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A Serengeti Land Ethic: Deconstructing Environmental Dualism in a Critical Ecosystem

Kristyn Gorton
kgorton@rollins.edu

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By Kristyn Gorton

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Advised By:

Dr. Gay Biery-Hamilton

Dr. Lee Lines

Dr. Emily Nodine

Chapter I:

Introduction

The Serengeti region is among those with the longest history of human presence on Earth. However, Western thought has a stronghold in the modern conservation ethic and has long isolated mankind from the wildness of its habitation in both philosophy and practice. This perspective falls short of a realistic or helpful point of view when considering the preservation of ecosystem dynamics in most of the world. This dual understanding of man and environment, and the impulse to theoretically separate them for the latter's preservation fails to hold water in real-world conflicts between the interests of land and people. I explore the concept of environmental interdependence as it pertains to the human ecology of the Serengeti Plains. That is, the mutually beneficial interactions which have historically occurred between indigenous cultures and the natural environment in the region. What, then, does this landscape look like under traditional habitat management versus the modern preservation methods? Further, should indigenous groups be managing this ecosystem today?

In this study, I synthesize information on the ecology of the Serengeti Plains biome, its landscape and human history, the ethnoscience of its indigenous populations (the Maasai, especially), and the current management objectives of the Serengeti's protected areas in order to evidence the suitability of indigenous habitat management technologies in the preservation of this ecosystem. Effects of indigenous removal include the encroachment of tsetse fly bush, reduction in grassland diversity and primary productivity, and decline in the Serengeti's keystone species, the blue wildebeest. The models of conventional national parks and community-based

conservation alternatives will be evaluated in order to determine an appropriate schema for environmental protection on the Serengeti's regional scale.

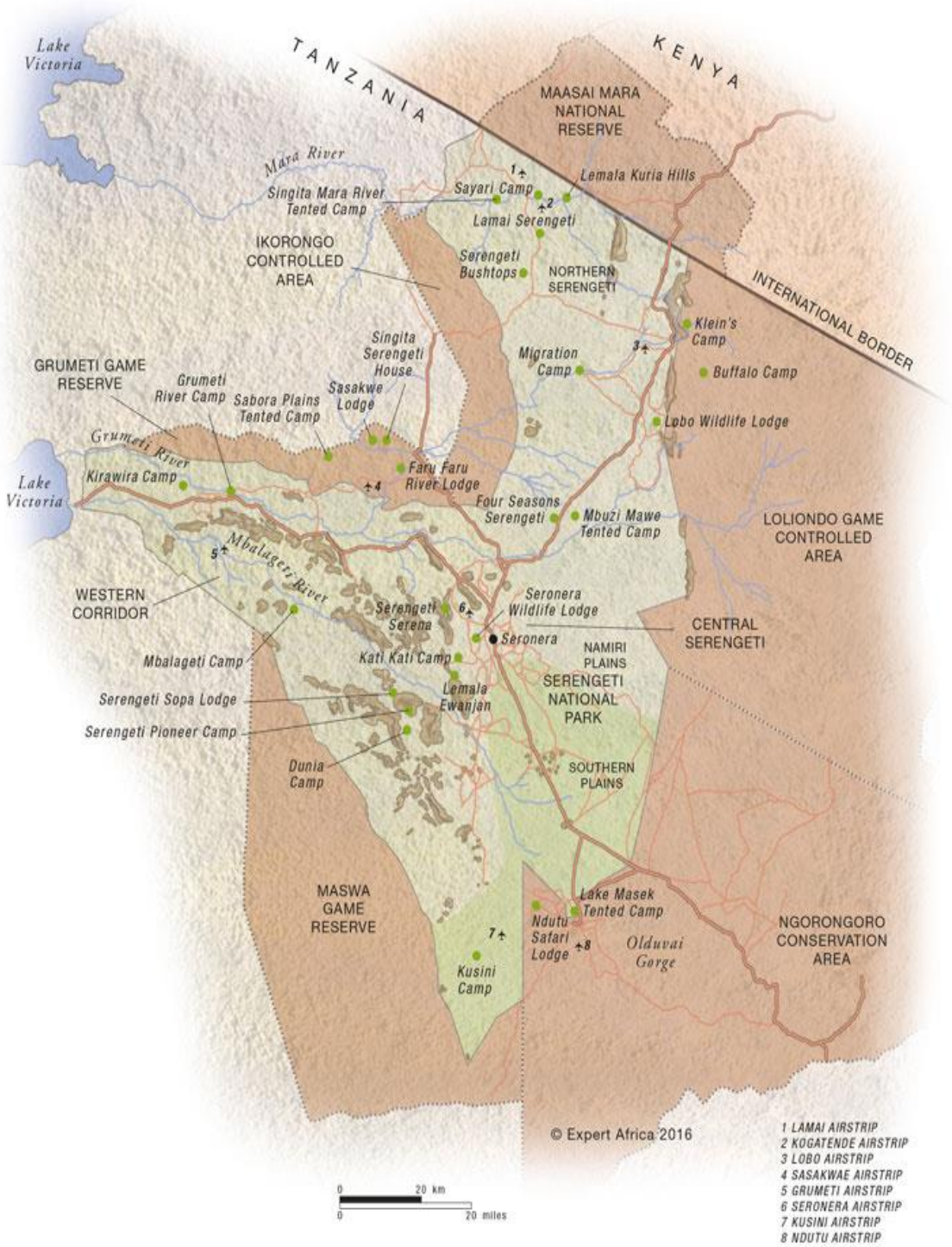

Figure 1 Map of the Serengeti ecosystem's protected areas (n.a., ExpertAfrica.com)

Context

Around the world, much anthropogenic grassland used for grazing is characterized by a mono-specific, low-diversity ecology (Chape, 2008). However, the plains of the Serengeti support a species-rich, semi natural ecosystem shaped by thousands of years of human-landscape interactions, namely pastoralist activity. Chape contends that in such areas, "humans are an integral part of the ecosystem, and indeed their presence may be vital for ecosystem function to be maintained." However, the modern conservation method excludes most human activity from protected areas.

Indigenous people are now made conservation refugees, forced from their ancestral lands and pushed to marginal areas with few subsistence options at the bottom of the local economy. When they return to their lands to visit the graves of their ancestors or hunt to fend off starvation, they are now a criminal class of trespassers and poachers (Johannesen, 2006). Human populations already put pressure on natural reserve borders, where local commerce and tourism activities are concentrated. Pushing pastoralist populations into these areas with no way to survive is exacerbating the intensity of land use here, and therefore, the edge effects and threats to the park's biodiversity. The parks have become islands, and long-term viability may not be possible without radical reorganization by the major players in these ecosystems.

While other tropical conservation initiatives (primarily in South Africa and Latin America) have had mixed success incorporating indigenous environmental knowledge and traditional habitat management, the Maasai way of life continues to be demonized by environmentalists (Becker, 2003). Their complex understanding of the plains' fire ecology has led the Maasai to perform seasonal controlled burnings of the grasslands in order to return

nutrients to the soil and allow prolific growth (Adams, 1996). These practices, although used to justify past evictions, are now utilized by park officials. Due to virtually nonexistent budgets and mismanagement, the Serengeti parks and reserves are now targets for illegal poaching--crimes that a network of resident Maasai may effectively prevent.

The lifeways of the various Serengeti civilizations which have produced the remarkable landscapes at stake are at odds with the capitalist structure superimposed on native lands since the colonial era. Pastoralism is not efficient in a capital-based economy, considering its land-extensive nature (Loibooki, 2002). Although the Maasai have followed the Great Migration and grazed livestock alongside the wildlife each year for centuries, this strategy can no longer be sustained. Due to the human-exclusionary philosophy of the Serengeti's protected areas, Maasai must now graze their livestock outside of the Serengeti and are arrested if they cross the border to water their herds. The Maasai people feel that conservation of this land only protects the wild animals, although areas like the Serengeti National Park were built by "people, wildlife, and fire" (Apostolidis, 2009).

Current literature paints a starkly negative picture of the history of conservation in the Serengeti. The protection of the Serengeti's wildlife by Europeans ("whites") is explained as purely profit-motivated: the economic values of Serengeti wildlife have shifted in nature several times and management actions have focused on maximizing the profitability of exploiting wildlife as a resource (Shetler, 2007). In the early colonial period, whites raced to hunt the most impressive species for sport and luxury items. The Maasai were not aware a fortune could be made from Rhino Ivory until Europeans commodified it. When poachers saw "tuskers" disappearing, they became conservationists. Eventually, the value of the Serengeti's wildlife

began to decrease in the exotic luxury items sector and increase in the tourism industry. In 1962, when the movie "*Hatari!*" with John Wayne made the Serengeti famous in the Western world, depicting the capture of wildlife for transfer to European zoos (Apostilidis, 2009). The film was shot during independence from the British and catalyzed photographic tourism, depicting the Serengeti as a wild and dangerous land, unconquered by man. "Safari" culture then began with the first luxurious "bush lodge" built during the presidency of Julias Nrebe in the 1970's (Walpole, 2004). During this period, the region's economy became centered on the spectacle of the annual migration event. Expensive hotels began take water out of the nearby Ngorongoro Crater and destroy the water supply of associated forests, converting the tangible value of natural resources into the intangible and transferable value of tourism. That is, the local environmental values of natural hydrology is diminished while foreign tourism companies profit.

