unavailability of that species in the future. Thus, to harvest the moose under western precepts is to put pressure on the moose population and ensure its continual decline. Failure to harvest the moose under Yup'ik precepts leads to the same outcome.

The key and crucial chasm between these views is the influence that humans have on animal persons. The Yup'ik view is that "only the availability, not their existence, is within the range of human influence" (Fienup-Riordan 1990, 173). However, from a traditional perspective, one overriding ethic—harvest only what you need—mitigates the impact of these other beliefs. Thus, a hunter encountering a moose is not required to harvest the animal if sufficient stores of wildlife resources already exist within the community. Respect, in the Yup'ik view, is demonstrated not only by right thought and

speech, but also by right behavior. For example, right behavior requires that as much of an animal as possible must be consumed, and last year's stores consumed, prior to the beginning of a new season. In addition, animal bones must be treated with respect.

Case study: the Western Arctic Caribou Herd (WACH)

The WACH Cooperative Management Plan (CMP). The WACH CMP was signed in March 2003. The plan, written by a working group that included state and federal land managers, subsistence hunters, sport hunters, conservationists, hunting guides, reindeer herders, and outfitters, was financially supported by the Alaska Department of Fish and Game (ADFG), and three U.S. Department of Interior agencies: the National Park Service (NPS), Bureau of Land Management, and Fish and Wildlife Service.

The reasons for the plan's development were complex, but were in part due to recent conflicts between local (subsistence) and non-local (sports) hunters who currently harvest between 15,000 and 20,000 caribou per year from a herd of about 450,000 animals. In addition, individuals seeking a wilderness experience sought opportunities to view and photograph the caribou. All stakeholders were also concerned about the long-term effects of industrial development and environmental pollution. However, the main catalyst for the plan was the historic experience of land managers trying to deal with cyclical crashes of caribou populations. Events in the 1970s indicated tremendous divergence between local communities, who harvested the caribou, and the management entities responsible for their regulation. Wishing to avoid the conflicts and communications breakdown experienced during the last crash, John Trent of ADFG and Dave Spirtes of the NPS helped find the fiscal resources for the plan, and guided its development. That they succeeded, in the absence of a pressing management crisis, is remarkable, and unique in the Alaska literature.

The purpose of the plan is to ensure the long-term conservation of the WACH, and to maintain traditional and other uses of this important species. The plan itself, endorsed by some 24 signatories, provides for joint management actions at three threshold points. At the lowest threshold point, when herd size is below 200,000 animals, a variety of recommendations go into effect, including bans on the harvest of cows or calves, maintenance of a minimum bull:cow ratio, and the restriction of harvest to local residents only. Several plan elements dealing with research, allocation, and regulation will be discussed below. The whole plan itself, including detailed maps, graphs and charts is available on the internet at <http://www.wildlife.alaska.gov/management/planning/Caribou_web.pdf>.

Historical circumstances of the WACH CMP. As in the bowhead whale case, there was also a dramatic difference of opinion between local hunters' estimations of the WACH herd size versus those of western biologists.

As a result, the hunters, acting on their own experience and observations, continued to harvest animals while ignoring the newly-established western game regulations, i.e., a dramatic drop in the bag limit. The reaction of local harvesters to what ADFG biologists believed was a precipitous decline of the WACH in the mid-1970s provides an important example of the difficulties of managing wildlife when harvesters and managers have divergent perceptions of how many animals populate the landscape. In the 1970s, caribou were counted via aerial surveys. However, these surveys were conducted without the benefit of recent enumeration techniques such as the use of radio-collared caribou to help find large aggregations, or photo census techniques to help improve the accuracy of the counts.

Agency managers and biologists not only believed that the herd was in a precipitous decline; they also believed that they understood the mechanism responsible for this decline. From data now available, it is apparent that the WACH has declined to its present size because of excessive use of caribou by humans, in combination with the significant impact of natural mortality including predation, especially by wolves (ADFG 1977). Working from this density-dependent model of the landscape, biologists responded to what they believed to be a crashing population by severely restricting harvest. Managers attempted to set a regional harvest quota on the basis of what little harvest data they could obtain from local residents (some of whom they paid $50/month to act as village reporters), or assessments from pilots and area biologists. As a result of what biologists describe as an "educated guess," human harvest was determined to be approximately 25,000 caribou per year between the years 1952–73 (Davis et al. 1978). Harvest from the WACH, a herd that had had no seasons or bag limits placed on it during the previous 17 years, was abruptly limited by the Board of Game to a total of 3,000 bull caribou for the 1976–77 season (Davis et al. 1978).

Soon after these restrictions were in place, relations between harvesters and the ADFG reached a crisis point. Local people did not believe the biologists' assertion that caribou had sharply declined, because many Native residents saw large numbers of caribou populating the landscape and even pass through their village. In response, ADFG biologists explained, "the major portion of the caribou that were located during our surveys this fall had moved along the coast from Pt. Lay all the way to south of Selawick or to the Kiana hills. Consequently, most of the coastal villages and those on the lower Kobuk River have had as many or more caribou available than ever in the past decade. This has created a credibility problem when the Department [ADFG] has suggested a reduced population" (Davis et al. 1978). To this day, most local residents do not believe that a significant caribou decline occurred during this period. When, during a recent survey, residents were asked if the caribou population had declined since 1970, 78% of villagers believed the

TABLE 4: Characteristics of western resource management science and traditional ecological knowledge (TEK) systems.

Characteristic	Resource Management Science	TEK
Mode of data collection	Based on experimentation and systematic direct and indirect observations. Knowledge base and management framework seen to be ahistoric and value-free.	Based on less systematic, ground-based observations. Ecological knowledge linked to myths/place-based narratives.
Temporal scale of knowledge	Short-term population surveys providing a synchronic perspective.	Long-term observations coupled with intergenerational knowledge, providing a diachronic perspective.
Spatial scale of knowledge	Large-scale (e.g., for moose, entire watershed; for caribou, herd range).	Smaller-scale (e.g., traditional subsistence harvesting zones; for some big game species, large portions of a watershed.
Locus of knowledge	Knowledge held by wildlife professionals. Management system hierarchically organized.	Knowledge diffuse, seen to increase with harvesting experience.
Goal of knowledge base	To establish generalizable principles explaining and predicting the status and behavior of wildlife.	To understand the dynamics and behavior of wildlife in the local area.
Assumptions about system dynamics	Populations can be maintained at or around a stable equilibrium point. Populations can be controlled by harvest, predation, and habitat enhancement. Population models emphasize density-dependent variables.	Many species seen to have population cycles. Populations can be affected by harvest and predation, though animal population dynamics remain largely autonomous.
Goal of management and harvesting activities	To manipulate or control species to achieve sustainable yield.	To respond and adapt to system surprise (uncertainty).
Ecological systems structured by:	Biophysical forces.	Biophysical forces and unseen supernatural forces.
Preferred conservation strategies	Regulate uses, control means, methods, seasons, and bag limits; open access to all user groups.	Control (limit) access to traditional use territories.
Shared goals and perceptions		
Commitment to the conservation and continued utilization of wildlife.		
Common belief in the need to regulate harvest by means of local or non-local institutions or through co-management.		
Belief that harvest impacts the size and distribution of wildlife populations.		

population had *not* declined; in contrast, 77% of wildlife managers believed that the herd had declined (Kruse 1995).

Despite new regulations and the threat of arrest, the local harvest of caribou during this crisis period probably exceeded the quota established by the Alaska Board of Game. ADFG biologists acknowledged the ineffectiveness of the severely restricted season and bag limits, estimating that although the reported harvest for the entire herd was only 451 animals, the total harvest was closer to 850 animals (ADFG 1977, 1). Agency staff also believed that Kivalina residents had taken caribou in numbers at least equaling, and possibly exceeding, the number of permits issued; Noatak residents likely also took more than reported (ADFG 1977, 2–3). Agency biologists stated, "Although a liberal extrapolation of the total [1977–78] harvest would be 1,932, we believe that the actual harvest may have been considerably larger because of apparently widespread noncompliance with regulations" (Davis et al. 1978). In addition, the vast majority of harvesters evaded compliance with "compulsory" harvest reporting provisions. In 1977, ADFG reported that for the entire range of the herd, only 19% of the hunters had returned permits as required by law (ADFG 1977). This is the landscape of resistance, as local perceptions of the landscape resist western interpretations through noncompliance.

It is not completely clear as to what degree the 1970s caribou crash reflected a precipitous decline of the magnitude asserted by ADFG, or whether it resulted from incomplete surveys that omitted a significant portion of the herd. For example, in 1978, ADFG biologists found 106,000 caribou in the herd—almost twice the number of animals that agency biologists had believed were present two years before (Kruse 1995). Since it is unlikely that the herd size would double in two years, it appears that inaccurate data manipulated in an inappropriate model led to a distorted perception of what was really happening on the landscape.

Today, indigenous people in the region are no more inclined to believe biologists' perceptions of the landscape than they were 20 years ago. When in a recent survey (Kruse 1995), local residents were asked if they were more likely to believe biologists now than in the 1970s, 77% of the local Native residents said no. In contrast, over 60% of the resource managers believe that their credibility has increased during this period. In the report, "The Western Arctic Caribou Herd (WACH): Barriers and Bridges to Cooperative Management," J. Spaeder et al. (2003) found that most respondents did not appear to view human harvest as a key factor controlling the overall size and distribution of a wildlife species. This was evidenced in the widely-reported belief that if local people harvest only to meet their needs, without waste, animal populations will be maintained. In Table 4, Spaeder et al. (2003, 66) summarize differences between western and indigenous knowledge as it

relates to "management" practices.

Respondents in Northwest Alaska, much like their Yup'ik speaking congeners in the southwest, reiterated their belief in the autonomy of animals. Spaeder notes:

> …animals are understood to increase and decrease largely according to their own patterns or cycles. Humans can neither predict nor closely control animal populations. To attempt to do so is inappropriate as it assumes possession of a power that humans don't possess. For example, when responding to this question, one older active hunter from Kiana stated that many animals go in cycles, but…"follow their own laws." Related to this some respondents stated that wildlife managers cannot control animals, they can only try to control people… The perceptions of Native residents regarding the cyclical dynamics of certain species and the relative lack of impact from human harvest are shaped by direct observation and accumulated local knowledge. For example, over the past seventy years, Native people have observed a number of species in the region increase exponentially while others have greatly declined, both trends being independent of hunting pressure (Spaeder et al. 2003, 67).

Development of the WACH Cooperative Management Plan

The discussion of TEK and local perceptions indicates that the art of achieving a conservation objective is not to insist on the priority of any view *in toto*. This paper has identified a number of mechanisms and processes that allow selective overlap or acceptance of multiple viewpoints. Chief among these has been the introduction of cooperative management techniques. Three aspects of resource management—research, allocation, and regulation—were singled out by the WACH co-management working group as initiatives for the development of the draft co-management document.

Research. There has been very little agreement between land managers and local communities as to the actual size of the WACH at any one point in time. To overcome the impasse, a number of cooperative research arrangements have been put into place. Two efforts stand out. First, photographic surveys of caribou are now carried out with hunters on board the planes. Hunters regularly complain that transects flown by observer planes often miss pockets of caribou. Local hunters who have carefully monitored the migration of the caribou in their area now fly with the observers to point out these pockets. Both sides benefit from this process; the biologists attain more

valid estimates of herd size, and local hunters are more likely to believe these estimates, because their input is now an integral part of the process.

In addition, under a variety of grants, biologists are now recruiting hunters to collect key information about the health of the herd—in part, by collecting a series of measurements and observations on the individual caribou they kill. These measurements include proportion of body fat, condition of bone marrow, presence of parasites, and gross body weight. Local hunters using aspects of traditional knowledge maintain a dialogue with the biologists (who input these measurements into a variety of models) as they jointly assess the health of the herd. Efforts such as these lead to a convergence of estimates on both herd size and the health of the herd, although both parties may still maintain substantial divergence as to why and how these outcomes have occurred.

Allocation. The WACH draft co-management plan sets up an equitable allocation process among communities that harvest from the herd. The allocation process was based upon the Kilbuck agreement, an earlier caribou co-management plan from southeast Alaska. Because the numbers of caribou in the WACH are at historic highs, the need to initiate this allocation process has not yet been enacted. When the eventual crash does occur, the process will probably unfold along lines similar to the Kilbuck agreement.

The Kilbuck herd is a non-migratory herd of barren-ground caribou (numbering about 7,000) whose home range lies mainly within the Yukon Delta National Wildlife Refuge in eastern Alaska. In 1990, the Kilbuck Caribou Herd Co-Management Regime was jointly established. The participants included 18 Yup'ik Eskimo villages, the U.S. Fish and Wildlife Service, and the Alaska Department of Fish and Game (Spaeder 1995). The Kilbuck Caribou Working Group, using a density-dependent model of herd dynamics, agreed to a permit-based harvest, bulls only, limited to 5% of the total herd. The working group next addressed the potentially difficult issue of how to divide the initial annual harvest quota of 125 animals among 18 villages. These 18 villages differed in their populations (70–550 people), proximity to the herd, and in the customary use of this resource for their communities.

After the allocation limit was established, the Native representatives in the working group were assigned to craft a process for distributing the permits. Instead of engaging in equity arguments around need (i.e., our community is larger, and thus needs a higher proportion of the permits) or precedence (i.e., our community has harvested these animals for hundreds of years, while you have never hunted them) it was decided to divide the permits equally among the 18 communities.

The Native membership of the working group opted for this egalitarian solution because it reflected the Yup'ik view of the landscape. Interviews with Native respondents suggest that this decision can be seen as an expression of

the Yup'ik value of sharing. Respondents stated that they felt it was important to share things over which one cannot extend ownership, such as big game. No one "owns" the caribou, respondents asserted, just as one cannot own the fish in the ocean. This decision also serves as an example of one way that Native groups attempt, where possible, to embed their own values within a regime whose character and structure is decidedly non-Native (Spaeder 1995).

Regulation. Section 805 of ANILCA mandates the implementation of Regional Advisory Councils (RACs) composed of local subsistence hunters who develop proposals that are forwarded to the Federal Subsistence Board. These proposals suggest who should be eligible to hunt, when the hunt should occur (seasons), and what is a reasonable amount to meet community and household needs (bag limits). Proposals from RACs carry considerable weight with the Federal Subsistence Board. In fact, the board is under substantial constraints if it should choose to reject these proposals. Grounds for rejection include potential harm to the resource. Thus, Section 805 provides for the incorporation of local experience and perspective of the landscape into western management practices. The WACH planning committee intends to utilize the RAC process to submit proposals for reasonable and equitable bag limits to the Federal Subsistence Board.

Decision analysis

The draft cooperative management plan for the Western Arctic Caribou Herd is a particular outcome to a vexing resource management issue, in this case how to manage the WACH when (not if) the caribou population crashes. The experience of resource managers during the crash of the 1970s was that local communities ignored or actively resisted a variety of management initiatives, including a regulation that required a nearly 90% reduction in human harvests. The management plan developed during the last several years encourages community buy-in by having active hunters become part of the research and decision process. The development of this co-management process is reflective of a larger endeavor, referred to variously as "decision analysis," "risk perception," and "value-based decisionmaking." These techniques are important because protected areas are only a stop gap measure; whether it's indigenous peoples in Alaska, tribal peoples in East Africa, or ranchers, miners, developers, and the recreation industry in Greater Yellowstone, the long-term viability of national parks and the conservation of biodiversity requires the active support of a variety of regional constituencies beyond park boundaries.

Decision analysis provides some formal techniques for integrating constituencies, maybe into a greater vision. The outcomes of these processes may be painful, and parks as they are currently constructed may look quite different after such negotiations are completed. Achieving biodiversity con-

servation may require compromises on deeply-held park values. What are the lessons from decision analysis? First, one of the keys to successful interaction with parties that have vested interests is involving them early and often in the decisionmaking process. Outside entities and constituencies are far more likely to respect decisions that involve rather than exclude them, and interest groups are much more likely to accept decisions when they have played some role in the decisionmaking process. Decisions made without "stakeholder" participation can not be legitimized no matter how much scientific data is provided after the fact. Second, people are unlikely to accept risks without a perception of some accrued benefit. The NPS should take no significant action without some informal bilateral consultations with affected stakeholders. This means talking with both supporters and detractors, especially the latter.

It is crucial to develop alternatives to current models of public input. Agency staffs often turn to public hearings, in part, because this forum is institutionalized. However, if agencies rely on public hearings and formal meetings for community input, citizens' concerns will usually be heard too late in the agency's decisionmaking process to be meaningful. In general:

- Hold routine, informal meetings with representatives of community and other interest groups.
- Accept and involve the public as a legitimate partner.
- Involve all parties that have an interest or stake in the issue.

There are several drawbacks to the decision analysis, or value-based decisionmaking process. First, it is expensive and labor intensive. In the case of the Kilbuck caribou cooperative management process, transportation and labor costs ran into the hundreds of thousands of dollars. Of course, if these issues are not solved cooperatively, legal challenges, court costs, and other "normal" public processes such as scoping meetings will probably cost substantially more.

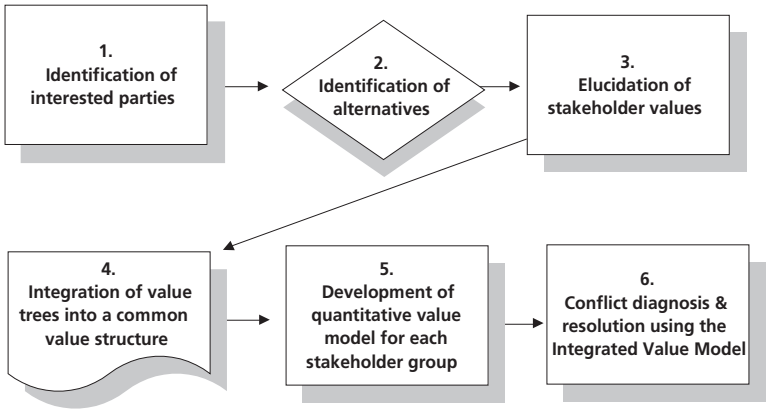
If a significant number of stakeholders are associated with a particular issue, "transaction costs" can be prohibitive. The combination and permutations of interactions between 10 stakeholders is exponentially higher than those between four. To some extent, these costs are contained by including only one representative from a class of stakeholders. In nearly every instance, there is a tension between limiting stakeholder representation and obtaining a significant buy-in to the decision. For example, should one select only one representative from a class of stakeholders, e.g., environmental groups, given the variance existing within this class? That is, would the Sierra Club accept the Audubon Society to represent its deeply-held values? This is not an academic issue; there is the risk that a hard won consensus could be challenged by a lawsuit from a specific stakeholder who, while not participating, was nonetheless "represented" by the process.

The greater risk comes from stakeholders who are participants and initially agree to be bound by the outcome of the process, but who, after the fact, renege on the agreement. This reneging may take the form of a lawsuit or an activation of their constituents to lobby against the outcome in the social and political arena. This latter reversal is particularly destructive, as it has the ability to destroy the trust generated by all participants in the process. Trust is of paramount import, because the most significant long-term outcome of the decision analysis process is often not the agreement on a specific issue, but the level of trust invested by the participants in their relationships with the other stakeholders.

No agency would want to invoke the decision analysis process for every issue on its plate. However, positive residual effects can come from working through the process at least once. Some term this residual "social capital," a kind of trust account upon which you can draw when another issue develops that affects the same stakeholders. Rather than beginning from an adversarial position, all parties expect that the other stakeholders will be reasonable, and that some compromise, perhaps informal, will provide resolution. In the case of the WACH cooperative management plan, the institutionalized structure of the working group provided a forum for ongoing communication across a whole range of issues. Chart 9 provides a graphic overview of the "value-based decisionmaking," "risk perception," or "decision analysis" process.

Conclusion: linking indigenous peoples to conservation areas in Alaska, and deeper problems

Chart 9. Value-based decisionmaking.



People hold a surprising number of values in common; they just weigh their importance differently.

The most salient reason for optimism in Alaska's effort to conserve biological diversity is the integration of indigenous peoples within the landscape of its conservation units. In the final analysis, park managers' struggle to achieve their objectives is not simply an issue of ecology, but is intrinsically a social, economic, and political endeavor. Alaska's combination of political and historical circumstances has provided a crucible where management options, decision processes, and negotiations with outside constituencies (including the profoundly disaffected) may be and have been tested.

Finally, the phrase "intrinsically related" describing the NPS and indigenous groups may seem to some to be hyperbole. Many parks in the contiguous U.S. can, and have, ignored historically-affiliated indigenous groups, despite the fact that the NPS is charged with interpreting these historical and contemporary connections. Ultimately, the justification linking conservation and indigenous groups "intrinsically" is connected to an understanding that social justice is an intrinsic element of environmental justice.

This paper advocates increased cooperation between parks and indigenous entities. In addition, it makes the argument that protected area/indigenous relationships are but a subset of a larger domain—the relationship between protected areas and the matrix of regional and international economic, social, and cultural forces and entities that impact them. Two additional concerns need to be mentioned. The world's demand for energy is expected to rise by 60% by 2020, as China and India industrialize. Oil is expected to remain the world's dominant source of energy, accounting for about 40% of all energy consumption. Total carbon dioxide emissions are projected to increase by 62% between 1999 and 2020. Protected areas with energy resources on or near their land will be put under increasing pressure for direct development. Indirect outcomes such as air pollution, contaminated aquifers, acid rain, and climate change will all be exacerbated.

Beyond this are some very pessimistic and radical analysis concerning the basic contradictions of the world's underlying economic engine (e.g., Meszaros 2001). The essential argument is that current levels of exploitation of the world's natural resources are simply not sustainable. Moreover, the vicious cycle (or "contradiction") of economic "development" requires the development of new markets and higher levels of production, while decreasing the world's finite natural resource capital at increasing rates. Under these conditions, conserving biodiversity may be a secondary outcome of the world's protected areas. More important might be a burgeoning social capital whose roots lie at the struggles and experiences of protected areas to deal equitably with affiliated indigenous entities and the development of tools for cooperatively managing natural resources at regional and international levels, allowing for a sustainable future for us all. In the end, natural resources govern themselves, but their destiny is linked to the quality and

nature of relationships between people. Protected areas will not be the last stand for biodiversity, but absent their engagement in a just and sustainable human vision, they may be our last stand.

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Issues in carnivore and ungulate conservation in the Yellowstone and Selous ecosystems

Scott Creel and Douglas W. Smith

Abstract

Yellowstone National Park is frequently compared to the large protected areas of East Africa, mainly because Yellowstone is the only protected area in the continental U.S. that holds the full complement of large carnivores and their ungulate prey, as most East African protected areas do. In addition, Yellowstone is one of few parks in highly developed countries that rivals East African protected areas in size. In an effort to identify underlying similarities and critical differences, we compare the conservation concerns and management issues facing African wild dogs in the Selous Game Reserve (Tanzania) and wolves in the Greater Yellowstone Ecosystem. While some similarities emerge, the dominant conclusion is that anthropogenic factors predominate for wolves in the Yellowstone area, while ecological factors predominate for wild dogs in Selous. We discuss the implications of this distinction for conservation and management policies.

Paper summary

Yellowstone National Park is often compared to other natural areas in Africa, especially the Serengeti. Reasons for this comparison are not entirely clear, but some are that Yellowstone is one of the few parks to rival the typically much larger African parks in size, and has its full complement of large carnivores and ungulate prey. Some would argue that African parks still have twice as many carnivores and ungulates; nonetheless, the comparison has persisted. Perhaps more appropriately, the comparison between the two largest canids, African wild dogs and wolves, offers more parallels and lessons for carnivore management. Both typically prey on one or two ungulate species, have large home ranges, and interact with a large number of other carnivores. Therefore, we felt it reasonable to focus our comparison more finely, evaluating commonalities and differences between these two canids in order to shed light on two of the more enigmatic species with which humans interact.

The main objective of our comparison was to evaluate how humans affect wild dogs and wolves. For both species, interactions with humans essentially define their ecological story. This has caused widespread declines in the abundance and distribution of both species on their respective continents.

The Selous Game Reserve, at 43,600 km^2, is several orders of magnitude larger than Yellowstone National Park (8,991 km^2). Despite this difference in protected area size, the Greater Yellowstone Ecosystem, which is mostly public land, does rival Selous in size, in that this area covers 57,000 km^2. Both parks, however, have a long history of preservation, as Yellowstone

was established in 1872 and Selous in 1905. The combined size and preservation history have combined to give each area a degree of pristineness that is hard to find elsewhere in the world. Unlike Selous, wolves were present in Yellowstone, eradicated, then reintroduced. Wild dogs have been continuously present in Selous.

The primary prey for wolves in Yellowstone is elk, although all of the ungulates present have been taken (seven others). In Africa, wild dogs prey primarily on two species, impala and wildebeest, with impala the most selected prey item. Both canids have similar hunting styles; described as coursing predators, they pursue prey enough that the predator can evaluate condition, selecting for the kill the easiest and most vulnerable animal. In both areas, prey are probably not limiting to either carnivore.

Besides geographic similarities, the biology of the two species is quite similar. Both travel widely and often leave the protective confines of the reserves. Each species is capable of dispersing hundreds of miles over a varied landscape. What happens to them when they do this? We feel the answer to this question lies in how the humans living in the area respond to the presence of wild dogs and wolves.

For one, human population density in Selous is much higher than it is for the Yellowstone ecosystem. Surprisingly, wild dogs are killed less often by humans than are wolves in Yellowstone. Approximately half of all wolves that die in the Yellowstone area die as the result of human-caused mortality, as compared to less than half in Selous. Survival rates are slightly higher for wild dogs in Selous (often >90%) than for wolves in Greater Yellowstone (~80%). When Yellowstone National Park is excluded from analysis, wolf survival rates for the Yellowstone area are significantly less (<50%).

This leads, inescapably, to the conclusion that humans in the Yellowstone area are much less tolerant of wolves than humans in the Selous are of wild dogs, despite the generally poorer economic conditions of the people living in Africa. We calculated a per capita effect of humans on each carnivore using data on the likelihood of human-caused mortality and human population density, and found the impact of humans on wolves in Yellowstone to be 700 times greater than it is for humans on wild dogs.

Reasons for this great disparity in tolerance are unknown, and counterintuitive, given the economic circumstances of the respective human populations. Possibly the period of absence that wolves experienced in the Yellowstone area effectively eliminated the cultural knowledge (or tolerance) needed to coexist with large carnivores. Most other studies have shown the future of carnivores anywhere to be largely determined by humans and our results support this finding. The debate in Yellowstone over habitat availability may be less important than education and public outreach to quell the reluctance to live with wolves.

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Cross-border insecurity: national parks and human security in East Africa

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Abstract

Many of the national parks in East Africa are contiguous; that is, one nation's park often borders another nation's park. Given many African states' inability to effectively control their formal borders, the parks' contiguous character hints at the central (but largely unrecognized) role they play in the ecological, economic, and political development of East Africa.

For the past several decades, the national parks of East Africa have helped contribute to the tremendous political strife that has beset the region—most recently reflected in the 1994 Rwandan genocide and the regional war in Congo that has claimed over two million lives since 1998. These national parks have often become unpoliced spaces where rebels and guerrillas have taken refuge or served as conduits for infiltration and invasion. Societies in the region, particularly around the national parks, also endure high levels of economic and environmental insecurity.

As centrally-controlled landscapes where local human use is often forbidden, national parks produce enormous and conflicting economic consequences. While generating valuable hard currency from Western tourists, the parks have also displaced thousands of rural people, most of whom live on the margins of the protected areas from which they were evicted. As a result, a regional "insecurity complex" has emerged in East Africa, composed of a set of states whose security concerns are multiple, varied, and so interlinked that they cannot reasonably be analyzed apart from one another. This paper explores the complex ways in which national parks operate as sources and obstacles for human security and development in Africa.

Introduction

One of the more striking characteristics of a map of the African Great Lakes region (Uganda, Rwanda, Burundi, eastern Congo, Kenya, and northern Tanzania), besides the arbitrariness of the postcolonial states that compose it, is the large number and significant locations of the national parks, forests, and game reserves. Largely colonial creations, these national parks, forests, and game reserves vary in size and shape, and are spread rather unevenly across the region. The map of the region shows how these parks are often contiguous, with one nation's park bordering another nation's park. Given many African states' inability to effectively control their formal borders, the contiguousness of many of the region's parks, forests, and game reserves hints at the important (but often unrecognized) impact they have on human

security and development of the African Great Lakes region. This essay examines the ways in which national parks operate as sources and obstacles for human security and for economic, ecological, and political development in Africa, and suggests that the multiple and often conflictual ways in which state officials, local residents, and armed insurgents utilize specific national parks in the African Great Lakes region have helped create an "insecurity complex" in the region. For the past several decades, the countries in the region have experienced tremendous political strife—most recently reflected in the 1994 Rwandan genocide and the regional war in Congo that has claimed over two million lives since 1998. Societies in the region also continue to endure high levels of economic and environmental insecurity. As a result, a regional "insecurity complex" has emerged. In this context, the term "insecurity complex" is used to characterize a region composed of a set of states whose security concerns are multiple, varied, and so interlinked that they cannot reasonably be analyzed apart from one another. This essay suggests that the creation, maintenance, and utilization of the national parks as part of specific state-making processes have helped engender a regional "insecurity complex." I employ the term "processes of state-making" to highlight that states are not static, ahistoric entities, but emerge out of the interaction of social forces and become repeated patterns of human practice. The next section articulates the essay's theoretical arguments. The following section provides empirical examples of how the region's national parks are related to the development of an insecurity complex.

Human security and development within a "new regionalisms" framework

Within the study of International Relations/International Political Economy (IR/IPE), two recent branches of analysis have proven to be quite fruitful: "new regionalisms" and "human security and development." The connections between the two, however, have largely been unexamined (Grant and Söderbaum forthcoming). This essay combines these two approaches in order to better understand how the African Great Lakes region's national parks are contested political spaces and how the dynamics involved in that contestation affect regional security concerns.

At the end of the last millennium, the "new regionalisms" approach offered a new and innovative way to conceptualize and analyze processes that were occurring in the post-Cold War era. The recent work on new regionalisms distances itself from earlier approaches to regional integration (such as functionalism, neofunctionalism, institutionalism, and neoinstitutionalism) by emphasizing informal as well as formal types of regional economic integration (Marchand, Bøås, and Shaw 1999; Hettne, Inotai, and Sunkel 1999). Such an emphasis provides a potentially rewarding alternative to the numerous IR/IPE paradigms that despite their continuing currency in Western scholarly

discussions, are too limited to be of much use for discussing the trends taking place across the African continent. One of the most significant promises that the new regionalisms approach offers is the move beyond the state-centrism that seemingly strait-jackets many traditional IR/IPE theories. As Daniel Bach quite correctly points out, "Max Weber's classical definition of the state cannot apply in numerous parts of the continent...the state is no longer the sole agency which, within society, possesses the monopoly of legitimate violence" (Bach 1999, 5). Because we can no longer assume the centrality of the state in our analysis, we must look beyond simplistic, state-centric approaches. The new regionalisms paradigm opens fertile ground for just such types of analyses. Following this line of thought, Björn Hettne argues that, with regard to security, "the predominance of the nation-state and a Westphalian political rationality prevents rational solutions, whereas the regional level opens up previously untapped possibilities for solving conflicts built into the state formation" (Hettne 1999, 18).

Recent work on "human security and development" has also gained increased prominence within the IR/IPE field (see Buzan 1983, 1998). The work in this field is largely credited with expanding what is included in a discussion of "security." No longer is security strictly defined in terms of state or regime survival, but now must incorporate the multiple threats posed against human beings and their ecological, cultural, social, and economic environments. The human security approach proposes that states and regimes are not the only (or even the primary) entities being threatened; rather, people and their environments are of central importance.

One of the conceptual links between the new regionalism and human security approaches is the notion of the "complex:" a set of states whose concerns are so interlinked that their problems cannot be analyzed in isolation. While a certain degree of interdependence is often cited as a characteristic of the current state system in general, a "complex" is distinguished by the intensity of that interdependence. Barry Buzan et al. point out that "[s]ecurity interdependence is markedly more intense between the states inside such complexes than it is between states inside the complex and those outside it" (Buzan et al. 1990). Yet, as Morten Bøås (2000) has pointed out, until recently the "complex" framework has been essentially statist and has ignored whose security is being pursued. For many, the notion of the complex or, more specifically, of "insecurity complexes," seems most useful in analyzing Africa's current political and economic problems when it is simultaneously framed within a new regionalisms approach. For example, the dominant security issues facing many African societies today—migration and refugee flows, AIDS and other health epidemics, drug- and gun-running, ecological distress, and poverty—tend to be beyond the scope of traditional state-centric analyses and solutions. That is to say, the theoretical Westphalian

nation-state model does not fit the African reality (Marchand, Bøås, and Shaw 1999; Hettne 1999; Swatuk and Omari 1997; Southall 1995).

Informed by the theoretical developments discussed above, this essay explores the connections and disjunctures between national parks and regional human security and development with an examination of the process of state-making in the Great Lakes region. There are two primary reasons for focusing on state-making. First, the creation and maintenance of the parks, forests, and game reserves was the work of colonial and postcolonial states. Therefore, the existence of the national parks is intimately intertwined with the nation-state, and the realization and utilization of the national parks has been a pronounced element within the process of state-making in the region. Second, traditional IP/IPE theories and practices have assumed that the state is the primary provider for its citizens' security and development. While there is considerable disagreement over exactly what role the state should play (particularly regarding a society's economic development), it is safe to say that the state does impact human security and development, for good and ill.

By taking a "new regionalisms" approach, this essay contextualizes the state, particularly by examining the social forces that have shaped the state and its evolution. It is this essay's assumption that there have been multiple social forces shaping the process of state-making in the African Great Lakes region, and these have affected the region's human security and development. Focusing on the national parks provides a unique and profitable angle for analyzing these social forces and their impacts. For example, a study of the national parks can offer rich insights into how globalization, regionalization, ethnic stratification, economic class conflict, contestation over land, the "criminalization of the state," environmental crises, and the emergence of political economies of violence have all directly impacted the security and development of individuals living in the Great Lakes region. Focusing on the region's national parks and forests allows one to see that a regional perspective is necessary for understanding how development, security, and the process of state-making are intimately intertwined.

Thus, approaching the state as a unit of analysis means raising several questions: What social forces have contributed to the construction of the state as an entity? How have these domestic and international social factors interacted to produce the state? How is the state being currently defined? Who is defining and employing the state, and to what ends? Asking these and similar questions allows us to examine the plurality and contradictions of the state, particularly with regards to its relation to the "insecurity complex" in the African Great Lakes region. The national parks offer a useful vantage point from which to examine these processes, disjunctures, and coincidences on multiple levels.

National parks and human insecurity

The fact that many of the parks of the Great Lakes region are either contiguous or serve as a boundary between states makes them fruitful units of analysis for examining the interstices of political, environmental, and economic obstacles for security and development. In this section, I will briefly illustrate some examples of how national parks are interrelated to security and development concerns in the region.

Political insecurity. One important feature of the national parks of the Great Lakes region is that many of them are either contiguous—crossing over nation-state borders—or serve as a boundary between states. For example, Tanzania's Burigi Game Reserve delineates Rwanda's southeastern border, while Uganda's Queen Elizabeth National Park continues almost seamlessly into eastern Congo as the Parc Nacional des Virunga. In fact, Uganda, Rwanda, and Congo all converge at the intersection of the Parc Nacional des Virunga, Parc Nacional des Volcans, and Mgahinga National Park. For many decades, this situation has provided unique political problems for the process of state-making in the region. These national parks have often become unpoliced/unpoliceable spaces where rebels and guerrillas have taken refuge. Yet, more than providing safe haven for armed insurgents, the region's national parks have frequently served as conduits for infiltration and invasion. Virtually every regime has faced (or continues to face) armed insurrection. In almost every case, these armed groups have used the national parks as safe havens and transit routes. Where national parks are contiguous with a neighboring state's national parks, the neighbor is intractably drawn into the fray as the armed insurrection becomes regionalized. In this way, the national parks illustrate most clearly how the political insecurity complex is a regional problem within the Great Lakes region.

For example, the Lord's Resistance Army (LRA) in Uganda continues to use Murchison Falls National Park as a safe haven in its 17-year struggle against the central government. In June 2003, LRA rebels launched several raids from their territory in Murchison Falls National Park, and it is generally held that the entire northern section of the park (north of the Nile River) is effectively a "no-man's zone" where the LRA operates freely. The 1994 Rwandan genocide was originally sparked when Rwandan Patriotic Front (RPF) guerillas invaded from Uganda via the Parc Nacional des Volcans. As the RPF rebels gained control of Rwanda, the former Rwandan army and their Interahamwe (the militia primarily responsible for structuring the genocide) allies sought refuge in neighboring eastern Congo. From there, these forces would frequently use the national parks (most significantly the Nyungwe Forest and the Parc Nacional des Virunga) to launch further attacks on Rwanda. These attacks have become so destabilizing in recent months that the Rwandan government announced that it would be placing military posts

throughout the main road through the Nyungwe Forest, which personal observation places at roughly every 500 meters.

These attacks, however, cannot be understood narrowly as domestic issues. In fact, it was inside Uganda's Bwindi National Park (which also borders Congo's Parc Nacional des Virunga) that Rwandan Interahamwe forces infamously attacked, kidnapped, and murdered several Western tourists in March 1999. In Burundi, Interahamwe elements joined Burundian rebels to launch numerous and sustained attacks on civilians. One important zone of instability for Burundi is the Parc National de la Kibira, which lies close to the Democratic of Republic of Congo and borders southwestern Rwanda. Rebels and armed bandits have so successfully utilized this park that the main road between Rwanda and Bujumbura is virtually a no-go zone, where buses and vehicles are attacked with fatal regularity. In the northwest of Burundi is Parc National de la Rurubu, which actually forms part of the northwestern border with Tanzania; it looks like a finger, stabbing into the center of that country. Recently, Burundian rebels have successfully been using the park as a safe haven and transit route, to the extent that the Burundian government is currently charging Tanzania with complicity in the rebel attacks. While there is no evidence supporting such claims, they illustrate the fact that the park helps make the border between the two states virtually uncontrollable.

Ecological insecurity. Often created to serve as environmental protection/preservation zones, national parks are perhaps the ultimate units of analysis for examining the region's ecological interconnectedness and ecological biodiversity. Within Uganda's Bwindi National Park alone, there are at least 120 species of mammals, including mountain gorillas, chimpanzees, and eight other primate species. Within this rich ecosystem are elephants, bush pigs, giant forest hogs, at least 346 species of birds, at least 14 species of snakes, 27 species of frogs and toads, and over 200 species of butterflies. All of the "Big Five" animals (black rhinos, buffaloes, elephants, leopards, and lions) can be found in a number of the region's national parks. But the region's reputation is usually earned by the presence of endangered mountain gorillas (*Gorilla beringei*). There are thought to be just 600 mountain gorillas left in the world, and their plight was famously publicized by the work of Dian Fossey and the book and film, *Gorillas in the Mist.* Importantly, all of the remaining mountain gorillas are found in a contiguous zone made up of certain of Uganda's, Rwanda's, and Congo's national parks. As the families of mountain gorillas move from park to park across nation-state borders (sometimes fleeing poachers and/or armed insurgents), they illustrate the problems and complexities that characterize the existence of a regional ecological insecurity complex.

Simply put, the Great Lakes region is intimately interconnected ecologically. The human societies of the area live in a rich but fragile ecosystem

characterized both by its biodiversity and recent environmental degradation. The numbers of species, flora and fauna, has decreased over the past several decades, leaving a region that is perilously close to ecological disaster. In Rwanda, the high human population density has left the land largely over-cultivated, and the country's large tea plantations have wrought untold environmental damage through pesticide use and soil depletion.

Since 1925, when the Belgian colonial government established Africa's first protected area, the creation, maintenance, and control over the region's national parks have been intimately connected to the process of state-making. The inability of the state to effectively exert control over the parks has given rise to poaching and guerilla activities that have had numerous disruptive environmental impacts. Likewise, the settlements of refugees in Parc Nacional de l'Akagera are the direct result of state-making dynamics in the wake of the 1994 Rwandan genocide. Facing a return of thousands of refugees who would have put unsustainable pressure on the country's over-cultivated land, the government in Kigali decided to degazette more than two-thirds of the 2,500 square miles of Akagera. Permanent settlements have been established, and the once-protected land has now become increasingly cultivated, resulting in the dispersal of many of the park's wild animals into neighboring communities, especially in northern Tanzania. As the case of Akagera suggests, the environmental impacts of state actions have regional repercussions. Mountain gorillas, Colobus monkeys, and other wildlife ignore international borders, as does pollution. What has emerged is a region that is ecologically connected, for better and for worse.

The links between the environment and the process of state-making in the region are numerous, often manifesting themselves in the tensions between local versus governmental needs, indigenous knowledge and practices versus western environmentalism, and developmental "expertise" and local land usage versus ecotourism and government's desire for foreign capital (see Neumann 1998; Kaufman, Chapman and Chapman 1996; McClanahan and Young 1996). This becomes especially clear when one recognizes that the land demarcated as protected parkland traditionally supplied local inhabitants with valuable resources from cultivated land, wild animals, medicinal plants, and clean water. In most cases, the creation of the national park required the removal of its traditional human inhabitants. In the case of Bwindi, Mgahinga, and Lake Mburo national parks, this was often done with force and extreme violence. In all three cases, local inhabitants were denied access to the vital resources now found inside the parks. In the case of Bwindi and Mgahinga, the Ugandan Wildlife Authorities are now running a test program that allows local inhabitants into the park to access clean drinking water. However, the BaTwa people, for example, are still denied access to collect wild resources, such as honey and medicinal plants, from within the park.

Lake Mburo National Park provides an interesting example of how state-making processes affected human insecurity via the production of national parks. In 1983, the government of Milton Obote converted the area (traditionally a controlled hunting ground of the Ankole king) into a national park. To do so, the government officially and violently evicted the many local inhabitants, with several people dying. For most observers, the creation of the national park and the forced eviction of its inhabitants were a response to the fact that the region was supporting Yoweri Museveni's rebellion against the government. As Obote's government slowly collapsed, the evicted inhabitants and others moved back into the park, destroying park buildings, re-cultivating the land, and grazing their cattle. As part of a negotiated settlement, the new Museveni government re-established the park, but at 40% of its previous size. However, some residents of the neighboring community continue to poach in the park and illegally graze their cattle there. Moreover, neighboring communities are critical of the park because the wild animals protected there often attack their domesticated animals and destroy their crops.

Economic insecurity. The creation of national parks often reflects a Western opposition between humans and environment. National parks and game reserves are thus centrally-controlled landscapes where local human use is often forbidden, a dynamic consistent with the colonialist representation of Africa as a primordial "natural" space. As Anderson and Grove have observed: "Much of the emotional as distinct from the economic investment which Europe made in Africa has manifested itself in a wish to protect the natural environment as a special kind of 'Eden' for the purposes of the European psyche, rather than as a complex and changing environment in which people have actually had to live" (Anderson and Grove 1988, 4). This situation has had enormous and conflicting economic consequences. Westerners provide valuable hard currency for their "safaris" into these parks and reserves, where they are able to see African wildlife. Yet the creation of these parks and reserves has displaced thousands of rural people, most of whom live on the margins of the protected areas from which they were evicted. In many cases, their previous daily economic activities are now criminalized.

One example of this situation is the Tarangire National Park, located in the Simanjiro district of northern Tanzania. The area first became a game reserve in 1957, and the Maasai pastoralists were allowed to remain in the Tarangire Game Reserve for 13 years, their ecosystem largely unaffected. However, in 1970, the area was converted into a national park, and it was announced that people living to the west of it would be evicted (Igoe 1999, 11). The creation of these "closed" spaces is problematic because the parks and reserves are not self-contained ecosystems. The park is centered on watering sites traditionally used during dry seasons by rural pastoralists as well as the region's wildlife. In the wet season, the animals disperse, usually

beyond the park's borders. Since the creation of the park, the Maasai pastoralists have been kept out of the park, away from its much-needed permanent water sources. As Jim Igoe has noted, "the main effect of the park was (and still is) the interruption of local resource management systems" (Igoe 1999, 4). The conservation and development ideologies behind the park's creation and maintenance are based on the assumption of the inferiority of African resource management and production systems. The local community does not perceive the park to be a public resource, but a commodity controlled by an elite for the benefit of foreign tourists. Igoe elaborates, "They say that they should not have to pay for protected areas so that rich white people could come from Europe and America to look at animals. They are aware that the tourist industry has benefited a wealthy elite while bringing few or no benefits to the people who have been most directly effected by large-scale appropriations of natural resources by the Tanzanian state" (Igoe 1999, 12).

In general, tourism has become a major generator of foreign capital for countries in the region. According to the World Travel and Tourism Council, tourism and travel contributed 10% of the GDP in sub-Saharan Africa in 2000, growing at a rate of over 5% annually in real terms (Christie and Crompton 2001). As such, ecotourism has become a pronounced part of the development strategies employed by these states. The region's national parks have been the primary destination for tourists in the region, particularly for those engaging in wildlife safaris or tracking mountain gorillas.

In the case of gorilla tourism, each visitor to the parks (Bwindi NP, Mgahinga NP, and Parc Nacional des Volcans; Parc Nacional des Virunga is currently closed) pays $250 (USD) for a permit, plus park entry fees. Because the mountain gorillas move freely across nation-state borders due to the contiguousness of the parks, their transiency has direct economic impact on the states and societies in the region. The closure of the parks in western Uganda due to Allied Democratic Forces attacks has been estimated to have cost the government millions in revenue—to say nothing of the local economies. Taken together, the national parks represent a regional source of valued foreign capital. Yet because of the contiguousness of the parks and the transiency of the wildlife, the region must be regarded as an ecotourist "complex" where the costs and benefits of that economic activity cannot adequately be reduced to individual states.

Moreover, within the Great Lakes region, as within other parts of Africa, there has been a decrease in the coverage of the national territory by a government that has resulted in highly porous borders where the flow of people, weapons, goods, and resources is largely unrestricted. Smuggling goods (everything from milk and cigarettes to handguns and precious minerals) across nation-state borders in the region is rampant and represents a major aspect of the informal economy (Nugent and Asiwaju 1996). The national

parks frequently exist as conduits between states and local economies, particularly for smuggling. Personal observation suggests a rich and profitable smuggling network in the greater Virunga ecosystem that connects the informal economies of Uganda, Rwanda, and Congo. Because state-making processes affect human economic security and development in complex ways, national parks operate simultaneously as sources and obstacles for economic development in the region. By taking a regional approach to these issues, the project will examine how the Great Lakes communities and economies are intimately interrelated and, therefore, how development schemes need to reflect the realities of regionalization.

Conclusion

By focusing on the national parks of the African Great Lakes region, this essay has sought to illustrate the interconnectedness between human security, state security, and development. The political, economic, and ecological forces that contribute to human security/insecurity cannot adequately be separated. Moreover, these issues of security and development cannot be reduced to individual nation states. The essay's employment of the "insecurity complex" concept is used to illustrate that the region is composed of a set of states whose security concerns are multiple, varied, and so interlinked that they cannot reasonably be analyzed apart from one another. Moreover, this essay has sought to illustrate that specific state-making processes from a range of actors involved in the creation, maintenance, and utilization of the national parks have helped engender a regional insecurity complex. As such, this essay suggests that any successful attempt to strengthen human security and development in the region must take a multi-layered and regional approach. The goal, one would hope, is to begin to convert the regional insecurity complex into a regional "security community." Successfully doing so will require recognition of the interrelatedness of human security and development and the state-making processes on the regional level. Thus, successful schemes should include state-making processes while looking beyond the narrow scope of individual nation-states to the interaction of social forces and repeated patterns of human practice.

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Approaching the table: transforming conservation–community conflicts into opportunities

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Abstract

With a goal of protecting and conserving natural resources, the approaches used by conservationists working with local communities can nonetheless create or exacerbate conflict. Conservation practitioners may expect communities living near key species or spaces of conservation interest to participate in programs that garner little benefit for their own identified livelihood and development needs. Our purpose, during this one-year study, was to gain a greater understanding of existing conservation–community conflicts, how they are addressed by conservation projects, and how the principles and approaches of a discipline such as community reconciliation could contribute to forming a more productive relationship between conservation practitioners and locally-affected communities. Semi-structured interviews and focal observations were conducted with participants in six conservation projects in sub-Saharan Africa. Analysis of the data elicited lessons learned and key factors affecting conservation activities, as well as relationships with government institutions and the country's citizens. Four themes—enabling environment, the role of NGOs, food security, and identity—exhibited important influence in the success of conservation initiatives and in shaping the outlook of affected communities. By coupling these results with concepts from community reconciliation, this study developed a conservation conflict transformation framework (CCTF), which focuses on transforming the conflict relationship between conservation practitioners and communities into opportunity. This framework for conservation was then tested in an alternate context through semi-structured community interviews with the Nez Perce Tribe's Gray Wolf Recovery Program in Idaho, USA. By presenting three basic areas of inquiry and action, conservationists are given methods and models through which to comprehend and analyze their project's situation, to create a new vision for the future, and to develop a strategy for creating new principles and approaches for a more effective relationship with communities.

Methodology

We employed an evolving, comparative case study research design to analyze the conflicts, as well as the philosophy, approach, and tools used to address conflicts and the social, political, and economic factors affecting a community's reception of conservation activities. Through project selection criteria and preliminary surveys, we chose six projects in Africa to generate lessons learned, and one project in North America to test the resulting model. Our field activities primarily consisted of participant observation and semi-

structured interviews with project managers and staff, government officials, and community stakeholder groups.

African case studies

Project	Mount Cameroon Project (MCP)
Organizations	Mount Cameroon Project (MCP)
Project location	Mokoko Wildlife Management Authority (MWMA), Cameroon
Model	Community natural resource management
Start date	1989

Summary. MCP was a feasibility test to implement Forest and Wildlife Law 1994 for community natural resource management. The MWMA is a community-generated association resulting from MCP implementation, and addresses the influx of immigrant resource exploiters and large-scale commercial hunters. MCP is a pilot project of the Ministry of Environment and Forests (MINEF), working to improve biodiversity conservation and local livelihoods across the Mount Cameroon region. MINEF introduced new legislation in 1994, and the project was established to test new approaches for making the laws work. The goal of MCP is to maintain the biodiversity of the Mount Cameroon area by developing a strategy with local communities, governments, and industry, for the sustainable management and conservation of natural resources. Testing and implementing participatory approaches is central to the partnership.

Project	The BaMbuti of Eastern Democratic of Congo (DRC)
Organizations	Dian Fossey Gorilla Fund Europe (DFGFE) and Entreprise Communautaire Pour Une Action Allocentrique (EcoAction—Congolese non-governmental organization)
Project location	Kashwa II, DRC
Model	Livelihoods, displaced and resettled traditional forest peoples, protected areas
Start date	1996

Summary. Implemented by a local Congolese non-governmental organization, EcoAction, with support from the Dian Fossey Gorilla Fund Europe, this project focuses on culturally-appropriate settlement of BaMbuti pygmies who were evicted from their traditional land that became the Virungas National Park without any compensation or resettlement. Later, in the 1980s, they were further banned from entering the park for hunting or obtaining forest products. There are an estimated 2,500 "pygmies" living around the Virungas, home to the last 650 mountain gorillas. Large numbers of BaMbuti continue to live traditionally through illegal activities such as hunting and gathering and selling of firewood from within the park. Their skills as hunters

and rich knowledge of the forest resulted in many being recruited by illegal poachers. DFGFE supports 20 different local conservation, research, education and development projects around the Virunga Mountains. In addition, this project is designed to deal with the problems of adaptation and integration of "pygmies" in the eastern Congo.

Project	Zoning of the Okapi Faunal Reserve
Organizations	Wildlife Conservation Society (WCS), Institut Congolais pour la Conservacion de la Nature (ICCN), Centre de Formation et de Recherche en Conservation Forestière (CEFRECOF)
Project location	Ituri Forest, Democratic Republic of Congo (DRC)
Model	Zonation
Start date	Okapi Faunal Reserve, 1992; Zoning Program 2000

Summary. The Okapi Faunal Reserve, created in 1992 in recognition of its biological significance, spans 1,362,625 hectares and covers approximately 18% of the Ituri Forest. Located in northeastern DRC, the Ituri forest is of particular interest in that it contains the greatest diversity of mammalian fauna of DRC forests, most notably the Okapi (*Okapia johnstoni*), a rare and endemic forest giraffe. Originally focused on zoning the Okapi Faunal Reserve, this project adapted to address community development needs and policy formation in the face of diminished government infrastructure in this remote region of Democratic Republic of Congo. The continuing civil war in this region has affected conservation feasibility with large numbers of soldiers, commercial hunting, and mining.

Project	Tsavo Conservancy
Organizations	African Wildlife Foundation (AWF)–Conservation Service Centers; U.S. Agency for International Development (USAID)
Project location	Taita Taveta District, Kenya
Model	"Business" model for conservation
Start date	November 1999

Summary. The Tsavo Conservancies were created in response to existing conflicts in the area. Funding received through USAID focuses on the business approach to conservation. Several principles guide this approach, all emphasizing the importance of community involvement, fairness, valuing partnership, and providing transparency. As a model of conservation community businesses, the African Wildlife Foundation sought to provide environmental tourism-focused business opportunities for communities living in Kenya's Tsavo National Park system.

Project	International Gorilla Conservation Program (IGCP) Organizations African Wildlife Foundation (AWF), Fauna and Flora International (FFI), World Wildlife Fund (WWF)
Project location	Bwindi Impenetrable Forest National Park, Uganda
Model	Partnerships with existing organizations; ecotourism
Start date	1991

Summary. As an international consortium addressing an internationally-important conservation crisis, the IGCP works as a liaison between local communities and the national park. The goal of this collaboration is to establish effective conservation and management of the afromontane forest shared by Uganda, Rwanda, and Democratic Republic of Congo, and to improve protection of mountain gorillas as a flagship species for this habitat and source of tourist-based revenue for this region.

Project	Administrative Management Design (ADMADE) Organizations, Wildlife Conservation Society (WCS), Zambian Wildlife Authority (ZAWA), African College for Community-Based Natural Resource Management (CBNRM)
Project location	South Luangwa, Zambia
Model	Community-based natural resource management

Summary. ADMADE is an integrated wildlife conservation and community development program operating in 30 of Zambia's 34 game management areas. ADMADE tests two main hypotheses: that community participation in, and its derivation of tangible benefits from wildlife management is a more effective way of conserving the wildlife and the ecological state of Zambia, and that sustainable wildlife utilization is a viable and profitable land use option for local communities to pursue. Through facilitation of community-based natural resource management legislation implementation in Zambia, ADMADE provides training and skill building opportunities at the College for CBNRM at Nyamaluma. Important issues in the area are tourism, game management areas, food security, and government–community cooperation.

Conflict categories

Human/wildlife conflicts. We extracted and compared the types of conservation and community conflict evident in the reviewed projects. The most conflictual relationship was that between communities and neighboring protected areas. In these instances, disputes focused on issues such as crop raiding, human safety, and access to water. A high profile example was human–elephant conflict, which has been traditionally addressed through technical prevention and mitigation tools such as solar fencing, elephant

grids, string fencing, and noisemakers. The Tsavo Conservancy case study in Kenya showed that while such solutions may have reduced the incidence of crop raiding, they also seemed to increase tensions, because while the Kenya Wildlife Service is attentive to elephant migration, there is no comparable body that focuses on human needs around the most visited national park system (Tsavo East and West national parks) in the country. Recurring disputes illustrated the need to move away from solely technical solutions and toward a relationship-based framework for the resolution of conservation and community conflicts.

Human–human conflicts. Another conflict category involved the formation, administration, and management of national parks themselves, including issues of access and revenue sharing. The poorest communities often shared a boundary with national parks and received the highest incidence of livelihood loss due to crop raiding and constrained resource exploitation activities with no compensation or tourism revenues. Human–human conflicts were also evident between different stakeholders. Government authorities did not always respect community institutions. Within communities, there were conflicts between short- and long-term residents, from political instability, and from industrial interests. There were also significant conflicts resulting from NGO activities such as voluntary committees, and from general misconceptions of NGO intentions, lack of transparency, and misunderstandings of tourism revenues and their distribution.

Four factors for success

We extracted key theme areas where lessons learned, conflicts, and approaches to resolving conflicts were nested. These are framed as four factors for success because each of these core categories can be re-framed to generate project objectives for more productive relationships between conservation practitioners and communities (Figure 1).

Enabling environment. The first factor for success is to assess how a conservation project enables the social, political, and economic environment surrounding its activities and local communities. This could include lobbying for new policies and legislations that provide the opportunity or ability for community empowerment, such as training opportunities for community leaders through the ADMADE project in Zambia.

Role of non-governmental organizations (NGOs). The role that NGOs play is directly determined by the capacity of other institutions, such as governments and communities. Communities in Africa in general are not organized, empowered, or equipped to address their own needs or speak with a unified voice. As such, NGOs need to clarify their mandates and ensure they have permission to engage in participatory community activities.

Food security. In Zambia, we noted that food insecurity occurs in the dry season, when maize flour resources begin to diminish. At that time,

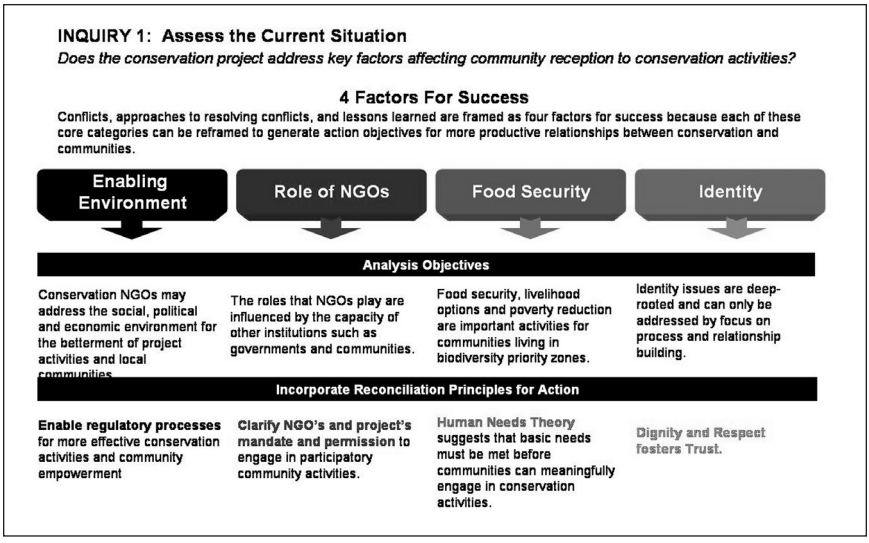

Figure 1. Four factors for success.

community members may engage in illegal hunting and trapping of wildlife. Interestingly, the captured game is not eaten, but rather sold to buy maize flour. With this insight, ADMADE was able to integrate food security activities into larger CBNRM and training opportunities.

Identity. Identity issues are deep-rooted, and can only be addressed with a respectful focus on process and relationship building. Identity sur-

Envisioning the future: reconciliation principles

- **Dignity and respect foster trust (CICR 1995).** Where dignity and respect exist, trust will follow. How dignity and respect are created within a process will be different in each context. Yet the concepts of respect and dignity usually begin with profound listening.
- **Profound listening.** How does a person listen in a way that creates a sense of dignity and respect? How does listening to gain insight into the cultural, social, or identity facets impacted by a situation change the nature of the interaction?
- **Conflict as opportunity.** The expression of conflict represents an opportunity not only to address the underlying conflicts driving a dispute, but also serves as a window into the values and beliefs central to the identity of the individuals and communities involved.
- **Focus on process and content.** How one addresses an issue is often as important as the content of the final solution. Why was a particular area chosen? How was funding procured? The need to create dignity and respect requires greater attention be paid to the process of conservation—how it engages and works with stakeholders. This application of conservation involves a new set of skills and processes.

faced in all reviewed projects through land tenure and access rights, ethnic group relationships, and other areas such as the lack of identity cards recognizing the existence of BaMbuti traditional forest peoples in DRC.

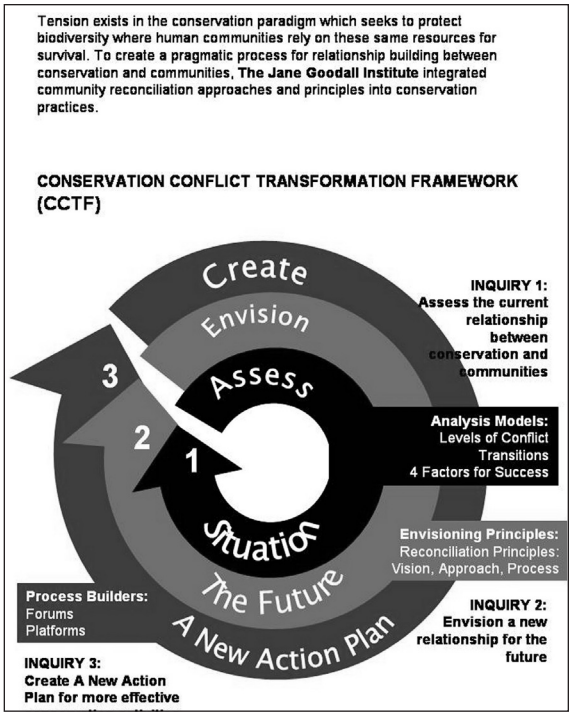

Figure 2. Conservation conflict transformation framework (CCTF).

The conservation conflict transformation framework (CCTF)

As a step toward creating a more pragmatic process for integrating concepts from community reconciliation (see box, previous page) into conservation practice, we synthesized several tools, approaches, and principles into the conservation conflict transformation framework diagrammed and outlined in Figure 2.

The first step is to assess the current situation of a conservation project. Tools to assist this analysis include the levels of conflict model, transitions model (explained below), and the four factors for success outlined above. The second step is to envision the future. We challenge conservation projects to focus more on process and relationship building, thereby integrating principles from reconciliation to re-envision the future. The final step is to create a new action plan. Tools here include how to move from a forum to a platform for action.

Levels of conflict

The first analytical tool is the levels of conflict model (CICR 1995), which differentiates between three different levels of conflict: disputes, underlying conflicts, and deep-rooted (identity) conflicts (Figure 3). Not every situation involves all three levels of conflict, but most intense conflicts do. The first level of conflict that conservation practitioners customarily address is the dispute level, which represents visible problems, issues, or objects of contention. These are the tangible issues parties seem to be fighting over. In the

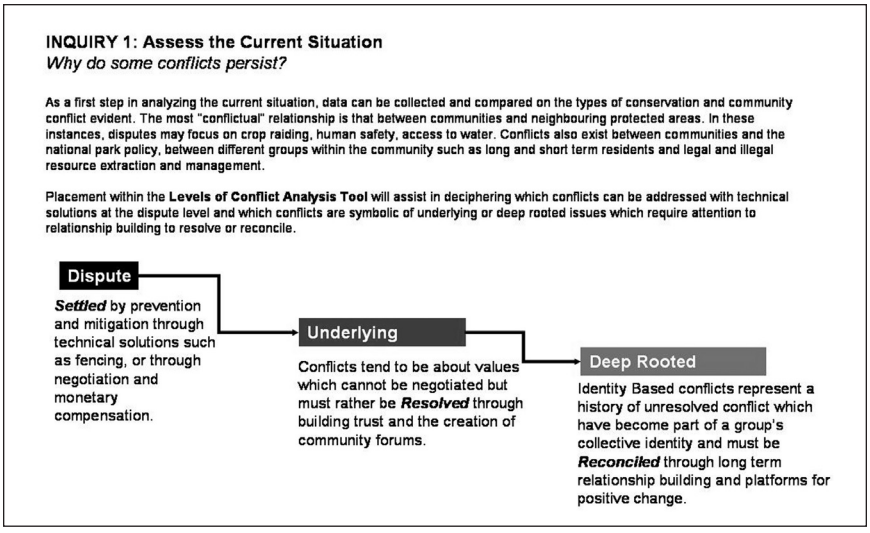

Figure 3. Three levels of conflict model.

case of the International Gorilla Conservation Program in Uganda, disputes often involve crop raiding, both symbolically by gorillas and impact-based by bush pigs and baboons. IGCP has settled these conflicts by forming Problem Animal and Human Animal Gorilla Program (HuGo) committees to reduce the incidence of crop raiding and monitor gorillas when they leave the park. Addressing the immediate problem by setting up programs to compensate for gorilla crop raiding may address the dispute level, but will not address the underlying sense of resentment.

The next level is underlying conflicts. Underlying conflicts represent the unresolved history of previous disputes that were not settled in a mutually satisfactory way, resulting in a sense of injustice or powerlessness. If these underlying conflicts are not resolved, future interactions will be used as opportunities to rectify the past. In the case of IGCP, this includes the loss of land and rights with the creation of the national park, and a lack of community distribution of tourism revenue to affected communities. IGCP has resolved these issues by creating a forum for communities to discuss their concerns and liaise with the national park.

Beneath underlying conflicts are deep-rooted, or identity-based conflicts. Deep-rooted conflicts represent situations where longstanding conflicts become part of the identity of the actors involved. However, deep-rooted conflict can occur in any situation that threatens the identity or beliefs of the actors involved. In the case of IGCP, this includes lack of respect for local community needs in the face of tourist development, and for traditional land use practices. These kinds of issues cannot be reconciled with tangible

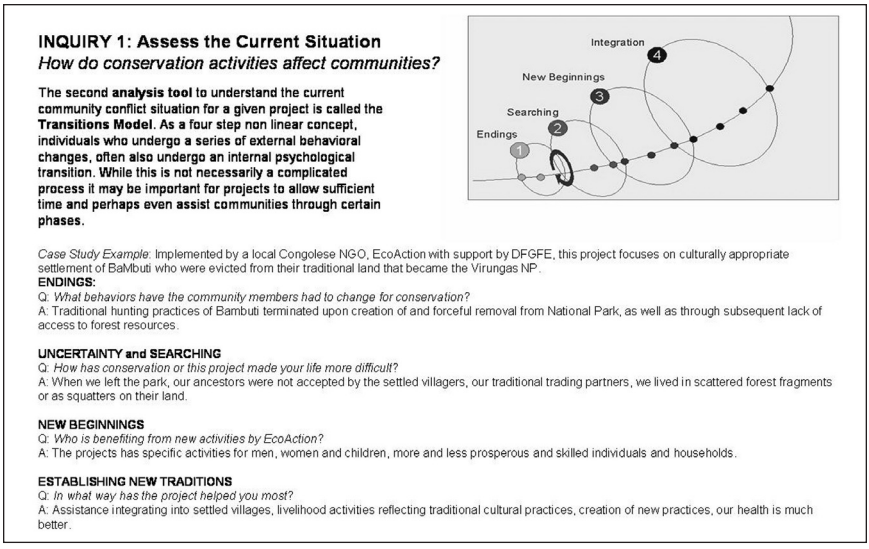

Figure 4. Transitions model.

technical solutions, but rather must be addressed through relationship building and through the creation of positive events where community needs can be discussed. This has not yet occurred in the IGCP project.

Transitions model

Our second analysis tool for understanding the current community conflict situation for a given project is called the transitions model (Figure 4), originally developed by William Bridges (Bridges 1991). As a four-step, non-linear process, individuals who undergo a series of external behavioral changes must also undergo an internal psychological transition for the change to be successfully integrated. While this is not necessarily a complicated process, it may be important for project workers to allow sufficient transition time and perhaps even assist communities through certain phases.

Endings. The first phase begins when a behavior, practice or way of life ends. An excellent example of transitions and the role of NGOs in facilitating them in individuals and communities is the African College for Community Based Natural Resource Management (CBNRM)'s Administrative Management Design (ADMADE) project in Zambia. Under this program, a hunter may be asked by his community to stop poaching and attend training at the college. By joining classes at the college, the poacher becomes a hunter and pledges to cease all illegal activities. In this regard, a phase of this young man's life has ended.

Searching. Hunters at the African College for CBNRM are guided through this phase of uncertainty. At the completion of their six-week train-

ing, hunters sign an oath to put down their guns for a minimum of six months in order to try an alternative livelihood, such as conservation farming, gardening, beekeeping, or community hunting. Every young man in the hunter transformation program is aware that re-entry into his village will be difficult. If proper time and respect are not given to either of these two phases, an uncertainty loop may return individuals and communities to the beginning of the process.

New beginnings. "People are ready to change attitudes, but the conditions under which they live dictate their behavior." This sentiment was echoed by poachers and other community members who wished to participate in the ADMADE program but lacked knowledge and training. The African College for CBNRM intends to provide new beginnings to its students. All participants who complete the course and sign the pledge receive small funds to start a new project, as well as dry season food supplies.

Integration. Perhaps the hardest phase of transitions is integration. The ex-poachers re-enter their community as hunters, beekeepers, or farmers. Many suffer difficulties during the six-month pledge period, but very few pick up their guns and return to hunting. We noted that most communities in Africa were in the endings phase, not having accepted that certain behaviors were no longer possible—that the national park, for example, would be a permanent fixture. Interestingly, most conservation practitioners were offering communities a new beginning, and could not understand why their project activities were not embraced by communities.

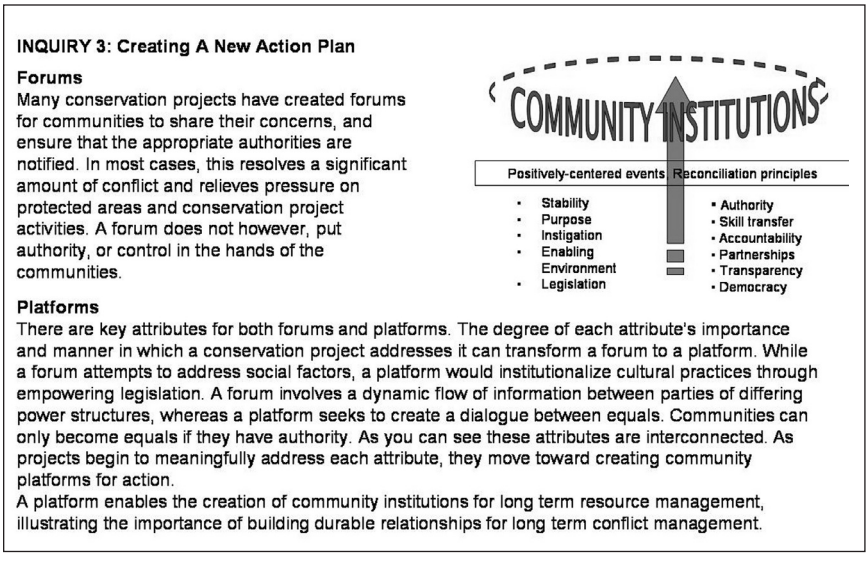

Figure 5. Create a new action plan: forum and platform.

Community institutions

Forums. Many conservation projects have created forums where community members can share concerns (Figure 5). In most cases, this resolves a significant amount of conflict and relieves pressure on protected areas and conservation project activities. A forum does not however, put authority or control in the hands of the communities.

Platforms. Conflict transformation suggests that sustainability is found in durable relationships, not specific solutions. Therefore, the function of a platform for change is to transform the relationship between conservation projects and communities (Lederach 2003). As such, there are key attributes for both forums and platforms. The degree of each attribute's importance, and the manner in which a conservation project addresses it, can transform a forum to a platform. For example, while a forum may attempt to address social factors, a platform would institutionalize cultural practices through empowering legislation. A forum involves a dynamic flow of information between parties of differing power structures, whereas a platform seeks to create a dialogue between equals. Community members can only become equals if they have authority. These attributes are interconnected. As projects begin to meaningfully address each attribute, they move toward creating community platforms for action. In order to facilitate effective community action, conservation needs to incorporate reconciliation principles. By engaging in the three-phase conservation conflict transformation framework, projects may begin to reformulate their relationships with local communities.

North American application: the Nez Perce Tribe's Wolf Recovery Program, Idaho

The purpose of the North American case study was to apply the conservation conflict transformation framework and reconciliation principles from the African project evaluations to an alternative conflict to test the model and see what lessons might be distilled for conservation practitioners and communities on two continents. In 1974, wolves were listed under the Endangered Species Act, but it took 20 years to build the political support for wolf recovery. In the mid 1990s, the U.S. Fish and Wildlife Service (USFWS) approached the state as well as the tribes of Idaho, seeking their involvement in the federally-mandated recovery effort. However, opposition from powerful ranching, timber, and outfitting constituencies prompted the Idaho state legislature to pass a bill prohibiting the Idaho Fish and Game Department from being involved in wolf recovery. The Nez Perce Tribe, which like many tribes in the U.S., is recognized as a sovereign nation and not bound by the state legislature, saw this as an opportunity to assert treaty rights regarding wildlife management in their traditional homeland, and to strengthen its ties with the federal government. Tribal biologists wrote a wolf management

plan which led to the signing of a Memorandum of Understanding with the USFWS to manage the wolf recovery program in Idaho. This innovative partnership was a first test case for a statewide endangered species recovery effort managed by a tribe in the U.S., and serves as a model for other tribes across the country interested in wildlife management.

While wolf recovery in Idaho has been a biological success story, the larger conflict over wolves is ongoing. To fully understand why this is so, it is helpful to use the "three levels of conflict" model (see FIgure 3). This model shows how what appear to be simple disputes that could be settled through negotiation or monetary compensation are often underpinned and fed by more complex issues. Livestock depredation by wolves, for example, has been addressed monetarily through the Defenders of Wildlife's Livestock Compensation Fund, but ranchers in Idaho believe that "compensation does not equal restitution" (M. Hinson, pers. comm.). In other words, this issue cannot be settled through monetary compensation alone. With intractable conflict, one must look deeper to see the underlying conflicts that represent a history of unresolved disputes; they tend to be more about values, and are therefore non- negotiable.

Finally, deep-rooted conflicts occur when a conflict has gone on for so long it becomes part of the identity of those involved. Identity-based conflicts for the tribe include loss of their aboriginal homeland, language, religion, and broken treaties. For ranchers, identity-based conflicts include threats to ranching as a way of life. Ranchers also express a sentiment—that, interestingly, was heard from community members in Africa, as well—that endangered species are considered more important than people by governments and conservation organizations. What the model reveals is that prolonged conflicts are usually not about monetary compensation or benefits, but usually involve unaddressed and underlying normative and identity issues.

The transitions model theorizes that change is external, situational, and imposed from the outside, while transition is the internal psychological process that one goes through to adapt to change. If the transition process is incomplete, the change is not successfully integrated. Obviously, this has relevance for conservation practitioners working with communities to reach conservation goals by asking them to abandon established behaviors that are often closely tied to individual or community identity. When the Nez Perce tribe, as well as Idaho ranchers, are mapped according to this framework, several important leverage points for conservationists are revealed. For example, to Idaho's ranching community, wolf recovery represents a threat to a way of life. The possibilities for innovation and for shaping new identities are still unclear, and uncertainty affects whether communities are able to see change as a threat or as an opportunity, and leaves people focusing more on what they stand to lose, rather than on possible opportunities ahead. This is a key

leverage point where conservationists can assist communities in transition. Rather than seeing gray wolf recovery in Idaho as a threat, the tribe was able to frame gray wolf recovery as an important opportunity for reconnecting to culture, religion, and language, integrate the old ways with the new, and complete a successful transition. The tribe is on the cusp of the transitions cycle. The tribe has succeeded at envisioning their political future, and wolf recovery has been so successful that delisting is on the horizon. But will they have a role as the state of Idaho takes the lead in wolf management upon delisting? How this next transition will be managed is yet to be played out, revealing another possible entry point for conservation organizations to provide support and assistance if needed.

The Nez Perce case study is mapped below, according to the four factors for success distilled from the African project reviews:

Enabling environment. The willingness of the USFWS to engage in this innovative partnership was crucial. It was a risky proposition for both the tribe and the service. The partnership was facilitated by an umbrella of existing legislation (Endangered Species Act), giving this program legitimacy as a government policy rather than just a conservation project. The tribe's sovereign status was also important here.

Role of NGOs. In contrast to the institutional roles that conservation organizations often play in Africa (providing health care services, building roads, paying for enforcement of existing legislation), in this case study the conservation organizations played a supporting role to the tribe and government, who were the primary partners.

Livelihoods (broadened from food security for this case study). The wolf recovery program has had a modest beneficial effect, monetarily speaking, on tribal livelihoods through employment of a few tribal wolf biologists and wildlife technicians. The tribe receives $400,000 per year from the USFWS to run the program.

Identity. Interviews with tribal members revealed strongly-articulated views that tied the tribe's recovery of the gray wolf to their identity as Nez Perce people. Tribe members related that they felt a shared history with the wolf that included prejudice, persecution, and removal. This parallel history continues today as the recovery of gray wolves has also sparked a spiritual and cultural recovery for the Nez Perce.

The tribe has been successful in creating a forum and platform within tribal society, and has been able to use this ecological restoration as a platform for a political, cultural, and spiritual restoration as a people. The formidable challenge that lies ahead is to construct a shared sustainable vision and a forum for all of the communities of central Idaho concerned about wolf recovery integrating the values, livelihoods, and identities of these stakeholder groups. If the decisions made through this forum have authority and

legitimacy, it will have the potential to become a platform for action and for conflict transformation.

Summary

In conclusion, this study has found that by addressing environmental conflicts, communities may be better able to address other difficult issues. Conflict can be an opportunity for skill training, for more effective activities toward biodiversity conservation, and for recreating the relationship between conservation projects and communities. Conservation crises are the product of social, economic, and political factors, and as such need to be addressed with comparable processes and relationship building, rather than wholly technical or biologically-based solutions. Benefits from participation in conservation programs are not always monetary. Identity underlies many protracted natural resource debates, and can alternately fan the flames of conflict or be channeled constructively to reach conservation goals and empower communities. Finally, conservation and community empowerment are compatible.

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What we've learned about nature from the national park idea

Aubrey L. Haines Lecture
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An interesting conceit (at least for those who believe that the past is irrelevant to how the world is unfolding) is that history is a brand of intellectual recreation, not a practical, applied field. I'd like to lay that assessment to rest. Not quite four years ago, I picked up my local newspaper (the *Missoulian*; it was November 27, 1999) to find this headline: "Blackfeet Take Boundary Dispute to Washington." In 1895, Montana's Blackfeet Indians had ceded to the United States a large chunk of their reservation, which a few years later became the eastern half of Glacier National Park. Based on their long-standing presence in the Northern Rocky Mountains, however, the tribe had reserved certain usufruct rights to the land they'd long thought of as home.

Over the subsequent century of time the Indians, the newspaper went on, were increasingly dismayed to discover that the park service (and the wilderness movement) had concluded that the Blackfeet never actually utilized the mountain "wilderness" that became the park, but were merely its "first tourists." The tribal council had thus concluded that if the tribe was to be denied special use privileges based on its long-standing history in the part of their territory that became the park, then it wanted a share of entrance fees, concessions, and control over campgrounds in Glacier as fuller compensation. The paper quoted Bill Old Chief, Blackfeet Tribal Chairman's, somewhat ominous conclusion: "We are a sleeping giant."

That was a particularly intriguing story to me because at the moment I was reading a new book titled *Dispossessing the Wilderness* by an environmental historian named Mark Spence, who had investigated a series of nineteenth-century controversies (which no one but the Indians remembered

these days) about the removal of native peoples from the places that became Yosemite, Yellowstone, Glacier, and several other American national parks. It turned out that a century or more ago we had ejected a host of resident natives—not just Blackfeet but Shoshones, Crows, Navajos, Miccosukees, Havasupais, even the Pai'Ohana of Hawaii—from their homelands in order to create many of America's most famous parks. This was a story that drove home to me, yet again, that history—especially what we now call environmental history, the study of the relationship between people and nature across the centuries—has a habit of circling back to bite at the present. If nothing else, wariness about getting our backsides nipped ought to be sufficient reason to look back over our shoulders occasionally.

Since Yellowstone National Park's inception as the modern world's first great national park in 1872, and its use as a kind of model for nations across the globe, a central theme for national parks around the world has been to preserve nature for the benefit of future generations. Over the ensuing 130 years, various nations have set aside national parks for a variety of reasons, but a majority of our "classic" parks have been scenic and/or wildlife preserves. In the case of these kinds of parks, the policymakers' goals—usually spelled out fairly specifically (as in the case of the American NPS enabling act in 1916), or at least implied—have been similar in both cases. When we have established parks primarily as monumental scenery preserved, park managers hoped to sustain vegetation and views and geological processes for future generations to enjoy. If we have intended parks as wildlife spectacles primarily, we've had similar goals resting on different natural sciences. In the instance of a grand park like Yellowstone, vegetation, views, geological processes, and wildlife spectacle have all combined in a vision that, quite often, ended up pitting one form of preservation against another. Nonetheless, park goals—as the NPS enabling act specified—were all about allowing the public to experience nature while preserving it for future generations.

Preserving nature, of course, has turned out to be a very tricky proposition. Integral to the premise is an implied knowledge about how nature works. To "preserve nature" in any part of the world—America, Africa, Australia, Canada—policy makers and park personnel had to possess not just a sound grasp of general ecological processes, they have had to cope with the nuances of places and (we found out soon enough) even the nuances of time frames. Looking back on this, it seems that the founders of the national parks idea bequeathed to those in charge of parks a profound task that scarcely anyone comprehended. Embedded in the notion of great nations' parks was not merely the charge that park personnel understand the natural world they were preserving, but that they interpret it for their publics. Largely because our sciences were in no way up to the task, this seemingly straightforward assignment turned out to be far more difficult than anyone would realize a

century ago.

The intent of this talk is to examine a select handful of the lessons the national parks in the U.S. American West have taught us over the past 130 years about what nature is, what wildness is, how they've functioned in the past, and how they're functioning in the parks today. As my brief historical survey shows, I hope, many of the things we thought we knew about these issues a century ago clearly turned out to be flawed, or far more complex and nuanced than anyone believed.

As the splendid Northern Rockies autumn of 2003 unspooled, I reflected on this topic, and it seems to me that one of the themes to discern in the historical story is one we'd expect to be there: That the history of park management through time nicely tracks the evolving story of modern humanity's increasing sophistication about the science of ecology. But it seems to me that there's another theme, as well, and I modestly propose that the parks have in fact played the role of great national laboratories, where over the decades we have tried to apply what we thought we knew about nature and, for better or worse, have gotten to observe the results. Sometimes we saw results we expected. More often, nature surprised us. But in so many respects—from the role of natural fire to the function of ecosystems, from the unending dynamism of nature to the cascading effects of predators, as well as where I started above, with the longstanding presence and role of humans in so many of the perceived "wildernesses" Europeans found around the planet—the national parks have been our great teachers and global laboratories in the quest to understand nature.

In the United States we, of course, had parks before we had a government service to bring a kind of rationality, and at least some rudimentary science, to managing them. We not only had parks—16 of them by 1916, but compliments of the Antiquities Act of 1906, the U.S. also had 18 so-called national monuments, widely-scattered parcels diced out of the public domain ostensibly to protect archeological ruins and sites in the Southwest, but mostly used up to 1916 to designate special geological wonders such as the Grand Canyon in Arizona and Devils Tower, a remnant volcanic plug in Wyoming. The 1916 enabling act for the National Park Service placed all these parks and monuments under control of the new NPS, whose mandate (according to the language of the act) was "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." More than one historian (and undoubtedly plenty of frustrated park superintendents) have noted that several of these multiple objectives seem at cross purposes.

National parks and the science of ecology were born almost as fraternal twins. Although conceived in the 1860s and having its first impact on policy

as a result of streamflow/watershed arguments in the late nineteenth century, ecology did not mature as a science in the U.S. until the Ecological Society of America emerged in 1914. The early American ecologists such as Frederick Clements (prairies), Victor Shelford (animal communities), C.C. Adams (mammal ecology), E.A. Birge (limnology), and Henry Cowles (plant ecology) were well on their way by 1914 to establishing some governing principles for the science. They all accepted the idea of a basic harmony in undisturbed nature (which they called "the balance of nature"), saw humans mostly as disruptors of it, and accepted that "undisturbed" nature represented ecological health and a baseline against which human changes could be judged. Additionally, they developed the principles of energy flow through nature, the idea of biotic communities, a grasp of adaptation, and the idea of the climax community, the natural state they believed nature seeks.

Eventually, the ecological sciences would add a crucial scientific leg to form a kind of tripod (the other legs represented by utilitarian/democratic conservation and romantic/aesthetic preservation) to support environmental thinking in America. But by our own time ecology has thoroughly critiqued, modified, even rejected many of its early insights. And as one indication of its emergent qualities as a science, one of the founders of the Ecological Society of America, Victor Shelford, wrote his last book in 1963, just 40 years ago.

Fire

It's especially interesting now to look back on our ideas about fire in light of ecology's early twentieth-century ideas about climax and the balance of nature. A century ago, ecology in its American form suffered from all the false starts one could expect in a new science. One of the most problematic of its ideas, which its scientists clearly absorbed from a tradition that extended back through Western culture to the Greeks, was the ancient notion of the balance of nature. The so-called Prairie School of ecologists, working in the grasslands of the Great Plains, re-fashioned this premise in the 1920s into the idea of "climax" in nature, an ultimate and static ecological balance of species—unique to each different setting—which life sought inexorably. The climax argument had little sympathy for ecological disturbance or dynamism in general. In the tradition of George Perkins Marsh's great, nineteenth-century book, *Man and Nature,* this was a theory that tended to regard humans as entirely separate from nature, and almost literally as the only power on the planet capable of disturbing "climax" conditions.

We all know that the catastrophic fires in Yellowstone National Park in the summer of 1988 woke many Americans up to the apparently counterintuitive idea that fire is an inherent part of the forest ecosystem, without which some species cannot survive or reproduce. Fire, in the new bumper sticker insight, was natural. Dramatically, too, the 1988 fires also showed the dangers of suppressing natural fire for decades. But fire suppression emerged in part

in light of ecology's early twentieth century ideas about the balance of nature. Anyone who spent time in a region like the Rocky Mountains or the Sierra Nevadas (or who looks at old photographs of those places) in the nineteenth century realized that fires burned or had burned everywhere, from foothills to high forests. The most startling of visual evidence of this for many modern people is looking at paired images of repeat photographs, shot in the same locations 100 years apart. The natural setting, for which many us yearn, it turns out was roughly 30% more barren than the nature we live with in our own time.

Now here is the punch line: In the American mind 100 years ago, the cause of that barren condition quite properly was fire. But when it came to the cause of fire, the early syllogism broke down. Today's ecology, with a full grasp of disturbance in nature, understands that a primary ignition source of wildfire (depending on setting, of course) is lightning, especially lightning strikes in years that follow wet cycles allowing the buildup of fuels. But a century ago, everyone was convinced that as the only possible disturber of nature, humans had to be responsible for almost all fire in the natural world. Today that has led us quite properly to a new appreciation of the role of native peoples in firing and shaping landscapes. But a century ago, particularly after the astonishing Great Fire of 1910 in the Northern Rockies, ecologists lent their weight to forest and park managers in the quest to suppress all fire. Why? Obviously in part because they destroyed property and lives. But beneath that ran the idea that fire was a disturbance, that only humans disturbed nature's balance, hence wildfire was "unnatural." As no less than John Wesley Powell argued, the best strategy for stopping wildfire in mountain forests was "to remove the Indians, the cause of the conflagrations."

Ecosystems

Yet another area where modern thought about nature's processes was either missing or downright wrong in those formative years for parks, from the 1870s to the 1930s, had to do with the fundamental question of criteria for sites to preserve. Historians of the American park system usually argue that the philosophical direction the NPS took in its early years was the result of first director Stephen Mather's personal vision. According to his biographer, Mather developed a set of evaluative criteria for new additions to the park/monument system that his successor and protégé, Horace Albright, followed as well. The "Mather criteria?" He looked for sites that were, in effect, clones of Yellowstone and Yosemite: large, preferably contiguous blocks of terrain, with natural features so extraordinary as to be of national interest. What features? Namely, scenery, and of a particularly unusual and impressive quality—what park service historians have called the "monumentalism" requirement.[1]

Monumentalism has its own fascinating cultural trajectory, springing as

it does from eighteenth century Romantic attempts—really quasi-religious attempts—to define the sublime in nature. The almost overpowering scenic qualities of many of the parks around the world owe much to European notions about the sublime, the idea that in the face of monumental nature one stands literally in the presence of God. If you peel back the layers sufficiently, here, as well, you find the seed that has flowered in our own time into parks as great national sacred places.

If God resided only in these specific blocks of the world, though, the deity didn't know much about ecology. Because, of course, the handy nineteenth- and twentieth-century method of drawing the boundary lines for parks omitted something we've come to realize was crucial. The linear grids we drew around sublime scenery disguised for us, but not for the life forms inside, the fact that Yellowstone or Glacier or Rocky Mountain parks never stood separately from the surrounding landscape. There always had been connectivity with the lands stretching away in every direction. As far back as 1933, when the very first *Fauna of the National Parks of the United States* appeared, park ecologists like George Wright understood that the parks did not function as ecological units.[2] So when the mid-twentieth century ecologist Eugene Odum began preaching the science of ecosystems, it became very clear what foolish mistakes we'd made in bounding so many of the parks as we had. Today, the science of conservation biology is neck-deep in mapping out the ecosystem connections of major landforms all over the planet. But again, it was the parks that became our teachers in the new idea—first by the example they set of how we never should have done things in the first place, but eventually in more positive ways, as in mapping out the Greater Yellowstone Ecosystem, that sprawling, connected landscape that takes in both Yellowstone and Grand Teton parks, set into an irregular terrain at lower elevation that's easily as large as the two parks combined.

Nor does the real ecological connectivity end there, as the Yellowstone-to-Yukon Initiative (and many others modeled on it) show so well. Of course, alongside that now-recognized ecological reality is the political one that the old mistakes leave us with. The NPS directly can manage only the parks themselves, not the ecosystems surrounding them. When bison or grizzlies or wolves in Yellowstone instinctively hearken to the ancient dictates of their landscape, and pass those linear 1872 boundaries like the artificial and cultural lines they assuredly are, we humans are compelled to act as if the old mistakes are still absolutely defining.

Predators—prey eruptions—vegetation changes

Then, famously, there was the predator question. Between 1901, when the professional wolfer Ben Corbin published his *The Wolf Hunter's Guide* explaining America's war on wolves in terms of Christianity, democracy, and the depravity of wolves, and 1924, when the Predator and Rodent

Control (PARC) division of the Biological Survey was distributing 3½ million strychnine baits annually, we cleared the American West (including the parks) of all but a few pockets of wolves. PARC's figures indicate that there probably never were as many wolves southward in the West as farther north, since by 1962 its wolf tally in New Mexico and Arizona was only about 600 animals, while in Montana, Idaho, and Wyoming PARC hunters had killed some *24,000* wolves. In the second half of the century, only in the far north of the continent were there still healthy populations of wolves.

In an orgy of death-dealing, we had shot wolves, roped them, gassed, stomped, and strangled them. We'd trapped them with the new steel leghold trap invented by Sewell Newhouse (to replace the wild with "the wheatfield, the library, and the piano," Newhouse said). We hung them from trees as if they were human outlaws. We tried biological warfare; in Montana, a 1905 state law required veterinarians to infect captured wolves with sarcoptic mange and release them to spread the disease. But mostly we just poisoned them, and by the thousands. Everyone in the West for three decades or so seemed to regard it as a patriotic duty to carry a vial of strychnine around to lace every carcass with poison. It was civilization's revenge on the animal that more than any other has reminded the civilized how brief is our separation from the animal.

We did all this because it was part of the European tradition, as well as some kind of psychological need. And, because our science—in the thrall of the culture than enveloped it—had yet to grapple with predators' role in nature. Indeed, ecology at least until the 1920s seemed to regard predators as some kind of natural mistake, varmints whose removal would improve the world enormously. Then the consequences of what we'd wrought began to come home to us.

In the 1920s, when ecologists first began to probe the possible beneficial effects predators might have in nature, a classic view emerged: that there was indeed a set of relationships between predators and their prey, and that they worked mechanically, that predators were the key to holding prey populations under some carrying capacity fixed by nature, and that this was a symbiosis working as a rhythmic oscillation around a steady line. As deer or elk populations increased, the number of wolves also increased until a point was reached where predation dampened prey population growth. Declining numbers of prey in turn suppressed predator population growth, until the scenario commenced once again. Ecology gave this concept a name—the Lotka-Volterra equation—while the parks where wolves were now erased, particularly Yellowstone, Rocky Mountain, and Grand Canyon parks, now demonstrated for the whole world how it worked in nature. Elk and deer populations without predators underwent a dramatic efflorescence and destroyed their browse, in some cases dramatically altering the vegetation

of the parks. Spectacular ungulate population crashes, at least sometimes, followed, the most famous one on the Kaibab Plateau of the Grand Canyon. Meanwhile, outside the parks, managers substituted human sport hunting for predators with better success.

In the mid-twentieth century, predator/prey ecology went through some revisionism from this classic view, when Charles Elton conducted careful new investigations of Hudson's Bay Company trapping records. Similarly, Durward Allen's work on moose and wolf interactions in Isle Royale National Park in Minnesota showed what seemed to be wild swings in the populations of both species, and also showed the precarious nature of predation; wolves commonly "tested" more than a dozen moose before they were successful in bringing one down. By now, predation revision was in full swing, and in 1973, a New Zealand ecologist, Graeme Caughley, published a soon-famous paper asserting that predators played little or no role in controlling populations of many prey animals, that for some ungulates an autogenic (internal) mechanism slowed or stopped population growth when it approached carrying capacity. Furthermore, Caughley argued, for a variety of reasons the whole Kaibab/Yellowstone/Rocky Mountain park ungulate irruptions probably didn't mean what ecologists thought. Kaibab, he asserted, may even have been a hoax.

Here in the twenty-first century, predator revisionism seems to be in retreat. Studies from the western Canadian provinces, from Denali Park in Alaska, from Isle Royale Park in Minnesota, and now increasingly from Yellowstone and the northern Rockies, where we currently have 800 wolves in the wake of a marvelously-successful restoration under the Endangered Species Act, all appear to demonstrate a keystone role for predators like wolves. In Denali, wolf predation is said to have exerted strong evolutionary pressure on the behavior and habitat selection of mountain goats, and on moose and Nechina caribou demographics. In Canada's Wood Buffalo Park, wolves have a dampening effect on the population dynamics of bison. In Minnesota, a particularly compelling study done by well-known biologist and wolf advocate David Mech found wolves a key factor (among several interacting ones) in significant whitetail deer herd reduction in the Superior National Forest in the 1970s.

Jasper and Banff parks, the Canadian analogues to Glacier and Yellowstone, join their U.S. counterparts in wolf history trajectory. Western Canadians inherited all the same flawed science and folklore that Americans did a century ago. Their park managers stayed in close communication with NPS managers during the heyday of wolf eradication, and they tried the same tactics. Using guns and traps, Banff very nearly succeeded in eradicating wolves—at least from the 1930s until the 1980s—and adding snares and wolfhounds to those weapons, Jasper came close to success during the '30s. But the Canadian Rockies had too much connectivity with wild country

north and south for local wolf extirpation to work for very long. After only a decade, particularly after elk shipped up from Yellowstone got going, the wolves filtered back into Jasper. They were denning in the Bow Valley in Banff again by 1980. Fortunately for the wolves, this happened during the span of years that ecology was moving towards an understanding of predation's role in nature, and was finally getting the word out to the public.

Canada has no Endangered Species Act to recover wolves, but in the 1980s, as wolves insinuated themselves back into Canada's parks, Banff and Jasper experienced the same remarkable ecological re-shuffling that Yellowstone is experiencing now.

And what an experiment it has been to remove a keystone predator for more than half a century, then get to watch as its return quite literally re-organizes ecological relationships and processes up and down the ecosystem!

Humans

In 1933, the pre-eminent American ecologist Victor Shelford, who at the time chaired the Ecological Society of America's Committee for the Study of Plant and Animal Communities, wrote in a short essay in *Ecology* that "primitive man…is probably properly called a part of nature." So far, so good; properly, so are we all. But then—and here Shelford would articulate a view that two succeeding generations of ecologists and environmental thinkers took to heart—he went on that America's ecology was "probably not much affected by these primitive men. That is the argument for leaving them out of the picture."[4]

It's also the argument that, most recently of all the issues I've touched on here, would eventually get those ecologists and conservation biologists down the timeline in a heap of trouble when environmental historians and ecological anthropologists came along with new techniques for estimating Precontact human populations, and considerable documentary evidence of Indian manipulation of the world around them. As we know, this has fueled a most interesting debate that's functional in modern ecological restoration: Were the Americas' wilderness settings shaped purely by "natural" forces? Or (the newer view out of the historical record), had 12,000 years of stacked-up human inhabitation/manipulation made the continents "managed" places much as Europe or Africa were? If the latter has been the case, what does that mean for our grasp of nature in the parks, aside from the kinds of possibilities I hinted at with the Blackfeet in my opening remarks?

The truth is, right now we don't quite know, at least in pragmatic terms, what an ancient human presence in our parks might mean. In other terms, it helps (at least) to restore our sense of our own naturalness. We, too, are children of nature. But pragmatically, our science is not yet up to the task of assessing an ancient human presence beyond obvious ones in places like Chaco Canyon or Mesa Verde parks, created around the ruins of the

ancients.

But grappling with this idea has had real importance in other parts of the world. As historian of African parks Jane Carruthers has written, as the park idea spread out of America and around the world, its peculiar conceits about the wilderness quality of the "New World" led to problems elsewhere. In Africa, from the beginning, an element in creating parks was conservation's insistence that the local natives with their subsistence hunting and gathering economies constituted a threat to the kind of nature tourists wanted to see. Thus, places like South Africa's Kruger National Park, from which the state ejected 3,000 Africans at its creation in 1926. Managers allowed some natives to continue living in Kruger Park, but for the sake of "wilderness" forbade them to walk on the roads or otherwise be visible. In 1969, Kruger Park officials finally expelled the Makuleke, the last group. Like the Blackfeet and many resident native peoples, they now have a lawsuit to allow either their return or significant compensation for their removal. Kruger, then, is just one example of a seeming conflict between the American park model, with its insistence that nature is only natural if humans are absent, and the real world out there, where in truth virtually all of "nature" is ancient human habitat.

Conclusion

The park idea is a Western idea, originating with Europeans in the form of the Greek sacred groves, in modern times emerging from a European tradition of treating unusual landscapes as terrain outside the normal expectation of privatization that powered the nineteenth-century settlement of America. It was a tradition that actually produced a public (state) park, in the astonishing canyon of the Merced River in the Sierra Nevadas—our Yosemite—almost a decade before Congress designated Yellowstone as the world's first national park.

The modern scientific method is another legacy of the Western tradition. However one feels about science as a worldview, and there are plenty of people mightily suspicious of its appropriation by powerful interests, science is here to stay, for two very good reasons: it explains more about our world and our universe than any other system of knowledge we humans have ever developed, and its very fallibility is one of its strengths. Science is often wrong, yet truth emerges eventually. Unlike faith-based systems of knowledge, science admits its mistakes—it cannot go forward any other way.

That is why, when I look at this history, I cannot share Alston Chase's outrage, in a book like *Playing God in Yellowstone,* where the author seems to think that park managers knew all along what they should have done, but were willfully and even criminally negligent enough to try to make bad science work. Willful they may have been, and (as Richard Sellars shows in his own book about science in the parks) their attention indeed may have been elsewhere, specifically on tourists. But with all the great ecological issues,

managers I think have simply applied what the experts assured them was the best science of the day. Looking back, that, of course, has to sober our confidence in what we think we know now.

One final conclusion: Around the world, parks have demonstrated convincingly that if you build it, they will come. From the dawn of time, our species seems to have known instinctively that we ascended out of the Earth, that despite our cultural or religious conceits, in fact we are biological. We spring from nature, and unless we figure out a way not to die, we will never transcend it. So modern humanity needs the sights and smells and tactile experiences of the natural world whose very processes produced us. We need it so badly that the parks, it seems to me, are the ultimate evidence for E.O. Wilson's biophilia hypothesis, that evolution hard-wired us to love and revel in the diversity of life with which we co-evolved.

Notes

[1] Shankland, R. 1979. *Steve Mather of the national parks*. 3rd edition. New York: Alfred A. Knopf, 210–15. Richard Sellars's *Preserving nature in the national parks: a history* (New Haven: Yale University Press, 1997) has shown how difficult it was for the ecologists to bring the park service around to their way of thinking.

[2] *Fauna Two* (1935) was an early investigation of the possibility of re-introducing extirpated species into the parks. See Keir Sterling, 1999. Zoological Research, wildlife management, and the federal government. Pages 19–65 in *Forest and Wildlife Science in America: a History,* H. Steen, ed., Durham: Forest History Society.

[3] I have no wish to whitewash the Canadian story. While Western Canadians have lived with wolves in their midst during most of the period that we Americans came to think of wolves as merely symbols of the long-gone Frontier—so that many Canadians have been, frankly, amazed at the uproar over wolf recovery in the U.S.—in Canada the story isn't straightforward, and it may be predictive for what's in store for us. In 1951, rabies appeared among red foxes in Alberta. The result for wolves was a hysterical rabies eradication program that from 1953 to 1955 reduced Alberta's wolf population from 5,000 to fewer than 1,000 animals, despite the fact that not a single wolf killed tested positive for rabies. Canada has no Endangered Species Act that protects wolves, and in the 1980s sport hunters and wildlife agencies in British Columbia pushed for and got a campaign to poison and helicopter-gun thousands of wolves in B.C. to protect ungulate herds. Although the courts declared that hunt illegal in 1988, the hunt encouraged a private sportsman's group in Alberta to offer bounties and free traps to anyone who would go after wolves in Alberta. And finally, this: The wolf/prey relationship in Western Canada hints that the norm in nature is an endless cycle of population swings, of both prey and wolves—something we should be ready to witness farther south.

[4] Shelford, V. 1933. The Preservation of natural biotic communities, *Ecology* 14: 240–5.

Community Conservation Services for Serengeti National Park's surrounding communities

Emmanuel J. Gereta

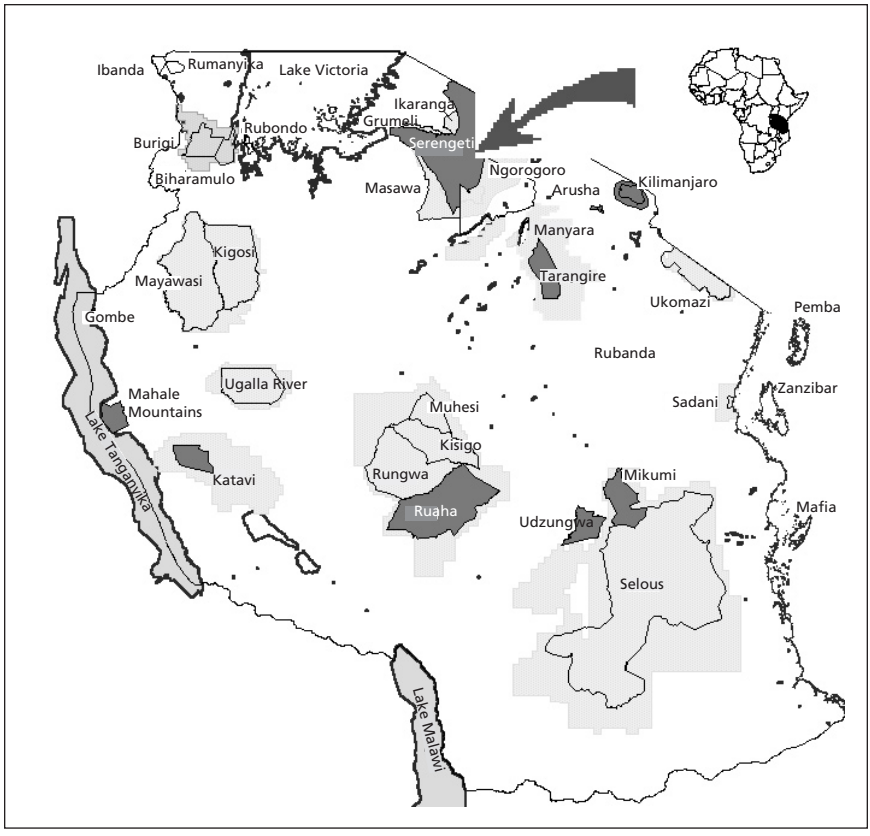
Abstract

Community Conservation Service (CCS) is an outreach program of Tanzania National Parks (TANAPA) intended to support communities surrounding national parks. The focus of the program is to create awareness in these communities so that they become part of conservation efforts. The program started with Serengeti National Park and thereafter grew to cover other national parks. The idea of the program was to solve social conflicts between people, wildlife, and protected areas. Communities are supported through a benefit sharing system using money collected from tourism in the parks. Communities also propose projects that the parks support on the understanding that the communities will also contribute. Communities pay 30% of the project cost in the form of cash, labor, or available local materials. TANAPA pays the remaining 70%. The program has registered some successes in conflict resolution. However, income-related poverty seems to link strongly to poaching by the poorest members of the communities. These community members have shown to be lacking the ability to meet their basic needs. The challenge ahead for TANAPA shows that the poorest members of the community need to be empowered individually to meet their basic needs for conservation to remain sustainable.

Introduction

The Community Conservation Service (CCS) was created to increase conservation awareness in local communities up to the district level of government (local government), with the aim of having them becoming part of the conservation efforts. It was a field-based program, supported by TANAPA head office. The program started in 1988 in Serengeti National Park (Maps 1 and 2) as a pilot project under "Neighbors as Partners," an African Wildlife Foundation (AWF) project in collaboration with TANAPA begun in three villages at the eastern borders of Serengeti National Park. All these villages were in the Ngorongoro District, a predominantly Maasai area. The program then grew to cover a few more parks in early 1991. These parks were Tarangire, Lake Manyara, and Arusha national parks.

The idea of CCS in Serengeti came about after it was realized that there was a continued erosion of the integrity of Serengeti National Park despite the increased efforts of law enforcement. The apparent decline of some of its wildlife species was caused by illegal over-exploitation that peaked in the 1980s. Affected species included elephants, buffaloes, rhinos, and roan antelopes. There was also a progressive loss of the natural system that was



Map 1. Location of Serengeti National Park in relation to other national parks and other wildlife-protected areas in Tanzania.

advancing from the boundary towards the interior of the park. The shrinking of the park was caused by human encroachment, most probably as a result of population growth. These threats forced the management to question whether its approaches to conservation were achieving the intended results of protecting the biological diversity in the protected area.

Natural resource use conflicts between people and parks, and people and wildlife were contentious under the colonial and post-colonial legislation. These laws imposed penalties for unlicensed hunting, entry into protected areas, firewood and medicinal plants collection, and any other unauthorized harvesting of park resources. Neighboring villages also suffered heavy losses of property and life caused by wildlife, without compensation. Thus, human communities were alienated from their natural resources. This created conflicts, and wanton harvesting ensued. An idea then came that suggested provision of social and welfare services to reverse the hostility. This suggestion

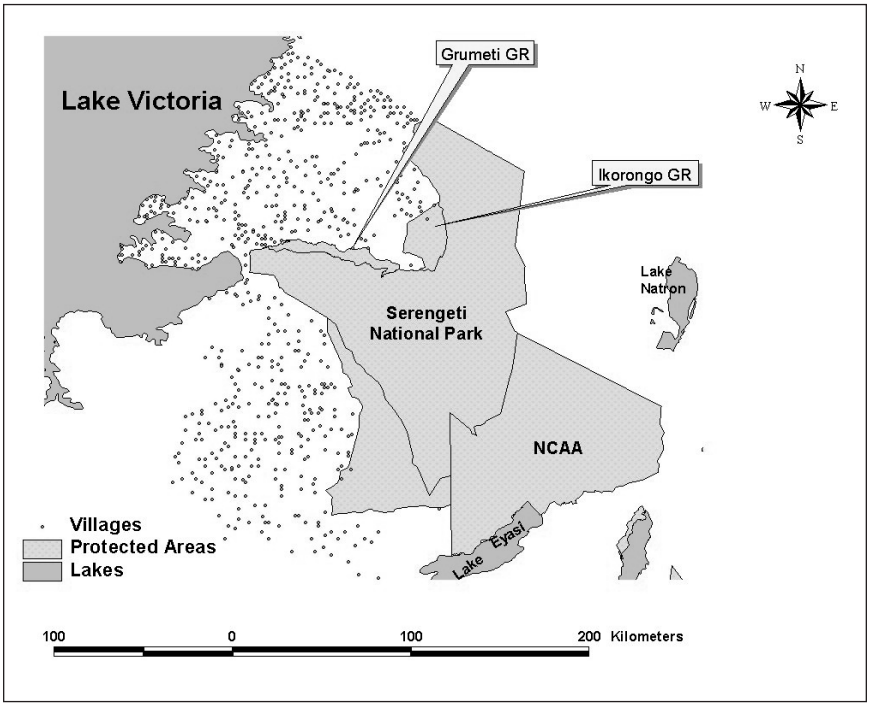
brought up the concept of establishing CCS, now known as the Outreach Program.

In 1992, the CCS program was incorporated and became one of the TANAPA departments under the Directorate of Parks Management and Conservation. Today, the organization has a full-fledged department, with permanently employed staff at the head office and in all 12 national parks. The department is now called the Outreach Program, with its manager under the Directorate of Resource Conservation and Ecological Monitoring, a change brought up by a recent corporate restructuring exercise.

The main objectives of CCS were to explain the purpose of the parks to local communities, to solicit local participation in park management, and to protect the integrity of national parks by promoting good relationships with the surrounding communities. In other words, community conservation sought to change the ways in which resource users and the state agencies interacted so that conservation goals could be achieved.

CCS mission

CCS is a TANAPA field program supported by the head office with an aim of identifying and implementing opportunities for sharing park benefits



Map 2. Serengeti National Park with surrounding villages.

(accrued from tourism) with adjacent communities. The CCS activities are fully integrated with other park management activities, and it follows normal TANAPA procedures along the lines of responsibilities and reporting. The Department seeks to protect the integrity of national parks by reducing conflicts between wildlife and surrounding communities, improving relations with those communities, and helping to solve problems of mutual concern (TANAPA 2001).

The Serengeti–Mara ecosystem

The Serengeti–Mara ecosystem covers an area of 25,000 km² defined by the annual movement of wildebeest, zebras, and Thomson's gazelles, and is comprised of several protected areas. Mara, in the southern part of Kenya, joins Serengeti in the northern part of Tanzania. Serengeti National Park, whose area is 14,793 km² and where CCS was pioneered, is the core of the ecosystem, and is one of the natural wonders of the world. Serengeti is famous for its annual migration of wildebeest, zebras, Thomson's gazelles, and elands, all together numbering more than 2,000,000 (Sinclair and Arcese 1995). There is also a high diversity and abundance of large predators and non-migratory ungulates. The CCS concept has been adopted in the conservation efforts supplemented by other management practices.

How CCS works in supporting communities

The CCS work strategy starts with the initiation of an extension service to communities to solve outstanding problems and establish good working relationships based on the concept of "Ujirani Mwema," literally known as "good neighborliness." Once this relationship is established, the park starts to make contributions to small community development projects that benefit ost of the people living there. The park's contributions to these projects are supposed to provide concrete benefits and real evidence to communities of TANAPA's willingness to share benefits of conservation.

TANAPA's Support for Community Initiated Projects (SCIP) fund was initiated in 1992 as part of headquarters and the park strategic planning process. The SCIP fund program works with communities bordering or close to national parks and stresses support for community-initiated projects. Approval mechanisms are set at the park level, and there is increasing collaboration with tourism-related projects adjacent to the parks.

The SCIP fund currently amounts to about 7.5% of each park's operating budget. However, the majority of parks do not receive enough gate fees to cover operating costs. The parks that generate more revenue subsidize such parks. The parks with such high revenue generation are Kilimanjaro, Serengeti, Arusha, Manyara, and Tarangire.

In order to access the SCIP fund, communities fill out a simple, one-page form written in Swahili. This proposal is reviewed by a park SCIP commit-

tee using a set of established guidelines together with the strategic plan for that park. Generally, the park contributes 70% of the project cost and the community provides the remaining 30%. The 30% contributed by the community can be in form of cash, labor, or locally available materials. The community forms a Natural Resources Committee under that community's village government that collaborates with the Outreach Program warden from the park. This committee supervises project implementation. Where technical expertise is needed, depending on the type of project, district authorities are consulted. This service is provided free of charge. Apart from supporting community projects, conservation education is also provided to schools and local communities by the park. The following are some of the projects supported by the SCIP fund from 1994 to 2002, and their costs in U.S. dollars as shown in Table 1.

Table 1. CCS projects and their costs, 1994–2002.

Year	Project type	Amount (U.S.)
1994–2002	Education projects	282,230
1994–2002	Health projects	82,541
1994–2002	Water projects	50,236
1994–2002	Conservation education	4,105
Grand total		$419,112

Conservation education. TANAPA's conservation education is an idea that was developed with an aim of making the population aware of, and concerned about the total environment and its associated problems, and providing them with the knowledge, skills, motivation, and commitment to work individually and collectively toward solutions of current problems and the prevention of the new ones (GreenCOM 2000). The implementation stage of conservation education is carried out in the form of arranging park visits by local community groups, providing training to communities on project management and accounting, establishing conservation clubs in schools, training teachers, and showing conservation films to communities using the park's mobile film van. The costs involved in these operations are fully covered by the park's operations budget, which is independent from the SCIP fund.

Contribution of local communities to conservation. Based on the conservation efforts created in communities through awareness of natural resources conservation and management, communities have started to respond positively. Poaching is now being combated by the formation of village game scouts (VGS) formed by village governments. The village game scouts perform anti-poaching patrols complementing the state-owned and park anti-poaching forces. Under the new Tanzania Wildlife Policy (1998), the VGS are empowered to carry out arrests within their communal land. They also provide tips leading to arrests of people dealing in illegal trophies (e.g., ivory, rhino horns) and more commonly, the illegal game meat trade.

VGS have the advantage of knowing the seasons and areas that are prone to illegal activities and probable perpetrators. The VGS and the general public are also providing the vital service of reporting stray animals. For example, on two different occasions, rhino sightings were reported at Machochwe and Halawa villages. Serengeti National Park, through its Outreach Program, supports law enforcement in community lands, recognizing that this is where most poachers live and sell their illegal products. Likewise, VGS compliment the park's ranger force by tracking down culprits outside the boundaries of the protected areas. In recognition of this good work, the park provided seven bicycles in 2000, on a trial basis, to facilitate easy travel to the nearest ranger post or police station when seeking assistance. The park also provided 30 uniforms to six VGS units. Transport is provided on request when needed for conducting anti-poaching operations. Institutions run by the government under the Wildlife Division offer training for the VGS.

Law enforcement in the communities. Apart from using the governmental machinery (court of law and police) in the prosecution of illegal activities, law enforcement officers on community lands use traditional leaders who have succeeded in controlling cattle rustling, which was a major concern for local authorities. Communities use sanctions that have evolved in their societies and have proved to be more effective than government procedures. Local people have several linkages among themselves. Better able to influence one another, they administer sanctions at less cost than the customary government bureaucracy. They know the appropriate and most effective sanctions based on the offenses committed. Sanctions range from verbal warnings to fines and corporal punishment. These sanctions have reduced time for park personnel in traveling to courts of law to give evidence, hence allowing more time for fieldwork.

Successes registered by CCS

Although there are no quantitative figures to show the success registered since the inception of the CCS program to Serengeti National Park, the following have been observed:

- There is now an amicable relationship between the local communities surrounding the park and park employees. The hostility that existed prior to the 1990s is now history.
- Environmental conservation through increased awareness and sensitivity seems to be well understood, as shown by the wide use of more efficient charcoal stoves by over 50% of households in 20 pilot villages that had one or two women trained. Tree planting has also shown success in these communities.
- A growing number of illegal harvesting cases are dealt with by village councils. As an example, the Mikese Village in Serengeti District

dealt with over 400 offenses that were related to wildlife conservation between 1999 and 2002.

- There is an apparent decline of illegal activities such as cattle grazing. Poaching missions are being disrupted before being effected, and trophies are sometimes confiscated as a result of intelligence tips offered by villagers.

Problems associated with CCS

Although people living around Serengeti National Park now have a better understanding of wildlife conservation, and some of their social welfare problems have been partly attended to, they still do not have reliable sources of income, apart from the few who have had the opportunity to be employed by various institutions in the park, to meet their basic needs. The provision of conservation education, revenue sharing, and building of schools and health centers have all led communities to value wildlife as a purposeful resource. Certainly, people's attitude toward wildlife and the park are positive, but poaching levels have not declined significantly as was earlier envisaged. Poaching has an economic basis, and without changing the economic incentive system for the villagers, all efforts will bear little fruit. This argument is supported by Campbell et al. (2001), who carried out a study on sustainable use of wild land resources in the Serengeti area. The analysis made on individual cases during 1998 to 2000 showed that all arrests of individuals from the village were of males and that all were hunting within the park. The cases also indicated that all could be classified as belonging to the poorest section of the community. None reported owning livestock, and all were arrested with hunting weapons either purchased at the village or made by themselves. Some did not own land, and 50% gave financial reasons for hunting. This study suggests that benefits from the partnership may not be reaching the poorest members of the community at levels that are sufficient to stop people from hunting in order to meet their needs for cash or meat.

Conclusion

Poaching or illegal hunting in the Serengeti is mostly linked to income-related poverty. The majority of community members are poor and are unable to meet their basic needs. The need to pay taxes, village development contributions, or levies including education for their children and the purchase of clothes were identified as the most important factors, and were responsible for 79% of the need for cash. Wildlife was primarily hunted for economic reasons, to generate cash through the sale of wild meat rather than in response to a direct need for meat (Campbell et al. 2001). This is a challenge TANAPA has to face now. TANAPA needs to start thinking on the kind of program or projects that will help reach the poorest members of the communities and

generate income that will sustain individual requirements if natural resources conservation goals are to be achieved.

Acknowledgements

I would like to thank the TANAPA Acting Director General and his management for allowing me to participate in this important conference, the Conference Program Committee of the Yellowstone Center for Resources for the invitation, CIMU-TAWIRI for the provision of the maps, and Dr. Simon Mduma, Mr. Inyasi Lejora, Mr. J. Hando, Mrs. Theresia ole Mako, and Mr. A. Mbugi for reviewing this paper.

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Ecological mechanisms linking nature reserves to surrounding lands

Andrew J. Hansen and Ruth DeFries

Abstract

Many nature reserves are losing species despite their being well protected within their boundaries. We suggest that human land use outside reserves may strongly affect ecological processes and biodiversity within reserves. This is because nature reserves are often parts of larger ecosystems. Energy, materials, and organisms flow between nature reserves and these larger ecosystems. Human land uses that alter these flows result in changes in the reserve. This paper focuses on land use effects on nature reserves in two regional settings: Maasai East Africa and the Greater Yellowstone Ecosystem. We first examine extent of land use change in these regions. Next, we review the ecological mechanisms by which land use outside reserves may influence biodiversity within reserves. These mechanisms include habitat size, ecological flows, crucial habitats, and edge effects. Finally, we consider implications for management. We found that 45% of the total lands and 53% of the unprotected lands in the Maasai region have been converted to human land uses. Within Greater Yellowstone, 11% of the total lands and 43% of the unprotected lands have been converted to human land uses. Based on the species area relationship, we predict that this reduction in habitat area will lead to a loss of 14% of bird and mammal species in the Maasai region and 5% in Greater Yellowstone. The full conversion of unprotected lands is predicted to result in the loss of 36% of birds and mammals in Maasailand and 9% in Greater Yellowstone. Land use has also altered large mammal migrations in East Africa, causing a dramatic reduction in populations of wildebeest and other species. In Greater Yellowstone, low elevation population source habitats for birds have been converted to population sink areas due to rural home development. Consequently, subpopulations in Yellowstone National Park are at increased risk of extinction. Knowledge of the ecological mechanisms by which land use influences nature reserves provides a basis for policies for sustaining nature reserves and local human communities across these two important regions.

Introduction

The concept of national parks evolved in the mid 1800s, as the new world was being colonized by Europeans and wilderness was rapidly being converted to agricultural landscapes. The thought was that by removing the influence of humans, natural ecosystems would continue to maintain native species and ecological processes. In the 130 years or so since then, we have come to consider nature reserves as the cornerstone of our global conservation strategy.

As human land use has continued to intensify in unprotected lands, we increasingly rely on nature reserves to protect nature.

Oddly enough, many nature reserves, even large ones, have lost species (Parks and Harcourt 2002). This suggests that the reserves are not functioning as originally expected. We are realizing that nature reserves are often parts of larger ecosystems (Figure 1) (Hansen and DeFries in review). Ecological processes such as wildlife often span areas larger than nature reserves, and some animals migrate outside reserves. The semi-natural habitats around nature reserves are being occupied by people and used for agriculture, settlement, and other land uses. How might land use intensification outside nature reserves influence ecological processes and biodiversity within reserves? Modern ecological theory provides a basis for understanding these influences and for developing regional management strategies to maintain both reserve function and local human communities.

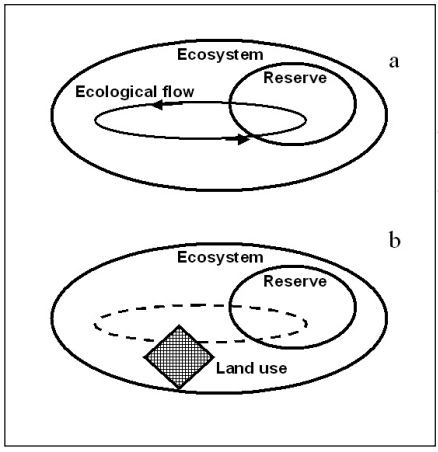


Figure 1a. Nature reserves as part of a larger ecosystem with energy, materials, and/or organisms flowing through the ecosystem. Figure 1b. Human influences in the unprotected portion of the ecosystem disrupt ecological flows and alter properties of the nature reserve.

We have been studying land use change and nature reserves in the Greater Yellowstone Ecosystem and in the region of East Africa occupied by the Maasai cultural group. This paper first reviews rates of land use change in these two regional landscapes; next, the ecological mechanisms by which land use change influences nature reserves are presented. Finally, we explore implications for regional management.

Land use change

The unprotected wildlands around nature reserves have been increasingly converted to human uses over the past decades (Hansen et al. in press). In some developing areas, road construction and demand for resources is leading to the harvesting of primary forest. In longer-settled areas, increases in wealth, technology, and population density are leading to more rural settlement. In the U.S. since 1950, for example, rural residential development has been the fastest growing land use type and now covers 25% of the lower 48 states (Brown et al. in review). Maasai East Africa and the GYE remain some of the largest tracts of wildlands in their regions. However, land use change is also happening in these places.

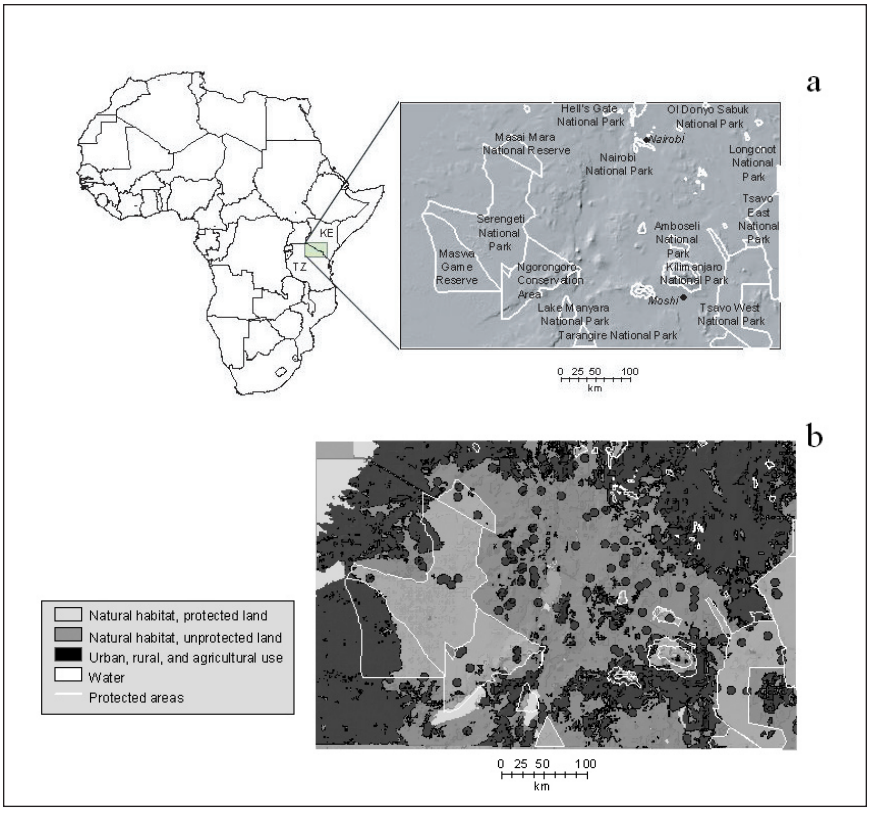
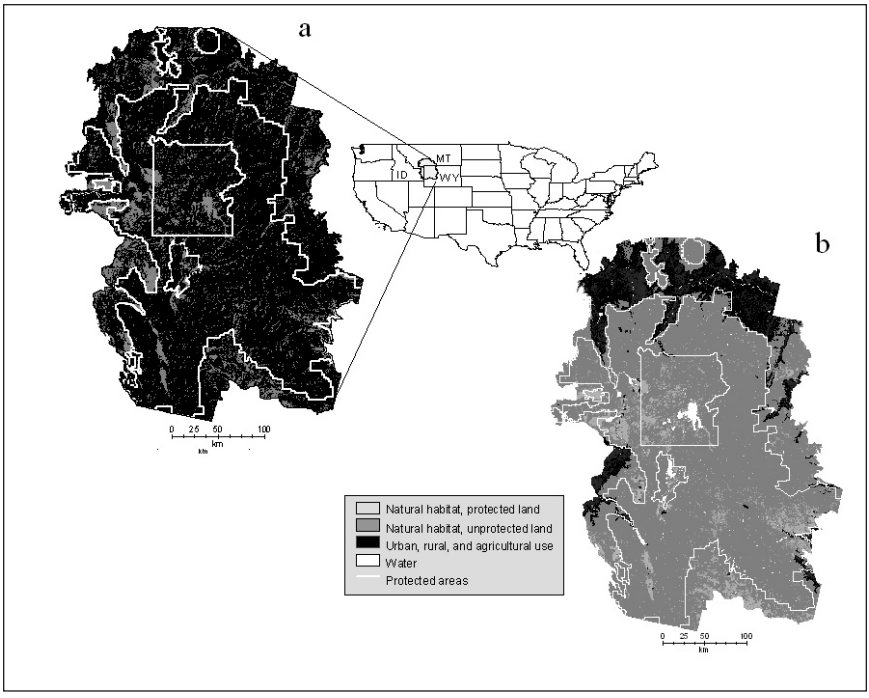


Figure 2a. The Maasai region of East Africa considered in this paper. Figure 2b. Distribution of land use types across the region including those occupied by human settlement or agriculture, natural habitats within protected land allocations, and natural habitats within protected parks and game reserves.

Maasai East Africa

Maasai East Africa in Kenya and Tanzania includes several national parks and game reserves (Figure 2). The area contains the largest migration of mammal herds on earth. Wildebeest, elephant, zebra, and other large mammals migrate over the region. Savanna vegetation is the basis for the predominantly pastoral lifestyle of the Maasai. However, small-scale farming and some commercial farming are increasing throughout the region (Serneels and Lambin 2001). Though the Maasai do not traditionally hunt for bushmeat, hunting and poaching are important for other ethnic groups in the region.

The rapidly growing population and changes in land tenure are causing massive land use intensification in the region, resulting in great reductions in many large mammal populations (Caro et al. 1998; Coughenour et al. 2000). Human population density has been rapidly increasing in recent decades, at



RUSTIGIAN ET AL. (IN REVIEW)

Figure 3a. The Greater Yellowstone Ecosystem. Figure 3b. Distribution of land use types across the region, including those occupied by human settlement or agriculture, natural habitats within protected land allocations, and natural habitats within protected parks and game reserves.

rates of up to 3% per year. An analysis of land use change by Rustigian et al. (in review) revealed that land use has intensified around many of the region's nature reserves. Agriculture and human settlement has increased rapidly to the west of Serengeti National Park, between Lake Manyara and Tarangire national parks, and around Kilimanjaro National Park (Figure 2). At present, some 45% of the total land area and 53% of the unprotected land areas are subject to intense land use.

Greater Yellowstone Ecosystem

The Greater Yellowstone Ecosystem (GYE) is made up of Yellowstone and Grand Teton national parks and surrounding public and private lands (Figure 3). The national parks are relatively high in elevation, while private lands are in lower elevations and include valley bottoms. Low elevation valley bottoms have fertile soils, longer growing seasons, and higher primary productivity. Consequently, many native species are concentrated in small hot spots at lower elevations. Land use varies with ownership. Outside the public lands, agriculture, range, rural residential development, and urban develop-

ment are common land use types on private lands. The GYE has 370,000 residents, most living in small cities. The national parks serve both as nature reserves and as sites for public recreation. Yellowstone National Park is one of the best-known nature reserves in the world and is unique in supporting wilderness species such as grizzly bears and free-roaming populations of large ungulates.

The GYE is undergoing a transition in demography and land use (Hansen et al. 2002). The population has grown 60% since 1970, fueled largely by wealthy immigrants that are attracted by the natural amenities. The dominant change in land use is from natural and agricultural land uses to urban and rural residential development. The number of rural homes has increased 350% over this time. Thus, the rate of land consumption has exceeded population growth. The areas of intense land use are mostly the productive, low elevation river valleys. Eleven percent of the total land area and 43% of the unprotected land area have been subject to intense land use (Rustigian et al. in review). Of the many miles of river flowing through private lands in the area, only 11% of the streamsides are not near homes, farms, or cities. Among aspen and willow habitats, critical for wildlife, only 51% of those in the Greater Yellowstone Area are free from intense human land use.

Ecological mechanisms

There has not been a systematic evaluation of the ecological consequences of such land use change around nature reserves on reserve function and biodiversity. Spatial ecology gives a basis for understanding these linkages. Island biogeography, habitat fragmentation, disturbance ecology, and metapopulation processes are all relevant to the spatial properties of nature reserves. Hansen and DeFries (in review) have put forth four general ecological mechanisms by which land use change outside reserves may influence biodiversity within reserves (Table 1). Here, we provide examples of some of these mechanisms for the Maasai and Greater Yellowstone regions.

Effective size. Land use intensification reduces the functional size of natural habitats, including the reserve itself and its surrounding intact habitat. Reduction in functional size can increase species extinction rates. A well-known tenet of island biogeography theory is that the number of species found on an oceanic island or in a habitat fragment is a function of its area. A large body of empirical evidence indicates that the number of species (S), increases with area (A), according to the equation $S=cA^z$, where c and z are constants (e.g., Rosenzweig 1995). The species area relationship has been used to predict the consequences of reducing the size of a habitat through conversion to intensive land uses (see Cowlishaw 1999).

Rustigan et al. (in review) used the species area relationship as a coarse, first-order estimate of likely species extinction rates associated with land use changes in our two study regions. Based on loss of habitats from pre-

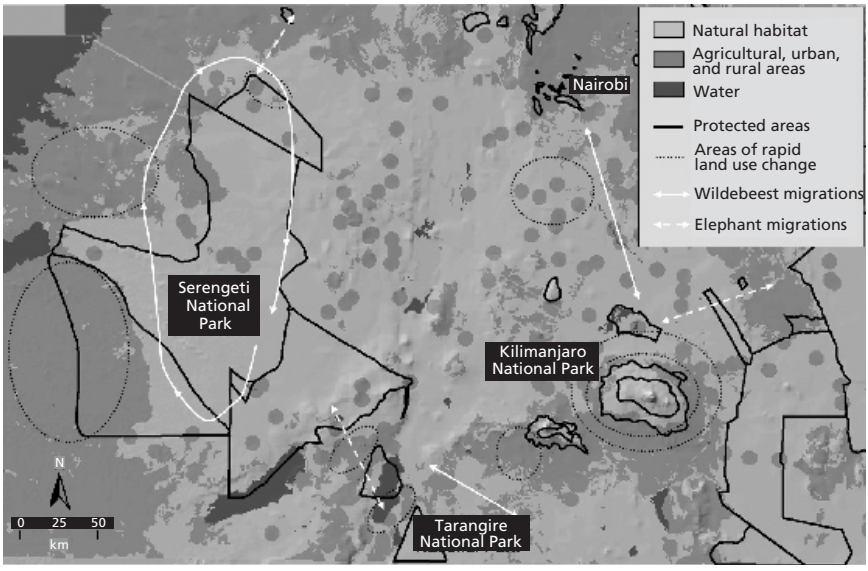
Mechanism	Type	Description	Examples
Change in effective size of reserve	Minimum dynamic area	Temporal stability of seral stages is a function of the area of the reserve relative to the size of natural disturbance.	Hurricanes in Puerto Rico
	Species area effect	As natural habitats in surrounding lands are destroyed, the functional size of the reserve is decreased and risk of extinction in the reserve is increased.	Fragmented forests in Kenya
	Trophic structure	Characteristic spatial scales of organisms differ with trophic level such that organisms in higher levels are lost as ecosystems shrink.	Loss of predators on Barro Coronado Island
Changes in ecological flows into and out of reserve	Initiation and runout zones	Key ecological processes move across landscapes. "Initiation" and "run-out" zones for disturbance may lie outside reserves.	Fire in Yellowstone National Park
	Location in air or watershed	Land use in upper watersheds or airsheds may alter flows into reserves lower in the water- or airshed.	Rainfall in Monte Verde Cloud Forest
Loss of crucial habitat outside reserve	Ephemeral habitats	Lands outside reserves may contain unique habitats that are required by organisms within reserves	Wildebeests in Serengeti National Park
	Dispersal/migration habitats	Organisms require corridors to disperse among reserves or to migrate from reserves to ephemeral habitats	Elephants in East Africa
	Population source sink habitats	Unique habitats outside reserves are population source areas required to maintain sink populations in reserves.	Birds around Yellowstone National Park
Increased exposure to humans at park edge	Edge effects	Negative human influences from the reserve periphery extend some distance into nature reserves.	Eurasian badgers in Donana Park

Facing page: Table 1. General mechanisms by which land use surrounding nature reserves may alter ecological processes and biodiversity within reserves. From Hansen and DeFries (in review).

European settlement times, they predicted a loss for Maasai East Africa of 14% of bird and mammal species. In the GYE, the predicted loss was 5% of bird and mammal species. These predictions for the GYE compare favorably to the number of species currently at risk in the ecosystem. If all unprotected habitats are converted to human land uses, 36% and 9% of birds and mammals are predicted to be lost from the Maasai and GYE regions, respectively. This analysis indicates that loss of habitat area across these regions is likely to lead to substantial extinctions of species within the protected areas.

Crucial habitats. Reserves often do not contain the full range of habitats and conditions required by organisms. In this case, organisms may move outside the reserve boundaries seasonally or during parts of their life histories to get access to crucial resources. If these crucial habitats outside reserves are subjected to intense land use, populations of organisms within reserves may be reduced.

Ecosystems with high heterogeneity in climate and food resources are especially likely to have organisms that move long distances over the land-



HANSEN ET AL. (IN PRESS)

Figure 4. Across the Maasai Region of Kenya and Tanzania, organisms such as wildebeest and elephant migrate outside of nature reserves such as Serengeti National Park seasonally. Replacement of nomadic pastoralism by crop agriculture and expansion of settlements has altered habitats outside of the nature reserves and resulted in substantial population declines of some migratory mammal species.

scape to acquire suitable resources. Populations of wildebeest in the Maasai Mara portion of East Africa's Greater Serengeti Ecosystem, for example, have declined by 75%, possibly due to the conversion of key seasonal habitat outside the reserve to commercial wheat farming (Serneels and Lambin 2001) (Figure 4). Elephants, zebras, and other large mammals have also decreased as human settlements and croplands have expanded in this region (Coughenour et al. 2000).

The crucial habitats outside reserves may be especially rich in resources and act as population "source" areas. These habitats may allow subpopulations to produce surplus offspring that disperse to less-rich habitats in nature reserves and allow persistence of the subpopulations in the reserves. For example, in the Greater Yellowstone Ecosystem, Hansen and Rotella (2002) found that bird populations were concentrated in small "hot spots" in productive, lowland settings outside protected areas (Figure 5). Intense land use

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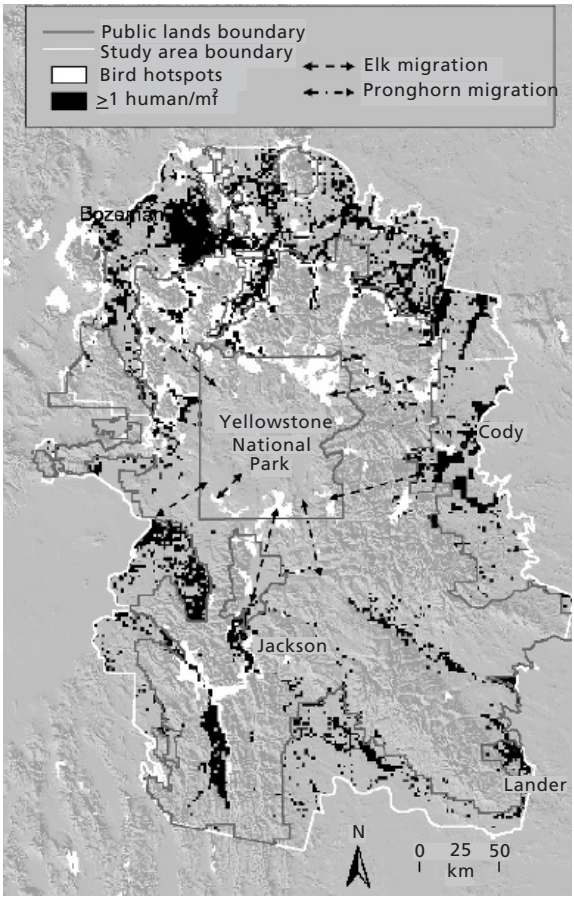

Figure 5. Distribution of bird hotspots and rural homes across the Greater Yellowstone Ecosystem. Bird hotspots are locations where predicted bird species richness and total abundance were more than 60% of maximum. Notice that bird hotspots are rare in Yellowstone National Park and are primarily at lower elevations near rural homes. Simulation model results suggest that low elevation hotspots were population source areas that maintained populations in Yellowstone Park. Rural residential development may have converted these source areas to population sinks, jeopardizing the viability of some bird species in the park.

Table 2. Criteria for managing regional landscapes to reduce the impacts of land use change outside of nature reserves on ecological processes and biodiversity within reserves.

Mechanism	Type	Design criteria
Change in effective size of reserve	Species Area Effect Minimum Dynamic Area Trophic Structure	Maximize area of functional habitats
Changes in ecological flows into and out of reserve	Disturbance initiation and runout zones Placement in watershed or airshed	Identify and maintain ecological process zones
Loss of crucial habitat outside of reserve	Ephemeral habitats Dispersal or migration habitats Population source sink habitats	Maintain key migration and source habitats
Increased exposure to human activity at reserve edge	Poaching Displacement Exotics/disease	Manage human proximity and edge effects

(exurban development) has converted these low elevation population source areas to sink areas and reduced the viability of subpopulations in the more marginal habitats in protected areas.

Increased exposure to humans at park edge. Human presence on the periphery of reserves may cause changes in ecosystem processes and biodiversity that extend varying distances into the reserve. On the western edge of the Greater Serengeti Ecosystem, poaching was found to lead to the death of approximately 40,000 wildebeest per year (Campbell and Hofer 1995). In the GYE, edge effects involve ecological processes such as disturbance rates and microclimate changes, human settlement and recreation, and introduction of exotic organisms and diseases. Many of these edge effects are proportional to the density of the adjacent human population (Brashares et al. 2001). Hence, these effects may be increased under human population growth around reserves.

In sum, myriad studies indicate that land use change has been an important driver of change in biodiversity within the protected areas of the Maasai and Greater Yellowstone regions. Natural habitats have been converted to more intense human land uses, with dramatic effects on native species and communities. Even the remaining natural habitats are not immune from the effects of land use change. Human activities in the matrix around natural habitats can alter ecological processes and organisms within the reserves. These findings suggest that the future ability of protected areas to maintain

current species richness depends on integrating reserve management with regional land use activities.

Regional management

How can we maintain nature reserves in the face of increasing human pressures? Clearly, management designs will need to consider not only nature reserves, but the entire regional landscape that the parts are embedded within. Knowledge of these ecological mechanisms can help provide design criteria for regional landscapes. Presented in Table 2 are criteria that follow from the ecological mechanisms that can be used to guide management and policies across the two study regions. Our challenge is to manage these regions to maintain nature reserve function and biodiversity as human land use intensifies in the unprotected portions of these regions.

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Conservation and contested landscapes: the potential for community-based conservation in East Africa and North America

Jim Igoe

Abstract

This paper draws from anthropological fieldwork in Tanzania and the United States. It addresses the experiences of two indigenous communities living on the boundaries of two national parks: Maasai herders and the Tarangire National Park; and Oglala Sioux and the Badlands National Park. Both parks were established in the latter half of the twentieth century following the traditional Yellowstone model. Both have ongoing conflicts with indigenous communities over the meaning and use of landscapes and natural resources. This paper argues that the effective management of the contested landscapes of Badlands and Tarangire will need to draw from recently developed models of collaborative conservation. It explores the potential obstacles to this approach in both parks, and suggests possibilities for overcoming them. Drawing from successful collaborative management models in other parts of the world, it suggests some possible ways forward for the Maasai, Oglala Sioux, and National Park Services of their respective countries.

Introduction: the case for community-based conservation

> *This conference will promote understanding of the ecological and social challenges facing parks in the Greater Yellowstone and East Africa, and initiate the development of useful strategies for sustaining the national park idea at the dawn of the twenty-first century. —Beyond the Arch conference program*

As the above quote implies, the concept and institution of "the national park" are under attack. Evidence of this attack is all around us. Shortly before the *Beyond the Arch* conference, Congress passed a new law allowing for oil exploration in wilderness areas—an objective of the Bush administration since their 2000 campaign. Similarly, it is no secret that the administration favors a drastic outsourcing of National Park Service (NPS) personnel, and even has designs for the privatization of national parks. In Africa, the story is equally bad, if not worse. Since independence in the early 1960s, there has been an ongoing tension between development and conservation. African leaders argued that their impoverished countries could not afford parks or conservation. Western conservationists countered that parks could become a major source of hard currency (Neumann 1998). This argument has created a fundamental confusion over parks in Africa: is their primary purpose to

preserve wildlife habitats or to promote economic growth? This tension has worsened since the free market reforms of the 1980s (Igoe and Brockington 1999; Igoe 2003).

In addition to the problems within parks themselves, conservationists have grown concerned that parks are increasingly threatened by processes and practices beyond their borders. Urban sprawl in the United States impinges on the borders of many parks. In Africa, large-scale commercial enterprises and growing human populations impinge on parks throughout the continent. These processes and practices have severely hampered wildlife migration routes in the vicinity of national parks both in Africa and the U.S. (also see Borner 1985). The danger in this situation is that parks may become island ecosystems, incapable of supporting their resident wildlife. The overcrowding of wildlife within national parks, and the resultant inability of park ecosystems to recover from grazing during certain times of the year, threatens the possibility of ecological collapse within national parks. This situation is compounded by the poaching of natural and cultural resources within parks, both by impoverished individuals and by well-armed networks of organized poachers.

The growing crisis of national parks set off by these conditions has prompted two types of responses from conservationists. The first is to call for the increased protection of park boundaries by paramilitary game guards, and the use of high-tech equipment such as radio collars. Dan Brockington (2002) has labeled this response "fortress conservation." The second response is to call for the involvement of communities in the conservation of wildlife habitats and the protection of park boundaries. Although I have some concerns about the ways in which community-based conservation is being implemented in some contexts (see Igoe 2003), I agree with those who argue that the future of conservation lies (among other things) with human communities living on the boundaries of parks and other protected areas.

The most important difference between community-based conservation and fortress conservation is that the former acknowledges that human societies are as complex as the natural ecosystems of which they are a part. Protected areas need to be flexible enough to adjust to the changes that are constantly occurring in the ecosystems they are meant to protect. The same can be said of the political side of conservation. As Brechin et al. (2002) argue, democracy is a necessary component to conservation. Democratic systems are dynamic enough to adjust to changes and to recover from mistakes. More totalitarian approaches to conservation, by contrast, are inherently inflexible. They tend to exacerbate longstanding conflicts between park authorities and neighboring communities. These conflicts are expensive to both park authorities and local people, as park authorities are forced to expend large sums of money on boundary enforcement while local people remain impoverished by

their continued exclusion from parks without economic alternatives.

The historical legacy of fortress conservation represents a major obstacle to community-based conservation in most parts of the world (Igoe 2003). This problem is clearly visible at both parks where I have conducted field research: Tarangire National Park, in northern Tanzania; and Badlands National Park, in South Dakota. Wildlife migration routes out of Tarangire have been blocked by large-scale commercial farms and human settlement (Igoe and Brockington 1999; Igoe 2002). Attempts by the AWF (African Wildlife Foundation) to implement community-based conservation have been staunchly resisted by local people (Igoe 2003). Since June 2002, a group of Oglala activists with close ties to the American Indian Movement has occupied the South Unit of Badlands National Park. They are demanding that the NPS (National Park Service) withdraw forthwith (*ibid.*). The basis for this claim is that the land contained in the South Unit belongs to the Oglala Sioux Tribe, since many tribal members refuse to recognize the memorandum of agreement that turned over the area to the NPS in 1976 (Burnham 2000; White 2002). The position of these Oglala activists is legally ambiguous, and the administration of Badlands has yet to determine an effective response to their demands. Instead, they have remained at a destructive standoff.

These examples demonstrate that community-based conservation needs to break from the historical legacy of fortress conservation—superficial attempts to enroll communities in conservation will not succeed. In the remainder of this paper, I address the major variables that influence options for community-based conservation in different parts of the world. Understanding the role of these variables in specific situations will be an important first step to creating flexible approaches to ecosystem protection and community empowerment. The variables to be addressed in the body of this paper are as follows:

- **Colonial histories and conservation encounters.** National parks were first imposed on indigenous communities throughout the world during the late European expansion and empire building (roughly 1872–1961). While parks came with specific types of ideological baggage and institutional restrictions, their impacts on indigenous communities varied from place to place and from time to time. Understanding the nature of these encounters in specific situations is essential to the success of community-based conservation.
- **Sovereignty and political clout.** In spite of their increasing use of community-based conservation rhetoric, western conservationists appear most inclined to enter into alliances with indigenous communities who control important conservation resources. This variable is directly related to the legal rights of indigenous and other

local communities over land and other natural resources.

- **Civil society and NGOs (non-governmental organizations).** In order for local people to participate effectively in community-based conservation, it is necessary to have conditions and institutions that foster democratic action and ideas. Conservation NGOs have played a central role in the politics of community-based conservation at specific locations. Indigenous NGOs have been important catalysts for the participation of local people in community-based conservation programs in their communities.
- **Local attitudes toward conservation.** It is dangerous to assume that local people understand the word "conservation" in the same way as western conservationists. If local people have had positive encounters with conservation, then their attitudes are likely to be positive. If they have had negative encounters with conservation, then their attitudes are likely to be negative. Like other people, indigenous people form opinions based on experience. It is facile to believe that local attitudes toward conservation should change just because conservationists promise to do things differently in the future. It would be irrational for local people to believe these claims without substantial proof.
- **Capacity and indigenous environmental knowledge.** As a result of historical dispossession, and their marginal position in the world economy, indigenous people are less likely to possess the skills and knowledge necessary to manage natural resources according to western conservation paradigms. The other side of the coin is that western conservationists have a poor track record of incorporating indigenous skills and environmental knowledge into their conservation paradigms.

Colonial histories and conservation encounters

> *Once we were happy in our own country and we were seldom hungry, for then the two-leggeds and the four-leggeds lived together like relatives, and plenty for them and plenty for us. But the Wasichus came, and they made little Islands for us and other little islands for the four leggeds, and always these are becoming smaller, for around them surges the gnawing flood of the Wasichu; and it is dirty with lies and greed.* —Black Elk, Lakota Holy Man, from *Black Elk Speaks*.

> *We were told to sign. It was never explained to us. None of the elders knew how to read or write. You white people are very tough.* —Signatory of the 1958 agreement stipulating

> that the Maasai would leave the Serengeti National Park (Bonner 1993, 175).

The creation of national parks, both in the U.S. and East Africa, entailed the forced exclusion of indigenous communities. While the popular discourse of national parks is that they protect wildernesses, free of human beings and any evidence of their activity, the reality of the situation is that park authorities needed to create these wildernesses before they could protect them. The details of these histories are beyond the scope of this paper, but are well worth reading about for anyone concerned for conservation and equity issues, as American parks like Yellowstone, Glacier, and Yosemite "have served as models for preservationist efforts, and native dispossession, the world over" (Spence 1999, 5; also see Keller and Turek 1998; Neumann 1998; Jacoby 2001; Igoe 2003).

For purposes of this paper, the most important aspect of conservation encounters is that they are unique in every context. It is imperative, therefore, that conservation interventions begin by reconstructing historical events surrounding the creation of a park and their implications for the future of the park in question. In both the [continental] United States and East Africa, indigenous communities were removed from parks by force, trickery, and bureaucratic fiat. Furthermore, park authorities have continued to expand park boundaries at the expense of local people, even in recent times (Bonner 1993; Keller and Turek 1998; Neumann 1998; Spence 1999; Burnham 2000; Jacoby 2001; White 2002; Igoe 2003). In such situations, it will be necessary to redress the historical grievances of local people, both in the interest of equity and for building relationships of trust that are the foundation of effective community-based conservation. These conditions are very different from those in Alaska and Australia, where local people were active participants in the creation of parks in the hopes that they would protect their lands from large scale commercial interests (Catton 1997; De Lacy 1994; Lawrence 2000). They also contrast with Brazil, where indigenous communities were allowed to live inside parks as another type of "endangered species" (Davis 1977; Nugent 1994). In these cases, there were more opportunities for alliances between conservationists and local people.

The legacy of historical encounters also varies from park to park within specific countries. At Yellowstone, for instance, indigenous communities were removed from the area prior to the creation of the park, which means that Yellowstone has no direct boundary conflicts with indigenous communities (Nabokov and Loendorf 2002). Mesa Verde National Park was created through dubious land swaps with the Ute Mountain Ute, and Ute leaders created a tribal park in an effort (among other things) to pre-empt further encroachment onto their land by the administration of Mesa Verde. The boundaries between Mesa Verde and the tribal park are still contentious

(Burnham 2000). At Badlands, where park and reservation overlap, the status of the park is still open to question (White 2002; Igoe 2003).

Similar differences can be seen in Tanzania. Maasai herders left the Serengeti after signing a "compromise" with the British that would allow them to continue living in the Ngorongoro Conservation Area (Bonner 1994; Neumann 1998). Tarangire National Park, by contrast, was created in 1971 after the British had already left Tanzania. In the mid-1980s, however, a group of European and African conservationists tried to expand park boundaries to the east, a move that has galvanized community opinion against the park to the present day (Igoe and Brockington 1999; Igoe 2003). Finally, local people were violently evicted from the Mkomazi Game Reserve in 1988. Although the Tanzanian Supreme Court later proclaimed these evictions illegal, they were never overturned, and local people were never meaningfully compensated (Brockington 2002).

Clearly, cookie-cutter approaches to conservation are bound to run into trouble trying to operate in such a diversity of socio-historical conditions. Fortunately, previous approaches of ignoring (or worse, covering up) conservation histories are falling away in favor of approaches that favor historical reconstruction. What remains to be seen about this promising development, however, is how historical information will actually be used in practice.

Sovereignty and political clout

> *Very few conservationists could truthfully say that they would vigorously support subsistence hunting if the natives had zero political clout.* —Robert Weeden, President of the Alaska Conservation Society, concerning the uneasy alliance between conservationists and native communities in Alaska in the 1970s (Catton 1997, 209)

In the past 15 years, discourses about the importance of indigenous communities for effective protected area management have achieved a surprising prominence in international conservation circles (see WWF 1997). Individuals within institutions like the IUCN (International Union for the Conservation of Nature and Natural Resources), the WWF (World Wide Fund for Nature), and the NPS have worked tirelessly for indigenous rights. Some have even advocated for new types of more flexible protected areas that would include local people rather than excluding them. In spite of the efforts of these individuals and indigenous activists from around the world, however, the discourses and ideas they promote have in many cases remained little more than discourses and ideas. Tangible support by western conservation organizations for indigenous land rights has been inconsistent. Actual alliances between conservationists and indigenous peoples—especially

where they entail the management of protected areas by indigenous communities—remain scarce on the ground.

The reasons why these new discourses have not translated well into practice are too complex to address effectively in this short paper (but see Catton 1997; Burnham 2000; Brockington 2002; Igoe 2003). Suffice to say that people-oriented approaches to protected area management are frequently at odds with entrenched approaches premised on the exclusion of local people. These established models are defended vehemently by powerful hardliners within conservation NGOs as well as within government agencies. They also serve the interests of powerful corporations that have made sizeable investments, and reap sizeable profits, in parks both in the U.S. and East Africa. In Africa and other developing regions, the traditional protected area model is also valuable to underpaid park officials who use their positions to supplement their income through various forms of misappropriation (cf. Bayart 1993; URT 1993; Chabal and Daloz 1999). In all cases, keeping national parks inviolate has become a point of pride for politicians and higher-ups within park bureaucracies. As such, it has also become part of the institutional culture of parks and an imperative for the rank and file of park personnel. The problem with this perspective is the assumption that parks are the property of the nation and therefore belong to everyone. From the perspective of people displaced by parks, this argument appears ridiculous. They pay the costs of parks, while receiving little or nothing in return. This discrepancy is even starker in countries like Kenya, where a small minority of national elites profit from parks that are visited almost exclusively by wealthy outsiders.

As in any other political situation, indigenous communities seem to do best in cases where they have some sort of leverage or political clout. In Brazil, the position of indigenous communities within parks became the basis of alliances with international conservation organizations (Turner 1993). A similar situation has prevailed in Panama, where the Kuna Indians have created a tribal park to protect their indigenous homeland (Chapin 2000). In Australia and Alaska, where indigenous communities have been able to lay legal claim to land within parks, government agencies have made them partners in protected area management. In Nepal, a Third World country that was never colonized, western conservationists have been unable to take a heavy-handed, exclusionary approach (Stevens and Sherpa 1993). All of these situations contrast sharply with both the U.S. and East Africa.

Two related variables appear to influence alliances between conservationists and indigenous communities on a global scale: sovereignty and legal rights to land, especially in the form of an officially designated corporate territory. In situations where such rights are present, indigenous communities consistently enjoy a prominent role in protected area management and/or receive large sums of money from international conservation organizations

(Igoe 2003, Chapter 5). In cases where indigenous communities do not enjoy these kinds of rights, they have fared much worse in the field of collaborative conservation.

The starkest example of this problem is Tanzania, where colonial land laws were designed specifically to transfer land from African communities to European settlers and colonial development/conservation projects, including parks. Central to this legislation was the idea of "permissive rights of occupancy," which meant that Africans could continue living on their traditional homelands as long as the governor didn't want to take the land away. If land was wanted for any reason, it could be taken from communities with a minimum of legal and bureaucratic procedure. The situation remains nearly unchanged in contemporary Tanzania, except that the government evicting local people from their land is African instead of European (URT 1993; Shivji 1998). From the perspective of local people, however, this is an unimportant detail. Evicted is evicted, especially when no compensation is involved.

This unfortunate situation presents international conservation organizations with formidable obstacles to their efforts to protect biodiversity and wildlife habitats in Tanzania. Organizations like the AWF and WWF have introduced programs to enroll local people in the protection of wildlife habitats under the rubric of community-based conservation. However, most local people actually have little say over the management of land and other natural resources in their communities. Consequently, they have little to offer western conservation organizations. The traditional resource management systems of rural Tanzanians have frequently been transformed in ways that are inimical to protected area management (also see Igoe 2002). Furthermore, rural people displaced by parks and large-scale commercial enterprise have also become a threat to wildlife habitats (Igoe and Brockington 1999; Brockington 2002; Igoe 2003). Finally, and most importantly, the biggest threat to wildlife habitats in Tanzania is usually not local people at all. More commonly, it is large-scale extractive enterprises that present the largest threat to biodiversity in East Africa—from commercial farms and mines that disrupt wildlife migration routes in the upcountry, to prawn farms that destroy mangrove swamps on the coast.

Because these enterprises threaten biodiversity as well as local livelihoods, they appear as a logical common ground for an alliance between western conservation organizations and local people. For the most part, however, western conservation organizations have been reluctant to take on the powerful vested interests behind these large-scale enterprises. This makes sense, as these organizations enjoy a privileged position in countries like Kenya and Tanzania. They are unlikely, therefore, to rock the proverbial boat (see Igoe 2003). What this means in practice is that local people are treated as a problem rather than as potential allies. Community-based conservation

programs wind up revolving around revenue sharing and technical development projects, missing important opportunities to incorporate indigenous environmental knowledge and enroll local people in biodiversity protection.

The situation in the U.S. is somewhat different, because some indigenous communities here do enjoy legal rights over land and natural resources, along with sovereign status. However, this situation has not consistently translated into political clout for indigenous communities when it comes to issues of protected area management (Keller and Turek 1998; Spence 1999; Burnham 2000; Jacoby 2001). In some cases, indigenous groups were removed from places that became protected areas (Yellowstone). Some parks were created by the "ceding" of reservation land (Glacier and Mesa Verde), and in other instances, small indigenous communities have remained resident in national parks, but with few legal rights (Death Valley, Grand Canyon, and Yosemite). A particularly challenging case is that of the Oglala Sioux and the Badlands National Park, where park land and reservation land overlap, and the legal authority of tribe and park administration has become blurred.

The details of the Badlands case are beyond the scope of this paper (but see McCabe 1995; Burnham 2000; White 2002; Igoe 2003). What is important about this case is that it presents a situation where the NPS and a tribal government could become partners in the management of a protected area. Unfortunately, this has not occurred. In fact, members of the Oglala Sioux Tribe are currently at a standoff with the administration of Badlands National Park. Oglala traditionalists have occupied the South Unit of Badlands, and are demanding that the NPS withdraw from the land forthwith. Part of the reason for this situation is that the NPS lacks an established paradigm for collaborative management with indigenous communities. Therefore, such an approach is not an established part of its institutional culture. More importantly, the history of Badlands has been fraught with conflict. The NPS only gained management authority over the land in question after a 15-year campaign of cajoling and coercion by Department of the Interior bureaucrats, which tribal leaders staunchly resisted. The agreement was finally signed in 1976 by a tribal administration that many tribal members consider to have been fundamentally corrupt. It is not surprising, therefore, that these individuals view the agreement as illegitimate.

The Badlands case demonstrates that the axe of sovereignty can cut both ways. While tribal governments have been successful at advocating on behalf of their constituents, they sometimes also enter into agreements that are detrimental to indigenous communities—agreements that are legally binding in perpetuity. This problem reflects the history of indirect rule both in the U.S. and in East Africa. Because of their desire to streamline their negotiations with indigenous communities, as well as to transform said communities according to western bureaucratic standards, European administrators worked to cre-

ate tribal governments—a process that was widely resisted in both Africa and North America. As Ronald Niezen (2003) points out, bureaucratic power, without a natural resource base to provide the foundation of economic development, is a recipe for despotism and corruption. Furthermore, allowing a small group of people to represent the interests of an entire community or country discounts the diversity of interests and perspectives that are essential to effective collaboration between [outside] conservationists and local people. Opening up the conservation arena to include such a diversity of voices is messy (and therefore frightening to some), but the alternative is to act as though some interests or perspectives are irrelevant or simply do not exist. The current situation at Badlands is a cautionary tale of why this type of approach is a bad idea in the long run.

Civil society and non-governmental organizations

> *Civil society occupies a unique space, where ideas are born, where mindsets are changed, and where the work of conservation and development doesn't just get talked about, but gets done*. —Kofi Annan, U.N. Secretary General, speaking to a civil society forum in Johannesburg, South Africa, September 2, 2002

Since the fall of the Soviet Union in the early 1990s, the question of democracy has become a central concern in international governance and development circles. Likewise, and perhaps a bit more surprisingly, it has become a concern of international conservation. In spite of initial enthusiasm for multi-party transitions in former one-party states like Kenya and Tanzania, however, it quickly became apparent that electoral politics were not sufficient to bring about democracy. People needed to be instilled with democratic world-views, and there was a spreading call for grassroots participation in conservation and development at the community level—something that has been sadly lacking in both the U.S. and East Africa.

In the discourse of democracy and community-based conservation, the putative space in which grassroots participation takes place is known as civil society. The most concise definition of civil society of which I am aware comes from anthropologist Robert Hefner (1998, 5–6):

> Though most writers differ on its details, most agree in describing civil society as an arena of friendships, clubs, churches, business associations, unions, and other voluntary associations that mediated the vast expanse of social life between the household and the state. This associational sphere is seen as a place where citizens learn habits of free

> assembly, dialogue, and social initiative. If managed properly, it is suggested, civil society can also help bring about that delicate balance of private interests and public concern vital for a vibrant democracy.

In the context of community-based conservation, civil society has come to be represented in most cases by officially registered NGOs, which operate on a number of levels. For purposes of this paper, three types of NGOs are of particular importance: international conservation NGOs, like AWF, the WWF, and IUCN; national conservation organizations, like the Sierra Club and National Parks Conservation Association; and indigenous NGOs, which operate at the community level and are usually run by community members themselves.

International conservation organizations have more influence in Africa than in the United States. The African colonial experience left countries like Kenya and Tanzania with weak states, lacking the resources and expertise to undertake conservation on their own. Consequently, international conservation organizations have had a tremendous amount of influence on conservation policy and practice in East Africa, including the establishment and funding of national parks. The influence of these organizations is evidenced by the ubiquitous panda (WWF) and elephant (AWF) logos that adorn government vehicles and the entrances to national parks (see Bonner 1993; Neumann 1998). For reasons described above, these organizations have not entered into significant alliances with indigenous communities in East Africa, as they have successfully done in other parts of Africa, Asia, and Latin America (see Igoe 2003).