This investigation will hinge on understanding the contrasting ideologies of environmental monism and environmental dualism. In order to evaluate the issue of imposing a traditionally Western, human-exclusive National Park-type structure on this particular ecosystem, the conflicting ideologies at hand must be identified and explained. I argue that the preservation model which was set in place first under colonial Tanganyika and continued by the independent government to this day is a manifestation of *environmental dualism*—the consideration of the natural environment as a system separate from humans. This view is applied in modern Western economic thinking, wherein products of nature are viewed as tradable commodities rather than subsistence materials. Conversely, *environmental monism* observes a single system in which humans as a species are not exceptional. Natural and human elements/processes are treated as interacting components within a shared system. This view obviously comes naturally when dealing with subsistence economies (i.e., those which constitute

most human activity, historically). Constant interaction with the environment is characteristic to such a lifeway and stewardship of it is basic to human survival.

Hypothesis

Preliminary consideration of the question at hand leads me to believe that several historical events which reconfigured the distribution and populations of indigenous Serengeti peoples and their livestock led to negative impacts on the ecology of the Serengeti. I thereby hypothesize that the inclusion of indigenous peoples and practices in the Serengeti ecosystem was a beneficial structure for the conservation of its landscape and biodiversity, and that this will be demonstrated in changes to landscape and species composition following the exclusion of traditional societies.

Methodology

In order to evaluate the hypothesis, it is necessary to establish the nature of the Serengeti Plains' ecology. Holistic considerations of this theme, synthesizing scientific and traditional systems of knowledge and framing them in historical context is lacking in modern research on the Serengeti's ecology. I seek to address this gap with this inquiry and make suggestions for further research. An evaluation of the system's biogeographic profile must be conducted in conjunction with that of its human history and culture in order to substantiate the claim that the landscape of the region is unique in the extent of its modification by humans. Traditional histories, archaeological evidence, and historical sources are used to construct a holistic vision of

the Serengeti's natural history. This understanding will be necessary while investigating the response of the landscape to disturbances in indigenous habitat management strategies. Wildlife census data is analyzed as it relates to the presence and activities of indigenous communities in order to understand the impacts of excluding these groups from natural reserves and suggest an appropriate model for preservation of the system's biodiversity and natural resources.

Oral histories, like any other source, are not perfect. They are not immune to the adaptive forces of time and perspective. However, the tragedy of this story lies in the neglect of indigenous knowledge, and I argue that its oversight in addressing the questions of this paper would be equally injurious. Prior research has failed to emphasize landscape histories as told by the cultures who acted in them in evaluating systemic changes in the Serengeti's protected areas. I argue that the inherent bias of oral history should be noted, but should not disqualify the sources in consideration of the Serengeti's ecological history. Oral histories of the Serengeti, finally made available to the Western reader by Shetler, deal with contextualized accounts of the imagined and metaphysical, the symbolic and supernatural, to holistically explain cultural understandings of the historical landscape and changes to it.

This study of the Serengeti's human ecology synthesizes concepts from multiple disciplines of variable practices and perspectives—necessitating understanding of the region's diverse habitats and species, its depth of human history, ethnic groups and stakeholders, and the current management pressures and goals of seven designated protected areas (of variable type and status) in two countries. Although the origins and implications of the issues dealt with in this research go beyond the specified area of study, the scope of this project will be limited to the following natural preserves as a system: Serengeti National Park, Maasai-Mara Game Reserve,

Ngorongoro Conservation Area, Maswa Game Reserve, Grumeti Game Reserve, and Ikorongo Game Reserve (Campbell, 1995). The indigenous groups included in the modern study of these areas are the Maasai, Ngoreme, Ikizu, Tatoga, Sukuma, Nata Ishenyi, and Ikoma people (Koerner, 2009). However, the relevant history of the Serengeti landscape (as it has been affected by humans and recent human ancestors) spans over two million years.

Justification

The ecoregion of the Serengeti Plains is one of the most remarkable natural features on Earth. It is valued not only for its picturesque landscapes and sublime appeal, but for its unparalleled biodiversity and unique species. Both Serengeti National Park and Ngorongoro Crater are UNESCO World Heritage sites, highlighting the area's natural and cultural importance. Additionally, tourism in the Serengeti ecosystem represents a vital contribution to the national economies of Tanzania and Kenya.

The Millennium Development Goals of the International Union for the Conservation of Nature (IUCN) also explicitly emphasizes the importance of incorporating indigenous peoples in the management of parks. Since denying resource rights to these "original or oldest surviving inhabitants" eliminates their incentive to conserve said resources, the IUCN recognizes the importance of coordinating efforts in environmental and economic sustainability for the long-term viability of the protected area. Furthermore, the recent United Nations Declaration on Government and Development Principle 2.2 states that indigenous people play a vital role in environmental management due to their "knowledge and traditional practices" regarding at-risk ecosystems. Additionally, the 5th World Parks Congress details the rights of indigenous people

in Outcome 6, asserting the need to address indigenous issues in environmental conservation (Chape, 2008).

Definitions

The following chapters include a discussion of environmental dualism, its weaknesses, and the advantage of deconstructing it in the consideration of the Serengeti. Thus, a defined understanding of this concept is required. For the purposes of this analysis, environmental dualism refers to the primary philosophical motivation for the creation of protected areas within the Serengeti biome by colonial and neocolonial structures. Environmental dualist thought is defined by the consideration of humans and their activities as a separate system which acts on and is acted on by the natural system. Heralded as a uniquely American idea, the National Park model is an apparent manifestation of environmental dualism. An account of the establishment of this ideal will be detailed in Chapter III in order to understand its influences in early conservation policies in Eastern Africa and the theoretical foundation for the current protected areas systems of the Serengeti.

Disturbances maintain a fine-grained mosaic of successional stages, maximizing diversity, productivity, and resilience of the system. The conservation ethic often couched in terms of maintaining existing diversity of plant and animal life-- unsuitable for highly dynamic and unstable semiarid ecosystems. Therefore, "preservation" of the Serengeti Plains biome will be defined as the maintenance of the ecological state prior to European contact. After all, it was the bountiful nature observed upon their arrival which the first conservationists sought to protect. Preservation of a multi-state system such as the Serengeti, then, requires preservation of

disequilibrium. How is this possible? Only by preserving the patterns of "disturbances," or traditional anthropogenic influences (fire management, migratory pastoralism, etc.) which acted on it. Environmental monism recognizes these historic processes as natural to the Serengeti landscape.

Chapter II:

Traditional Community-Landscape Interactions

"Serengeti" is an approximation of *siringet*, the Maasai word for "endless plains" (Shetler, 2007). In the entirety of their remembered history prior to European infiltration, Serengeti pastoralists held this view of their landscape; the boundless plains had always cared for the people who cared for them. Pastoral economies were resistant to most resource pressures (with the exception of extended drought events) until the introduction of famine-causing Rinderpest and other diseases in the late nineteenth century, and the plains were considered a sort of infinite paradise in the indigenous world views (Gibson, 1995). It is therefore necessary to understand the human resource management activities which were predominate prior to the "Time of Disasters" in order to shed light on the historic landscape configurations and governing ideologies. No place on Earth has experienced a more extensive history of huan impacts than the Serengeti—where early human ancestors, Australopithecus, produced the world's first stone technologies in Ngorongoro Crater's Olduvai Gorge (Leader-Williams, 1996). The habitat management practices employed by the Serengeti's historic human population are diverse and complex. Traditional environmental management technologies operated in the economic, social, and ritual spheres of indigenous societies and are not easily separated from other cultural features. Rather, the intimate understanding and maintenance of the natural landscape informed Serengeti people's world views.

An essential aspect of understanding the Serengeti is the landscape history of the Serengeti from the perspective of its native inhabitants. Oral traditions of native groups have transmitted the history of the landscape for generations, and can be used to understand the

worldviews and adaptive strategies of the Serengeti's people. Unfortunately, the indigenous people of Serengeti are incredibly limited in their power to disseminate information about their ancestry and modern lives to a global audience, and most accounts of the natural and human history of the Serengeti are composed by outside agents. *Imagining Serengeti* (Shetler, 2007) contains some of the most important source material for this project, being the only major academic work to synthesize indigenous landscape histories as they are understood by modern Serengeti peoples. The author states that "oral histories cannot stand on their own as unmediated accounts of the past, they must be reconnected to the social groups and historical contexts from which they were transmitted" (Shetler, 2007). The only way of describing oral tradition of historical narratives among modern groups is "amang'ana ga kare," or "matters of the past" (Shetler, 2007). The origin of the Serengeti's modern pastoralist peoples is understood by traditional Serengeti societies as a consequence of the first interaction between the male hunter, Nyamuswa, and female farmer, Nyasigonko. The mythological pair represents the complementary subsistence technologies of mobile foraging groups and settled horticultural societies which form the basis of traditional sustainable subsistence strategies (Shetler, 2007).

Due to a lack of a written language, the subsistence strategies of pre-European contact Serengeti peoples are accessible only through oral histories and material residues of landscape alteration. From these sources, it is known that the Serengeti Plains civilizations intentionally altered the composition of flora species and controlled wildlife populations to their advantage (Koerner, 2009). This was accomplished with the systematic use of grazing and fire, deliberate hunting sanctions, and the establishment of sacred spaces. This chapter will explore these traditional landscape-human interactions following a bit of essential ecological background.