In the United States, with its powerful government and imperviousness to trends in international governance, international conservation organizations have been much less influential. National organizations, on the other hand, have been significant in their influence. To be sure, the history of the largest of these organizations is inextricably linked to the history of national parks in this country. John Muir, founder of the Sierra Club, was also a champion of Yosemite National Park. George Bird Grinnell, founder of the Audubon Society, was also instrumental in the creation of Glacier National Park. It is not surprising, therefore, that these organizations strongly subscribe to the traditional exclusionary approach to protected area management, and that they have consistently opposed indigenous land rights whenever they conflict with what they perceive as conservation interests (Spence 1999; Burnham 2000). Because of their elite-centric approach to conservation, it has been difficult for these organizations to link with grassroots social movements dealing with environmental issues. This situation is evidenced by the difficulties experienced by the Sierra Club in developing an environmental justice

component to its activities, and stands in stark contrast to Australia, where the Australian Conservation Association has supported indigenous land rights since the early 1970s. It is probably no coincidence that co-management of national parks is legally impossible in the continental United States, while it has become an increasingly common approach to protected area management in Australia and is currently also on the rise in Canada.

Indigenous NGOs can also have tremendous influence on park–community relationships. In Tanzania, this relationship turned out to be rather dysfunctional. In my research area, one Maasai NGO played the role of patsy for the AWF, working to enroll local people in community conservation with extraordinarily limited success. Meanwhile, a rival NGO played the role of spoiler for community-based conservation. Representatives of this organization regularly attended and disrupted meetings between the AWF and local people. Most local people did not trust the Maasai NGO that supported the AWF. They didn't necessarily trust the other NGO either, but they saw it as the lesser of two evils. The bottom line was that the AWF had very little success in convincing local people that it was bringing a "new kind of conservation" that would benefit them significantly. In the end, they gave up and went away (Igoe 2000; Igoe 2003). Such antagonism need not automatically prevail. PEMANSKY, a quasi-NGO of the Kuna in Panama, entered into successful alliances with a number of international conservation organizations. In the process, the organization successfully raised millions of dollars for the protection of biodiversity as well as Kuna land rights (Chapin 2000).

It is important to note that indigenous NGOs have yet to make a comparable impact on community-based conservation here in the United States. While the NPS does work with indigenous NGOs, conservation and development work for tribes in the U.S. is dominated by tribal governments. Furthermore, indigenous NGOs in this country are primarily oriented toward tribal governments and Bureau of Indian Affairs funding. This makes it difficult for them to define or follow alternative agendas (Kathy Pickering personal communication). This is unfortunate, because it makes it difficult for diverse interests to influence protected area management. As noted above, this can lead to intractable problems. It is all fine and well for the superintendent of Badlands National Park to wave around a memorandum of agreement to trump protesters at community meetings. Unfortunately, this memorandum isn't worth the paper it's written on when it comes to removing Oglala occupiers who are disrupting park management. Finally, neither tribal governments nor indigenous NGOs in the U.S. have received substantial funding from international conservation organizations, although they probably could access this type of funding—especially groups like the Ute Mountain Ute, the Navaho, and the Salish Kootenai, who have established their own parks and wilderness areas.

Local attitudes toward conservation

> *We have to be very careful about what we say. Those conservationists are just waiting for us to make a mistake.* —Ernest House Senior, Ute Mountain Ute Council Member, speaking to a council meeting in July 2002

> *Tanzania National Parks Authority does not understand good neighborliness (Tanzania's community-based conservation program). Their cattle (wildlife) come to graze in our villages, and we do not bother them. If it rains in the park we can't go there, even if our cattle are dying. If we do go into the park, we are beaten and our cattle are taken away. This is not good neighborliness. I know all about Tanzania National Park Authority's good neighborliness. I've seen it with my own eyes, and we don't need it here. We would all be better off if they took their good neighborliness and went somewhere else.* —Loodo Ole Loure, Maasai Elder, speaking at a meeting on community-based conservation in November 1996

> *We Eskimos would like to join the Sierra Club. We have no money, but lots of thoughts and collective action.* —William Willoya, Inuit Activist, in 1969, advocating for the creation of a wilderness area that would also protect Inuit land rights (Catton 1997, 195)

Park administrators and representatives of western conservation organizations frequently view indigenous people as being intractable and ignorant. Negative local attitudes toward conservation are described as unfounded and treated as a hindrance to conservation—as something that needs to be changed or at least worked around. During my work in Tanzania, representatives of the AWF frequently expressed bewilderment concerning local people's suspicious attitudes toward community-based conservation. When people pointed out that conservationists had come and taken their land, the standard response was, "that was a long time ago; we don't do things that way any more." I have heard similar discourses in my work here in the U.S., such as when a Sierra Club representative described Native Americans' asserting their rights to land and natural resources as dressing the conservation problem in "Indian blankets." NPS personnel express dismay at the confrontational attitudes of some Native American groups, saying, "they don't really know what they want" or "they just want to hunt in the park."

It is important to remember, however, that most peoples' attitudes reflect something about their experiences. When western conservationists confront

indigenous communities whose attitudes toward conservation are very different than their own, their immediate reaction is frequently to assert that there is something irrational or wrong about these attitudes. A more rational response would be to begin with the assumption that local people's different attitudes reflect different experiences. For them, the word "conservation" may have very different meanings and associations than it does for people in the West—especially those who have dedicated their lives to conservation and are emotionally invested in the concept.

The ideas of most Americans concerning conservation are shaped by popular ideas and images, to which they are exposed through the media and formal education. They experience conservation at a distance. When they send a check to the WWF or the Sierra Club, they rarely see how their money gets used. Indigenous communities, by contrast, tend to be on the "business end" of conservation. They experience conservation directly. Their ideas concerning conservation are shaped in large part by these direct experiences. The nature of these experiences influences how specific groups perceive and respond to conservation.

When I asked my informants in Tanzania if the Maasai did conservation, they usually responded, "Of course not, why would we do anything so ridiculous?" If I asked them, however, whether they ever managed the environment in ways that were beneficial to wildlife, they often responded, "Of course, don't you see that more animals graze in the areas that we burned last year than in other areas?" In short, most of my informants didn't describe conservation as an activity, but as an alien force over which they had no control. I witnessed similar attitudes at a meeting of the Ute Mountain Ute Tribal Council, in which a council member spoke about tribal involvement in a water project opposed by the Sierra Club. He said, "We have to be very careful about what we say. Those conservationists are just waiting for us to make a mistake." This is an especially interesting statement, considering that the Ute Mountain Ute have their own tribal park, which would make them conservationists in almost anyone's book. Here again, we see conservation described as an outside force, rather than something that local people might undertake themselves. Similar attitudes prevailed among Oglala traditionalists who are occupying the southern part of Badlands National Park. Conservation is seen as a political force, one that is controlled by powerful outsiders, and a negative one to boot.

This situation stands in contrast to the Inuit who wanted to "join the Sierra Club." Other groups, like the Anangu in Australia and the Kayapo in Brazil, have also sought alliances with international conservation organizations. The Kuna of Panama started a conservation initiative that achieved international renown. While members of these groups might not see conservation as a wholly positive thing, they do see that it has possibilities. It

can become the basis for alliances to protect traditional homelands and the valuable natural resources they contain. It can also become the basis for initiatives that will bring unprecedented levels of funding to marginal indigenous groups. Differences in local attitudes toward conservation appear closely tied to the differences in the experiences of colonial processes outlined above.

The question of local attitudes is especially important because so many conservation interventions revolve around changing them. Unfortunately, many of these interventions begin with faulty assumptions. For instance, community-based conservation in Africa begins with the premise that local people need to learn to value nature. Of course, most already do—they just value it in ways that are not compatible with western conservation agendas. If local attitudes toward conservation are bad, this probably has more to do with negative experiences with an alien force called "conservation" than with inherently problematic ways of looking at the world. Conservation interventions geared toward changing local attitudes should begin by asking where they come from in the first place. Is there a historical basis for an alliance between western conservationists and indigenous communities? If not, what might provide the basis of such an alliance? What is the nature of community grievances toward conservation, and how can those grievances be redressed? What would be the most effective ways for building trust between conservationists and indigenous communities? Most importantly, what do indigenous conservation practices look like, and how could they be incorporated by mainstream conservation?

Capacity and indigenous environmental knowledge

> *Replacement of European staff by untrained, unqualified (African) men will spell disaster for game.* —Russell Train, Chief Founder of the African Wildlife Foundation, Speaking about the impending independence of Kenya and Tanzania in 1961 (Bonner 1993, 57)

> *We felt that under new African governments, all prospects for conservation in nature would be ended.* —Max Nicholson, Founding Member of the World Wildlife Fund, explaining the interference of western conservation organizations in the internal affairs of Kenya and Tanzania during the 1960s (Bonner 1993, 64)

The final variable addressed in this paper is the question of capacity. The administration of parks and other types of conservation programs requires special skills. Unfortunately, the skill set it requires, such as computer and grantwriting skills, are often in short supply in indigenous communities. As

a result, it is extraordinarily difficult for indigenous communities to become partners in protected area management. People who acquire these types of skills frequently leave their impoverished communities for jobs in urban areas or conservation and development bureaucracies. Those who stay are in short supply and high demand. Consequently, they are frequently overburdened and almost always underpaid. This means that they are forced to look for other sources of income, which takes them away from conservation activities. Their other alternative is to live in abject poverty, a lifestyle most are understandably unwilling to accept. Finally, and perhaps most tragically, the efforts and achievements of these indigenous intelligentsia frequently go unrecognized both by their own communities and by western conservationists.

If indigenous leaders lack the skills to do conservation, or there simply aren't enough of them to do it, this can be as disastrous as any of the other problems outlined in this paper. Training and capacity building are therefore essential to collaborative conservation with indigenous communities. This presents two dangers. First, training usually involves indoctrination. Not only are indigenous leaders given new skills, they are also immersed in the cultural values that go along with them. Second, conservationists frequently use lack of community capacity as a reason not to involve local people in protected area management. In spite of these dangers, the issue of community capacity is pragmatically important. Even the Ute Mountain Ute, who would prefer to keep westerners out of their business, cautiously engage experts to teach them the skills necessary to run their tribal park.

The question of capacity is a two way street. While western conservationists are usually well trained to do conservation, they frequently lack the capacity for intercultural communication necessary to do community-based conservation. They are also frequently unaware of indigenous environmental knowledge and resource management systems. As a result, they have a difficult time incorporating indigenous knowledge and practice into the conservation models that inform their daily activities. The devaluation of indigenous environmental knowledge is one of the central problems of contemporary western conservation models. Finding ways to value and incorporate indigenous knowledge through democratic inclusion of indigenous communities will be essential to the continued survival of national parks and the national park idea in many parts of the world.

Conclusion: building alliances and "getting to yes"

> *I am personally not very interested in animals. I do not want to spend my holidays watching crocodiles. Nevertheless, I am entirely in favor of their survival. I believe that after diamonds and sisal, wild animals will provide Tanganyika (Tanzania before 1964) with its greatest source of its income. Thousands*

> *of Americans and Europeans have a strange urge to see these animals.* —Julius Nyerere, First President of Tanzania

> *Do you know what the park service has always been able to gain that nobody even recognizes or talks about? Indian land and park land have been traditionally immune from large-scale development. That relationship is the land base. It just extends beyond park boundaries. Endangered species, both plant and animal, somehow find a way to maintain their existence on Indian land just outside of parks.* —Don Whyte, Mesa Verde Ranger and Ute Mountain Ute Tribal Member, speaking to investigative journalist Phillip Burnham (2000, 267–268)

In many ways, unpacking the complexities of conservation problems flies in the face of traditional approaches to conservation and development. Simplicity is an essential ingredient in the realms of policymaking and NGO fundraising. Cookie-cutter approaches to conservation and development policy require a world in which diverse, complex problems can be made to fit into a limited set of policy boxes. Meanwhile, leaders of conservation NGOs are faced with the daunting challenge of distinguishing themselves from a growing field of similar organizations in an intensely competitive fundraising environment. In the space of about 30 seconds, they need to convince people to write a check to their conservation organization as opposed to another. In this brief message, they must present both a problem and a solution. Furthermore, they must convince their target audience that the problem can be solved by giving money to them (cf. Nugent 1994 and Maren 1997). There is little space for complexity under these extraordinarily difficult conditions.

Cookie-cutter policies and NGO fundraising imperatives also do not fit well with the growing recognition on the part of ecologists and social scientists that conservation problems are extraordinarily complex, not to mention context-specific. Unfortunately, this lack of fit has become a widely-recognized sticking point for the incorporation of ecological and human complexity into conservation and development interventions, even those that are explicitly designed to be community-based. This fundamental problem presents conservationists with two possible courses of action: to continue to obfuscate the complexity of conservation and protected area management in an effort to keep it simple; or to find more flexible and complex (but admittedly less tried and true) ways of doing conservation.

The first approach is more attractive in the short term, because it appears to protect the precarious gains that conservationists have made in the twentieth century, which are currently under direct attack by an especially virulent form of free market capitalism. In the long run, however, this approach cre-

ates more problems than it resolves. Simply sweeping complexity under the rug will not make it go away. Most commonly, human communities on the margins (and sometimes inside) of parks threaten the continued viability of parks—including areas outside of parks that are essential to biodiversity. By ignoring the presence of these communities for so long, western conservationists have gotten themselves into a proverbial Chinese finger trap. They respond to the perceived threat of indigenous communities by strengthening park boundaries, while bemoaning the fact that the parks, whose boundaries they are busily reinforcing, are not effective models of biodiversity conservation.

Developing new approaches to protected area management that account for both human and ecological complexity will be a contentious political process, one that will almost certainly push some people well out of their comfort zone. It is also important to acknowledge that there are a growing number of people within the conservation movement who are simply opposed to community-based conservation. In fact, advocates of community-based conservation are currently organizing themselves to address the "backlash" against their organizations within the conservation movement. In light of this problem, the conservation movement needs to set priorities for itself and find the political will to promote them. However, expecting such a diverse group of people to speak with one voice—let alone become a political vanguard—is simply unrealistic.

Nevertheless, it is incumbent upon people within the conservation movement to address the fundamental contradictions that continue to plague our work. There is a real danger that addressing these contradictions will strengthen growing rifts within the conservation movement. However, we will all fare better by listening to one another rather than tuning each other out. By listening, rather than stereotyping, it will become increasingly clear what we are disagreeing about—and quite probably we will discover that there is more common ground within our movement than we previously assumed.

Another area where we could use some clarity is in defining who the so-called enemies of our movement actually are. In the past 10 years, there has been a tendency for conservationists to circle the wagons without really looking to see who might be shooting at us. Anyone who may threaten conservation agendas, narrowly defined, is seen as a potential enemy, from indigenous communities to tourists, social scientists, large-scale commercial enterprise, and even ecologists whose ideas run counter to the short-term imperatives of NGO fundraising. Conservationists working in Tanzania see the country's parks as equally threatened by European investors and the rural poor. Individuals within the NPS see parks in the American West as equally threatened by national snowmobile lobbies and indigenous hunters. Clearly,

however, these perceived enemies of conservation have different agendas and different impacts on the environment. Most importantly, in my opinion, their historical claims to the resources in question are not equally valid, and we need to find sophisticated criteria for evaluating people's claims to resources. Simply asserting that the problem is too complex will not make it go away.

At present, the biggest threat to conservation is global capitalism and large-scale commercial enterprise—a situation that is made doubly difficult by the fact that a number of conservation NGOs are dependent on large donations from corporate sponsors, while the viability of parks in countries like Kenya and Tanzania depends on investment from companies like Hilton and Serena. In the U.S., the Bush administration has created a drastic shortage of funding for the NPS—so that three new parks were added to the National Parks Conservation Association's endangered park list in 2003 (NPCA 2003). In Africa, commercial farms threaten the boundaries of national parks, while luxury lodges tax local water tables. In both the U.S. and East Africa, the infrastructural demands of large-scale tourism threaten the continued viability of wildlife habitats—not to mention contributing to our unsustainable dependence on private motor vehicles and fossil fuels.

Addressing the impacts of these processes on a global scale would tax the current capacities of the conservation movement, especially because we ourselves are divided on how to deal with these issues (and whether we even should deal with them at all). It is more realistic to address these problems on a case-by-case basis, and in this respect indigenous communities and other local people will quite often be our natural allies, since their cultures and livelihoods are frequently threatened by the same processes that threaten national parks. It is important that we avoid romanticizing these communities, since they are as complex and diverse as the conservation movement itself. It would be folly to deny that there are members of indigenous communities who favor activities like oil exploration in northern Alaska, uranium mining in northern Australia, and gold mining in the Amazon Basin. This being said, there are significant interest groups within these communities who staunchly oppose these activities because of their implications for their traditional livelihoods and more generally the health of the Earth.

As Mesa Verde ranger Don Whyte points out, national parks and Indian reservations often represent contiguous areas of low (or no) economic development. His home, the Ute Mountain Ute Reservation, is a quintessential example of this relationship, since members of his tribe have opted to set aside large areas of their reservation for the preservation of cultural and natural resources. Not all Native American communities have set aside parts of their reservations as protected areas, although a surprising number have. Generally speaking, however, there is less development on reservations than in surrounding communities. As such, they may be inadvertently protecting

"biodiversity hotspots," as Whyte implies in his statement above. Work by Homewood and Rodgers (1991) indicates that Maasai resource management practices have had similar effects in East Africa, by maintaining palatable grass species and keeping farms and commercial enterprises out of wildlife migration corridors (a situation that is admittedly changing). Finally, a study by the WWF (1997) indicates a strong correlation between biodiversity and the territories of indigenous communities on a global scale.

I do not view indigenous peoples as "noble savages" or "natural conservationists." However, I do believe that the relationship between indigenous communities and biodiversity is compelling and well worth exploring through rigorous interdisciplinary research. Furthermore, it would be worthwhile for conservationists to empower indigenous communities by supporting indigenous self-determination, reconstructing the historical relationships of specific communities and specific parks, redressing the historical grievances of indigenous communities through good faith gestures, trying to understand local attitudes toward conservation (whether negative or positive), helping to build the capacity of indigenous communities to do conservation, exploring ways to incorporate indigenous resource management and environmental knowledge into mainstream conservation models, and working to assure that conservation benefits accrue directly to the people who have paid for the creation of parks with their traditional natural resource base—something that conservationists have promised to do since they began negotiating with indigenous communities for access to land at the turn of the twentieth century.

Most importantly, it will be necessary to begin addressing the ongoing conflicts that have surrounded most national parks since their inception, since these conflicts represent major obstacles to both conservation and the equitable distribution of its benefits. Addressing these conflicts will begin with the simple step of admitting that they are conflicts. In many cases, effective community-based conservation will need to begin by treating conservation problems as conflicts of entrenched positions. As current approaches to conflict resolution acknowledge, it is frequently difficult for individuals enmeshed in these types of conflicts to see beyond their positions in order to effectively evaluate their wants and needs. This in turn makes it difficult (seemingly impossible, sometimes) to negotiate with others (who are similarly enmeshed in their positions) around these wants and needs, making it exceedingly difficult to develop pragmatic strategies for meeting those wants and needs (Fisher and Ury 1991).

This fundamental problem is compounded by the fact that many powerful conservationists feel that there is nothing to negotiate about. However, their growing concern about the future of parks should indicate that, in fact, there is something to negotiate about. A professional mediator I met once put it quite simply, "If you can wave a magic wand and make the world exactly

how you would like it to be, then there is no need to negotiate. Otherwise, you are going to have to negotiate or resign yourself to the status quo, whatever that happens to be." Many conservationists would like to see a global system of protected areas with inviolate boundaries, protecting biodiversity in the form of pristine wildernesses. Since this vision is practically impossible to translate into reality, it is probably time to explore alternative visions. Inviolate parks are part of the traditional conservationist position, but the protection of biodiversity is one of the primary conservationist needs. If effective alternatives can be found for the protection of biodiversity, then it would make sense for traditional conservationists to abandon their position on inviolate parks in favor of more effective alternatives. These alternatives will necessarily entail negotiation with, and accommodation of, other interest groups. This is something that conservationists are going to have to get good at in order to be effective in the future. Finding effective ways of grappling with complexity and uncertainty, ultimately resulting in more effective approaches to biodiversity protection, represents the central challenge to conservation in the twenty-first century—a challenge we can no longer afford to ignore.

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Theodore Roosevelt's quest for wilderness: a comparison of Roosevelt's visits to Yellowstone and Africa

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Abstract

This paper will compare and contrast Theodore Roosevelt's presidential visits to Yellowstone in 1903 and eastern Africa in 1909. I will examine the reasons why Roosevelt chose to visit these regions, his experiences from both trips, his observations regarding ungulates and predators, and his visions for the future of these two wildlife reserves. In both visits, Roosevelt wanted to experience a wilderness adventure similar to his early experiences on the western frontier. Roosevelt intended to hunt dangerous game in both visits, but due to the threat of bad publicity and the protective game laws of Yellowstone, Roosevelt did not hunt in Yellowstone as he did in Africa. Despite the obvious difference between his activities during both visits and the varied ecosystems of both areas, Roosevelt took great interest in comparing the African landscape, its residents, and its wildlife with their western counterparts. In both instances, Roosevelt greatly focused on wildlife, including human–wildlife encounters, predator–prey relationships, and the effects of protective game laws on animal populations and their behavior. In his written accounts of these visits, Roosevelt expressed his vision for game reserves and game laws for both Africa and the United States. By examining Roosevelt's visits and his impressions of both Yellowstone and Africa, one can better understand the role Roosevelt played in both national and international conservation movements. Researchers can also compare the similarity and differences of early twentieth-century conservationists' perspectives of and goals for Africa and Yellowstone.

Introduction

A bronze equestrian statue of Theodore Roosevelt stands at the entrance of the American Museum of Natural History in New York City. Depicted standing beside the mounted Roosevelt is a Native American and an African. Although the artist's intent was to represent Roosevelt's visits to the American West and Africa, this statue is sometimes viewed by those unfamiliar with its context as representing the racist ideology of the Progressive Era, when Native Americans and Africans were viewed as being socially inferior to the dominant white Roosevelt towering above them. However, in the minds of Theodore Roosevelt and many of his contemporaries, the lands and the wildlife of Africa and the American West shared one very important characteristic, the ability to provide an exciting wilderness experience.

Theodore Roosevelt's visits to Yellowstone in 1903, and to eastern Africa in 1909, illustrate his continual quest for an ideal wilderness experience. On both visits, Roosevelt wanted to experience a wilderness adventure similar

to his early experiences on the western frontier, which had come to typify Roosevelt's ideal vision of a wilderness experience. Roosevelt intended to hunt dangerous game during both of these visits, but due to the threat of bad publicity and Yellowstone's protective game laws, Roosevelt did not hunt in Yellowstone as he did in Africa. Despite the obvious differences between his activities during both visits, as well as the varied ecosystems of both areas, Roosevelt took great interest in comparing the African landscape and its wildlife with their western American counterparts in Yellowstone. Roosevelt was strongly focused on wildlife, including human–wildlife encounters, predator–prey relationships, and the effects of protective game laws on animal populations and their behavior in each of these distinct ecosystems. In his greatly publicized written accounts of these visits, Roosevelt also expressed his vision for the future of game reserves and game laws in both Africa and the United States.

The American West, Africa, and a teenage boy, 1872

In 1872, three separate events, occurring far apart, would form a lasting impact on the historic development of both the American West and Africa. On March 3, 1872, President Ulysses S. Grant signed a bill setting aside Yellowstone National Park as "pleasuring ground for the benefit and enjoyment of the people." This act protected and removed from the homesteading process a vast area containing great scenic and geothermal features then-recently revealed to the American public through government-sponsored scientific expeditions. At the time, no one would guess that this region, originally intended as a "pleasuring ground," would also evolve into what Theodore Roosevelt described as a "wilderness reserve," serving as a refuge for a variety of species of western wildlife that were threatened with extinction in other western regions.

On September 8, 1872, only a few months after the creation of Yellowstone National Park, Henry Morton Stanley was presented to Queen Victoria for finding Dr. David Livingstone in East Africa. Livingstone, an English missionary and famed explorer, became stranded in his quest to find the then-unknown headwaters of the Nile River. After years of isolation in Africa, many of Livingstone's family members, friends, and the general populace of England feared him to be dead. Stanley, sponsored by a New York newspaper publisher hoping to increase newspaper sales with tales of adventure from the "Dark Continent," surprised the world by finding Livingstone still alive. Upon meeting Livingstone for the first time, Stanley uttered the famous words that came to symbolize the European conquest of the African continent, "Doctor Livingstone, I presume?" Stanley's famous expedition brought considerable attention to Africa, and many explorers followed Stanley's footsteps to map and claim eastern Africa for the European colonial powers. In 1872, most people predicted that within a few years of Stanley's famed expedition, East

Africa would be settled by a variety of Europeans, and would become another "civilized" land contributing to the growing European empires. At this time, if anyone had predicted that Africa would become a "wilderness reserve," serving as a refuge for vast herds of African wildlife for future generations to enjoy, they would have been viewed by many of their contemporaries as being of unsound mind.

In the summer of 1872, young Theodore Roosevelt celebrated his fourteenth birthday and received his first hunting rifle. Roosevelt described his first gun with a sense of nostalgia in his autobiography, "My gun was a breech-loading, pin-fire double-barrel, of French manufacture. It was an excellent gun for a clumsy and often absent minded boy. There was no spring to open it, and if the mechanism became rusted shut, it could be opened with a brick without serious damage. When the cartridges stuck they could be removed in the same fashion. If they were loaded, however, the result was not always happy, and I tattooed myself with partially unburned grains of powder more than once" (Roosevelt 1926, 20:20–21).

Roosevelt also received taxidermy lessons from John G. Bell, a professional taxidermist who previously worked under John J. Audubon during his western trips collecting wildlife species. Hoping to acquire hordes of new species with his rifle to practice his taxidermy skills, Roosevelt discovered the need to correct his weak eyesight after constantly missing his intended targets. Shortly after receiving a pair of spectacles, Roosevelt quickly built up a large collection of mounted bird specimens.

Undoubtedly, this adolescent boy dreamed of hunting unusual species of wildlife in the far western lands surrounding the newly created Yellowstone National Park. Young Roosevelt most certainly also followed the news coverage of Stanley's expedition and became fascinated with adventure tales from Africa and descriptions of its unique species of wildlife. In the winter of 1872–1873, young Roosevelt did visit Africa, and enjoyed a cruise up the Nile River on a dahabeah, an Egyptian yacht, with his family. Roosevelt's sister, Corrine, later described her brother's first African hunting expedition, "When not walking through quivering bogs or actually shooting bird and beast, he, surrounded by the brown-faced and curious sailors, would seat himself on the deck of the dahabeah and skin and stuff the products of his sport. I will remember the excitement, and be it confessed, anxiety and fear inspired in the hearts of the four young college men who, on another dahabeah, accompanied us on the Nile, when the ardent young sportsman, mounted on an uncontrollable donkey, would ride unexpectedly into their midst, his gun slung across his shoulders in such a way as to render its proximity distinctly dangerous as he bumped absent-mindedly against them" (Robinson 1921, 57). If any one of the four college students who witnessed the young Roosevelt hunting on the banks of the Nile River predicted that

this young teenage boy would one day be recognized as one of America's most respected sportsmen and an expert on western American and African wildlife, his counterparts more than likely would have scoffed at him.

Theodore Roosevelt the hunter–naturalist

Theodore Roosevelt's fascination with wildlife began at a young age after he discovered a dead seal in a fish market on Broadway. Roosevelt wrote in his autobiography, "That seal filled me with every possible feeling of romance and adventure" (Roosevelt 1913, 14). Young Theodore eventually obtained the seal's skull and began the "Roosevelt Museum of Natural History" in his room until family members' complaints regarding the stench originating from the "museum's" collections caused Roosevelt to move his material into a back hallway out of sight and of the range of smell. Receiving a rifle and taxidermy lessons shaped Roosevelt's childhood fascination with animals into a more serious study of natural history. Using his rifle and his taxidermy skills, along with the benefit of eyeglasses, Roosevelt collected a wide variety of wildlife specimens, from his family's summer retreat in Long Island to the Nile River, to add to his growing collection.

In 1876, Roosevelt enrolled at Harvard to study natural history in hopes of achieving a career in that field. However, his academic studies took on a secondary nature shortly after he met a young lady, Alice Lee, who would later become his first wife. Roosevelt subsequently decided that life in a laboratory was not for him (and his constant handling of dead animals may not have endeared him to the young lady with whom he fell in love!), and decided to study law instead. This career choice eventually led him into New York politics, where he won a seat in the New York state legislature. Despite this change in career direction, Roosevelt continued as an amateur, yet well-versed, natural historian throughout his life.

Theodore Roosevelt in the West

In 1883, Theodore Roosevelt arrived in Dakota Territory for a buffalo hunt, hoping to kill a bison before the species became extinct in the American West. Roosevelt did kill a buffalo. In the process, he fell in love with the area and its inhabitants, and he purchased a ranch to begin a brief career as a Dakota rancher. Unfortunately, shortly after his return home to New York, Roosevelt lost both his mother and his young wife, who had delivered their first child on Valentines Day, 1884. Roosevelt's budding political career also suffered when he became embroiled in a vicious political fight during the Republican National Convention. He quickly left New York and returned to Dakota Territory, hoping to escape political struggles and to privately grieve for the loss of his wife and his mother.

Throughout the remainder of the 1880s, Roosevelt spent a considerable amount of time in the American West on his ranch. He spent his time

ranching and going on various hunting trips. Roosevelt enjoyed a number of western adventures in this untamed wilderness. He fought a drunken cowboy, killed a few grizzly bears, and stood off a group of what he considered to be "hostile" Indians. Roosevelt's adventures strengthened his weak body, and his childhood asthma disappeared in the West. He became an authority on life in the West, and a respected natural historian of western wildlife. In a speech delivered in North Dakota at a library dedication in 1910, Roosevelt told the audience, "I can never begin to say what I owe to North Dakota…I never would have been president if it had not been for my experiences here in North Dakota" (Vivian 1989, 62). After recovering his emotional and physical strength, Roosevelt married Edith Carow, a childhood friend, and returned to his political career. The great blizzard of 1886–1887 destroyed his ranching operation, but the new husband and soon-to-be father of five more children returned to the American West often for hunting and camping trips, including two visits to Yellowstone National Park in 1890 and 1891.

Roosevelt explores Yellowstone National Park

Roosevelt's first documented visit to Yellowstone National Park occurred in 1890. Accompanied by his second wife, Edith, and sister, Corrine, Roosevelt enjoyed a two-week camping trip through Yellowstone. Ira Dodge guided the party through Yellowstone's backcountry, and a Chinese cook kept the party well fed. "We were all in the best of health and the best of spirits," wrote Corrine Roosevelt. "[We] ate without a murmur the strange meals of ham, tomatoes, greasy cakes and coffee prepared by our irresistible Chinese cook" (Robinson 1921, 147).

This trip through Yellowstone was not typical of Roosevelt's usual western hunting expeditions. Roosevelt's sister noted, "what he loved was roughing it; near-roughing it was not his 'métier,' nor, frankly was it his 'métier' to arrange a comfortable trip of any kind. He loved wild places and wild companions, hard tramps and thrilling adventures, and to be part of the type of trip that women who were not accustomed to actual hunting could take, was really an act of unselfishness on his part. We paid huge sums for no comforts, and although supposed to go—as we were riding—where the ordinary travelers in stage-coach could not go in Yellowstone Park, yet there were times when we seemed to be constantly camping in the vicinity of tomato cans!" (Robinson 1921, 146–147).

Despite Corrine Roosevelt's claims that Roosevelt curtailed his adventurous spirit during this trip, the Roosevelts did find some adventure during their visit. During a horseback ride near the Grand Canyon of the Yellowstone, Roosevelt's guide, Ira Dodge, lost the trail. While riding over rough, dangerous terrain in hopes of finding the lost trail, Edith Roosevelt fell from her horse. She escaped with only bruises, but her sister-in-law noted she nearly broke her back. Corrine praised the wilderness skills of Roosevelt, who assumed the

task of finding the trail and continually reassured the women until he found it and led them back to camp. In his book, *The Wilderness Hunter,* Roosevelt described the party's trip to the Grand Canyon of the Yellowstone as a true adventure. "Late one afternoon in the fall of '90…[we] clambered down into the canyon before darkness overtook us; as there was not a vestige of a path, and as the climbing was exceedingly laborious and at one or two points not entirely without danger, the rocks being practicable in very few places, we could hardly have made much progress after it became too dark to see. Each of us carried the bag of trout in turn, and I personally was nearly done out when we reached the top, and then had to trot three miles to the horses" (Roosevelt 1893, 496–97).

In September 1891, Theodore Roosevelt returned to the Yellowstone area to enjoy a more rigorous wilderness adventure with one of his ranch foremen, Robert Ferguson. On this trip, Roosevelt hunted elk south of Yellowstone National Park near Two Ocean Pass. Tazewell Woody, a veteran Indian fighter and scout, and Elwood Hofer, a local hunter famous for capturing live animals, acted as Roosevelt's guides. During this expedition, Roosevelt killed nine elk. After the hunt, Roosevelt and Hofer traveled through the park to Mammoth Hot Springs. Bad weather slowed their progress through the park. "There is no more tedious work than striking camp in bad weather," noted Roosevelt, "…It is sheer misery to untangle picket-lines and to pack animals when the ropes are frozen; and by the time we had loaded the two shivering, wincing pack-ponies, and had bridled and saddled our own riding-animals, our hands and feet were numb and stiff with cold" (Roosevelt 1893, 519). In his cold condition, Roosevelt attempted to mount his horse, only to be bucked off onto the ground. He complained, "my thumb was put out of joint. I pulled it in again, and speedily caught my horse in the dead timber." Roosevelt's horse continued its attempts to buck him off, "usually choosing a down grade, where the snow was deep, and there was fallen timber." Fortunately for Roosevelt, the two riders met a group of railroad surveyors in the Upper Geyser Basin and arranged for Roosevelt to borrow another riding horse and packhorse. One surveyor accompanied Roosevelt and Hofer for the remainder of their trip.

After leaving the Upper Geyser Basin, Roosevelt and Hofer encountered a troop of First Cavalry soldiers patrolling the park under the command of Captain Frank Edwards and Lieutenant John Pitcher. Roosevelt and his companions accepted hay for their horses and enjoyed a luncheon with the cavalry officers. After lunch, Pitcher and Edwards entertained Roosevelt and Hofer with exciting stories detailing their various violent encounters with Native Americans. Captain Edwards recounted his experiences with the Crow Indians. Lt. Pitcher detailed his involvement in a recent violent encounter with Cheyenne Indians accused of killing a government herder on the Tongue

River in northern Wyoming (Roosevelt 1893, 746–752). After listening to his guests' stories of adventures on the western frontier, Roosevelt continued his ride over snow-covered roads to Mammoth Hot Springs, where he parted from his traveling companions and prepared for his return home. Roosevelt summed up his trip: "To me still-hunting elk in the mountains, when they are calling, is one of the most attractive of sports, not only because of the size and stately beauty of the quarry and the grand nature of the trophy, but because of the magnificence of the scenery, and the stirring, manly, exciting nature of the chase itself" (Roosevelt 1893, 521).

Roosevelt's wilderness adventures, including his two trips through Yellowstone, greatly contributed to the shaping of his character. They not only allowed him to renew his emotional and physical strength, but also contributed to Roosevelt's great confidence in himself. Hunting, which played a central role in Roosevelt's wilderness experiences, would continue to play a strong role in Roosevelt's remaining years. "In hunting," he wrote, "the finding and killing of the game is after all but part of the whole…The free self-reliant, adventurous life, with its rugged and stalwart democracy; the wild surroundings, the grand beauty of the scenery, the chance to study the ways and habits of the woodland creatures—all of these united to give the career of the wilderness hunter its peculiar charm. The chase is among the best of all national pastimes; it cultivates that vigorous manliness for the lack of which in a nation, as an individual, the possession of no other qualities can possibly atone" (Roosevelt 1926, 2:xxix).

Politics and wilderness hunting do not mix

Theodore Roosevelt re-entered politics with a vengeance after his return from ranching in the Dakota Badlands, quickly rising up the political ranks of the Republican Party. In 1889, Roosevelt served as a Civil Service Commissioner, and in 1895, he served a two-year stint as a New York City Police Commissioner. After campaigning for President William McKinley, Roosevelt received an appointment as Assistant Secretary of the Navy in 1897. In 1898, with the outbreak of the Spanish American War, Roosevelt volunteered for service and formed the famed Rough Riders Regiment. Roosevelt and the Rough Riders returned from Cuba as the heroes of San Juan Hill. With his new heroic status, Roosevelt won the election for the governorship of New York state; however, reform-minded Governor Roosevelt scared the political bosses of the Republican Party. Hoping to silence Roosevelt, the party bosses pushed him into running as William McKinley's vice presidential candidate. Upon the success of the McKinley–Roosevelt campaign, many believed Roosevelt's political career and his popularity with the voters were silenced. Theodore Roosevelt himself believed that being under the shadow of McKinley would greatly curtail his political influence.

Shortly after becoming vice president elect, Roosevelt vacationed to

northwestern Colorado to enjoy a winter cougar hunt with famed cougar hunter John B. Goff. Roosevelt killed 12 mountain lions during his trip, many using only his knife and the assistance of Goff's hounds; however, Roosevelt noticed the American public and press wanted to be appraised of the famous and charismatic vice president elect's every move. Roosevelt's hunting now served an additional role as public spectacle. Stories, some true but many incorrect and silly, appeared in newspapers throughout the United States. Stories of near-death encounters with vicious bears (who must have forgotten to hibernate in the winter of 1901), and packs of hungry wolves attacking Roosevelt appeared in many papers. With the stories came editorials and opinions supporting and criticizing Roosevelt's hunting. Thomas Edison's film company produced a short film parodying Roosevelt's 1901 cougar hunt. The film depicted Roosevelt shooting and stabbing a very small stuffed cat representing a cougar while a reporter and cameraman recorded his every move (Edison 1901). Roosevelt, as a national celebrity, realized his favorite pastime of hunting in the wilderness would be carefully scrutinized by both his supporters and detractors. Hunting could no longer be a private escape into the wilderness for Theodore Roosevelt.

On September 14, 1901, William McKinley died from an assassin's bullet and "That Damned Cowboy," a moniker used by party boss Marc Hanna to identify Roosevelt, assumed the Presidency of the United States. The public fascination with Roosevelt's hunting only increased; his public image and hunting became completely intertwined. In 1902, Roosevelt attempted to arrange another hunt with John Goff and his famous pack of hounds, but time limitations and other problems cancelled out the possibility. Instead, Roosevelt hunted bear in Mississippi, and experienced a frustrating and disappointing hunt. Hounded by newspaper reporters and spectators, many of whom literally stepped on the backs of Roosevelt's feet as he stalked bear through the canebrakes, Roosevelt failed to get a bear or even a decent shot at a bear. The only possible kill was a starved bear that had been roped and tied to a tree by individuals eager to see the president shoot a bear. Roosevelt refused to kill the poor animal, and a cartoon depicting the event led to the marketing of stuffed bears under their new name, teddy bears.

After the disastrous Mississippi bear hunt, Roosevelt attempted to arrange a wilderness hunt with John Goff within Yellowstone National Park. Roosevelt, encouraged by reports of cougars killing wildlife in Yellowstone, hoped to help the military authorities by killing a few of the predators. Roosevelt's presidential advisors argued against any hunting in Yellowstone by the President for fear of bad publicity. His frustration with maintaining his public image is evident in the following letter to the army officer he met in 1891, former Lieutenant and now Major John Pitcher, Acting Superintendent of Yellowstone National Park:

> Secretary [of War and close presidential advisor, Elihu] Root is afraid that a false impression might get out if I killed anything in the Park, even though it was killed, as of course would be the case, strictly under Park regulations, and though it was only a mountain lion—that is an animal of the kind you are endeavoring to thin out. Now I have though of this, would it be possible, starting from within the Park, to go just outside the border and kill any mountain lions? Could you send a good man to explore right across the border and see if you could not get some located? Could you have this done at once and let me know what the chances are? If favorable, perhaps I might take a week or two traveling around the Park first, just for the fun of seeing everything…then go off for a week or ten days hunt in the mountain lion country just outside…If I can fix it all right I will have Johnny Goff and his dogs set in ahead of me, and probably shall send you my rifle in advance so as to avoid any talk of my taking it with me (Roosevelt 1903).

After failing to get John Goff into Yellowstone, Roosevelt arranged for the military officials in Yellowstone to purchase a pack of cougar-hunting dogs to be placed under the park's game warden, Charles Jesse "Buffalo" Jones. Unfortunately for Roosevelt, the pack turned out to be very poor for hunting, preferring to chase deer and elk instead of cougars. Frustrated with dismal reports of the new pack of hounds and the negative publicity beginning to appear in the press about his rumored Yellowstone hunt, Roosevelt decided to forego any hunting in Yellowstone. Instead, he invited famed naturalist writer and non-hunter John Burroughs to accompany him on a sightseeing adventure through the park.

1903 presidential visit to Yellowstone

On April 8, 1903, Roosevelt and Burroughs arrived at their destination: Gardiner, Montana, where they were met by Major John Pitcher. The party then made preparations for the horseback ride to Fort Yellowstone at Mammoth Hot Springs. Pitcher promised the president he would see much of Yellowstone's wildlife along the way. Before they departed, Roosevelt was swarmed by people wishing him a good trip. Meanwhile, Burroughs quietly slipped onto a wagon for a more comfortable ride. While Burroughs adjusted himself in the wagon, the president and his entourage rode off, leaving Roosevelt's elderly guest behind. Burroughs's over-eager wagon driver excitedly hurried to catch up with the presidential escort. During the chase, Burroughs received some bruises on his hand, and the wagon ran over a couple of dogs. The horses pulling the wagon refused to obey the driver's

attempts to slow them down, and the wagon continued running out of control, forcing the presidential escort to move off the road to give Burroughs's wagon the right of way. Burroughs exclaimed, "this is indeed a novel ride; for once in my life I have side tracked the President of the United States!" (Burroughs 1907, 25). Burroughs continued racing on to Fort Yellowstone ahead of the president, slowing down only when his team of horses began climbing the hill leading up to the fort.

After being forced off the road by his traveling companion's wagon driver, Roosevelt and his entourage continued riding at a leisurely pace. Shortly after crossing the park boundary, they encountered a herd of antelope grazing just off of the road. The animals' tame nature amazed Roosevelt, who later wrote, "it was easy to ride within fair rifle range of them…it was extraordinary to find them showing such familiarity almost literally in the streets of a frontier town" (Roosevelt 1905, 294). Roosevelt praised the citizens of Gardiner for resisting the temptation of antelope steaks: "it speaks volumes for the good sense and law-abiding spirit of the people of the town" (Roosevelt 1905, 294). Roosevelt spent two hours examining herds of antelope numbering in the hundreds.

During this time, the president also viewed a few deer and a small herd of bighorn sheep "which were absurdly tame...to a degree matched by but few domestic animals" (Roosevelt 1905, 296). Roosevelt dismounted his horse and crept within 20 yards of the sheep. After spending 20 minutes admiring them, Roosevelt continued along his way. He continued to see vast numbers of "tame" animals within close proximity. No animal, large or small, seemed to escape his eye, and he admired mule deer, whitetail deer, and ducks as he continued his ride to Fort Yellowstone.

Upon reaching the fort, Pitcher guided Roosevelt to the buffalo pens where Buffalo Jones bred domesticated buffalo with wild buffalo he captured within the park. Roosevelt and others hoped the cross-breeding of domestic bison with wild bison would assist in the effort to increase the park's bison populations. The president noted the buffalo were "breeding well" (Roosevelt 1905, 296). Roosevelt retired to Major Pitcher's home believing he would see no more animals for the remainder of the day, but while writing in his guest room he noticed five mule deer on the parade ground. He described the deer as being tame as cows and was surprised when the animals paid no attention to the soldiers' flag lowering and raising ceremonies. Noise filtered throughout the grounds; a bugle first sounded then the cannon was fired. The deer jumped slightly, but then wheeled around to watch the flag slowly come down the flagpole. When the ceremony ended, the deer continued grazing upon the parade ground, much to the president's amusement. That evening, he wrote to his daughter Ethel, "I wish you could be here and see how tame all the wild creatures are" (Roosevelt 1926, 19:435).

The following morning, the presidential party, which included Pitcher and Roosevelt's former guide Elwood Hofer, set out for their camp on the Yellowstone River. Burroughs was to remain at the fort until Roosevelt and his hosts established a comfortable camp. Roosevelt's hosts made sure his camp was isolated from the outside world by refusing any permission to reporters wanting to accompany the president through Yellowstone. Major Pitcher ordered soldiers to seal off any areas where the president would camp to prevent hordes of curious spectators from bothering him. One reporter ignored the soldiers' warnings and set out with his dog to find the president's camp, but was caught by a cavalry patrol before he reached it. To punish the reporter, the troopers shot the dog, escorted the reporter outside park boundaries, and ordered him never to return (Haines 1977, 2:230–31).

President Roosevelt viewed many elk along his way to the party's first campsite on the Yellowstone River, observing, "They were certainly more numerous than when I was last through the Park twelve years before" (Roosevelt 1905, 300). In one sitting, the president, with the aid of Pitcher and Elwood Hofer, counted 3,000 head of elk. The president also noticed many elk carcasses lying on the ground. He paid close attention as to what caused their deaths; two were killed by "scab," and some were killed by cougars, but the majority were killed by starvation resulting from the harsh winter conditions. "As the elk were evidently rather too numerous for the feed," he later wrote, "I do not think the cougars were doing any damage" (Roosevelt 1905, 303). This was an unusual view of predators for the time, especially from a former rancher. Coyotes also drew Roosevelt's attention. He noted that the animals were very numerous, but the elk did not fear them. The only predation Roosevelt actually witnessed was a golden eagle attempting to kill a yearling elk. The eagle came within a few feet of the elk, but caused it no harm other than scaring it a little. However, the next day the president did see two eagles feasting on the carcass of a yearling elk.

Roosevelt did not attempt to kill any predators during his trip through the park. He only fired one pistol at a large tree, injuring himself when the spent cartridge flew back and cut his cheek. Roosevelt feared that his actions would be misunderstood and his image tarnished if he were to hunt in the park. Buffalo Jones, apparently unaware of the president's final decision not to hunt, took it upon himself to entertain Roosevelt by organizing an impromptu cougar hunt with the government's newly-purchased pack of hounds. Upon reaching the campsite, Roosevelt immediately ordered the pack of dogs be returned to Mammoth. The next day, when Jones ran into John W. Meldrum, the judge of Yellowstone's court who had tried to warn Jones not to bother the president, Meldrum said to Jones, "Hello Jones, I thought you were out with the President." Meldrum noted, "Jones was so mad that he never said a word" (Meldrum 1930).

On the fourth day of the President's outing, Burroughs rejoined the party at their campsite on the Yellowstone River and was surprised to find that the President had gone hiking by himself. Burroughs noted that Major Pitcher seemed nervous about his famous guest setting off on his own without a military escort, but the president was eager to get away by himself to pursue an elk herd seen the previous day. By himself, Roosevelt soon located the elk and spent the day pursuing them for a closer view. After spending an hour observing the elk herds at a range of 50 yards, Roosevelt returned to camp, completing an 18-mile hike. Upon his return, he eagerly recounted to Burroughs all of the animals, especially the birds that he viewed along his way (Burroughs 1907, 33).

The following day, the presidential party broke camp and set out for Slough Creek. Burroughs attempted to fish the stream, but ice prevented him from doing so. He instead tried his luck at following birdcalls with the President. After hearing one strange call, the men followed the source of the sound to find a pygmy owl. "I think the President was as pleased as if we had bagged some big game," Burroughs recorded, "he had never seen the bird before" (Burroughs 1907, 40).

The president entertained Burroughs the following day by leading him on a chase for elk. Roosevelt spied the elk as the party made its way to the next camp, located near Tower Fall. He signaled for Burroughs to follow him. Burroughs ambled along at a slow pace due to "logs, rocks, spring runs, and a tenderfoot rider" (Burroughs 1907, 42). He lost sight of the president until he climbed over a hill, where he found Roosevelt standing 50 yards from the band of elk. "The President laughed like a boy," Burroughs recalled, and the elk stood in their position "with tongues hanging out…now here stood scores of them with lolling tongues, begging for mercy" (Burroughs 1907, 43). Burroughs and Roosevelt then proceeded to a plateau where they could continue to view the elk, and from their vantage point counted nearly 3,000 elk. "And then the President did an unusual thing," Burroughs recalled—he "loafed for nearly an hour" (Burroughs 1907, 45).

The next morning, Roosevelt and his hosts moved their camp near the Tower Fall Soldier Station. That afternoon, at the new camp, the president began shaving, but after he had finished only half of his face, someone informed him that a herd of bighorn sheep were approaching. The party had seen the herd before, but Roosevelt was interested to see if the sheep could traverse from a mountaintop, over an almost perpendicular cliff, to the river below for water. Roosevelt decided his shave could wait, and left camp to get a better view. Burroughs noted the president's face was half-covered with shaving soap, and a towel hung around his neck. Roosevelt remained oblivious to the state of his appearance until Burroughs sent someone to retrieve his coat and hat (Burroughs 1907, 47–49).

After the third day at Tower Fall, the presidential party broke camp and returned to Fort Yellowstone. The following day, Roosevelt and his entourage, including park concessioner Harry Child, traveled to Yellowstone's famed geyser basins in horse-drawn sleighs. Snow in this area of the park reached levels ranging from four to five feet in depth, and Pitcher ordered the roads to be cleared and packed for the president's trip before his arrival. After waiting for a newly-formed drift to be shoveled away, the party continued along their way to the geysers without delay. The president rode up front with the driver until the sled reached a bare patch of ground resulting from the heat given off by the geysers. When this occurred, he jumped to the ground from his seat and walked alongside the sleigh, causing Burroughs and the other riders to also jump down. "Walking at that altitude is no fun," wrote Burroughs, "especially if you try to keep pace with such a walker as the President is" (Burroughs 1907, 62–63). When the sleigh reached more snow, Roosevelt climbed back onto the sleigh and continued his ride next to the driver.

The sleighs eventually reached Norris Geyser Basin, where the party remained for one night in the Norris Hotel. That evening, the President and Burroughs, sharing one room, decided the temperature was too hot, and Roosevelt threw the window wide open. The next morning, Burroughs recorded the hotel caretaker's surprise: "There was the President of the United States sleeping in that room with the window open…and not so much as one soldier outside on guard" (Burroughs 1907, 65).

After a cold night's sleep, the party continued to the Fountain Hotel, located near the Lower Geyser Basin. Along the way, the president killed the only game he hunted during the trip. As they rode, Roosevelt suddenly leapt from the sled to chase a mouse across a snow-covered meadow. He threw his hat over the creature and then clapped his hand around it. While the others went fishing in the heated river waters, Roosevelt skinned the mouse and saved its pelt. He later sent the specimen to his friend Clinton Hart Merriam in Washington, hoping that he may have found a new species of mouse in the park (he hadn't). Burroughs later told this story to a newspaper writer fearing that if "[the writer] changes that u to an o and makes the President capture a moose and then what a pickle I shall be in! Is it anything more than ordinary newspaper enterprise to turn a mouse into a moose?" (Burroughs 1907, 67). Fortunately for Burroughs and Roosevelt's peace of mind, no reports of moose being captured by the president circulated in any newspaper report.

From the Fountain Hotel, Roosevelt traveled to the Upper Geyser Basin, where he watched Old Faithful erupt. Roosevelt did not record his opinions of Yellowstone's geysers in any of his travel accounts. One can only wonder if he agreed with Burroughs, who thought the geysers were boring after their uniqueness faded upon seeing so many geothermal features. In fact, Burroughs felt the geysers were a waste of the earth's energy: "One disliked

to see so much good steam and hot water going to waste; whole towns might be warmed by them, and big wheels made to go round. I wondered that they had not piped them into the big hotels which they opened for us, and which were warmed by wood fires" (Burroughs 1907, 64). It is uncertain if Roosevelt agreed with his companion. Although Roosevelt did not mention any geysers in his account of the trip, he did draw brief mention to the attractions in a speech given at Gardiner on April 24: "The geysers, the extraordinary hot springs, the lakes, the mountains, the canyons, and cataracts unite to make this region something not wholly to be paralleled elsewhere on the globe" (Roosevelt 1903).

After viewing the Upper Geyser Basin, Roosevelt returned to the Norris Hotel for another night's stay. Upon their return, tragedy struck the presidential party when one of the sleigh drivers, George Marvin, died suddenly of a heart attack. Burroughs mourned his passing and praised the man's skills. Roosevelt hurried to the barn, where Marvin's corpse laid, and paid his last respects to the man. Later, upon his return to Mammoth, Roosevelt looked up Marvin's fiancée and consoled her. Burroughs believed "the act shows the depth and breadth of [Roosevelt's] humanity" (Burroughs 1907, 69–70).

After the unfortunate loss of Marvin, the party worked its way from Norris Geyser Basin to the Grand Canyon of the Yellowstone to stay in the Canyon Hotel. From in front of the hotel, Roosevelt and Burroughs strapped on skis and proceeded over shoveled paths to scenic vistas of the canyon. Burroughs believed this to be the grandest spectacle of the entire park. An ice bridge that spanned the brink of the falls fascinated him, especially when he learned coyotes traversed this precarious crossing. After viewing the Lower Falls of the Yellowstone, Roosevelt visited a squadron of soldiers in their winter quarters and inquired about their tour of duty within the park (Burroughs 1907, 69–70).

Roosevelt and Burroughs then enjoyed some skiing on the low hills near the Canyon Hotel. During the festivities, Roosevelt tumbled into the snow. Burroughs described the humorous situation:

> The snow had given away beneath him, and nothing could save him from taking the plunge. I don't know whether I called out, or only thought, something about the downfall of the administration. At any rate, the administration was down, and pretty well buried, but it was quickly on its feet again, shaking off the snow with a boy's laughter. I kept straight on and very soon the laugh was on me, for the treacherous snow sank beneath me, and I took a header too.
>
> 'Who is laughing now, Oom John?' called out the President.

> The spirit of the boy was in the air that day about the Canyon of the Yellowstone, and the biggest boy of us all was President Roosevelt (Burroughs 1907, 73–74).

After the day's skiing and one night at Canyon Hotel, the President returned to Fort Yellowstone.

On April 24, 1903, Roosevelt presided over a Masonic ceremony dedicating the new arch at Gardiner, Montana. At least 2,500 people attended the dedication to see the president of the United States lay the cornerstone of the arch that would later carry his name. After the dedication, Roosevelt outlined his vision for Yellowstone in a speech. His remarks mainly focused on the park's wildlife resources; Roosevelt indicated his support for the continued protection of ungulates to increase their population, and for the military's predator control program, under the condition that predator populations be limited but not exterminated. To increase the park's wildlife diversity, Roosevelt recommended the introduction of new species such as pheasants and chamois, and that the park's buffalo breeding program be expanded to include the cross-breeding of park bison with domestic cattle, with the offspring used to establish ranches in Alaska (Schullery 2003).

Throughout the remainder of his administration, Roosevelt implemented many of his policies for Yellowstone National Park, and used his presidential power to monitor and control the park's future economic development, including the removal of disreputable steamboat concessionaire E.C. Waters. Sensing the need for a professional agency to manage the park, Roosevelt also began the effort to replace its military administration with a civilian park guard.

TR seeks wilderness experience in Africa

After his Yellowstone trip, Roosevelt continued his search for yet another wilderness experience in the West. In 1905, he hunted with John Goff in Colorado, but problems with spectators and news reporters continued to diminish the quality of his hunt. Upon leaving the White House in 1909, Roosevelt concluded he needed to escape the attention of the American pubic by hunting in a far away land outside of the United States. Stanley's Africa, still a considerably wild area in Roosevelt's mind, would do.

In April 1909, Roosevelt arrived in British East Africa for a year-long safari with his son, Kermit. The Roosevelt expedition would explore British East Africa, travel into the Congo, and then proceed north to the Nile River and on to Cairo. The official purpose of the expedition was to collect specimens for the Smithsonian Institution's natural history collections; however, Roosevelt viewed this expedition as an attempt to live out a wilderness hunting adventure that he could not enjoy in the American West. During his trip through Africa, Roosevelt killed 296 African animals. Kermit killed 216 ani-

mals (Roosevelt 1910, 534). Roosevelt explained, "Kermit and I kept about a dozen trophies for ourselves; otherwise we shot nothing that was not used either as a museum specimen or for meat—usually for both purposes. We were in hunting grounds practically as good as any that have ever existed; but we did not kill a tenth, nor a hundredth part of what we might have killed had we been willing. The mere size of the bag indicates little as to a man's prowess as a hunter, and almost nothing as to the interest or value of his achievement" (Roosevelt 1910, 534).

A number of events intensified Roosevelt's African wilderness experience. Roosevelt barely survived two separate animal charges, one from an elephant and the other from a rhinoceros. He witnessed a lion attack and wound a few of his African porters. Roosevelt rediscovered his wilderness in Africa and remembered similar experiences in the American West and Yellowstone, "I galloped towards the herd [of eland]; and for the next fifteen or twenty minutes I felt as if I had renewed my youth and was in the cow camps of the West, a quarter of a century ago. Eland are no faster than range cattle. Twice I rounded up the herd—just as once in the Yellowstone Park I rounded up a herd of wapiti for John Burroughs to look at…" (Roosevelt 1910, 372–373).

In 1910, Roosevelt published a collection of his writings detailing these African wilderness adventures, African Game Trails. Roosevelt's book entered into the classical African safari literary genre and did much to publicize the African wilderness experience to the American public. Now many American adventurers hoped to copy Roosevelt's experience in their own safaris.

African Game Trails also expressed Roosevelt's support for the preservation of Africa's wildlife resources. "The English Government has made a large game reserve on the way to Nairobi, stretching far to the south, and one mile north, of the track. The reserve swarms with game; it would be of little value except as a reserve; and the attraction it now offers to travelers renders it an asset of real consequence to the whole colony," he wrote (Roosevelt 1910, 14). He also expressed his opinion on the effective management of these game reserves:

> Game reserves should not be established where they are detrimental to the interests of large bodies of settlers, nor yet should they be nominally established in regions so remote that the only men really interfered with are those who respect the law while a premium is thereby put on the activity of the unscrupulous persons who are eager to break it. Similarly, game laws should be drawn primarily in the interest of the whole people, keeping steady in mind certain facts that ought to be self-evident to every one above the intellectual level of those well-meaning persons who apparently think that all shooting is wrong and that man could

> continue to exist if all wild animals were allowed to increase unchecked. There must be recognition of the fact that almost any wild animal of the defenseless type, if its multiplication were unchecked while its natural enemies, the dangerous carnivores, were killed, would by its simple increase crowd man off the planet; and of the further fact that, far short of such increase, a time speedily comes when the existence of too much game is incompatible with the interests, or indeed the existence of the cultivator. As in most other matters, it is only the happy mean which is healthy and rational. There should be certain sanctuaries and nurseries where game can live and breed absolutely unmolested; and elsewhere the laws should, so far as possible, provide for the continued existence of the game in sufficient numbers to allow a reasonable amount of hunting on fair terms to any hardy and vigorous man fond of the sport, and yet not in sufficient numbers to jeopardy [sic] the interests of the actual settler, the tiller of the soil, the man whose well-being should be the prime object to be kept in mind by every statesman. Game butchery is as objectionable as any other form of wanton cruelty or barbarity, but to protest against all hunting of game is a sign of softness of head, not of soundness of heart (Roosevelt 1910, 14–15).

Roosevelt's recommendations for the future preservation of African wildlife echoed the same policies he recommended for Yellowstone National Park. In Roosevelt's mind, these two distinct ecosystems deserved equal protection.

Roosevelt's Yellowstone and African legacies

Roosevelt continued his quest for adventure in far away lands. In 1914, he explored an unknown tributary of the Amazon River. However, the expedition took such a toll on Roosevelt's health that many believe it contributed to his early death. On January 6, 1919, Theodore Roosevelt passed away in his sleep at his home in Long Island, New York. Roosevelt's legacy, his writings, and his speeches continued to impact Yellowstone and Africa. Yellowstone's visitation in 1903, the year of Roosevelt's visit, was 13,433 people. By 1905, Yellowstone visitation had increased to 26,188 people. In the year of Roosevelt's death, 1919, Yellowstone's annual visitation had reached 62,261 individuals. Although many factors can be attributed to this increase in visitation, Roosevelt's promotion of Yellowstone certainly increased the American public's desire to visit the few remaining wilderness areas in the West. Roosevelt also promoted the idea of African safari to a worldwide audi-

ence. Kenneth Cameron noted in his history of the African safari that after Roosevelt's visit, hunters "were more likely to be hurt by a bullet than a lion" due to the increased numbers of hunters attempting to copy Roosevelt's trip (Cameron 1990, 61).

Roosevelt promoted the spirit of wilderness in Yellowstone and Africa, yet he expressed disappointment when these wilderness areas became too tame for his liking. In a conversation with John Leary, who published Roosevelt's remarks in the book, *Talks with T.R.,* shortly after Roosevelt's death, Roosevelt said the following about the wilderness areas he visited in the West, Africa, and South America:

> I have no desire to return to the scenes of my ranching days. It's all changed—and I don't want to see it…It is a mistake, I think, for one to hit the back trail after many years have passed. One finds things changed, the old picture is destroyed, the romance gone. I was back in the old country once. I saw only a little of it, but that was enough. Why there was a store down where we had a clash with the Indians!
>
> The place is all settled now. The folks there are largely of foreign stock, good people and good citizens, who lead most matter-of-fact lives. It is best that it should be so, but I don't wish to see the place again. I'd rather try and remember it as it was.
>
> Change, of course, is the rule of all new countries. I imagine that thirty or forty years from now the jungle I hunted over in Africa may be quite settled and as safe as Upper Harlem. This will not be true of the Amazon. A great many years must elapse before that country is little more than poorly charted wilderness. It is not attractive to the white man.
>
> Africa, on the other hand, is. For that reason, it will be comparatively developed when the Amazon country is still raw.
>
> I shall revisit neither place. I have done my bit. Those who come after me must do theirs. Anyway, I've no desire to hit the back trail. As a rule, it's not profitable (Leary 1920, 278–279).

Despite Roosevelt's frustrations with the taming of his ideal wildernesses, many individuals today continue to redefine the wilderness experience in Yellowstone and Africa. Theodore Roosevelt's recommendations shaped the future preservation of game reserves and their management for years to come. The game reserves of Yellowstone and Africa would move away from

Roosevelt's vision of breeding grounds to provide a surplus of game to protect the sport of hunting. Despite the limitations of these early management techniques, the wildlife of these regions, although still threatened, continues to thrill visitors today. These modern visitors carry cameras or just a simple desire to witness wild animals, instead of carrying firearms and stalking the same wildlife in both Yellowstone and Africa that Roosevelt encountered. Although the wilderness experience of today is much tamer than Roosevelt would have preferred, the opportunity to experience the wilderness and its wildlife still exists in Yellowstone and Africa because of Roosevelt's desires to preserve these areas.

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A. Starker Leopold Lecture

October 7, 2003

Richard Leakey

Richard Leakey, son of renowned paleoanthropologists Mary and Louis Leakey, was born in Kenya in 1944. His remarkable early fossil discoveries, funded by the National Geographic Society, led to his appointment, at age 25, as director of the National Museums of Kenya, a position he held for about 20 years. In 1989, he was appointed director of Kenya's Department of Wildlife and Conservation Management (later the Kenya Wildlife Service), a position he held until 1994, and again from 1998 to 1999, followed by a two-year term as head of civil service and secretary to the Cabinet. He continues to be embroiled in Kenya's stormy political scene, and has survived what many still believe was an assassination attempt. Dr. Leakey's scientific achievements, his leadership in fighting political corruption and the destruction of Kenya's natural resources, and his prominence as a global spokesperson for conservation have resulted in many awards, including Gold Medals from the Royal Geographic Society and the Scottish Geographical Society, the Hubbard Medal of the National Geographic Society, and numerous honorary doctorates. His books include ***Origins; The Origin of Humankind; The Sixth Extinction;*** *and most recently,* ***Wildlife Wars: My Fight to Save Africa's Natural Treasures.***

I tried to find out if I had sent an abstract of what I was going to talk about tonight, and nobody could remember if I did, including myself. I inquired whether I had offered a title and I was told that I hadn't. I was asked if I'd brought any notes and I said I hadn't. And so I'm just going to talk a little bit. I've listened with varying degrees of attentiveness over the last day-and-a-half. Different talks have caught my attention more than others. I don't really want to take an unfair advantage of the opportunities to discuss contributions in this setting, but I'd really like to address some of the concerns that I feel very deeply about. And I feel very deeply, principally, from my own experiences and my own opportunities on the cutting edge of a number of different intersecting components of what I think we all face.

Some of you may not know things that I've done, so let me just touch very lightly as an introduction to this first part. As somebody who looked at vertebrate paleontology for a number of years—not just the story of our own origins, but particularly looking at the evolution and extinction of animals whose remnants today represent the African fauna—I have been enormously

struck by how many things have disappeared, and how fragile species have been. And I don't need to say to most of you, but perhaps to some, that it's worth remembering that the great biodiversity we see today is estimated to represent less than 1% of all life forms that have ever lived on this planet. We are living at the end, if you like, of an extraordinary range of living organisms. And what we see today, although impressive and indeed incalculable in their numbers, is still a tiny part of what has been here before and is now gone forever.

I think the point that that brings home is that we need to keep a sober mind on the fact that we can't ultimately turn the clock back in terms of extinction, and we can't necessarily prevent things from disappearing, although I do believe the work [of Yellowstone Wolf Project Leader Doug Smith] that we've just joined in celebrating on the wolves' being reintroduced to the Rockies is a remarkable story, and one that I'm tremendously pleased to have participated in hearing a little bit about tonight, and celebrating with you in the award that's been given for the work that has been done. Of course, the wolf wasn't faced with extinction, but it got to such a low number that its extinction was certainly on the cards.

Put aside the paleontological record (and that really is to one side, but I think the part that emerges out of that is still very much with us), and I think as wildlife managers, as conservationists, as practitioners of the interlocking disciplines that go with conservation today, we cannot ignore that it is only in our time that we have threatened and brought about extinction. Most of the extinctions that I've referred to happened long before there were humans to bring them about, and we shouldn't assume that we've got a special role. Extinctions are going to happen irrespective of us. The problem is that we are making them more likely at the present time.

And the way we're making it more likely, apart from bad management and policy and the various things that some people have already been talking about, is an issue that I don't think gets enough attention today, and one which I was really quite surprised about when I attended the IUCN [World Conservation Union], the World Parks Congress; that is the issue of climate change, or global change. Whether it's the fault of the Americans or the North or the South, the Russians, or the Finns, whoever—it doesn't matter whose fault it is; indeed, it may be nobody's fault—the climate is changing. Weather patterns are changing. And with the enormous pressure on the planet from the vastly expanded human population, there may not be the capacity in some parts of the world to accommodate some of the changes that are taking place.

And I think conservationists are guilty, perhaps, of being somewhat complacent about the fact that climate change, global change, is something that is so gradual that it may not really impact us at all in our lifetime or careers. I

think you may be surprised at how quickly this phenomenon could accelerate, and how quickly we could find ourselves looking at situations that are no longer possible to control. It may not be the case in the larger ecosystems, it may not be the case in some of the temperate national parks, such as the Greater Yellowstone Ecosystem. I'm not an expert. But what is very clear is that if the temperature changes by a relatively small amount, there are going to be fundamental consequences to biodiversity. And we are going to lose species at a rate unprecedented in the human historical memory. And, I think, when talking about protected areas and conservation as we've been doing, focused, if you like, on two great ecosystems, the Serengeti–Mara and the Greater Yellowstone, we need to reflect on the context of what we're discussing and be a little, perhaps, a little more realistic about how fragile what we're charged to look after, in actual fact, is. So that will be another aspect.

Another aspect to my career that I think has been useful is that I have been quite closely involved with government in one form or another. I had the delightful experience of being head of a wildlife agency. I had the extraordinary experience of being able to raise really quite substantial funding for a wildlife agency. [Even] in this room, where people talk about big sums, it was still respectable. We raised $160 million for a five-year program for Kenya. And with that money, we were able to do a lot of things. We weren't able to make a big difference, and I think that's a fairly humbling aspect of having raised a lot of money. But the challenge of looking after wildlife, and looking after protected areas, and interacting with other people who are concerned with various aspects related to protected areas, has been certainly an enormously rich experience. And when people talk about communities, and talk about sharing revenue, and talk about predator implications to pastoralists, talk about invasive species, talk about making decisions, talk about what priorities are, I can listen with the knowledge that I've been there. Not necessarily done it, but I've had a hands-on feeling of what it's like to be in those different positions.

And I think the lesson I learned from that is that it's so much easier to think about what other people should be doing than to do it yourself. And I find no difficulty, now I have no job, in once again taking the position, "I just don't understand why you guys don't get it right." But there was a very different sensation when the buck stopped on my table. And I think that is something that many of you in this room should keep in mind. It isn't easy to do these things.

Then I went out of conservation and got extremely involved in politics. And I got involved in advocacy for the change of government—opposition politics. And in your country it's a fairly calm affair, people are quite gentle in terms of bringing about changes—although listening to the last moments of the [recent gubernatorial recall] campaign in California, it's getting a little

dirty. But in our part of the world, it's a lot dirtier than that. And if you're in opposition politics and opposing a government that has been in power a long time, and kept itself in power by methods that are not entirely acceptable to any of us, including them, it's a fairly rough home. Getting governments to change their positions is probably as difficult as advocacy for getting conservationists to change their position on issues. And I'm struck, in the discussions that have taken place here and elsewhere, particularly by people who probably haven't been on the front lines, how convinced they are that if you make enough noise and shout loud enough, people will change their positions. It's very easy for me to join in a conversation and take a strong position as to why the elk should or shouldn't be culled, or why the buffalo should or shouldn't walk past a certain point on the ground, which they don't understand. But in reality, the politics of this is very complex, and I think we need to keep that in mind. It doesn't hurt to remind [us] politicians that we're usually completely wrong, and we should listen more attentively than we do, but it's still a tough battle.

I then went into government and worked my way into an absolutely extraordinarily important position, where, basically, I could make decisions with or for the president (who was considered to be somewhat dictatorial), and basically, when the president would be leaving the country, he would say to his cabinet, ministers, the vice president, "When I'm out, Richard's in charge." There's no constitutional basis for that, but nonetheless, he would say it frequently. And after a while you like the idea, and say, "Mr. President, aren't you taking another trip?" [Laughs] It's quite good to feel...People move aside when you walk through a room, and it's a good feeling, but…It's a tough position. And the thing that most struck me, I suppose, in reflection, is that [although] I have a passion for wildlife and conservation, [when] I had a particular responsibility for reforming the public service and looking at economic reform measures, and as a consequence, every part of government's budget had to come through me for approval before it went to Cabinet, I found myself absolutely unwilling to listen to the wildlife department and the wildlife lobbyists, who wanted more money. I said, "you must be crazy, why would we want to give money to wildlife when all of these other things aren't funded?" And my conservation friends would say, "when did [you adopt] that position; couldn't you just give us a little more?" It's not as simple as that. There are enormous demands on leadership in government, as to what can and can't be done. And so really what I'm saying is that I have a career that suggests to me that this whole story that we're discussing is quite complex.

Nonetheless, I'd like to make a few remarks with that background—if you like, I'm trying to establish my credentials—to say some things which I'm sure won't be entirely acceptable to everyone. First of all, I think—and I stuck my neck out on this recently, and I'd stick it out again—I'm getting

more concerned by the day about this idea that there is an international group of people who call themselves indigenous. And that these indigenous people have, on every continent of the world, got special rights. Now, I can concede, and I can understand that the situation in the New World—Canada, North America, Central America, and South America—where to a very large extent, the indigenous people have been exterminated, disappeared from the records. Remnants do feel that they've been dispossessed, and do need, if you like, affirmative action to redress the past. I don't think there's any question there is a legitimacy to that. But when you go to other parts of the world, particularly to Africa and Asia, the situation isn't the same, because in an attempt to reach the same position of Caucasian domination, the battle was lost, and the Caucasians had to give way to the majority of the indigenous people, who now have taken over the reins of power. The sovereign states of Africa, and the sovereign states of Asia now have indigenous presidents, indigenous ministers, indigenous cabinets, indigenous civil servants, and indigenous park rangers. And the place for those nations to make their decisions is really the indigenous institutions that have been established under legal, lawful government. And I think we've got to be very careful not to mix up the tragedy that has happened and is still happening in the New World and Australia and a few places with what is actually happening in Africa. This is not to suggest for a minute that what has happened in Africa is right. The colonial experience is appalling. It's outrageous what has happened. But the people who now have to move this forward are people of the country, and they need to move it forward in a democratic way, with opportunities for due process and not advocacy for separatism. And I think this is an issue that we really can't afford to lose sight of.

Having said that, I would also suggest that even in Australia and the New World, but certainly it's applicable in Africa, there is an issue that some people call property rights. And people have been dispossessed of what was theirs. There's no question of that, and this needs to be redressed. But I'm not sure that the dispossession of rights to live in an area that is now inhabited by wildlife is any more of a legitimate cause of concern than the people who have been dispossessed by large agricultural schemes to grow sugar cane, coffee, tea, hydroelectric schemes, and things like that. I think there is an argument to be made for property rights restitution or property rights compensation, but let it not just be the open spaces, particularly because I feel the conservation wildlife cadre are probably the least equipped to deal with that battle. Let that battle be dealt with by governments who address it across the board. This whole idea of our revenue sharing is an element that comes out of that issue. We've heard it today: people have lost their land for wildlife, people who've lost that land need to be compensated by that wildlife adjacent to the national park. Why shouldn't people who live next to a hydroelectric scheme, who

are dispossessed of fertile land to create a dam that is producing electricity, why shouldn't they be compensated at the dam turbine? Why is it that those people are told the wealth generated by this dam is redistributed in a nation–state through taxation and various other categories of redistribution under a national budget? Why is it that hundreds of thousands of hectares that have been set aside for large scale agriculture, whether it's tea, coffee, wheat, corn, or the other things, why is that those people who are making profits from those activities are not expected to pay the people who were displaced from those particular parcels of land living around them? Why is it only that the wildlife has to pay people? I think it's perfectly legitimate to recognize that poverty is everywhere, but I'm not sure people are more impoverished by being pushed out for elephants or elk, than they were impoverished by being pushed out for large scale ranches or agriculture in any part of the world. And I think we've got to be very careful to keep a balanced view on some of these issues.

Having said that, I do feel that there are, of course, a number of instances where conservation has perhaps gone too far, or a protected area is calling for more than it is entitled to in terms of a national balance. But let me say something that I've alluded to earlier, and I'd like to emphasize it. In the United States, if the Yellowstone were to be covered with volcanic ash because the dome here blew up and we lost Yellowstone, I don't think the economy of the United States would take much of a blip in terms of the lost revenue from Yellowstone National Park from your entries and concessions. In fact, you might capitalize on it, and have people come to see the devastation and make a lot more money from international transit. It's what I sense would happen. But if the Maasai Mara, or the Serengeti were to be closed down for one reason or another—but let us say it was closed because there were no longer any animals—the entire economy of the country would be impacted. Ten percent of GDP in Kenya is generated by wildlife-based tourism.

For that reason, the central government has to maintain certain standards in maintaining those protected areas—for the benefit not of the animals, but for the state. We need jobs as a result of ecotourism. Currently in Kenya, some 450,000 people are directly employed because people come to see our wildlife. We can't afford to gamble with new experiments in management and find that it didn't work, the animals are gone, and it's all over. I said to my colleagues from the Maasai Mara, unfortunately people think that the only place where there's decent wildlife in East Africa is the Serengeti–Mara. I would argue that it's not true—they have some of the most spectacular wildlife in the world, but the image of Kenya, the image of Tanzania, is the Serengeti–Mara. And we have to be extremely careful what we do with these ecosystems—not simply because of the people living peripheral to the parks, the people who've lost their ground space, as it were, by being dispossessed when the park was

created, whether it was during the colonial era or subsequently, but we have to be careful, because the whole country could go belly up if we let it go. And I think that's very different between the United States and Africa, and also between many parts of Africa and other parts of the world. And I think we need to keep an economic focus on that.

But having said that, I think one of the problems we may be facing in this discourse, which is a varied discourse, is that we may have forgotten what we've already agreed. And this isn't to suggest that you can't revisit previous understandings. But many years ago, and Lee Talbot is sitting there, and he probably could remember better than me, but the International Union for the Conservation of Nature, at the end of a decade of debate and argument, decided to categorize protected areas and to agree that certain protected areas, national parks if you like, simply were too important scientifically, scenically, economically, or a combination of the three or more, for them to be subject to any form of management other than the strictest protectionism, if you like to call it that. And I think, as I remember, Lee, it was category I, II, and III, were absolutely sacrosanct. And that covers the Serengeti–Mara. I'm sure it covers the core Yellowstone area, and I'm sure it covers most of the national parks we're concerned about. The concern for participation of local communities in management—the participation of the change of revenue direction, where the local communities benefit directly, rather than indirectly—is not an illegitimate discussion, but I think it needs to be looked at in terms of the categorization that has been made. And I think many of us in the wildlife business get frightened when community leaders start demanding things about protected areas without necessarily defining which of the protected areas they're talking about. And I think if we took the time, as we said earlier in one of the sessions today, to listen before we answer, we might find that we're not so far apart at all. And I do sometimes worry that we're going back to an era of 30–40 years ago, when people seemed to be against national parks, and the parks seemed to be on the defensive—they were under siege as being inappropriate land use options. Given the knowledge we now have about biodiversity, about genetic resources, about the opportunities to make further advances that will lead to the survival of our own species as well as species we're dependent on through the exploitation of the genetic resources yet to be discovered, we simply cannot afford to lose some of these incredibly rich ecosystems. And we cannot afford to tamper with them to the extent that some of the suggestions would suggest people want to do.

I have been fascinated by the idea that wildlife threatens domestic stock. Has anyone thought that domestic stock threatens wildlife? It's true. Africa's population of lions has gone from about 80–90,000 ten years ago to less than 20,000 today. The decline in lions in Africa has been more rapid and more dramatic than the decline in elephants 10 years ago. Fortunately, lions pro-

duce lots of cubs, and the chances are you could probably bring the lions back relatively easily compared to the elephant or some of the other species, but nonetheless, a large number of these cats are dying from diseases introduced by dogs that are coming from communities living right on the park edge where there are no veterinary services, no inoculations against rabies, heartworm, distemper, feline HIV, or whatever they call it in those cases.

These are serious issues, and ones which we cannot afford to ignore, because if you lose some keynote species, as you ecologists know better than me, you can set off a chain reaction in terms of communities of species, and you can find yourself very quickly in deep trouble. I think we need to go back to where we were, and recognize that we're not going back to the drawing board, we're drawing further detail on the main drawing that was established and agreed over a period of years by very sound policy makers and research. That some people may want to revisit and change things on a national level I think is appropriate, but I think we need to be very careful not simply to lose the corporate memory, as is so often the case, and think that everything has to be done again. Everything can't be done again. We don't have the time; we don't have the money or the resources.

Having said that, let me just try, if you will, to draw this together in a way. I think the current state of conservation, or the current future of wild places, the threat to ecosystems that are largely natural, has never been greater. And I think this morning, Steven Sanderson of the Wildlife Conservation Society made the right comment: we are facing one of the most dangerous, worrying times that humankind has ever seen. Is it impossible to salvage something? Of course, it's not impossible, but I think we need to be very mature and very realistic, and I think we need to think very hard. And I think we've got to remember that one size doesn't fit all. And while I think it's extremely important for collaboration between systems, or managements of ecosystems such as the Greater Yellowstone and the Serengeti–Mara, I think we need to remember that there are going to be huge differences, and this Arch maybe isn't an arch, and maybe it's not overriding in that sense. Obviously, the objectives are very similar, but I'm not sure we want the Serengeti to be a Yellowstone. And I'm not sure you could ever get the Yellowstone to be a Serengeti. And this in no way demeans the value of either; both are very important.

Both are the property of the world. And I think one of the concerns that I have, and I've talked about this with my colleagues from East Africa, [is that] it is not adequate or appropriate today to think of—we were talking earlier about the Bwindi Trust, the Bwindi Impenetrable Forest, and the people who have been displaced. Of course it's of concern. People, you [indicating conference presenter Ann Laudati] were saying that Uganda Wildlife Authority is only giving 2% of the money back to Bwindi for distribution to the communities; I think that was the comment that you made. It is true, but are you

aware that the Bwindi gorilla tracking produces close to 70% of the Uganda Wildlife Authority's total budget, and if all the money that you want, and rightly believe your people that you worked with need, the Uganda Wildlife Authority would cease to function? And if Uganda Wildlife Authority ceased to function, very quickly Bwindi would cease to function, too, in my judgment as a former government employee. And I think there's a cascading effect to these issues, and it's not simply a matter of the Uganda Wildlife Authority being ornery. It's a question of survival.

There has been reference to whether the money that is kept in the Uganda Wildlife Authority is going for what it should be going for. And I would have thought today it's considered better than it used to be. There may be problems, but I think it's a whole lot better than it was. But I think we need to be careful in not thinking of Bwindi as simply a local community national park. It is a Uganda property. And it must play its part in the survival of Uganda as a country first and foremost. The same for the Maasai Mara, and Samson Lenjirr [of Kenya's Narok Council] and I have talked about this on many occasions. The Maasai Mara simply can't be left, I'm afraid, or I would argue it can't be left, to the whims and passions of the local Maasai leaders. It's much too important to my country. And the Maasai of the Maasai district of Narok are part of Kenya. There's no way they can detach themselves from Kenya in realistic terms. And just as other people have had to give up many other things to be part of a nation–state, so do the people on whose land they once lived, and [who] now have national wildlife reserves that have central economic importance. I think we have to keep that in mind, or at least I would argue we have to keep that in mind.

I understand where some of the...I would call, the more liberal viewpoints are coming from in terms of dispossessed people, human rights, environmental rights. I've been an advocate of human rights, environmental rights. I've had my car burnt for my advocacy, I've been whipped and lashed, and I've been jailed and tear-gassed for my advocacy, so I've been on the barricades, and I understand the importance of this, but at the end of the day, we cannot afford these experiments that are suggesting a more equitable arrangement, given the reality of our current economic situation. In the long term, we have to redress some of the wrongs that have been done—no question, and I would advocate that we do so. But let us not throw the baby out with the bath water.

The final point I would make—and I don't want to take too long, because I know that some of you have some questions, and I'm sure I've provoked some comment if not questions, but it's late, and once I stop we can all go home to bed, and I want to do that fairly soon. But let me say this. I think we've suffered—and I've said this elsewhere—I think many of us have suffered from the sense that somehow we are guilty. That taking land for wildlife,

wilderness, is something to feel very awkward about, and that it is has put people to tremendous disadvantage. It's put people at no more disadvantage than many of the other land use policies that have been devised over the last 100 years in terms of achieving nation status and participating in the commonwealth of nations in the current economic formula. I don't think we should be ashamed to say: "we are here, damn it, to see that wildlife does not decrease. We are here to see that wildlife is sustained, that it is enriched, that habitats are improved, and that future generations will not have to look to this generation for those who let the last remnants go."

That the people are hungry, that there are people in gross violation of human rights, that there are people impoverished by government policy, there's no question. But it's not the question of the Superintendent of Yellowstone National Park to become a development agency for putting in water pipes and troughs for ranchers who are facing pecuniary difficulty, any more than it is appropriate for Samson Lenjirr, as the senior warden-in-charge of the Maasai Mara, to have to worry about building schools and sitting on parents' committees as to whether the school should have two classrooms or five, and who should pay for it. [Samson's] job is to see that the lions are not being infected with feline distemper, and the lions are not being poisoned by people who have ill intent, and that your park raises the maximum amount of benefit through the distributive procedures that exist in the country under lawful arrangement. You're not a development expert, you're not an agricultural expert; you're a wildlife expert. And I don't think you should feel bad about that.

The truth is that we don't respect our wildlife people. They are the least well-paid in the public service. You, wildlife managers, I believe, control, oversee, protect, look after national assets that in—perhaps not in America, because you're very rich—but in Kenya, the wildlife estate (protected areas) is far more valuable than the entire financial assets protected in the Central Bank of Kenya. The central bank doesn't have a fraction the amount of value—monetary value—that the protected areas have. Yet we pay the office messenger, the person who delivers letters and tea, more than we pay some of our wardens. And yet they are charged with the responsibility of looking at an asset far more valuable than is in the Central Bank. We've got things twisted around. But my plea is, in these expressions of concern, in efforts to bring about dialogue, in efforts to reach together to find common solutions, let us not think what works for the Mara necessarily works for Yellowstone, or Bwindi, or some of these others. Let us look at each in its own way. But in the developing world, let's remember that we are developing; we're not developed. And we're under tremendous difficulty.

And if I could end with a swipe at the U.S. position on the World Trade Organization: as long as you subsidize your farmers the way you do, you

have an inflated value of your cattle that you believe are getting brucellosis from your bison. But more importantly, it stops our farmers ever getting to where they want to be. And the great ideas of producing "conservation cattle" —I think, was the term that Lisa [Graumlich] used—is way off for us. And until you get rid of the trade barriers and the subsidies of the West, the Third World, the developing world, is never going to have a chance of making conservation-related agriculture work, because we have no markets; it's not there. We don't exist as far as the planners of this are concerned. So let's have a reality check. Let's not give up. Let's recognize it can be done. But my goodness, we've never had a tougher time to look at the future, I think, than we do today.

Thank you.

Involving communities in conservation in Zanzibar: local factors in program outcomes

Arielle Levine

Abstract

As a newer initiative in international conservation efforts, marine protected areas lack the history of community conflict seen in terrestrial conservation in Africa. Marine conservation thus presents a tremendous opportunity to pilot innovative new techniques in community-based conservation programs. The islands of Zanzibar are home to four community-oriented marine protected areas, each of which is sponsored by an international agency, and each of which involves some form of community component. However, a number of issues arise when working at the community level, requiring nuanced attention to a variety of local factors. The Menai Bay program in southern Zanzibar provides an excellent example of the complexity of factors involved, which can result in dramatically different village-level responses to a single program. These factors include, but are not limited to differences in geography and infrastructure, the potential for tourism development and alternative sources of income, pre-existing community structures within each village, and the relationship of conservation program managers to the Zanzibari government. While these factors are complex and difficult to predict, it is essential that conservation programs take them into account when trying to establish community-based marine conservation programs that will be sustainable in the long term.

Introduction

Tanzania is internationally renowned for its parks and protected areas. With over 25% of its land surface set aside in parks, protected areas, and wildlife reserves, the country has placed a high priority on safeguarding its valuable wildlife and land resources (Leader-Williams et al. 1996). Many of these areas were established during the colonial period, and the number of national parks in Tanzania rapidly expanded after the country gained independence in 1961. Parks, protected areas, and game reserves provide a significant source of revenue for the country through international tourism, as well as through funding from international conservation and development agencies.

While terrestrial conservation in Tanzania dates back to colonial times, marine conservation has only recently come into the spotlight. The Tanzanian government began to designate a few small marine reserves off the coast of Dar es Salaam in 1975, but these protected areas were not fully implemented until the Marine Parks and Reserves Act was ratified in 1994 (Spaulding et al. 2001), which was when the majority of marine conservation activity began (Table 1).

Table 1. Marine protected areas in Tanzania.

Site name	Designation	IUCN category	Year designated
Bongoyo Island	Marine reserve	II	1975
Chumbe Island Coral Park*	Marine sanctuary	II	1994
Fungu Yasini	Marine reserve	II	1975
Mafia Island	Marine park	VI	1995
Maziwi Island	Marine reserve	II	1981
Mbudya	Marine reserve	II	1975
Menai Bay*	Conservation area	VI	1997
Misali Island*	Conservation area	VI	1998
Mnazi Bay	Marine park	VI	2000
Mnemba*	Conservation area	VI	1997
Pangavini	Marine reserve	II	1975

**Zanzibar Marine Protected Areas (from Spaulding et al. 2001)*

At the same time, conservation and protected area management in general was undergoing a dramatic revolution in thinking. After years of exclusionary models of parks and protected areas, conservation programs began moving toward a more participatory mode of involving local communities in community-based conservation and community-based natural resource management programs in Africa and other developing countries around the world (see Brandon and Wells 1992; Murphree 1993; Gibson and Marks 1995; Leader-Williams et al. 1996; Brosius et al. 1998; Newmark and Hough 2000). Conservation and development organizations began to acknowledge the importance of obtaining community support and returning benefits to local people in order to guarantee the long-term sustainability of their programs. Community-based conservation was heralded as the way of the future for natural resource management in developing countries, and organizations ranging from government agencies to NGOs, international development institutions, and private tourism operators gradually began to incorporate local communities into their conservation agendas. By the end of the 1990s, it was difficult to find a conservation area in Tanzania that did not have a community component sponsored by an associated donor agency.

Because marine protection was initiated more recently and during the same time that this shift toward community-based conservation was underway, marine programs do not yet have the same history of conflict as land-based conservation programs in Tanzania. Marine protected areas thus provide a tremendous opportunity to pilot innovative conservation initiatives in collaboration with local community and user groups. Many new experiments are currently underway to work with local communities around marine protected areas, often incorporating techniques used in land-based conservation strategies. However, many of the issues involved in terrestrial community-based conservation initiatives may not apply to the marine environment. Marine conservation faces additional challenges in the fugitive nature of fisheries resources, in that user groups are often highly diffuse and hard

to define as traditional "communities," and in the fact that marine borders are extremely difficult to demarcate and enforce. While community-based land conservation tends to focus on working with local residents, fisheries resources are often used by people who come from great distances and local "resident" communities may not exist, or involving only nearby communities may overlook the influence and importance of other key resource users.

Marine conservation in Zanzibar

On the island of Zanzibar, off the coast of Tanzania, four protected areas have recently been established that attempt to combine marine conservation with the interests of local communities (Figure 1). This is done primarily by involving local communities in the management of these areas and/or providing nearby communities with benefits derived from conservation. Two of the programs in Zanzibar are sponsored by international non-governmental organizations (NGOs), and the other two are managed by private sector, eco-tour operators (Table 2).

An unusual feature of marine conservation programs in Zanzibar is that all are managed by external international organizations. Indeed, the divisions of government that would normally be responsible for managing protected areas do not have the funding or resources to manage these protected areas themselves. While many government programs were supported in the past by international development funding, during the 1980s the international donor community shifted its funding priorities away from providing direct assistance

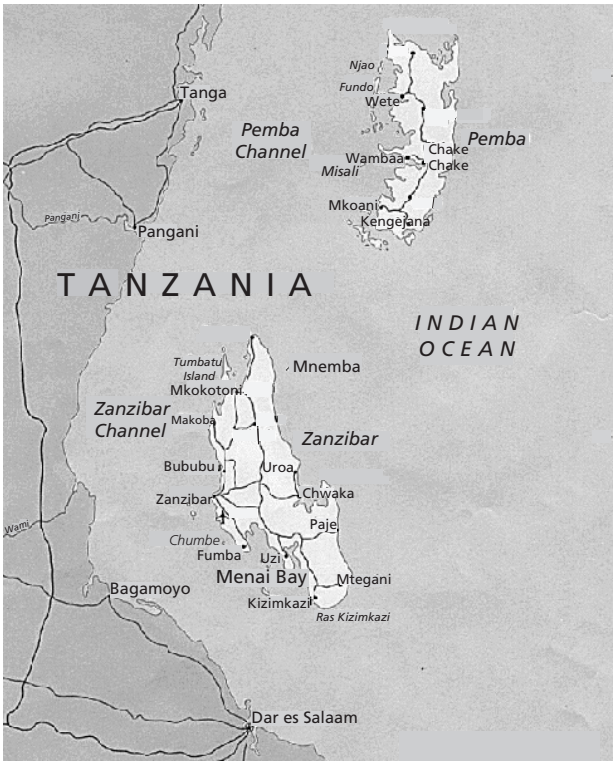

Figure 1. Zanzibar's Marine Protected Areas.

Table 2. Marine conservation areas in Zanzibar.

Conservation Program	Program Type	Implementing Organizations	Location and Involved Communities
Misali Island Marine Conservation Area	Non-governmental organization (NGO)	CARE International; Government of Zanzibar–Department of Commercial Crops, Fruits, and Forestry (DCCFF); Misali Island Conservation Association (MICA)	Misali Island, west of Pemba; works actively with 12 user communities (shehias) around Pemba; involves 34 shehias in fishermen's association
Menai Bay Conservation Area	Non-governmental organization (NGO)	World Wide Fund for Nature (WWF); Government of Zanzibar–Fisheries Department	Menai Bay, southern Zanzibar; involves 17 user villages in the Menai Bay area
Mnemba Island	Private Sector	Conservation Corporation Africa; Government of Zanzibar–Fisheries Department	Mnemba Atoll, northeast of Zanzibar; involves four nearby user communities (shehias)
Chumbe Island	Private Sector	Chumbe Island Coral Park, Ltd.; Government of Zanzibar–Fisheries Department	Chumbe Island, west of Zanzibar; involves local fisher communities and Zanzibar teachers and schoolchildren

to the state. Now, donor institutions emphasize decentralization or privatization of state functions, preferring to work through what are often referred to as "civil society" organizations, which are deemed to be more efficient and representative of society, or through private sector operators, which are also seen as more efficient and flexible than the bureaucratic government structures. In essence, this means that the majority of donor funding in Tanzania is now distributed through intermediary organizations such as NGOs (often seen as institutional representatives of civil society), or it is used to encourage private sector initiatives, prompting the increased involvement of these two types of alternative organizations in conservation activities (Gibbon 1995; Levine 2002). Additionally, the political corruption and human rights violations associated with the Zanzibar elections in 1995 and 2000 (Human Rights Watch 2002) caused the rapid withdrawal of many of Zanzibar's remaining sources of international development funding, leaving the Zanzibar govern-

ment further strapped for funds (Bigg 1996).

Addressing this severe lack of state resources and capacity, Zanzibar's Environmental Management for Sustainable Development Act of 1996 specifically provides that the National Protected Area Board of Zanzibar can delegate its authority to institutions or individuals not employed by the government, stating that the board "may delegate in writing any of the National Protected Areas Board's powers except its power to recommend national protected area status to the Minister responsible for the national protected areas system" (Government of Zanzibar 1997). This appointment may be made to "any person qualified to exercise those powers," thus opening the potential for NGOs, the private sector, and local communities to become involved in protected area management. While the government still retains authority over reserve designation and delegating reserve management powers, nearly all responsibility for managing Zanzibar's marine protected areas currently lies in the hands of outside agencies, allowing for a variety of innovative techniques in conservation and community involvement.

Because of the current priority of involving local communities in conservation programs, each of the institutions managing these protected areas (be it private sector or NGO), has incorporated a community component into its management plans. However, it is nearly impossible for these external organizations to engage directly with local communities without working through pre-existing structures established by the Zanzibari government. Thus, while the Zanzibari state has essentially written itself out of the management of these protected areas, external managing institutions are still required to work through the state in order to reach local communities. This creates a rather convoluted relationship between protected area managers, the government, and local communities, that is not necessarily conducive to building strong and sustainable conservation programs (Levine forthcoming).

Communities and conservation: NGOs and private sector programs

Zanzibar's Protected Area Management Plan has opened opportunities for involvement by a variety of institutions in marine protected area management, and has resulted in a wide range of conservation programs and methods in a relatively small area. This created a natural experiment for assessing the outcome of different management styles, particularly the difference between private sector and NGO techniques for conservation and community involvement. As might be expected, village members' views of and reactions to the conservation programs vary greatly between the different programs. However, their responses also vary just as dramatically between the villages within an individual program. A single management institution may experience a positive response from a community in one village, while members of a different village may react strongly against the same program.

To assess local responses to the different types of conservation programs,

in-depth, questionnaire-based interviews were conducted in 2002 with over 500 fishermen in 25 shehias involved in each of the four marine conservation programs in Zanzibar. ("Shehia" refers to the administrative district just above the village level. Some shehias involve only one village, while others incorporate several villages located in close proximity to each other). Focus group discussions were also conducted with groups of fishermen in each village. Preliminary results from this research show that while there is no dramatic difference between average project satisfaction in villages involved in NGO vs. private sector programs, there is a striking difference in the extremity of the fishermen's reactions. Fishermen located in villages associated with private sector programs tend to be passively accepting in their attitude toward the programs. They may be somewhat disappointed to lose access to a fishing area, but are perhaps pleased to be receiving benefits from program funding in their villages. On the other hand, fishermen located in villages sponsored by NGOs often exhibit a much more extreme response. When the NGO programs are meeting community expectations, community members feel highly involved in and enthusiastic about the conservation initiatives. Conversely, if the program fails to live up to its promises, local community members may exhibit outrage and threaten to rebel against the program itself.

This dramatic difference in community-level responses appears surprising until one examines the different techniques used by NGO vs. private sector programs in implementing community-based conservation. NGOs tend to focus much more on building community-level structures, actively trying to involve fishermen in conservation and/or management. Fishermen are encouraged to form village conservation committees and may participate in patrols or become involved in deciding management issues. This creates an overall sense of engagement and community-level investment in the conservation programs. Private sector programs, on the other hand, operate more as socially responsible businesses. The hotels incorporate a conservation component to their operations and try to provide benefits to local community members. Profit-making remains a top priority, but ecotourism is a profitable niche market, and the community and environmental programs provide positive publicity for the hotels, and help to ensure good local relations. Local communities are not actively involved in management, but are passive recipients of some of the hotels' profits derived from tourism.

While a highly engaged community is much more likely to feel invested in a conservation program, this in itself cannot guarantee a positive community response. The overall outcome of a community-based conservation program at the local level depends on numerous other factors beyond the type of implementing institution, or even the techniques used to carry out the program. These factors are often complex and unpredictable, and can be either internal or external to the village or program itself. In spite of the com-

plexity of these factors, it is important to try to assess, predict, and adapt to these issues in program planning and implementation in order to avoid future problems and potential program failure.

The Menai Bay Conservation Area program

Among the marine conservation programs in Zanzibar, the Menai Bay Conservation Area provides an excellent example of the potential for extreme variation in local response within a single program. Sponsored by the World Wide Fund for Nature (WWF), the Menai program is located in southern Zanzibar, encompassing an area of about 470 km² (Figure 2) and working with 17 villages in the Menai Bay area. The program was initiated in 1994, and the region was officially gazetted as a protected area in 1997. While WWF is responsible for funding the program, it collaborates with the Fisheries Division of the Zanzibar government to work with local villages and has received financial assistance from USAID, the British government, and other sources to finance certain aspects of the program.

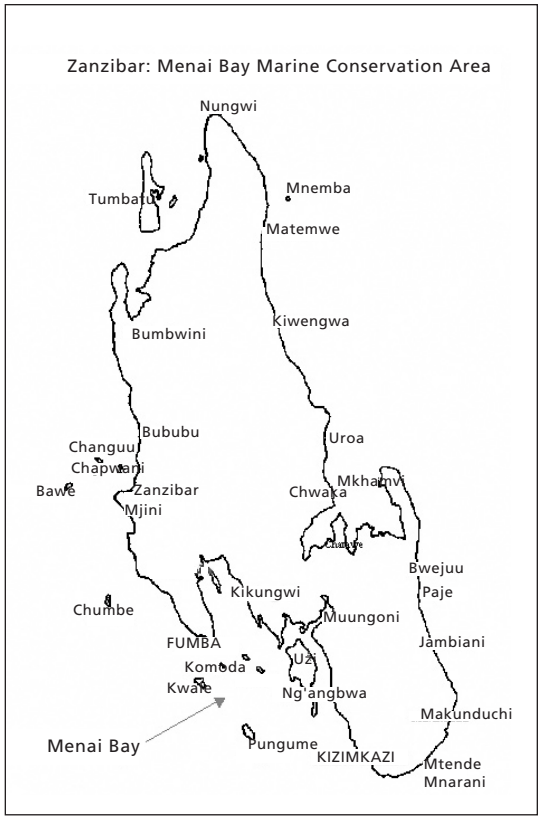

Figure 2. Menai Bay Marine Conservation Area.

The primary aims of the Menai Bay program are to sustain the biological resources of Menai Bay through the establishment of a multi-user marine conservation area, ensure local participation in conservation and monitoring of the protected area, and increase public awareness and education. The project also hopes to increase local capacity for sustaining conservation activities and provide sources of revenue to improve local livelihoods and to make the project self-supporting in the long-term (Ngaga et al. 1999). To address these goals, each of the 17 villages involved in the program has organized village conservation committees (VCCs) that provide a structure through which the program contacts and works with each village. The VCCs are also intended

as a way of organizing village members to focus on issues of environmental protection such as mangrove replanting and reduction of dynamite fishing and illegal nets (Menai Bay Conservation Project 2000).

To address the problem of destructive fishing in the area, the Menai program has established a system of local patrolling where fishermen from participating villages take radios on their boats to report incidences of illegal fishing. Five radios were distributed amongst the villages, and two patrol boats are stationed in Kizimkazi Dimbani on the east end of the bay. The patrol sometimes works together with the local coast guard to intercept illegal fishermen; between 1997 and 1999, 12 cases of illegal fishing involving 167 fishermen were brought to court (Ngaga et al. 1999). Although fishermen continue to complain that those who are prosecuted are rarely punished in any substantial way (only 40 fishermen involved in the above cases were actually fined), most villagers have reported a significant reduction in dynamite fishing in the bay since the program was initiated, particularly in the area around Pungume Island in the south.

WWF is also working to promote alternative sources of income in the Menai Bay villages. Tourism is actively promoted in some of the involved villages to bring in additional income to improve the livelihoods of local people, as well as to provide revenue to support conservation activities and program expenses in the bay. Many villages have also received assistance and training for alternative income strategies such as bee keeping, tree nurseries, and improved charcoal-making techniques.

Village-level outcomes in Menai Bay

The Menai Bay program has generally used a consistent model for conservation and community involvement when working with each of the involved communities. The VCC structure is virtually identical in each village, and the program has used similar methods for promoting conservation and alternative livelihoods (such as radio patrols and forming women's bee keeping groups to work in mangrove areas). However, although the model for implementing conservation programs is similar across villages, the outcomes at the village level have not been as consistent as the stated approach. This has resulted in highly divergent responses from community members within different villages, as well as high variation in village participation in and support of the programs.

The Menai case study involved intensive interviews and focus group discussions with fishermen in seven of the program villages situated across Menai Bay. While every village is unique, and thus different outcomes would be expected in each area, the variation in community responses from different villages within Menai Bay is extreme, with program satisfaction generally higher on the eastern end of the bay than in the West. These differences are due to a number of factors, both internal and external to the villages. These

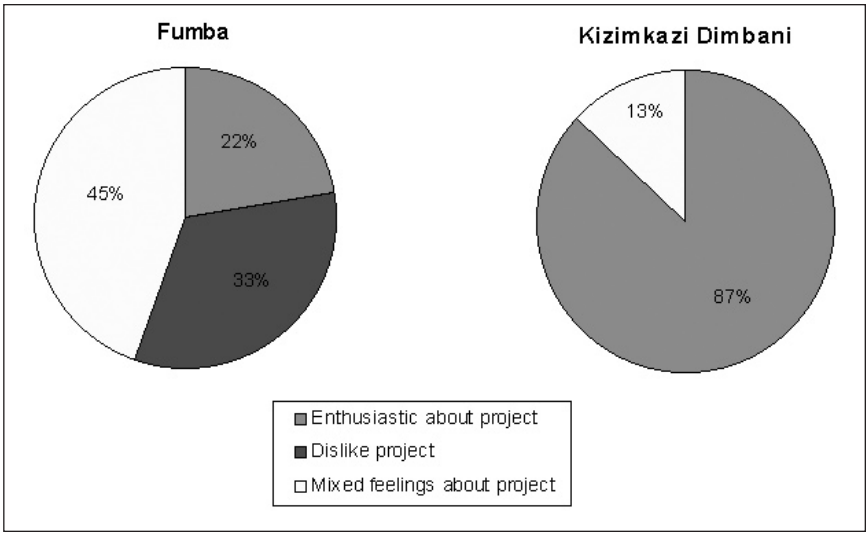

Figure 3. Fishermen's reactions to the Menai Bay project.

factors include, but are not limited to differences in the infrastructure and geography of an area, local differences in history and fishing methods, the presence of illegal fishing in the area (from either village members or outsiders), village members' access to alternative means of income, the degree of the community's dependence on fishing for their livelihood, and variations in the previously existing social structures found within each village.

Two villages in particular exemplify this extremity of variation in responses: Kizimkazi Dimbani (located on the far eastern end of the bay) and Fumba (on the far western peninsula). Fishermen in Kizimkazi Dimbani are generally highly enthusiastic about the project, believing that it has helped their village tremendously, both through the reduction of illegal fishing and through an improvement in their overall livelihoods. The village of Fumba, on the other end of the bay, is much less enthusiastic (Figure 3). While fishermen who are members of the VCC in Fumba seem to have a slightly more positive opinion of the program (a trend seen in all villages), Fumba fishermen are generally pessimistic about the program's ability to reduce illegal fishing in their area or improve their overall situation (Figure 4). Many of the differences between these two villages in local responses to the program can be explained by the aforementioned factors, a subset of which are discussed below.

Geography and infrastructure. Differences in infrastructure are perhaps the most obvious factors accounting for these divergent responses. Although Kizimkazi Dimbani is much farther from the project headquarters in town, a well-maintained, paved road runs all the way to the village. Fumba is physically much closer to town, but the road to reach the village is in poor condi-

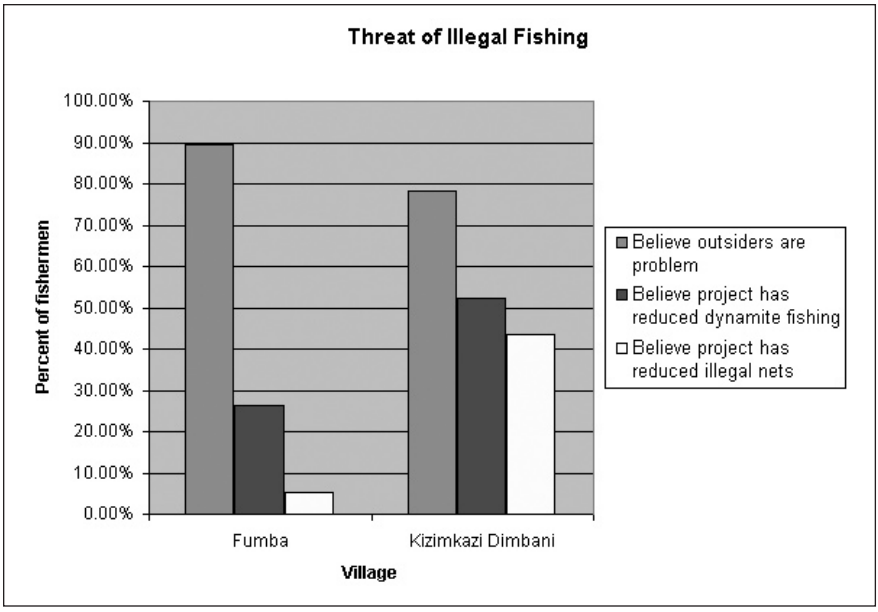

Figure 4. Perceived threat of illegal fishing.

tion, and driving to Fumba actually takes longer than the trip to Kizimkazi Dimbani. A common complaint among many fishermen is that program officials don't come to their villages, and indeed, program officers rarely make the grueling trip to Fumba. The smooth road to Kizimkazi Dimbani, however, also allows project officials to stop at other project villages en route, making a trip to this village both comfortable and convenient. Not surprisingly, program officers are much more inclined to visit Kizimkazi Dimbani than Fumba, and the village gets much more attention from the program.

Additionally, Kizimkazi Dimbani serves as the base for the program's two patrol boats and radio headquarters. One of these two boats contains two powerful outboard engines that theoretically enable the patrol team to intercept almost any illegal fishing boat that enters the bay. However, these impressive engines also use a considerable amount of fuel, and the limited project funds are often inadequate to support the cost of fueling these boats. Project officers frequently lack sufficient fuel to take the boats on patrol or intercept illegal fishermen outside the immediate area of Kizimkazi Dimbani.

As Fumba is located on the opposite end of the bay from Kizimkazi Dimbani, the patrol boat is rarely able to arrive there in a timely manner in response to illegal fishing, even if adequate fuel resources are on hand to make the trip across the bay. Both Fumba and Kizimkazi experience a number of outsiders fishing in their area. However, Fumba is located closer to the mainland and to town, meaning that the perceived threat of outside fisher-

men using illegal methods is greater (Figure 4). The presence of the patrol boats in Kizimkazi Dimbani serves as a deterrent to illegal fishing in that area, while fishermen in Fumba do not generally believe that program has helped to significantly reduce illegal fishing.

Because of the ease and comfort of transportation to Kizimkazi Dimbani, as well as the noticeable presence of program resources (such as the patrol boats), the Menai program officers have been much more likely to bring donors and other visitors to this village to visit the program. This has resulted in Kizimkazi Dimbani becoming a kind of "showcase village" for the Menai Bay program. While this was probably not the initial intent, this situation has contributed to the further concentration of program attention and resources in Kizimkazi Dimbani. It has also opened up other opportunities to the village, such as increased international attention and the presence of tourism.

Alternative income through tourism. The tourist industry, which the Menai project has actively promoted as an ecologically friendly source of alternative income generation in the Menai Bay region, is already a notable source of employment in both Kizimkazi Dimbani and Fumba. The presence and potential of tourism is probably greater in these villages (with easy ocean access) than in most other villages in the project area. Fishermen in both villages work for outside companies taking tourists out to sea, and many

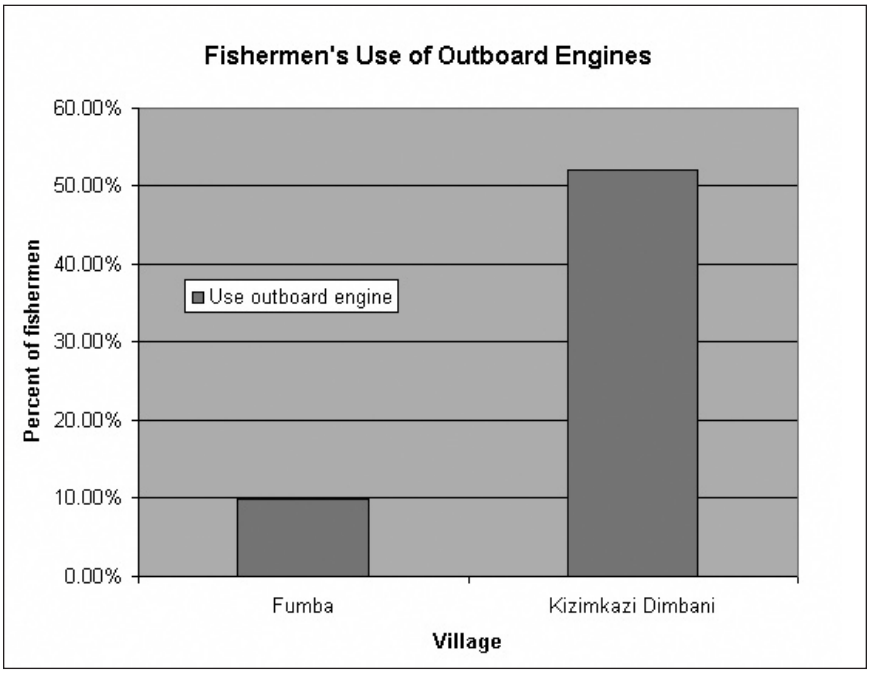

Figure 5. Use of outboard engines in Fumba and Kizimkazi Dimbani.

fishermen in Kizimkazi Dimbani also lead dolphin tours in their own boats using personal resources and initiative. The Menai project actively promotes tourism in the Kizimkazi region, and opportunities for independent employment are greater in this area because its popularity and the condition of the road bring frequent casual day visits from tourists. The Menai program has also tried to use tourism as a source of program revenue, attempting to tax tour operators at two dollars per head. This scheme met with considerable resistance from individual fishermen and tour operators alike, particularly in Fumba, where both fishermen and tour operators believed that they were receiving few benefits from the project.

Tourism is a major factor contributing to the greater relative wealth of fishermen in Kizimkazi Dimbani compared with Fumba. The use of boats with outboard engines, a proxy indicator of the economic status of fishermen, is dramatically higher in Kizimkazi Dimbani than in Fumba (Figure 5). This greater use of outboard engines allows Kizimkazi fishermen to travel farther to fish, making them less reliant on their immediate area, and thus less threatened by destructive fishing in their region. Engine ownership also allows fishermen to independently take tourists out in their own boats, further increasing their potential to earn tourist income.

Fishermen in Kizimkazi Dimbani see the presence of tourism as a strong benefit provided by the Menai program, bringing in supplemental income and employment opportunities for other people who might otherwise leave the village to find work in town. As one fisherman stated, "the village benefits because many youth get employment when indeed our own government says that there are no jobs. It isn't customary for many of our youth to move to town when they finish school because there is work here and they help each other. A person can earn two to three thousand shillings [here] that people in town can't get. Also, our village has become well known because many different visitors come here…and many make contributions" [all quotes from fishermen are translated from the original Swahili by the author].

Fumba fishermen see the relationship between the Menai project and tourism differently. When asked about the two-dollar contribution that the project was soliciting from tourist operations, many fishermen cited corruption within the project. One fisherman responded, "truthfully, this project has been given a lot of money by donors and they have not done one thing of meaning; they've used all of this money and they've done nothing…They say they do patrols, but they don't do this—they just take tourists out to make money…They say that this money will help the village, but this isn't true. If they get money they eat it themselves and it doesn't help anything here. Now many people in Fumba don't believe in Menai." Another Fumba resident emphasized the village's disillusionment with the project: "The people of Menai aren't honest…after we've seen that there is no truth, indeed we don't

even pay one dollar, because although the project appears to be doing things for the environment, still…destructive fishing occurs even though the project has boats to enforce the law. Therefore there is no need to pay to make their [the project officers'] stomachs fat—there is no meaning."

The uneven distribution of program attention and resources goes far to explain the differences in fishermen's attitudes between the two different villages. However, other villages participating in the project also suffer from negligible program attention, but their reaction against the project has not been nearly as extreme as in Fumba (Figure 6). As the village located farthest from the patrol headquarters and closest to the mainland and town, the threat of outsider illegal fishing may be greater in the Fumba area than in other parts of the bay, potentially exacerbating village-level dissatisfaction. However, the significant degree of dissatisfaction with the Menai program found among Fumba residents may also be explained by other historical factors within the village itself.

Pre-existing village structures. Fishermen in Fumba established their own village conservation committee in the early 1980s to fight the growing incursion of illegal fishing in their area. With the help of donor funding, they later expanded this committee to work with five other villages on the Fumba peninsula. Fumba fishermen frequently cite with pride how they were "the first to protect the environment." When the Menai project came to Fumba, the program officers asked the villagers to disassemble their village conserva-

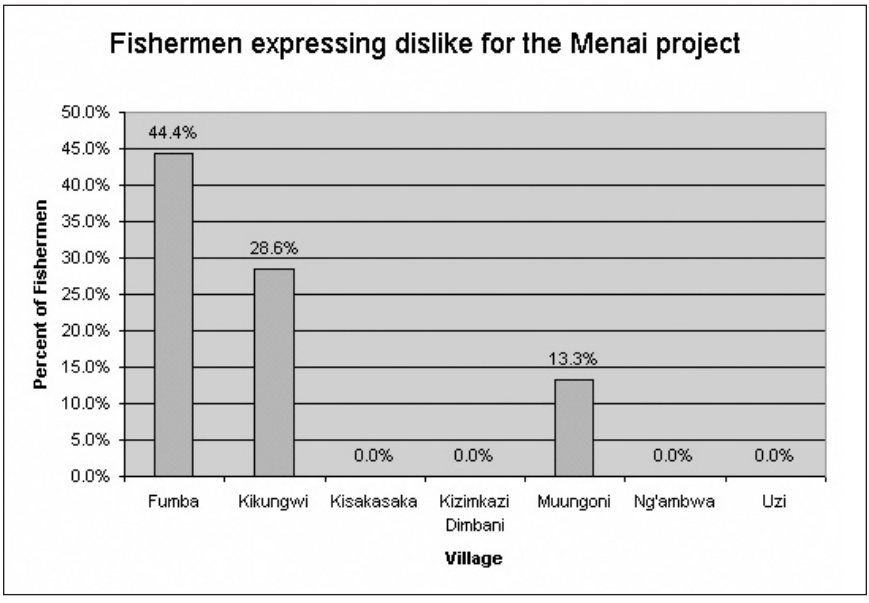

Figure 6. Other village responses to the Menai Bay project.

tion committee and create a new one under the auspices and structure of the Menai Bay program. The Fumba villagers willingly complied, expecting to receive increased support from the project. Unfortunately, the villagers state that they have since been abandoned by the project; the program officers never come to their village, and the patrol boat never reaches their area. One Fumba fisherman complained, "Menai, they've got problems—they don't send the boat. There used to be a committee here but it died a few years ago; it didn't work. People came from [the project] but they did nothing." Another complained: "Menai and WWF have done nothing for the committee—they've done zero. Nothing has come of it." Other fishermen express a sense of urgency: "They [the project] need to do real work because the coral is being broken, fish are ruined, destructive fishermen fish every day—it must be protected. Fishermen must not use destructive methods, and the project must do their work well. We don't want destructive fishing in Menai Bay."

Much of the outrage in Fumba seems to stem from the feeling that the Menai project has undermined the efforts that the villagers initiated themselves. The program officers made promises to assist them, but instead focused their resources elsewhere. As one Fumba fishermen stated: "People in Fumba were the first to protect the environment. Here we were teachers for other areas, but the project removed us…now people from here have had their hearts broken—they don't continue [to work to protect the environment]." Many cite the increase in illegal nets in their area as a big problem, and they are frustrated that the program focuses its efforts on the other side of the bay. "Our strength has decreased because we have gotten nothing, it all goes to Kizimkazi…We've gotten no tools to protect against anything. People from Menai don't come often now…they've stopped coming completely, they only go to Kizimkazi." Some villagers are outraged enough to state that the program officers are no longer welcome in Fumba.

The Menai project's failure to work with, and in fact, its undermining of pre-existing village-based conservation structures goes far to explain the extreme resentment that most Fumba fishermen feel against the program. Kizimkazi Dimbani, on the other hand, had no formal village conservation committee before the Menai project began. The Menai program brought a formal structure and resources to the village to address issues such as the incursion of illegal fishermen in their area. It also helped increase tourism in the village. Rather than undermining local structures in Kizimkazi Dimbani, the Menai project helped to build them, a factor which may help to explain the fishermen's high level of support for the program.

Implications for community-based marine conservation programs

Although the Menai Bay project's formally-stated goals and models are the same for each village within the Menai Bay region, the outcomes and community-level responses vary tremendously within individual villages. The dif-

ferences in responses from fishermen in Fumba and Kizimkazi Dimbani are an extreme example, but the responses from other villages involved in the Menai program also show similar variation across the bay. This variation at the village level is not unique to the Menai program, but is seen in the results from the majority of the case study villages associated with marine protected area programs in Zanzibar, regardless of the structure of the program or the type of sponsoring organization. This within-program variation makes it very difficult to deem any single program a complete "success" or "failure," but requires that attention be paid to the nuanced differences within the program area itself.

It is difficult to predict which of the numerous potential contributing factors may account for program variations at the village level, and local factors vary significantly by case and by region. However, the Menai program provides some interesting lessons regarding important factors to consider in implementing community-based marine protected area programs. One of the more obvious and widely applicable considerations is the need to try to disperse program benefits across villages as evenly as possible. While differences in geography and in local infrastructure may make this difficult, the resentment between villages that can result from unequal distribution of program attention and resources can be detrimental to the success and stability of the overall program. In the case of Kizimkazi Dimbani, the Menai program focussed more resources in this easily accessible location, using it as a successful "showcase village" for donors, and indeed, the level of program success and local support in Kizimkazi Dimbani is very high. However, this tactic did not go unnoticed by other participating villages, and many felt alienated or abandoned by the program. Focusing resources in an easily accessible location may also serve to further marginalize villages that are already politically and economically marginalized by poor access to transportation, communications, and infrastructure.

Additionally, it is important to pay particular attention to differences in local situations and history. Community-based conservation programs can be important tools for building local community structures to address conservation problems and for gaining community support. However, these programs must also take into account the previously existing societal structures within each village and attempt to work with these structures of civil society, rather than undermine them. While a village's previously existing organizations and techniques for addressing conservation issues may not necessarily fit neatly with the conservation model of a wider program, it is important to try to work with these local structures that have a strong local base of support, rather than dismantle them in the hopes of creating a more even, generic program structure across villages. In the case of Fumba, the dismantling of the local conservation committee in favor of the Menai program's VCC model not only

alienated local fishermen from the program, it also left the village without any effective, village-based structures to address the growing problem of illegal fishing in the area.

Externally-sponsored conservation and the state

A wider issue in community-based marine conservation in Zanzibar, and one that is perhaps more difficult to address, is the structural relationship between the government and the external institutions implementing marine conservation on the island. Although the government is a key collaborator at the ground level in terms of program implementation, the state does not generally play largely in the funding or formulation phase of the programs. The shortage of internal resources in the Zanzibari government requires that it work with external institutions to fund its conservation programs. However, this means that the government may not feel ownership of, or investment in, the projects. It places the program sponsors, whether they are NGOs or private sector operators, in the position of a fatted calf that can be seen as a potential source of funding for government priorities that may not fall in line with the program's conservation agenda. Government officials may cooperate with the program only as a means of gaining access to outside funding, rather than because they support or believe in the program's aims and goals.

Additionally, if the government does not see itself as directly invested in the project, then government officials and employees may be more likely to try to skim resources from the program (at the expense of overall program goals) rather than actively support it. A number of fishermen, and even some program employees, claimed that corruption was a problem in the Menai Bay program. If this is the case, then already-inadequate program resources must be stretched even more thinly across the project's 17 villages. This perception of corruption also detracts from the program's relationship with individual villages, undermining community trust and cooperation.

Another challenge to the Menai program is that it lacks adequate support within the Zanzibari state's legal structure. Although the incidences of illegal fishermen being brought to court increased dramatically after the patrol system was established by the Menai program, very few of these fishermen have been substantially fined or punished, providing very little disincentive for the use of illegal fishing nets in the area. This might not be the case if the Zanzibari state felt ownership of the Menai program, potentially prompting a more active level of support and collaboration across the different sectors of the islands' government.

The Menai program provides an excellent example of the extremely complicated factors involved in implementing community-based conservation programs. The wide variation in village-level outcomes, both for and against the program, illustrates the need for increased attention to the nuances and details at the local level, as well as to the program's institutional and

contextual setting. Applying a single model of conservation and community involvement across multiple villages—even villages located in a similar region and setting—is bound to result in very different outcomes once that model hits local cultural, historical, and political realities. Although these different results are not entirely predictable, it is important to take local differences into account to try and minimize inequitable outcomes that might undermine long-term program success. Program techniques and policies must be adaptive to pre-existing local structures and to unpredicted individual situations that may arise. It is certainly a daunting task for an international conservation NGO (or any organization) to create a community-based marine conservation program that is sensitive to local contextual differences, has an adaptive management style that can respond to unexpected needs, and is integrated into both local-level and state-level structures. However, this kind of structure is necessary if community-based conservation programs are to be effective and sustainable in the long term.

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A brief survey of standing: seeking shelter without technicalities in Africa

Kelly Matheson

Abstract

The pursuit of environmental protection and ecological preservation requires widespread access to justice. In part to protect the integrity of the judiciary, all governments, to an extent, limit their citizens' access to the courts by adopting a series of barriers one must overcome to bring a lawsuit. The requirement that a plaintiff be granted "standing to sue," or locus standi, *is one such barrier.*

While the U.S. courts are developing jurisprudence to restrict standing to sue, many other countries, including those in the developing world, have adopted interpretations of standing better calculated to allow the law to play its part in protecting the public interest. They do so based on the understanding that the inequality between those with power and resources and those without is magnified when access to courts is restricted. This paper briefly explores a citizen's ability to bring environmental lawsuits in three African countries: South Africa, Kenya, and Tanzania, examining both the constitutional provisions and the record of judicial interpretation. In each of these countries, the existing constitution provides a basis for standing to sue. The security of this basis in an environmental context, however, depends on the varying language of the countries' constitutions and traditions of judicial interpretation.

Introduction

The pursuit of environmental protection and ecological preservation requires widespread access to justice. In part to protect the integrity of the judiciary, all governments, to more or less of an extent, limit their citizens' access to the courts, by adopting a series of barriers one must overcome to bring a lawsuit. The requirement that a plaintiff be granted "standing to sue," or *locus standi,* is one such barrier.

Standing is the determination of whether a specific person, group of persons, or organization is the proper party to bring a particular matter to court for adjudication. In many judicial systems, this means that the plaintiff must show it was, or is likely to be "sufficiently and personally injured" as a result of a legal wrong. Governments often justify and defend this stance by arguing that this requirement helps hold back the floodgates of litigation. However, when applied to environmental law, standing to sue, if not liberally interpreted, threatens access to justice. This is partly because of the complexity of determining the cause and effect relationship in environmental cases and partly because public interest organizations, rather than individual victims, are often best placed to file suit to remedy environmental wrongs.

Narrowing access: the U.S. approach

The stance of the U.S. Supreme Court illustrates the stifling impact that narrow interpretations of standing can have on valid environmental claims. In the early 1970s, for instance, the U.S. Forest Service granted Walt Disney Enterprises a permit to construct a major resort complex despite the environmental degradation that would result from the completion of the project. The Sierra Club, a non-profit, non-governmental organization, filed suit, asserting, "[A] special interest in the conservation and sound maintenance of the national parks…and forests of the country." The Supreme Court dismissed the case, finding that the members of the club would not be "significantly affected" by the proposed activities and concluding that "a mere interest in a problem, no matter how longstanding the interest and no matter how qualified the organization is in evaluating the problem, is not sufficient." This holding put the American public on notice that only those who are "sufficiently," and later, "personally" injured have standing to sue those who fail to fulfill their legal duties. Since this case, the U.S. Supreme Court has issued a line of opinions that consistently embraces a conservative interpretation of *locus standi* which, in turn, restricts access to the courts when the public's well being is at issue.

Broadening access: a worldwide trend

While the U.S. courts develop jurisprudence to restrict standing to sue, many other countries, including those of the developing world, have adopted interpretations of standing better calculated to allow the law to play its part in protecting the public interest. They do so based on an understanding that the inequality between those with power and resources and those without is magnified when governments restrict access to courts. In the now-famous case, *Oposa v. Factorann,* for instance, the Supreme Court of the Philippines expanded standing to sue to take in the progressive concept of intergenerational responsibility by allowing children to sue on behalf of themselves and others of their generations as well as for succeeding generations not yet born. This court supported its decision by citing to the nation's constitutional right to environmental protection and the constitutional guarantee of a right to life. Moving on to Africa, in Nigeria, Chief Justice Fatayi-Williams declared, in the case of *Adesanya v. The President*, "To deny any member of…society who is aware or believes…that there has been an infraction of any of the provisions of our Constitution, or that any law passed…is unconstitutional, access to a Court of law to air his grievance on the flimsy excuse of lack of sufficient interest is to provide a ready recipe for organized disenchantment with the judicial process."

This essay briefly explores a citizen's ability to bring environmental lawsuits in three African nations: South Africa, Kenya, and Tanzania, examining

both the constitutional provisions and the record of judicial interpretation. In each of these countries, the existing constitution provides a basis for standing to sue. The security of this basis in an environmental context, however, depends on the varying language of the national constitutions and the traditions of judicial interpretation.

The African experience

South Africa. Of the countries considered, post-apartheid South Africa has, on paper at least, the most expansive legal methodology for granting citizens standing to sue in public interest cases. In its 1997 constitution, not only are South African citizens granted the right to an "environment that is not harmful to their health or well being," but they are also provided an explicit and comprehensive guarantee of legal standing to sue in cases affecting the public interest. Section 38 provides:

> Anyone listed in this section has the right to approach a competent court alleging that a right in the Bill of Rights [which includes a right to an environment that is not harmful to their health or well being] has been infringed or threatened, and the court may grant appropriate relief, including a declaration of rights. The persons who may approach the court are: anyone acting in his/her own interest; (a) anyone acting on behalf of another person who cannot act in his/her own name; (b) anyone acting as a member of or in the interest of a group or class of person; (c) anyone acting in the public interest; and (d) an association acting in the interest of its member/s.

While South Africa's formulation is extremely wide, capable of accommodating a variety of substantive and procedural claims, and may resolve virtually all the procedural difficulties to the enforcement of environmental rights through the judiciary, this constitutional approach is young. Thus, only time will determine whether this explicit promise of broad access to justice will remain.

Tanzania. In Tanzania, the constitutional guarantee of environmental standing to sue is less clear. Article 30(3) of the country's constitution states that "Any person alleging that any provision in this Part of this Chapter or in any law concerning his right or duty owed to him has been, is being or is likely to be violated by any person anywhere in the United Republic, may institute proceedings for redress in the High Court." At first glance, this may appear to be expansive. However, when carefully reviewed, this section implies that to bring suit to enforce the constitution, the plaintiff himself would most likely need to have suffered a "sufficient and personal injury." Additionally, because

Tanzania's constitution fails to provide an explicit right to a clean and healthy environment, a court has grounds to deny standing if the case involved an issue of environmental rights. The restrictive nature of this provision, taken in isolation, however, is lessened by Section 27(1) which provides, "[E]very person has the duty to protect the natural resources of the United Republic," and also by Section 26(2), which states, "Every person has the right, in accordance with the procedure provided by law, to take legal action to ensure the protection of this Constitution and the laws of the land." Taking Sections 27(1) and 26(2) together, Tanzanian courts have reason to grant individual citizens and groups of citizens standing to bring environmental lawsuits on behalf of the public interest, as the bringing of any such suit would fulfill a citizen's constitutional *duty* (not "right") to safeguard Tanzania's natural resources.

Although the practical implications have been little tested, the Tanzanian courts have generally taken a progressive stance and upheld a broad right to sue in the public interest. To illustrate, in 1993 Rev. Christopher Mtikila, a human rights campaigner and political activist, brought suit challenging the constitutionality of myriad laws. When the attorney general contested the reverend's standing to bring suit, the High Court, relying solely Article 30(3), but supporting its conclusion with Section 26(2), issued an amazingly comprehensive and progressive opinion in *Mtikila v. Attorney General,* holding,

> In matters of public interest litigation this Court will not deny standing to a genuine and bona fide litigant even where he has no personal interest in the matter…[S]tanding will be granted on the basis of public interest litigation where the petition is bona fide and evidently for the public good and where the Court can provide an effective remedy.

The Court reasoned that

> Given all these circumstances, if there should spring up a public-spirited individual and seek the Court's intervention against legislation or actions that pervert the Constitution, the Court, as guardian and trustee of the Constitution and what is stands for, is under an obligation to rise up to the occasion and grant him standing.

The Rufiji Delta case, considered by the High Court in 1999, illustrates the need for expansive standing jurisprudence. In 1996, the African Fishing Company began efforts to secure government approval to build an environmentally-disastrous and economically-unsustainable prawn farm in East Africa's largest expanse of mangrove forest. In November 1997, the Tanzanian government granted this request without consulting the communities impacted by the project and despite recommendations from the government's own

environmental agency that the permit be denied. If constructed, this project would have wholly destroyed 10,000 hectares of mangrove forest, including 4,000 hectares located in National Mangrove Forest Reserve and Mafia Island Marine Park. This loss of mangroves would have, among other impacts, led to coastal destabilization; eutrophication of water bodies; destruction of the nursery ground of thousands of fish and marine invertebrates; a reduction in fisheries stocks upon which delta inhabitants, other Africans, and commercial fishers depended; increased the threat to the endangered sea cow; and destroyed an internationally-significant wintering ground for migratory birds. The project also would have forced between 4,000–6,000 delta residents to leave their traditional homes and ways of life behind.

To prevent this project from moving forward, the villagers took a variety of actions without success, and thus were forced to pursue legal action against the government. During the first round of legal arguments, the villagers successfully obtained a restrictive injunction halting the project until the court could hear the villagers' preliminary objections. In response to this injunction, the government filed a motion asking the court to dismiss the case, arguing that the villagers did not have standing to sue. The villagers, fortunately, and thanks to the progressive stance of the High Court, defeated this motion to dismiss. If they had lost, however, and the court had decided to deny them standing to legally challenge the Rufiji Delta project permit, then the destruction of the mangrove forest and coastal environment would have gone forth unheeded, the villagers would have lost their ability to assure the laws are faithfully executed, and the natural resources on the delta would have been irreversibly destroyed.

Kenya. In Kenya, the law of *locus standi* and its judicial interpretation have proved to be the least favorable, of the countries considered, to the pursuit of environmental justice. The situation is not hopeless even here however, as a 1997 judicial opinion gave citizens a small foothold into court.

The legal framework set up in Kenya's constitution has a number of downfalls with regard to standing to sue in environmental cases. Specifically, section 84(1) provides:

> [I]f a person alleges that any of the provisions of [the fundamental rights guarantees] of this Constitution has been, is being or is likely to be contravened in relation to him…then, without prejudice to any other action with respect to the same matter which is lawfully available, that person may apply to the High Court for redress.

Again, while this language may appear expansive, its limits are twofold. First, the language "in relation to him" supports the traditional "sufficient and personal injury" test and thus, according to the plain language of the provi-

sion, courts may bar plaintiffs from bringing a suit on behalf of the public interest. Second, the language "that person may apply" fails to acknowledge the standing rights of a group of citizens, and thus has the potential to bar citizen organizations and non-governmental organizations (NGOs) from bringing environmental lawsuits.

These shortcomings are exacerbated by the absence from the Bill of Rights of any explicit mention of the right to a clean and healthy environment, and also by legislation that identifies the attorney general as the individual assigned to prosecute cases in the public interest (thus by implication excluding private individuals and NGOs from assuming the responsibility to bring suit when the environment has been degraded). Such problems highlight the importance of including an unrestricted grant of standing of both individuals and groups and fundamental environmental rights in any constitution.

The rulings by the High Court of Kenya that blocked cases brought by Professor Wangari Maathai, coordinator of the Greenbelt Movement in Kenya, illustrate the stifling effect these provisions have had on the capacity to bring environmental suits in Kenya. In 1989, Ms. Maathai filed suit seeking to bar the Kenya Times Media Trust, Ltd., from constructing a large building complex in Nairobi. The High Court at Nairobi summarily concluded that only the attorney general has the authority to sue on behalf of the public, and thus dismissed the case. This ruling was reaffirmed in *Wangari Maathai v. City Council of Nairobi* and *Raila Odinga v. Cockar*. In this second *Maathai* case, decided in 1994, the Court justified its decision by reasoning that "[T]he constitution of the country has wisely entrusted the privilege with a public officer, and has not allowed it to be usurped by private individuals."

While the rule set fourth in this trilogy of cases appeared ingrained in the Kenyan judiciary, the High Court's 1997 ruling in *Paul Nderito Ndungu v. Pashito* questions this position. In the *Ndungu* case, residents of the Loresho estate sought to stop the commissioner of lands from allocating lands reserved for a police station and a water reservoir to developers. The developers planned to take possession, develop, fence, and sell the lands allocated parcels. The *Ndungu* Court recognized that "The submission that the Attorney General is the only competent authority to institute a suit on behalf of the public is, with respect, restrictive and may lead to the miscarriage of justice if accepted as such." While this language is only *dicta*, and thus not a rule of law, it indicates the chipping away of the traditional restrictions on standing to sue.

Conclusion

While this essay merely touches on the approaches taken by African governments regarding standing to sue, one conclusion is clear: if courts are to discharge justice effectively and guarantee environmental accountability, the doctrine of standing to sue must be expressly guaranteed in national constitu-

tions and interpreted in a manner that serves rather than obstructs the public's need for environmental justice. Such explicit grants would ensure a principle eloquently adopted in 1999 by the High Court of Tanzania in *BAWATA v. Attorney General*, "It is our view, that the constitutional gates, into the house of human rights, should always be open and ajar, for any aggrieved, to seek shelter and redress there under, without adoration of technicalities."

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Livelihood diversification among the Maasai of northern Tanzania: implications and challenges for conservation policy

J. Terrence McCabe

Abstract

This paper was part of a panel that included J. Terrence McCabe, a University of Colorado anthropology professor; lawyer Jeanette Wolfley and Idaho State University instructor Drusilla Gould, both members of the Shoshone-Bannock Tribes; NPS anthropologist Don Callaway; and Herb Anungazuk, an NPS anthropologist and Native Alaskan. The panel was submitted under the following abstract:

The creation of national parks in the Greater Yellowstone Area (GYA) and East Africa displaced mobile, indigenous tenants. Over a century has passed since Native Americans historically associated with the GYA were removed to reservations and ceased practicing traditional livelihoods, though many traditions associated with their identities, and some with their livelihoods, continue to survive. In contrast, Maasai pastoralists continue to live in protected areas such as the Ngorongoro Conservation Area in Tanzania (adjacent to Serengeti National Park), but conservation policy has changed their land use practices, among other things. They cannot hunt lions or graze their livestock in Kenyan and Tanzanian national parks/reserves, most of which are located inside Maasailand. Eligible rural native and non-native residents of most Alaskan parks, on the other hand, by federal law can continue to engage in a subsistence way of life. Fishing, hunting, and plant gathering for Alaska natives are considered integral to their cultural, economic, and physical existence. In the course of this panel, presenters will explore historical reasons for these differences; identify some examples of traditional ecological knowledge and management regimes; define "traditional;" address some commonly-held misconceptions about mobile peoples and conservation; speak to the role of ethnographic research in informing policy decisions; and explore ideas and models for ethical conservation strategies that protect wildlife as well as the interests of indigenous peoples.

Introduction

For the past two decades, conservationists, protected area managers and planners, indigenous peoples living in proximity to national parks and protected areas, advocates for indigenous peoples, and social scientists have been struggling with the need to protect wildlife and biodiversity while protecting the rights and livelihoods of indigenous peoples. With the publication of the World Conservation Strategy by the World Conservation Union (IUCN) in 1981, the rights of indigenous peoples with respect to conservation policies was formally recognized; indeed, it was argued that the goals of conserva-

tion could only be met by involving local communities in the conservation process. Since that time, many attempts have been made at bridging the gap between the goals of conservation and the welfare of human communities. Community conservation projects, integrated conservation and development projects, multiple use conservation areas, and attempts at cooperative management have all been tried. In each of these frameworks, there have been varying levels of success and failure, but no one framework has emerged as the model of success to be emulated throughout the world.

For many, if not most, of these conservation frameworks, a national park based on the Yellowstone model remains the centerpiece of the conservation strategy. However, even the strongest advocates of wildlife policy that excludes any form of human habitation or use within the protected area recognize that in the long term, wildlife conservation may only be possible with the cooperation and involvement of local communities. Nowhere is this more true than in the savanna regions of East Africa, where the majority of the wildlife live outside protected areas and large migratory ungulates seasonally depend on resources outside national parks. The *Christian Science Monitor* recently reported that 75% of wildlife in Kenya lives outside reserves and protected areas (Christian Science Monitor 2003). In Tanzania's Tarangire National Park, conservationists and park managers are concerned that the viability of the wildebeest and elephant populations may be threatened as wildlife corridors are being cut off due to the expansion of mechanized agriculture in the areas east of the park. In the Ngorongoro Conservation Area (NCA), the adoption of cultivation by the resident Maasai has challenged the multiple use concept and may result in the expulsion of Maasai families engaged in agropastoralism.

Failure to incorporate local peoples can come at a great price. The expulsion of peoples from protected areas has resulted in great hardships for the communities involved, as documented by both Neumann (1998) and Brockington (2002). The destruction of national parks and the decimation of wildlife have followed periods of political unrest in Uganda and Ethiopia. The expansion of cultivation around Tarangire National Park has, to some extent, been a response by local peoples to perceived threats posed by conservation policy (Lynn, personal communication).

Mobile peoples, such as the Maasai and Barabaig, living close to the eastern border of Serengeti National Park, pose unique challenges to bring together conservation policy, indigenous rights, and development. A positive development is that it is becoming increasingly recognized that nomadic pastoralism and wildlife conservation can co-exist, and may be mutually beneficial when combined with revenues generated from tourism (McCabe 2003; DeLuca 2002). The old, accepted wisdom that pastoralism is a destructive form of land use is being replaced by one that argues that mobile livestock

keeping is environmentally benign (Scoones 1996). This shift is illustrated by the following quotations:

> In balance, it seems that the symbiosis of pastoral man and his domestic animals has been very successful if viewed as a survival strategy in the short term. In the long term it appears less successful since it tends to destroy its own habitat (Lamprey 1983, 656).

> Most traditional pastoral management can now be seen as to be environmentally benign, and indeed customary institutions for land management are potential models for the future (Scoones 1996, ix).

This view has been incorporated into the management plan for the Ngorongoro Conservation Area (NCA), and to a lesser degree in the policy for the new Wildlife Management Areas in Tanzania. However, many East African peoples who formerly depended nearly exclusively on livestock for their livelihood have recently diversified their economies, especially through the adoption of cultivation. After decades of disparaging nomadic pastoralism, conservation policy is finally catching up to the scientific understanding of how arid and semi-arid ecosystems work, but the people who have traditionally inhabited these areas are undergoing major transformations in their livelihoods and their integration in larger regional and state social and economic systems.

A few recent publications have attempted to address how changing livelihoods could impact current conservation policy and programs. For Africa, Hulme and Murphree examine community conservation issues through a series of case studies (Hulme and Murphree 2001). In a recent book edited by Dawn Chatty and Marcus Colchester, the unique challenge posed by incorporating mobile peoples into conservation programs is taken up on a worldwide basis (Chatty and Colchester 2002). Chatty and Colchester's book was based on a conference held in Oxford, England, in 1999, which was followed by a conference held in Dana, Jordan, in 2002. At the Dana conference, social scientists were joined by conservationists, wildlife researchers, and policymakers. The result was the "Dana Declaration," presented at the World Parks Congress recently held in South Africa. The Dana Declaration consists of five core principles relating to how conservationists and mobile peoples can work together to help conserve wildlife and biodiversity while protecting the rights of nomadic peoples. I do not have time or space to discuss these in detail here, but the text of the Declaration can be found at www.danadeclaration.org.

In the paper that follows, I want to present some of the results of research conducted among the Maasai living on the eastern borders of the Serengeti,

and discuss how the types of livelihood changes mentioned above impact how the Maasai see themselves, their livelihoods, their livestock, and wildlife. These changes have important implications for conservation and the management of wildlife. I conclude by arguing that management needs to be flexible, adopting what development experts and ecologists working in arid and semi-arid lands refer to as "adaptive management" (more detailed discussions of these issue can be found in McCabe 1992; 2002; 2003; in press).

Maasai land use and livelihood change

The Maasai have often been referred to as the archetypal pastoral people, living on a diet of milk, meat, and blood, moving across the plains of East Africa with their vast herds of cattle. This "myth" was probably never true, but it certainly was the case that livestock, particularly cattle, were the centerpiece of their economy, and critical to their identity. The Maasai have incorporated small amounts of grain into their livestock-based diet since recovering from the rinderpest epizootics of the late nineteenth century, and the Maasai of northern Tanzania began to cultivate small gardens approximately 40–50 years ago.

Population

Colleagues and I have just completed a study examining some of the causes and consequences for adopting cultivation. One of the first questions we asked was, to what extent did increases in the human population drive the diversification of the pastoral economy?

It was formerly thought that human population and the livestock populations were tightly articulated—that a rise in one necessarily meant a rise in the other. The NCA is one of the only places in East Africa where a long history of human and livestock census data is available. This data demonstrates that the two populations are not linked (see Figures 1 and 2). The livestock population fluctuates around a mean, while the human population continues to increase. More and more people depend on the same number of livestock, and with each generation, households become poorer. It certainly makes sense that people have found it necessary to supplement their livestock based economy with some other food source or income.

Based on interviews conducted over the last three years, this explanation has been borne out, to some degree. I have reported on the extent to which cultivation has made a difference in the nutritional status of children (McCabe 1991; 2003), and on the degree to which herd owners were able to dramatically reduce the selling of livestock, especially reproductive animals (McCabe 2003). But this is not the whole explanation. Survey analysis suggested that an increasing human population did indeed result in more poverty, and those who adopted cultivation initially were the poorest families. But once cultivation began to spread, families from all wealth categories began to cultivate.

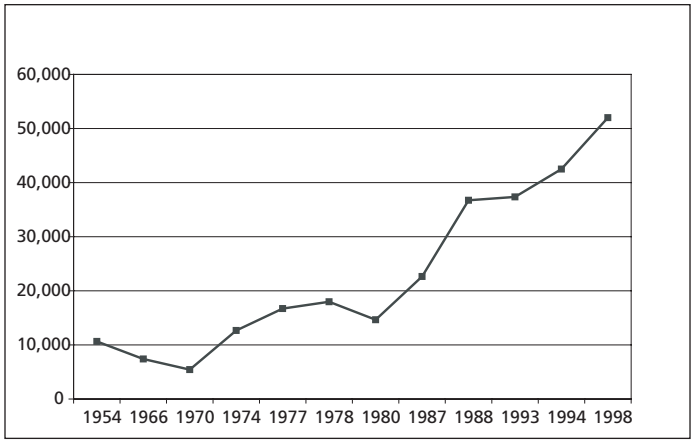

Figure 1. Human population in NCA, 1954–1998.

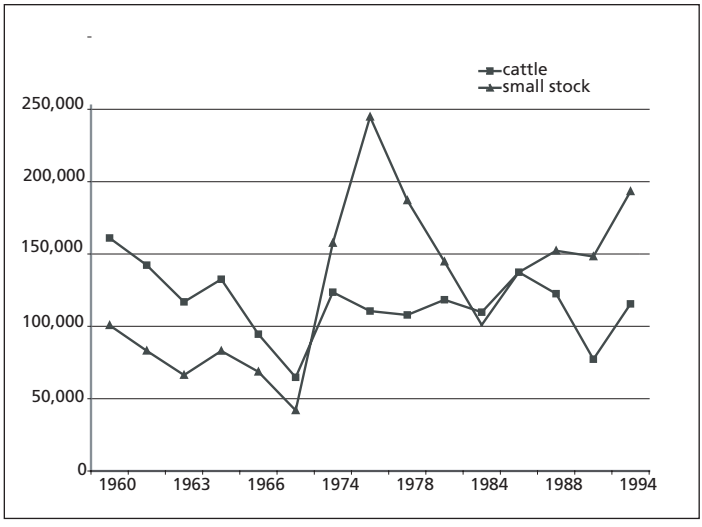

Figure 2. Livestock population in NCA, 1960–1994.

Those in the mid-range to wealthy categories desired to avoid selling livestock that prompted them to adopt cultivation. In many cases, this was related to the maintenance of the core herd and to the reproduction of their pastoral identity. Many people thought that the combination of losses due to disease, drought, and the need to purchase grain combined to create a situation that could not be offset by the natural reproductive capacity of the herd. Thus, in a counterintuitive way, Maasai were adopting cultivation to remain pastoralists.

Cultural models

Much of what I am reporting on below will be published in a special edition of the journal, *Nomadic Peoples* (McCabe in press), but it is directly relevant to the goals of this session, and to the conference as a whole, so I am including it here in a somewhat abbreviated form. The adoption of cultivation cannot really be separated from larger forces of change emanating from the social and political contexts within which their lives are embedded. One way to explore how people conceptualize change is through the use of cultural models, which are "taken-for-granted models or schemas of the world that are widely shared by members of a particular social group (Holland and Quinn 1987). They are also learned over time and can be motivational, thus linking cognition to behavior. Using this approach, we examined how elders, both men and woman, conceptualized important changes in general as well as changes in land use and cultivation, family formation, and wildlife.

General. The results of the cultural models study with respect to overall change are presented in Table 1. Three issues emerge as especially important here: (1) the increased individualization of decision-making and the decrease of cooperative management practices; (2) the reduction of respect for elders, especially by the Moran (warriors); and (3) the changing role of the Moran in Maasai society. Natural resources have always been cooperatively shared among the Maasai. People and livestock can move anywhere within their sectional territory, the *iloshon*; indeed, the Maasai say that people and livestock can move anywhere within Maasailand. While this may be true in the abstract, the actual process of moving out of one's sectional territory takes time and must be negotiated at a number of levels. The important point here is that natural resources are used cooperatively, and the notion that decisionmaking is becoming more individualized and cooperation among families decreasing is a sign that significant shifts are underway concerning the management of natural resources, including the commons.

Table 1. Change in general.

Past	Present
Many families living together	Often one herd-owner and family living together in an enkang
Smaller, less dense population	Larger population, increased density
Collective decision-making	More individualized decision-making
More cooperation between families	Less cooperation
Maasai sections living in separate areas; few non-Maasai	Sections mixing in the same area; more non-Maasai
More respect for elders	Less respect for elders, especially among Moran
Moran were "warriors"	Moran herd, work, go to school, hang around; less like warriors now

The decreasing influence of the elders could have important implications for the use and management of natural resources. Maasai society is organized around a series of age grades, from warriors to senior elders. Traditionally, all important decisions were made by those within the senior elder age grade. Elders tend to be more conservative than those in more junior grades, and have been concerned with maintaining traditional values and livelihood practices. The decreasing influence of elders could lead to more rapid social and economic change.

With a decrease in mobility (see "Herding and land use"), and a reduced threat of raiding from neighboring groups, the traditional role of the warriors has been undermined. Young men are no longer needed to take the livestock to remote *manyattas*, or to protect the livestock from raiders. In many Maasai communities, these young men are beginning to migrate to urban areas in search of work, usually as night watchmen and guards. This experience again reinforces the need for skills other than livestock keeping and intensifies the forces of modernization and change within the Maasai community.

Family formation. There are significant changes in how people have viewed family formation (see Table 2), but what is most important in this context are the skills seen as necessary for success. In the past, a man had to have access to livestock and the knowledge and skills necessary to manage them. Now, a man still needs livestock and the knowledge and skills necessary to manage them, but this is just one component of a diversified livelihood strategy. It should be noted here that livestock management remains at the core of a diversified strategy, and this is reflected in both cultural practices and when the needs for land or labor are in conflict with the needs of livestock. Nevertheless, our research revealed that it is now understood that cultivation is an important component of household subsistence practices, and that people growing up now have to have access to money. In fact, the need for money was often mentioned as the most dramatic change between the time that the elders were young and that of today. Education is seen as necessary for young Maasai men, and to a lesser extent, women, to be successful both within and outside of Maasailand. It is evident that wage labor will be important in the future, and the key to success here is education.

Table 2. Family formation.

Past	Present
Marriage for men while junior elders	Men marry while still "warriors"
For success, a man needed cattle, goats, sheep, and knowledge of herding	For success, a man needs livestock, knowledge of herding, land for cultivation, education, and money
Fewer children	More children

Herding and land use. The cultural models study on land use and herd-

ing shows that very important changes have occurred over the last 30–40 years (see Table 3). Once again, the importance of cultivation is apparent, but what is also important is the decreased mobility of the people and livestock, and the fact that people feel like they cannot depend on livestock. People frequently mentioned access to schools, shops, and medical facilities as contributing to becoming more sedentary. They also mentioned that increased human population had reduced the areas available for grazing. The combination of a series of outbreaks of livestock disease and increasing variability of the weather has undermined people's confidence in any single livelihood strategy. In recent years, droughts have been followed by floods, followed again by drought. Whether this is a result of global warming or a temporary climatic event is unclear, but it has had an impact on livelihood strategies. People often remarked that livestock would do well in one year, while cultivation failed. In other years, livestock would not produce milk and many would die, but cultivation would provide enough to survive. In some years both failed, and in other years both were productive. It was understood that a diversified strategy was not just a possible option, but a necessity.

Table 3. Herding and land use.

Past	Present
Move frequently	Less mobility
Large herds	Smaller herds
Less livestock disease	More disease, especially tick-borne disease
Large common grazing lands	Grazing lands restricted by population
More rain; "land was sweet" for livestock	More drought; cannot depend on livestock
Maasai did not cultivate; diet consisted of milk, meat, and blood	Almost everyone cultivates; diet now consists of meat, milk, and crops grown at home
Small gardens, crop was mostly maize	Large cultivated plots; crops grown are maize, beans, and potatoes

Wildlife. Finally, the cultural models study on wildlife revealed that attitudes toward wildlife were changing, but that wildlife were still viewed as abundant (see Table 4). Most people still viewed wildlife as something they valued in the environment, but believed that wildlife created problems for cultivation that did not exist in the past. Zebras, wildebeests, and buffaloes were seen as especially problematic in terms of incursions into fields, but people thought that the problem was manageable. Fields have to be guarded day and night in some areas, often resulting in labor shortages. However, people insisted that wildlife were rarely if ever killed for damaging crops, and that they had no desire to do so.

Table 4. Wildlife.

Past	Present
More diverse wildlife; many rhinos	Less diverse wildlife; not many rhinos, but many other animals
Wildlife not a problem	Wildlife bring disease, eat crops
Wildlife viewed as important	Wildlife viewed as important

Conclusions and implications for conservation policy

With respect to the northern Tanzanian case, it is clear that the Maasai are undergoing rapid social and economic change. The growing human population, coupled with a fluctuating livestock population, may have been the initial factors for the adoption of cultivation, but the process of change has included increased sedentarization, the desire for education, and the understanding that wage labor may be a necessary component in a future diversified livelihood strategy. Of special importance here is the adoption of cultivation.

In the Ngorongoro Conservation Area (NCA), the authorities believe that if livestock production is improved and veterinary services made more readily available, the Maasai will willingly give up cultivation. The results of the research presented here suggest that this will not be the case. Cultivation is now considered a necessary and desirable component of a diversified livelihood with livestock as its base. Not only have the Maasai developed a taste for cultivated foods, but by cultivating people feel they have more control of their lives, and their food supply is more secure than in the past. Regaining confidence in livestock as an exclusive source of subsistence and income will be difficult, if not impossible. Even if a portion of gate receipts is returned to the residents of the NCA, the process is not transparent, and increases their dependency on government largess. Land for cultivation and knowledge pertaining to cultivation are now thought to be critical components of a sustainable livelihood. The diversified economic strategies are well established and people are unlikely to be willing to give up cultivation even with improvements in livestock health and production.

North of the NCA, where the new Wildlife Management Areas (WMAs) are planned, the issue of cultivation is also problematic. The new wildlife policy stipulates that cultivation will not be allowed in the WMAs, but that revenue from tourism will not only replace the losses accruing to the loss of cultivation, but also increase the local communities' economic well-being. One problem is that foregoing cultivation makes the local communities dependent on the vagaries of international tourism, and events over which local people have no control can greatly influence the numbers and kind of tourists that visit East Africa. Following the events of September 11, 2001, tourism as a whole was greatly depressed, with those catering to the more

wealthy tourists impacted the most.

There is no doubt that the adoption of cultivation has the potential to impact biodiversity and wildlife conservation. Crops have to be protected, and attitudes toward wildlife can and do change. What is unclear is the extent to which various mixes of livestock and crops impact biodiversity and the large ungulates that East Africa is famous for. Other considerations are location of agricultural plots and the types and costs of fences that would protect crops from wildlife.

Banning cultivation would solve one aspect of the problem, but would come with a significant price. Local communities would experience increased vulnerability to conditions over which they have no control, as well as decreased food security. In addition, the level of cooperation and trust between local communities and conservation authorities may be undermined. In a previous publication, I noted that one of the most important lessons from 40 years of trying to combine conservation and development within the NCA was that relationships between local communities and conservation organizations must be based on trust, transparency, and free flow of information (McCabe 2002).

Adaptive management

The "new ecological thinking" concerning ecosystem function and development options in the world's rangelands has important implications for pastoral peoples, and should have important implications for incorporating pastoral peoples in conservation projects. The new development alternatives stress flexibility, mobility, and adaptive management—a process that is locally-based and requires "approaches to planning and intervention that involve adaptive and incremental change based on local conditions and local circumstances" (Scoones 1996, 6). The old "blueprint" formula for development is viewed as inappropriate where climatic variability is high and predictability low. In addition to climatic variability, pastoralists make contingent responses to changing economic and political circumstances.

If we apply the same thinking to the incorporation of pastoral peoples in conservation projects, then local conditions and circumstances would be of prime importance in developing conservation policy. Flexibility, mobility, and scale must be maintained. The Dana Declaration, mentioned earlier, also adopted "adaptive management" as one of its five core principles. In this context, an adaptive management approach "should build on traditional/existing cultural models and incorporate mobile peoples worldviews, aspirations and customary law. They should work towards the physical and cultural survival of mobile peoples and the long-term conservation of biodiversity" (Dana Declaration 2002).

What this would mean in the northern Tanzanian case would be to allow more flexibility in local management practices, encourage mobility and scale,

allow for diversified livelihoods, and recognize the value of "cultural sustainability" as well as biological conservation.

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Democratizing natural resource management: experiences from northern Tanzania

Fred Nelson

Abstract

Northern Tanzania's savanna rangelands contain some of the most renowned national parks and extensive wildlife populations found anywhere in Africa. Since the colonial period, the management of this resource has been characterized by central control and proprietorship. Wildlife conservation has emphasized establishing protected areas such as national parks and restricting the use of wildlife resources in order to prevent over-exploitation. These strategies are insufficient for conservation of wildlife populations across northern Tanzania's savanna landscapes. Wildlife disperses across much larger annual ranges than are contained in even the largest parks, thus depending heavily on unprotected communal and private lands. Sustainable conservation therefore requires matching protected areas with viable incentives for landholders to invest in wildlife conservation as a valued form of land use. Creating such incentives necessitates reforming traditional centralized wildlife management strategies to devolve managerial authority, property rights to wildlife, and control over resources' economic value to local landholders. Such devolution, or democratization of wildlife management, is a substantial reform effort, and inevitably involves contests over control, access, and power. The dynamics of these management issues are explored here in terms of experiences in northern Tanzania's Tarangire ecosystem.

Introduction: protected areas and local communities in East African savanna rangelands

Northern Tanzania's savanna rangelands are home to some of the world's most renowned national parks and other state-protected areas. These protected areas vary in size (Serengeti National Park: 14,000 km^2; Lake Manyara National Park: 330 km^2), vegetation and biota, and legal status (national parks, game reserves, Ngorongoro Conservation Area), but the region's savanna parks share a number of common features central to their management. First, these parks and reserves were established principally in order to provide protection for the region's large mammal populations, and in particular to develop a profitable tourism industry based on this natural resource. Wildlife conservation and sustainable tourism development are therefore the chief management objectives of northern Tanzania's parks. Second, these parks exist in semi-arid environments where rainfall is unpredictable and critical resources such as grazing and water sources are unevenly and erratically distributed throughout the landscape. Consequently, mobility and flexibility

for both wild animals and domestic livestock—and therefore, people—are essential ecological survival strategies throughout this region (Homewood and Rodgers 1991). Wildlife ranges spread far beyond the boundaries of even the largest protected areas, into adjacent communal and private lands, and may shift considerably from year to year according to locally variable range conditions. As a result of this underlying reality, the interests, incentives, and actions of local landholders are central to conservation outcomes at the landscape level.

This background context of the state's aims to maintain wildlife populations and the dependence of those wildlife populations on communal and private lands outside the parks is central to protected area management in northern Tanzanian rangelands. Over the past 20 years, it has become increasingly clear that conservation strategies focusing solely on the establishment of exclusive protected areas and restrictions on wildlife use—the traditional preservationist, "Big Government" approach—are insufficient given wildlife's widespread and variable distribution outside the parks. In Tanzania, as in much of sub-Saharan Africa, this has led to a new emphasis on community-based conservation (CBC) (Leader-Williams et al. 1996a; MNRT 1998; Baldus and Siege 2001). CBC aims to create positive incentives for wildlife conservation at the local level by empowering rural landholders to make management decisions and capture economic benefits. Local participation in wildlife management in lands surrounding protected areas has become critical to sustaining the biological resources within northern Tanzania's national parks. These strategies revolve around matters of land and resource property rights, legal reform, and social equity. CBC in northern Tanzania is thus fundamentally a matter of democratizing natural resource management and economic opportunities in the interest of both biodiversity conservation and local livelihoods.

People, land, and wildlife in the Tarangire ecosystem

The Tarangire ecosystem stretches across an area of roughly 20,000 km^2 in north-central Tanzania, and is one of Tanzania's most important wildlife areas (Borner 1985). At the center of this area is Tarangire National Park, first established as a game reserve by the British in 1956, and later gazetted as a national park in 1970. The park comprises 2,600 km^2 of important dry season habitats for elephants, buffaloes, zebras, wildebeests, and other large mammals along the Tarangire River. While wildlife is densely concentrated in the park during the dry season, during the rains animals disperse widely into areas outside the park on community and private lands, particularly to the north of the park towards Lake Manyara, and to the east of the park in the Simanjiro plains (TCP 1997; TMCP 2002). Northern Tanzania's largest elephant population, comprising approximately 3,000 animals, resides in the Tarangire system, using extensive unprotected areas to the northeast and

southeast of the park. The shortgrass plains in Simanjiro District are particularly important to the overall dynamics of the Tarangire system, because tens of thousands of zebras and wildebeests migrate there for grazing and calving during the rainy season (TMCP 2002). This migration is driven by the variable nutrient contents in the soils and vegetation within the Tarangire system, coupled with the seasonal variance in water availability. Were zebras and wildebeests restricted to Tarangire's less nutritious grasslands during the calving season, their populations would be severely reduced (Voeten 1999). Thus, the areas to the north, east, and southeast of the national park are essential corridors and dispersal grounds for the Tarangire's large mammal populations. These unprotected village lands make up, in total, over 80% of the Tarangire system.

The majority of these areas outside the park fall under the jurisdiction of local communities, primarily Maasai pastoralists and agropastoralists in the Simanjiro area east of the park and a more diverse mix of agropastoralists and farmers to the north and west of the park. Lands are either individually-held homesteads and agricultural plots or larger, communally-managed tracts of rangeland used for livestock pasture. Land use practices combine traditional rangeland management practices with more recent individualization of lands for farming. All land in these local communities is classified as village lands, however, by Tanzania's land legislation, and is managed by elected village councils on behalf of the overall community.

Pastoralists and wildlife have a long history of co-existence in East African savannas (Ole Parkipuny and Berger 1993; Homewood and Rodgers 1991; Collett 1987). Traditional Maasai land use practices that maintain open, unfenced rangeland and disfavor cultivation have served to maintain wildlife habitats, including large tracts of rangelands that pastoralists keep free from cattle for most of the year as dry season grazing reserves. Traditional Maasai taboos against eating the meat from wild animals have also greatly benefited wildlife populations in the region, as has the tribe's unusual tolerance of large predators such as lions, spotted hyenas, and cheetahs (Maddox 2001).