Ecological Considerations

The Serengeti Plains ecosystem is a global biodiversity hotspot and home to several threatened and endangered species, including the black rhino, as well as unparalleled natural wonders. The Serengeti Plain is a high plateau of 2,500 square kilometers in Eastern Africa, part of the larger Serengeti-Mara system (Shetler, 2007). Its rich volcanic soils host mostly shallow-rooted plants with few trees. Dominant grasses are of the *Cynodon* and *Digitaria* groups, and the main tree emerging from the low-lying vegetation is the acacia (Sinclair, 1995). These species have coevolved with humans—they thrive with the deliberate and controlled use of fire that has aided subsistence activity on the landscape for thousands of years.

The ecosystem as it exists today is a pyrogenic community which requires fire management in order to provide young, nutritious grasses for the massive ungulate populations it hosts (Dublin, 1995). The seeds and roots of plants can survive regular burns which return the nutrients from groundcover into the soil and support the growth of vegetation such as red oat grasses, a staple of native grazing animals. In the absence of fire, this habitat becomes overrun with tall, nutritionally valueless grasses (reducing available food for wildlife) and poses the threat of a hot-burning fire which may destroy trees, subsurface grass roots, and seeds that can survive the frequent cool burns (Adams, 1996).

The ecology of the Serengeti is defined by the great annual migration of its keystone species—the blue wildebeest (*Connochaetes taurinus*) (Becker, 2003). Each year, 1.5 million individuals lead other ungulates (and their predators) in a circular migration within the Serengeti

biome (Biel, 2004). In the wet season, herds start in the Southeast in Ngorongoro Crater. As the plains dry from May to June, the wildebeest and zebra herds direct wildlife movement to the North and West, where the woodland hills retain permanent water sources (Campbell 1995). This seasonal movement of animals is one of the Earth's last great annual migration events, and fuels the ecotourism economy of both Tanzania and Kenya. Current management plans of the Serengeti's protected areas are based on the wildebeest, and the preservation of their post-Rinderpest recovery populations, which stabilized in the 1970's and are assumed to represent pre-contact numbers (Runyoro, 1995).

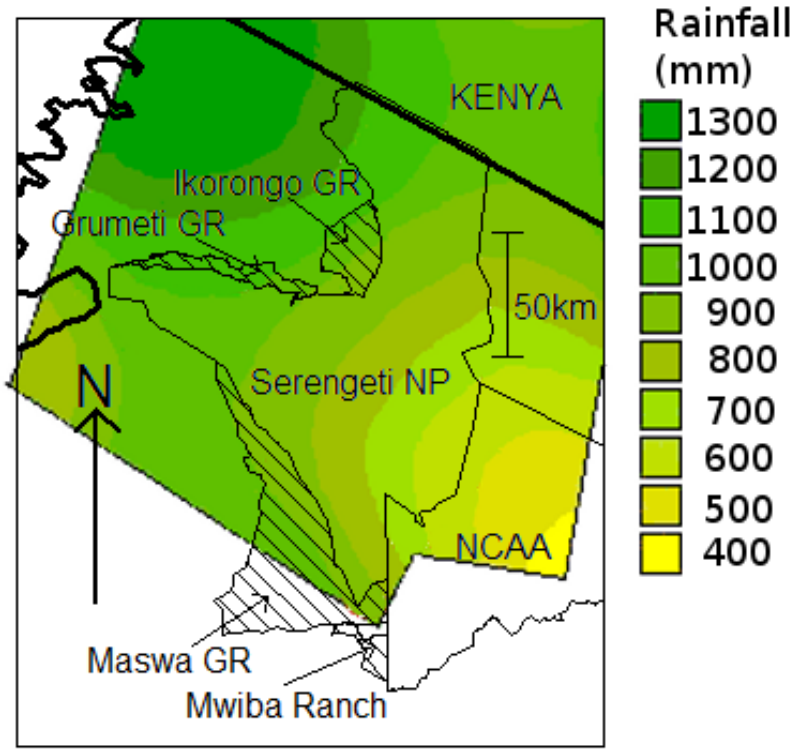

Figure 2 Rainfall pattern across the system drives the annual migration (safari-ecology.blogspot.com)

The Serengeti Plain is termed a "multi-stable state" or "disequilibrium ecosystem," since the natural vegetative pattern and wildlife biodiversity in the region is defined by the oscillation between woodlands and grasslands in variable intervals (Roe, 2000). As alluded to in Chapter I, seasonal as well as long-term shifts and disturbances in landscape produce the Serengeti system's invaluable diversity, productivity, and resilience. The Serengeti biome is a sprawling mosaic of intricately interlaced and gradated habitat types, a product of ever-shifting

environmental conditions and constant anthropogenic interference. This allows the land to host such high species richness.

Grazing

The timing and nature of the advent of pastoralism in Eastern Africa is uncertain. It has long been held that domesticated cattle from Western Asia were introduced to Africa around 4,000 years BP, although recent genetic evidence points to an African center of domestication slightly earlier (Gibson, 1995). Either way, African cattle joined the migrating herds of the Serengeti ecosystem thousands of years ago. Therefore, domestic herds have long constituted a significant portion of the seasonal migration's grazing individuals. Resource-based analyses have shown that domestic herds do not limit the nutrients available for wildebeest populations; the fast-growing grasses of the ever-changing plains regenerate with the short fallow periods allowed by seasonal movement (Koerner, 2009).

A team of ecologists conducted an experiment in which small portions of grassland were fenced and compared with the natural, grazing-accessible vegetative compositions. Protection from grazing in enclosures causes radical changes in community composition—one representative enclosure had *Andropogon greenwayi* and *Sporobolus marginatos* comprising 56% and 20% biomass outside but were not recorded inside. *Pennisetum straminerm* and *Pennisetum mezianum* made up 5% and 3% outside, but 72% and 26% inside (Norton-Griffiths, 1979). This is significant since livestock not only traditionally comprise a large portion of herbivore biomass on the Serengeti Plains, but also graze in the absence of wild herds, thereby maintaining diversity of grass species year-round. These grasses are clearly grazing dependent

since relative dominance increases while diversity declines with exclusion of grazing, which qualify these species as "obligate grazophils." Therefore, grazing by domestic herds does not significantly increase competition with wildlife since their use of the grazing lands actually increases the availability food resources. There is plenty of savannah to go around when unbounded by modern political borders and land use partitioning/specialization. The migratory nature of both domestic and wild herds prevents the exceedance of the system's carrying capacity—therefore, intensification in the system (and degradation of grazing resources through soil compaction) is not caused by the presence of domestic herds (i.e, an increase in population of total herbivores) but by their containment through the alteration of migratory paths as seen in the forced relocation of indigenous populations (Campbell, 1995). Given the full natural extent of the system through which to migrate, domestic herds have not overburdened grasslands of the Serengeti. This is demonstrated in the long history of coexistence and coevolution between wildlife and domestic herds in the region.

Fire Management

The systematic and measured use of fire is an essential aspect of the modern management of certain natural communities. Such communities are termed "pyrogenic"— their ecological equilibrium sustained by periodic fires on the landscape. On a regional scale, fires transform the Serengeti's woodlands to grassland over time. Conversely, the exclusion of fire from the system results in the spread of woodlands at the grasslands' expense. Although woodlands provide critical habitat, resources, and contribute to the system's diversity, they are less productive than grasslands—which constitute the Serengeti's most central resource: grazing land. If left

unburned for a few decades, the savannahs of the Serengeti would succeed to a near monoculture of Acacia forest. An overwhelming majority of the Serengeti's biomass depends on the availability of the diverse nutritious grasses on the plains. The most notable biomass component is of course the Serengeti's keystone species, the blue wildebeest, whose abundance is directly related to amount of suitable forage (Mduma, 1999).

Fire affects community composition in several ways, each of which are (and long have been) comprehensively understood by the Serengeti's native people. Firstly, fire provides immediate return of essential nutrients to the plains soil. Fires in the Serengeti occur only in the dry season, and are started exclusively by humans. Although the aboveground organs of fire-adapted plants are combusted and eliminated with natural fires, roots, seeds, and regenerative organs remain undisturbed beneath the soil, where they convert the freshly available nutrients from the burned organic matter into new growth. Therefore, relatively frequent fires produce more nutrient-rich grasses for consumption by grazing animals. Additionally, fire synchronizes the maturity/ flowering of certain herbaceous species, thus contributing to continued survival of the species by increasing recruitment of new plants.

In addition to the revival of grass species, fire frequency determines the boundaries of woodland habitat and influences which species are able to thrive in a given area. Short fire intervals preclude the establishment of woody species by diminishing recruitment of plants which are not fire adapted—known as non-pyrophytic or pyrophobic species. These communities remain viable only given adequate shelter from fire events—made possible by the low-energy and spotty burns which result from the low fuel capacity of short grasses and

traditionally, also by methodical applications of fire to the landscape which spared old-growth forests while opening and enriching the plains by humans (Bird, 1998).