Increasingly during the last 30 years, however, this co-existence between people and wildlife has been eroded by changing land uses and resource exploitation in the Tarangire system. Agricultural cultivation has increased considerably in the area, affecting both human and wildlife ecologies (Mwalyosi 1992). In Simanjiro District, cultivation has spread rapidly in recent years, increasing from about 1% to 4% of the land area, with significant conversions continuing (TMCP 2002). To the north and northwest of Tarangire National Park, agricultural expansion has eliminated numerous wildlife migration routes and severely restricted the movement of animals between Lake Manyara National Park and Tarangire (Borner 1985).

Over-exploitation of wildlife is the other main pressure on wildlife popu-

lations in the Tarangire area. Bushmeat consumption in northern Tanzania is widespread in unprotected areas. Barnett (2000) records 75%, 94%, and 67.9% of people in respective northern Tanzanian survey groups as illegally consuming bushmeat, and anecdotal information from around Tarangire suggests that this pervasive illegal use of wildlife occurs there (TWCM 2000). The open access exploitation of wildlife for bushmeat in northern Tanzania occurs due to a tenure system that puts ownership of wildlife in the hands of central authorities who lack the capacity to enforce these laws. Local communities, meanwhile, are alienated from the resource and have few incentives to promote its conservation.

These changing land uses and open access exploitation in the Tarangire ecosystem are leading to the escalating decline and depletion of the area's wildlife. Recent surveys indicate significant declines occurring in the large herds of migratory zebras and wildebeests. Recorded zebra numbers have dropped by around 60% from approximately 35,000–40,000 animals in the system in 1988–1990, to only 10,000–15,000 a decade later (TWCM 2000). Wildebeest numbers plummeted during the same period, from 40,000–45,000 to only 9,100 in 1999 (TWCM 2000). Similarly, numbers of the area's giraffe declined by 60% from 1994 to 1999, according to aerial census data (TWCM 2000). Hartebeest numbers dropped from about 4,000 to 1,000 from 1990 to 1999 (TWCM 2000). Driving transect counts done in Tarangire National Park over the past 10 years further indicate that zebra and wildebeest populations may have declined by over 60% and 75% respectively (C.A.H. Foley personal communication). In the Kwakuchinja corridor that links Lake Manyara to Tarangire National Park, eight large mammals have reportedly gone extinct, while the proportion of cultivated land has risen from 8.25% in 1987 to 16.36% (Kidegesho 2000).

The decline of Tarangire's wildlife populations has important consequences at the national level in terms of both protected area management and economic growth. Tarangire National Park is a keystone of northern Tanzania's rapidly growing tourism industry. The number of visitors to Tarangire National Park increased from 7,290 in 1987–88 to 54,454 in 1996–97, when it earned the park $1,145,517 in gate fees alone (Otto et al. 1998). Tarangire is one of only four national parks in the country that earns revenues in excess of expenditures, meaning that Tarangire's tourism revenues fund the management and protection of many of the other national parks elsewhere in Tanzania. The tourism industry is also a central element in the nation's poverty reduction strategies, as it is one of the few sectors where the country has seen consistently high rates of growth over the past decade, and where Tanzania enjoys a considerable competitive advantage over developed nations (URT 2002).

Sustaining wildlife populations and park values in the Tarangire system

depends on land and resource use decisions in the village lands outside Tarangire National Park that maintain open savanna rangelands and prevent unsustainable uses of wildlife. Traditional Maasai pastoralist land use practices provided this type of voluntary landholder conservation, but changes in land use practices and local livelihoods have led to a considerable increase in agricultural cultivation. This spread of agriculture, coupled with open access exploitation of wildlife populations for bushmeat consumption, is currently driving the depletion of Tarangire's biological resources and may ultimately threaten the tourism values of the national park as well. Creating a sustainable framework for managing the Tarangire ecosystem requires greater incentives for landholders to invest in wildlife conservation and to maintain rangelands at the expense of agriculture. The next section explores how a variety of different conservation initiatives carried out or attempted over the past two decades in the Tarangire area have attempted to address this fundamental issue.

Communities and conservation in the Tarangire ecosystem

The landscape-level challenges facing the sustainable conservation of the Tarangire ecosystem's wildlife have been broadly recognized for over two decades now. In the 1980s, there were a number of published warnings from biologists and other observers regarding the danger of Tarangire becoming an "island park," isolated from surrounding lands and habitats, which would render wildlife cut off from key habitats and depleted inside the park (Ecosystems Ltd. 1980; Borner 1985). By this time, it had become clear that Tarangire's viability depended on stopping the trends of agricultural conversion in the Simanjiro plains and other key dispersal areas. This realization corresponded to a shift in thinking about wildlife management in Tanzania during the late 1980s and 1990s. This change comprised a new emphasis on community participation in wildlife management, and reflected the spread of CBC approaches throughout sub-Saharan Africa at this time (e.g., IIED 1994; Hulme and Murphree 1999; Barrow et al. 2001). In Tanzania, as throughout the region, it was increasingly argued that centrally-managed protected areas and restrictive laws prohibiting consumption of wildlife were not enough to safeguard the resource. Protected areas were insufficient to conserve wildlife that used much larger areas, and anti-poaching laws had not prevented Tanzania's losing nearly all of its black rhinos and half of its elephants during the 1970s and 1980s. The Wildlife Policy of Tanzania (MNRT 1998) concluded that a key element of meeting this challenge would be enabling "rural communities and private landholders to manage wildlife on their land for their own benefit." Such new approaches that built conservation on the economic self-interest and local knowledge of rural communities were required, and the Tarangire ecosystem was one of many places where experiments in community-based conservation took place.

The Simanjiro Conservation Area

The first major proposal for addressing the landscape level conservation challenges being created by land use changes in the Tarangire system did not look toward communities as part of the solution, but rather served to demonstrate the increasing infeasibility of reliance on conventional protectionist tactics. In 1982, a proposal for a Simanjiro Conservation Area, modelled on the Ngorongoro Conservation Area, was put forth by a biologist with the Frankfurt Zoological Society (Igoe and Brockington 1999). This new conservation area would cover 6,000 km^2 of savanna rangelands centered on the dispersal areas in the Simanjiro plains east of Tarangire National Park. Agricultural cultivation would be prohibited in this area, and de-stocking of livestock was recommended as well (Igoe and Brockington 1999). The proposal did not lead to any immediate change in the status of the dispersal areas; a 1984 workshop and subsequent commissioning of a land use assessment for the Tarangire area were the most tangible products.

The proposal for enveloping Simanjiro within a new conservation area prompted more focused responses by local people than it did on the part of conservation authorities. Igoe and Brockington (1999) note that if the recommendations of a cultivation ban and de-stocking had been implemented, "the ability of the Simanjiro Maasai to feed themselves would have been severely constrained." This threat to local lands and livelihoods embodied by the conservation area proposal fostered an indigenous movement in the area to secure land tenure through surveying and titling. Local communities, in concert with a number of local activists and community-based organizations, mobilized to survey their lands and obtain village title deeds in order to protect themselves against land alienation (Igoe and Brockington 1999). With these land rights better secured, changing the status of village lands to a new protected area in Simanjiro became less feasible, and also demonstrated the firm local resistance that any attempts at encroachment or protected area expansion were bound to meet from increasingly mobilized rural communities.

National park outreach and benefit sharing

The Tanzania National Parks Authority (TANAPA) manages Tarangire and Lake Manyara national parks, but has little or no jurisdiction beyond the boundaries of those areas. After expanding the formally-protected portions of the Tarangire system became politically and legally unrealistic by the late 1980s, following the failure of the Simanjiro Conservation Area proposal, protected area managers changed tactics in their effort to confront the area's conservation challenges. By this time, TANAPA had developed a broad realization regarding the inadequacies of protected areas for conserving large and mobile wildlife populations that spent much of their time outside the

parks' boundaries (Bergin 2001). TANAPA was also burdened with tensions between park managers and neighboring communities over boundaries, resource access, and other contentious issues. Regardless of such practical difficulties in the relationship between these parties, park managers realized that without support or at least cooperation from the local communities around national parks, these areas' conservation objectives could be undermined and even basic management tasks rendered difficult. As a result of the widely acknowledged need to involve these local neighbors, TANAPA initiated the Community Conservation Services (CCS) outreach and benefit sharing program in the late 1980s (Bergin 2001).

The CCS program was initiated around Tarangire in the early 1990s. In the villages bordering the park, TANAPA's CCS activities have focused on improving relations with local communities by fostering dialogue and building cooperation on issues such as anti-poaching (Bergin 2001; Kangwana and Ole Mako 2001). More tangibly, TANAPA has devoted considerable financial resources to benefit sharing activities designed to ensure that local people reap some of the rewards of living with wildlife, and to partially compensate them for costs such as crop raiding and livestock predation that result from this co-existence. This benefit sharing has consisted of contributions by TANAPA to villages' social infrastructure, such as construction of schools, dispensaries, village government offices, boreholes, and other local development projects. The amounts of money involved in this redistribution are considerable; between 1992 and 2002, Tarangire National Park paid over 314 million Tshs. (approximately $350,000) to local community projects (Wildlife Working Group unpublished data).

TANAPA's outreach and benefit sharing has improved relations with its neighbors, fostered better communication, and made the tasks of protected area authorities more practicable around Tarangire National Park (Kangwana and Ole Mako 2001). Nevertheless, considerable tensions and suspicions remain on the part of local people toward the park and wildlife conservation activities in general due to their past experiences and history of resource appropriation (Nshala et al. 1998; Igoe and Brockington 1999).

More importantly, the TANAPA outreach activities have not been able to address the fundamental issues of agricultural expansion and depleted wildlife populations in the communities surrounding Tarangire National Park. Nor has the benefit sharing created a direct link between wildlife populations on village lands and community earnings. Despite the program's good intentions, the reality is that these benefits consist of donations from an outside entity, are perceived as donor gifts or handouts, and are not "earned" by locals from enterprises they control on their lands. The TANAPA program has not been able to address fundamental issues of pastoralist land tenure or community rights to use and benefit from wildlife found on village lands. The

limitations of the TANAPA outreach approach as a landscape-level conservation strategy are illustrated by the fact that while benefits provided to villages around Tarangire increased substantially during the 1990s from implementation of the CCS program, agricultural expansion in surrounding villages continued and wildlife populations in the Tarangire system decreased.

Institutional reform and devolution

A fundamental constraint on TANAPA's efforts to create village-level benefits from wildlife has been their limited jurisdiction and inability to influence wildlife management practices outside the national park. Wildlife outside the parks is managed by the Wildlife Division of the Ministry of Natural Resources and Tourism; wildlife is owned by the state and controlled by this authority. The main form of wildlife management in areas outside national parks in Tanzania is tourist hunting; revenue from these activities flows centrally, and little trickles down to villages even when hunting is conducted on village lands (Leader-Williams et al. 1996b; MNRT 1998). For communities to benefit directly from wildlife resources on their lands, a devolution of ownership or usufruct rights is required; this has been widely advocated by Tanzanian policymakers during the past decade (WSRTF 1995; Ndolanga 1996; MNRT 1998). Tanzania's official Wildlife Policy states its aim of "conferring user rights of wildlife to the landholders to allow rural communities and private land holders to manage wildlife" (MNRT 1998). However, this policy has not been implemented, and no user rights to wildlife in the Tarangire area have been granted to landholders. The result is that wildlife remains an inaccessible and uncompetitive land use option in most cases, a problem that national park authorities can do little to redress.

Ecotourism

While communities remain excluded from wildlife management and uses on their lands, new opportunities for generating benefits from wildlife on village lands around Tarangire have developed from ecotourism during the last five to ten years. As tourist arrivals have increased in the northern circuit, and in Tarangire National Park, tourism activities have also spread into the village lands adjacent to the park. These tourism ventures, usually formulated through written agreements between tour companies and village governments, have created an increasing source of tangible village-level benefits from Tarangire's wildlife. Direct revenues from tourism to the communities can be substantial. For example, Loiborsoit village in Simanjiro District earned a total of $43,000 from a luxury camping operation conducted on its lands between 1994 and 1998 (AWF 2001).

Lolkisale village in Monduli District, situated along the northeastern boundary of Tarangire National Park, has entered into a joint venture resulting in the construction of three lodges on the community's land. The

combined revenue accruing to the village from these operations totals up to $50,000 per year (Lolkisale Biodiversity Conservation Support Project 2003). The scale of revenues earned from ecotourism by Lolkisale village is among the highest of any community in Tanzania. As a consequence of wildlife's increasing value to these landholders, the community has begun looking for ways to further develop its tourism business. Its most recent initiative is a joint venture between the village and a private tourism company for the construction of Boundary Hill Lodge that gives the village a 50% stake in the ownership of this development (Lolkisale Biodiversity Conservation Support Project 2003). In order to provide a high-quality tourist experience, the village has designated approximately 35,000 acres of land adjacent to the park to form the Lolkisale Conservation Area to be used for wildlife-based tourism only, and an additional 99,000 acres have been zoned by the village for use as an integrated livestock grazing and wildlife area (Lolkisale Biodiversity Conservation Support Project 2003). The village and its private-sector collaborators are currently exploring ways of buying out a number of small-scale farmers holding agricultural plots within these resource conservation zones. Thus while most of the Tarangire ecosystem is under increasing threat from agricultural conversion, Lolkisale presents a unique exception where conservation incentives created by wildlife-based tourism on village lands actually stand to reverse some of these land use changes.

Despite tourism's potential for creating conservation incentives in areas such as Lolkisale, these community-based initiatives currently are not supported by wildlife authorities in Tanzania. All tourism activities occurring on village lands outside national parks are illegal according to regulations issued several years ago, as a result of conflicts between tourism in these areas and centrally-managed tourist hunting concessions (MNRT 2000; Nelson 2003). The central government captures revenue from the hunting blocks, as stated previously, and has been unwilling to enable local communities to determine what types of ventures will occur, even though villages are legally empowered to make land use decisions. Tourism operations in villages throughout the northern part of the country have been at risk of being legally halted for the past three or four years, threatening the existing revenues earned by communities such as Lolkisale.

Democratization or degradation?

The landscape-level conservation challenges facing the Tarangire system have been the subject of discussion among conservationists and protected area managers for over two decades now. There has been an array of initiatives designed to address the problem of conservation outside the park's boundaries, ranging from alienating more community lands for a much-expanded conservation area in the Simanjiro plains to benefit sharing directed by the national park authorities. Expanding formal state conservation areas has

proved infeasible, while benefit sharing has been inadequate in terms of directly linking wildlife, rural livelihoods, and land use decisions. The result has been that habitat loss due to expanding cultivation has continued in the Tarangire system, open access exploitation of wildlife populations remains rampant, and critical migratory wildlife populations are declining. Although a more promising way of creating conservation incentives for local landholders has arisen by way of the growth of ecotourism in village lands surrounding Tarangire National Park, these initiatives have not received sustained support from central authorities, and are currently legally and politically tenuous.

At the heart of these issues is the control of lands and resources and access to the economic value of wildlife and tourism in the Tarangire area. Ecological and land tenure realities in the Tarangire system are such that conservation over the long term must be driven largely by the interests of rural communities in order to be sustainable. But creating these requisite incentives for landholder investments in wildlife is contingent upon devolving market opportunities and managerial authority to the local level. Such reforms amount to a democratization of the control of wildlife resources. While these institutional changes are advocated by Tanzanian policy (MNRT 1998), they are not supported in practice. Even incipient positive instances of local benefit generation and resultant conservation measures through community-based tourism have not been supported by central authorities. By contrast, recent legal measures impose greater restrictions on local options for earning revenue from wildlife on village lands (MNRT 2000). If such institutional obstacles persist, they will largely eliminate the possibility of integrating wildlife management with rural land uses in the majority of the Tarangire ecosystem. This will result in the further depletion of local populations and degradation of the natural resource base and tourism value of Tarangire National Park.

Conclusion

Tarangire National Park embodies the challenges of managing protected areas in East African savannas where large, mobile wildlife populations spend the majority of their time outside the park's boundaries. As a result of these ecological realities, the Tarangire ecosystem's future is largely dependent upon the interests and actions of local landholders and the ability of wildlife to compete as a viable form of land use. This reality exists throughout sub-Saharan Africa; an estimated 75% of Kenya's wildlife occurs outside protected areas (Kock 1995), as does the 80% of the total range of Africa's elephants (Campbell 1998).

Protected area management must take account of this context by working toward democratizing control over wildlife and natural resources on surrounding unprotected lands. Experiences in the Tarangire ecosystem suggest that despite a clear understanding of landscape-level management challenges, relatively little progress has been made in achieving such reforms. Village-level

ecotourism presents some important new economic opportunities for local communities, but has not been supported by national law or central management authorities. These institutional issues represent the greatest long-term threat to the Tarangire ecosystem and its biological and economic values.

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A century of changing land uses and property rights in Tanzania's Selous Game Reserve

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Abstract

The 98-year history of Tanzania's Selous Game Reserve—at 48,000 km², the largest uninhabited protected area on the African continent—offers a compelling and complex case study of shifting land use and property rights. Popularly known today as "Africa's last wilderness," at the time of its designation it was home to tens of thousands of African agriculturalists, hunters, and laborers. During the British colonial occupation, the peoples who lived in and around the reserve retained their common property rights to wildlife, honey, and a range of other wild resources. Over the decades, the boundary expanded, and legal restrictions on land use and resource exploitation within the reserve increased. In 1945, the colonial government forcibly relocated all of the resident population, some 40,000 people, outside the reserve's boundaries. People whose primary land use had been farming fertile bottomland in the reserve's river valleys were compelled to take up slash-and-burn agriculture on the boundary where they have been plagued by crop-raiding wildlife. In 1989, as part of a crackdown on elephant poaching, the Tanzanian government curtailed all remaining local rights to the reserve's wild resources. Since then, the government has attempted to alleviate antagonisms by initiating a community-based conservation program that allows some wildlife exploitation in a buffer zone. This paper places these new initiatives in the context of nearly a century of displacement, changing landscapes, and diminishing resource rights. It evaluates the possibilities for such programs to establish a more cooperative and mutually beneficial relationship between protected areas and surrounding communities.

Introduction

This study focuses on the history of the Selous Game Reserve and the impact of its establishment and management on local land uses and property rights. At 48,000 km², it is the largest uninhabited protected area on the African continent. During the British colonial occupation, some 40,000 people were evicted from the region that later became the core of the Selous Game Reserve. Over the decades, the boundary expanded, and legal restrictions on land use and resource exploitation within the reserve increased. In 1989, as part of a crackdown on elephant poaching, the Tanzanian government curtailed all remaining local access rights to the reserve's wild resources. Since then, the government has attempted to alleviate antagonisms by initiating a community-based conservation program that allows some wildlife exploitation in a buffer zone. This study evaluates this new conservation initiative,

in the context of nearly a century of state interventions characterized by the displacement of local residents and the loss of villagers' rights of access to land and resources. The following analysis of changing land uses and property rights in the Selous area is based on research conducted over a three-year period (1997–1999) that included on-site interviews and the study of colonial archives in Tanzania.

The setting

The region of the case study is comprised of two administrative units of the Tanzanian state, the Selous Game Reserve and the Liwale District (see Figure 1). The terrain is mostly rolling, forested hills—called *miombo* (*Brachystegia* spp.) woodland after the dominant tree species—and is heavily bisected by frequent streams and rivers. The larger valleys have deep alluvial soils. Most of the land falls within 300–700 meters of elevation and receives an average of 600–800 millimeters of rainfall annually. The German colonial administration initially established two smaller game reserves in the northern portion of the area in 1905, which the British later incorporated into the Selous Game Reserve. During most of the British colonial period, the Liwale District fell within the Southern Province, now called the Lindi Region, and was administered at various times from district administrative offices in Liwale, Kilwa, and Nachingwea. The colonial government recognized Liwale as the ancestral home of the Ngindo people, and in 1926 created the Ngindo Native Authority, whose boundaries more or less overlapped with those of the district. The Ngindo will be a focus of this paper.

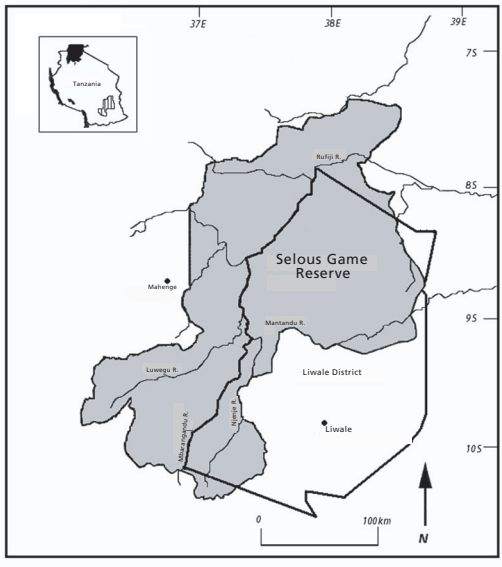

Figure 1. Location and boundaries of present-day Liwale District and the Selous Game Reserve. (Adopted from GTZ/Selous Conservation Programme 1995).

In the late nineteenth century, prior to the imposition of German colonial control in 1885, Liwale and the territory surrounding it functioned as the economic hinterland of the Indian Ocean trade in African commodities funneled through Zanzibar and Kilwa (Wright 1985). Slaves, ivory, rubber, and, to a lesser extent, various non-timber forest products

such as gum-copal, beeswax, and honey flowed through and from Liwale to the coast. The Ngindo and neighboring peoples were actively involved in the production and trade of export commodities. By the late 1870s, vine-grown rubber collected from the forest and bush by Ngindo, Makonde, and Ndonde inhabitants of the hinterland, had surpassed both slaves and ivory as Kilwa's principal export (Wright 1985). While their involvement in extraction and trade was an important economic activity, the Ngindo were primarily millet farmers, with the most productive cultivation focused in the upper valleys of the Rufiji and Matandu River basins. Though geographically limited, these valleys held highly fertile soils that allowed permanent cultivation. European explorers noted large granaries in place for storing grain surpluses in the villages of these valleys.

Throughout Tanzania, wide-ranging negative demographic, ecological, and economic effects accompanied the imposition of German colonial rule in 1885 (Iliffe 1969; Ford 1971; Kjekshus 1977; Iliffe 1979; Turshen 1984; Wright 1985). In the Kilwa hinterland, human and animal disease epidemics, followed by German military actions, took a huge toll on the economy and population. Following the suppression of the 1905 Maji Maji rebellion, German estimates of population in Songea District, part of which would later be included in the Selous, declined from 166,000 in 1902–03 to 20,000 in 1907 (Turshen 1984, 113). It is estimated that Liwale and surrounding areas suffered a loss of one-third of their population in the aftermath of Maji Maji (Iliffe 1979, 200). African peasants and their livestock have never reoccupied many areas that were heavily cultivated in the late nineteenth century.

In the early twentieth century, one of the main factors inhibiting the reoccupation of territory in southeastern Tanzania and throughout East Africa was the spreading presence of tsetse fly (*Glossina* spp.), which is the vector for trypanosomiasis in livestock and wildlife, and sleeping sickness in humans. Through the combined effects of conquest, ecological crisis, and the reorientation of African labor to European enterprises, tsetse fly began to take over large portions of East Africa beginning in Uganda about 1900 (Langlands 1967; Ford 1971; Iliffe 1995; Hoppe 1997). In effect, an unintended consequence of conquest and the early incorporation of the region into the colonial economy was the expansion of wild nature at the expense of African settlement and civilization. The British emphasized a spatial strategy of population evacuation of affected areas and settlement concentration elsewhere (Ford 1971; Hoppe 1997). Many of the major sleeping sickness evacuation areas formed the core of East Africa's well-known protected areas, including Queen Elizabeth and Murchison Falls national parks in Uganda (Langlands 1967; Kinloch 1972).

British colonial conservation and development schemes

When the British took control of Tanzania (then, Tanganyika Territory)

in 1919, they initially left the Germans' game and forest reserves intact (Neumann 1998). Outside the game reserves, African subjects were allowed to hunt for their own subsistence needs and defend their cultivated fields against crop-raiding wildlife. Under British game laws, Africans were not allowed to hunt certain "scheduled" animals, elephant being the most important, without a relatively expensive license. Commercial wild meat hunting was illegal, but enforcement was lax and many African communities had thriving markets in wild meat.

Early colonial wildlife policies and practices were mostly concerned with controlling wildlife in terms of numbers, variety, and location. During most of the British colonial occupation, the principal concern was balancing conservation with the need to protect commercial plantations and peasant plots from raiding wildlife, particularly elephants.

In the 1920s, the Game Preservation Department (GPD) scouts annually killed over 800 elephants in the territory in an effort to limit crop predation. In the Liwale area of the Southern Province, an ambitious and geographically extensive scheme was devised after the governor toured the district in 1933 and was alerted to the serious damage being done to crops by elephants and other wildlife. The scheme, in essence, was an attempt to corral elephants toward the west and eradicate them in the east (Blunt 1933; Southern Province Game Ranger 1935). In the first year of the scheme, European game rangers accounted for the shooting of 1,304 elephants in the Southern Province alone (Acting Game Warden 1934).

As elephants were driven westward, the government strategy required the creation and expansion of the game reserves in the Liwale District to contain them. In the early 1930s, the government approved a southward extension of the extant Selous Game Reserve to accommodate the exiled elephant herds. This lengthened the reserve to about 241 kilometers along a north–south axis; in 1937, the game warden declared that it was too narrow for elephant movement and recommended a westward expansion. While the effort to herd elephants into what would eventually become the Selous Game Reserve progressed, the GPD's opposition to peasant occupation of Liwale's fertile western valleys increased.

The government's strategy was to have elephant "control be intensified to the east and abandoned to the west, to try and force the natives in the west to come into country which could be protected" (Blunt 1933). Not only did the game warden ban all African hunting within the expanded reserve, he also prohibited defending cultivation plots against marauding elephants. The resident Ngindo, who were cultivating some of the most fertile soils in the district, resisted relocation and continued to exercise their legal rights to defend their crops. GPD officials believed this was foiling their efforts to relocate the elephant herds. Initially, there were no compulsory relocations, though the

government supported the GPD's campaign of neglect with regard to crop protection in the reserve. The strategy was to coerce people into "voluntarily" vacating the game reserve, as the GPD would neither provide protection within the reserve nor allow residents to arm and defend themselves. This strategy essentially followed a policy put in place by the first Director of Game Preservation, C.F. Swynnerton. In 1927, he instructed his cultivation protectors to give no aid to sparsely-populated or distantly-located settlements (Swynnerton 1927).

As a result of the state's control efforts, the population of elephants throughout the territory grew. The Southern Province had the largest concentration, and as these were driven westward, their densities in the de facto reserve increased. Those villages unfortunate enough to be in the path of the drive came under intense pressure from crop-raiding elephants. With the passage of the 1940 Game Ordinance, those pressures increased. The boundaries of the Selous were expanded by the ordinance, which now encompassed the most fertile and productive valleys in the district. Describing the implications of the new boundaries, the Liwale district commissioner wrote that the Ngindo "are valley cultivators and a cursory glance at a map will show the West and South of the District [now in the reserve] offer at once the greatest number of valleys" (District Officer, Liwale 1942). As had been the case, the 1940 Game Ordinance did not require forced evictions, but "discouraged" settlement by withholding crop protection.

The GPD's strategies eventually began to have the effect of forcing some people to abandon their cultivated fields and homes in fertile valleys such as those of the Njenje and Mbarangandu rivers (Acting District Officer, Liwale 1936). The "pressure of elephant," one Liwale district officer noted, "is already very great and the natives are finding it difficult to maintain their cultivations" (District Officer, Liwale 1941). Some local administrators realized that the GPD's twin strategy of driving elephants westward while withholding crop protection was promoting an invasion of wildlife and the spread of tsetse fly into the most agriculturally productive areas of the district. As early as 1936, Liwale District officials noted that the number of elephants had increased inside the future reserve, and that the best valley lands subsequently had been given over to wildlife (Acting District Officer, Liwale 1936). The district records note that the reoccupation of once-prosperous settlements on the Mbarangandu River had been curtailed by the 1940 extension of the Selous, and that elephants had become "a great menace to the fertile Ndapata valley and to Mbindera which borders with the reserve" (Nachingwea District Book, no date [a]).

While the game warden lobbied the local administration to order the Ngindo Native Authority to evacuate the expanding Selous, officials in Dar es Salaam were pondering the larger question of how to proceed in the econom-

ic and political development of the residents of Liwale. In 1943, Tanganyika's administrative secretary, J.E.S. Lamb, revealed that he had "for some time had in mind the need for 'doing something' about the Liwale district" (Lamb 1943). His overriding concern was the same as that of his official predecessors: that Liwale and its inhabitants were just too cumbersome to administer. The only viable solution for future economic and social development was "resettlement of the bulk of the population." Once the area was depopulated, it "should be declared a game reserve," the use for which it was best suited (Lamb 1943). A subsequent minute by the governor justifies compulsory relocation as a necessary first step in bringing Africans "the 'civilizing' influences" of colonial occupation (Governor, Tanganyika Territory 1943).

Since the 1930s, the colonial government had, as part of its civilizing mission to "induce natives to settle in productive areas and develop them," endorsed an overall "concentration policy" (Tanganyika Territory 1934). According to British authorities, Liwale, where concentration would be in "the natives' own interest," was an ideal target (Acting District Officer, Liwale 1935). For one thing, the administration viewed settlement concentration as a means to strengthen a politically weak Ngindo Native Authority by bringing their subjects under closer supervision. For another, Liwale was in all regards difficult to administer, "especially with regard to tax collection," and concentrating populations closer to large towns and administrative centers would relieve this problem (Acting District Officer, Liwale 1935). Following the governor's approval of Lamb's evacuation plan, events progressed swiftly in Liwale, and it quickly became the largest single settlement concentration in Tanganyika.

The resettlement scheme created three concentration centers in the northeast, central east, and southeast of the district, evacuating everything to the west. This would leave only Liwale town, which would serve as a local headquarters for the game reserve on its new eastern boundary. The operation's records indicate that nearly as many people fled the concentration schemes as were actually relocated by the government. By 1947, much of central Liwale was evacuated. As district administrators made plans to evacuate another 3,195 families in 1948, however, an even more ambitious plan for Liwale's development appeared on the horizon. Compared glowingly in the press to the settlement of the western frontier of North America, the Overseas Food Corporation's (OFC) enormous groundnut scheme dwarfed and ultimately halted the evacuation plans in the interest of maintaining an *in situ* labor force.

The colonial office in London, and the OFC, had big plans for Liwale. The entire groundnut scheme would cover 3,210,000 acres in three colonies, with 2,400,000 acres falling in Tanzania. Of this total, 55 units of 30,000 acres each, by far the largest single block, was planned for Tanzania's Southern Province.

Over half of these units were located in Liwale. The groundnut scheme originated in early 1946 in a plan submitted by Frank Samuel, Managing Director of United Africa Company (UAC), to the Secretary of State for the Colonies and the Minister of Food. The idea was to use "all the latest techniques of mechanized production in remote and undeveloped areas" to produce large quantities of groundnut oil for the world market. A vision of "[i]mmense fleets of heavy tractors, bulldozers, angle-dozers and rippers" celebrated the potential of modern technology to transform the African bush (Samuel 1947).

While mechanization and high capitalization were the dominant theme of the scheme, the planners recognized that there was still a need for the unskilled African laborer. Tanganyika, as the planners were well aware, was in notoriously short supply of African labor. In a 1948 report, the deputy labor commissioner estimated that the total labor requirement for the Southern Province sector in 1949 would be at least 35,500, and declared "the labor situation…very critical" (Deputy Labor Commissioner, Tanganyika 1948). It quickly worsened, as the dream of mechanized efficiency faded. First, the "immense fleets of heavy tractors" never materialized due to a worldwide shortage. Instead, the managers imported and patched together surplus military equipment from the World War II campaigns in the Pacific and Middle East. Second, the plans and equipment were wholly unsuited to clearing the land of stumps, which proved beyond the power of the machinery. It was quickly clear that manual labor in great quantities was needed for clearing land.

The Ngindo of Liwale were thus in great demand. Many of the areas of central Liwale that had been evacuated in 1946 and 1947 were reoccupied after an initial government prohibition. Others would never be able to return because their villages were now inside the Selous Game Reserve, and the GPD remained vigilant against attempted reoccupations. All of these people were in easy walking distance to the first areas being cleared to the south, and to the OFC headquarters and groundnut labor camps. By the middle of 1949, "a very large portion of the 4,000 tax payers in the Liwale division" was at the OFC's groundnut camps (District Commissioner, Ruponda 1949). Patchy OFC records indicated that 500 Ngindo (all men) were working on the plantations at any one time. Nearly all were hired as unskilled laborers for clearing bush by hand (Crosse-Upcott 1954). The land clearing work, which demanded the single greatest pool of unskilled laborers, was highly unpopular. Economic necessity drove the Ngindo, particularly the former evacuees, to seek wage labor in the OFC camps, but they tended not to linger once their cash needs were met. The rate of desertion in the scheme was high, and the monthly turnover rate was 30% (Overseas Food Corporation 1951). In 1950, the OFC was able to obtain only one-third of the needed 3,000 workers

for hand clearing operations in the Southern Province, causing them to fall behind in planting and requiring an even greater number of workers the following year to recover the lost target.

Within a few years of its conceptualization, the groundnut scheme became the archetype for bloated, ill-planned Third World development projects. Among the many miscalculations, there was little understanding of climate and soil conditions of the area. Rainfall had been uncharacteristically high in the years preceding the scheme, leading to over-optimistic production projections. What scant production of groundnuts there was had to be chipped out of the sun-baked soil with picks at times. Late in 1949, "Block A," the first site cleared just south of Liwale, was revised downward to 420,000 acres, subsequently to 200,000, and finally to only 150,000 of economically viable land (Area Manager, OFC 1951). Most of "Block B," which fell entirely within the Liwale/Ngindo Native Authority, was under water during the rainy season—a fact of which the OFC representative seemed initially unaware (Acting District Officer, Rubonda 1948). Plans to develop it were abandoned in 1951. A few years later, journalists portrayed Nachingwea, the OFC headquarters, as a ghost town.

What were the cumulative effects of these colonial conservation and development schemes on the region's land uses, ecology, and economy? The general effect of the elephant control schemes and settlement concentrations was to fundamentally transform the land rights and land uses of Liwale's inhabitants. The pressure from the increasing numbers and density of elephants reduced peasant production in two ways; by increasing crop losses and by displacing cultivation from the most productive soils. Elephant control schemes included a general policy of African peasant disarmament, and the state took over most crop protection efforts. In the case of the game reserve, the state provided no assistance at all while simultaneously denying the right of farmers to defend fields. The records make clear that colonial officials were aware of increasing elephant populations and crop losses, and that wildlife managers and advocates of closer settlement used the knowledge effectively to drive Ngindo peasants off their lands. When, in 1944, it came time to "do something about Liwale," two decades of elephant control had made the area unfit for human habitation.

At the core of the shift in Ngindo land uses and land rights was their evacuation from well-watered, fertile valley bottom lands to dry, infertile uplands along the boundaries of the new reserve. Settlement concentrations eliminated what remained of peasant cultivation in the upper Rufiji and Matandu river basins, and the expansion of the Selous Game Reserve curtailed any possibility of recovering lost land rights. The reduced access to fertile valleys meant fewer people could be supported by permanent cultivation, while at the same time greater demands were made on the valley lands

that were available outside of the reserve boundaries. Ngindo peasants had to adapt their cultivation to the new ecological conditions and land tenure regime. Extensive shifting cultivation techniques in the *miombo* woodlands spread as the productive capacity of the remaining valleys was reached. While population densities remained low (the district average is currently about 1.5 people per square kilometer), the possibilities for permanent cultivation were greatly reduced. Consequently, settlement patterns also shifted and homesteads became widely scattered and semi-permanent.

The ecology of the region was transformed, as well. The elephant control policies made the most fertile valleys uninhabitable, promoted the advance of bush at the expense of cultivation, and thus encouraged the spread of tsetse fly (Kjekshus 1977; Iliffe 1979). Earlier studies of the Selous concur that very little wildlife was found in the area prior to the 1930s (Matzke 1972; Rodgers 1976; Kjekshus 1977). Ngindo elders interviewed in the 1970s unanimously remembered that no elephants were in the area prior to the 1920s, and associated their occurrence with the imposition of British rule (Rodgers 1976, 23). By the early 1930s, it was widely recognized by game officers in the field that elephant numbers were increasing throughout the territory, "occupying great tracts of land where they have not been seen for years" (Blunt, 1933, 3). The GPD was consequently forced to kill ever-larger numbers of elephants, from 800 in the 1920s to over 3,000 annually by the 1940s, in an effort to control damage to cultivation areas. Year after year, the GPD reported that "[i]n spite of so many beasts being killed, it is estimated that the elephant...is still on the increase" (Tanganyika Territory 1953, 10).

The various colonial plans for Liwale, from the first elephant control scheme to the evacuation, to the groundnut scheme, never mentioned a desire to preserve wilderness, a need to protect wildlife populations, or any other significant conservation motivation. Wildlife control policies were, however, inextricably linked to the general policy of settlement concentration of the 1930s, which was driven by overriding concerns for the political control and economic development of the territory. The twin spatial strategy of park and reserve creation and "closer settlement" became the foundation upon which to construct a colonial economic development strategy in the 1940s. This "modernization" strategy failed, however, to translate into "advancement" for the Ngindo and neighboring groups, though it did produce a vast wilderness area. As the colonial era closed, an administrator concluded in hindsight, "it would be untrue to say that Development to any appreciable extent has taken place" in Liwale (Nachingwea District Book, no date [b]).

Conservation and communities in the postcolonial era

When the independent government of Tanzania came to power in 1961, it publicly announced its commitment to wildlife conservation and national parks (Neumann 1998). The national parks and other protected areas

remained intact, and there was a new emphasis on creating more national parks to attract foreign tourists' hard currency. The legal status of the game reserves allowed for both tourist trophy hunting and the continued extraction of non-timber forest products by neighboring communities, though permanent settlement, cultivation, and traditional hunting within the boundaries were banned. The Wildlife Division (the renamed GPD) was responsible for the control and management of the game reserves and all wildlife outside of national parks, which were controlled by a parastatal organization, Tanzania National Parks. In the case of the Selous, the populations evacuated in the 1940s continued to enjoy access rights to various forest products within the reserve boundaries, particularly honey and beeswax. Traditional hunting of small game, while illegal, remained important for both subsistence and market purposes.

For a variety of internal and international political and economic reasons the Tanzanian government's capacity to rule their territory was shrinking rapidly by the second and third decades of independence. In all sectors of civil service, including the Wildlife Division, salaries were often unpaid, and when they were paid, they were wholly inadequate for meeting the costs of living. In the context of the economic collapse of the state, energies were directed away from official duties toward petty entrepreneurial activities. Rent seeking, black marketeering, and bribery among officials became widespread. These political and economic conditions, along with rising prices for ivory on the world market, provided the context for a steep decline in elephant and rhino population numbers in the Selous, from an estimated 110,000 in 1976 to 30,000 in 1989 (Siege 2000). In the terms of property regime theory, the Selous was de jure under state ownership, but was de facto an open access situation as a result of the government's inability to control its boundaries. Uncontrolled commercial extraction of ivory and rhino horn reduced elephant numbers by an estimated 70%, and nearly extirpated rhinos.

The government, with a great deal of assistance from international conservation organizations, responded to the crisis with a two-pronged strategy: strict control of all illegal hunting through paramilitary tactics, and the development of community-oriented conservation programs. In June 1989, Tanzania launched "Operation Uhai" in an effort to sweep protected areas and adjacent communities clean of "poachers" using a military strike force comprised of army, police, and Wildlife Division personnel. As part of the crackdown in the Selous, all of the local communities' legal access rights, such as the right to collect honey and beeswax, were curtailed. In addition, the government shifted its energies away from crop protection and adopted a hands-off policy toward farm-raiding elephants. Since the crackdown, elephant populations have recovered significantly (Siege 2000). At around the same period as Operation Uhai, the government began to implement a

new policy for protected areas that encouraged community participation and benefit sharing. Around the Selous, this new policy emphasis took the form of a buffer zone. The remainder of this section will focus on the details of this project.

The Tanzanian government and the German agency Deutsche Gesellschaft Fur Technische Zusammenarbeit (GTZ) jointly implemented the Selous Conservation Programme (SCP) in 1988. The key to the program was the creation of a buffer zone around the reserve (GTZ/Selous Conservation Programme 1995). The buffer zone consists of a strip of the villages' lands lying between the reserve boundary and surrounding farms and houses in which wildlife conservation is the dominant land use. The buffer zone thus creates a new type of land designation wherein sections of village lands are dedicated to managing a portion of the country's wildlife estate. In exchange for restricting the extent of cultivation and settlement, villages are allowed limited access to the wildlife on their lands. As a prerequisite to gaining access to wildlife, the villages must produce village land use plans that designate "wildlife management areas" (WMAs) along with areas for cultivation and forests. Contiguous WMAs thus comprise a buffer zone outside of the reserve boundaries. As part of this process, the village lands are surveyed, registered, and titled in the name of the village council (an elected and legislatively designated corporate body).

Once the village land use plan and village title application are completed, the Director of Wildlife grants a wildlife utilization quota for the WMA of each village. This constitutes a partial and temporary devolution of property rights. Under current law, there is no legal basis for transferring the ownership of wildlife—thus, each allocation must take the form of a special permit issued by the director. Consequently, the allocation can be revoked at any time at the discretion of the director or SCP officials. The allocation is made to the village council and administered through the newly-created institution of the village natural resources committee. Each village appoints "village game scouts" (*wahifadhi*) whom the SCP instructs at a training center set up south of the reserve. A syllabus and manual guide the training in order to standardize the performance of duties by all village scouts. Upon being instructed and equipped, the *wahifadhi* take primary responsibility for monitoring village wildlife lands and conducting hunts under the utilization quotas. Currently, over 45 villages participate.

SCP provides the umbrella under which wildlife found both within the reserve boundaries and in the village lands are managed for sustainable harvest. The reserve itself is divided into 45 hunting blocks that are leased to private safari companies that guide foreign big game hunters (GTZ/Selous Conservation Programme 1996). Within the buffer zone, GTZ and the Tanzanian government have planned that the sustainable off-take of wild

meat on village lands will provide a long-term source of income for participating villages. Meat is sold to villagers at or below market prices for beef; this is counted as "income" from wildlife, which goes toward the recurring expenses of the project and for community development projects, such as schools and dispensaries. In assessing the benefits to the community, it is important to bear in mind that villagers pay for wild meat taken from their own lands; therefore, meat sales do not generate any "new" money for the village (GTZ/Selous Conservation Programme 1996, 91). The main benefit touted by the SCP staff is that villagers have legal access to wild meat for the first time. In fact, as was noted previously, villagers did have legal access to wild meat for subsistence during the colonial period. The current level of access is comparatively limited, both in the total amount of wild meat and in the length and frequency of its availability.

In Liwale, the implementation of the buffer zone did not go smoothly. It was the only area in which the program was begun and then halted over conflicts between the SCP and neighboring villages. The main source of conflict appears to have been the problem of crop raiding wildlife and the villagers' claims that the SCP was not providing adequate protection. It should be noted here that the government provides no compensation for loss of property, injury, or death resulting from wildlife coming from protected areas. In my interviews with village representatives in the Liwale area in 1997 and 1998, they claimed that the situation of crop raiders was so severe that some people were abandoning their cultivation plots and moving away. I also noted in my interviews that while government officials viewed the creation of WMAs as a permanent and irrevocable change in land tenure, villagers portrayed the agreement as something that they could legally break should conditions change. The situation reached a head sometime in 1998, when the local Parliament member put pressure on the Wildlife Division to recall the wildlife officer in charge of the buffer zone project in Liwale. The program for the nine Liwale villages was subsequently suspended for the 1998–99 and 1999–2000 fiscal years, then reinstated in 2000–01.

Discussion and conclusion

For the Liwale Ngindo, the buffer zone is one more scheme in a long line of external interventions that have restructured their interactions with non-human nature and closed their access to the local commons and fertile cultivation plots in the river valleys. Elephant control, the settlement concentration scheme, and the groundnut scheme produced major changes in land use and land rights, but as colonial administrators recognized, achieved little in the way of development. Supporting the development plans were the state's proprietary claims over the territory and its resources, most notably elephants. The creation of the game reserve thus constituted a large-scale enclosure and a shift from a common property regime to state ownership.

Under the independent government, Operation Uhai eliminated the few rights to the commons that remained. The buffer zone project is meant to redress these historic displacements through the limited devolution of some property rights back to local communities.

Whether program officials acknowledge it or not, the buffer zone program thus bears the weighty burden of overcoming a century of antagonisms between the state and the Liwale Ngindo communities. In peddling a future of local development benefits from the game reserve and the new village WMAs, it echoes the (failed) promises of every intervention that preceded the SCP in Liwale. Is this project up to the task? The two-year suspension of the buffer zone project in Liwale hints at some of the challenges, and suggests that a few pounds of wild meat every year may not be enough to compensate for crop losses. The situation of the buffer zone historically highlights how much land and resource access the Liwale Ngindo have lost to wildlife conservation and how relatively small the compensation offered by the program is. The history of how the Selous wilderness was created, of who gained and who lost, will be a key focus in the continuing negotiation over the control of local commons and the proprietary rights of nature.

From a geographic perspective, the buffer zone represents a de facto expansion of the reserve boundaries onto village lands. That is, the villages pledge to dedicate a portion of their village lands to managing wildlife. Though the land remains under village ownership, the wildlife belongs to the state, which oversees its management. The main difference between the buffer zone and the reserve itself is not ecological, but social and political. The implications of this expansion, the principal one of which is the greater proximity of wildlife to cultivation crops, are not lost on village residents. As evidenced in the Liwale buffer zone, the failure to protect crops from raiding wildlife can result in the breakdown of the agreement. To exacerbate matters, elephant numbers have been increasing rapidly since Operation Uhai, and they now number over 60,000 (Siege 2000). Crop raiding by protected elephants will undoubtedly rise with their population numbers, resurrecting the old land use conflicts between wildlife and agriculture that have been at the center of Liwale residents relations with the state since the colonial period. Human/wildlife conflicts continue in the buffer zone villages, and it remains to be seen whether village game scouts are up to the task of controlling them.

Finally, there remains the question of the development potential of the buffer zone project. The key economic benefit is access to the economic benefits from wildlife, based on the temporary restructuring of property rights and the commodification of a wild resource. Wild meat, once available as a subsistence resource from the commons, now has to be purchased from village game scouts. The economic benefit of this scheme for villagers is dubious

for a number of reasons. First, the money from meat sales is generated when villagers purchase it from village game scouts. The village councils deposit these funds in village bank accounts for later allocation. Thus, the meat sales function as a sort of wildlife tax on village members, rather than as a source of individual income. Second, the meat is sometimes priced out of reach for most villagers, or is harvested during periods when villagers are short on money and so access is financially restricted. Third, on average, over half of the revenue from all sources combined (principally meat sales and revenue sharing with the reserve) goes toward meeting the recurring costs of managing the village WMAs (Hahn and Kaggi 2002). The extent to which the buffer zone constitutes a path to integrating community development and conservation is thus a subject for closer analysis.

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Connecting islands of hope in a raging sea

Opening Keynote
October 6, 2003

Charles R. Preston

Charles R. Preston is the Founding Curator and Curator-in-Charge of the Draper Museum of Natural History, part of the Buffalo Bill Historical Center complex in Cody, Wyoming. He has previously been Chairman of the Department of Zoology at the Denver Museum of Natural History, and Associate Professor of Biological Sciences at the University of Arkansas at Little Rock. He has received numerous awards for his teaching, research, curatorial, and public service activities. Dr. Preston's current interests focus on ecological and socioeconomic aspects of wildlife conservation and management, and the evolving role of natural history museums in society; he is a strong advocate for the role of museum scientists as public educators. He is the author of three books and more than 50 other scientific, technical, and popular publications. He is currently at work on a companion book to the Draper exhibits, **Greater Yellowstone Adventure: The Braided Paths and Tangled Destinies of Humans and Nature in Yellowstone Country.**

When I listen to my introduction and biography at these events, I'm always a bit shocked at how often I've moved from one type of position to another through my career. I'd like to think that this pattern is due to a versatile intellect and an inclination to seek and embrace new challenges, but there are those who might argue that I simply become bored easily. I don't believe that is true, but even if that evaluation had some merit, I can assure you that there are some things in this world that I will never tire of exploring and thinking about—these include the Galapagos Islands, the Cockscomb Basin of Belize, the Serengeti–Mara and Greater Yellowstone areas, and, of course, my wife Penny. Each is beautiful, wild, and therefore unpredictable, and at times more than a little dangerous! I am delighted to have the opportunity to consider two of these this evening.

When we opened the Draper Museum of Natural History last year, we were in a bit of a quandary. Our staff and trustees at the Buffalo Bill Historical Center felt very strongly that the Draper's focus should be the Greater Yellowstone Area. To some, that appeared a bit myopic; after all, the great natural history museums established a century ago aspired to bring the world to their communities. Our thrust was quite the opposite—to showcase one particular region to the world. But our rationale was that the Greater

Yellowstone Area is a global resource and treasure, and by exploring this resource in depth, we could reveal global connections—connections binding human cultures with nature. Our quandary was how to kick off the Draper Museum in some tangible way that expressed our global, interdisciplinary perspective. Our solution was to feature an internationally-known figure who could help us articulate that message by his or her very presence. Our first choice was Richard Leakey, and he graciously accepted our invitation to help open the Draper. Richard was subsequently interviewed for an article published in *Yellowstone Science*, and I believe his presence and interview helped in some way create or at least support the theme of this conference—no doubt from ideas and projects that have been brewing for many years in the minds of people like John Varley, Glenn Plumb, and Lisa Graumlich, among others. I should admit that we lured Richard to the Draper and to this region initially with the opportunity (he says "guarantee," by the way) to see grizzly bears. Of course, we failed to produce any bears during his short stay last year. So, this year, we lured him back for this conference with the opportunity (he insists "promise") to see wolves. Again, despite the best efforts of many, we failed. Next year, Richard, we hope you will return to see bears and wolves together, perhaps with a cougar thrown in for good measure.

I was invited to speak to you this evening to help set the stage for the next two days of this conference—to explore connections between two places in the world, the Greater Yellowstone Area and the Greater Serengeti–Mara area, that on many levels are as different as night and day. They are located on different continents and separated by vast oceans. The indigenous people in the two regions differ greatly from one another in ethnicity, history, language, and culture. Current prevailing regulatory bureaucracies, though derived and flavored heavily from a common European or Caucasian spice pot, represent distinctly different recipes. These two places represent biomes and wildlife assemblages bound by processes common to life throughout the globe, but differing significantly in species composition, diversity, dynamics, and biological productivity.

Yet there are profound connections between these two world treasures. Though as ecologists we may wince at the term, there may be some basis for regarding Yellowstone as the "Serengeti of North America." Indeed, the thesis I'd like to advance this evening is that the fundamental connections between these two magnificent places are far more profound than the differences, and recognizing and reinforcing those connections is far more important today than at any time in history. Each of these places individually represents an island of hope for long-term wildlife and wildlands conservation, and each is confronted with essentially the same raging sea of challenges, though they may be manifested somewhat differently.

Before developing these specific points further, I'd like to digress for

a few minutes to introduce you to another island of hope that might help provide perspective on both the challenges and opportunities connecting the Yellowstone and Serengeti areas. In 1990, I left a tenured university position to assume the dual position of Curator of Ornithology and Chairman of Zoology at the Denver Museum of Natural History. As much as I enjoyed academia, I was anxious to be involved again in large-scale public education—as I had been even long before graduate school. I was also anxious to pursue a growing research interest focused on teasing apart ecomorphological relationships among bird and mammal assemblages along an elevational gradient. The Rocky Mountains of Colorado provided an ideal setting for this work. But a funny thing happened on the way to the high country; I was waylaid by an unlikely island of hope on the plains just east of Denver. A U.S. Fish and Wildlife Service biologist introduced me to this place in a phone call when he invited me to tour a future wildlife refuge that was once deemed one of the most polluted areas on the face of the earth. The paradox was intriguing, but frankly, I would not have agreed to a tour so quickly if it hadn't been for the insistence of my colleague on the phone.

During my first tour of the Rocky Mountain Arsenal, I found a complex of buildings interspersed with a mixture of native shortgrass prairie broken by cottonwood riparian corridors and disturbed areas dominated by cheatgrass and other invasive species. Most of the buildings were abandoned. They had once been the site of chemical weapons production—everything from mustard gas to various nerve agents. The Rocky Mountain Arsenal was established shortly after the beginning of World War II to help develop weapons for the Allied war effort. After the war, the arsenal was leased by private companies to produce chemical pesticides for agriculture. Toxic wastes from both weapons and pesticide production were simply dumped on the arsenal property. That was standard operating procedure during those naïve times. Amid reports of waterfowl dying or flying into buildings after landing on arsenal ponds, and groundwater contaminating crops on nearby farms, chemical production and dumping was halted, and access to the site was restricted even further. The arsenal was eventually named a federal Superfund site and slated for cleanup. But nobody could decide how clean the area should be, nor what the area should eventually become. Some people argued for a children's park, some argued for low-income housing, some for an industrial park, some for agricultural use, and so on. Several state and federal agencies were involved, and lawsuits seemed to be springing up everywhere. By the time I arrived in Colorado in 1990, the proposal that at first seemed to be the most unlikely was gaining momentum. That proposal was to turn the Rocky Mountain Arsenal Federal Superfund Site into the Rocky Mountain Arsenal National Wildlife Refuge. Which brings me back to my first tour of the Rocky Mountain Arsenal. In addition to the buildings and mixed vegetation I saw

on that cold January day, I recorded 31 mule deer, 2 white-tailed deer, 12 cottontail rabbits, 5 black-tailed jackrabbits, 4 coyotes, 1 badger, 3 active prairie dog towns, 62 ferruginous hawks, 3 red-tailed hawks, 3 rough-legged hawks, and 19 bald eagles. Now that's a decent day afield anywhere, but what makes it truly remarkable is that the Rocky Mountain Arsenal is a tiny, 7,000-hectare island surrounded by commercial developments and intensive agriculture, within about 16 kilometers of downtown Denver and in the midst of a sprawling metroplex of some three million people. This small area had become a de facto refuge for wildlife because it was the one area of this size (ironically, due to the restrictions associated with a contaminated military installation) that had not been fragmented and developed.

The Rocky Mountain Arsenal became the unlikely focus of a massive conservation effort supported by the National Wildlife Federation, National and Denver Audubon societies, National Fish and Wildlife Foundation, and U.S. Fish and Wildlife Service, among others. I became intrigued by the challenges of creating an island wildlife refuge in a heavily contaminated Superfund site, and had the opportunity to direct a series of wildlife habitat studies and educational programs related to the site. Amid continued challenges from some development interests, legislation was introduced by both Colorado republican and democratic legislators and passed by the U.S. Congress to establish the Rocky Mountain Arsenal National Wildlife Refuge pending appropriate contamination cleanup and habitat restoration. The process is expected to take 15–20 years. In the meantime, the area is known as the Rocky Mountain Arsenal National Wildlife Area under the joint authority of the U.S. Fish and Wildlife Service and U.S. Army, and attracts tens of thousands of visitors yearly. It has become a highly valued community resource for local residents and visitors alike to learn about and experience a small vignette of the shortgrass and mixed grass/shrubland ecosystem of the western Great Plains of North America. Admittedly, it remains a highly compromised environment, but that's what makes this story so poignant. How is it that such a compromised environment has become so valuable to wildlife and to people? To the residents of the Denver metroplex, the Rocky Mountain Arsenal has become an island of hope—a remnant, a pale vision, really, of a native biome that has all but disappeared from North America. Larger, less impacted tracts of native grasslands remain in some areas of west–central North America, but nothing that truly reflects the pre-Columbian diversity and dynamics of this biome. From an ecological point of view, it was the once-expansive Great Plains grasslands, rather than the uplifted plateau of Yellowstone National Park, that most nearly warranted the designation, "Serengeti of North America." Unfortunately, no one saw fit to value and preserve a large expanse of Great Plains grasslands before they were altered and fragmented by intensive livestock grazing, agriculture, and urban and suburban sprawl.

We're here this week because visionaries more than 100 years ago recognized the value and the vulnerability of some natural systems and created the powerful idea of a park—a national park—to preserve the integrity of a functioning ecosystem. Yellowstone National Park was established in 1872 to become the world's first national park, and at least the symbolic model of all national parks to follow. Initially protected for its active thermal features, Yellowstone has become increasingly valued as a refuge for the suite of native wildlife that once occupied a much broader temperate landscape in the intermountain region of western North America. Yellowstone National Park (900,000 hectares) has become the centerpiece of what is generally termed the Greater Yellowstone Area (GYA, 7 million hectares), often described as encompassing the last, large, nearly intact native ecosystem in the northern temperate zone of the earth. The GYA covers portions of three states and includes all of Yellowstone and Grand Teton national parks, portions of six national forests, two national wildlife refuges, lands managed by BLM, Indian reservation lands, and substantial state and private lands. Only 6% of this land is in national parks; 34% is privately-owned.

The Serengeti–Mara Area (SMA), defined by the movements of the migratory wildebeest, covers roughly 2.5 million hectares, and like the GYA, crosses several jurisdictional boundaries—including the two sovereign nations of Tanzania and Kenya. The SMA includes the Ngorongoro Conservation Area, Maswa Game Reserve, three game-controlled areas in Tanzania, the Maasai Mara National Reserve and adjoining group ranches, and of course, the Serengeti National Park (1.5 million ha). The Serengeti was afforded national park status in 1951, with extensive boundary modifications in 1959. The SMA supports the largest herds of migrating ungulates in the world and one of its highest concentrations of large predators—both carnivores and raptors.

Both Yellowstone and Serengeti national parks are recognized as Bioshpere Reserves and Natural World Heritage Sites. Each has become an icon of conservation the world over—arguably the two most widely-celebrated natural preserves in the world. And if Rocky Mountain Arsenal is an island of hope for the Colorado Front Range, GYA and SMA are islands of hope for the world. Of course, they differ in some obvious ways. The GYA occupies a largely mountainous landscape dominated by coniferous forest. Only about 20% is covered by grasslands, and these are cool, temperate grasslands. In contrast, SMA occupies a broad, sloping plateau covered almost entirely by warm, tropical grasslands and savannah. Where the Serengeti–Mara supports more than two million ungulates of 31 species, fewer than a half-million ungulates of eight species occupy the GYA.

Creation of both Yellowstone and Serengeti national parks displaced indigenous residents. But more than 100 years have passed since Native American people and traditional lifestyles have been displaced and largely

replaced with EuroAmerican ranching, farming, and other land uses outside protected areas; this latter culture, though relatively recent, is firmly entrenched, and exerts profound influences on land use and wildlife management issues in the region. Maasai pastoralists and other Native Africans continue to have a significant presence in the SMA, though traditional land use and lifestyles have changed. Tourism is important to both areas, and both attract worldwide audiences. But SMA is far more dependent on foreign tourism.

Despite these differences, there are some well-documented underlying similarities, particularly involving certain grazing ecology and dynamics. Seasonal and geographic variations in forage characteristics within each region require ungulates, and the omnivorous grizzly bear in the GYA, to range widely to make most efficient use of foraging opportunities. The large herbivores help regulate grazing ecosystem processes in each area, but they, along with the large predators that track them, help create common conservation challenges that connect the GYA and the SMA. The point is that success of the parks, themselves, as wildlife reserves, depends to a large extent on land management and other human activities not only within the parks, but also in broad buffer zones that are defined by park wildlife needs. And here is where Yellowstone and Serengeti are so intimately connected—by the general nature of the challenges they face. These challenges may be shared by other national parks and reserves throughout the world, but it is in these most celebrated parks where the world focuses so much hope for identifying and meeting these challenges.

Many of the challenges to wildlife conservation in the GYA and SMA are ecological, to be sure, but they are also economical, sociological, ideological, and educational. I suspect many of us who have taught courses in wildlife management have begun the course with the rejoinder that successful wildlife management includes a healthy dose of people management. Today more than ever, humans are a critical element in wildlife conservation and management, and there are no more high-profile proving grounds than the GYA and SMA.

To summarize a bushel of challenges in a thimble, there are simply increasing human demands on landscape and resources adjacent to and intimately tied to the parks. Private land use practices that may have presented little threat 100 or even 20 years ago, are now a much greater threat because of the sheer number of people and the movement away from mere subsistence living toward mass production and extraction. In both the GYA and SMA, largely open, natural landscapes surrounding protected areas that help support park wildlife are being changed in character. Symptoms include sprawling settlements and residential development, poaching, logging, and other extractive industry, invasive species, and wildlife diseases. Adjacent

landowners often view wildlife as being a source of livestock diseases, competition for grazing, threats to crops, depredation on livestock and pets, and even threats to human life. Park managers must also deal with inherent natural processes—wildfire, drought, long-term climate change, predator-prey and grazing dynamics—that sometimes present management, or at least public relations challenges in compromised nature. Managers must monitor, evaluate, and mitigate impacts from park visitors as they demand increasing access to park resources and experiences. The task is made more difficult by a chronic lack of adequate resources, often allocated through political ideology and even out-and-out corruption, rather than management needs.

While those living around national parks stand to gain the most from landscape aesthetics and tourism economy provided by the parks, they are also most vulnerable to land use restrictions and wildlife-related impacts connected to park management. In general, financial incentives are greater for landowners to manage their land for farming or ranching, or subdivide it for housing, than to manage it for wildlife conservation.

In some ways, the financial challenges may be easier than ideological ones. This is particularly true for the GYA, where long-held distrust and antipathy for the federal government, fears of losing personal property rights and personal freedoms, a deeply-held fear and loathing toward predators, and cultural clashes between American Western neo-traditionalists and conservation advocates create obstacles for wildlife and landscape conservation supporting national park goals.

Let me relate the gist of a recent conversation I had with a friend of mine who happens to be a local rancher/outfitter. He was complaining to me about wolves and grizzlies in his elk hunting area. He didn't like having to spend so much time and energy protecting his clients and campsites from grizzlies, and he was worried that the combined predation from grizzlies, cougars, and now reintroduced wolves, would reduce his and his clients' elk hunting success. He had already lamented the fact that the number of hunting clients had been declining, and that they tended to be older and more difficult customers to deal with. I agreed that recovered grizzly and wolf populations might make elk hunting more of a challenge and that the current, very liberal, elk hunting regulations might be modified in the future. But I pointed to a few hunting outfitters who have been very successful branching out to include backcountry natural history expeditions, including wolf- and bear-watching opportunities for clients. At least one former hunting outfitter in Wyoming has chosen to specialize in these kinds of experiences for clients. My friend was appalled by my suggestion, shook his head, and said, "That's just not the cowboy way!" At least for this guide/outfitter, his interpretation of his cultural identity outweighed economic, or even logistical pragmatism.

If, indeed, the GYA and SMA are connected via common challenges to

wildlife conservation, how do we stand to benefit from exploring those connections together? The obvious potential benefit is to increase opportunities for articulating problems and finding solutions. We've all walked the path between the ponds of strict protectionism and community-based cooperation and dangled our toes in each to test the temperature. Many of you carry the scars to prove it! We've emerged with new lessons about the right times, places, and methods to immerse ourselves in each pond. Sharing those lessons across a broader experimental field may help us identify general patterns and shape future applications.

Exploring and nurturing connections also helps to focus broader attention on both the importance of these areas and the challenges they face. It helps reduce the isolation of islands of hope, and places local obstacles to conservation in a much larger global context. Just as creating connections between geographic islands encourages gene flow and reduces the chances of species extinction in a rapidly changing environment, forging intellectual connections between disjunct conservation reserves encourages the flow of ideas and solutions, and reduces the chances of failure in creating sustainable wildlife conservation strategies in a world of increasing human demands. A broader dialogue also helps identify sweeping threats to conservation, e.g., global climate change, beyond the local context.

If our overarching goal is to create sustainable wildlife conservation strategies, then our objectives should include:

- improving our ecological understanding;
- improving our economic understanding;
- improving our cultural understanding;
- reducing ecological barriers to conservation by employing ever more effective wildlife management practices;
- reducing economic barriers to conservation by creating financial or other compensatory incentives where possible; and
- reducing cultural barriers to conservation through community involvement, education, and protectionist regulations, as appropriate.

Judging from the abstracts, the presentations, panels, and posters featured at this conference address these objectives, and will hopefully provide object lessons for future work and application. I am anxious to hear from this distinguished gathering of thoughtful people.

Before I leave the stage, I would be remiss if I didn't pound one drum that I think is too often overlooked and marginalized in scientific and conservation circles: the importance of public education, particularly by museums and other similar, non-governmental institutions. Education is far too important to occur only in classrooms. Public museums and similar institutions are in a unique position to attract, engage, and inform. Museums are now address-

ing conservation issues and the connections between people and nature like never before. My own institution was conceived with the vision of integrating natural sciences with humanities to explore and inform about conservation issues through exhibits, field experiences, courses, conferences, lecture series, and other venues. We've only just begun, and have a lot to learn and to do, but we've made some inroads in what many of you know is a difficult cultural and politically-charged environment.

Finally, I hope you will indulge my thoughts on a key role for scientists and scholars in resource conservation. It seems to be a conspicuous thread running through the tapestry of issues featured in this conference. In my mind, advocacy for a particular position or policy is a personal matter appropriately pursued by anyone as a private citizen. But I strongly believe scientists and other scholars have not only the opportunity but also the professional responsibility to interpret their work and unique level of understanding for the public—to seek out and help replace dogma with information in our fields of expertise. Just as bad things often happen when good people do nothing, bad environmental policy happens when informed professionals don't share their knowledge. Science is poorly understood by the general public, in part because there are so few working scientists willing or able to communicate effectively in public venues and truly connect with lay audiences. Aldo Leopold, among others, clearly recognized and worked to improve this situation in the twentieth century. I am fortunate to be married to a very bright, highly professional and competent journalist, but I believe we continue to rely too heavily on journalists to interpret newsworthy scientific information to the public.

Thirty years ago, when I first considered becoming an ecologist, I read an editorial in a professional newsletter that sticks with me today. The author argued that what society needs/wants from ecology is predictability. I think much the same thing can be said today of the interdisciplinary realm of natural resources conservation. I believe that among our most critical responsibilities is to explore and clearly inform policy makers, managers, and the general public regarding what we know (and don't know) about the ecological and socioeconomic consequences of human activities and proposed policies. We do not always have the opportunity to make policy decisions, but we should do everything in our power to ensure that the public, and public policies, are adequately informed. The Greater Yellowstone Area and Serengeti–Mara Area are certainly two of the most important laboratories in the world for creating and applying information about how nature works and the ecological and cultural consequences of human actions.

Thank you for your attention and indulgence—I am looking forward to learning from you and sharing ideas over the next few days.

Excluding people from parks in East African savannas: unintended consequences for wildlife?

Keynote Address
October 8, 2003

Robin Reid

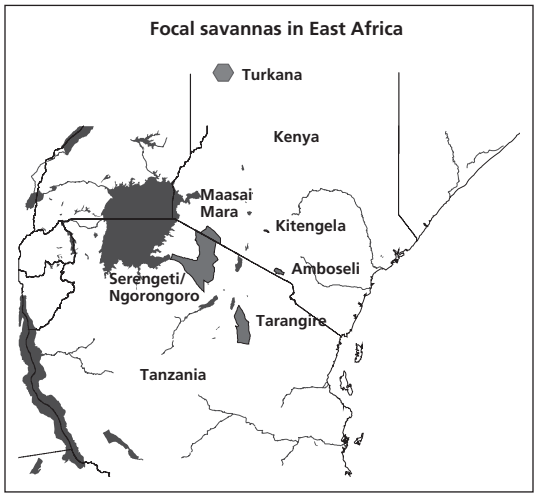
Robin Reid is a systems ecologist and Programme Coordinator for the People, Livestock and Environment Programme at the International Livestock Research Institute, Nairobi, Kenya. She started her career with the National Park Service, where she served as a ranger and biologist at Gateway, Canyonlands, Olympic, and Yellowstone national parks. For the last 15 years, she has worked with pastoral peoples and wildlife throughout East Africa. She currently leads transdisciplinary research teams investigating how to balance the often conflicting needs to conserve biodiversity and improve livelihoods of pastoral peoples around the world. Dr. Reid serves on international scientific advisory panels for land use and biodiversity science (IGBP-LUCC and DIVERSITAS), and founded an East African network of scientists and policy makers concerned with land use issues called LUCID. Her scholarly articles have appeared in ***Conservation Biology, Development, Journal of Applied Ecology, Biological Conservation, Ecological Applications and Landscape Ecology.***

I'm going to present a talk today that is data-driven, unlike [those of] some of the other keynote speakers (although much of what they said was data-driven—they just didn't present the data). And so you're going to see a lot of information here. Part of the reason I'm going to do that is that my great-grandfather was a criminal lawyer, and I learned at an early age that evidence is important. And my mom is a scientist, and so I learned that early, as well.

I'd like to thank some people on my team first, because they are so much a part of what I'm going to present. I have the fantastic good fortune of working with a team of people from 20 different countries; I'll present much of their work today. I'd also like to say that I recognize—and I really want to recognize for all of us—that we stand on the shoulders of giants. There are a number of people who have gone before in science, particularly Jim Ellis, and some other folks that I've worked with; many of those people are here in the audience. I want to recognize the great work of people in the past, and that which is still ongoing. Finally, I want to thank the great Maasai people that I get to work with, and other pastoral people. They're terrific, and they've been

always gracious about welcoming me into their lives, and I'd really like to pass that on to them.

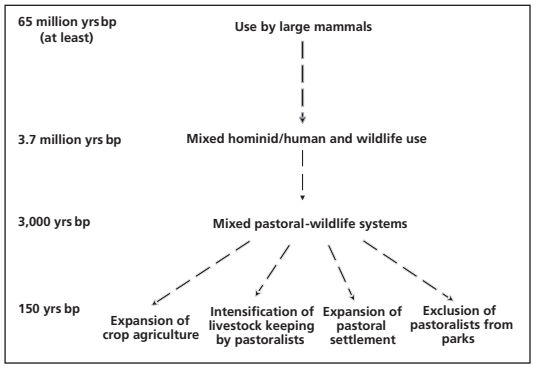
I used this provocative title because I wanted us to investigate the idea of whether excluding people from parks has unintended consequences for wildlife. So what am I going to talk about today? First, I'm going to talk a little bit about prehistory. And I'm relieved to see that I can't find…Oh, there's Richard [Leakey]! Second, I'm going to talk a bit about the current spasm of wildlife loss in East African savannas. It's truer in some places than others, but I want to recognize it because it bears on the question of whether people should be in parks. I also want to point out some of the things that we may have lost with the exclusion, or removal of homo sapiens from parks, and then about some specific things that people do on landscapes: grazing, burning, and pastoral settlement. Then, I want to sum up by saying something about conservation policy and management and what all this might mean.



Slide 1.

This is a map [slide 1] of some of the places that I'm going to talk about in East Africa, areas in Kenya, and in Tanzania. I'm going to talk a bit about the northern area in Turkana, and about the Serengeti–Mara ecosystem that most folks have talked about [at this conference], and the Ngorongoro area. I'll talk a little bit about the Kitengela system that is near the city of Nairobi, and then the Amboseli system near Kilimanjaro, down in southern Kenya.

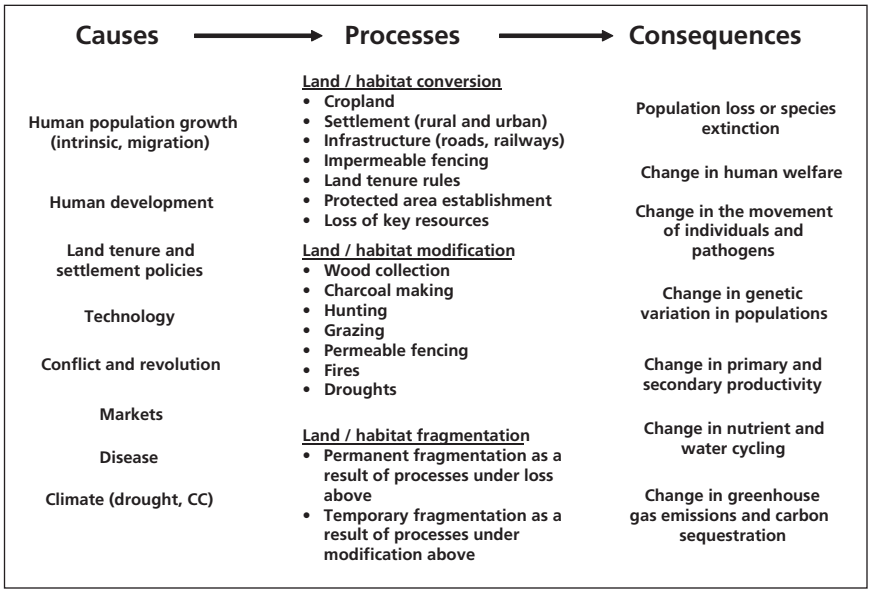
Here's my dangerous prehistory slide [slide 2]. I just want to remind us about East Africa and its long history with wildlife and people, because I think it's an important context



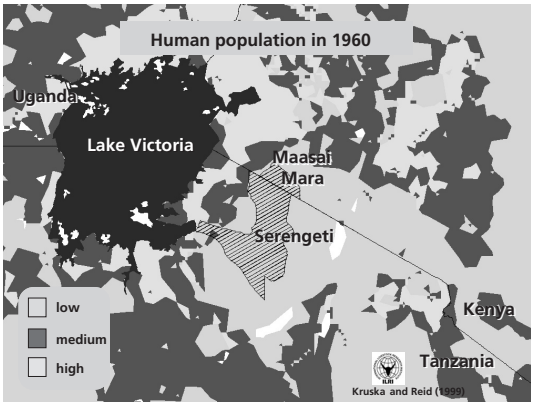
Slide 2.

for thinking about people and parks. Also, it's very different than it was in much of North America—at least [in terms of] the length of time—and so I'm crazy enough to say that large mammals have been part of these landscapes for many, many millions of years, and I've probably got the date wrong, but it's a very, very long time. Richard's mom [Mary Leakey] found some footprints in Tanzania, or at least [published] work [resulting] from the footprints, showing two hominids walking, maybe side by side, or maybe one behind the other, 3.7 million years ago. One with larger footprints and one with smaller, in volcanic ash, preserved for us in the present. What was so remarkable about those footprints was not only the evidence of bipedalism, but also the fantastic array of wildlife footprints that were also preserved there, as well as acacia leaves and things like that, that are there in those savannas [today]. And so there's been a very long mixing of people and wildlife in these landscapes.

More recently—quite a bit more recently, but still a long time ago—wildlife were both domesticated in Africa (which is some new evidence in the last couple of years), and brought to Africa, arriving at East African savannas maybe about 3,000 years ago. So there has been a pastoral–wildlife landscape for the last 3,000 years. In the last 150 years or so, there's been a wide array of new ways of using the land. Expansion of cultivation, expansional settlements, intensification of livestock keeping, and also the exclusion of people from parks have all happened during that time.



Slide 3.



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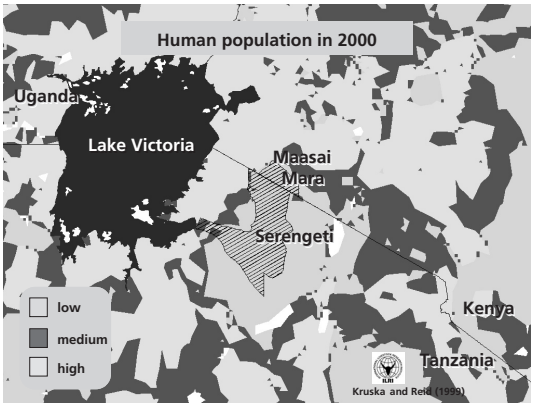


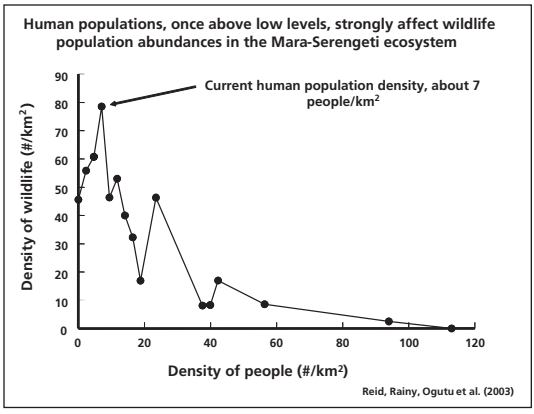
Slide 5.

So what is this loss, this spasm of wildlife loss? This is a complicated slide [slide 3], and I'm just going to point out some highlights. It's complicated because the causes and consequences of habitat fragmentation and loss are complicated anywhere in the world; you will all recognize many of these things [also] driving the landscapes in the Greater Yellowstone Ecosystem. Exponential growth of human populations certainly has been a strong driver in this case. Changes in land ownership have [also] been very important. Civil unrest has been very important in Uganda, [along with] a whole range of other things, particularly markets. The development of markets, and economic development, has been a big cause of fragmentation. A whole range of things happen when habitat is converted. There are consequences for the ecosystem. I'm going to talk about more the wildlife end, but there's a whole range of consequences for ecosystems that many of you are very, very conscious of in this system.

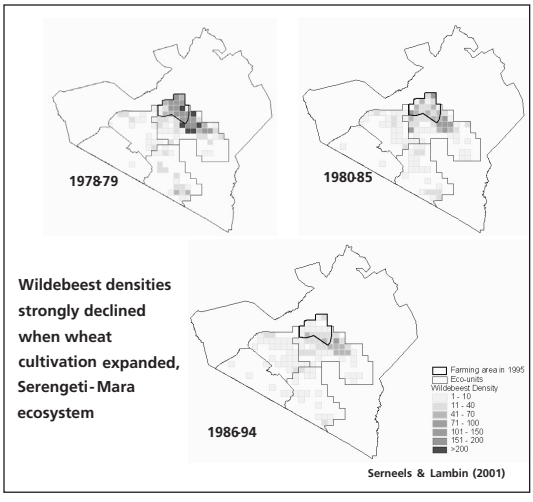
There are some other things happening in East Africa as well, such as bushmeat harvesting, particularly in the western Serengeti. I saw some numbers last week when I was in the Serengeti where it looks like there's been a pretty strong loss in the resident wildlife populations. But I'm dangerously saying, with Tony Sinclair in the room, that it looks like poaching has had a big impact on the migratory wildebeest, as well. Second, not only do people kill wildlife, but they harass them with their dogs and different things, which is important. Finally, competition between livestock and wildlife for forage and water is also important.

In slide 4, I'm showing a section of the border between Kenya and

Tanzania, and what human population was like in 1960. What you can see in this landscape is that the Serengeti–Mara, and also Ngorongoro (not shown here), is in an area that extended out into surrounding areas of low human population, and there were connections in this landscape. Slide 5 shows you the human population in 2000. You can see now that many of these savanna landscapes are becoming islands within this sort of sea of humanity. But that is different in different parts of edges of the park, much like it is here in Yellowstone.



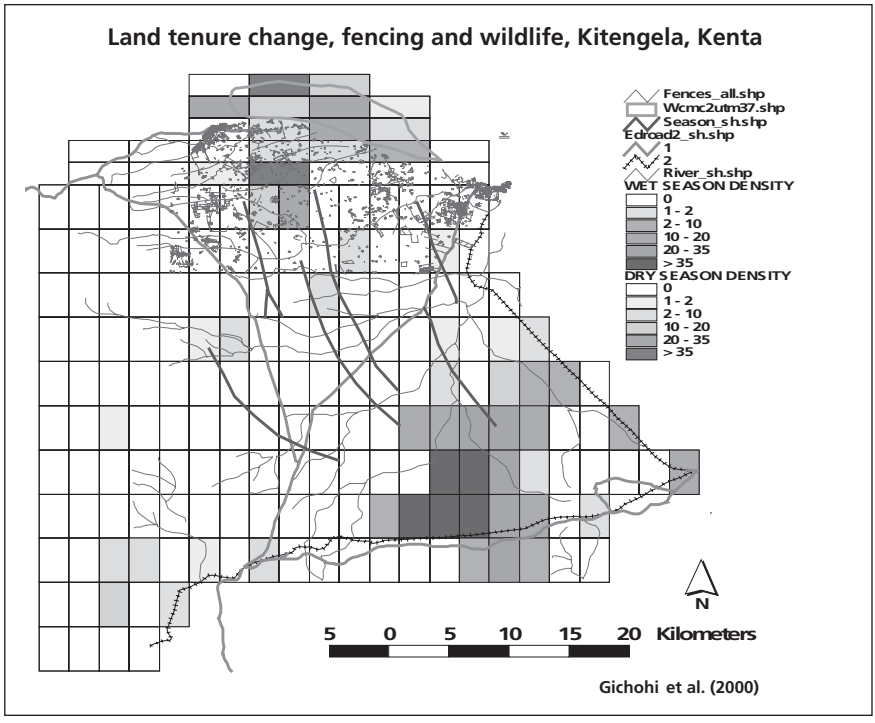
Slide 6.



Slide 7.

Another thing I want to show is the consequences for wildlife. This is a correlation, so don't take it as a causative relationship, but the right side of this graph [slide 6] indicates that as human population increases, we're seeing a very strong loss in the abundance of wildlife. That's what we assume will happen. We'll come back to this.

So we have this human population increase. Another driver of change is the leasing of land to commercial wheat farmers in the northern Mara ecosystem. Slide 7 shows the Mara reserve and surrounding pastoral lands. From the upper left, we can see what wildebeest distribution looked like in about 1976; in the early 80s, when they started farming the area for wheat; and more recently, about the mid-1990s. So there's a strong loss in the resident wildebeest population. We saw, on average, about a 70% decrease in all species of wildlife in this ecosystem in the last 20 years. So, big, big changes [are happening].

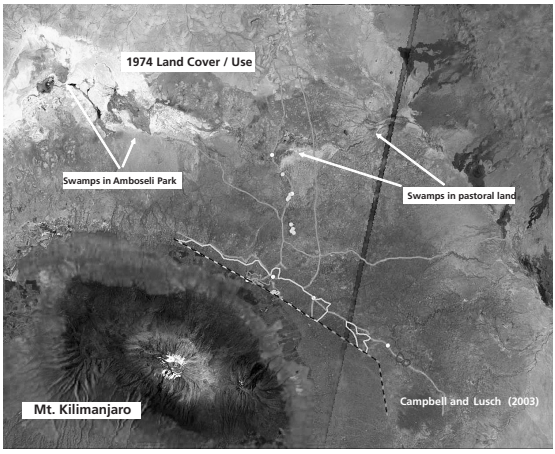


Slide 8.

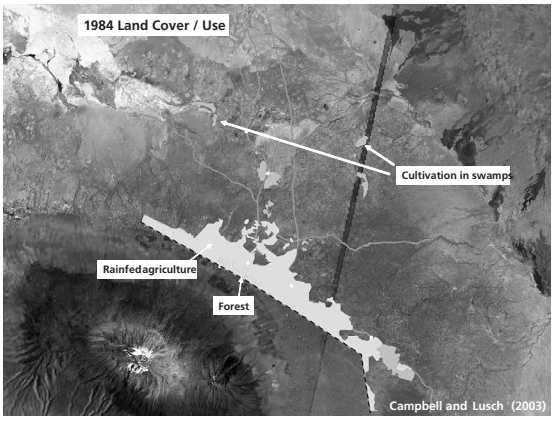
Slide 8 shows an ecosystem near Nairobi, where I live. This is the Kitengela landscape. The sort of mango-shaped thing at the top is Nairobi National Park. The area to the south of it [contains] the pastoral lands of the Kitengela. To the southeast are the wet season calving grounds for wildebeest and zebra; during the dry season they migrate up into Nairobi National Park. The things that look like little worms are the fences that are going up on private land. They are having a huge impact on the migration of wildebeest, and also on vegetation and burning practices.

Slide 9.

Slide 10.



Slide 11.



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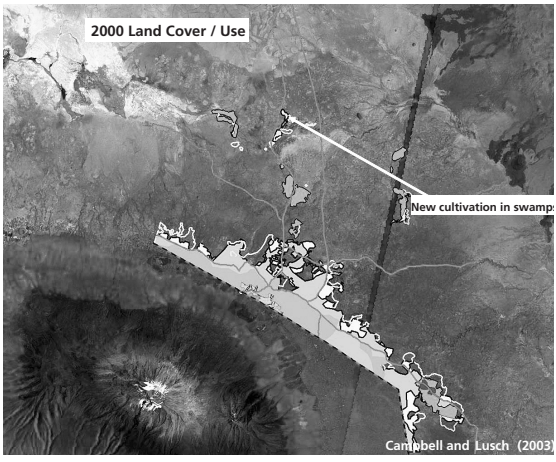
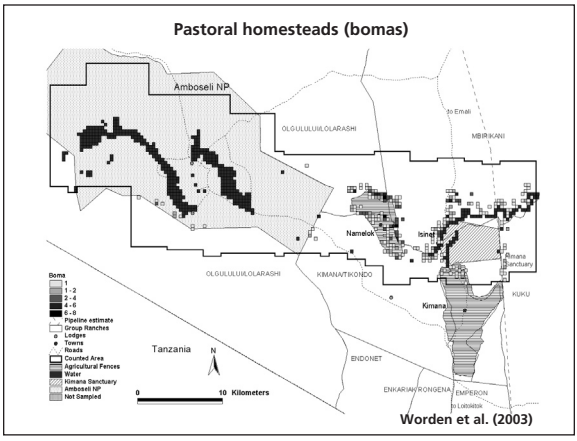


Slide 13.

Slide 14.



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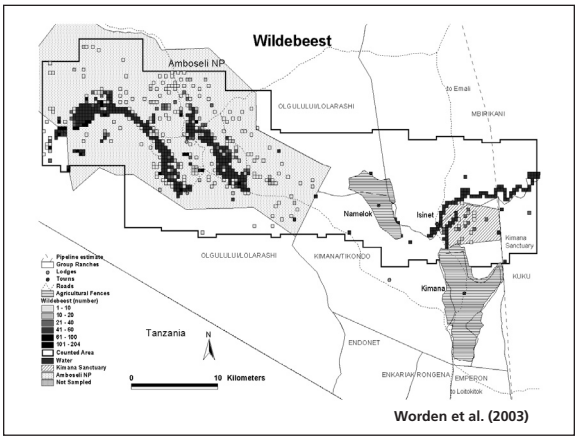
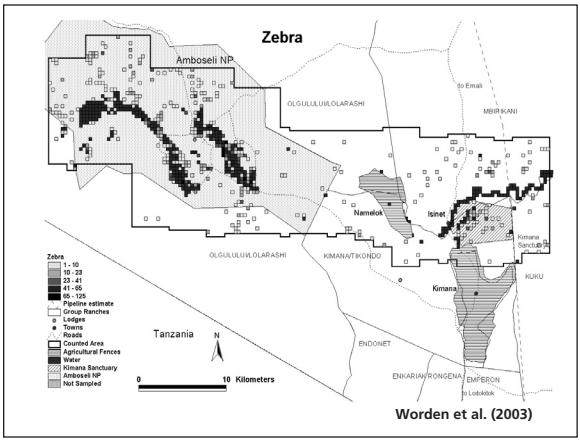
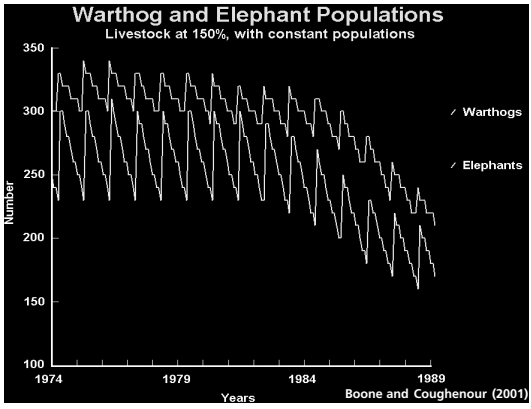


Slide 16.





Slide 17.

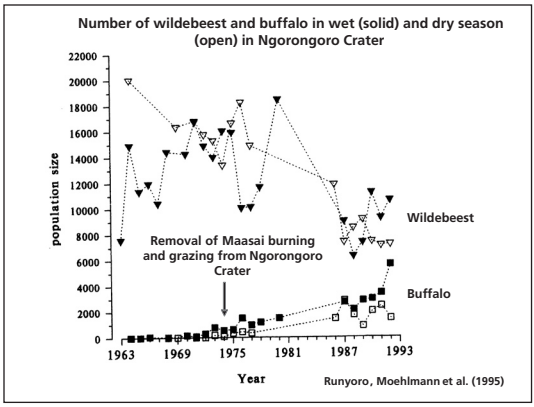
The last thing I'm going to point out about this wildlife loss is from the Amboseli at the base of Kilimanjaro. Slide 9 is an aerial photograph of the Amboseli swamps, a key resource for people and wildlife—or at least they used to be. At present, they are inside Amboseli National Park [slide 10]. In some of our research, we are asking what happens when this kind of swamp turns into this kind of cultivated area. Slide 11 is a satellite image showing what those swamps looked like in 1974. Slide 12 shows the same area in 1984; you can see a dramatic increase in cultivation in the swamps, and also the expansion of rain-fed cultivation along the edge of Kilimanjaro. More recently, that cultivation has solidified, and a lot of those areas have been fenced [slide 13].

Slide 14 shows the distribution of bomas, or settlements, around the swamps. Some bomas look like they're in Amboseli, and there is a high concentration around the swamps outside the park. Slide 15 shows wildebeest distribution; there's a very strong impact of cultivation in the swamps, although not a complete exclusion of wildebeest. Slide 16 shows zebra, which seem to be somewhat less affected, but still very strongly affected, by this conversion of land to cultivation.

Slide 17 shows the results of some work done by Randy Boone and Mike Coughenour in Ngorongoro, looking at what happens to different wildlife populations as you increase livestock populations. This is a back-casted simulation using the savanna model that Mike Coughenour developed, looking at what would happen to warthog and elephant populations if the livestock population were increased by about 50%. At the start of the simulation, the livestock populations go up, but we don't actually see the effects on the wildlife until quite a bit later. I think it's really important to remember that we have huge time lags in these systems. It's maybe 10 years before we really start to see a perceptible decrease.

Are there any synergies? Pastoral people do four types of things to landscapes that are important to account for as we exclude people from parks, and also as we think about the land around parks. In East Africa, the existence of pastoralism prevents less sustainable uses, or less wildlife-compatible uses of landscapes. That's a backhanded way of saying that wildlife is conserved

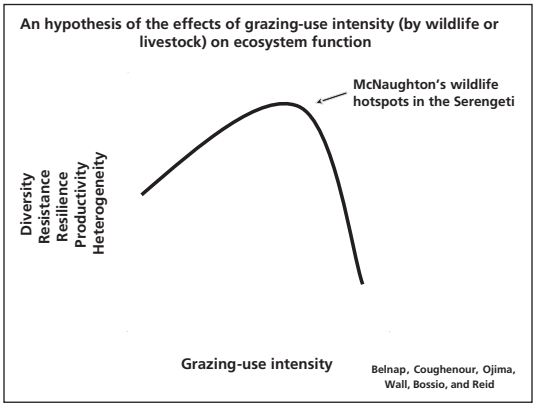
on pastoral lands. There's not much evidence about pastoral burning practices and the patterns that they bring to the landscape, but I think fire is actually a very important factor that can be replaced in protected areas by burning in other ways. A lot of work has been done in the Serengeti about wildlife improving the nutrient flows and improving the nutrient cycling in some of these systems. Our hypothesis is that livestock do that, too. Finally, settlement does two things: creates long-lasting nutrient hotspots, and protects grazing ungulates from predators around pastoral settlements.



Slide 18.

Can people diversify by burning? In Australia, aboriginal peoples do some very complicated burning in small patches. They do it in the cool season, and when scientists have compared the diversity of plants and wildlife and other factors between aboriginal lands and nearby national parks, they've found that there are just as many species of wildlife and plants, and very few invasive species on aboriginal lands. There's certainly evidence in North America of the diversification of landscapes by Native American burning practices.

Slide 18 shows what has happened to the wildebeest and buffalo populations in Ngorongoro crater in northern Tanzania between the 1970s and the present. The wildebeest populations have tracked downward, and the buffalo populations have tracked upward. The Maasai used to live in the crater. In their research, Victor Runyoro, Patricia Moehlmann, and colleagues hypothesized that since the Maasai were excluded in 1974, the lack of burning has caused the grasses to become less nutrient-rich, and so it has attracted more buffalo and become less attractive to wildebeest.



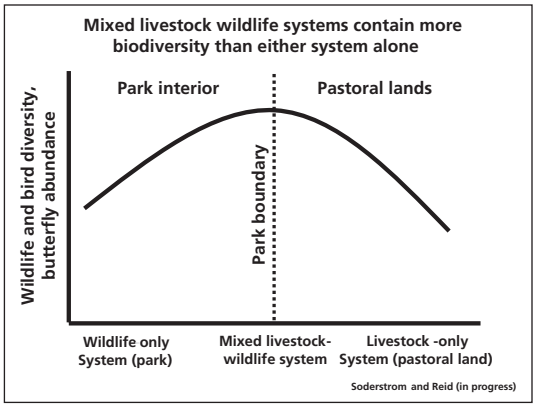
Slide 19.

Slide 19 is a model we're developing in relation to a whole range of

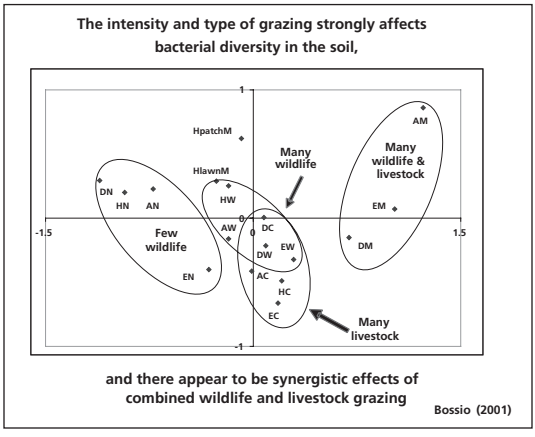
diversity from microbes to elephants. We have pretty good evidence from Sam McNaughton's work in the Serengeti that there's a peak of diversity and abundance of wildlife on hotspots that are heavily grazed. There's a whole range of things going on at these spots; we think they contribute to resistance and resilience, and also to landscape heterogeneity. There is evidence that leads us to believe that this is a reasonable hypothesis.

Slide 20 shows the results of some work we're doing in the Mara, looking at what happens to different aspects of biodiversity as we go from inside parks (the wildlife-only system on the left side) to areas where wildlife and livestock mix at the edge of park boundaries, and then finally to areas that are livestock-only. We've found that there is a higher density of wildlife, a higher diversity of wildlife, and a higher diversity of birds in areas where wildlife and livestock mix, and the abundance of butterflies is higher.

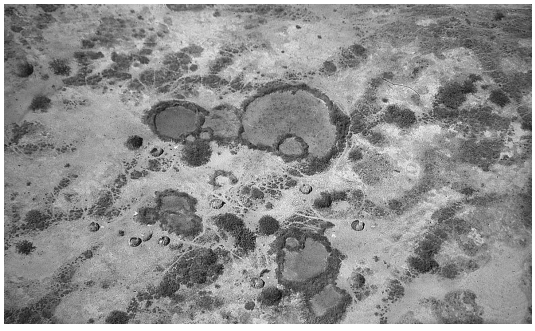
Another thing that we're looking at is microbial diversity. Slide 21 shows some nice work by



Slide 20.

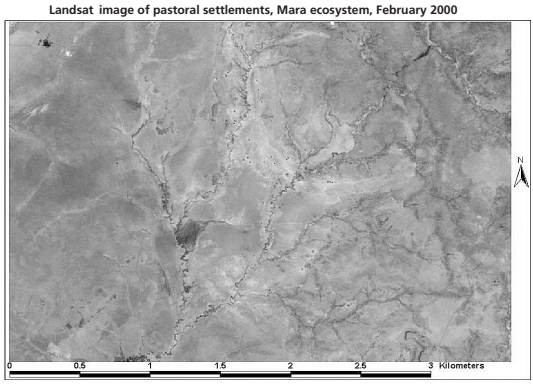


Slide 21.



Slide 22.

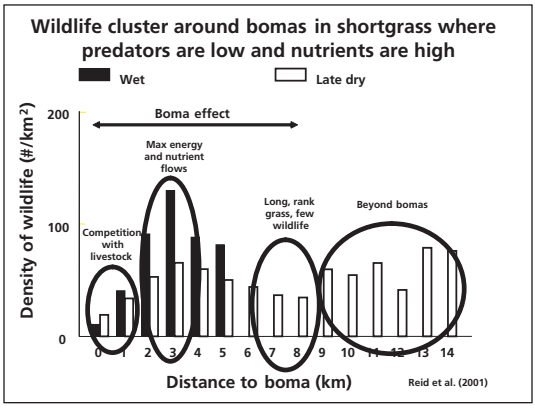
Deborah Bossio. On the left side of this graph, the microbial communities are really different where we don't really have any grazing at all, where few wildlife are. On the right side, we have these mixed, wildlife–livestock systems. They're also very different in diversity. There are areas in the middle that aren't actually very different from each other. These are the areas where we have lots of wildlife or we have lots of livestock. We're kind of puzzled by this, but we have some good evidence from the soil that there's something going on here in these different systems.



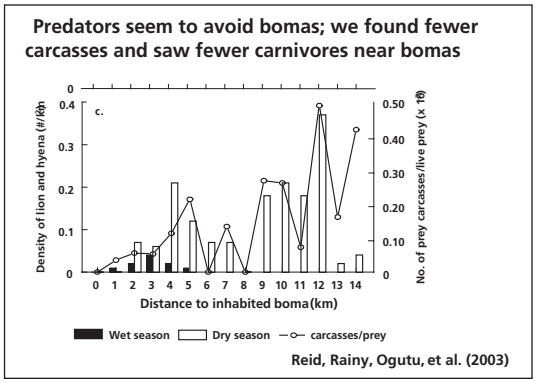
Slide 23.

What happens when pastoral people settle in these landscapes? Slide 22 shows an aerial photograph of a pastoral settlement in northern Kenya. These are enclosures that people build to keep their livestock safe from predators at night. They cut branches from acacia trees and pile them up. These folks live in these settlements up in northern Kenya, often for as little as a month. In the wetter areas of southern Kenya and northern Tanzania, they might live in them for three to five years. In southern Kenya, I've often seen settlements that, when people move away from them, have a pile of dung that's taller than I am—I mean, just a huge pile of dung in the middle of these settlements. That's kind of unusual, but this is a real piling of nutrients in one spot over time.

Slide 23 is a satellite image of the pastoral settlements of the Mara ecosystem. All the little dots that sort of look like measles on this landscape are pastoral settlements. The center point is where the dung is, and then there are impact rings of grazing around the settlements. These are settlements that people currently live in. So we started asking the question, "well, what the heck is happening to wildlife around these settlements?" We



Slide 24.



Slide 25.

expected to see negative impacts of settlements on wildlife; that was our starting hypothesis. But what we found really surprised us. In slide 24, the x-axis shows the distance to the nearest boma (settlement) in kilometers; the y-axis shows the density of wildlife. Close to these settlements, we're seeing areas where we think there's competition with livestock for forage—there's really not so much to eat, and so the wildlife don't want to hang out next to these settlements. Then, there's an area where wildlife are actually most abundant on the landscape in both the wet and the dry seasons, 2–3 km from a settlement. We think these are places where these grazing lawns, or hotspots, are set up by livestock and wildlife together, and where the grass is an intermediate biomass, and so this is where wildlife are clustering. We have areas some distance from settlements where the grass is very tall. A lot of the small and medium grazers don't want to be in the tall grass. Finally, we have these parts of the landscapes that are far from the settlements that we don't think have anything to do with it.

The other piece of information that we collected is shown in slide 25. What we see here is that predators basically want to be away from people, and that's probably no surprise to people that live here. People are scaring away the predators. The basic message of slide 26 is that if you compare the areas inside the protected area with the areas outside it, you find that there are species that want to be around people and species that don't. The big things, like elephants and carnivores, don't want to be around people, and the medium-to-small things do want to be around people, prefer to be around people. Then there's a whole suite of species that actually seem not to be affected by the presence of pastoral people.

Why are wildlife clustering around pastoral settlements? We've got four hypotheses, and we think all of them are right. First, there's been some nice work by John Fryxell and Tony Sinclair looking at intermediate biomass areas, and by Sam McNaughton and his hotspots, basically getting across the idea that there are places that have been grazed that wildlife really like to cluster in. That's where they are most productive, and that's also where nutrients are the highest. Second is the predator protection hypothesis—the idea that people are chasing away predators, and so wildlife want to be around settlements.

Some species of wildlife are more abundant in parks, others are more abundant in pastoral lands

More livestock, dik-diks, giraffe, impala, topi, Thomson's, Grant's, and vervets on the pastoral ranch

More buffalo, crocodile, eland, elephant, hippo, hyena, hartebeest, lion, ostrich, wildebeest, zebra, reedbuck, vultures and warthogs in the Mara reserve

Species	1999	2002
Dik-dik	Ranch	Ranch
Giraffe	Ranch	Ranch
Impala	Ranch	Ranch
Vervet	Ranch	Ranch
Cattle	Ranch	Ranch
Donkey	Ranch	Ranch
Shoat	Ranch	Ranch
Buffalo	Reserve	Reserve
Crocodile	Reserve	Reserve
Eland	Reserve	Reserve
Elephant	Reserve	Reserve
Hippo	Reserve	Reserve
Hyena, Spotted	Reserve	Reserve
Hartebeest	Reserve	Reserve
Lion	Reserve	Reserve
Ostrich	Reserve	Reserve
Reedbuck	Reserve	Reserve
Topi	Reserve	Ranch
Vulture	Reserve	Reserve
Warthog	Reserve	Reserve
Mongoose	Reserve	Same
Baboon	Same	Same
Bat-eared Fox	Same	Same
Bushbuck	Same	Same
Cheetah	Same	Same
Duiker	Same	Same
Grant's Gazelle	Same	Ranch
Jackal	Same	Same
Leopard	Same	Same
Rhino	Same	Same
Thompson's Gazelle	Same	Ranch
Tortoise	Same	Same
Waterbuck	Same	Same
Wildebeest	Same	Reserve
Zebra	Same	Reserve
Honey Badger	Same	Same
Hare	Same	Ranch

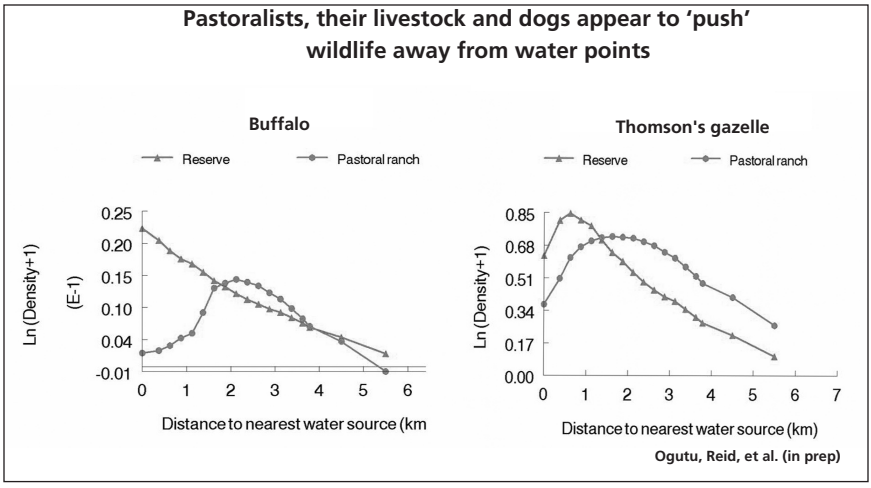
Same number of mongoose, baboon, fox, bushbuck, cheetah, duiker, jackal, leopard, rhino, tortoise, waterbuck, honey badger, hare – but most of these species are rare, so no conclusions can be made

Reid, Rainy, Ogutu, et al. (2003)

Slide 26.

In fact, what we're finding now, as we do a night study looking at predators around settlements, is that wildlife are coming very, very close to these settlements at night to be around people. The "best places" hypothesis is one of my favorites—in other words, people live in the best places, and wildlife want to be there, too. That's very possible. Finally, there's the old boma, or "old settlement" hypothesis: all the new settlements are near older settlements that have been abandoned, and so these are nutrient hotspots, and the wildlife come in and graze on those at night, particularly hippos and elephants; I've also heard the Maasai talk about impala coming in at night. I think that probably all of these are right. We're doing some experimental work right now to try and sort that out.

We're also doing some work on looking at the relationship of wildlife to water [slide 27], which shows that buffalo in the reserve would prefer to hang out near water, but when they're outside the reserve and people are also using the water with their livestock, they're being pushed away from water a bit. There's a similar sort of effect for Thomson's gazelle; they don't want to be right next to water in the reserve, but they do cluster near water. Outside the



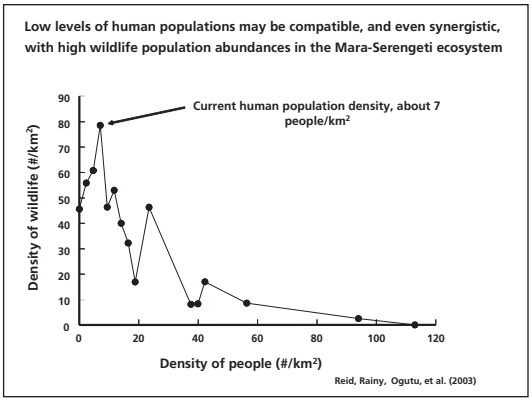
Slide 27.

reserve, the pastoralists are pushing the wildlife a bit away from water. This is a pretty subtle effect but probably very important.

Returning to slide 6, [see slide 28] I want to talk about the left-hand part of the curve. I find it really kind of interesting that when there are no people on a landscape, wildlife density and abundance is lower than when you have some people on this landscape. This is another way of looking at the effect of pastoral settlements on wildlife.

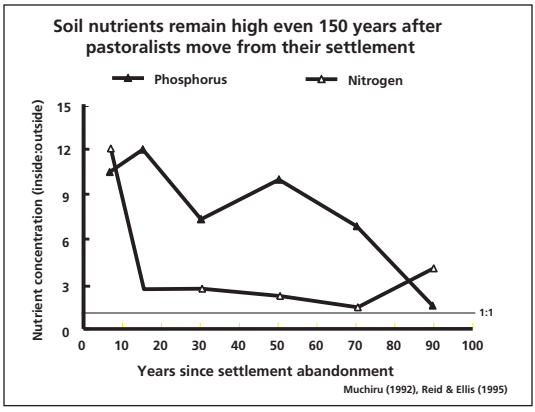
What happens when people move out of settlements and leave behind nutrient hotspots? My team in northern Kenya sifted goat dung from a settlement, pulling the acacia seeds from it. People feed the seeds of acacia trees to their goats and some calves, and they end up in the corrals at night, and trees come up in the corrals. We've found that in a normal year, about 50% of the trees on the landscape may grow up inside old pastoral settlements. In dry years, almost all the trees in the landscape are regenerating in the corrals, so there's an important vegetation effect of pastoral settlement.

Another thing that's going on is that in settlements where people stay quite a long time, maybe 30 years, we find grassy areas along with some



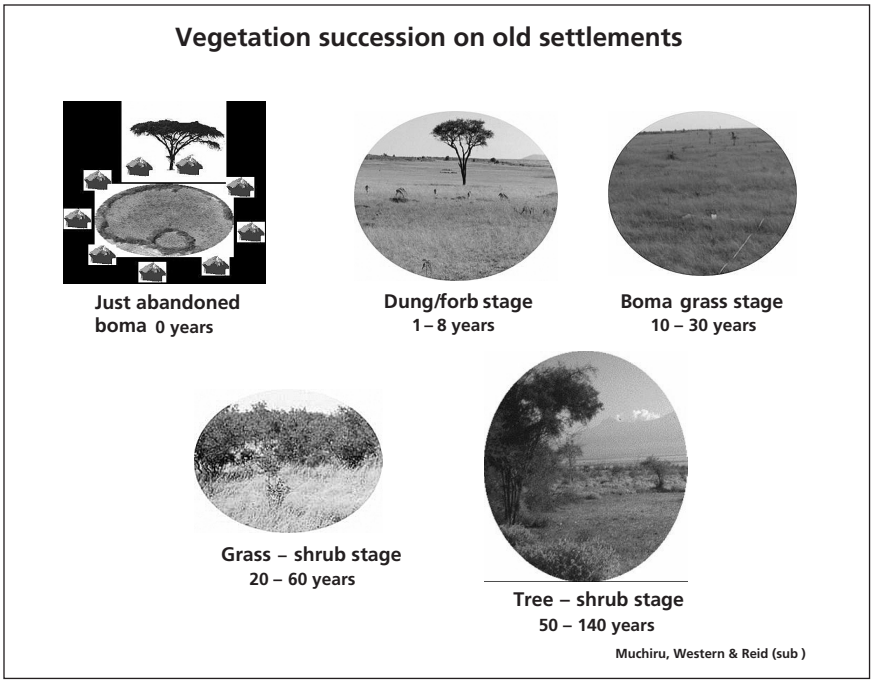
Slide 28.

low shrubs and trees. The grasses grow on top of the settlement, and the shrubs beyond it. And so the settlement areas, we're finding, are more productive. They have more nutrients, and I would probably guess that they're also improving the nutrition of the wildlife and the livestock, but we don't have any evidence of that.



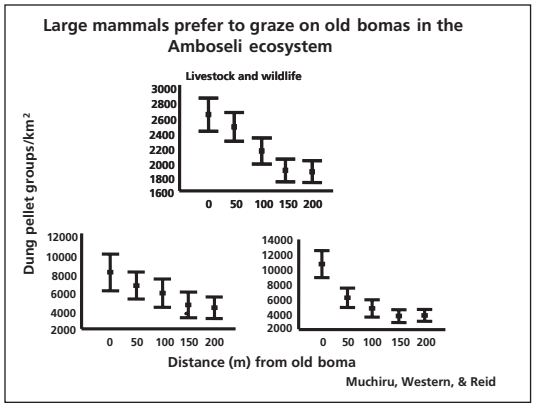
Slide 29.

Slide 29 shows the nutrients and nutrient signal over time; the y-axis is the number of years since the settlement was abandoned. The graphic that goes down very quickly is what happens to nitrogen over time as these areas are abandoned. The more gradually-sloping line is phosphorous. We're finding, again, that there are differences in different nutrients, particularly that the nutrient signal is lasting on the landscape for a century, or maybe a century and a half, and maybe even



Slide 30.

longer in these settlements, so they are nutrient-rich areas for a very, very long time.

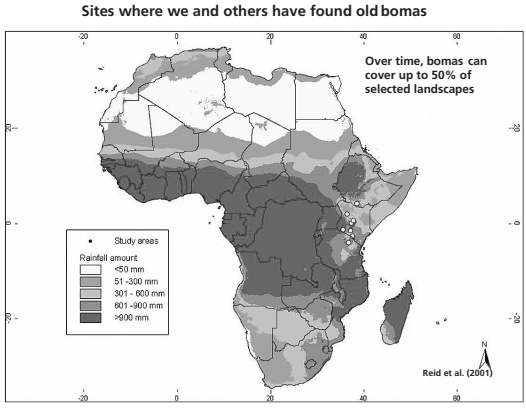


Slide 31.

Slide 30 is a bit of a cartoon showing the vegetation succession on old settlements—from being a bare area to an area with herbaceous plants and then, after about 30 years, a boma grass or grassy landscape, and then shrubs and trees come in. You will see this kind of succession going on in any landscape, but at different times; people have abandoned different parts of the landscapes at different times, adding significant diversity to the vegetation in these landscapes.

Large mammals and livestock prefer to graze on old settlements. The x-axis in slide 31 is the distance to the nearest settlement. The wildlife, depending on the species, might be twice as abundant on top of these settlements, or sometimes three times as abundant, so they're really preferring these spots. They're also doing a lot of observing the landscape; some of these old settlements may create some predator advantage by opening up vegetation for the ungulates. Slide 32 is a map of Africa showing the places that different researchers have found old settlements, to give an idea of how important they are.

So what does all this say about excluding people from parks? Is this a hare-brained idea in East Africa, or are we doing the right thing? Well, culture matters. I think it's no coincidence that most of the wildlife-rich areas of East Africa happen to be in pastoral areas. I don't think that is just an accident; I think it's about the way people have used the land, and their cultural practices. There's a rule within the Maasai culture not to harm harmless animals—not to



Slide 32.

kill harmless animals like giraffe and eland and things like that, and also to use the wildlife products from dead animals. There is regulation of where cattle go, so that they don't overuse different parts of the landscape. That's true in some cases and not in others. Around settlements I've seen some pretty heavy use, but there is a good potential that they're adding diversity to these landscapes by their diverse cattle grazing practices. Then there's the clustering of settlements—people clustering in a certain area and leaving different parts of the landscapes open. Our information would bear out that that's a really important part of the conservation of wildlife in these systems. And I think that the pastoral burning practices are probably important, but I haven't seen the work that talks about that in East Africa.

So what does the information we've collected from a scientific perspective say about these cultural practices? First, we have some evidence that would lead us to believe that livestock can create these hotspots, or grazing lawns, that wildlife are attracted to. However, they also compete with wildlife for forage. Second, this practice of leaving behind old settlements can create the nucleus for development of these long-term hotspots that wildlife cluster around. Now, obviously, that's not happening in Jackson, [Wyoming,] and it's not happening in Yellowstone, so that's not the only way these things can be set up. But it certainly is an important one. Third, our information is just beginning to show that occupied settlements may have an important role in these landscapes for some species of ungulates, attracting them and protecting them, potentially being safer places on the landscape. But we need to remember that in this ecosystem and a number of others, we've seen very strong loss of wildlife. So we've got two things going on. In some of the systems we're working in, the Maasai did not cause this loss, and they also did. The causes of this loss of wildlife for which the Maasai are not responsible include a series of droughts that have exacerbated some of the things going on. I don't think that we can say the Maasai are responsible for that, although they may say they are; I don't know. The poaching does seem to be mostly carried out by people that are not pastoral people, although I have a little skepticism about some of that. But the Maasai are responsible for leasing their land for commercial cultivation; I think they have to take credit for that. And they also are responsible for the expansion of some of the villages in the area, and so there's sort of this tension going on.

So should we let people back in parks, you know, just open up the doors in East Africa and bring the pastoralists back in? Well, I think the colonial and African governments inadvertently created new ecosystems in East Africa by excluding people. People had been there for a heck of a long time, and so we've created these new ecosystems, and we're trying to substitute some of the things that people do to landscapes, like burning, those kinds of things, but it's still very different. I mean, all of you here in Yellowstone know exactly

what happens when you bring in something new. You bring in your wolves. Well, imagine excluding something that is doing more to a landscape than the wolf from the ecosystem, and how that affects the ecosystem. These are, in a sense, new ecosystems in a certain time scale. And we can guess, we don't know, that this removal of people from these landscapes may have taken nutrient-rich grasslands and turned them into more nutrient-poor grasslands, may have or did alter fire burning regimes, certainly removed the nucleus of these old settlements that can generate hotspots, and probably impoverished savannas in some sense through cascading effects through the food webs as you're seeing with wolves here in Yellowstone. Probably, but maybe not, but at least they're different. I think we can probably agree on that. But there's a very big "but" in this, and that is that the modern pressures on societies, on all peoples in East Africa, including the Maasai, are pushing them, and they're accepting to be pushed, to adopt practices that are highly incompatible with wildlife—in other words, taking up cultivation for the first time. That's highly incompatible with wildlife. Leasing land to commercial interests, that also can be highly incompatible, along with settling and heavily developing villages and settlements where people stay for long periods of time. So it's neither a good or a bad story, it's just a story.

So what is the way forward? I would say we should keep the parks without people, and the Maasai should be given the credit for giving this gift to their nations, and to the people of the world. Even though this may be a new experiment, because of modern economic pressures, we really need these parks for wildlife. On the other hand, I think that folks with a long history of indigenous knowledge of how to manage these landscapes sure as heck ought to be more involved in the management of both the parks and the areas outside the parks—but particularly the parks. And I think that culture does matter, and there are people who do have more experience in this than others, and I would say that's very important. I think that we need to be much more careful about helping Maasai have access to the incentives that will allow them to benefit from and conserve wildlife on landscapes outside reserves.

The last thing I'm going to say is about these incentives outside reserves. Given all the things we're seeing in the world with globalization, with climate change, with extreme weather events, it may be that Maasai outside reserves, sitting in these areas that conservationists would call buffer zones, actually may end up saving this great wildlife heritage, because they are in the position to conserve the wildlife that will, when we have these extreme events, re-colonize some of these reserves, providing us a real future. I think that we really need to support their efforts to do so.

Play, place, and safety in images of Yellowstone and other national parks

Bruce A. Richardson

Abstract

Safety is a practical policy issue with legal ramifications in national parks. It may be inherent in the original national park idea that valued sublime and therefore inherently dangerous landscapes. Tourists, of course, accept safety, but were and are attracted to the danger. This paper addresses the tension between creating an ordered, secure space out of a dynamic, inherently dangerous, and chaotic landscape and also allowing the visitor some room to feel free and to play freely—to feel some wildness within. This tension can be seen in images and maps that depict the Upper Geyser Basin and Mammoth Hot Springs. These images teach a way of experiencing the space in an orderly way while feeling some element of choice and exploration. The fort at Mammoth is a reminder that Yellowstone was originally a kind of imperial outpost for the United States and a collection of nationally significant images that warranted military protection. The paper concludes by discussing Yellowstone as a national commodity as well as images of the energy and desire for order and control that made it a symbolic stand-in for the United States. A short section on Kenyan National Parks suggests how this sort of analysis would apply to them.

Recently, it's been an exciting time in Yellowstone, or rather in the virtual Yellowstone that lives in the very real world of television, newspapers, and websites. There's the big bulge under Yellowstone Lake, the seething ground and closure of the Norris Back Basin, another set of large fires, and a report that Yellowstone is exceedingly vulnerable to human crime. We might also remember the bear attack that made its way all to the David Letterman show and the ongoing legal saga of the hotel employees burned in a hot spring near Pocket Basin.

All this might just make a visitor pretty jumpy. One was my fiancé's sister Janet. As a wedding present, we gave Janet and her husband Bob their first trip to Yellowstone. The fires were a concern for them, but the bulge in the Lake had stimulated Janet's interest in the big caldera and what it might do. "What did you think of standing at the brink of the Falls," I asked her. "That this might be my last moment on earth" replied Janet, a generally cool-headed Seattle lawyer.

My brother-in-law Jim, from Texas, was even more concerned when he found a website issuing an early stage alert for a large-scale Yellowstone eruption. Under the headline "It is time to cast a worried eye toward Yellowstone," Larry Park and Marshall Masters predict that one recent earthquake is evi-

dence for a cataclysmic eruption and the attendant destruction of most of the western United States. The site does admit that "Larry Park's theories [about volcanism] are on the outside of conventional science," but that does not stop the panicky author from providing page after page of lurid images, maps, and predictions. My brother-in-law, a computer engineer, was worried that Yellowstone might blow up before his kids had seen it.

He might have been more concerned had he read the new novel, *Yellowstone Farewell,* by Wayne and Judy Sutherland. This page-turner packs in plenty of geological information, wacko environmentalists, myopic government bureaucrats, annoying feminists, sensationalizing news people, a love story, and a very big boom. The hero, a geologist from [Wyoming's] Casper College, predicts a large eruption in Yellowstone, but in the manner of these sorts of novels and films, the bureaucrats, environmentalists, and other dismiss his concerns. As a reward, most of them are obliterated in the explosive conclusion. The hero witnesses a giant pyroclastic flow from Yellowstone race across the Bighorn Basin. In scenes like those in the film *Dante's Peak,* he drives down the Bighorn Mountains through the volcanic muck and back to the relative safety of Casper and the prospect of starting a new life with the novel's one good journalist, a comely reporter from the Casper TV station who really just wants to be a good wife and mother and keep the humanity going after this very big bang.

Radical environmentalists are also the enemies in Kyle Hannon's *The Yellowstone Faithful.* The worst of them uses attacks on humans by a horror-film scaled grizzly bear to argue that Yellowstone should be off limits to people. The hero, ranger Dusty Steward, a lover of Yellowstone and a passionate defender of access to it, gets mixed up in a complex political fight to keep the gates open.

This energetic book has a lot of emotion, and much of it, interestingly, is about the possibility that fewer people will visit Yellowstone and get to experience the magic it has and the lessons it teaches. That, of course, does not seem to be a problem. In fact, the awareness of some danger may be part of the appeal of the place. Tourists have had a long interest in erupting volcanoes, dangerous mega-predators, terrifying heights, mighty waters, and the like. The Imax film for Yellowstone gets much of its energy from a bear that might be cast in the film version of *The Yellowstone Faithful.* The Imax begins and ends with the beast, whose concluding roar elicited a few screams from the audience with whom I saw it.

The quest for thrills has an interesting history and a lively present with the rise of extreme sports and adventure tourism. One might have expected Jon Krakauer's *Into Thin Air,* a vivid account of the horrors of a climb of Mount Everest, to have discouraged amateur climbers from going to the mountain, but in fact, their numbers have swelled. I have been enjoying and marveling

at *Adventure* magazine, published by the National Geographic Society and aimed at nature-loving thrill seekers. In one issue, Robert Young Pelton writes about being kidnapped by guerrillas during a hike through adjoining national parks in Panama and Columbia. Astonishingly, one of the people who signed on for Pelton's expedition was hoping for such an adventure, something like what happened to Kathleen Turner in the film *Romancing the Stone*.

Tourists from Radersburg, Montana, did not set out to be captured by Nez Perce Indians during their 1877 tour of Yellowstone, but when they were, that became the central part of the trip. Mrs. George Cowan describes the experience not as a nightmare, but a sort of exciting and sometimes amusing adventure, despite the fact that her husband was shot in the head and left for dead. Laughter and survival are, of course, antidotes to fear.

In fact, it may be argued that a common element of early writings about Yellowstone was danger. Calvin Clawson's recently reprinted newspaper articles describing a tour in 1871 is a sort of anthology of terrors. Clawson vividly describes a bear attack, fear of Indians, nervousness about geysers, supposed ghosts on Yellowstone Lake, and an unnerving earthquake. In some ways, Clawson is an ideal tourist; he's very careful. It's as if he had memorized Lee Whittesley's *Death in Yellowstone* and sees potential disaster everywhere. If there had been boardwalks, Clawson would have stayed on them.

Nonetheless, we might praise Clawson for getting something about Yellowstone right. It is an alluring and unnerving package of wonders and trouble. Why this combination of danger? It's worth pointing out that this is no random accident, some perversity designed to torment the National Park Service, injure visitors and generate lawsuits. Yellowstone was marked off as a pleasuring ground to be preserved for the enjoyment of the people in large part because it was dangerous. We might say the same for Yosemite, Mount Rainier, Grand Canyon, Zion, Glacier, and many others.

The central reason is the aesthetic and cultural attachment to scenery sublime as well as beautiful. The word "sublime" has a long and tangled history and has generated excellent commentaries, so of course what follows is too simple, but it points us in an important direction. In the eighteenth century, the sublime came to be applied to scenery that was huge, jagged, rough, dark, powerful and, most of all, dangerous. Edmund Burke argued that the sublime is a feeling akin to terror evoked by the thought of death and in the presence of death-dealing powers. So lakes are beautiful and powerful waterfalls are sublime, meadows beautiful and mountains sublime. Especially sublime were glaciers and volcanoes. The beautiful, for Burke, is harmonious, peaceful, sensual, orderly, and connected to love.

Marjorie Hope Nicolson, in *Mountain Gloom and Mountain Glory,* has argued that we can see the developing preference for the sublime in a shift in European attitudes toward mountains. From being treated as disgusting piles

of chaotic rubble, mountains became glorious emblems of power and divinity. Nicolson's approach is quite literary, but her subject has been expanded this year by Robert MacFarlane in *Mountains of the Mind: How Desolate and Forbidding Heights Were Transformed into Experiences of Indomitable Spirit*. MacFarlane has plenty of literary examples, but makes use of his own experience as a mountain climber and that of other mountaineers in an attempt to answer the "why climb it" question in more detail than was provided by George Mallory.

Such studies begin to tell us why Kansas got passed over early on for national parks and why so few pieces of original prairie have been preserved. I remember asking my late father why not have more national parks on flat lands as we drove through the middle of Wyoming. "Well," he said "this place would be named 'Boring National Park.'" Sublime landscapes just seem naturally more interesting. This would have surprised Daniel Defoe, whose *Tour of Britain* in 1720 praises flat, useful lands near water and dismisses the mountains of the English Lake District as an abominable wasteland. Today, a residue of Defoe's sort of thinking can be found here and there, but has generally been replaced by a rage for mountains. A casual survey of car ads with vehicles climbing mountains or posing in front of them gives us a commodified sublime and return to usefulness to these big masses of rock.

Sublime landscapes that became national parks were sometimes mountainous, but also included canyons, waterfall, glaciers, rivers, and other emblems of power. Yellowstone was a mountainous region, but the main objects of interest were the geysers, hot springs, and Grand Canyon. Though described as carnival oddities by some, many were pulled to the sublime qualities. Langford's account of Yellowstone is almost a glossary of the sublime. His account of their first encounter with the canyon stresses terror:

> The immense cañon or gorge of rocks through which the river descends, perhaps more than the falls, is calculated to fill the observer with feeling of mingled awe and terror…At all points where we approached the edge of the canon the river was descending with fearful momentum through it, and the rapids and foam from the dizzy summit of the rock overhanging the lower fall…were so terrible to behold that none of our company could venture the experiment in any other manner than by lying prone upon the rock, to gaze into its awful depths…the stillness is horrible and the solemn grandeur of the scene surpasses conception. You feel the absence of sound—the oppression of absolute silence (Langford 1972, 30–31).

In his 1785 tour of Yellowstone, John Muir found both the canyon and

the geysers terrifying. Camping in the Upper Geyser Basin, he sleeps badly because of the frightening sounds, especially an eruption of nearby Castle Geyser:

> The ground sounds hollow underfoot, and the awful subterranean thunder shakes one's mind as the ground is shaken, especially at night in the pale moonlight, or when the sky is overcast with storm-clouds. In the solemn gloom, the geysers, dimly visible, look like monstrous dancing ghosts, and their wild songs and the earthquake thunder replying to the storms overhead seem doubly terrible, as if divine government were at an end (Muir 1979, 45).

I have written elsewhere that Yellowstone's volcanism distressed Muir because it seemed more compatible with catastrophic theories of geology instead of the uniformitarian model of slow change through time which he saw in the glaciers carving Yosemite (Richardson 1990). Muir used "sublime" as a synonym for grand, orderly, and elevated, though in this passage he employs the Burkean language of disorder, obscurity, power, and terror—which is what he found in Yellowstone.

Behind the dangerous features that made Yellowstone sublime is a grander one: the caldera now used by Sutherland's novel and that website to evoke the most sublime thought of all: the end of or actually radical alteration of the earth. In his recent bestseller, ** A Short History of Nearly Everything*, Bill Bryson writes vividly about the Yellowstone caldera and the likely effects of an eruption, and after raising a good level of readerly panic, he ends the discussion with reassurances from [former Yellowstone geologist] Paul Doss: "But the thing is, most of the time bad things happen" (Bryson 2003, 233).

The preservation of animals came later and added a new element to the sublime: the grizzly bear. Parenthetically, one might wonder about the use of active volcanoes such as Yellowstone and Mount Rainier as Noah's arks for endangered animals. A longer paper would consider how the drive for commodification of animals has worked over time and led to shifting hierarchies of creatures in the West. The issue is even more complex, I gather, in East Africa. I am also passing over the difficult topic of how Indians became part of the definition of sublime and how all things defined as "other" by a group can fall into the category of the unknown, powerful, threatening and, therefore, sublime. There is also the question of how national parks fit into the ongoing history and political struggles of the time, as encountered by the hikers in Panama/Columbia and the Radersburg tourists in Yellowstone. Further, one might consider the status of national parks as symbolically powerful images of a nation and possible targets for media-savvy attackers.

A dangerous place calls for many responses. The result is a rich culture

that accommodates danger and provides security. We see this in the development of park roads, trails, hotels, and advertising. It is difficult to create an ordered, secure space in a dynamic, inherently dangerous, and chaotic landscape and allow the visitor the chance to play freely within this space, to feel some wildness within, resulting in tensions within the arrangement of the park and the depictions of it.

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A conservation agenda in an era of poverty

Keynote Address
October 7, 2003

Steven E. Sanderson

Dr. Steven E. Sanderson is President and CEO of the Wildlife Conservation Society (WCS) in New York City. Prior to his appointment in 2001, he was Dean of Emory College, Faculty of Arts and Sciences, at Emory University in Atlanta. He received his Ph.D. in Political Science from Stanford University (1978), with a specialty in Latin America. He has been involved with the organization of scientific cooperation on the environment, through the Social Science Research Council, the International Geosphere–Biosphere Programme, and the NRC Oversight Committee on Restoration of the Greater Everglades Ecosystem. A former Fulbright Scholar, Dr. Sanderson has also held fellowships sponsored by the Rockefeller Foundation, the Woodrow Wilson International Center for Scholars, and the Council on Foreign Relations. In addition to several scholarly books about Latin America, his recent publications are "The Future of Conservation," **Foreign Affairs** (September 2002); and "The Contemporary Experience of Wild Nature and its Importance for Conservation," (June 2003).

It is a delight to be included in the ambitious and important program of this conference, in such a beautiful part of the world. I am not an expert in the specific subjects of this conference, but I do represent an organization that is devoted to the protection of great landscapes such as the Serengeti and Yellowstone systems, as well as the sustenance of the wildlife they support. I also grew up on the western slope of the Rockies in Colorado, and I lived my first 13 years in and around the Gunnison/Crested Butte area and in Montana during the late 1940s to 1960. During that time I experienced the transformation of Crested Butte from a sleepy mining and ranching community to one that boasted a tourist economy, and then ecotourism.

I should also add that the bison restoration in the West was sponsored by the New York Zoological Society, our founding organization, and began at the Bronx Zoo. My office is there, and directly across the great court is the historic Lion House where Theodore Roosevelt and William Hornaday, our founding director, created the American Bison Society to repopulate the American West with Bronx Zoo bison. Incidentally, the bison exhibit at the Bronx Zoo was one of the first naturalistic exhibits in any zoo in the world—a 20-acre prairie in a temperate woodland, which hosted the genetic

bison stock that populated a lot of this country. So, when you see bison in Yellowstone or the Flathead country, you are looking at the descendants of proud New Yorkers.

I am filled with admiration for the principal speakers at this meeting, from whom I have learned so much. Dan Flores, Richard Leakey, Tony Sinclair, and Lee Talbot, as well as others on the program represent the very best in natural history, science, and conservation action. Whatever our individual strengths and weaknesses, our work together in coming years is extremely important to the future of life on Earth.

My message to the conference is partly a pessimistic one. From the standpoint of conservation, which is at the intersection of science and public purpose, the temper of the times is not very good. The public commitment to conservation is a muddled one, and it has real implications for our work together as scientists, scholars, and public servants. In Johannesburg last year at the World Summit on Sustainable Development, the world appeared very publicly to walk away from the commitments it had made at the Earth Summit in Rio in 1992, and which had begun at the pathbreaking summit in Stockholm in 1972. By the end of the Johannesburg Summit, conservation had been almost completely obliterated from the public consciousness of the multilateral system in favor of yet another rendition of sustainable development.

This year, the World Parks Congress in Durban, South Africa, was a troubling and difficult exercise, in which conservation was hardly invoked with pride. The chosen theme, "Benefits Beyond Boundaries," should have reiterated a commitment to extend the impact of protected areas to their surrounds. Instead, the discussion turned into a confused, rambling discussion that focused on the elimination of the hard edges of protected areas, which we have strived to create over decades of time, and which we should be proud to have achieved: 10% of the world's terrestrial surface under some kind of protection. Somehow, credible international conservationists who had worked hard to create those protected areas now positioned themselves more conservatively, to support a much more restricted notion of protected areas that would have "no net negative impact on local peoples"—without so much as a definition of what a "local people" was, much less what "no net negative impact" might mean. Conservationists know well that when there is a publicly contested question of the allocation of natural resources, stakeholders claiming to be local spring up all over the place, with varying degrees of legitimacy. So, for the conservation community to make such arbitrary and unspecified stipulations was disturbing. Additionally, some advocates for indigenous peoples argued—without so much as a word of opposition—that protected areas had been the worst thing ever to have happened to them. The Congress, apparently acquiescing to such categorical statements, conceded

that protected areas had to be justified by economic and social criteria, not conservation or ecological integrity. There was very little mention of the achievements of the conservation community or its historic goals. And, in fact, there was a great deal of homage paid to the rural development community, despite the fact that the broad concepts of development offered in the post-World War II era have failed to prove their sustainability or their value to the truly poor.

These issues have been almost uncontested in the rush to promote poverty alleviation in the new millennium. The United Nations (UN) and the multilateral development community goals for the new millennium barely mention conservation. In fact, in the millennium development goals of the UN and the World Bank, sustainable resources with respect to human development have actually taken the place of conservation. The World Bank's new forestry sector policy has shifted from conservation to human poverty alleviation, after a decade of staying out of financing projects in tropical moist forests because the bank itself (along with its many critics) became concerned with the negative impact such projects might have on the all-too-rapid process of tropical deforestation. The argument for returning to forestry sector loans appears to be that somehow, 10 years later, the world knows enough about achieving sustainable forestry practices throughout the world. The evidence for this claim is missing.

The desire to relieve the world of extreme poverty is a laudable social goal. It is implicitly valuable to human life on Earth, and close to the hearts of those of us who work in developing countries, but also in the American South and West. Poverty is a difficult, degrading human condition that needs attention of the kind that the millennium development goals are paying. And it bears directly on who we are as conservationists. Conservation, like poverty, is a cultural concept, and our culture is concerned with human social progress. As the eminent conservationist Richard Leakey has said in his writing, he is not sure he would be so conservation-minded if he were hungry and cold.

However, something or some force in the global community has led the world to believe that conservation of protected areas should be responsible for bearing a great deal of the burden of economic development and local poverty alleviation in the world. How we came to that is a matter of great mystery, especially since the economic growth and development of much of the world has led to a protected areas system that is a tiny fraction of the terrestrial biosphere. The remainder, for better or worse, has been open to development and has been rapidly transformed in the last century, with increasing speed in the post-World War II period. Now, in Equatorial Africa and South and Southeast Asia, where much of the world's rural poverty is concentrated, plans for poverty alleviation depend on increasing agricultural productivity in existing land, using more energy and water, and intensifying livestock husbandry in

fragile lands.

The goals of hunger alleviation require that such improvements must accrue to local peoples, as well, but the history of agricultural productivity and the Green revolution during the post-World War II era do not inspire confidence. After all, in 2003, 75% of the world's poorest populations [were] in the countryside after 50 years of agricultural development. Even in the Greater Yellowstone Area, we can find evidence of local peoples being crowded out or hurt by what appear on the surface to be good ideas for development.

I believe this process around the world is the product of shortsighted economic development ideas, a continuing emphasis on sectoral economics in the face of decades of environmental failure, and a reading of past and future that is more convenient than true. In the American West, much of the so-called local protest against environmental restrictions actually is a stalking horse for large-scale energy, mining, agricultural, and more recently, tourist endeavors that often displace people to less attractive areas where they now staff the service sector for the rich interloper. The issues are posed as local, but they are often national (in the case of energy) or global and corporate, in the case of subsidies or mineral permits.

In any case, wild nature in our time has been converted into a contested area that is debated, not in terms of nature itself, but purely in terms of economic potential. It is my hope that our work together in the future will be controversial in the best sense, pushing flaccid and poorly-argued concepts out of the way in favor of sharper ideas, good science, and plans for conservation. And the first way to do that is to ask how all this happened, and how current forces are arrayed, so that we assess how we act most appropriately. When one looks at the history of any natural system that is human-impacted—and that certainly applies to the focus of this conference—one has to grant a big swath of ground to politically-infused memory. History as we know it is quite often the political use of facts or phenomena in the past to create myths and opportunities for the future.

In the case of natural resource systems, quite often there is a direct political use of natural phenomena, so that a flood on the Mississippi River produces greater effort to engineer flood control. Likewise, in the aftermath of the degradation of the Everglades, the federal government and the State of Florida are investing billions of dollars to recreate the Everglades, restore it, and re-engineer it, and, in fact, re-plumb it. Whether in the Everglades or the Mississippi, history becomes the reinvention of failure as success.

Similarly, in the international community, rural development and human poverty alleviation are reinvented failures now parading as successes. The ostensibly new tools, mechanisms, and models for rural development in the world today go back to the 1940s and 1950s. The only thing that is missing is the intellectual leadership of the post-war economic development theorists,

who really led the way to a new way of looking at human progress. Missing also is a serious self-conscious critique of the failures of rural development in our time. River basin development of the kind now in play in the Mekong River Basin is, in fact, similar to projects from the 1960s and 1970s that were emblems of environmental disaster. Integrated rural development projects, increased inputs, credit availability, and agricultural intensification, the integration of agriculture into commercial markets and livestock production—these are all old, old ideas, dogged by as much failure as success. The community-based development ideas bandied about today are not much different than those in practice in Vietnam under the French.

Turning to the landscapes under consideration in this meeting, wilderness and preservation in Yellowstone and Serengeti were invented concepts, invented for specific political purposes. In both places, wilderness and preservation were concepts that did not take into account aboriginal presence. And so they have been, as we have learned over the last hundred years, demonstrably false as explanations of the natural systems of the Rocky Mountain West and East Africa. There has also been a reinvention of the explanation for our current condition, in which the extirpation of wildlife in wild systems has been blamed on the poor. Maurice Hornocker will tell you that cougars were shot out of the American Southwest by 1925, and it was not by the poor.

But the conversation today in the global community insists that poverty leads to degradation and species extinction. Conservation, as the argument goes, stands in the way of economic development and so must be pushed aside in favor of sustainability. Conservation has been reinvented not as a promise for the future, but an obstacle to economic success, and so instead of building on the 10% of global lands under some kind of protection, they and their protectors are indicted for keeping people out and keeping people poor. And in landscapes like Yellowstone or Serengeti, or the Mekong or Congo Basins, there is proposed what Dan Flores has referred to as a leap from extractivism to ecotourism without the intervening steps. So that in the Congo Basin, one of the most demanding and difficult deliverables that the conservation community is charged with over the next dozen years is to transform what is essentially a logging economy into an ecotourist economy in which there will be no disadvantage to the tropical forested countries of the Congo Basin and, in fact, there will be a clean sustainable future based on European, American, and South African tourism.

The conservation community may welcome the opportunity to make this historic shift, but it requires a standard never demanded of other, less conservation-minded economic agents. To go from logging directly to ecotourism is extremely difficult, just as it was extremely difficult in Crested Butte, Colorado, to go from coal mining to ecotourism without asking about the income gap or the dislocation of local peoples. I can promise you, you cannot

find many of the people who lived in Crested Butte when I was born living there today, and I don't mean just that they've all died. Their families are not there. And it was because of the income gap. Likewise, the residents of Aspen today are not those of past generations. To the extent they remain, they are dotted along the valley road to Glenwood Springs. And so on.

There is not a given socio-economic benefit to changing an economy from an extractive base to an ecotourist base. The potential conservation benefit is much clearer. If conservation actually does have to do with human landscapes as well as natural landscapes, someone has to develop viable, realistic human benefits from the economic changes being proposed. And it must be done "on the run," as an ersatz model of economic development with putative ecotourism carving up the landscape.

It is worth noting, too, that conservation has become derivative of human use because the public agencies charged with conservation are also charged with satisfying the public. Nowhere in this world is it harder to satisfy the public than in the United States. The public agencies charged with protecting national forests, public lands—the Forest Service, the Park Service, Bureau of Land Management, all of the public agencies—have to respond to what people want, as expressed through organized civil society and the political process. So, conservation goals become derivative of human use practices. Perhaps no better case exists than the ongoing controversy over winter use rules for snowmobiles in Yellowstone. Twenty years ago it was not an issue; but now, more than 100,000 people use Yellowstone Park in the winter every year. The impact of that use is a fundamental issue for Yellowstone and for the National Park Service.

Similarly, in the early 1990s a survey was conducted of visitors to Yellowstone. People asked to rank what they liked about Yellowstone mentioned most often walking outside, going to the visitor center, and shopping. One imagines that in 1872, there must have been something else on people's minds when Yellowstone was created. While one might approve or disapprove of the hierarchy of consumer demand, national parks cannot be divorced from public satisfaction. That fact is etched on the Roosevelt Arch. The Park Service is not charged with telling the American people what they should insist upon in the parks. But the consumer is a new stakeholder in protected areas, in a way that might not necessarily serve the interests of conservation.

This confusing and distressing place in the history of conservation has come to us thanks to a lack of leadership on all sides. By that I mean that no organization or political consensus has emerged to seize the agenda for conservation in these great landscapes in the way that there must be. In the absence of such convincing hegemonic leadership, society risks a catastrophic compromise in which no one would be satisfied, in which all of the

belligerents would butt heads for a period of time, and in which no public policy solutions would be stable.

In conservation today we may be witnessing a convergence of weakness on all sides, development, economic growth, and conservation—from the multilateral to the local political forces in conservation that pull at the complex issues under consideration at this conference and beyond. Wildlife biology is in a tragically weak position, though getting stronger. It is of enormous importance to conservation, but only about a half-century old. The monographic studies and continuous databases on wildlife rarely stretch beyond the life of an individual animal, 8 to 10 years, and some of the longest continuous observations are 20 years. That shallowness in chronological time means that wildlife biology does not have explanations for many of the long-term consequences of different conservation strategies.

Wildlife biology also suffers from the skepticism of public authority. Public authorities view science with a jaundiced eye. Sometimes science plays a positive role in helping define the terms of reference for a public ecosystem restoration. In the Everglades, National Park Service biologists and independent scientists are looking at snail kites and crocodilians, and the hydrologists at salinity and sheet flow, all of which contributes to the creation of models that will drive that restoration. Unfortunately, the role of science is circumscribed in the Everglades, too. When those models cross the political or public policy line, they are pretty readily kicked back across the line or discarded. For example, the restoration of a truly natural Everglades ecosystem by definition of the restoration plan cannot prejudice water availability or flood control for the populations of Floridians outside the Everglades boundaries. The restoration is delimited politically by the very human impacts that degraded the system in the first place. It is not censorship or bad faith, necessarily, but science with a complicated political value assigned to it is often unwelcome. Far better than the Everglades is the case of the Intergovernmental Panel on Climate Change, where despite the scientific consensus and the moderate tone of the panel, the political use of science in public discourse is problematic.

Beyond the uneven experience with domestic public authority, conservation biology does not articulate well with the multilateral development assistance community. Conservation does benefit in some ways from official development assistance, or multilateral development strategies. But it is not an exaggeration to say that conservation has little role in setting their institutional agendas. Conservationists understand little and have even less of a role in multilateral trade, structural adjustment, and international finance. We simply are not at the table.

Some of this arranged irrelevance is the fault of applied science itself, especially its truncated scope. Wildlife biology has been very confused histor-

ically about people. Protected areas have been demarcated without regard to local people. Indigenous peoples and frontier folk alike have been demeaned by some protectionist strategies or dislocated by well-meaning conservationists. In the United States and in pre-independence Africa, wilderness and preservation were concepts that were developed without regard to people.

Conservation science has little reputation in the social science community, which itself understands little about natural systems. Social science invests little in knowing anything about wildlife or wild lands. Social scientists tend to spend very short field stints and to fix economic or social equilibrium rather than explore its dynamics. Social scientists in the academy—like their life science counterparts—have no management accountability, which conservation organizations and public agencies do. And they have generally failed to acknowledge or write up successfully the failures of rural development.

Public agencies are burdened by uneven levels of capacity and discretion, and extremely political environments in which to work. The multilateral community does not appear to have any accountability for the projects it supports. While criticism abounds, it is difficult to imagine a circumstance in which the multilateral development banking system will actually be held to account for its loans and project ideas. The same can be said of the World Trade Organization, the International Monetary Fund, and numberless regional development authorities. Combine that lack of accountability with the endless infatuation with hopeful rhetoric and a recipe for adventurous experiments is ready. One might readily include the quest to eliminate half of the world's poverty by the year 2015 in that category.

Non-governmental organizations, for their part, completely lack political legitimacy. However important the work of NGOs, they are always in the position of never having been elected or legitimated by any political process. NGOs are able to work only as long as they are convenient to those in power.

What is to be done? It is an important question, because conservationists have failed to produce a positive agenda that the world can accept and be enthusiastic about. Conservationists can cleave to their core mission by creating models of the kind that are being discussed at this conference, models that integrate human social variability into natural system models. That requires an integrative science that does not yet exist. It does not make sense to talk about the human side of the question separately from the natural side of the question, nor to hold meetings about conservation priorities without a joined social and natural science community.

The community that gathers around these questions has to work at multiple scales, to think about distal drivers, not just local drivers. That also means understanding globalization more seriously. Recently, Montana cattle prices spiked because of BSE [Bovine Spongiform Encephalopathy] in Canada, and the embargo on the imports of cattle from Canada. Since that time, prices

have reversed again, thanks to the appearance of BSE in the American West. Forces like that have impact on natural and social systems all the time. And yet conservation does not consider multiple scales for research. Yellowstone is not simply a park, but a linked landscape from the Elk Refuge all the way up into Canada.

In addition to working in an integrative fashion, conservationists must keep their boots muddy. Many organizations in this world do conservation by proclamation. Real conservation must be groundtruthed, and conservation actors must create a contingent model for conservation action as well as scientific observation along the lines of strong, adaptive management principles.

In the end, the community of conservation science, and the science of protected areas and these great landscapes, must cleave to the mission of conservation: the sustenance of wildlife and wildlands in changing human circumstances. As Clifford Geertz would say, that has to be "lit by the lamp of local knowledge." But it always has to refer back to larger objectives. This community I am addressing must be the best, but with a clear set of outcomes in mind. The positive alternative is a science for conservation in small, out of the way places that is associated with human betterment. It can be done, but it's not easy. Conservation can inspire people to care about wild nature, people who are alienated from wild nature in every facet of their modern life. Conservation can educate young people to science in an applied way that excites them, rather than in the classroom with principles of science. Conservation can create a positive concept of wildlife health, addressing everything from how prey densities may affect populations of lions in the Serengeti to the sources of chronic wasting disease in the American West.

Finally, conservation can represent two-track diplomacy, working in systems where it is very difficult to work politically. By linking science and community development to positive outcomes, conservation can create alternative pathways to formal diplomacy. Does the proclamation of Iran as part of the Axis of Evil make the conservation of the remaining populations of Persian cheetah less important?

Above all, conservation has to represent the integrity of mission, of conservation, knowledge creation, and stewardship, and a vision of a future in which people and nature can co-exist. That's a very bright promise, a very demanding agenda. But it's one that I believe all of us at this meeting share. It crosses from academic to applied organizations, and from private NGOs to public agencies like the National Park Service. I congratulate you on being a part of it, and look forward to your deliberations, which undoubtedly will help us all.

Thank you.

Understanding ecosystem processes for conservation and management

Superintendent's International Lecture
October 7, 2003

A.R.E. Sinclair

Anthony R.E. Sinclair is a Professor of Zoology and Director of the Centre for Biodiversity Research at the University of British Columbia. Born in Zambia, Dr. Sinclair spent his first 10 years at Dar es Salaam, Tanganyika (now Tanzania) on the tropical African coast, later moving to Blantyre, Nyasaland (now Malawi). He holds a Ph.D. from Oxford University, was the recipient of a NATO Fellowship for work in Tanzania from 1966–1969, and was a research scientist with the Commonwealth Scientific and Industrial Research Organization in Australia from 1970–1973. Dr. Sinclair is an international leader in the study of the ecology, population dynamics, and community structure of large mammals. His 30-year study of hoofed mammals in East Africa has shown how such populations are regulated. An expert in ecosystem dynamics, Sinclair has played a central role in the management and conservation of large herbivores around the world. Dr. Sinclair's books include **Serengeti: Dynamics of an Ecosystem** and **Serengeti II: Dynamics, Management, and Conservation of an Ecosystem.** His scholarly articles have appeared in scientific journals including **Ecology, Oikos, Conservation Biology,** and the **Journal of Animal Ecology.**

Introduction by Yellowstone National Park superintendent Suzanne Lewis

The Superintendent's International Luncheon, initiated at the very first conference in this series, has always served a special role. No matter what the focus of the conference, whether ecological or cultural, whether wildlife species or geographical feature, we set aside this occasion to take the long view, and the far view. Previous speakers in this series have introduced us to the workings of conservation on several continents, and have thereby always enriched our grasp of the local subject matter.

Because this year's conference is by definition international, our planning committee admits that they dithered briefly over what to do about this occasion. Finally, they resolved that the best thing was just to keep doing what has worked so well in the past—invite some recognized leader in the world of conservation research and turn that person loose to exercise one extraordinary personal vision for us.

Once that was decided, Tony Sinclair's name immediately arose. Your agenda and abstracts program contains a nice biographical sketch, noting some

of his most important publications, his long research experience in Africa and Australia, and his great breadth of vision as an ecological thinker. These facets of his career make him a natural choice for this lecture, but it is probably his long and little-known connection with Yellowstone's ecological research that made us most eager to bring him here today.

Long-time research staff here in Yellowstone tell me that in the late 1970s, when the controversial experiment now popularly known as "natural regulation" was still getting underway, one of the texts you were most likely to see being passed around in the research office was entitled The African buffalo: a study in resource limitation of populations, *by one A.R.E. Sinclair. This milestone study, with its examination of the magnificent grazing system of the Serengeti, seemed vitally relevant to the questions then being asked about Yellowstone's own large, complex, northern ungulate range.*

Yellowstone ecologists of the time communicated with Dr. Sinclair, and eventually he joined our own Doug Houston and two other scientists in publishing iconoclastic and irreverent papers on the ecological sciences. In 1982, when Houston completed his own landmark study of the northern Yellowstone elk, it was only fitting that the foreword was written by Tony Sinclair.

At the conclusion of that foreword, Dr. Sinclair made a statement that still rings true and warms the hearts of those of us who are responsible for real-life, on-the-ground wildlife management. He said, and I quote, "Since we can never know all the facts about a situation, we can never be sure that management is necessary nor that its results will be what we predict: we must manage in an air of uncertainty."

For all our lengthy and tremendous research efforts here in Yellowstone, we still breathe just that kind of air every day, and we are forever in Dr. Sinclair's debt for helping us understand that it is just such uncertainty that drives us to think, and learn, and do the best we can.

Ladies and gentlemen, Tony Sinclair.

First, I must say thank you very much, Suzanne, for not only your gracious invitation to come here, but also that you knew way more than I thought you should know about me. Those papers were supposed to be anonymous. I don't know how you knew about that. I would also like to thank the other members of the organizing committee, John Varley, and Glenn Plumb, and a whole bunch of other people that I can't spend all the time thanking. But thank you very much indeed; it's a great pleasure to be back. It's 25 years now since that first visit, and it's been extremely interesting to see how things have changed. Not just in the biology, but also in the way people are thinking and talking.

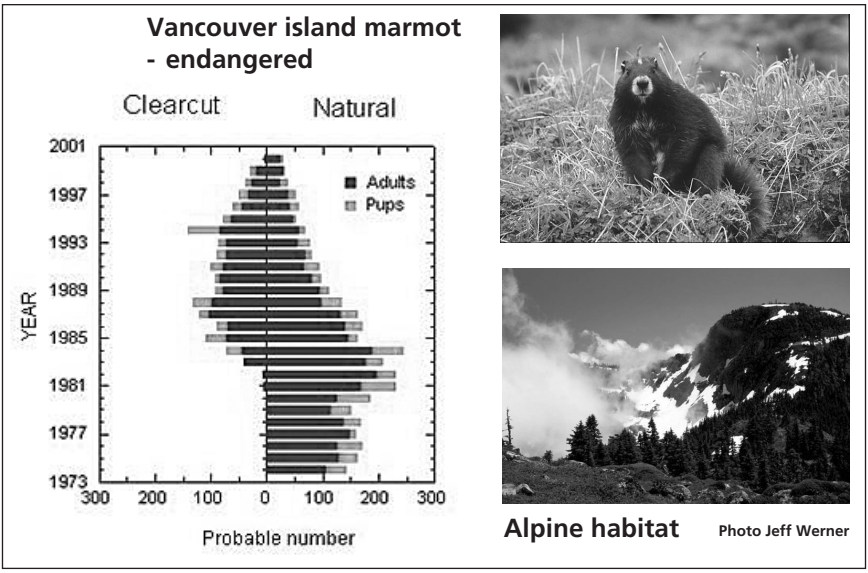
I went to Kruger Park last year. It was exactly 20 years after I had been invited the first time. And there was an almost exact parallel change in the

way people were thinking, and the way they were doing things in those parks. So I consider this as a really heartwarming experience to see that people are flexible and that they're looking for differences.

I thought what I should do today is, rather than talk directly about Serengeti, let alone Yellowstone—you know much more about it than I do—that I should pick on some interesting aspects of ecosystem management. So I'm going to talk about science. I could have talked more about people and parks, and I wasn't aware of the great emphasis which I've now heard from these talks about that, so I'll confine some remarks about people and parks to the panel discussion at the end [of the conference]. In the meantime, I'd like to go over some examples of ecosystem management. I'm going to start out simple, and then we'll gradually get to more complex situations. And really, the sort of sub-heading for this talk could be, "cautionary tales—things are not always what they seem to be."

I'm going to start with my colleague and good friend Graeme Caughley, who encapsulated I think nearly all problems to do with the biology side of management, rather than the people side of management, by saying that we could basically call all problems in terms either of too many, too few, or how many—that is, harvesting. I'm not going to address the third of those. But I will consider those first two aspects. The real issue is this: that when we have a problem to do with a species, we recognize that that species is embedded in a community, and in an ecosystem. Despite that, we almost never actually apply management taking that into account. It's nearly always single-species management that we're dealing with. I think you can all think about your own work in that context. The problem is that if we do that too blindly, we'll end up getting some surprising results, and it's because of that that I'd like to work our way through some of these issues.

Vancouver Island marmot is Canada's only truly endangered species. We have lots of others, but they basically live in America, and we don't recognize anything south of the border. So I don't count those. The Vancouver Island marmot is now down to 20 animals. It's declined, as you see from the graph [slide 1], from about 200 in the last 10 or 15 years or so. Before that, of course, it was a lot more common. Currently, the real issues are that a single wolf can go in and gobble up three or four of them in a summer, and that's a huge proportion of the remaining population. And there's a tremendous public outcry concerned with "shoot the wolves" or "don't shoot the wolves," depending on whether you like wolves or not, and whatever else is around, golden eagles and so on. I happen to be in charge of a major program looking at the research there, and we contracted a paleoarcheologist—a paleobotanist—to go and look at the habitats of these animals. Within a fairly short time, he's come back and said, "we have found remains over a much larger area," and that this area was alpine habitat—that's where they like to live—and that this



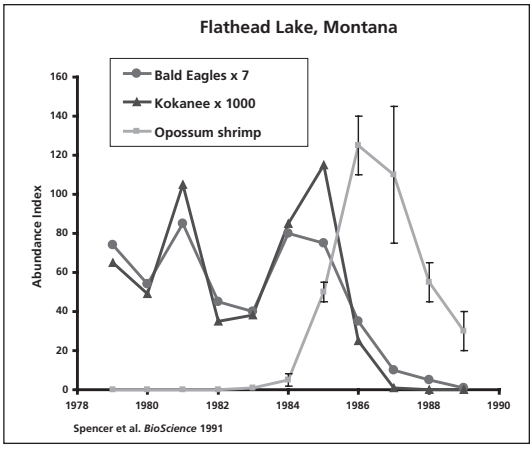
Slide 1.

has been progressively declining for the last 10,000 years.

So that really raises the issue: if we deal with predators, we're just talking about the symptom of the problem. Sure, when you get down to 20 animals, predation is—if you know anything about the dynamics of predation—is going to drive them extinct. So we do have to do something about that. But if that's all we do, then we're never going to solve this problem. On the other hand, should we be dealing with habitat, that is, alpine habitat, or should we in fact be thinking about climate change? What really is the issue in this particular case?

Therefore, we have to put these kinds of problems into a much bigger perspective, not only in terms of the space and the other species involved, but also the timescale. I'm going to therefore start with a community, and look at the simplest possible interactions. Nearly all of us recognize that when there's a problem of a species, it's going to be imposed upon by something directly related to it—either its food supply or its predators. What is less understood is that there are indirect effects. There are longer food chain effects that can be playing a part, and if we don't consider that, we can come up with all sorts of strange results.

Here is an example of the population of bald eagles at Flathead Lake in Montana. Bald eagles are there in numbers dependent upon the Kokanee salmon. Kokanees are sort of land-locked sockeye salmon. For the first few years in this example [slide 2], you see that there are lots of bald eagles, and they depend on lots of Kokanee. Now, it is known from many other lakes



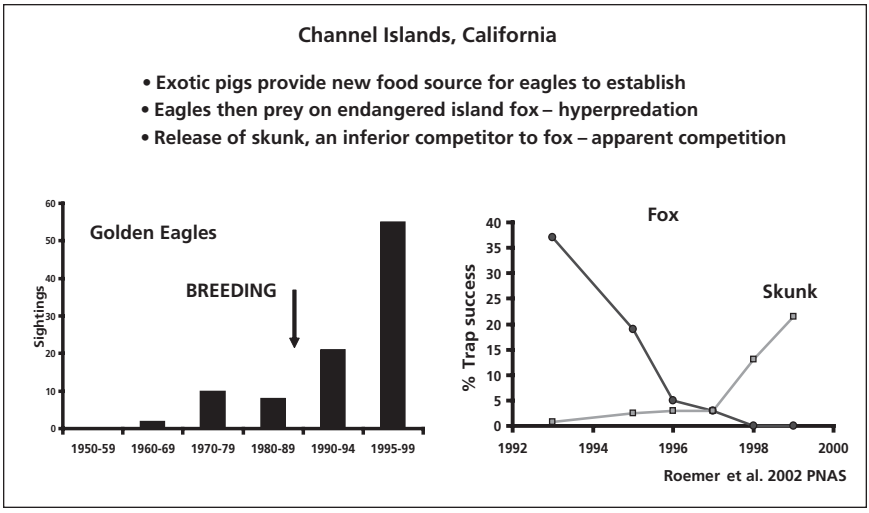
Slide 2.

that Kokanee love eating a particular shrimp called the opossum shrimp. It's an indigenous, even an endemic species that occurs in oligotrophic lakes around this part of the world. Where they have introduced opossum shrimp, Kokanee really eat it in large amounts, and their numbers go up, and so fishermen can catch more.

So they decided to introduce opossum shrimp, in 1968, to the Flathead Lake. Well, what you see is that as the opossum shrimp went up, the Kokanee salmon went down, and so did the bald eagles. It turned out that instead of the salmon eating the shrimp, the shrimp actually became a competitor for the cladocerans and other species that the Kokanee had originally been feeding on. And for some reason that we don't know about, the Kokanee didn't eat the shrimp. So the shrimp became the competitor, the dominant competitor, and down went the Kokanee. This was a completely unexpected result. So it's important, therefore, to be aware that things don't always come out the way you expect them. They got what we call a perverse result.

That, in a sense, is what we could call a bottom-up effect. Now, if we looked at top-down effects, such as predators, predators have a whole range of possible different effects in communities, and I've listed a few of these here. Some of them we can call hyperpredation, apparent competition. Predation, because of its non-linear effects, can cause collapses of prey, or the reverse—it can cause outbreaks of prey—and we can get what we call multiple states in communities. These complexities mean that the way you manage a particular species is often counterintuitive. In the Channel Islands off Santa Barbara, California, we had a situation where exotic pigs were released. They roamed around these islands for some time in small numbers, but as exotics often do, all of a sudden they started to increase after many decades of being in low numbers [slide 3]. That provided a prey base for golden eagles to first visit, and then settle on those islands. Previous to that, golden eagles had not been able to live on the Channel Islands.

As a consequence of the golden eagles' appearing, we saw a decline in the island fox, which is an endemic species. So here we have a problem of too few. As it turns out, the golden eagles were feeding on the island fox, so this



Slide 3.

is hyperpredation as a consequence of now having an additional prey base, namely the pigs, that allowed the eagles to increase their numbers. Then, we got an increase in a non-threatened species, the skunk, which was being kept down by the fox. And so the consequence of putting in an extra prey resulted in a turnover of the species communities, again a result that was not expected, or wanted.

I mentioned multiple states, and I think it's important to understand that because of the way predators work, we can actually end up with more than one way that a community is brought together. There are several types of examples of this. Most of them are produced by top-down effects from top predators, but it doesn't always have to be that way. I'll just give you one example from Serengeti. I will mention Serengeti from time to time in this talk, but my intention, actually, is to draw examples from all over the world.

We have the situation, in Serengeti, of elephants feeding on plants. I'm not going to go into all of the details here—I just don't have time to do that—but essentially, we've got two states. We've got an elephant state with grasses, and when they have the grasses, they're actually pulling up baby trees. They go in line abreast, and literally weed out these tiny little trees, and they're so good at doing this that they can actually completely clean out a grazing swath. This [slide 4] is in the Mara Park, and the Mara Park doesn't have regeneration of acacia trees. Go south into Serengeti proper, and for other reasons, we have had an outbreak of trees, and we now have a situation where elephants are feeding on bigger trees [slide 5].

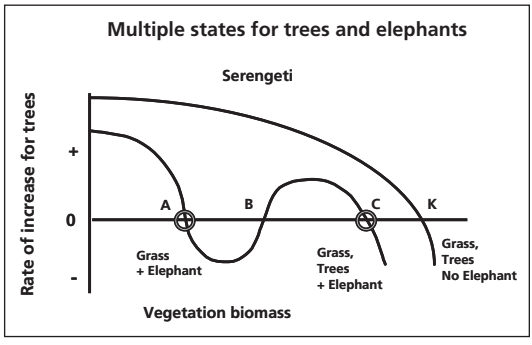
We therefore can look at two situations within the same ecosystem—the Serengeti—where we have grass and elephants feeding on baby trees, and they

Slide 4.

Slide 5.