Hunting of Wildlife

Indigenous populations occupying the Serengeti ecosystem prior to European contact were acutely aware of the population dynamics of the wildlife with which they shared the land. Strict hunting sanctions and community taboos among pastoralists forbid the use of wildlife for food except in times of severe famine (Walpole, 2004). Among groups which did hunt for sustenance, hunting was prevented from surpassing sustainable levels both by low human population density and the desire of hunters to maintain the resource for future use. Although whites felt they were uniquely capable of protecting African wildlife in the colonial period, hunting communities already had their own built-in hunting controls informed by an ecological understanding of their surroundings (Colding, 2001). Among Maasai, lion-hunting in a group operates as a coming-of-age ritual and was practiced for hundreds of years without significant effects to the lion population (Roe, 2000). As opposed to sport hunting, the practice is one woven into the social fabric of Serengeti lifeways and therefore acts within the ecologically sustainable nature of traditional Serengeti subsistence.

Although conservationists have long cited human-wildlife conflicts as justification for human-exclusionary preservation, modern Serengeti populations rely overwhelmingly on pastoralism (and to a lesser extent, cultivation) to meet nutritional demands. The meat, milk, and blood derived from livestock holdings account for nearly all Serengeti peoples' calorie intake, and can adequately support human life on the plains given adequate access to grazing resources.

The increased bushmeat trade around the National Park following its establishment is a direct result of the loss of these resources, and does not represent typical patterns of subsistence (Campbell, 2001).

Sacred Spaces

Although traditional subsistence strategies (i.e. food procurement) in the Serengeti favor the establishment and maintenance of grassland, ritual practice and spiritual beliefs have supported the survival of extensive woodland habitats for most of the area's human history. Woodlands are a vital component of the Serengeti biome; they provide shelter, hunting grounds, and nesting habitat for several species. Additionally, the perseverance of resilient, old-growth woodlands contributes to the diversity of the overall system's vegetation. Emphasis on ancestral reverence within the Serengeti spiritual complex fosters direct connections between sacred and natural spaces on the landscape. Examination of oral histories reveal continuities in indigenous peoples' historic cognitive maps of the Serengeti, in which specific locations are associated with actual events in the cultures' mythologies. For example, the site where the hunter is thought to have met the farmer and formed the modern bases of Serengeti societies is considered among Serengeti societies to have occurred in a particular area of the western plains (Shetler, 2007). Additionally, burials typically occurred in the wooded areas of the land prior to the establishment of the National Parks. Burial sites were remembered, observed, and visited as a part of the spiritual tradition of the Serengeti people (Koerner, 2009). Therefore, these areas were maintained intentionally as sacred enclaves and ritual spaces. The combination of subsistence

and religious traditions of the Serengeti's people have thus insured a proportional balance between grasslands and woodlands in the ecosystem.

Spiritual authority among these indigenous societies is accumulated and reinforced through knowledge of the natural systems. Healing of the land is a spiritual obligation of religious leaders, who hold the most knowledge of environmental management processes. Social unrest and economic challenges were understood as signs of the land's need for attention and care of the human inhabitants (Shetler, 2007). Thus, the survival of Serengeti peoples is intimately and inseparably tied to stewardship of the land, not only for the purpose of procuring resources, but as the nucleus of cultural identity. This integrated nature of ecological management among the Serengeti's traditional groups' lifeways and self-understanding, then, ensures not only the survival of indigenous people, but of their culture. This guarantees the protection of the Serengeti's nature more than a system based purely on resource extraction would (which became the case under colonialism). For example, if pastoral societies sought only to create capital in the form of livestock, there would be no incentive for the preservation of wooded areas. The impulse of stewardship is central to indigenous ideologies of the Serengeti and is demonstrated in the associated religious systems.

Chapter III:

Transitions in Landscape-Governing Bodies and Ideologies

The Serengeti landscape was governed (in the anthropogenic sense) exclusively by indigenous bodies of knowledge prior to the late nineteenth century. This era is understood as the "Time of Disasters" within native oral traditions and refers to experienced hardships of Serengeti societies resulting from the massive upheaval of traditional systems with European intrusion and colonialism (Shetler, 2007). While this age is often measured by and explained via the historical events which depopulated and impoverished these societies, less attention is paid to the associated shifts in core spatial imagery within the oral tradition (i.e. the lens through which Serengeti cultures understood their past) and resultant ideological conflicts with colonial forces. This chapter examines transitions in the understandings of the Serengeti landscape, both within native societies and among colonists, in order to demonstrate the shift in power from systems of beneficial habitat management practices to the unsustainable and uninformed systems of early game management and the subsequent National Park-type conservation regime.

"America's Best Idea": The National Park Model

In order to understand why critical African habitats such as the Serengeti are subject to complex land-use concerns, a concise evaluation of the National Park ideal's historical underpinnings is required. Indigenous oral histories often conflict with the reports of government agencies and conservationists, adding a valuable perspective on the ecological threats at hand while further complicating prospects for integrated habitat management. This

section psay special attention to the American invention of the National Park ideal and its exportation to colonial Africa.

The founding men of the United States, including Thomas Jefferson, idealized the American landscape as vast wilderness to be harnessed by their infant nation. The monumental landscapes and natural features of Yellowstone, Yosemite, and Sequoia National Parks were among the first areas in the world to be officially set aside for aesthetic and recreative value. Valued as nature "untouched," "unspoiled," "pristine," these lands represented America's opportunity and exceptionalism for proponents of early protected areas, such as John Muir (Apostolidis, 2009). Romanticized in his writings and campaigns for preservation is the "wilderness" to be experienced in these parks, landscapes of pine trees, mountains, and fellow animals (Chape, 2008). Although moving, these observations reflect a dangerously inaccurate depiction of America's environs. Upon European contact, it is estimated that a minimum of 250,000 native people (some estimates claim several million) occupied the mosaic of American landscapes. The latest archaeological findings evidence a lengthy chronology of human presence in the Americas, of at least 15,000 years (Adams, 1996). This differs dramatically from the assumption (by 19th and 20th century archaeologists) that Native Americans had used these landscapes for maybe several hundred or a couple thousand years, an idea rooted in the racist concept that indigenous people were primitive, brutish, or otherwise developmentally lagging behind contemporary Europeans. In reality, complex habitat management systems and ritual practice allowed native populations to exploit natural resources for thousands of years, typically sustainably. This was not accomplished by passively foraging, as European settlers (or the unwitting American history student) may have imagined, but through extensive manipulation of the natural environment. Hundreds of distinct ethnic groups adapted to the challenges and

advantages of virtually every American landscape—building roads and earthworks, diverting waterways for fishing, establishing agricultural areas, creating grasslands, and genetically manipulating species for domestication. These indigenous peoples were rapidly exterminated through violence and disease, and forcibly removed from the habitats which generations of their ancestors had managed and altered for subsistence. With the oppression of these great and complex civilizations came the idea of wilderness as a place without the perceptible influence of humans; the unique American landscapes could only survive given the exclusion of most anthropogenic activity (Chape, 2008). In order to secure this intangible and unrealistic "wilderness" value, conservation movements would theoretically separate humans and nature for the majority of the 20th century, an ideology that would prove disastrous for many of the Earth's most biodiverse habitats.

European nations had welcomed the national park ideal by the early 20th century, despite their general shortage of large tracts of intact habitat (Chape, 2008). European lands had long been mostly developed, but several saw the landscapes of their African colonies as a great resource to be capitalized. With the establishment of Virunga National Park in 1925, human-exclusive preservation came to the African continent (Chape, 2008). British exploration of the Serengeti Plains began with the arrival of Steward Edward White in 1913. During his three-month return in the 1920's, he and his companions hunted and killed fifty lions (Apostolides, 2009). It was immediately apparent that these populations could quickly be hunted to extinction, and the British colonial administration designated an 800-acre partial game reserve in 1921, elevating its status and expanding to a full game reserve in 1929 (Apostolides, 2009). During the 1940's, several national parks and other reserves were designated in Eastern Africa in order to preserve hunting grounds for whites. Due to limited understanding of wildlife and pastoralist

migratory patterns, the parks were centered on major dry-season watering holes, where large numbers of animals gather for half of the year (Chape, 2008). As a result, human populations and their livestock were expelled from these critical areas and forced to utilize drier areas where overgrazing readily occurred. They continue to be pushed to more and more marginalized lands, where the carrying capacity is reduced. Thus, the exclusionary conservation efforts are having effects in direct contradiction with the landscape and species preservation goals of the protected areas—aimed to maintain lush grassland for the massive migrating herds.

The Time of Disasters

The "Time of Disasters" in the late 19th century describes the challenges to social, supernatural, and ecological landscapes brought on by persistent drought, epidemic disease, warfare and raiding, and disruption of the existing environmental state. This era marks the beginning of "historical" time in the Serengeti-- when Europeans first documented events on the landscape in writing (Shetler, 2007). Most importantly, however, this era designates a major evolution in interpretations of the physical environment by native groups. The traditional ways of viewing the landscape emphasized the separate ecological roles of farmers and herders, the use of prophetic leadership, and sacred spaces in wilderness. These intellectual technologies were pressured with themes of loss and dispersal, and indigenous understanding of changes to the landscape, accurately recognizing the character of the environmental deterioration taking place and its causes.

Italian prospectors introduced rinderpest, a highly contagious disease affecting cattle, to Ethiopia in the late 1800's. The illness quickly became an epidemic and 90% of East African

cattle perished between 1880 and 1890—causing the worst famine in the remembered history of the Serengeti (Shelter, 2007). Indigenous people termed the advent of rinderpest and other introduced diseases (East Coast fever and cattle lung disease) the "Hunger that Finished the Cattle" (Shetler, 2007). With increased hardship and starvation, the exclusively pastoralist Maasai groups began raiding Serengeti villages in order to survive and further weakened political and social systems.