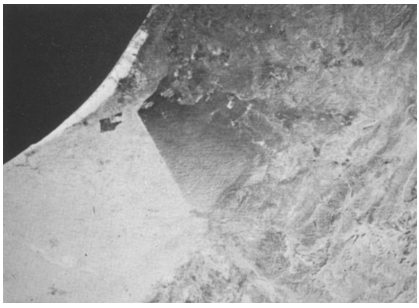
keep the tree population down. This graph [slide 6] basically illustrates what's going on with the rate of increase of the prey, which is the trees, against the tree biomass. One situation is where the S-curved line is above zero—here, it means that the tree population is increasing. Below the zero line, the tree population is decreasing. And where they intercept at zero, there's a steady state. It doesn't mean that that's where they sit the whole time; it means there is a tendency toward a steady state. And so here, we see that we've got a grass-and-elephant state.

There is the other state that I mentioned, where we have grass, trees, and elephant. And we can be in both states in the same system at the same time and have the same species present. But the combination is different. The way you get from one to the other requires a perturbation. In our case, the perturbation that actually knocked it down from elephants and trees to elephants and grass was, in fact, fire. We've actually been able to go through the cycle more than once, and we've gone back up now to the situation where we've got elephants and trees, and the perturbation that was required there was poaching—knocking out the elephants. In the 1980s, 80% of the elephants were knocked out in the Serengeti. But that didn't occur in the Mara side of this system. There's a difference in management, and we can look at that difference in management as an experiment to tell us what's going on. In effect, this ecosystem has three stable states. It has one where we have grass and trees, and no elephants; one with grass, trees, and elephants; and one with just grass and elephants.



Slide 6.

Not all places in Africa, of course, will have this; it's actually quite unusual to find this situation. Most other places simply have



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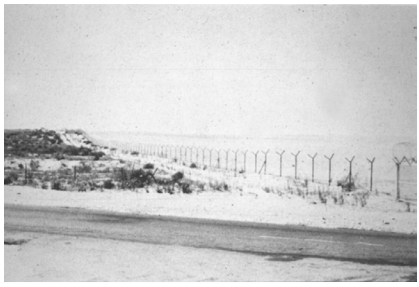


Slide 8.

two: one without elephants, and one with. A grass-and-elephant one would be, say, present in Uganda. One with trees and elephant would be characterized by, say, Tsavo National Park, Kruger National Park, or Chobe.

Now I'm going to give you another example. This is an infrared image of the Israeli–Egyptian border in the Negev desert [slide 7]. It's a thermal image, so the dark means warm and light means cold. You can see the boundary by the change in vegetation. This is what it looks like from the ground [slide 8]. On the left, we have a blanket of arid-type vegetation which keeps the soil surface warm. On the right, we have no vegetation because of a difference in the grazing pressure we have on the Egyptian side—Bedouin grazing. They were excluded on the Israeli side for something like 20 to 30 years, and the consequence of that was that there's a difference in the albedo—that is, the reflectance of the two habitats—and that difference led to differences in the thermal uprising and the amount of moisture in the air.

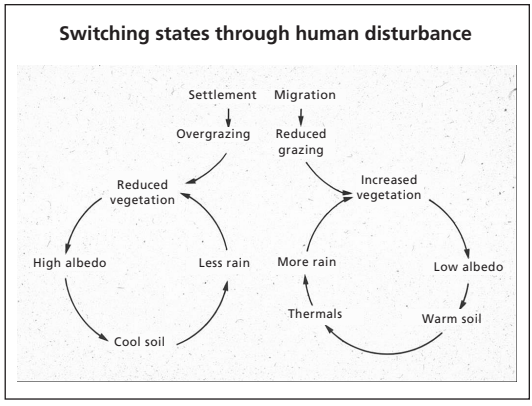
Consequently, we can recognize that there are two basic systems [slide 9]: in the one on the right, we have little grazing, and vegetation, as on the Israeli side—low reflectance, warm soils, thermals, and rainfall which maintains the vegetation. This is a positive feedback loop. On the left, we impose overgrazing, which is a perturbation. We take out the vegetation and get high reflectance and less rain, which means we get continued desert conditions. This is also a positive feedback loop. So both of these are stable situations, and they jump one to the other by a perturbation, in this case the overgrazing.

So that's an example of a multiple state. It is also an example of a perverse state, because there's one that you would normally recognize you would want, and the other that you would recognize you don't want. It's easy to fall into that trap if you don't understand the complexities of both the abiotic and the biotic connections in that system.

To go on, I've been talking about food chains, and now I'm going to get a step more complex and talk about communities. Communities, of course, are a big subject, and every single one of these slides would require a lecture, but I can't do that so I'm just going to [ask you to] remember that communi-

ties are not just made up of a bundle of species all thrown together. They are made up of species which are not all equal. Some are more important than others. Some important ones we call dominant species, and they structure the environment for other species, and provide components of the food chain. I won't say much more about that, but they also can contain what we call keystone species.

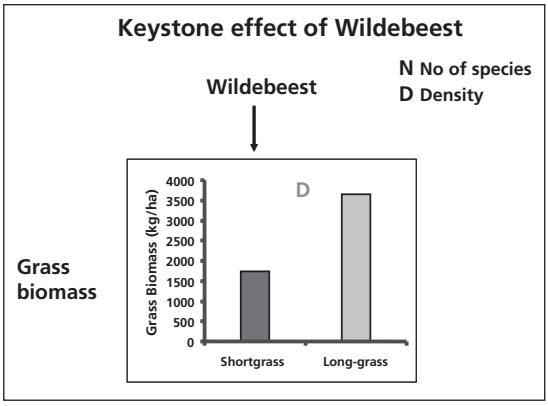
A keystone species as a concept is somewhat controversial, but we do have to recognize that there are some species which even in small abundance have major impacts on the whole community. I'll give you another example from the Serengeti, of the wildebeest doing this. The wildebeest is a keystone species. Even though it's in great abundance, its biomass relative to the vegetation is quite trivial. Wildebeest like eating shortgrass, and they go around more like lawn-mowers than anything, and keep the grass short if they can. When they are on the plains they occur in large numbers, and in that fashion they will have a major impact on certain parts of the plains. It's the eastern plains where this impact is greatest; in the western plains, their impact is not so great.



Slide 9.

We happen to know from historical evidence that these plains were not always impacted by wildebeest. Therefore, we can say that when the plains are in this configuration of very short grass, there is actually a plethora of small flowering dicots, herbaceous species, to the extent that they take up 40% of the area. If you drive across there, you don't really notice it unless the flowers are out. But it is, in fact, really quite considerable that only 60% of that area is actually grass. We can tell that because we had an exclosure that was up for about 10 years, and in that time, we got a changeover of the grass community. Up until then, we always thought that the shortgrass plains were edaphic, due to the volcanic surroundings. But it turns out that's not the case, and it turns into long-grass plains when the wildebeest are removed for long periods, as they were in the first half of the century.

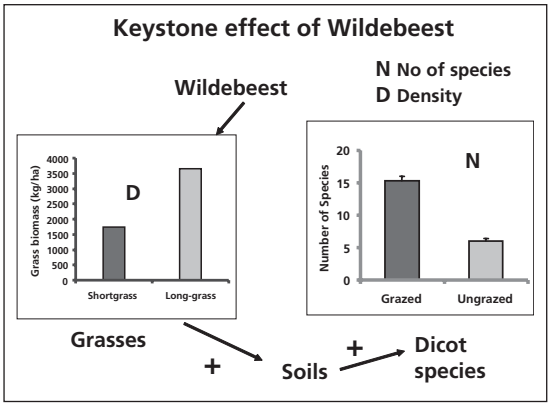
I want to show you a few interesting components of this system. As I said, there's a change in biomass of the grass, so we can compare the long-grass areas now, which are the same as the long-grass areas that used to be on those



Slide 10.

plains 50 years ago, and we know that from that experimental exclosure, with shortgrass plains, the biomass of the grass is half or less than the biomass in the long-grass area. If we look through the competition, long-grass excludes flowering herbaceous forbs, and so if we remove the grass, keep the competition down by grazing, there's an increase in the number of dicot species, as I mentioned [slides 10 and 11]. This is actually an underestimate; there are probably twice that number of herbaceous species now. So we get a huge diversity of herbaceous plants on the shortgrass plains that are simply not found on the long-grass plains.

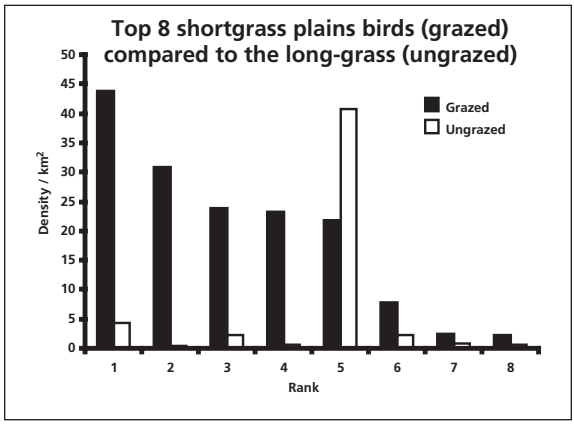
Now, we have butterflies. Butterflies like flowering plants, and we find that the density of butterflies in the shortgrass plains is something like 100 times the density in the long-grass plains. The different structure of that vegetation also houses a different structure of bird fauna, so things like the capped wheatear, for example, like shortgrass. Things like the rufous-naped lark like long-grass, and we can see, if we do our counts correctly, changes in the composition of this bird fauna. There's something like 50 species, but if we just take the top eight or so, you can see that we look at the fate of the shortgrass species when we get to long-grass [slide 12]. Nearly all of these shortgrass species which are in high density drop out, and only one of them actually increases when you go from grazed areas to ungrazed.



Slide 11.

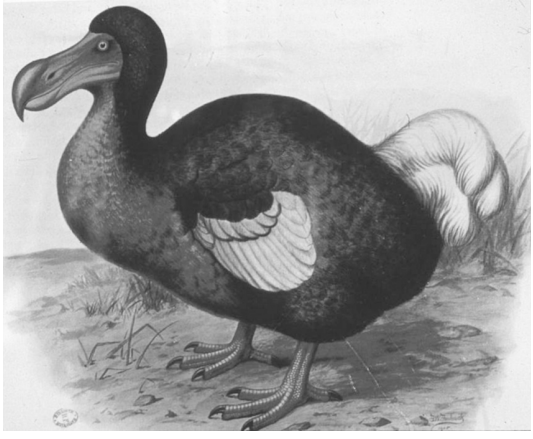
Now, we've tracked the ripple effect of wildebeest through many other components of this system, and we're still looking further and further, into the insects, for example. In fact, I was interested to see that Robin Reid is now looking at bacteria, and I think that's an area where

we should maybe encourage her to come and look on our plains as well. In essence, then, the wildebeest impact is spread not just across the mammals, but across every component that we have so far been able to measure. That is a truly keystone effect, and the result is that we get increases in diversity in some aspects, and we get decreases in diversity in other aspects.



Slide 12.

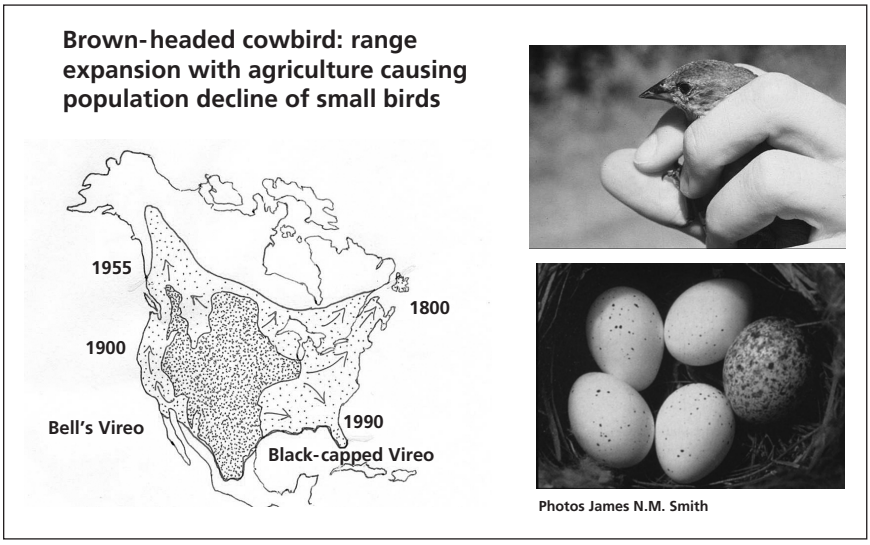
On top of this, we have to recognize that part of the not-all-species-are-equal component in communities is that some species are completely dependent on others. This is what we call co-evolved links, and I'll just give you one quick example here. This is taken from Mauritius, where there's a tree called the *Calvaria*. Up until 1977, this tree was never known to germinate; in fact, it was on its last legs. It was about to go extinct because the trees were getting too old. Luckily, a wise chap called Stan Temple, of Wisconsin, figured out what the problem was, and he got some turkeys to eat the seeds of this plant. (Well, actually, he sort of had to ram the seeds down the turkey, because they were rather big and the turkey didn't really like to eat them.) When, eventually, the seeds came out the other end, they germinated for the first time that people had ever remembered since the invasion of that island in the 1600s. [Temple] did that because he figured out that there was a bird on that island called the dodo [slide 13], which went extinct 200 years ago. [The dodo was] a large flightless pigeon of several kilos—I think it's 10 kilos or something quite enormous—and this was the bird to which the trees



Slide 13.

had become closely linked. The trees had evolved so that this was their way of transportation, of getting those seeds around the island. This big, flightless pigeon just sort of waddled around and dropped the seed. Now, of course, they've got better ways of getting these seeds to germinate, and they don't have to torture poor turkeys to do it. But it really brought home the fact that if you lose one part of a community, you may well lose other components of the community, because they're dependent on the first part. There are other examples, but I don't have time to go into all of this.

There are such things as mobile links; that is, we have to manage systems for other species that come and go. One of the clearest examples that I heard



Slide 14.

today was from Robin Reid, where at the Nairobi park, the migrants spend their time in the wet season outside of the park and then have to come back in. And Robin didn't mention, but it looks strangely as though that migration route is going to be cut very shortly. And if that's the case, then the park is basically going to lose its major grazers, and essentially will cease to be a proper functioning system. Now, that's simply an interpretation, because I didn't hear from Robin what's actually happening in terms of managing and keeping those corridors open. [To] manag[e] a system, one has to look beyond the borders of that system.

Another case is the cowbird problem. In America, cowbirds were confined to a particular area, which is the stippled area [slide 14], until agriculture came along and cut down all the trees around about in the west and in the east. When the trees were cut down and agriculture came in, the cowbirds

spread. Cowbirds are parasitic birds; they lay their eggs in other birds' nests. As a consequence of that, they started to lay their eggs in the nests of species that had never been exposed to these parasites. In particular, two of them are now threatened: the black-capped vireo and the bell's vireo, which are collapsing as a consequence of the cowbird parasitism. So here what we have is a perverse result, as a result of human activities outside of a system bringing in something that causes the community to start changing its shape and resulting in a problem.

Ecosystem Processes

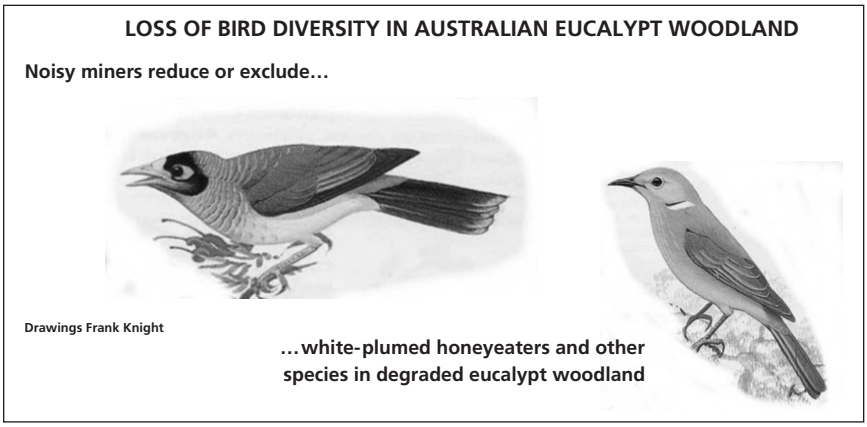
- **Hydrology, flux and storage**
- **Biological productivity**
- **Biogeochemical cycling and storage**
- **Decomposition**
- **Biodiversity and Stability (resilience)**

Slide 15.

Communities, of course, are dependent upon the abiotic environment, and on the disturbances that go on in that environment. Those disturbances are very important in shaping the community. This is one audience that I don't have to tell that to; I just thought I'd mention it. Obviously, fire is one of them; flooding in other systems. Herbivory is a kind of perturbation (a biotic perturbation). These things have all sorts of important controlling effects on the system. For example, if competition is reduced, species diversity is increased through the process we call intermediate disturbance. Both fire and grazing act as disturbances, and in moderate amounts they create not only an increase of diversity, but also a more patchy (heterogeneous) environment that forms new niches for other species. But we also have to remember that disturbances operate at different rates. We can have fast rates of disturbance, or very long-term ones. And we have to be aware of the timescale of these disturbances. If you're not, you can either manage wrong or you're forever chasing your tail because you're one step behind what's going on.

A nice example of the long-scale events that have to be taken into account is that of the habitat for the pandas. Pandas basically eat bamboo and only eat bamboo, and it's unfortunate that this bamboo tends to flower at long periods of 20 years, and they flower synchronously over large areas and then die—very large areas, way bigger than any reserve that the panda lives in. So all of a sudden, the panda is confronted with having no food whatsoever in its reserve. Management, therefore, has to take into account that they have to have reserves over a big enough area so that they can get food or transport animals from patch to patch so as to take into account the synchrony and timescale of this kind of disturbance.

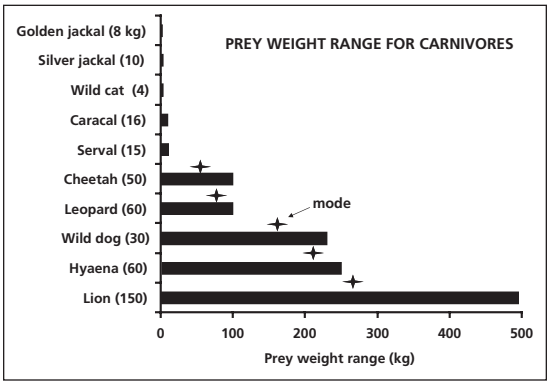
Now I get onto ecosystem processes. Ecosystems are not just descriptive properties; there are rates of flow in these systems. This is a list of some of those sort of things: hydrology, productivity, and so on [slide 15]. I'll just give you examples of a couple of these. One is how, if you don't bear in mind



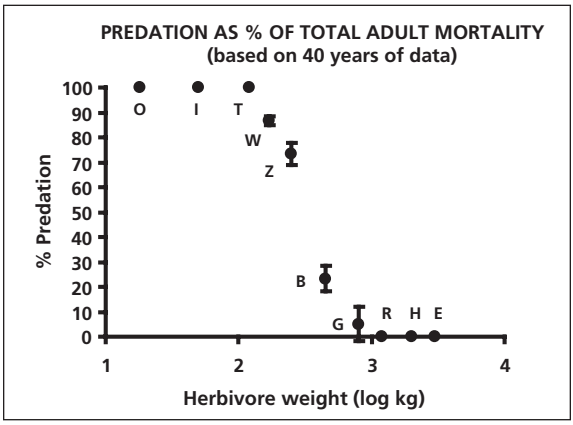
Slide 16.

these processes, things can go wrong. To bear in mind these processes means you have to know something about them. [For instance,] most of southern Australia was covered in eucalypt forest before Europeans got there. Europeans have, in the last 150 years, systematically cut down nearly all of it, particularly in western Australia, for the wheat belt. So there are only tiny little patches left. It now turns out that those trees were actually extremely useful, because they were drawing water from the water table and transpiring it, thereby keeping the water table down. Cut down the trees, nothing draws the water down, and it comes up to the surface and evaporates. When it evaporates, it then deposits salts that it has picked up on the way up through the water table, and now we've got salinization and the collapse of just about everything because those plants can't tolerate high sodium. This problem now is Australia-wide. It's not just a local problem, it covers everything. And so the Australians are now going back to planting eucalypts all over Australia again.

It's wise to learn from these lessons; obviously, it's easy to be wise in hindsight. But we should be paying attention to how these systems work. Another example, also from eucalypt woodlands in Australia, involves a group of birds called the honeyeaters. Normal woodland in Australia is quite dense, and it has



Slide 17.



Slide 18.

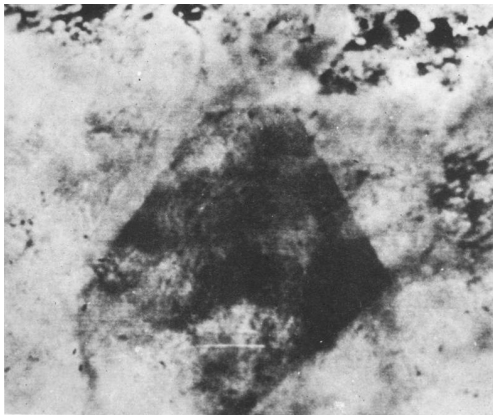
a large range of honeyeaters. Cut down the woodland, and what happens is that one particular honeyeater, the noisy miner, dominates and excludes most of the others, including the white-plumed honeyeater [slide 16, right]. These small honeyeaters are insect eaters. They keep down insect pests, and as a consequence of the tree cutting, the remaining trees in the area are now suffering major outbreaks of insects, and there is what's called dieback, which eventually kills the trees. So this is a breakdown in the system as a consequence of losing species, which is a consequence of opening up the structure in the vegetation.

One other aspect of this: I've just shown you how a system can break down if you start breaking up the community. What we've just discovered in the Serengeti is how we can actually create stability, or rather not how we create, but how the system creates stability by having a diversity—in this case, a diversity of predators and prey. This slide [17] illustrates the species prey weight range of a series of different carnivores, from lions down to very small ones. What you see is what we call nested niches of predators. Small predators eat prey that are also eaten by the larger predators, but they have a smaller range. Now, this has a particularly important effect upon the prey, of course, because if you're a small prey, you tend to be faced with rather a large number of predator species. So some small mammal species will be confronted with as many as seven different carnivores, whereas very large ones have very few. That means we can say that small prey are likely to be predator-limited, whereas large prey are food-limited.

This is important because before this, we have not been able to predict when we're going to get predator limitation and when we're going to get food limitation. This is really the first time we've been able to see that. Now, we've got measures of the amount of mortality imposed on different sizes of these ungulates which we've accumulated over 40 years, and we see a pattern that is predicted by that previous one [slide 18], so that all of the adult mortality of these small prey are accounted for by predators. There's a sudden dropoff; there's a rapid threshold change from predator limitation to prey limitation. This has only just come out, and we think that this pattern actually creates

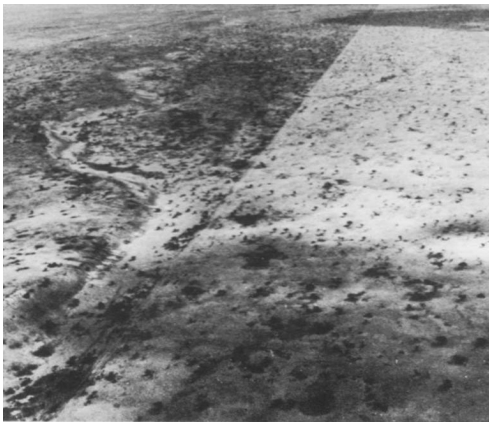
stability, and that if you start to lose the diversity of the predator guild and of the prey guild, then you'll start to get disruptions, and then you'll start to see either outbreaks of prey or collapses of prey.

I'm just going to say a quick word about applying some of these aspects. Essentially, what I've talked about really has to be applied in natural systems, and for the benefit of conservation. But to do this, we have to think about conservation in two different areas. One is the protected areas, and the other is community conservation. I detect, not only here [at this conference] but elsewhere, that there is some sort of polarity in this argument. And I've never understood why, because it seems to me we have to have both. The reason is that protected areas are required, absolutely essential for certain groups of species. We're going to lose the major predators if we don't have protected areas. Certain rare and endangered species require complete protection, and so on. At the same time, we have to have areas which we call benchmarks to judge the impacts we're having outside. Robin Reid's example of comparing pastoral areas vs. non-pastoral areas is a classic example. Without doing that comparison, we won't be able to interpret what goes on. This is, to me, the most fundamental reason why we have to have protected areas; it is an insurance policy for our whole well-being on this planet.



Slide 19.

The example of having a baseline, I think, couldn't be more clear than this: Africa went through decadal cycles of major droughts and major famines. They were in the 1970s, 1980s, 1990s. They were about every 10 years, as I said, and they had been blamed on the drop in rainfall. It turned out that this was completely wrong. We understood that



Slide 20.

because, in the middle of this drought, when people were dying in large numbers, one of the NASA interpreters of LANDSAT saw what has come to be called the green polygon [slide 19]. It's a very poor image; that was the best we had in those days, 30 years ago. They looked at this; they said "Wow, what's this green thing right in the middle of this drought area in Mali?" They went down, and here they discovered it was a ranch of 200 square kilometers [slide 20]. That ranch had cattle on it, didn't have any water supply to it, yet the grass was green, about a meter high. Outside, there was no grass at all; this white area is just sand. This was exposed to nomadic peoples and their grazing, and by having that baseline—that control, if you like, it showed that it wasn't the abiotic environment that was doing this. Rather, it was a biotic impact from the grazing, and this was actually the first clue that this was a man-induced situation. That is why we have to have baselines.

However, protected areas cannot protect everything. Just by a simple species–area relationship, we know that if we had as much as 10% of the world protected, we would lose at least 50% that's not included. That means we have to be thinking about conserving other areas as conservation areas, what we would call community conservation areas. So it's absolutely essential that we go outside of parks to look for our conservation. Nevertheless, it must be recognized that community conservation areas are limited in their capacity to conserve. They generally conserve those species that are able to tolerate human impacts, often those ones which are most common and need the least amount of protection. And so it turns out that there's pros and cons on both sides, and we have to have both of them.

So what do we say about Caughley? If we are going to do anything, we have to be aware of a number of important aspects. We have to know not just [about] food chains, but some of the more unexpected interactions that go on in communities. Some of these things, these complex interactions, involve multiple states, and of those states, it is not always obvious which ones we have to manage for. Ecosystems are shaped by natural disturbance, and we have to manage for their frequency. Ecosystems are always changing; that's an important point. You cannot manage for the status quo. You have to be able to allow the flexibility to allow the system to change. If you don't do that, then you're going to get into trouble. Complexity leads to the biodiversity, which feeds back onto ecosystem structure and function and maintains our systems. And if we're going to maintain systems, we have to be able to protect them. We have to stop the large-scale abuses that humans are doing to our environments, and why do we need to do that? Because it's the only way we're ever going to be able to understand whether what we're doing to our environment is good or bad.

Thank you.

Ungulate grazing systems compared between the Greater Yellowstone Area and East Africa

Francis J. Singer, Linda C. Zeigenfuss, and Robert Stottlemyer

Abstract

The wild ungulate grazing system of the Serengeti has become known for its large number of compensatory responses of grasslands to herbivory. Grazing lawns develop as nitrogen processes are accelerated on repeatedly-grazed sites and production of previously-grazed grasses are stimulated. GYA ungulate winter ranges similarly support the largest assemblages of large grazing herbivores in North America, but these ecosystems have cool, continental climates, not tropical climates; the elevations are montane versus the low elevations of the Serengeti; and productivity is much less. Can these GYA grazing systems develop some of the same dramatic compensatory responses to grazing that the Serengeti ecosystem has?

We review recent research in the Jackson Valley, Wyoming, grazing system and the long-term record of research on Yellowstone's northern winter range. Strong compensatory responses to grazing were observed in both areas. Grazed grasslands in Jackson Valley generally produced more biomass, aboveground nitrogen (N) yield was higher, and N processes were accelerated, including nearly doubled N mineralization rates, larger N pools, and higher plant N concentration. Fine root activity, seed production, seed viability, recruitment, and replacement rates were also higher on grazed sites in these study areas.

We conclude that GYA grazing systems are as resilient, responsive, and adaptive to intense herbivory by large assemblages of native ungulates as are Serengeti grasslands. YNP's northern winter range is subjected to relatively low offtake only during the winter dormant season, unlike the Serengeti. The Jackson Valley experiences substantial winter and growing season offtake, yet the system remains largely productive, vigorous, and sustainable.

Introduction

The wild ungulate grassland-savanna grazing ecosystem of the East African Serengeti is a textbook example of positive compensatory responses to grazing. Largely through the research of Sam McNaughton, Anthony Sinclair, and their co-workers, the Serengeti ecosystem has long been recognized for stimulation of aboveground production of grasses following grazing by wild herbivores; grazing facilitation by guilds of wild herbivore species; development of grazing "lawns" through repeat grazing events; increased rates of nutrient turnover; and increased concentration of nutrients by repeat grazing (Bell 1970; McNaughton 1979; 1983; 1984; 1985; Sinclair and Norton-Griffiths 1979). Grazed graminoids in the Serengeti have higher uptake rates

of nitrogen, and higher rates of photosynthesis per unit of plant tissue than do their ungrazed counterparts (Ruess et al. 1983; Ruess 1984).

East African grasslands have been recognized to possess a long evolutionary history of grazing by large ungulate herbivores (McNaughton 1985). About three million individuals of 27 species of ungulates occupied the Serengeti region in recent times (Sinclair and Norton-Griffiths 1979; McNaughton 1985). Major grazing species are wildebeest (*Connochaetes taurinus*), zebra (*Equus burchellii*), Thomson's gazelle (*Gazella thomsonii*), buffalo (*Syncerus caffer*), and topi (*Damaliscus lunatus*). Ungulates of the Serengeti graze the diverse vegetation in a serial manner, and/or in different ways, thus reducing competition amongst a highly diverse grazing fauna. The succession of grazers includes examples such as: (1) zebras following wildebeests and grazing patches that the wildebeests ignore; and (2) gazelles focusing on short re-growth of plants previously grazed by wildebeests (Bell 1970).

Greater Yellowstone Area (GYA) ungulate winter ranges support the largest assemblages of large grazing herbivores in North America, and have been typified as the "Serengeti of North America." GYA ecosystem ranges have cool, continental climates, with short growing seasons of only about 75 days. The Serengeti of East Africa, by comparison, is a tropical ecosystem with the potential for year-round growth that is mediated by a wet-dry season precipitation pattern. Elevations of GYA winter ranges are montane (1,500–2,600 m) compared to low elevations in East African grasslands (1,135–1,800 m). Aboveground production of most grasslands in the GYA is predictably only 1/5–1/4 the production (60–200 g/m^2) of the most productive Serengeti grasslands (600–900 g/m^2). However, the fact that both the Serengeti and the GYA support large and diverse populations of grazers makes them interesting counterparts for comparison.

Traditional views of GYA grazing systems

Montane grasslands of the interior northern Rocky Mountains, such as GYA ungulate winter ranges, have long been viewed as sensitive to even light grazing. Intermountain grasslands and those located west of the Rocky Mountain chain are typically dominated by C3 bunchgrasses and other non-rhizomatous grasses. Examples include bluebunch wheatgrass (*Pseudoroegneria spicata*), Idaho fescue (*Festuca idahoensis*—in the U.S., replaced by rough fescue [*F. campestris*] near and north of the Canadian border), and Sandberg's bluegrass (*Poa secunda*). This area, referred to as the Agropyron Province, lacked large herds of mammals throughout the Holocene, and was felt to have less evolutionary history of, and fewer adaptations to grazing than North American Great Plains grasslands (Mack and Thompson 1982; Milchunas et al. 1988). Grasses that use the C3 photosynthetic pathway are considered less grazing-tolerant than are the C4 grasses more typical of the Great Plains (Caswell et al. 1973).

The classic, and often cited, studies of Pond (1960) and Mueggler (1967) reported high sensitivity of the three common grasses to grazing (especially spring grazing) in the montane grasslands. Traditional views held that the short growing season, combined with low productivity in mountain grasslands (such as the GYA), did not allow adequate plant re-growth and storage following repeated grazing cycles each season (Platou and Tueller 1985). Fescue grasslands were felt to be seriously impacted by grazing. Grazed fescue grassland soils were drier and warmer during the summer, while grazing reduced the weight of roots and the forage yield (Johnston et al. 1971).

In contrast to the GYA, the Great Plains' mid- and shortgrass prairies are typified by C4, sod-forming, rhizomatous or stoloniferous grasses (*Bouteloua gracilis*, *Pascopyrum smithii*, *Buchloe dactyloides*). This area was suspected to have a much longer evolutionary history of grazing by large herds of ungulates, especially bison (*Bison bison*) (Mack and Thompson 1982; Platou and Teller 1985; Milchunas et al. 1988). Grasses of this area predominantly use the C4 photosynthetic pathway (Table 1), which is thought to confer grazing resistance. They incorporate more silica bodies, are more fibrous, and have lower nutritional content than C3 grasses (Caswell et al. 1973; Platou and Tueller 1985).

Table 1. Presumed grazing-resistant ecosystems (Serengeti, Great Plains) compared to presumed grazing-sensitive systems in the Greater Yellowstone Area

	Grazing-resistant		Grazing-sensitive	
	Serengeti	**Great Plains mid- and short-grass prairie**	**Northern YNP**	**Jackson Valley**
Rainfall (mm)	350–1,200	250–610	300–550	430–640
Elevation (m)	1,135–1,800	300–1,200	1,600–2,600	1,850–2,600
Percent grasslands	40		55	37
Predominant photosynthetic pathway	C_4	C_4	C_3	C_3
Major grass growth form	sod-forming	sod-forming	bunchgrass	bunchgrass
Grass reproduction	vegetative & seed	mostly vegetative	seed	seed
Growing season	76 days to continuous	90–129	74–121	36–76
ANPP (g/m^2)	960	180–400	60–120	45–300
N yield consumed (g/m^2)	3.9–5.6	n/a	1.1	0.84
Ungulates/km^2	120	n/a	16–21	2–71
Number of ungulate species	27	3–4	6	6
Major grazers	wildebeest, zebra, gazelle, buffalo	bison, pronghorn, now cattle	elk, bison	elk, bison

Ungulate grazing could be harmful to plants and soils. Trampling and hoof action may increase soil compaction, increase sediment yield, and increase soil bulk densities. Root biomass and seed production are widely held to be reduced by grazing (see reviews by Ellison 1960; Belsky 1986). Plant production, plant sizes and shapes, and plant recruitment rates can be dramatically reduced by grazing (Dyksterhuis 1949; Pond 1960; Jaindl et al. 1994). Bare ground increased about 11–18% on grazed areas in YNP, and 17% in Jackson Valley (Coughenour 1991; Singer 1995; Zeigenfuss et al. 2003) as compared to ungrazed exclosures.

However, ungulate grazing may also affect annual net primary production (ANPP) through higher nitrogen excretion by ungulates and greater N retention in the system. Any decline in N or other nutrient cycles or pools is potentially serious to grazing ecosystems, because some pools may take decades or even centuries to accumulate. Nitrogen is typically limiting to plants in most terrestrial ecosystems. Its abundance is closely tied to soil fertility, soil organic matter, and soil water retention. Large changes in N abundance may alter plant species composition (Ritchie et al. 1998).

The primary objective of this review is to answer the question, "Can these GYA grazing systems develop some of the same dramatic compensatory responses to grazing that the Serengeti grasslands do?" In order to answer that question, we first compare the sustainability of GYA montane winter ranges to other well-studied North American and East African grasslands and shrublands. Second, we inspect GYA grasslands for any acceleration or deceleration of nitrogen processes. Third, we inspect the GYA for any stimulation of aboveground production of graminoids due to grazing. Our two study areas in the GYA are the northern winter range of Yellowstone National Park and the grassland winter ranges of Jackson Valley, Wyoming.

Study areas

Northern ungulate winter range of Yellowstone National Park. The northern range of Yellowstone National Park encompasses ~1100 km^2 in the park (82%) and the Gallatin National Forest (18%) along the Montana–Wyoming border in the northwest corner of Wyoming (Figure 1). Elevations range from 1,600–2,400 m. Average 30-year (1971–2000) annual precipitation near park headquarters in Mammoth, Wyoming, was 37 cm (Natural Resources Conservation Service Data), but higher sections of the range receive closer to 55 cm annually (Singer 1995). Mean 30-year summer (June–August) temperature was 15.8°C; winter (December–February) temperature was −5.9°C. The growing season is short (74–121 days). The northern range is primarily forest (41%) and sagebrush steppe/grassland (55%). Wild ungulate species include elk (*Cervus elaphus*), bison, moose (*Alces alces*), mule deer (*Odocoileus hemionus*), pronghorn (*Antilocapra americana*), and bighorn sheep (*Ovis canadensis*).

Grassland ranges of Jackson Valley. The Jackson Valley ungulate winter range encompasses ~2267 km^2 of public (Grand Teton National Park, the National Elk Refuge, Bridger-Teton National Forest) and private lands in the Snake and Gros Ventre river drainages north of and surrounding the town of Jackson in northwest Wyoming (Figure 2). Elevations range from 1,850–2,600 meters. The range is 52% forested (46% coniferous, 6% deciduous), and 37% sagebrush and grasslands. The 30-year (1971–2000) mean summer (June–August) temperature in the region was 14.3°C; mean winter (December–February) temperature was −8.9°C (Natural Resources Conservation Service Data). The 1971–2000 average precipitation in the region was 54.1 cm. Growing seasons are very short (36–74 days).

Locations of study sites can be found in Zeigenfuss et al. (2003). Wild

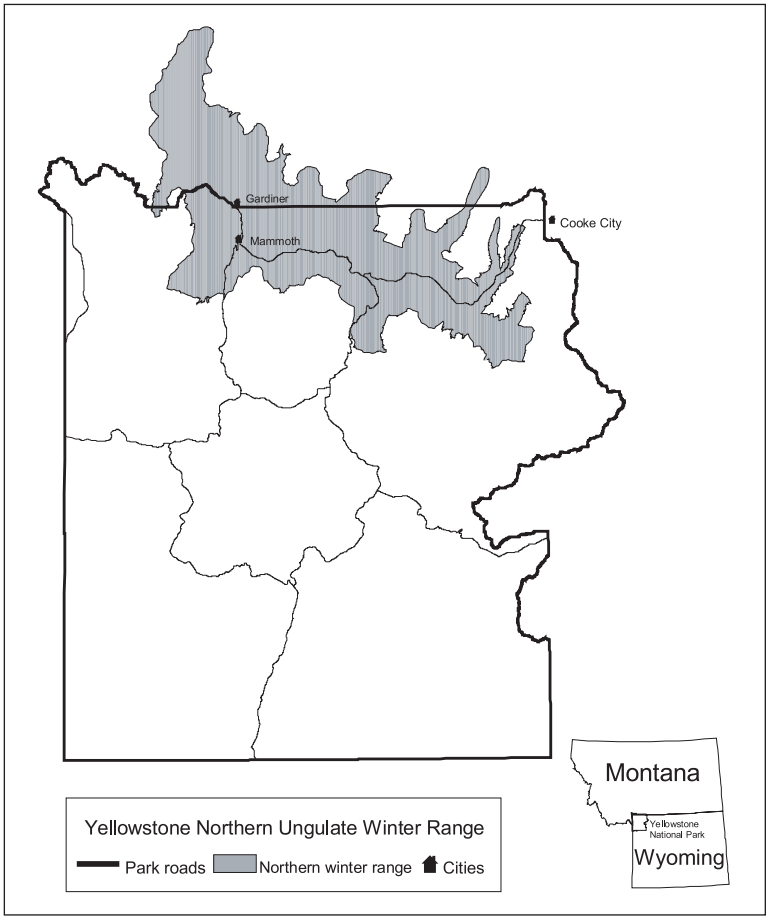


Figure 1. Map of the northern ungulate winter range of Yellowstone National Park.

ungulate species include elk, bison, moose, mule deer, pronghorn, and bighorn sheep. Approximately 36% of this winter range (~98 km^2 in Grand Teton National Park and ~730 km^2 in the Bridger-Teton National Forest) is grazed by domestic cattle during the summer. Elk and bison are the primary wild grazers. A portion of the elk herd and nearly all of the bison herd spend the bulk of the winter months on the National Elk Refuge and three feedgrounds run by the state of Wyoming in the Gros Ventre drainage, where they are fed alfalfa pellets or hay for two-to-three months of the winter.

Sustainability of GYA systems to grazing

Our review suggested that as traditionally viewed, the GYA and other montane grasslands of the interior northern Rockies are more sensitive to grazing than either the Serengeti or shortgrass prairie (Great Plains) grasslands (Figure 3). However, the differences are not nearly as dramatic as previously perceived. GYA and montane grasslands regularly sustained ungulate consumption rates of 45%, while the shortgrass prairie of the Great Plains sustained 66% use (Figure 3). Detrimental levels of use in grasslands followed the same approximate pattern. Use levels of 70% or higher were detrimental for GYA montane grasslands, 80–90% or higher for shortgrass prairie, and 80% or higher for Serengeti grasslands.

Shrubs are generally less tolerant of herbivory than grasses, because they have fewer reserve meristems, nonintegrated modules, and slow, determinant growth rates. Similarly, GYA riparian shrub communities were more sensitive to herbivory than were grasslands (roughly ≥30% annual removal rates of shrubs were detrimental; Figure 3). Several shrub communities with rapid annual vertical growth that were found in burned or otherwise disturbed sites in mesic ecosystems (such as the Great Lakes and northwest U.S.) were the most resistant shrub communities (Figure 3). Shrubs of the sagebrush steppe, such as those found in the GYA, were

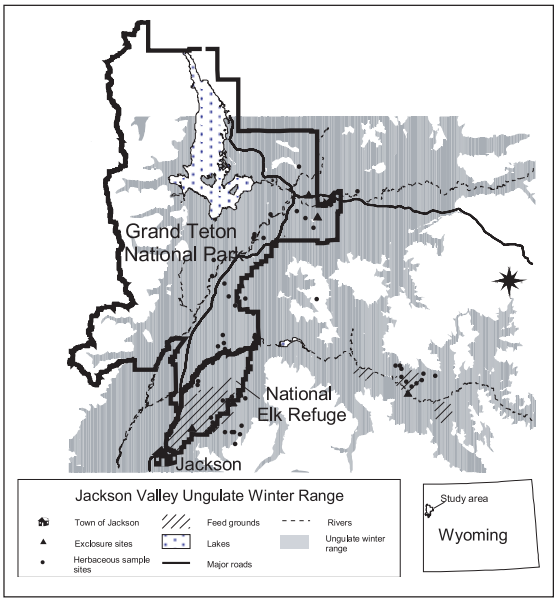


Figure 2. Map of Jackson Valley ungulate winter ranges, Wyoming.

the second-most resistant shrub type to browsing, of those reviewed. Forest understory shrubs were the most sensitive to browsing. Removals of as little as 10% of the current annual growth of forest understory shrubs resulted in dramatic effects on the woody community (Figure 3).

The evolutionary history of grazing in GYA grasslands needs to be reconsidered. Apparently, the grasslands of the GYA are very well-adapted to grazing. Plants may have coevolved with grazing animals (Verkaar 1992). Alternatively, plants may already possess mechanisms that "preadapt" them to repair and replace tissue lost to herbivory (Harper 1977). Examples of preadaptions to herbivory include prostrate growth of some plants, large belowground root reserves (a preadaptation of plants in arid ecosystems), rapid growth rates, and basal meristems. Many adaptations to drought preadapt plants to survive the effects of herbivory. Thus, compensatory responses observed may not necessarily reflect any evolved plant–herbivore mutualisms.

GYA grasses also were observed to be well-adapted to seasonal graz-

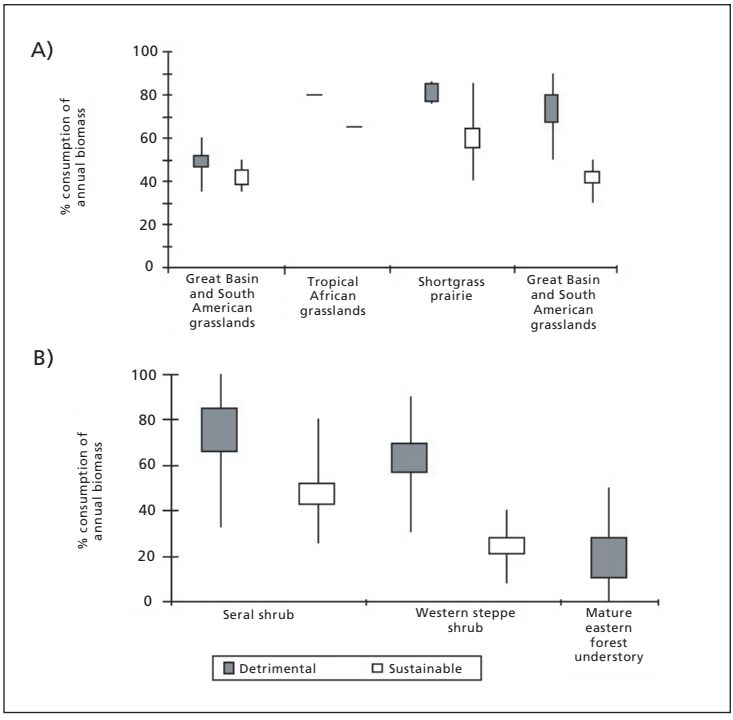


Figure 3. Schematic of percent consumption of herbaceous (a) and shrub (b) species by ungulates that were reported in the literature to be sustainable or detrimental to growth, production, vigor, or fitness components (from Singer et al. 2002).

ing; ungulates preferred sites with greater productivity, and seasonal movements of ungulates resulted in brief, intense bouts of grazing from which plants could recover (Frank and McNaughton 1992). Bluebunch wheatgrass, intensely grazed in the spring in YNP, "caught up" in growth of both aboveground and root biomass by late summer compared to ungrazed counterparts (Merrill et al. 1994). In YNP, no differences were found in sediment yield, soil temperatures, or soil nutrient pools between grazed and ungrazed sites (Lane and Montagne 1996; Singer and Harter 1996; Singer et al. 1998a). Grazing did not influence plant species richness in YNP, and exotic plants did not invade grazed areas, although exotics existed in two areas where they were planted in the 1930s. Exotics also occur on disturbed roadside sites on the northern range. Standing crop biomass of specific plant species was generally not influenced by grazing, except one common grass species and three forbs were less abundant on grazed plots (Singer 1995).

In spite of the compensatory responses to grazing, several more sensitive plant species or groups of species, and several locales were overused by ungulates. These plant communities in the GYA were declining as a result of herbivory by high densities of elk and bison. For example, willow patches in the Jackson Valley consumed at rates of 25–27% of the current annual growth (CAG) were about 60% shorter, and production was about 60% less than maximum values (Dobkin et al. 2002). Percent consumption of ≤17% of CAG appeared to be a safe level of use, and did not reduce current annual growth to levels below those of unbrowsed patches of willows. Unfortunately, browse use in Jackson Valley was highest on the National Elk Refuge, where elk and bison are artificially fed each winter. Seven of 10 samples of willow patches on the refuge revealed excessive use based on these levels. Similarly, some patches of willows on Yellowstone's northern range were apparently overused. Short, height-suppressed patches of willows were browsed at use levels of 28% of CAG, while tall willows were used at only about one-half that rate, 15% (Singer et al. 1998b).

Some grasslands in the Jackson Valley were also grazed at apparently excessive rates of 80–90%. Production declined and these sites tended to be dominated by exotic grass species (*Poa pratensis, Agropyron cristatum*) (Zeigenfuss et al. 2003). Also, the Wyoming big sagebrush subspecies (*Artemisia tridentata wyomingensis*) found in the boundary line area of Yellowstone's northern range was browsed at very high levels of 66% of CAG (Singer and Renkin 1995). Heights, numbers, and recruitment of Wyoming sagebrush are dramatically reduced by browsing. Yellowstone's boundary line area is an area of altered use by ungulates. Migrations of elk out of the park may be curtailed, and some Yellowstone pronghorn do not migrate to the summer range. Late hunts of pronghorn outside the park may discourage movements from park lands, and may also concentrate pronghorns on this

Table 2. Compensatory responses to grazing compared between the Greater Yellowstone Area and Serengeti native ungulate systems

	Africa	GYA	
Compensatory responses	**Serengeti**	**Northern YNP**	**Jackson Valley**
Stimulation of aboveground grass biomass production by grazing	Yes	Yes	Yes
Change	+ up to 3×	+ 21–47%	+ up to 2×
Nitrogen acceleration	Yes	Yes	Yes
Change in net N mineralization	+ ~2×	+ ~2×	+ ~2×
Change N concentration in live grass tissues	+ 9–45%	+ 21%	+ ~2×
Change N yield	+ several ×	23%	n/s
N excreted in feces and urine $gN/m^2/yr$	3.99	+ 0.49	+ 0.38
Net movement of N to winter range (kg/ha/yr)	n/a	+ 0.0606	n/a
Stimulation of belowground (root) production	Yes	Yes	Yes
Change	–19% (shortgrass) +85% (tallgrass)	35	n/a

n/s = no significant difference
n/a = not available or not applicable
From McNaughton et al. 1993; 1998; Frank et al. 1994; Frank and Groffman 1998; Stottlemyer et al. 2003.

area.

Nitrogen acceleration

Acceleration of nitrogen processes has recently been reported for GYA winter ranges. This new information on nitrogen processes published in the last five years is reshaping our view of GYA grassland–ungulate grazing systems. The work reported here, unless specified otherwise, includes not only winter ranges but also a diversity of wet and dry transition and summer range grassland sites. Soil nitrogen mineralization rates were about double on grazed vs. ungrazed winter range sites in YNP (Frank and Groffman 1998; Table 2). This finding of a near-doubling in mineralization due to grazing has been corroborated recently in the southern GYA in Jackson Valley (Stottlemyer et al. 2003), where ungulates excreted substantial amounts of urine and feces annually to the soil surface (Table 2). Migratory ungulates in the GYA also moved nitrogen from summer to winter ranges (Table 2).

The mineralization process provides highly labile, or usable forms of nitrogen to plants and soil microbes. Grazing by native ungulates in the GYA increased these more labile forms of nitrogen for plants compared to ungrazed exclosures through increased mineralization rates (Frank and Groffman 1998; Stottlemyer et al. 2003). Plants respond to this greater avail-

ability of N through widespread higher concentrations of N in live plant tissues (Coughenour 1991; Merrill et al. 1994; Singer 1995; Singer and Harter 1996). Typically, N concentrations averaged 21% higher in grasses and upland shrubs—a very substantial increase.

Ungulate grazing may result in the process of nitrogen acceleration on grazed patches. Ungulate feces and urine represent a potentially valuable source of N inputs to the soil, and they provide N in the form of ammonium and nitrate that is more usable to plants. When ungulate excretions come into contact with plant litter, they increase the ratio of nitrogen to carbon, and thus increase the rate of decomposition of senescent plant material (Seagle et al. 1992; Pastor et al. 1993). Plants accumulate the more available N in tissues, resulting in higher concentration of N, and often higher aboveground N yield. Ungulates may thus prefer the more nutritious re-growth of previously grazed plant tissues, resulting in positive N feedback to repeatedly grazed patches. This may result in "grazing lawns" similar to those observed in the Serengeti.

Stimulation of vegetative production by grazing

Overcompensation, defined as cumulative biomass of grazed plants that is greater than that of ungrazed controls, was, until about 1990, suspected to be limited to the Serengeti, to a few special or unique situations, or to where plants were artificially watered or fertilized (Belsky 1986; Detling 1988). However, in the previous 10–13 years, examples have also accumulated in North America for overcompensation or stimulation of ANPP attributable to grazing (Paige and Whitham 1987; Hik and Jefferies 1990), although this evidence has not been without counterpoints (Bergelson and Crawley 1992).

Stimulation of aboveground production of grasslands in YNP, at levels of about 45% consumption of ANPP, has been documented by Frank and McNaughton (1993). These authors attributed this stimulation, in part, to the migratory behavior of ungulates on the northern range that follow newly greening, high-quality forage as it moves across the Yellowstone ecosystem. Similar stimulation, at levels of 40–60% consumption, has recently also been documented for grasslands of the Jackson Valley (Zeigenfuss et al. 2003). Elk and bison on the Jackson Valley winter range also follow the greening of forage in the spring to their higher-elevation summer ranges.

Conclusions

The Serengeti wild ungulate grazing system is tremendously different from GYA ungulate grazing systems. The Serengeti is a tropical ecosystem, with growing seasons up to four times longer, and precipitation as much as two-to-three times greater (except in a few dry shortgrass regions). As a consequence, the aboveground annual production of the Serengeti was four-to-eight times greater, and ungulate densities were six times greater.

Ungulate species diversity is also about six times greater in the Serengeti than in GYA ecosystems. Thus, in many ways, the GYA is not comparable to the Serengeti. However, in spite of these dramatic differences in production, GYA winter ranges demonstrated a remarkable number of positive compensatory responses to grazing that were similar to those in the Serengeti ecosystem. There are several potential explanations for the compensatory responses to grazing observed in the GYA. The movement of nutrients from outside the ecosystem under consideration may explain the compensation (Mazancourt et al. 1998), and elk in the GYA are suspected of transporting nitrogen from the summer range where they gain weight to the winter range where they lose weight (Frank et al. 1994; Singer and Schoenecker 2003). Frank and McNaughton (1992) felt that the strong migratory behavior of elk and bison in the GYA resulted in intense, but short, grazing, and time for plants to recover. This may be an important property of this ecosystem that permits plants to sustain grazing. Grazers in YNP increase rates of root turnover, increase net soil mineralization, and thus facilitate the availability of highly usable N to plants (Frank et al. 2002; Stottlemyer et al. 2003). Both GYA ecosystems were nitrogen-limited, and plants that are strongly nutrient-limited are more likely to respond to ungulate acceleration of nutrient processes.

The stimulation of grassland production observed in the GYA was strongly correlated to sites where nitrogen acceleration (2× higher mineralization, higher decomposition) was observed. Nitrogen acceleration and higher turnover rates of root carbon (Frank and Groffman 1998; Frank et al. 2002; Stottlemyer et al. 2003) apparently explain the stimulation. Thus, coevolution, or mutualism, between grasses and grazers is not necessarily implied for the observed responses.

Stimulation of aboveground production by grazers is very rarely observed (Belsky 1987). When observed, the stimulation has often been attributed solely to unique environmental conditions, including monocultures, rich soils, and continuous wet growing season (Painter and Belsky 1993; Belsky et al. 1993). The fact that YNP grasslands do not possess these conditions makes the findings especially unique.

We stress that these findings of stimulation by no means support, carte blanche, all grazing levels in the GYA. The stimulation occurred only at moderate, and not high levels of grazing, i.e., grazing optimization is implied. We recommend against management that allows the highest levels of grazing, e.g., 70–90% use, such as occurs on a few sites in the Jackson Valley. The apparent overuse of riparian shrubs and trees on some sites on the northern range is a serious ecological issue (National Research Council 2002); however, the recent restoration of wolves to the area is apparently resulting in the height release of cottonwoods and willows (Beschta 2003; Ripple and Beschta 2003; Singer et al. 2003). These recent findings may point to the need for further

analysis of grazing effects on shrub communities of the GYA compared to other grazed ecosystems.

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Early wildlife and parks research in East Africa: parallels with Yellowstone?

Opening Keynote Address
October 6, 2003

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Lee M.Talbot is Professor of Environmental Science, International Affairs, and Public Policy at George Mason University, and senior environmental advisor to the World Bank. He is an ecologist and geographer with over 45 years experience in national and international environmental affairs, biodiversity conservation, management of wild living resources, environmental policies and institutions, environment and development, ecological research and advising in 128 countries. He has also been Director General of the World Conservation Union (IUCN), environmental advisor to three U.S. Presidents, and head of environmental sciences at the Smithsonian Institution. As the first Staff Ecologist of the World Conservation Union, he spent over six years conducting pioneering ecological research on the Serengeti–Mara Plains of East Africa with his biologist wife. He has served on over 20 committees and panels of the National Academy of Sciences, and is the author of over 270 scientific, technical, and popular publications. He has received national and international awards for his scientific accomplishments, environmental work, popular and scientific writing, and documentary film.

As an introduction to this conference I have been asked to discuss the early days of wildlife and parks research in East Africa, and possible links with Yellowstone. On reflection this seems particularly appropriate, because I have a background and heritage that combines both areas. My grandfather, C. Hart Merriam, was a naturalist on the Hayden Expedition that explored what became Yellowstone National Park in 1872. Subsequently, as head of the Bureau of Biological Survey, now the Fish and Wildlife Service, he and colleagues such as Vernon Bailey continued with faunal surveys and explorations of the Great Plains and the Yellowstone area. I vividly recall their stories about the wildlife and the area of those days. These memories were reinforced by my father's pioneering work in range and wildlife ecology, and my mother's work with Native Americans. Consequently, I grew up with Yellowstone and the Great Plains an integral part of my heritage.

But at the same time, the East African plainsland and wildlife also loomed large in my early years. My parents knew Martin and Osa Johnson, the explorers whose early movies and National Geographic lectures brought the Serengeti's wildlife riches to American public attention. I had eagerly

read accounts ranging from those of the early hunter/naturalists like Selous, Roosevelt, and Percival to Hemingway's Green Hills of Africa. I was drawn intellectually to the spectacles of the plainsland with its wildlife, and also, I must admit, to the romance of safari life.

However, I did not make a conscious link between East Africa and the Yellowstone area until early 1956, when I had the good fortune to work in the Serengeti region. One hot afternoon when car trouble brought operations to a temporary halt, I climbed a small rocky hill overlooking the plains. Sitting in the sparse shade of an acacia, I could see the Ngorongoro Highlands rising mistily beyond the grasslands. Herds of wildebeests and gazelles dotted the plains until they disappeared in the afternoon haze. A pair of jackals trotted across the foreground, hyenas loped between the grazing herds, and vultures wheeled hopefully in the hot sky. I found myself, then, with the curious feeling that I was no longer in the Africa present, but rather that I had stepped back into history. The head-heavy wildebeests could have been American bison with the Rockies rising mistily in the distance, the gazelles our antelope, and the hyenas and jackals our wolves and coyotes.

With the endorsement of Uganda's governor and subsequent personal visits to the Colonial Office in London and the Fulbright headquarters in Washington, it was possible to convince the Fulbright program to accept wildlife research as an acceptable category for Fulbright scholarships. Within six months, we had three outstanding American wildlife biologists working in Uganda—two on the hippos and a third working on a similar problem with elephants in the country's other national park. They proved their value to the park management, so the program was continued and the original biologists and their successors established wildlife research as an integral component of the Uganda National Parks. When the Uganda Fulbright program was completed, the field research center they established at Queen Elizabeth [National Park] was taken over and expanded by English organizations.

Prior to my initial work in the Serengeti, I had carried out research or surveys in North America, Latin America, Africa, Europe, the Middle East, and South and Southeast Asia (Talbot 1960). Nothing I had experienced had thrilled and challenged me as did the Serengeti region. From my first experience in the Serengeti, I had found that other than hunters' anecdotes, virtually no biological or ecological information was available on the area or its fabulous wildlife migrations. It was virtually a blank slate. Consequently, it appeared to me that the most exciting and productive ecological research in the world would be an extended ecosystem study of the greater Serengeti area. In 1959, I returned to East Africa to carry out that study with my then-new biologist wife, Marty, under the sponsorship of the U.S. National Academy of Sciences. Ultimately, and on the request of the governments of Kenya and Tanganyika (later Tanzania), we would spend nearly six years on research

safari in the area, with periodic returns over the subsequent 40 years.

We felt that it was only good science to try to find all the previous work from the area and build upon it. Continued literature searches had turned up no new data other than a report by Dr. Pearsall of the U.K., who had made a brief, government-sponsored survey of the Serengeti park boundaries in 1957 to follow up my 1956 survey. In addition, we knew that there had been three brief but as yet unpublished research or surveys in the area, so en route to the Serengeti we visited the individuals in New York, Germany, and Uganda, with mixed results. The fine British ecologist, Frank Frasier Darling, had just made an ecological reconnaissance of the Kenya Mara, and he generously gave us a copy of his handwritten manuscript. A Canadian biologist had made a brief study of Thomson's gazelles in the Serengeti and he showed us his thesis. Bernhard Grzimek and his son, Michael, had visited the Serengeti briefly in 1957, and sought to buy part of it to conserve it. They were told that was not possible, but were given my earlier recommendations for needed ecological research. In 1958, they returned for several months. Michael started the research but was killed in an aircraft crash, and Bernhard made the movie, *The Serengeti Shall Not Die*. We spoke with Bernhard in Germany, and another of his sons advised us on camera equipment.

When we arrived in early 1959, the wildlife research situation in East Africa remained much as it had been three years earlier, except for the Fulbrighters in Uganda. The one biologist as such on the staff of an East African game or parks department recently had been hired for "vermin control" by the Tanganyika Game Department. Not only did East Africa have virtually no solid biological information or research on its wildlife, but it also had no physical or institutional facilities for supporting such research, nor any organized way to handle and disseminate the information that such research might have produced. Consequently, to establish a long-term ecological research program in the Serengeti–Mara region, we basically had to start from scratch and create our own physical and institutional support system.

Take, for example, obtaining the necessary approvals. To do field work in East Africa at that time, one needed approval from the governor's office, and also from the provincial and district headquarters. To carry out research in a park, one needed approval and permits from both the national park and game department authorities, along with their personal endorsement and support. Collections required additional permits. To verify plant identification, one had to make the arrangements well in advance with the Nairobi Herbarium and with the individual botanists. In these, as in most other matters, my previous work and contacts in East Africa and knowledge about how things were done helped us immensely.

By 1959, there were several research centers established by the East African High Commission to assist all three East African territories with agri-

cultural and other development. Two of these, the East African Agricultural and Forest Research Organization (EAAFRO) and the East African Veterinary Research Organization (EAVRO), were potentially interested in wildlife. Both were located in a research park called Muguga about 18 miles north of Nairobi, so we introduced ourselves and our plans to them, and on their invitation we made Muguga our headquarters when we were not in the field.

There were other institutions with potential for assistance in various ways, including the Geological Survey, the East African Herbarium, and the Nairobi University. We spent considerable time initially meeting and consulting with all the East African institutions that we thought might be involved in our study. We also met with all the government officials, including the governors, the provincial and district administrators, heads of game and parks departments, and even the police and central firearms offices. The Mau Mau insurgency was still active in parts of Kenya, and the authorities wanted us both to carry side arms and maintain good security with our weapons.

Kenya's governor graciously gave us authorization to conduct research anywhere in Kenya, except in the Mara. "You will have to make a separate peace with T.B. Major Temple-Boreham," he told us. T.B. was the legendary game warden of Narok District, where the Serengeti ecosystem extends into Kenya. We did make "our peace" with T.B., and we greatly valued his friendship and assistance, as well as those from the Kenya Game Department.

It is hard to overemphasize the importance of meeting and briefing the colonial government officials at that time. Each had absolute control over his jurisdiction. If he liked and supported you, you could do virtually anything and would get invaluable help. If he felt slighted, you would find roadblock after roadblock. In the following years, many researchers tried to maximize their research time by avoiding official visits, and they often rued the day.

One example illustrates. Somewhat later, in Uganda, there were two competitive American wildlife biologists. One, a fine scientist, would arrive by plane, get his land rover, drive directly through the capital and out to his research site, bypassing all the officials so he would not waste time getting to his fieldwork. When the district officer made a half day's safari to visit him at his research site, this scientist felt he had no time to show him what he was doing or give him hospitality. The other biologist, a less distinguished scientist, would spend two to three days in the capital visiting and briefing all the relevant officials. He would then visit the provincial and district officers en route to his research area. And when any official came to his research camp, he took time off to be hospitable and show him what he was doing. The first scientist had immense trouble with virtually everything including permits, supplies, labor, and transport; in the long run, he spent a vast amount of time trying to make things work, and eventually he was refused the right to return to his research site. We once were asked to intercede on his behalf just to get

him back into the country. The other scientist received every assistance, and had an open invitation to return any time. In spite of the stature of the first scientist, the second one was far more productive and successful.

Our research area covered roughly 20,000 square miles, including the Mara area of Kenya and the greater Serengeti region of Tanganyika. By 1959, there were two dry weather dirt roads in the whole area, one across the northern edge in Kenya, and the other from the Ngorongoro Crater north to Senonera camp, which by that time was being developed as park headquarters. For our fieldwork we purchased a used land rover, modified it extensively, and collected safari equipment at auctions in Nairobi. The Kenya Veterinary Department allowed us to use a small veterinary house at the far north end of the Mara area, and in Tanganyika the Serengeti National Park allowed us use of an old German scout house. However, most of our time was spent on safari traveling through the study area with our land rover and tent, driving transects, capturing, marking, and following the migrating animals, checking on vegetation stages and fires, setting up plots with soil pits, vegetation transects, and photo points, and generally monitoring the ecosystem. We periodically returned to one of the houses to re-provision, and each six to eight weeks we drove out to spend a few days at Muguga and the bright lights of Nairobi to work up specimens and notes, and re-supply.

For our aerial surveys and censuses we either rented a small plane or used one belonging to a Kenya game warden friend who periodically would fly over and join us. We organized what has been called the first biome study, where we had scientists from over a dozen research institutions in several countries joining us periodically and conducting generally linked research on different aspects of the ecosystem, which we then sought to synthesize into a unified, dynamic description of the Serengeti–Mara ecosystem.

While our relationships with the game departments in Kenya and Tanganyika were excellent, we—and to some degree, most of those who followed us—did find some strains with the Serengeti park wardens. By the time we returned in 1959, wardens' houses had been constructed at Seronera, and there were two wardens in residence along with other staff. While there were virtually no tourist visitors yet, the wardens felt that scientists should obey the rules set up for eventual tourists. Among these rules were no driving after dark, and no driving off the road. This required some negotiating, particularly since there was only one road—a track—at that time. We also had some disagreements on wildlife management. For example, one of the wardens wanted to sight-in his rifles on wild dogs since he regarded them as vermin. And when he was in a bad mood he would go out and shoot every hyena he could find. One morning, for instance, we found the carcasses of nearly 20 hyenas he had shot the night before. The idea that research could provide information of use to management was foreign to the park's staff. They "knew" what they were

doing, and did not want any extraneous information or opinions.

Although the Serengeti Park's wardens had little interest in research results, we found that there was keen interest on the part of some staff of the game departments, other resource agencies, and research organizations. A common complaint in developing countries was that foreign researchers would receive assistance and facilities, then leave and take their information with them, bringing no benefit to their erstwhile hosts. So Marty and I made a point of preparing and widely distributing our preliminary findings in the form of mimeographed reports. We also published some of our early findings in the local East African Agricultural and Forestry Journal.

The early 1960s saw a dramatic increase in wildlife research and researchers in East Africa. By 1964, when we did a survey for the United Nations of past and present wildlife research in East Africa, we found that there had been nearly 100 researchers since my first work in 1956 (Talbot 1965). Most of these focused narrowly on some aspects of physiology or behavior and relatively few dealt with ecology per se. However, they illustrated trends and problems in research, some of which have continued.

All were short-term studies, mostly of a few months duration and at most covering two years. Most did not search out previous data. Only a few of the over 200 publications we identified had cited any previous research from the area. We regarded this as poor scholarship, although some of the researchers from England were proud of that approach, saying that it freed them from preconceptions. Most researchers based dogmatic and sweeping conclusions on their short and often narrow research, and where they did note earlier research it was to show how wrong the earlier researchers were because they reported different findings. This behavior showed a fundamental misunderstanding of ecology and of the East African environment.

Over a period of years in East Africa, there are broad fluctuations in precipitation and other weather conditions. A wet year can be followed by a dry one, or several wet ones may be followed by several years of relative drought. Since my first Serengeti work there have been at least three periods of severe drought. Even a two-year study only provides one small window on the range of conditions encountered over a span of 10 to 15 years, much less one of several decades. Differences in weather, in turn, can dramatically affect vegetation growth, species composition, and distribution; and in turn can affect the food habits, population dynamics, behavior, and survival of the wildlife. Fire, livestock grazing, disease, and hunting also affect the system and are in turn affected by the weather. It is only through long-term studies that the true, dynamic nature of East African ecology can be described accurately.

In 1960, the Tanganyika national parks got a new director, John Owen, who had an appreciation of the potential importance of research to the parks. In periodic visits with him, we emphasized the desirability of establish-

ing a wildlife research center in the Serengeti that could study and monitor the dynamics of the Serengeti system, coordinate research, seek to provide continuity, and assure that research provided for management needs. Subsequently, with initial funding from Germany and later from the U.S. and U.K., John started the Serengeti Research Institute (SRI), which still exists.

The SRI history continues to illustrate the evolution and problems of wildlife and parks research in East Africa. The facility did provide the researchers who followed us with a ready-made physical and institutional base for their work. However, in part because of the sources of funds, most researchers did their own thing, often with relatively little reference to other research or the needs of the park. Each time I visited SRI in subsequent years, I was told by some researchers that they had little idea of what some of the others were doing. In 1978, [A.R.E.] Sinclair and [M.] Norton-Griffiths edited the first of two compendia of Serengeti research results seeking to bring together the results and "to see where we stand" (Sinclair 1979). They noted, "Until now, management has been based upon either intuition or short-term studies conducted in response to local ecological crises, such as elephants damaging mature trees." They noted the problem of "short term studies too narrow to have provided a proper perspective."

The second Serengeti compendium, *Serengeti II,* edited by Sinclair and Arcese in 1995, further illustrated the evolution (Sinclair 1995). I use both volumes in a graduate seminar on East African grassland ecology, and my students always note the differences between the two books. The researchers in the first often are more dogmatic, they have the answers, and they seem to be seeking an ecological stability, a balance. In contrast, some papers in the more recent volume more overtly recognize the dynamic nature of the ecosystem and the limitations of our knowledge.

This change also reflects the larger shift in ecological thinking. Some call this "the new ecological paradigm." Although it is called "new," the facts have been known by some for many years; but it is only relatively recently that there is more widespread recognition and acceptance of the knowledge. Formerly, the dominant paradigm was that of an ecosystem that was stable, closed, internally regulated, and behaved in a deterministic manner. This was the homeostatic ecosystem cited by some early East African wildlifers, including some of the Fulbrighters. The new paradigm is of a much more open system, one in a constant state of flux, usually without long-term stability, and affected by a series of human and other, often stochastic factors. As a result, the ecosystem is recognized as probabilistic and multi-causal rather than deterministic and homeostatic; it is characterized by uncertainty rather than the opposite.

Ironically, this recognition of uncertainty and instability creates further problems between researchers and park managers. Managers want clear

answers. Relatively few researchers in East Africa have tried to provide information for park managers. However, in the past when they did, they were often too short-term, narrow, and concerned with stability to be of much help. Now, researchers who recognize the uncertainties often provide probabilistic information to managers that is often considered to be equally unsatisfactory. In the U.S., the conflicts between what park managers wanted and what biologists provided were abundantly clear when I served on a science advisory board to the director of the U.S. National Park Service, and also when I was offered the position of Chief Scientist to the NPS. In this context, there are clear parallels between East Africa and the Yellowstone.

Another area where there are some parallels but also contrasts between Yellowstone and the Serengeti involves the local residents in and around the parks. When parks were created in both areas, the indigenous peoples were removed, and a major effort of the parks' staffs has been to keep people out. This was the case with the Serengeti National Park, but the Kenya Mara was quite different. In the late 1950s, the Royal Kenya National Parks wanted to make the Mara a national park. We, Major Temple Boreham (T.B.), and others felt this was not the way to achieve effective conservation and provide equitable treatment for the Maasai who lived there.

T.B. worked with the Maasai and I helped with the central government, and a little over two years later we succeeded; the government gazetted the Mara as a "County Council Reserve." In essence, it was a Maasai park. The Maasai agreed to establish a core area adjacent to the Serengeti as pure reserve with no grazing, hunting, or human occupancy, and the parcels of land around it were designated as hunting or photographic areas. The land remained property of the Maasai; they took responsibility for protecting and managing it; they received the fees, provided staff, let concessions, and charged admissions. The government agreed to provide training and assistance. Initially, much of the revenue went to the Maasai around the reserve, with the remainder going to the district. The agreement was that it went for schools and dispensaries, clearly marked to identify the source of funds.

This was one of the first community conservation projects, and it is probably the longest running one. In more recent years, the distribution of the receipts has changed, but the Mara continues to protect the northern part of the Serengeti–Mara ecosystem and its great migrations, and it brings substantial revenue to some of the local people.

So the Serengeti–Mara region has both models, the community conservation one where local people play the major role, and the traditional national parks one that removed local people, and that is parallel to the Yellowstone. It is believed that if the parks can bring benefits to the local people around them, the people will be more likely to support the park rather than the reverse. This principle underlies the idea of "Benefits Beyond Boundaries," the theme of

the 5th World Parks Congress just attended by some 3,000 participants from 154 countries in Durban, South Africa. Significant efforts are being made to implement this principle on some of the Serengeti's borders.

There is a rich history of wildlife and parks research that extends back 47 years in East Africa and over 120 years in the Yellowstone. There are differences between the areas, but there are also many parallels. In my view, both areas can benefit from knowledge of the experience—good and bad—of the other. I congratulate the organizers [of this conference] for starting to bring the experience of both together here; I look forward to learning from the rich schedule of talks that await us in the coming days; and I hope that this will be the start of a long and productive association between these two great areas.

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Yellowstone wildlife watching: a survey of visitor attitudes and desires

Alice Wondrak Biel

Abstract

This paper explores visitor experience and attitudes concerning a variety of wildlife watching issues in Yellowstone, specifically 1) visitor response to seeing wildlife collared for research purposes; 2) visitor desire to feed wildlife; awareness of past history of wildlife feeding in Yellowstone; 3) which wildlife are most desired for viewing; and 4) perceptions regarding the "perfect picture" of a bear in Yellowstone.

In summer 2001, I surveyed 150 visitors at the Old Faithful viewing area using a method of random selection for three-day periods during each of four summer months. Response data were then coded and analyzed using Nvivo qualitative analysis software.[1]

Results indicate that visitors are far less disturbed by seeing collared wildlife than may have been previously thought. They claim not to want to feed wildlife but exhibit a certain amount of cognitive dissonance on that point; are fairly aware of past history of bear feeding; and display a predictable preference for charismatic megafauna. Their aesthetic preferences for the "perfect picture" reveal an interesting conflation of Alaskan and Yellowstone grizzlies, past and present human/bear interactions, and scientific versus popular media influences.

This research refutes the commonly-held assumption that research collaring adversely affects visitor experience in Yellowstone, and therefore has important implications for wildlife research in national parks both here and elsewhere. The results on experiential and aesthetic preferences, and on desire to feed wildlife, are instructive in terms of mapping the intersections of acquired knowledge and personal emotion and experience relative to national park wildlife.

Background

For 60 years or so, Yellowstone was the place where visitors came to feed the bears. People got hurt, bears got killed, and the NPS got sued, but still the park's managers failed to see how it would ever be possible, or even desirable, to end the roadside feeding that was at once so desired and so detrimental. With the 1963 release of the Leopold and Robbins Reports, however, came new ideas about what parks were for and how they and their wildlife resources should be managed, which were interpreted by Yellowstone's managers as necessitating a naturalizing process throughout the park. And that meant getting black bears to stop eating marshmallows at the roadside and extricating grizzlies from the park's soon-to-be-closed open pit dumps.

To some, it also meant removing the colored streamers that some of the

park's grizzlies wore in their ears for research purposes, and minimizing the amount of marking (such as ear tags and radio collars) seen on the park's wildlife in the future. Arguments against marking were based on the contention that it gave the animals an "unnatural" appearance that visitors didn't like, and "unnatural" was undesirable at a time when the parks were charged with creating landscapes that represented "vignettes of primitive America." Biologists John and Frank Craighead, who had placed the markings on the park's grizzlies in the course of the groundbreaking studies of the animals, maintained that most visitors never saw the markings, and that many of those who did were more intrigued than bothered by them (this was but one of many things upon which the Craigheads and the NPS disagreed over the years).

In 1968, Yellowstone's rangers finally started enforcing the no-feeding regulations that had existed in the park since 1902, and roadside feeding was ended within a couple of years. By 1971 or so it was uncommon to see a roadside bear, and unhappy visitors were demanding to know where they had all gone. The park generally provided a prescriptive response to these queries, informing visitors that seeing fewer bears leading natural lives was a preferable experience to seeing many bears being denigrated by begging. Did visitors believe it? Some did, some didn't; the process of convincing visitors to "think like an ecosystem" in the wake of the vast policy changes of the past 35 years has been a long one, and the goal of this work was to gauge how far we've come, and catch a glimpse of how far we might have to go.

On the whole, park staff will tell you that although marmots, bighorn sheep, and elk are fed by visitors more frequently than bears are these days, the desire to feed Yellowstone's bears still exists in the hearts of some. That may come as a shock to those of us naïve enough to believe that 30 years of active law enforcement, NPS educational efforts, PBS nature shows, *Grizzly!*-type horror films, and wilderness ideology should have been enough to quell anyone's desire to hand-feed these massive, wild omnivores. But it is so, and what it demonstrates is the strength and lasting power of those images and attitudes that started to develop the very first time people gathered to watch bears eat garbage out behind the Fountain Hotel back in the 1890s. The question that drives this article is, just how strong and widespread is the desire to feed: how well have visitors received the park's anti-feeding messages over the years—is it just the fear of getting caught that keeps them from feeding? Or have visitors learned over the years, whether from park literature or outside sources, of the dangers that feeding brings to both humans and bears, and accepted that knowledge and incorporated it as their own?

The survey

Over the course of 13 days in May–August 2001, I administered a 15-

question survey to a random sample of 150 visitors in the Old Faithful viewing area. The survey assessed attitudes and desires in regard to a number of issues related to wildlife watching in Yellowstone. The initial questions of my survey were designed to get visitors warmed up and thinking about their expectations for their Yellowstone experience, and to measure their level of previous experience with the park. Archival research seems to show that fear of punishment was the primary factor in finally ending bear feeding as common practice in the park. Thus, in a key survey question (about whether visitors wanted to feed bears, and why or why not), punishment was hypothetically eliminated as a potential deterrent to feeding in order to determine whether or not fear of punitive consequences was the reason that today's visitors generally don't feed the bears. The other major question surveyed people's attitudes toward seeing collared wildlife, which remains controversial among researchers and managers today.

Ninety-nine percent of all visitors interviewed were white. Fifty-five percent were female, while 45% were male. Twenty-eight percent were aged 18–29, 27% were 30–45, 22% were between 46–55, and 23% were 56 or older. Respondent household income ranged from less than $10,000 per annum to over $100,000. Sixty-seven percent described themselves as married, 24% as single, and 9% as other (divorced, widowed, or in a long-term relationship). Ten percent of all respondents lived in foreign countries. Fifty-four percent of American respondents were from states west of the Mississippi River, 46% from east of it.

Expectations

To get them thinking about their desires and expectations for their visit, respondents were asked to name three things that they hoped to see while in Yellowstone. Because my research is wildlife-related, visitors who answered simply, "wildlife," or "animals," were prompted as to whether there were any specific kinds of wildlife they were particularly interested in seeing. No specific species were suggested, however—respondents were never asked if they were interested in seeing bears, for example, or wolves. The specific animals named by respondents came strictly out of their own heads. Interviewees were not prompted when giving other general answers, such as "scenery" or "thermal features."

Question: What do you most hope to see while in Yellowstone, if you could name three things? There were a fairly wide range of desired sights, but most could be categorized in terms of either wildlife, thermal features, or natural scenic features. Figure 1 shows the responses that occurred at least 10% of the time, demonstrating that among those interviewed for this project, Yellowstone's most desired sights were Old Faithful, bears, wildlife, thermal features, bison, moose, scenery, elk, grizzly bears, waterfalls, and wolves,

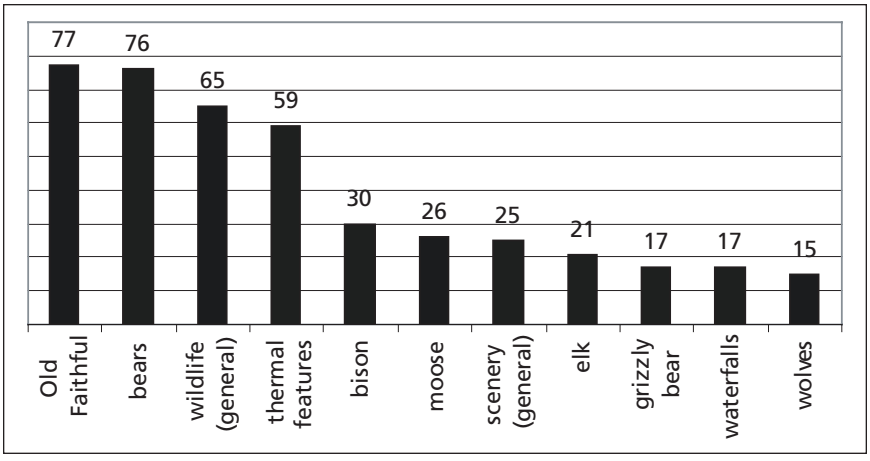

Figure 1. YNP sights that at least 10% of visitors interviewed said they hoped to see.

respectively.[2] Old Faithful and bears appear to remain the park's most popular sights by far, with a little more than half of all respondents naming them as one of the three things they most wanted to see while in the park.

These answers, of course, should be considered within their context. While Old Faithful was the feature mentioned most often (53% of the time), it should be remembered that visitors were interviewed while sitting in front of Old Faithful, waiting for it to erupt, and so were probably likely to remember to mention that the geyser was one of the things they most wanted to see in Yellowstone. Similarly, animals such as bison and elk, although popular in their own right, are also frequently visible along the roads that approach the Old Faithful area from the park's most popular entrance (the West Entrance), and so some visitors may have been simply naming sights that they had already seen. When asked, several did just that. Musing, "well, we saw a bison on the way in, we wanted to see that, and I think a deer…" was not atypical.

The frequency with which visitors mentioned wanting to see a bear, however, (52% of the time) is less likely explained in this way. Bears are not commonly visible along the road between the West Entrance and Old Faithful, and many visitors, when stating that they would like to see a bear, specifically added that they had not yet seen one or did not really expect to see one. Therefore, it seems certain that these visitors associated bears with Yellowstone by reputation, rather than because of recent experience or visual convenience, i.e., because they were looking at them.

Question: On a scale of 1–5, with 1 being not very important and 5 being very important, how important is it to you to see a bear during your visit? In spite of the fact that an impressive one-half of the visitors interviewed had stated, unprompted, that a bear was one of the three sights

they most wanted to see, it was not crucial to most people that they see one. When asked to measure, on a scale of 1–5, how important it was to them to see a bear during their visit, the overall average answer was 3.29—somewhere in the middle (this included a "minus 5" from a man traveling by motorcycle who was clearly less than interested in encountering a bear during his visit). Many people added that they would like to see one, "but it wouldn't ruin the trip if I don't," "but I won't commit suicide if it doesn't happen," or "but I know they're hard to see."

Overall, it appears that visitors come to Yellowstone today to see the things they have always come to see; extraordinary thermal features, wildlife—bears in particular—and beautiful scenery. The only average importance of seeing a bear to the overall quality of one's trip would seem to indicate that although visitors still commonly associate bears and Yellowstone, seeing a bear is no longer a driving reason for making the trip, in spite of the fact that they still appear to be one of the park's main attractions in the minds of visitors.

Collared wildlife

The debate over whether wild animals living in national parks and wilderness areas should be collared for scientific monitoring purposes has raged almost since the Craighead brothers pioneered the technique in Yellowstone during the 1960s. Collars and other markers have gotten smaller and less conspicuous over the years, and in order to further minimize their visibility, today's managers even frequently wrap collars in dark-colored tape. Nevertheless, there are those who still hold the line established by Superintendent Jack Anderson (1967–1975), maintaining that any visible marking is deleterious to the viewing experience and makes the marked animal seem "less than wild" because it is an indication of interaction with humanity. In this way, collaring shakes the façade of untouched nature that many people attribute to national parks and wilderness areas.

Other critics point out that collaring requires that animals be drugged and handled, which has in the past proven to be potentially dangerous for both wildlife and managers. Advances in drug technology have greatly decreased the potential for hazard in recent years, but the possibility of injury or death during capture, immobilization, or (in extremely rare instances) afterward still exists. Still others complain that the collars look uncomfortable and that we should simply "leave wildlife alone" and "stop studying them to death;" a rather common expression that originated in the days when animal deaths caused by immobilizing drugs were more common than they are today.

Proponents of collaring maintain that the amount and quality of knowledge that can be obtained from monitoring certain members of an animal population far outweighs the negative visual effects and small potential for danger. Innovations in GPS technology have greatly increased the scope of

that knowledge in recent years. Among other things, researchers can now learn the extent of an animal's range, measure its length of life, discover what sorts of food sources might hold it in a certain place for extended periods of time, track its reproductive history, and find out how it uses land throughout the day and night—all of which is valuable information for managers charged with making land use decisions within the Greater Yellowstone Ecosystem and protecting endangered species such as the grizzly. It is important to note that this number of collared animals in the park changes as studies are introduced and concluded.

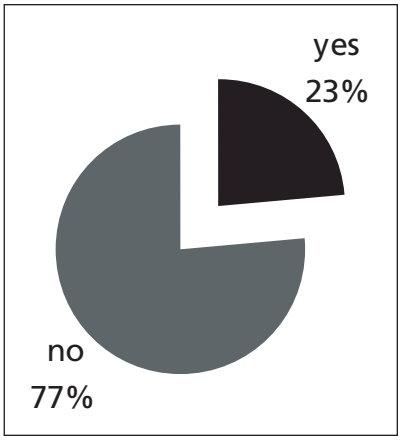

Figure 2. Percentage of visitors interviewed who said they had seen a park animal wearing a radio collar or ear tag.

Question: a) Have you seen any park animals wearing radio collars or ear tags? Roughly 23% of the visitors interviewed believed that they had seen an animal wearing a radio collar or an ear tag (Figure 2).[3] Elk were most frequently noted as having been marked, and as was earlier stated, are a fairly common sight along the road between Old Faithful and the park's most popular (West) entrance.

Question: b) If yes (or "if you did see that"), did that affect (or "do you think that it would affect") your experience of viewing that animal, one way or the other? Make it better or worse? Of those 23% (35 people) who believed that they had seen an animal wearing a radio collar or an ear tag, 77% (27 people) said that seeing the marking had had no adverse impact on their experience of viewing that animal. Visitors who had not seen any animals wearing radio collars or ear tags were asked to imagine their reaction to seeing such an animal. Of those, 86% (97 people) believed that seeing an animal wearing a collar or a tag would have no impact on their experience of viewing that animal (Figure 3). Although those who said that seeing a collared animal would not depreciate

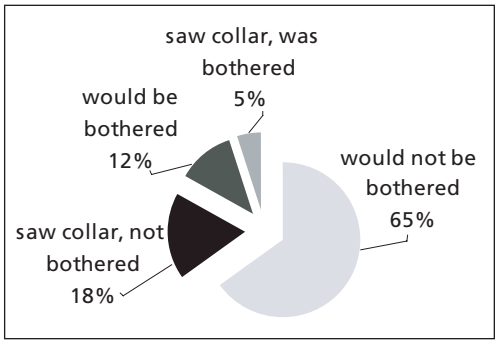

Figure 3. Percentage of people who had, or imagined that they would be bothered by seeing a park animal wearing a radio collar or ear tag.

their experience were not generally prompted to explain why not, 21 of them (17%) volunteered that they wouldn't be bothered because they knew why collaring was done and believed it to be a positive thing. One man went so far as to say that seeing a collar would actually enhance his viewing experience for that reason.

Twenty-three percent (eight people) of visitors who had seen a marked animal said that seeing the marking had adversely impacted their experience of viewing that animal. These respondents were prompted to explain why such had been the case. Three said that the collar had made the animal seem less natural. One person each said that the collar had looked uncomfortable for the animal, that wildlife should be "left alone," and that wildlife should be "allowed to be free." Two people were ambiguous as to their reasons, with one saying that "it would be better to see one without one but I understand why they do it," and the other not specifying a reason.

Of those visitors who had not seen a marked animal but were asked to imagine their reaction, 14% (16 people) said they thought that their viewing experience would be adversely impacted by the marking. These respondents were also asked to explain why this would be the case, with the overall result that 12 of the 24 people total who said that they had been or would be bothered by seeing collared wildlife said that it was because it seemed "unnatural," with one adding that collared wildlife were unsuitable for wildlife photography for this reason. Three people said that they thought the collar would be uncomfortable for the animal to wear, and two each said that "wildlife should be left alone" and that "animals should be free." Two people said that they would be bothered by seeing traces that the animal had interacted with humans, and two people said that they would be bothered because they wouldn't know why the animal was wearing a collar.

Lack of knowledge seemed to be a bit of a problem in regard to collaring. Although they were not asked about their knowledge, a total of 4% of all respondents stated that they did not know why collaring was done, with one respondent initially stating that she would be bothered by seeing a collared animal because "it would make me sad that [the animal] had to wear a collar because [it] had been fed by people" (she changed her mind after her husband explained what the collars were typically used for). Five people were ambivalent about collaring, stating that they knew and appreciated the reasons why it is done, but still didn't like seeing it.

Overall, this research shows that more than four out of five visitors surveyed said that seeing an animal marked for scientific purposes either had had or would have had no impact on their experience of viewing that animal. In fact, in some instances, the long-held contention by some scientists that far from being a bad thing, visitors' seeing marked animals was a positive byproduct of research because it generated public interest in science and

wildlife conservation proved to be true. The percentage of people who had actually seen a marked animal and been bothered by it, however, was higher than the percentage of people who had not seen a marked animal but thought they would be bothered by it, reminding us that there is a gap between how people imagine their reactions and what they actually turn out to be. But even among those who had seen a collared animal, more than three out of four said that the marking had had no impact on their viewing experience, indicating that most visitors may not cling as tightly to an ideal of "pure, untouched" Yellowstone as we may have thought they did, or as they actually did at times in the past.

Awareness of bear feeding

This question was designed as a contextual precursor to asking visitors whether they would want to feed the bears today.

Question: Are you aware that several decades ago, it was common for people to see many bears along Yellowstone's roadsides, begging for food? About three-quarters of visitors surveyed (76%) answered that yes, they were aware that people used to feed bears at the roadsides. The 24% who did not know that such was common practice in the past were informed that the activity had always been against the rules but that those rules were not enforced until the late 1960s, and that a visitor in the 1950s might have expected to see between 40–50 bears a day along Yellowstone's roads. Overall, 37% of those who were not aware of roadside feeding were 18–29 (this age group comprised 28% of the total sample), 28% were 30–45 (27% of the total sample), 19% were 46–55 (22% of the total sample), 5% were 56–65, and none were over 65 (combined, 23% of the total sample).

Though they haven't been seen for three decades, the reputation of Yellowstone's begging bears still precedes the bears of today. Visitors' knowledge of this past activity appeared to be correlative to age, with awareness increasing with visitor age. Awareness was low among those from outside the U.S., especially among the younger age groups.

"Would you want to feed a bear in Yellowstone?"

Because enforcement appears to have been the driving force behind ending bear feeding in Yellowstone, and I was interested in finding out whether visitors still had any desire to feed the bears, I asked them whether they would want to feed a Yellowstone bear if they did not have to fear being caught or punished for doing so.

Question: Today, the rules against feeding bears are strictly enforced. But during the years of the roadside bears that I just mentioned, they weren't. If we existed in a kind of vacuum here today, and you could feed bears in Yellowstone today without being afraid of getting caught or punished, do you think that's something you would want to do? Although

there are, of course, gaps between what people will say they might do when queried out of context and what they might actually do when placed in the midst of a situation, the results were overwhelming; 95% of visitors surveyed said that no, they would not want to feed Yellowstone's bears, even if they would suffer no legal consequences for doing so. Eight people (5%) stated that yes, if they could do it without fear of reprisal, they would want to feed a bear in Yellowstone.

Question: Why not?

"That's unsafe." Asking "why not" frequently earned me incredulous looks.[2] In sum, 43% of all those who answered "no" cited safety reasons (see Figure 4). Notable responses falling into this category included, "a bear can attack me," "it might kill me or scratch my car," "you don't mess with bears," "I'm chicken," and "you can't have people going around getting themselves killed." It seems clear that twenty-first century visitors to Yellowstone are fairly well aware of the risks associated with bear feeding; a change from notions shared by the people I interviewed separately who had visited during the 1950s and 1960s. Ten percent of all people interviewed said that they would not want to feed the bears for safety reasons alone. Eighty-nine percent of people who said they would not want to feed a bear provided more than one reason why not.

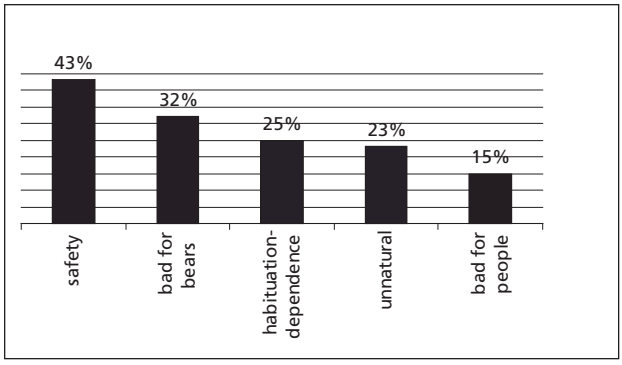

Figure 4. Most frequent answers to the question, why would you not want to feed a bear in Yellowstone? Numbers add up to more than 100% because several respondents provided more than one answer.

"That's bad for the bears." The second-most popular explanation for not wanting to feed the bears related to the idea that bear-feeding is bad for bears. Concerns cited in this category included, accurately, the popular adage that "a fed bear is a dead bear;" 10 people explained that bears that gain access to human foods have to be either relocated or killed, because they will invariably return in search for more and then become hazardous nuisances. Others (25% of those who said no) knew that bears that were fed would become dependent upon human foods, and some worried that they would be unable to survive in the winter, "when there's no one there to feed them." Eleven per-

cent mentioned the possibility that they might even lose their natural instincts and skills for foraging altogether. A third supposition was that human foods would be unhealthy for bears; that they are "not the right food" (8%). In all, 32% of the people who said they would not want to feed bears alluded to the fact that to do so would be to the detriment of the bears.

"That's unnatural." Sixteen percent of those who would not feed said they were opposed to the idea because it was "unnatural" in some way. Thirteen percent said they would not feed the bears because they were "wild," and 8% said that they wouldn't feed because the bears would cease to be wild if they were fed.

"That's bad for people." Fifteen percent indicated that feeding had negative effects on people. The most common responses here had to do with the idea that people feeding the bears today will cause trouble for those who visit tomorrow, in that they will leave behind a habituated bear who may cause property damage or bodily injury in its search for human foodstuffs.

Other reasons for not feeding included "we just want to look, not to touch" (8%), "wildlife should not be fed" (8%), a desire to follow the rules (6%), "that's stupid" (6%, once accompanied by, "If I saw someone doing that, I would hit them"), that would make it like a zoo" (4%), a concern that human feeding would disrupt the cycle of nature (4%), an overall feeling that feeding is "just not right" (3%), and a simple lack of desire to feed (2%).

As with the question of collaring, there was some ambivalence among those who said that they would not feed. In a clear case either of conflicting internal philosophies or of saying what one thinks one should say and then what one really feels, one woman commented, "I know human food is not appropriate for wildlife—wildlife needs to be with the ecosystem as it is. Have they ever thought about selling food that could be used for that?"

Question: Why? Of the eight people who said they would want to feed a bear in Yellowstone, five said that they would do it in order to be able to get close to a bear. The remaining three said that they would feed because "they're hungry," "it seems like the humane thing to do," and "I've just always fed animals. Like squirrels." Four were men and four were women, and half were in the 18–29 age group. Two were 30–45, and one each was 45–55 and 56–65. Three of these visitors lived in Idaho (a rather disproportionate turn of events, as only five respondents total were from Idaho) with the others hailing from Colorado, South Dakota, Wisconsin, New Jersey, and Georgia.

If one of the preconditions for civil obedience of a rule is that its constituency believes in its legitimacy, then the NPS appears not to have a problem in regard to bear feeding, as at least 95% of those interviewed agreed that there are legitimate reasons why people should not feed bears in Yellowstone, and were aware of what some of those reasons are. This conclusion, however, should be taken with the earlier caveat which tells us to mind the gap between

COURTESY FAYE BLACK

Figure 5. Man feeding a roadside black bear in Yellowstone, 1960s.

decontextualized statements and contextualized action, and keeping in mind a 1953 visitor survey by researcher Donald Bock, in which almost everyone claimed to have seen someone else feeding a bear but almost no one would admit to having done it themselves.

It also does not bespeak any need to reduce either the numbers of staff available to patrol bear jams, nor the wildlife warnings that are conveyed via interpretive materials, as this question did not address whether people would approach a bear without the intent to feed. In fact, two people, in the course of emphatically stating that they would want to stay far away from bears, named "50 feet" as being the proper distance—a full 250 feet closer than the 100-yard distance required by law. Surveys have been conducted finding that as a group, Yellowstone's visitors tend to greatly underestimate the distance from which wildlife viewing can be safely conducted. The continuing need for both education and vigilance is shown by the fact that half of those who wanted to feed the bears were in the lowest age group and by the decrease in awareness of past feeding as age increases. In other words, the practical management implications of my results for this question are minimal, except for the fact that we have learned that people are generally aware, at this point, of at least some of the reasons why they shouldn't feed bears. What is more important here are the indications for changing visitor expectations, experience, and attitudes that my results show, as well as the fact that residual desire for bear feeding still exists.

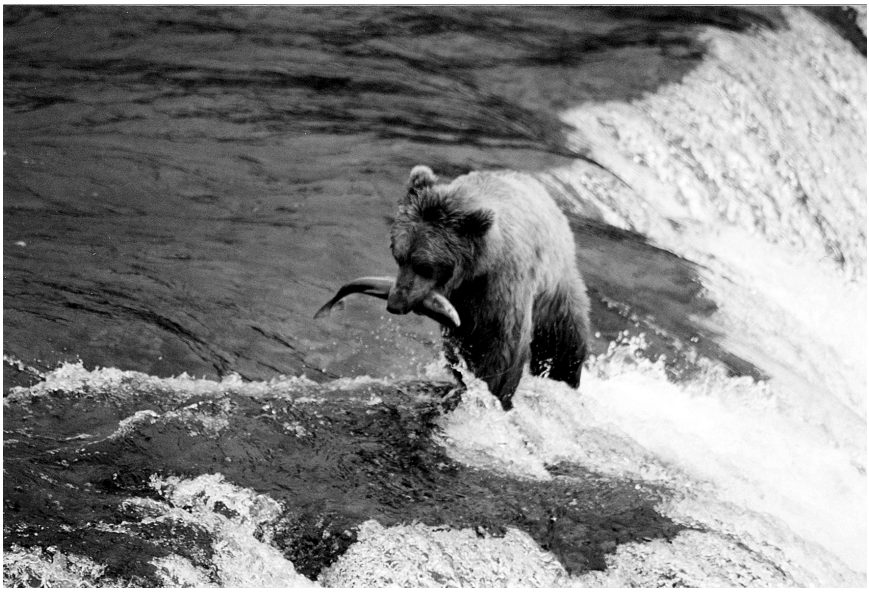

Figure 6. The image most frequently described as the perfect picture of a Yellowstone bear.

The perfect picture

The final aspect of my survey research focused on people's vision of Yellowstone and its bears today. To find out how people's view of bears has changed since the days of roadside feeding, I asked people, in my final question, to visualize their ideal photograph of a bear in Yellowstone. And what I found was that although figure 5 might have been the ideal photo a few decades ago, figure 6 represents the ideal photo today. The image of a grizzly, standing in a river, fishing, was described by more people than any other ideal picture, and there were many different ideas. What is interesting is that not many people ever see this in Yellowstone, because it generally takes place in the early morning or after dark in remote areas that are sometimes closed for bear management purposes. Figure 6 is, in fact, is one of the famous fishing grizzlies of Alaska's Brooks River. The popular proliferation of this image through TV nature shows and calendar art is probably what people had in mind when they described the ideal Yellowstone bear picture to me, indicating that today, that ideal image has less to do with a specifically Yellowstone bear than with a more general, fuzzy image of what a bear in the wild is supposed to look like and do. It seems that people aren't exactly sure what to expect or how to visualize a specifically Yellowstone bear today, which in light of the very specific images embraced in the past may not be a bad thing.

Conclusions

This research provides a brief overview of the kinds of expectations and preconceived notions that visitors bring with them to Yellowstone relative to wildlife and bears in particular these days. It also shows that on the whole, Yellowstone's visitors are not particularly bothered by seeing collared or otherwise marked wildlife, that they still strongly associate bears with the park but don't necessarily expect to see them anymore, and weren't even really sure what they should expect to see when they do see a bear. They are aware of the past history of bear feeding in Yellowstone, and although they don't claim to be keen to feed a bear in Yellowstone, the gap between those who would and those who wouldn't gets smaller with youth, and it is the young who are probably the least aware of the park's history in this regard. It is also the young, however, who seem the most incredulous to hear of it. So what we know is that in a relatively short period of time, people generally seem to have absorbed a sort of no-feeding ethic when it comes to bears, and are at least aware of some reasons why they should not feed them.

Overall, in terms of management, all of this paints a pretty positive picture. If I were to make a recommendation, it would be that managers of both wildlife and people in Yellowstone keep doing what they're doing now in regard to the issues discussed here, because for the most part, those efforts seem to be working. That means gearing education toward young people, who need to know what happened in the past as well as how to behave today, and educating visitors in general about wildlife collaring and the reasons why it's done. What they should guard against is laxity, because it's not like this is a project that will ever be completed. As long as there are wildlife and people together in Yellowstone, there will be a continuing need for education and enforcement to work together to ensure the well-being of both.

Notes

[1] Responses are reported in straight percentages based on the 150 people interviewed; no complex statistical analysis was performed, and so it should not be assumed that these results could be extrapolated to reflect the feelings of all Yellowstone visitors.

[2] A vote for "grizzly bear" also counted as a vote for "bear."

[3] It should be noted that this is not indicative of the percentage of animals in the park that are collared, as a single elk standing by the roadside may be seen by hundreds of people a day.

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The snowmachine in the garden: Yellowstone, industry, and the Snowmobile Capital of the World

Michael J. Yochim

Abstract

Preserving park resources while providing recreational access to parks has been an ongoing challenge for [national] park managers. Local communities sometimes have different perspectives and priorities, leading to occasional conflicts with park managers. The winter use history of Yellowstone National Park and the border community of West Yellowstone, Montana, illustrates these challenges and conflicts. Both the National Park Service and West Yellowstone town members have played important roles in constructing the winter landscape and visitor experience in both Yellowstone and the town. While these contributions have been important, certain outside industries have also played a crucial role in that construction. For the town, the snowmobile and hospitality industries have provided the financial backing to dramatically change the town's geography. However, town identity—and perhaps autonomy—have had to change as well. For the park, the snowmobile industry made possible the oversnow experience common to park users today. But, this powerful interest has influenced efforts to craft national park policy. Effective collaboration in park–community problem solving may be compromised by one industry's overriding influence in the area's winter use history and in West Yellowstone.

Introduction

Cooperation, hard work, chance, and industry have combined to make West Yellowstone, Montana, "the Snowmobile Capital of the World."[1] This town of 1,200 residents sits at the 6,666-foot-high West Entrance of Yellowstone National Park, and derives more than 75% of its income from the three million annual park visitors. Since the 1960s, West Yellowstone merchants have increasingly made themselves a winter economy based on snowmobile rentals, with up to 1,400 snowmobiles for daily rental today. Given its history, snowmobiles have come to symbolize values such as independence and self-reliance to the townspeople.

The town's dependence upon, and success from, snowmobiles depends largely on its proximity to Yellowstone National Park and the willingness of the park's administrators to accommodate visitors on snowmobiles. West Yellowstone and park administrators have a long history of cooperating with each other, influencing each other, and depending on each other to make winter tourism in the area possible. Throughout, the snowmobile and (to a lesser extent) hospitality industries have played crucial roles. While these industries have at times provided the capital necessary to make snowmobile tourism

possible, they have also zealously guarded their investments. Politicians from Montana and Wyoming support industry efforts to protect snowmobiling, as do most town leaders.

Many scholars, land managers, and politicians today promote "collaborative conservation" as the best way to protect natural landscapes. Secretary of the Interior Gale Norton promotes "communication, consultation and cooperation, all in the service of conservation." Collaborative conservation involves all stakeholders, particularly local residents, in the cause of resource conservation while attempting to address the concerns of all.[2]

Yellowstone's winter use history, West Yellowstone's economic development, and the evolving relationship between the town and park illustrate some of the nuances of collaborative conservation. Efforts by park staff to protect their park and accommodate the town's desires, efforts by townspeople to promote a winter economy, and industry's influences on the process are illustrated as well. Park staff have consistently striven to accommodate West Yellowstone's needs while protecting their park's fabulous resources. Meanwhile, West Yellowstone's leaders have consistently promoted snowmobile-related tourism, though other townspeople have more and more questioned them. Most importantly, industry has played an increasingly influential role not only in park–town relations, but also in directing the future of winter tourism in the area. The story suggests that industry must be recognized as a key player, with an agenda not necessarily supporting either the town's or the park's efforts, in modern and future collaborative conservation efforts.

Snowmobiles arrive in the Yellowstone area

In 1908, the Union Pacific Railroad's rails arrived at Yellowstone's west boundary. Two years later, Gallatin County, Montana, completed a road linking the railroad terminal to Bozeman. Almost immediately, West Yellowstone developed, to provide the arriving and departing visitors with necessary services. Until 1936, when the state began plowing the road to Bozeman, the 50 or so resident households were literally snowbound for the long northern Rockies winter. Winter in West Yellowstone was no laughing matter, lasting at least six months, with bitter cold and 150 to 200 inches of snowfall. In fact, Yellowstone's Riverside ranger station, about a mile inside the park from West Yellowstone, held the country's all-time recorded low temperature (outside of Alaska) for 21 years—66° F below zero.[3]

Such long snowy winters fostered a sense of shared hardship and independence. Town residents in fall laid in a "grubstake" of food—a food cache adequate to last the winter. Without electricity or running water, firewood for woodstove heat was another important essential. Through the long winter, residents socialized, gathering at potlucks and their (two-room) school functions. On their skis fashioned from one-by-fours, heated in a park hot spring and given the proper bend at the tip, they went to the local hills at "the Barns,"

just inside the park. For all overwintering residents, the one open grocery store ran a tab that could be decreased or increased through one's skill at the regular grocery poker games.[4]

The isolation diminished when the state began plowing the road, but the communal struggle for survival did not. Residents were quick to realize the potential benefits of winter tourism, calling upon the National Park Service (NPS) as early as 1940 to plow the roads into Yellowstone Park. After World War II, though, they began to adapt to the eternal winter in a new way, taking advantage of the park's unplowed roads. They built "snowplanes," the first motorized vehicles capable of traveling on snow-covered roads. These were loud contraptions consisting of a one- or two-person cab set on three skis (only one in front, for steering), with an airplane engine and propeller mounted on the rear. Between January and March 1949, 35 West Yellowstone residents blew into Yellowstone (without ever becoming airborne) on such vehicles. They were thus the park's first motorized winter visitors.[5]

In 1955, a new kind of oversnow vehicle joined the snowplanes: the snowcoach.[6] Snowcoaches were larger vehicles made by the Bombardier Company of Quebec, Canada, capable of carrying 10 people in a heated interior. Calling them a "good tourist gimmick," West Yellowstone entrepreneurs Harold Young and Bill Nichols took up to 500 visitors per winter through the park in their snowcoaches in the 1950s. The modern snowmobile, first mass-produced by Bombardier in 1959, arrived in West Yellowstone in 1963 to become the third kind of oversnow vehicle touring Yellowstone. West Yellowstone's creative entrepreneurs promoted winter visitation as well; for example, in 1964, Young contracted with the Northern Pacific Railway to bring two tours per week from Chicago into the park. Despite the dawning economic opportunity, though, there were still only a few hotels open in winter in West Yellowstone in 1966.[7]

Events from 1966 to 1971 would prove crucial for the development of Yellowstone's winter tourism and West Yellowstone's snowmobile economy and identity. Since the late 1940s, regional politicians had been pressuring the NPS to plow park roads. Their pressure culminated in a congressional hearing on the matter in Jackson Hole, Wyoming, on August 12, 1967, chaired by U.S. Senator Gale McGee (D-WY). At that hearing, virtually every chamber of commerce in the Greater Yellowstone Area (and some from as far away as Utah and Texas) sent a representative or statement in favor of plowing, all reasoning that it would stimulate tourist traffic with consequent economic benefits.[8]

The West Yellowstone Chamber of Commerce's statement at that hearing is of particular interest. The day before the hearing, the chamber's board of directors voted against plowing, but changed their mind on the day of the hearing (perhaps to be in sympathy with the other chambers). Howard

Kelsey, representing West Yellowstone's chamber, indicated the reason for West Yellowstone's initial position in his testimony:

> Two years ago…we had, through the west gate, 994 passengers in the large snowmobiles…Only 64 people went into the park through the west gate on the small machines… Now, this last winter—and I think this is quite significant—there were 4,009 passengers on the large snowmobiles, there were 1,823 on the small snowmobiles, representing a total of 5,332 people that came to West Yellowstone who spent an average of two and a half nights…Now…transforming this into dollars and cents, in 1965, the people who came up for snowmobile rides spent $64,488. This last year they left $296,000 in the community… if…the roads are plowed, this means that the West Yellowstone snowmobile business is a thing of the past, and it's just starting. I mean, any time you can take a recreational industry and in two years project it five times what it was, it is a pretty important index of what can happen.[9]

Kelsey's statement indicates that, by this time, the realization that a new winter economy was possible was dawning on some town residents. His words would prove to be prophetic.

In March 1968, Yellowstone's administrators formalized their park's oversnow policy. Snowmobiles, not automobiles, would be the primary vehicle allowed into the park. Managers reasoned that wildlife would get trapped on the plowed roads, which would resemble linear trenches through the snowscape. Such trenches additionally would be difficult for automobile passengers to see out of, and would trap blowing snow. To foster oversnow visitation, they began grooming the snow-covered roads for smoother touring and opened a lodge at Old Faithful in 1971 (both services continue today). Park managers saw the snowmobile as the solution to the thorny dilemma of how to accommodate winter tourism without incurring the impacts of plowed roads. Snowmobiles allowed people to see the park's wonders, satisfied those pressuring the NPS to open the park, and protected it from automobile impacts.[10]

Administrators were swayed by the increasing importance of snowmobile-related income to West Yellowstone residents. Park superintendent John S. McLaughlin told the NPS Director in 1967 that "there is considerable sentiment around Idaho Falls and West Yellowstone against further opening….[O]versnow vehicle business is more beneficial for these communities" than plowing roads would be. An internal NPS report from 1968 revealed the park's concern about impacts on West Yellowstone as well: "Who would suf-

fer [from plowed Yellowstone roads]? The townspeople of West Yellowstone who have seen the advantages of oversnow travel in the Park, who have encouraged this use, and who have watched the steady growth of travel by this means."[11] Clearly, the snowmobile income West Yellowstone merchants were already realizing was influential, but protecting the park from plowing impacts was as well.

Town residents took another action in the same era, which also served to develop their economy and identity. Montana state law banned snowmobile use on plowed roads, unless an incorporated village passed a law permitting it. Until 1966, West Yellowstone was unincorporated; that year, town residents voted to organize a local government, with a primary reason being to pass the needed snowmobile law. The town council's first formal action was to permit snowmobiles on town roads.[12] Incorporation and welcoming snowmobiles were therefore practically equivalent actions.

Thanks to these town and government decisions, the town's new snowmobile economy took off. The first snowmobile rentals in West Yellowstone opened between 1965 and 1970, mostly subsidized by competing manufacturers attempting to develop consumer markets. A measure of how successful the early rentals were comes from the First Security Bank of West Yellowstone, which opened in 1966. President Dean Nelson hoped to build his bank's total footings to $1 million in two years, but realized that goal in less than three months. Nelson knew that "the winter economy *is* the snowmobile" (emphasis in original). By 1982, the bank's footings had grown to over $10 million, in part due to other important events soon to follow.[13]

In the early 1970s, the Big Sky Ski Resort opened 50 miles north of West Yellowstone, bringing thousands of new tourists into the area. Many such skiers took a day off from skiing to tour Yellowstone on rented snowmobiles. Further, the resort attracted guests from all over the country; no longer were local and regional residents the typical winter visitors. By the 1990s, only about a third of Yellowstone's winter visitors were from the three local states, with most visitors coming from the upper Midwest and the country's more populous states like California, Washington, New York, and Florida.[14] Figure 1 illustrates the exponential growth in Yellowstone's winter tourism in this time period; many of those visitors entered the park through West Yellowstone.

Also in 1972, the West Yellowstone Snowmobile Club was created, and began grooming 125 miles of snowmobile trails on U.S. Forest Service (USFS) land to the west and south of town. These trails, groomed cooperatively with the USFS and State of Montana since 1979, and later expanded to 212 miles, continue to be a major draw for West Yellowstone's visitors.[15] They offer access to backcountry areas where off-trail snowmobiling (along with its associated thrills) is allowed, something Yellowstone does not offer. Similarly,

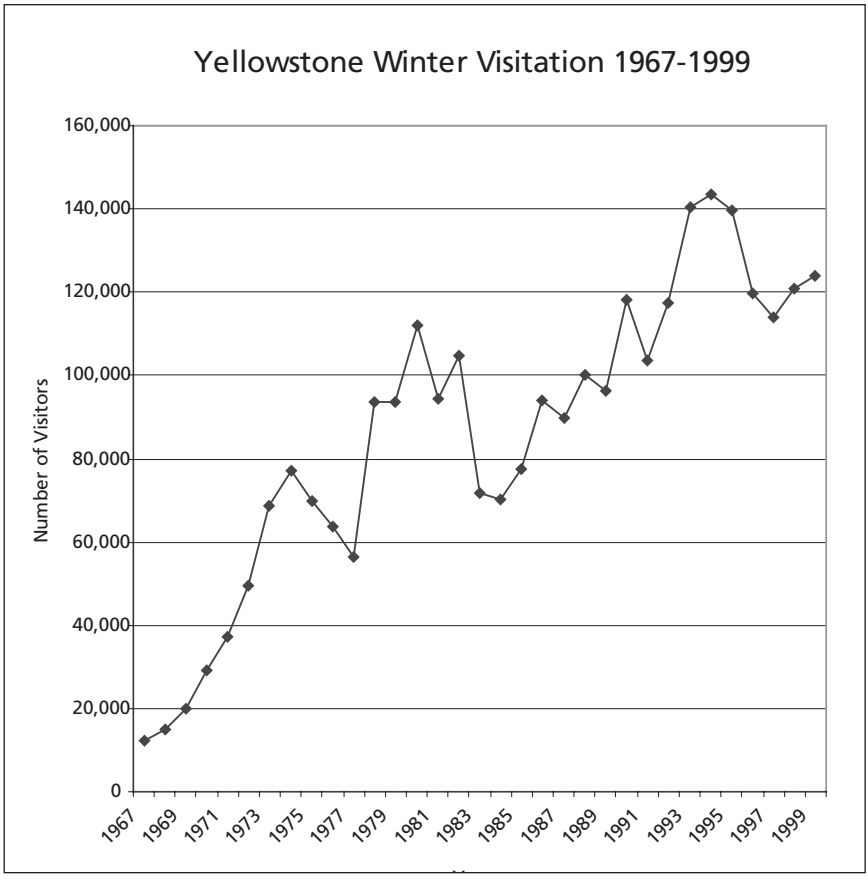

Figure 1. Yellowstone winter visitation, 1967–1999. Source: see endnote 40.

manufacturer improvements in snowmobile reliability facilitated continued growth of West Yellowstone's snowmobile industry in the 1980s.

Another factor instrumental to West Yellowstone's success was advertising emphasizing the new activity's thrill, freedom and independence, along with its masculine prowess, control, and camaraderie. Bars in town proliferated as well, encouraging the realization of such effects. Surveys today reveal that "having fun" is still a prime motivator to snowmobile, and that 66% of Yellowstone's winter visitors are male and younger than all other visitor groups. Other ads even compared snowmobilers to modern-day cowboys, clearly drawing upon Old West mythology to promote the vehicles. The advertising was broad-based, also targeting middle-class families who would be attracted to the package tours that West Yellowstone entrepreneurs developed in the early 1970s. Still, most of the advertising emphasized the thrills, freedom, and masculinity of the activity, as it still does today.[16]

By 1983, West Yellowstone's snowmobile-related income employed 426 residents, who staffed 29 hotels, 11 restaurants/bars, 13 gift shops, 6 service stations, 2 lumber or hardware stores, and 4 realtors. Clearly, by that time, West Yellowstone's economy no longer slumbered in the long winter; it had arrived. It had become so lucrative that some merchants derived more income in February than in any other month of the year, including the busy summer months.[17]

West Yellowstone's experiences with snowmobiles during this time period, as well as the advertising associated with them, gave the vehicles a rich symbolism. West Yellowstone and snowmobiles grew up together, making them an expression of West Yellowstone's sense of shared hardship and entrepreneurship. Snowmobiling became a cherished part of West Yellowstone's identity, the reason that West Yellowstone residents claim with pride to be the Snowmobile Capital of the World. Since snowmobiles made it possible to explore previously closed terrain, they also came to signify independence of mind and the freedom to explore, two core American values. They are to winter as the auto is to the rest of the year.[18]

By the mid-1980s, West Yellowstone had a thriving year-round economy, made possible largely by tourism and, in winter, mainly by the snowmobile. Growing visitation, though, along with the town's promotional efforts, began to produce problems in Yellowstone and gradually developed into one of the region's greatest modern controversies.

Modern challenges

As the number of visitors entering Yellowstone grew throughout the 1980s and 1990s (Figure 1), concerns over those numbers and associated snowmobile impacts multiplied. The growing numbers of snowmobiles created four significant problems that park managers grappled with four times between 1989 and 2003: air pollution, noise pollution, conflicts with other park users, and impacts upon wildlife.

The two-cycle snowmobiles used in the park through 2003 mixed oil with gas for combustion, an inherently dirty process. Each snowmobile emitted many times the pollutants of a typical car, with carbon monoxide, hydrocarbons, and particulates being the pollutants of greatest concern. The large number of snowmobiles entering Yellowstone—an average of 66,619 per winter, peaking over 77,000 in 1992–93—caused near-violations of the federal Clean Air Act at the West Entrance.[19]

Two-cycle snowmobiles also produced high levels of noise. A 2000 study found that Old Faithful visitors could not escape snowmobile noise during the daylight hours, and backcountry skiers frequently reported hearing snowmobile noise as far as 10 or even 15 miles from the closest road.[20] Snowmobiles, then, disturbed the park's winter silence.

Noise and air pollution problems led to conflicts with other park users,

notably cross-country skiers and snowshoers, who generally desire quiet conditions. By the mid 1990s, over 100 park visitors sent written complaints annually to Yellowstone. Some of the letter writers and local environmentalists claimed to have been displaced from Yellowstone by snowmobile noise and air pollution.[21]

Finally, snowmobiles and other oversnow vehicles, by using hard-packed roads, had conflicts with wildlife. Park bison learned that such hard-packed roads present energy-efficient travel routes, and consequently used them at times to travel from one grazing area to another. While on the roads, they sometimes obstructed snowmobile traffic, leading some drivers to attempt to pass them, which at times frightened the bison off the road. Such conflicts led to concerns about snowmobile impacts on bison health, numbers, and behavior. Research into this problem produced conflicting results.[22] Still, the obvious conflicts witnessed by park visitors and illustrated in the media have produced great concern among people interested in this issue. Moreover, such conflicts led to a key lawsuit against the NPS, filed in 1997 (see below).

Most of these issues first surfaced in the 1970s, but magnified with the increasing numbers of snowmobiles in the 1980s and '90s.[23] Yellowstone Superintendent Bob Barbee first attempted to address them in the 1990 Winter Use Plan Environmental Assessment. This plan was a comprehensive summary of the existing policies that directed the park's winter management; it made few changes in that management. Park staff felt the plan did not adequately address the growing concerns with winter use, but felt they needed an altered political climate to make major changes.[24]

The plan's authors, however, did insert language that would compel another winter use review. If combined [winter] visitation to Yellowstone and Grand Teton national parks exceeded 143,500 visitors, or if the Continental Divide Snowmobile Trail (a 300-mile snowmobile trail paralleling the Continental Divide and terminating at Yellowstone's South Entrance) opened before the year 2000, then that review would begin. Both triggers tripped in 1993, so the NPS began a second round of winter use planning known as the "Visitor Use Management Process." This was a formal process, with specified steps of action, that land managers followed to examine a controversy and recommend solutions.[25] Although it made some recommendations, it left individual decisions up to the federal land managers. So like the previous plan, it made no major changes in actual policy.

West Yellowstone merchants, watching their livelihood being questioned, began to take what steps they could to solve the air and noise problems (the two most persistent concerns). Service station owners there began selling ethanol in December 1997, which slightly reduces carbon monoxide and particulate emissions by burning more cleanly. More importantly, between 1996 and 2000, snowmobile manufacturers (including West Yellowstone

resident Ron Gatheridge) unveiled four different clean and quiet snowmobile prototypes. All of these machines reduced emissions and noise by using four-cycle engines, similar to those in automobiles. Manufacturers marketed some of these models in fall 2000, with some West Yellowstone entrepreneurs acquiring them for rental the following winter.[26]

Natural and social events then combined to produce a climax, the extraordinary winter of 1996–97. Near-record snowfall combined with unusual winter rain to produce an icy snowpack that was impervious to even the largest bison. To obtain food, the park's bison began migrating out of the park (partly using the snowmobile roads) in search of lower elevations and grass with less snow cover. Some of the bison carry brucellosis, a disease that, if transmitted to cattle, can cause a pregnant cow to abort its fetus. To prevent that transmission from occurring when bison came into cattle range outside the park (along with associated negative economic and political consequences), the state of Montana shot or sent to slaughter 1,084 bison by spring 1997. This number represented about a third of the park's herd and was the largest control of bison departing Yellowstone in its history.[27]

Yellowstone's bison are the only herd in the U.S. that has continuously ranged freely in the wild. Their numbers dropped to only 23 before the U.S. Army (administering Yellowstone before 1918) and early conservationists saved them through last-minute efforts around 1900. Today, they are powerful symbols of nature's wildness and of the wisdom of conservation. Seeing them slaughtered called to mind the guilt that many Americans still feel over the original nineteenth-century slaughter and motivated them to protest it and its perceived cause: snowmobiling.[28] The Fund for Animals, a wildlife advocacy group, led the way with a lawsuit in May 1997 alleging that the NPS had failed to follow its Organic Act and several other laws regulating park management. The NPS settled out of court by agreeing to write a new Winter Use Plan and Environmental Impact Statement (EIS).[29]

As this third planning process unfolded, park managers initially proposed plowing the road from West Yellowstone to Old Faithful. Yellowstone Superintendent Mike Finley saw this as a way to weaken the snowmobile industry's influence on park policymaking, but found little support for the idea, even in the environmental community. Instead, Bozeman's Greater Yellowstone Coalition (GYC) developed its own EIS alternative, the "Citizens' Solution for Winter Access to Yellowstone," which proposed to ban snowmobiles and restrict winter traffic to snowcoaches with no additional plowing (this was very similar to Alternative G of the Draft EIS). When the EPA announced in February 2000 that all EIS alternatives except that solution would fail to protect Yellowstone's air quality, Finley found more support for a snowmobile ban from the Clinton administration.[30] By spring 2000, he had formally proposed banning snowmobiles from the park by adopting

Alternative G, but the final decision would wait until late that fall.

By this time, West Yellowstone's position as the "Snowmobile Capital of the World" was secure. Winter visitors spent around $18 million in the community annually, finding almost 1,500 motel rooms available for their use, including many national chains such as Holiday Inn and Ramada Inn. A third of the park's winter visitors entered through West Yellowstone on 70% of the total number of snowmobiles. As much as 85% of the town's winter economy was (and still is) based on snowmobiling tourism.[31] Clearly, a ban on snowmobiling in Yellowstone gravely threatened not only West Yellowstone's economy, but also the town's very identity (according to some, at least).

The proposed ban struck the West Yellowstone snowmobile community predictably hard. Glenn Loomis, owner of a snowmobile rental, responded by saying that banning snowmobiles from the park was akin to "a meteor falling on West Yellowstone." Gallatin County joined with the four other regional counties in developing another EIS alternative that guaranteed continued snowmobile use of Yellowstone, by the new four-cycle snowmobiles. Finally, Montana and Wyoming politicians responded by threatening to introduce a rider overthrowing the NPS's decision or to hold a field hearing to probe the possible ban.[32]

But other West Yellowstone residents responded differently. Jackie Mathews, a flyfishing store owner there, felt that "Yellowstone National Park is not responsible for providing us an income," and encouraged townspeople to look at other alternatives. Another town resident, Doug Edgerton, joined with her to argue that banning snowmobiles from Yellowstone would present a significant economic opportunity for the town, since merchants there could then become the exclusive providers of Yellowstone winter tours (few people own a snowcoach, so visitors would have to tour the park on snowmobiles owned by West Yellowstone merchants). Edgerton later traveled with two other West Yellowstone business owners to Washington, D.C., to deliver a petition containing the signatures of 150 town residents advocating the removal of snowmobiles from Yellowstone. The petition noted that a healthy economy in West Yellowstone depended upon a healthy ecology in Yellowstone, and "West Yellowstone is a resilient community able to adapt and take advantage of changes."[33]

Divisions among West Yellowstone residents over the issue ran deep. In 2001, town voters again revealed their divided feelings on the issue in a referendum intended to implement a snowmobile curfew between the hours of 11 PM and 5 AM. It lost by six votes, 149 to 143. The split in the town is emotional, too. Supporters of snowmobiling have at times ostracized or harassed those who oppose the activity's continuation.[34]

Still, despite the division, those in favor of snowmobile use dominate the discussion in town. A small group of men own a large portion of the snow-

mobile-dependent businesses there, and often speak out to defend their livelihoods. These men have significant personal efforts, investments, and paid staff to protect. For example, Clyde Seely has lived in West Yellowstone since 1966, and has promoted snowmobile tourism since 1970. In part through these efforts, he has built or acquired numerous properties, including the largest motel in town (the Holiday Inn) and a fleet of 275 rental snowmobiles (also the largest in town) and several other properties. Seely understandably takes some credit for developing the town and its economy, along with his business partner Bill Howell and friend Glenn Loomis.

Local snowmobile boosters, however, increasingly find the voices of industry speaking louder. Since 1995, corporations from Texas and South Dakota have opened four new state-of-the-art hotels in town, forcing many local hotel owners to update theirs.[35] Such recent investments reveal the year-round strength of West Yellowstone's economy, and introduce industry representation to the controversy's table. As events would soon reveal, the snowmobile industry and its advocacy groups also have taken an increasing interest in the region's snowmobile controversy.

So have national environmental groups. The Bluewater Network, a national environmental organization, petitioned the NPS in early 1999 to ban snowmobiles from all national parks in the country. After studying the matter and surveying all of its areas that allow snowmobiling, the NPS confessed "years of inattention to our own regulatory standards on snowmobiles" and then proposed banning snowmobiles from all national parks except the Alaskan national parks, Voyageurs National Park, and Yellowstone/Grand Teton in April 2000, which were exempted because they either had snowmobiling expressly written into their charters or, in Yellowstone's case, were already dealing with the issue in a formal manner.[36]

Finally, on October 11, 2000, Yellowstone administrators announced that they planned to ban snowmobiles from Yellowstone in the winter of 2003–04. Regulations implementing the ban were published on January 22, 2001, but not before the International Snowmobile Manufacturers Association (ISMA) challenged them in court. In the new political climate [after President George W. Bush took office], the National Park Service settled with the ISMA in June 2001, by agreeing to write a Supplemental EIS that would focus on the air and noise impacts of the new four-cycle snowmobiles, which became commercially available after the previous study ended (this, then, initiated the fourth planning effort).[37]

The ISMA lawsuit, coming from a national industry trade group rather than the West Yellowstone Chamber of Commerce, illustrates that snowmobiling in Yellowstone is no longer an issue of importance only to West Yellowstone and the park. The issue has acquired national prominence, making the industry fear that loss of snowmobile access to Yellowstone will

result in diminished access to other national parks and federal lands across the country. The snowmobile advocacy group BlueRibbon Coalition, which receives funding from the ISMA and many other snowmobile groups, has especially articulated this concern. The increasing involvement of national environmental groups in the controversy further illustrates the issue's national scope. No longer is the issue so much about West Yellowstone's economic livelihood as it is about the continued viability and appropriateness of snowmobiles in national parks. As much as industry seems to be using West Yellowstone as a pawn in a larger game to retain motorized access to national parks, environmental groups are using the issue in their game to ban the vehicles from them.[38]

In 2003, Yellowstone's new Superintendent Suzanne Lewis announced a new direction for winter use. She and her staff announced that snowmobile use would continue under three conditions. First, the NPS would restrict the number of snowmobiles allowed into the park to numbers approximating average daily usage today (for example, 550 daily from West Yellowstone). Second, all machines must use "best available technology," which uses four-cycle engines to reduce air and noise emissions. Finally, all visitors touring the park on snowmobile must be guided, primarily to ease the wildlife concerns.[39]

The winter use issue in Yellowstone appears to be never-ending. Environmentalists have filed two lawsuits contesting the retreat from the ban (hearings have just begun as of this writing). Publication of the final rule on December 17, 2003, will likely bring yet more lawsuits. Meanwhile, both the NPS and West Yellowstone merchants hold their breath, wondering what the future will bring to winter tourism and their relationship.

Discussion

For over 50 years, winter visitors have found increasing access to Yellowstone's spectacular wonders. Throughout, West Yellowstone entrepreneurs have been important drivers in the process, pressuring the park at times to open while providing necessary visitor services. Snowmobiles (and to a lesser extent, snowcoaches) not only opened the park to winter visitation but also led to the town's incorporation. They are as much a part of the town's identity as are its long, cold winters. Being the winter equivalent of automobiles, it is easy to see that snowmobiles also embody personal freedom, and to predict that banning them from a town with whom they are synonymous will be difficult indeed.

Nevertheless, undercurrents of dissent are evident in the town's deep division over the continued snowmobile controversy. The recent snowmobile curfew referendum exemplifies the split, while its defeat illustrates continued snowmobile primacy. The closeness of the vote, however—in the Snowmobile Capital of the World—may signify a willingness to change.

West Yellowstone exemplifies America in general, which is itself divided on these issues of access and environmental preservation. The West Yellowstone residents opposed to continued snowmobile use may take note of the fact that West Yellowstone began its long association with winter tourism on snowcoaches, long before snowmobiles arrived. They argue that the town's identity rests more on making winter tourism possible than it does specifically on the snowmobile.

Throughout this history, the National Park Service and West Yellowstone together have been crucial in defining the winter visitor experience. Yellowstone Park staff and town residents have had a long, evolving relationship that reflects their basic humanity: the relationship has wandered from support to distrust, from collaboration to shouting, and back again. Most constructive have been the periods of support and collaboration, but growth and learning occur during the difficult times as well. Collaborative conservation is not easy, and must understand human frailty and desires.

The hospitality and snowmobile industries cooperated in making the winter experience possible. In so doing, these industries have remade West Yellowstone from a town that hibernated six months of the year to one that today hums with winter activity. However, those same industries today have significant influence on the future of winter use. They have large investments to protect, and will take the necessary actions. To some observers and residents, those same industries may even manipulate both West Yellowstone and the park for their own, perhaps different, purposes. Increasingly, West Yellowstone seems to be a pawn in industry's larger quest for legitimacy. Any efforts at collaborative conservation must reckon with industry and its economic and political strength.

Conservationists and snowmobile advocacy groups have succeeded in transforming this from a local to a national issue. Conservationists see off-road vehicles like snowmobiles as inappropriate in national parks, while snowmobile advocacy groups defend their access to the park. All groups see Yellowstone National Park as the trendsetter, fearing or hoping that whatever policy the park adopts will transfer to other federal lands. As with its other controversies (like wolf reintroduction and bison management), Yellowstone once again is the fishbowl, this time frozen.

Notes

[1] A distinction it evidently shares with Rhinelander, Wisconsin, where I observed a billboard proclaiming itself to be the "snowmobile capital of the world" in Sept. 1999.

[2] Norton's quote has often been repeated in the press; see <http://www.doi.gov/news/021205.htm> for an example. Daniel Kemmis is one of many scholars promoting collaborative conservation in his book *This Sovereign Land: A New Vision for Governing the West* (Washington, D.C.: Island Press), 2001. See also

Across the Great Divide: Explorations in Collaborative Conservation and the American West, Philip Brick, Donald Snow, and Sarah Van de Wetering, eds. 2001.

[3] Richard A. Bartlett, *Yellowstone: A Wilderness Besieged,* 1985 (Tucson: University of Arizona Press): 63; Janet Cronin and Dorothy Vick, *Montana's Gallatin Canyon,* 1992 (Missoula, Mont.: Mountain Press Publishing Company): 58–59; Aubrey L. Haines, *The Yellowstone Story: A History of Our First National Park,* 1996, rev. ed., 2 vols. (Niwot, Colo.: University Press of Colorado) 2:314; Frank H. Anderson to Superintendent, Jan. 31, 1949, loose file in Box N-158, Yellowstone National Park Archives, Mammoth Hot Springs, Wyoming (hereafter YNPA).

[4] David Warner, "West Yellowstone: Those Good, Bad Old-Time Winters," *Montana Magazine* 57 (Jan./Feb. 1983): 9–11.

[5] Arno Cammerer to Senator Joseph O'Mahoney, Feb. 8, 1940, in File "868 Winter Sports," Box L-46, YNPA; Michael J. Yochim, "Snowplanes, Snowcoaches and Snowmobiles: The Decision to Allow Snowmobiles into Yellowstone National Park," *Wyoming Annals* 70 (Summer 1998): 6–23.

[6] Snowcoaches were known until the mid-1960s as snowmobiles, and as "big snowmobiles" until the mid-1980s, when the "snowcoach" label was coined.

[7] Yochim, "Snowplanes, Snowcoaches and Snowmobiles," 13; George Remington, "West Yellowstone Plans Projects To Make Area Big Winter Resort," *Livingston Enterprise,* Feb. 3, 1966.

[8] Yochim, "Snowplanes, Snowcoaches and Snowmobiles," 7–16; Department of the Interior, National Park Service, Hearings Before a Subcommittee of the Committee on Appropriations, United States Senate, on Winter Operation of Roads in Yellowstone National Park, Ninetieth Congress, Second Session, 1968.

[9] Hearings Before a Subcommittee of the Committee on Appropriations, 59–60.

[10] Yochim, "Snowplanes, Snowcoaches and Snowmobiles," 17–22.

[11] John S. McLaughlin to Director, July 6, 1967, in File D30: "Roads & Trails 1967—Winter Travel in Yellowstone," Box D-166; "Disadvantages to Winter Road Opening–Yellowstone;" in File D30: "Roads & Trails 1968—Winter Travel in Yell. Snow Removal," Box D-164, both at YNPA.

[12] Ray Ring, "Move Over!" *High Country News,* Apr. 1, 2002:10.

[13] Darcy L. Fawcett, "Colonial Status: The Search for Independence in West Yellowstone, Montana," (professional paper, Montana State University, 1993): 21, 27 (source of quote); Calvin W. Dunbar, Testimony Before the Subcommittee on Public Lands and National Parks, May 1983; "Winter Use Plan EA" Box, Loose, Planning Office Files, National Park Service, Yellowstone National Park (hereafter POF).

[14] Phyllis Smith, *Bozeman and the Gallatin Valley: A History,* 1996 (Helena, Montana: Two Dot Press, an imprint of Falcon Press), 290–292; Margaret Littlejohn, *Yellowstone National Park Visitor Study, 1996* (Moscow, Idaho: University of Idaho Visitor Services Project Report 75, Cooperative Park Studies Unit), POF, 9.

[15] Jean Arthur Sellegren, "Blue Haze: Multi-Use Issues Come to a Head in the Land

of the Buffalo," *Backcountry* (Jan. 1996):52–54.

[16] Bar information from John Miller, "West Yellowstone: Montana's Biggest Little Town," *Bozeman Daily Chronicle,* Feb. 28, 1999; "Having Fun" from James T. Sylvester and Marlene Nesary, "Snowmobiling in Montana: An Update," *Montana Business Quarterly* (Winter 1994):3–8 (quote from 7); camaraderie also mentioned in McMillion, "West Yellowstone packs 'em in for the… Snowmobile Expo," *Bozeman Daily Chronicle,* Mar. 18, 2000; male statistic in *Winter Use Plan Environmental Impact Statement (*1), 91; youth statistic in Littlejohn, *Yellowstone National Park Visitor Study, 1996,* A-1; package tour from Fawcett, 21–27; other snowmobile ads or pictures featured in these *Bozeman Daily Chronicles:* Nov. 20, 1997; Jan. 11, 1998; Mar. 11, 1998; Mar. 18, 2000.

[17] Dunbar, Testimony Before the Subcommittee; Darryl Harris, "Winter Season Extension Needed At Yellowstone," *Snowmobile West* (Sept. 1985):63–64.

[18] James A. Jurale, *History of Winter Use in Yellowstone National Park,* (Master's thesis, University of Wyoming, 1986), 135. See also Randy Roberson, "Data Supports Continued Use of Snowmobiles in Park," *Bozeman Daily Chronicle,* Nov. 5, 1999.

[19] Scott McMillion, "Snowmobiles 'Extremely Dirty,'" *Bozeman Daily Chronicle,* Jan. 9, 1994; U.S. Department of the Interior–National Park Service, "Air Quality Concerns Related to Snowmobile Usage in National Parks," (unpublished report), POF, Feb. 2000:1–2; "Ambient Air Quality Study Results, West Entrance Station, Yellowstone National Park, Winter 1995," (unpublished report), POF.

[20] "Snowmobiles Create Inescapable Roar in Yellowstone," NPCA press release dated Mar. 9, 2000, available at <http://www.npca.org>; Michael J. Yochim, *The Development of Snowmobile Policy in Yellowstone National Park,* (Master's thesis, University of Montana, 1998), 140.

[21] Greater Yellowstone Winter Visitor Use Management Working Group, *Winter Visitor Use Management: A Multi-Agency Assessment,* Mar. 1999, 9–12; Hope Sieck, "West Yellowstone Business Owners Go to Washington, D.C.," *Greater Yellowstone Report* 17 (Summer 2000):22; David Cowan, "Yellowstone Park: Speedway or Sanctuary?" *Greater Yellowstone Report* 14 (Fall 1997):1; Robin Heyer, "When Snowmobiles are Banned, More Skiers Will Come," *Bozeman Daily Chronicle,* Dec. 31, 2000.

[22] See Mary Meagher, "Winter Recreation-Induced Changes in Bison Numbers and Distribution in Yellowstone National Park," 1993, unpublished report, POF; Daniel D. Bjornlie and Robert A. Garrott, "Effects of Winter Road Grooming on Bison in Yellowstone National Park," *Journal of Wildlife Management* 65 (2001):560–572.

[23] Yochim, *The Development of Snowmobile Policy,* 67–75.

[24] U.S. Department of the Interior–National Park Service, *Winter Use Plan Environmental Assessment,* Dec. 1990 (Denver Service Center, Denver); Yochim, *The Development of Snowmobile Policy*, 144; Chris Turk, personal interview by author, June 4, 2003.

[25] Greater Yellowstone Winter Visitor Use Management Working Group, *Winter*

Visitor Use Management, 9–12.

[26] "Marketing Gasohol in West Y. a Savvy Move" (abbreviation in original), *Bozeman Daily Chronicle,* Dec. 11, 1997; Scott McMillion, "Clean Machine," *Bozeman Daily Chronicle,* Mar. 1, 1996; McMillion, "Lean, Mean, and Green Machine" (emphasis in the original), *Bozeman Daily Chronicle,* Mar. 20, 1996; "In Search of a Clean...Machine" (ellipses in the original), *Bozeman Daily Chronicle,* Feb. 25, 2000.

[27] Doug Peacock, "The Yellowstone Massacre," *Audubon* 99 (May/June 1997):42.

[28] See Paul Schullery, *Yellowstone's Ski Pioneers,* 1995, (Worland, Wyoming: High Plains Publishing Company), for an account of these early conservation efforts. The ideas on their symbolic values and the guilt idea are from Dave Price and Paul Schullery, "The Bison of Yellowstone: The Challenge of Conservation," *Bison World* (Nov./Dec. 1993):18–23.

[29] *Fund for Animals et al v. Bruce Babbitt et al.,* May 20, 1997; Settlement Agreement, *Fund for Animals et al., v. Bruce Babbitt et al.,* Civil No. 97-1126 (EGS), Sept. 23, 1997, U.S. District Court, District of Columbia, POF.

[30] Michael V. Finley, telephone interview by author, June 24, 2003; Ron Tschida, "Enviros Offer Plan to Limit Yellowstone Snowmobiles," *Bozeman Daily Chronicle,* Oct. 13, 1999; Scott McMillion, "Winter Use Plan: EPA Gives Cold Shoulder to All Options but Snowmobile Ban," *Bozeman Daily Chronicle,* Feb. 24, 2000; McMillion, "Snowmobiles in Yellowstone May Well Become…a Vanishing Breed" (ellipses in original), *Bozeman Daily Chronicle,* Mar. 14, 2000.

[31] West Yellowstone Chamber, "Sleep," 2002, available at <http://westyellowstonechamber.com/lodging.htm>; National Park Service, *Draft Winter Use Plan Draft Environmental Impact Statement Volumes 1* (Denver: U.S. Government Printing Office, July 1999), 198; Sellegren, "Blue Haze," 54.

[32] Meteor quote from McMillion, "Snowmobiles in Yellowstone May Well Become…a Vanishing Breed;" Will Rizzo, "Counties Agree on Yellowstone Winter Use Plan," *Livingston Enterprise,* Sept. 17, 1999; Todd Wilkinson, "Politicians Play Fast and Loose with the Law," *Bozeman Daily Chronicle,* Mar. 28, 2000; Michael Milstein, "Winter Debate Over Park Use Turns Political," *Billings Gazette,* Mar. 25, 2000.

[33] Matthews quote in Ron Tschida, "Enviros Offer Plan to Limit Yellowstone snowmobiles;" Doug Edgerton, letter to the editor of the *Bozeman Daily Chronicle,* Sept. 14, 1999; petition information in Sieck, "West Yellowstone Business Owners Go to Washington, D.C.," *Greater Yellowstone Report* 17 (Summer 2000):22.

[34] Ring, "Move Over!" 11–14; Finley interview, June 24, 2003.

[35] Ring, "Move Over!" 14.

[36] James Brooke, "A Move to Rid Parks of Snowmobiles," *New York Times,* Feb. 7, 1999; Douglas Jehl, "National Parks Will Ban Recreation Snowmobiling," *New York Times,* Apr. 27, 2000.

[37] Karin Ronnow, "Year Delay in Rules Proposed," *Bozeman Daily Chronicle,* Mar. 30, 2002.

[38] Michael Scott, Executive Director of the Greater Yellowstone Coalition

(Bozeman, Montana), personal interview by author, Apr. 16, 2003; see the following *BlueRibbon Magazine* articles: "BlueRibbon Supporters in 1998," Jan. 1999:8–11; "Help Save Snowmobiling on our Public Lands" (July 1998): 14; Jack Welch, "Fund for Animals Sets Snowmobiling in National Forests as their Next Target" (Nov. 1998):3; Clark Collins, "Green Advocacy Groups Unmasked at Last" (Mar. 1999):2; Viki Eggers, "Recreationists Draw a Line in the Snow" (Nov. 1999):8; "Park Service Announces Snowmobile Ban" (June 2000):6. The group continues to articulate this same concern.

[39] Mike Stark, "Parks Reverse Snowmobile Decision," *Billings Gazette,* June 26, 2002.

[40] Figure is developed from data in Summary Record of Snowmobile Use, Yellowstone National Park, 1966 through Apr., 1978, in Box K-57, File "Winter Activities," YNPA; "Seasonal Visitation Statistics," flyer available from the Yellowstone National Park Visitor Services Office. Data for 1998 and 1999 was downloaded from the official Yellowstone National Park website, <http://www.nps.gov/yell/stats/index.htm>.

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Poster session abstracts

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Modeling land cover changes across the boundary of Yellowstone National Park: use of remotely sensed data, GIS, multiple drivers of change, and multi-model inference and selection.

This poster describes land cover changes since the early 1980s across the boundary of Yellowstone National Park. Attributes of land cover and their spatial pattern of change are described from a series of LANDSAT images using change vector analysis. Environmental and socio-economic drivers are then used to generate a suite of models of change that are implemented with Generalized Linear Modeling (GLM), Generalized Additive Modeling (GAM), and Markov modeling. The suite of models represent a series of multiple working hypotheses describing the effects of spatial variables as a representation of social, economic, and environmental drivers of land cover change in and around Yellowstone National Park. The alternate models produced are evaluated in a process of model selection and multi-model inference, which also allows the relative importance of different drivers to be assessed. Differences in land cover changes within and outside Yellowstone National Park are described through geographic differences between models. In addition to the specific results of the case study, the research demonstrates the use and interpretation of change vector analysis in description of land cover change, the generation of multiple alternative models, the utility of model selection as a mechanism for rating among plausible models that describe patterns of land cover change, and multi-model inference based on a set of models rather than a single model. It is argued that this approach provides a robust mechanism for analysis and interpretation of spatial and temporal changes in land cover based on a wide variety of drivers and is particularly useful in the context of change around National Parks where there may be different drivers that vary geographically.

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Lake Manyara, Tanzania, watershed assessment.

The Tarangire–Manyara ecosystem in northern Tanzania is a well-known area of global biodiversity. Within the ecosystem is a closed-basin waterbody called Lake Manyara, a portion of which is managed as Lake Manyara National Park. In contrast to Yellowstone National Park, which is at the

headwaters of several rivers, Lake Manyara National Park is at the terminus of several rivers that drain a 766,700-hectare watershed dominated by human uses. The African Wildlife Foundation (AWF), an internationally recognized conservation organization, is concerned with habitat fragmentation and environmental degradation within the Lake Manyara watershed. Further, they recognize that human use of the watershed is paramount. To address these concerns, they have partnered with local stakeholders and the U.S. Forest Service (USFS) to build and foster a working relationship that will result in improvements in watershed health while maintaining a strong link to societal values. One critical component of the partnership is completion of a watershed assessment. The assessment will result in characterization of the human, aquatic, riparian, and terrestrial features, conditions, processes, and interactions of significant importance. AWF staff is leading the assessment, which includes development of a GIS and associated database. USFS staff is providing technical assistance in watershed science. AWF and USFS personnel sponsored an on-site workshop in December 2002 with approximately 25 stakeholders. The workshop included a watershed science shortcourse, broad characterization of the watershed, and identification of key issues and questions. Future workshops are planned and will focus on comparing current and reference conditions, and formulation of recommendations for improving watershed condition.

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The changing political landscape of the outfitter–guide industry in Jackson Hole, Wyoming.

For many decades, outfitters were largely hunting guides. Now often referred to as outfitter-guides, they guide clients rock climbing, snowmobiling, paragliding, hiking, snowshoeing, helicopter skiing, camera hunting, and most any other sport for which they can obtain a national forest or park permit. The proliferation and diversification of guiding outfits in national parks and forests is indicative of the growth and diversification of outdoor recreation in general. My dissertation research focuses on how the U.S. Forest Service is responding to this growth and diversification, and focuses on the San Bernardino, White River, and Bridger-Teton (BTNF) national forests (in California, Colorado, and Wyoming). The poster I am proposing for this conference focuses on the changing role of outfitter-guides in the regional economy of Jackson Hole, Wyoming, and in the national political landscape. It is based on interviews with representative Jackson Hole outfitters performed in the fall and winter of 2002–03. Jackson Hole outfitter-guides, many of whom operate in the BTNF, Grand Teton, and Yellowstone, have figured prominently in the Jackson Hole political and economic landscape since the region

shifted focus from agriculture to tourism in the early 1900s. Now outfitters are well organized on a national level, hiring full-time lobbyists in Washington and waging high profile lawsuits against the land management agencies. They are also attracting more scrutiny from regional and national environmental groups. This poster will examine the changing political landscape of outfitting, an important and largely non-extractive way of extracting value from a preserved natural landscapes of the American West as well as East Africa.

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Community change on Mount Kilimanjaro.

The geography of the land surrounding Mt. Kilimanjaro, in Tanzania, has changed dramatically over the past decade. Research was conducted during 2002 in three villages at varying distances from Kilimanjaro National Park and Forest Reserve (KINAPA), which officially opened in 1977. The combination of KINAPA on one side and former colonial plantations at the base of the mountain, in addition to a high birth rate, has caused a dramatic population squeeze among the Chagga tribe who live on the mountain. This has resulted in smaller plot sizes for families and overuse of the mountain's water sources. Surveys, ethnographies, and interviews showed that population and environmental changes are causing change at the community level. The land shortage has caused young people to search for other sources of income, such as tourism and small businesses. These jobs are not plentiful and many are forced to migrate to other areas of Tanzania in search of income. This out-migration, plus the population pressure which remains, has caused many to claim the values of the people are changing, despite the strong attachment they feel to their homes and lands. To them, only "God and time" will tell what the future holds.

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A demographic and economic analysis of big game seasonal range acreages and its importance for Wyoming.

This analysis presents demographic and economic information related to enhancing wildlife management information collection beyond the traditional hunting and biological information base. The analysis identifies demographic and economic characteristics of the human settlements in Wyoming Game and Fish Agency management areas for six big game species: pronghorn (*Antilocapra americana*), elk (*Cervus elaphus*), moose (*Alces alces*), bighorn sheep (*Ovis canadensis*), mule deer (*Odocoileus hemionus)*, and whitetail deer (*Odocoileus virginianus*). Census data is compared with U.S. Fish and Wildlife Service wildlife participant profiles to identify populations of interest within the management area. Economic impacts of hunting and wildlife viewing are also assessed. Hunters and wildlife viewers spent over $240 million in expenditures in Wyoming, generating almost $80 million in labor income and 5,370 jobs. The results provide a profile of land ownership, social and economic characteristics of management areas and suggest how wildlife managers can more fully consider social aspects of game management decisions.

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Community and conservation on Mount Kilimanjaro.

One of the most important issues on Mount Kilimanjaro is natural resource use and distribution. Local communities, especially those adjacent to Kilimanjaro National Park (KINAPA), have used and managed these resources for generations, but with the establishment of the national park, resource management and distribution changed dramatically. As recognition of the importance of involving local communities in conservation has grown, both locally and globally, the Tanzania National Parks system has developed a Community Conservation Service to improve local involvement and relationships between park staff and local communities. However, research conducted by Jeffrey Durrant and students from the Department of Geography at Brigham Young University and Abuid Kaswamila and students from the College of African Wildlife Management shows that there is a large gap between the objectives of community conservation and actual practice and understanding. The expectations and needs of local communities for infrastructure development projects usually overshadow any plans for conservation projects. In addition, local communities do not feel they are involved in the planning or decision making processes of the Community Conservation Service. The difficulties of combining community development with conservation as

well as limited financial and human resources present formidable obstacles to successful community conservation on Mount Kilimanjaro. However, the need for increased cooperation and benefit sharing is great as local communities still feel they must rely on resources from KINAPA to survive.

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Community attachment and conceptions of place on Mount Kilimanjaro.

The concept of place as a social force has been present in social theories since such theories were first recorded. Recent social theories identify length of residence, economic activities, age, and social status as the most important predictors of attachment to place. However, most of these theories are based on a Western conception of place. While conducting research on Mount Kilimanjaro during the summer of 2002, it became clear that there were distinct differences between how we, as western college students, and the local people we talked to conceived of place. Through important traditions as well as historical, familial and social ties, the people on Mount Kilimanjaro have developed a unique conception of place. Despite population pressure and few livelihood options, we found that people are very reluctant to sell their land, and most would not move even if they had the means. Their attachment stems from historical, agricultural, and social ties to the community and land and is found among people of all social classes, age groups, and distances from KINAPA. This challenges Western theories that age and social class lead to differences in attachment, but it supports theories that length of residence increases attachment, due to the high level of attachment found in those whose families have lived on the land for multiple generations. By better understanding how people in this region view the concept of place, we can better understand how people feel about their homes, land and their relationship to conservation on Mount Kilimanjaro.

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Applying economic geography to the management of big game migration corridors and the lands they cross.

Corridors used by big game herds for seasonal migration are receiving increasing attention from natural resource managers and conservationists. This analysis evaluates location and land ownership issues for migration corridors for six big game species in Wyoming: pronghorn (*Antilocapra americana*), elk (*Cervus elaphus*), moose (*Alces alces*), bighorn sheep (*Ovis canadensis*), mule deer (*Odocoileus hemionus*), and whitetail deer (*Odocoileus virginianus*). Migration corridors are analyzed using the Revised Gap Analysis digital grid to identify corridors that may be impacted by development and human use. Gap Analysis represents four levels of land management status across the state. Status 1 and 2 lands include wilderness, national parks, national monuments, preserves, refuges, natural areas, special interest areas, wildlife habitat management areas, and national recreation areas. Status 3 and 4 lands include national forests, national grasslands, Bureau of Land Management lands, Department of Defense lands, native lands, state trust lands, and private lands. The Gap grid was used to develop a level of protection measure that was assigned to each corridor. Those migration corridors that lie primarily, or in some cases entirely, on Status 3 and 4 lands, are generally at a higher risk of disruption from land and resource development projects. The GIS analysis provides a landscape level profile of where most known corridors are located, land ownership status, and general levels of protection.

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Demographic change in the New West: rural residential development around nature reserves.

Human populations are growing rapidly in rural lands surrounding nature reserves. We currently lack a thorough understanding of the technological and societal changes that are driving this trend. Knowledge of the factors influencing residential sprawl is needed for assessing regulatory implications, economic costs, and ecological consequences of future development. This poster describes the roles of natural resource constraints, transportation infrastructure, and the location of towns and natural amenities in shaping changes in rural home density in the Greater Yellowstone Ecosystem. Our findings indicate that spatial patterns of rural development were most

strongly correlated with previous home density, measures of accessibility to services, and environmental amenities. Implications of the results are: (1) new home sites in previously undeveloped areas are a primary factor encouraging further land conversion; thus, the siting of new subdivisions is an important policy decision, and (2) enhancing environmental amenities through land use management can likely stimulate growth while limiting the ecological impacts of development. Another goal of the study was to provide communities and planning agencies with an improved understanding of how and why development patterns occur, as well as a tool for evaluating alternative growth management policies. Thus the Rural Development Simulator (RDS), a spatially-explicit computer model, was constructed and used to simulate future development under different land use planning scenarios. By allowing the impacts of proposed policies, such as zoning and the purchase of development rights, to be systematically evaluated, the RDS should improve the effectiveness of growth management in this region of high ecological significance.

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Defining the dimensions of vulnerability to wildfire in the Greater Yellowstone Ecosystem.

We propose a framework to assess the vulnerability of communities and landscapes to wildfire as a manifestation of linked social-ecological systems. This work synthesizes two distinct bodies of knowledge: (1) fire as an environmental process, and (2) fire as a human-mediated process. Traditionally, wildfire research has evaluated fire as an environmental process. The human role in wildfire, especially in complex regional mosaics of land use, however, has yet to gain a similar level of consideration. The wildfire vulnerability framework considers exposure, sensitivity, and adaptation within the context of biophysical, institutional, and cultural/behavioral subsystems. This approach offers an alternative view to wildfire as a predominantly fuels and weather driven process, potentially identifying a wider range of fire management options and applied research questions designed to better understand the role of fire in complex regional systems such as the GYE. In order to evaluate this framework, we quantified the vulnerability of four regional fire systems (GYE, Colorado Front Range, Mogollon Rim, and Los Alamos/Bandelier NM) and then qualitatively looked at dynamics influenced by climate anomalies. Although the GYE has a relatively lower overall wildfire vulnerability, continued population growth and associated development suggest that GYE wildfire systems are moving toward a higher state of vulnerability as evidenced in the other systems. This approach allows fire managers to prepare for wildfire system changes due to both ecological and social factors. Next steps include additional vulnerability quantification and simulation models of landscape

wildfire driven by both social and ecological factors.

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A comprehensive rapid-assessment approach for research agenda development at Yellowstone National Park: Elk (Cervus elaphus).

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Complexity across boundaries-coupled human and natural systems in the Yellowstone northern winter range.

The Greater Yellowstone Ecosystem is a complex natural system. A primary issue in the GYE is the ecology of the northern elk winter range (NEWR), where elk and wolves cross the Yellowstone Park boundary and, thus, between areas managed as "natural" and "altered" systems. Land management inside the park, and development pressure outside park boundaries, suggests that wildlife management plays out on a landscape mosaic dominated by human decisions, values, and economic considerations. The main objectives for this project are to: (1) gain a better understanding of the relationships between ecosystem dynamics and human decision-making, and (2) use this understanding to construct an ecosystem model that facilitates the exploration of plausible future scenarios in a manner that captures the uncertainty associated with complex systems. We are developing integrated, spatially explicit submodels for elk, wolf, vegetation and human development to assess the impacts of climate variability, and land use decisions on the NEWR. These submodels are being developed within the context of a multi-agent system (MAS) designed to model complex adaptive systems. The MAS-based model will be used to simulate alternative states that result from assumptions about decisions, natural conditions, and ecosystem processes. The results will demonstrate the complex nature of a highly integrated ecosystem and the role that climate, human decisions, and natural variability play in producing ecosystem change and/or stability. This poster highlights work in progress for our NSF

Biocomplexity in the Environment Coupled Natural-Human Systems grant.

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Mitigating conflicts between humans and large predators in Africa: challenges and lessons learned.

The most significant cause of the decline in predator populations is direct killing by humans. The African Wildlife Foundation (AWF), working with local communities to conserve habitat for the benefit of people and wildlife in Africa since 1961, will present specific examples from eastern and southern Africa to highlight challenges faced in conserving predators and draw lessons learned to inform future action. Case studies discussed have either benefited from support by or are familiar to AWF. Hindrances to effective conservation abound across predator species and populations, and include inadequate basic knowledge, management in absence of science-based plans, inadequate supporting policy, lack of education about predators and anti-depredation measures, ineffective partnerships, inordinate lack of funds, and inadequate predator-focused programs. In one study, both relative abundance rankings and attack frequencies for each species vary by site. The central issue may not be how much damage predators do (AWF's result suggest the damage is minimal) but rather how people react to that damage or threat—real or perceived. Different predators elicit different responses; relatively little pastoral effort is directed towards eliminating wild dogs, the most endangered species. Across sites, AWF has confirmed that predator populations can rebound, and that solutions for conflict mitigation need not necessarily be expensive. Successful conflict mitigation requires multi-disciplinary approaches integrating scientists, managers and landowners to agree on goals, as well as pooling experiences and resources. Positive aspects of living with predators need to be highlighted through livelihood improvement projects. For reasons ecological, economic, or otherwise, predators are important species wherever they occur.

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The interplay of natural and anthropogenic disturbance in determining distribution of invasive plants: example from the northern range of Yellowstone National Park.

Invasion of non-indigenous plant species (NIS) into natural and managed ecosystems is a widespread problem with potentially devastating ecologi-

cal and economic consequences. The increased occurrence of NIS is often linked with disturbance. Anthropogenic disturbance is often perceived to have the greatest influence on NIS distribution in bioreserves, but wildfire and wildlife also may play a large role in NIS distribution. Fire is a natural disturbance phenomenon in many ecosystems, and creates favorable sites for establishment and regeneration of flora. Some native species can exploit these conditions, as can some non-indigenous species. Similarly, wildlife have been anecdotally blamed for the spread of NIS. We examined patterns of NIS distribution and associated wildfire and wildlife distributions in the northern range of Yellowstone National Park. Our analysis was specifically designed to understand the processes that link these diverse disturbances that may influence NIS distribution. We have found that vectors of travel associated with roads and trails, and vectors of wildlife movement and fire management are variously correlated with NIS distribution. Our studies on invasive species represent an excellent specific example of how processes transcending park boundaries will require specific knowledge about the processes and challenges of designing integrated and adaptive management plans that also cross the boundaries of the park.

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Approaching the table: a framework for tranforming conservation-community conflicts into opportunities.

Information associated with this poster appears in the earlier chapter by the same title.

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Earthwatch Institute: Conservation and Community Involvement in Samburu, Kenya and Rocky Mountains, North America.

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Attitudes toward conservation on Mount Kilimanjaro.

There have been several different studies of local people's attitudes towards Kilimanjaro National Park (KINAPA) as well as their attitudes towards the Community Conservation Service (CCS) of KINAPA. Surveys of community attitudes have been conducted by Dr. Jeffrey O. Durrant of the Department of Geography at Brigham Young University (summer 2002), Abuid Kaswamila, research director at the College of African Wildlife Management (spring 2002), Andrew Matthias Marandu, thesis for graduation from Sokoine University of Agriculture (2001), and William Newmark in conjunction with the College of African Wildlife Management (1992). These surveys find that attitudes are generally favorable towards KINAPA, although the majority of those surveyed do not feel they have been involved in planning or decisions about conservation or community development. While a majority of residents around KINAPA support the existence of the park, they would also like to see more personal benefits from the park and more alternatives for resource use. In addition, most people feel disappointed that their voices aren't taken into account when KINAPA and the CCS plan and implement community projects. An analysis of people's attitudes towards conservation shows that in general although people understand the concept of conservation and are at least verbally supportive of the park, they also feel dependent on the resources they obtain from the forest and do not feel that they have been given the help or alternatives needed so that they no longer depend on resources that they can now only use illegally.

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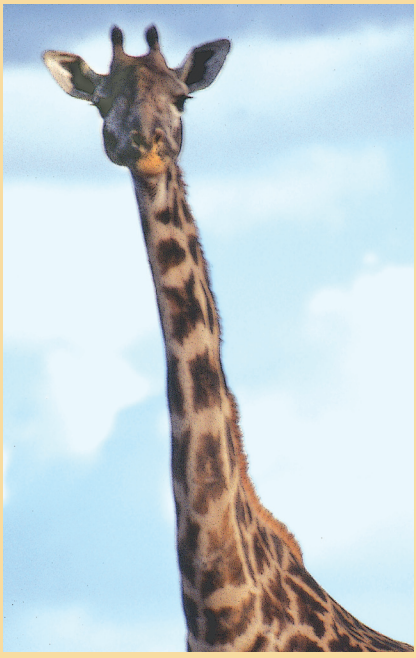

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