As communities depopulated and concentrated during these insecure times, thick bush expanded and created enough habitat for a boom in the tsetse fly's population. The fly is a transmitter of the deadly sleeping sickness, which manifested in the Serengeti by 1902. Thus, a positive feedback loop of sorts played out: further depopulation allowed the increase of unhealthy bush and the decrease of healthy plains—representing a loss of control over the lands once integral to the local economy. Thus, spatial imagery of the landscape in oral histories reflected motifs of loss and dispersal. However, where people remained, it was noted that the Serengeti maintained an "orchardlike appearance" and in 1913, a European hunter by the name of White described the country around Ngoreme (an area of relatively high human settlement) as "a perfectly flat green lawn of indefinite extent" (Shetler, 2007; Ngorongoro Conservation Unit, 1962). Thus, it can be surmised that the presence of traditional societies on the landscape were in fact successful in maintaining healthy and productive species compositions.

Despite this, the low density and migratory nature of the Serengeti's population, in conjunction with the famine and disease-related depopulations led Europeans to describe the Serengeti as largely "uninhabited" in the beginning of 20th century. A German traveler, Kollman, declared the entire area uninhabitable, and another early European account claimed,

"apart from a few nomadic Maasai and wandering bands of Ikoma hunters, the Serengeti had always been an uninhabited game area" (Pearsall, 1957). These views demonstrate an obvious ignorance of the Serengeti's traditional ecological configurations, exacerbating the negative environmental impacts of European intrusion. By the time whites began describing the Serengeti, they had already altered it through the introduction of epidemic disease. Additionally, they were unaware of the relationship between the savannah biome and its native human inhabitants—believing that the plains flourished despite the groups of natives rather than because of them.

Just as Serengeti civilization was recovering from the disasters of hunger and disease (in terms of human and livestock populations), the period of formal colonialism began and again caused radical changes in the imagined landscapes of Serengeti people. During the 1884 Berlin Conference, Germany laid claim to the area of Tanganyika (the mainland of modern-day Tanzania). As German officials evaluated the annexed land, they deemed "primitive" patterns of usage inefficient (Kideghesho, 2007). The land-extensive nature of traditional subsistence activities (which were designed to minimize long-term impacts to the landscape and maintain ecological equilibrium) did not align with the profit-motivated goals of imperialism. Instead, colonial officials viewed the landscape as a reserve for economic exploitation in the form of resource extraction and conversion into intensively cultivated land. Much like the earlier conquests of the Americas by whites, the subversion of the natural order through capitalist endeavors supported colonialist ideals of taming wildness and ending savagery.

The domination of the natural landscape was a major component of the forced "development" of East Africa, rationalized as cultural evolution or progress in colonial

propaganda. Therefore, civilizing the Serengeti landscape called for the ideological separation of nature and culture. The German government began to set aside pristine areas of natural beauty for hunting, distinguishing the sphere of leisure from that of production—a structure clearly at odds with the long-established human ecology of the region.

Serengeti peoples were marginalized as "unruly natives" and poachers because of their passive resistance to joining the colonial migrant labor force which sought to source manpower for state development projects (Shetler, 2007). People were forced to adapt to colonial demands and the ways of seeing the landscape which were antithetical to their own. Thus, the colonial state assumed responsibility for control over the environment and people could no longer manage the ecological landscapes of the past. The divorce of political authority from ritual control meant local leaders had to carry out the orders of government rather than focus on healing the land in traditional ways (as described in Chapter II). German-appointed "chiefs" were required to enforce colonial rule, which allowed them to gain material advantage and support of a powerful patron, but also were threatened with military action should they not comply (Pearsall, 1957; Shetler, 2007). This was in sharp contrast to the precolonial political authority, in which a number of different leadership positions maintained authority over several separate spheres.

Colonial powers also disliked nomadic communities due to the fact that they were difficult to keep track of and landless, and therefore viewed as tax evaders. Thus, there was an antagonistic relationship between colonial forces and indigenous peoples of the Serengeti from the beginning of their interactions. This bias against pastoralism would persist beyond the colonial era in order to maintain the system of environmental conservation in the region. The

environmental view of Serengeti societies-- of an ecological landscape in which people were an integral part of management as interdependent hunters, herders, and farmers was threatened as the state continued to regulate the environment as a method of controlling people.

Colonial officers wanted natives to farm and herd in the "rational" ways prescribed in the Western world, and deemed hunting as evolutionarily regressive. Additionally, the use of fire management on the landscape by indigenous communities was considered barbaric and destructive, and was quickly outlawed by German officials. The later British administration used controlled burning, but as a means of controlling tsetse fly populations. They restricted burns to only after the beginning of the rains in mid-September and encouraged burning only every other year—which created hot, bush destroying fires (Shetler, 2007). This is in contrast to the fire regime to which the plains had adapted, in which elders controlled orderly progressions of cool burns which did not threaten grazing areas or significantly disturb the species composition by destroying the grasses' means of resprouting. Additionally, efforts to manage the sleeping sickness epidemic included the physical separation of humans from wilderness entirely through the restriction of movement though tsetse bush and forced resettlement to "low-risk" areas (Norton-Griffiths, 1979). Whites were not aware that it was the movement of Serengeti pastoralists which traditionally limited the expansion of the bush. These are early examples of colonists' naivety of the complex ecosystem dynamics in which Serengeti peoples were well-versed.

The Conservation Movement

While these early misjudgments of the Serengeti's human-environment interactions by colonists marked the beginning of European alteration of the landscape's ecology, they pale in comparison to those perpetuated and acted on by the quickly established conservation agenda. Protecting and revering special places has become more important as human impact endangers natural ecosystems and biodiversity. Today, 18% of East and South Africa's characteristic biome, the tropical savanna, is protected in some capacity (Chape, 2008). However, the ecosystems of the Serengeti are threatened due to the social and economic insecurity of the system's constituent political entities and indigenous groups. Although there has been a historical impulse in the region to protect land for the "notions of the wild and untamed," current literature regards the Serengeti biome as a "profoundly humanized landscape" (Chape, 2008). This is central to understanding the conservation needs of the system. Conservation philosophy and activities have governed the Serengeti landscape since early colonial times, when German officials began setting aside areas of "pristine wilderness" for European sport hunting. A historic account of the manifestation of the traditional National Park ethic on the Serengeti landscape demonstrates the clash between environmental dualist thought and traditional understandings of the environment. This informs exploration of the causal relationship between the applied conservation ethic and its environmental consequences.

The first conservationists were European hunters who viewed themselves as uniquely able to protect the Serengeti's wildlife against their "cruel and indiscriminate" slaughter by locals (Shetler, 2007). The Hunting and Game Department laws preserved areas exclusively for European sport hunting, which further controlled access to wilderness resources.

Conservationists considered hunting for meat with primitive weapons as brutish, and only approved of the slaughter of wildlife with the "clean and humane" method of high-speed rifle use. Officers called for the protection of wildlife as a "resort for bona fide sportsmen, collectors, and naturalists," prohibiting the traditional activities of game-driving fires, nets, traps, snares, pitfalls, or poisoned weapons (Shetler, 2007). This effectively limited hunting to the wealthy with access to permissible hunting technology.

The Germans established two game reserves in 1896, eleven more in 1903, and another in 1913. The British further restricted the activities within controlled game reserves, and although the Chief Secretary of Tanganyika said that people could stay in reserves in 1923, the Game Department soon lobbied for removal of the "squatters," claiming "human settlement and wildlife are incompatible." However, these policies were hard to enforce until 1959, when game posts in park actually made an impact on poaching. In 1927, drought and more Rinderpest caused the Veterinary Department to implement strict restrictions on cattle movement which kept people from finding suitable pasture land during the drought (Campbell, 1995). Hunting resultantly increased as an emergency famine strategy in colonial years, although colonists did not understand this. A 1942 law established that no person could sell wild meat without permission of a Provincial Commissioner (Shetler, 2007). This targeted western Serengeti peoples who had begun to hunt commercially in order to avoid the labor market. The survival reactions to extreme hardship were misconstrued as standard practice. Conflicts increased as fundamentally different ways of seeing and using the landscape clashed.

The creation of Serengeti National Park was the third major challenge to the Serengeti peoples in the twentieth century. Boundaries and rules imposed a hegemonic conservationist

view on the landscape, making any competing visions suspect. The conservationist view of the Serengeti was first officially represented by the Society for the Preservation of the Fauna of the Empire, and Tanganyika's Game Department (later, the National Park Service) which profited from outside funding and tourist dollars. Although I argue that they operated along the same assumptions, the conservationist approach operated as a critique of colonial economic views of the landscape. Conservationists believed that instead of physical resource extraction, the natural wonder of the landscape was the most important value of the Serengeti, and preserving it was essential. The system of ideas governing the Serengeti landscape, however, continued to embrace the ideological separation between nature and culture. Nature came to be understood as a global resource, further removing locals from the questions and debates of the Serengeti's conservation.

At this time, core spatial images among the native inhabitants' oral histories reflected "constriction and restriction"—this is extremely significant considering the notions of an endless and bountiful land long held by Serengeti society (Shetler, 2007). The creation of the park, the Game Controlled Areas, and increasing capacity to enforce laws and restrict land rights meant that Serengeti peoples finally lost control over ecological landscapes of the past and were denied customary usage rights. In the GCA, no hunting, gathering of wood, salt or thatch, propitiation of ancestral spirits or even walking the land was permitted without a guide and vehicle. Subsistence farmers, then, were gradually forced to depend on a cash economy. Debates over boundaries of the Serengeti National Park started with the 1929 establishment of the Serengeti closed reserve and ended with the final delineation of the park's borders in 1958. The area was officially labeled as a National Park in 1940 (Shetler, 2007). Park officers did not recognize that poaching was a temporary local solution to famine rather than a long-term trend, and steps to

create the park in 1930, 1940, and 1951 coincided with peak poaching years. Game laws classified lions as vermin and European sport hunters excessively hunted them, sometimes killing up to 100 at a time for a paid bounty (Apostolidis, 2009).

Small-scale farmers in the western Serengeti were not a viable political force, and were not consulted in defining the park boundaries. The 1931 report proposing the Serengeti National Park stated that the western Serengeti contained "few native inhabitants" and thus, "there [would] probably be no serious objection to those few being transferred outside the boundary." The park's vision aimed to protect "pure nature" and "unpeopled wilderness" (Shetler, 2007). Therefore, Serengeti National Park took on the same land ethic of environmental dualism as the National Parks established in the United States. The resident Maasai were the only recognized ethnic group with legitimate traditional rights of occupancy in the park, and were promised indefinite domain in the Game ordinance of 1940 and National Park Ordinance of 1948. When the park was proclaimed, it contained a fifth of the Maasai's total population in the territory—5,000 Maasai and 150,000 of their cattle (Adams, 1996). Supporters of these peoples argued that the Maasai don't traditionally hunt and actually live in harmony with nature.

· The opinions surrounding continued occupation of the protected areas of the Serengeti were diverse and complex. In 1950, the governor expressed concern that the Maasai had become "exhibits" in the national park (since their continued residence depended on tourists' desire to see them), and the Maasai would be unable to develop and improve their economic position within the park, since park rules unjustly "maintain[ed] Maasai in their present primitive state," and would have to be adjusted to grant Maasai more autonomy (Shetler, 2007). However, park wardens continued to assert that the Maasai's presence in the landscape resulted in long-term

destruction of the environment by harboring hunter-gatherers, removing trees for building materials, and grazing. Park trustees attempted to encourage relocation by offering natives improved water and grazing resources outside of the park's boundaries while intentionally not developing them within the park.

In 1954, district officer Grant of Monduli put forth a proposal supporting indigenous rights in the park based on the fact that the Maasai only graze in the park during the dry season, when wildebeest aren't present. Conservation advocates were appalled by the proposed measures, and in 1956, the Legislative Council determined "the maintenance of human rights in a national park is not compatible with the interests of the wild life therein." Therefore, three areas were selected for the total exclusion of people: the Western Serengeti (3,625 square km), Ngorongoro Crater (1,165 square km), and Embagai Crater (260 square km), with corridors in between for the passage of wildlife (Shetler, 2007). These park boundaries removed the central plains and Moru kopjes and returned these areas to the Maasai, reducing Serengeti National Park from 11,550 square km to 6,730 square km. This decision was met with outcry, and the East African Standard called the "dismemberment of the park" a "tragedy". Others claimed the new boundaries "threaten[ed] to sacrifice one of Nature's greatest heritages of wildlife for fewer than 100 Maasai families who entered illegally into Ngorongoro Crater in 1946" (Shetler, 2007). It is obvious that at this point, the philosophy which governed the boundaries of the proposed park was based in human-exclusionary conservation ideology at odds with the natural order.

The final 1958 boundaries very much resemble those of today and included the entirety of what was believed to encompass the wildebeest migration, fully excluding human settlement. This included the western and central plains, and the Moru kopjes. The Ngorongoro highlands

were removed to become special conservation units in order to make up for the loss of these areas to indigenous communities, but the floors of Ngorongoro and Embagai Craters retained special status as nature reserves. The park authorities then systematically evicted Maasai, Sukuma, Ikoma, and Ngoreme people from the park, completing the process in 1960 (Shetler, 2007). The mass eviction was largely invisible outside of the immediate impact zones, outcompeted in international news media by portrayals of the park's establishment as a massive success for global environmental protection. Debates over Maasai land rights persisted-- The International Conservation United Network, Nature Conservancy, and other conservation groups demanded the reintegration of Ngorongoro Crater (Shetler, 2007). The conservation community overwhelmingly advocated for the complete removal of humans from the vast region of the Serengeti-Mara plains.

With the shift from colonial rule to a national government, there was a common fear that a park budget wouldn't exist with the reduced government spending necessary to forge the new nation and Serengeti National Park officials fought to gain citizen support. It is at this time that Dr. Grzimek of the Frankfurt Zoological Society published the book and subsequent film, "The Serengeti Shall Not Die," which popularized the image of Serengeti as a wild place devoid of human influence (Apostolidis, 2009). The film, *A Place without People*, evaluates these modern conceptions of the Serengeti as they pertain to a deep and deleterious misunderstanding of the landscape. The Serengeti National Park is depicted as a result of "cross-pollinating" Theodore Roosevelt's ideas of Yellowstone-type preservation with European colonialism in Africa. The film attributes the modern myth of the Serengeti as an unpeopled wilderness to the 1958 film which comprised of systematic flight surveys showing lions, wildebeests, and other animals in the complete absence of humans (Apostolidis, 2009). The Maasai assert that people and wildlife

have been living side-by-side for millions of years, and are equal components of the Serengeti ecosystem. This idea is the opposite of environmental dualism—the singularity of natural and human elements of the landscape. The indigenous people feel responsible for the populations of wild animals and have protected them for generations. One Maasai woman claims "The Mara is a land that loves the Maasai… the land was turned into the Queen's farm" (Apostolidis, 2009).

In order to ensure continuity in the park's protection, it became necessary to fundraise via foreign entities and increase tourism attendance, which rose from only 400 annual visitors in 1956 to 52,000 in 1972 (Shetler, 2007). This view of the landscape is now the unquestioned orthodoxy which governs the Serengeti's current management scheme. The postcolonial years yielded surprising continuity in the government's commitment to protecting natural areas-- which eventually extended to 32% of the nation's total land area (Chape, 2008). The impulse to preserve such spaces quickly led to militarization of the national park, which focused on eliminating illegal use through often violent anti-poaching campaigns.

In 1966, the landscape faced another transition in the Serengeti's human population distribution when President Nyerere instated the era of *ujamaa*, or African Socialism. *Ujamaa* villages eventually became mandatory and concentrated populations, forcing many Serengeti peoples to relocate (Shetler, 2007). This inevitably stressed the agricultural and grazing resources and erosion, soil degradation, an increase in epidemics, decrease in food production, and the further spread of the bush quickly manifested. In 1981, the national government realized the mistake and gradually allowed the return of natives to dispersed homesteads. The state's right to take land was based in the British Colonial law which granted ownership of all land to the king by right of conquest, so indigenous groups effectively lacked any political autonomy

when it came to their land rights. Many elders conclude that the diminished number and quality of the Serengeti's animals is a sign that the land is not healthy and requires healing by indigenous people. The extensive plains in Ngoreme used to be covered with migrating herds in the dry season, but almost none appear since the late 1960's. The last Rhino was seen in this area in 1964 (Shetler, 2007).

In conclusion, the establishment of the Serengeti's formal protected areas failed to acknowledge the landscape as humanized and historic, which would emphasize the necessity of preserving culture in conjunction with the desired natural qualities of the system. Instead, separation of nature and culture allowed for the destruction of nature in productive spaces as well as the destruction of culture in leisure spaces. The Serengeti National Park as it exists currently, therefore, is founded within a flawed conservation framework which jeopardizes the ecological stability of the system. The following chapter will seek to demonstrate specific impacts on the landscape and biodiversity within the Serengeti National Park and associated protected areas as a result of exclusion of indigenous populations.

Chapter IV:

Effects of Human-Exclusive Conservation on the Serengeti System

Now that the major challenges to Serengeti traditional indigenous ideologies and habitat management technologies of the 19th and 20th centuries have been established, shifts in vegetative and faunal composition can be evaluated in conjunction with the altered human ecology influencing them. Isolating cases for analysis is complicated by the multiple variables acting on the Serengeti biome: including precipitation, season, climate, and poaching. However, causal relationships between environmental degradation and the removal of indigenous populations are illuminated at the regional scale over time. This chapter will call on oral traditions, written histories, wildlife censuses, and woodland/grassland surveys in order to define impacts of indigenous removal to the traditional landscape and establish certain trends as negative. Since there is not much ecological data for Serengeti National Park prior to the eviction of its native inhabitants, Ngorongoro Crater makes a useful case study given its later eviction date.

These impacts are well demonstrated in wildlife communities in the case study of the Maasai's eviction from Ngorongoro Crater in 1975, but it should be noted that research in the Serengeti has focused overwhelmingly on megafauna, limiting scientific understanding of vegetative dynamics and smaller animal species. In fact, I argue that since megafauna are typically long-lived and adaptable, their populations reflect fluctuations in environmental conditions less than those of the ever-shifting plant communities in this often disturbed habitat. I argue that the decline of the Serengeti-Mara ecosystem's woodland communities is directly attributable to the absence of indigenous peoples and their mechanisms of landscape cultivation.

Therefore, documented vegetative shifts are explored first for the purpose of evaluating post-exclusion changes to landscape and species.

Shifts in Vegetative Composition as Result of Indigenous Exclusion

Analysis of the major disturbances to indigenous activity (rinderpest, major eviction events of 1959 and 1975, and tightening enforcement of park boundaries) by ecologist Holly Dublin indicates that the major results of these upheavals were overgrazing of the plains, the encroachment of woodlands on healthy savannah, compaction of the soil in peripheral areas to which human populations were expelled, and a vegetative community consisting of less nutrient-rich grasses than usual. As discussed in Chapter II, fire can influence the spread of more palatable grasses (such as *Themeda triandra*) over courser ones. However, the loss of old, established woodlands has also become an issue as recruitment is often not adequate to replace mature trees due to the hot wildfires started by poachers.

Three major vegetative shifts were documented in 20th century, each coinciding with a major change in the dynamics of indigenous population: the outbreak and treatment of Rinderpest, the creation of the Serengeti National Park, and the tightening of legislation and enforcement regarding usage of protected areas (Dublin, 1995). Dublin traced the effects of these factors on woodland/grassland composition and evaluated dry counts of the Serengeti's woodlands in 1962 and 1972. Analyzing these shifts offers better insight into the roles of indigenous societies in affecting vegetative compositions and the systemic results of social and environmental pressures on indigenous populations and their herds. Recall that in this region, the wet season begins in November and persists into May. July is typically the driest month of

the year. The 1962 dry count showed a 33% woodland cover density in the northern portion of Serengeti, 39% in the central Serengeti region, and made up 37% of the overall land area's vegetative cover type. The 1972 count demonstrated significant decline in the woodland coverage: 24% density in the northern portion, 36% in the central portion, and 32% overall. Therefore, the absolute rate of change (in % woodland cover/year) was .86 in the North, .28 in the central region, and .47 overall (Dublin, 1995). These results were calculated from dot count analyses of aerial imaging data.

More information on this loss of woodlands is provided in the Serengeti Ecological Monitoring Program's 2005 report on threats to the ecological integrity of the National Park, which identified eight "Key Ecological Attributes" for the focus of biodiversity conservation. The evaluated indicator, "fire patterns and extent of dry season fires," is key in the management plans for six of these: The migration, Riverine Forest, Acacia Forest, *Terminalia* forest, Kopje habitat, and the black rhino—all of which are confined by the extent, frequency, and heat of fires (Serengeti Ecological Monitoring Program, 2009). In the Serengeti, fires have always been started by humans. However, fires were used by traditional societies in a way which benefitted the biodiversity in the system, as opposed to the fires set by poachers today (Bird, 1998).

Changes in Key Faunal Populations as Result of Indigenous Exclusion

While some conservationists have insisted that the Maasai people and their livestock compete with wildlife for resources at the expense of wild populations, this has not been evidenced. In fact, detailed wildlife censuses kept by the Ngorongoro Crater Conservation Association have recorded that the expulsion of the Maasai from Ngorongoro Crater in 1974

resulted in an undeniable decline in grazing herbivore species, most notably in the wildebeest populations (Shetler, 2007). This specific year marked the most important set of population change events in the census' forty years of data.

When Serengeti National Park was finally established from the bases of environmental dualism in 1951, the Maasai people had been raising their livestock alongside the Serengeti's wildlife for several hundred years (Moller, 2004). Concerns over preservation of the plains' species lead to the first mass eviction of the Maasai people in 1959, when they were expelled to the Ngorongoro Conservation Area. According to the Maasai, this was accomplished through deceit and coercion on the part of the government (Shetler, 2007). To this day, Maasai leaders insist that they never signed an eviction treaty. It is worth recalling that at the time of these early evictions, the primary goal of wildlife conservation was to ensure game for wealthy whites. An eviction in 1975 removed the Maasai from Ngorongoro Crater entirely, and ungulate populations declined shortly thereafter (Runyoro, 1995). Before any common understanding of ecology, it was not known that the Maasai were as much a part of the Serengeti ecosystem as the brindled wildebeests and Nile crocodiles. The effects of this eviction on ungulate populations were analyzed in Sinclaire et al. in 1997. Long-term trends in the herbivore populations of the Ngorongoro Crater are complex and certainly demonstrate a radical reconfiguration following the removal of the Maasai in 1974. Many Maasai, although primarily of a pastoral subsistence economy (rarely killing wild animals), were greatly disturbed when evicted by Ngorongoro conservation authorities in 1975. When the Maasai were evicted from the crater they were promised a new land and government support, which did not materialize (Loibooki, 2002). Tribal leaders contend that no eviction treaty was ever signed. The Maasai people had been managing the landscape with fire for generations in order to maintain healthy grasslands for both

livestock and wildlife. The massive wild herds of the Serengeti migrations simply would not exist without anthropogenic landscape alteration. One Maasai man notes that although his people have long known that "fire has advantages and disadvantages," their use of fire was demonized and used to justify the early evictions from the area (Apostilidis, 2009).

Transitions in Ngorongoro Crater

Ngorongoro Crater is a three hundred square kilometer caldera with mostly steep walls, rising five hundred meters from the crater floor. Its wildlife has been protected since 1921 and the Ngorongoro Conservation Area is not an isolated system—it is linked to the plains and crater highlands by the great seasonal migration of wildebeest and zebra. However, it makes a useful case study due to the extensive data collection efforts in recent decades. Wildlife populations have been monitored since 1963 by the Ngorongoro Conservation Area Authority, the College of African Wildlife Management, and several research scientists. Most notably, the Ngorongoro Ecological Monitoring Programme has taken wet and dry season censuses since 1987. This case

Figure 3 Looking upon the vast crater ecosystem (Kristyn Gorton)

study utilizes a total of fifty herbivore counts in Ngorongoro Crater between 1963 and 1992. The study utilizes the classification of herbivores into four functional categories: wildebeest, buffalo, other grazers (Thompsons gazelle, Kongoni, eland, zebra, ostrich), and mixed grazers/browsers (grants gazelle, waterbuck, black rhinoceros, elephant) (Runyoro, 1995).

Maasai had permanent bomas on crater floor until the beginning of the dry season, 1974. From 1963 to 1966, the total livestock biomass (cattles, goats, donkeys) was an average of 12.72% (+/- 2%) of total herbivore biomass. This figure was then used to estimate the percent composition of livestock biomass for 1963-1974, which was comparable. Of course during the second study period, following the dry season of 1974, livestock comprised 0% of herbivore biomass in the Crater.

Following the decline associated with the Time of Disasters at the turn of the century, wildebeest populations increased until 1974 (presumably trending towards pre-Rinderpest numbers), then declined markedly following the eviction. However, this change was pronounced in the dry season but not the wet season. The wildebeest population in Serengeti tripled from 1961 to 1973 and were compared to 1973 and 1961 figures for domestic livestock (15,227 and 11,068-- a 38% increase) a comparatively modest increase (Runyoro, 1995). Buffalo were virtually absent until 1960, and slowly increased until acceleration with removal of Maasai (5000 by the wet season of 1992).

Trends in Herbivore Populations of Ngorogoro Crater Related to Eviction											
	Blue Wildebeest	Buffalo	Kongoni	Thompsons Gazelle	Eland	Zebra	Ostrich	Grants Gazelle	Black Rhino	Elephant	Waterbuck
Overall	Decline	Increase	Increase	Decline	Decline	Decline	Constant	Decline	Decline	Constant	Constant
Period I (before eviction)	Increase	Increase	Increase	Increase	Constant	Constant	Constant	Increase	Constant	Constant	Constant
Period I (after eviction)	Decline	Increase	Decline	Decline	Decline	Decline	Constant	Decline	Decline	Constant	Constant

Only buffalo and Kongoni had higher averages during period 2, following the eviction. All other grazers declined except ostrich, which showed no trend. Among mixed grazers/browsers, waterbuck and elephant showed no change in mean population size, while grants gazelle and black rhino had lower averages during period 2. After removal, Kongoni, Thompsons gazelle, eland, zebra, grants gazelle, and black rhino declined significantly. Total wild herbivore biomass showed no significant change over time. All categories of grazers showed significant increase during period 1, while wildebeests and other grazers of similar or smaller size declined and buffalo increased rapidly. In last 30 years, wildebeest moved from dominant species in biomass (50-65% of total herbivores) to second (35-45%). Buffalo biomass was initially low (0-20%) but rapidly gained during period 2 to become largest wet season biomass component (55%) (Runyoro, 1995).

In conclusion, the significant decline of the keystone species and other ruminant grazers reflects a negative trend in wildlife population ecology in the crater. Wildebeest and buffalo populations experienced the most dramatic changes with the removal of Maasai and their livestock (Runyoro, 1995). Buffalo (which prefer taller, less nutritious grasses) increased due to

reduction in wildebeest population and establishment of denser vegetation. An increase in buffalo numbers is undesirable since they compact soil and eliminate the nutritious grasses on which most species rely.

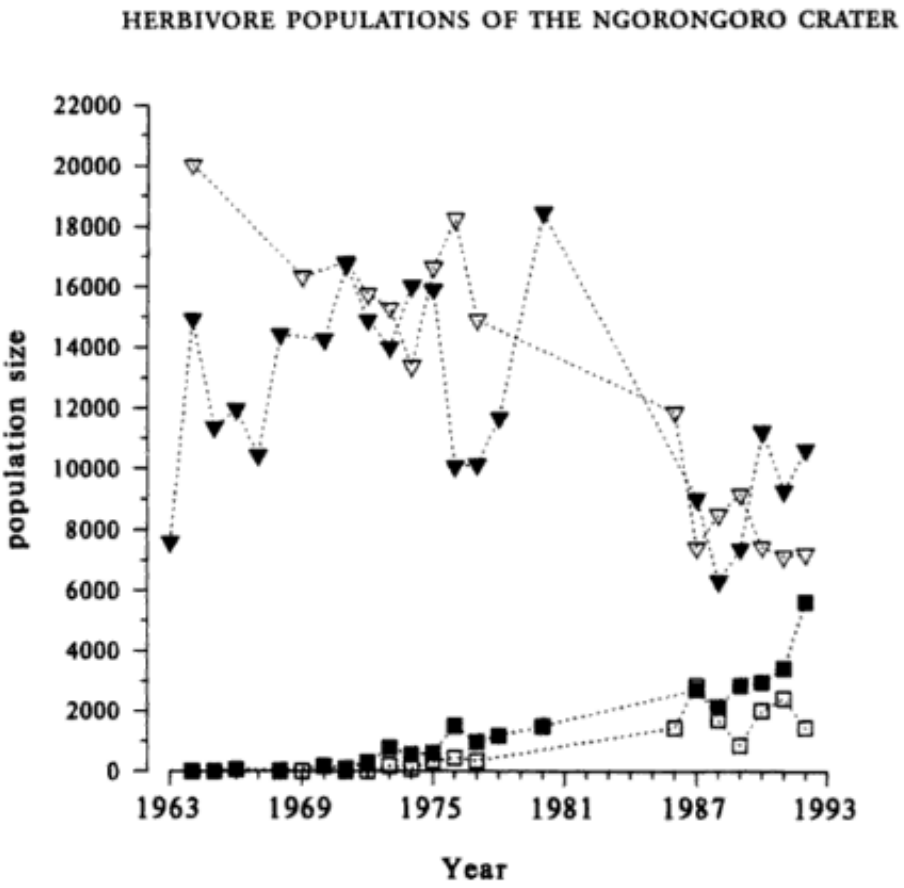

Figure 7.2 Numbers of wildebeest (triangles) and buffalo (squares) in wet (solid symbols) and dry seasons (open symbols).

Figure 4 Graph from (Sinclaire, 1995) study demonstrates trends in wildebeest and buffalo populations

A Note on Dependency Theory

The spectacular government-owned and operated nature reserves which characterize the Serengeti's sublime appeal and define the area's tourism-based economy, namely Tanzania's Serengeti National Park and Kenya's Maasai Mara Game Reserve, are products of colonial Africa. In other words, these parks were not designed to be a part of a self-sustaining economy

but rather as colonial endeavors to most efficiently extract economic value from the landscape and absorb it into Great Britain's economy (Kideghesho, 2007). The protected areas of the Serengeti continue to drive an imbalanced economy which depends on the native lands and people within it while returning little to them. In this structure, benefits of conserving the critical spaces of the Serengeti Plains flow overwhelmingly in one direction: away from local people. No group has been as disrupted by this as the indigenous communities of the landscape—who have been severely restricted in access to resources and traditional lifeways. We should briefly consider how the conservation model has subverted local interests and ushered in a sort of neocolonialism.

By the 1940's, the promise of improved quality of life for Africans by modernizing the continent's economies had spurred academic inquiry. Economic theorists posed two opposing theses which disagreed on the projected effects of economic globalization for Africa. Development economists insisted that poor nations needed a push of foreign aid and restructuring in order to develop the necessary infrastructures, skilled workforce, and movable capital necessary to compete in the world market. The alternative theory maintained that in the competitive free market, the networks of dependency founded in colonialism would be reinforced and subvert poor economies. While development strategies have been implemented and tourism has been emphasized, the Serengeti's poorest people continue to get poorer while foreign tourism companies gain riches in the global economy (Gibson, 1995).

This augmented dependency on external bodies, resulting from structural adjustments and perhaps premature entrance into the world market, may be best termed "economic colonialism." This implies that the capitalism and business globalization which Africa embraced in the post-colonial period has effectively led to neocolonialism. The distorted development ushered in by

European colonizers placed abnormal emphasis on raw material extraction and cash crop production, which left the region with unbalanced and incomplete economies. Then, post-colonial regimes which sought to increase autonomy actually fortified the externally dependent economic structures of the colonial era. Dependency theorists predicted emphasis on external economies such as tourism would not serve the Serengeti's sustainable development, and it does not appear that it has, whereas integrated wildlife management by indigenous populations very well could.

Chapter V:

Conclusions

East Africa is often described as the "cradle of humanity" because the landscape has been altered by hominids for millions of years, especially in the widespread use of fire to aid in the cultivation and gathering of food resources. Additionally, these societies have a highly evolved and specialized variety of systems to protect habitats and species, including community taboos, social sanctions, and sacredly preserved areas for burial and ritual. The Maasai of the Serengeti are an exemplar of a society still operational in their effective habitat management techniques. Colonial forces brought government-protected areas to East Africa primarily in order to preserve wilderness for big game hunting" by affluent whites. National Parks are currently a target for illegal poaching due to inadequate management and virtually non-existent budgets. Community-run "wildlife management areas" have demonstrated marked success in South African nations, and are now being tested around the Serengeti Plain (Gibson, 1995).

What does the Serengeti landscape look like under traditional habitat management versus the modern preservation methods? Evictions of indigenous peoples continue presently, and thousands of Maasai have been displaced by the burning of their *bomas*-- the traditional domestic architecture of the savannah. As their range is limited, it can be expected that the Maasai's pastoral activities will become increasingly intensive. In many areas, overgrazing has already compacted the soils, reducing the oxygen content and therefore carrying capacity of the grasslands. For thousands of years, pastoral activity on these plains shaped the landscape and sustainably maintained productive grasslands. For the Maasai, their home now has borders, and leading livestock over such a border could result in arrest.

Landscape and Species Configurations with and without Traditional Habitat Management		
Attribute	Traditional Configurations	Modern Configurations
Acacia Woodlands	Thinly distributed, old-growth stands with little shrub stratum and variable, diverse herbaceous layer; abrupt transition at forest edge to grassland	Expanded dense, tsetse fly-prone bush into grasslands with gradient edges; less avian habitat; more relative dominance and less species richness; old-growth stands threatened by poaching activity
Grasslands	Species rich, displaying low relative dominance of any one species; short, nutritious grasses during both wet and dry seasons	Low-diversity, less nutritious grasses; lower primary productivity; overgrazing at habitat margins
Herbivore Populations	Wildebeest constitute largest biomass component in the ecosystem; domestic herds graze in a pattern which compliments the annual movement of wild herds	Reduction in suitable forage for grazers has resulted in population declines in wildebeests, zebras, and most other herbivores; buffalo constitute majority biomass, further reducing available forage
Fire Regime	Indigenous people employed fire management in intervals which accounted for annual fluctuations in climactic variables; frequent, cool burns every 2-3 years	Capacity to manage landscape with fire by park authorities is little; most fires are set by poachers without regard for maintaining ecological integrity; hot, stand-destroying fires limit old-growth forest

Today, foreigners will pay thousands of dollars to see "exciting, exotic dances" and to "hunt wild beasts." So-called "survival clubs" can use the Serengeti National Park to experience a connection with nature, while indigenous people may not convene with the landscape in their traditional ways. The main value of the National Park's trails is now photographic tourism, and wildlife is preserved in order to be seen for profit rather than to exist in its natural state within the ecosystem. Currently, hunting associations claim a "passion for wildlife" of the Serengeti, and "protest poaching" (Apostolidis, 2009). This represents an obvious cognitive dissonance. To a bush elephant or white rhinoceros, or a Maasai person, poaching is essentially the same act as sport hunting. The wasteful and disrespectful non-subsistence killing of wildlife shocks and

saddens the Maasai people. Maasai warrior Tundu Lissu articulates the irony: “Those who don't need the meat are allowed to hunt, those who need the meat are not allowed to hunt” (Apostolidis, 2009). Similarly, scarce water resources are poured into luxurious safari resorts while indigenous people, their livestock, and the Serengeti wildlife must struggle to secure drinking water.

Further, should indigenous groups be managing this ecosystem today? An overhaul of the Western-derived conservation model is likely necessary to protect the natural assets of the distinctively humanized Serengeti ecosystem. For meaningful protection of this environment to take effect, it must be recognized that the exclusion of indigenous groups from designated reserves is not an appropriate policy given the system’s historical and socioeconomic contexts. A conservation schema that would be more effective in preserving traditional environmental configurations would grant pastoral communities grazing rights on ancestral lands. As these indigenous people provide security against poaching and comprehensive land management at no cost to the park, this sort of arrangement would prove sustainable in the long run while addressing not only landscape preservation, but human rights issues and the severely damaged local economy.

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