

WITH ELIZABETH WILLOTT

Reinventing the Commons

An African Case Study

Political scientist Elinor Ostrom writes that, over generations,

Swiss and Japanese villagers have learned the relative benefits and costs of private-property and communal-property institutions related to various types of land and uses of land. The villagers in both settings have chosen to retain the institution of communal property as the foundation for land use and similar important aspects of village economies.¹

Lest we think this institution must be merely a vestige of a more “primitive” culture, Ostrom adds:

One cannot view communal property in these settings as the primordial remains of earlier institutions evolved in a land of plenty. If the transaction costs involved in managing communal property had been excessive, compared with private-property institutions, the villagers would have had many opportunities to devise different land-tenure arrangements.²

History is full of examples of people converting communally held land into private parcels.³ How often do people voluntarily move the other way? Not often. On our most recent trip to South Africa, though, we were surprised to find a constellation of economic, ecological, and cultural forces leading landowners voluntarily to convert private parcels into commons.⁴

1. Ostrom (1990) 61.

2. Ostrom (1990) 61

3. For several examples, see Ellickson (1993).

4. For what it is worth, we were in Africa on other business, namely to meet Ian Whyte at Kruger Park. Ian was preparing an essay for a textbook we were editing. What we report here was not what we

This essay treats South Africa’s Sabi Sand Game Preserve as a case study of incentives and pressures that lead people to switch from one land ownership regime to another, in this case from private to communal management.

1. Pressure for Change from Private Ranchers

What is now the Sabi Sand Game Preserve was once a patchwork quilt of privately owned ranches. Many tried at some point to raise cattle, but ranching was never profitable. Hoof-and-mouth disease was a problem. The soil is not rich. Water is not plentiful. Predators abound.⁵ The local customer base is limited and cash poor, and getting perishable products to distant markets is not easy. Before the development of malaria prophylactics, no one wanted to live there during the wet season. Under the circumstances, ranchers were open to new ideas about how they might use their land.

The new idea: game preserves. According to Lambrechts, “the most expensive rangeland in South Africa is the Sabi Sand Game Reserve.” Lambrechts estimates that the value of “privately owned wildlife habitat has increased by as much as 2500%

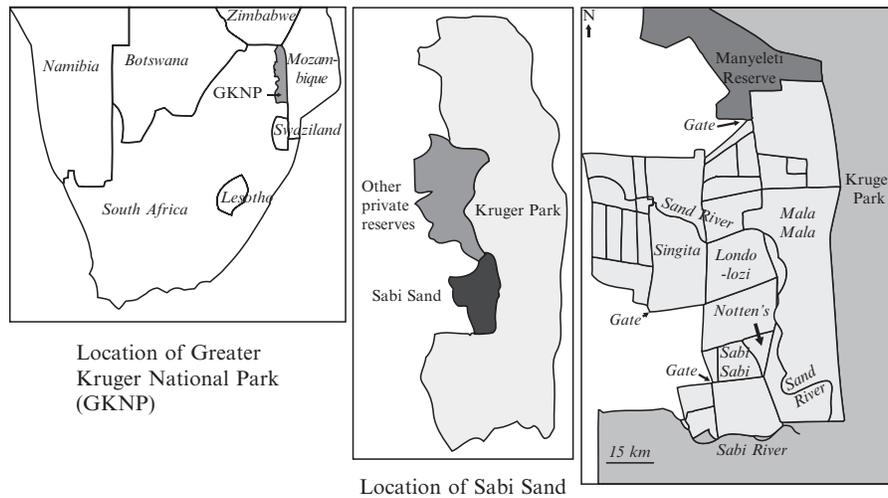


FIGURE 12.1. Maps of South Africa, Greater Kruger National Park, and Sabi Sand.

were expecting. We did not conduct interviews as we would have done had we been expecting from the start to find ourselves in the middle of an experiment in the conversion from private to communal land management. We did, however, follow up with telephone and email correspondence and have since found evidence that similar processes of converting private rangeland to jointly managed game preserves are not uncommon in southern Africa.

5. “In the early 1900s attempts were made to substitute Mala Mala’s wildlife with cattle farming. A losing battle with lions and a constant struggle with wildlife, diseases and drought soon proved that it was not a viable option.” Greenlife South Africa, African Safari website, www.e-gnu.com.

during the last 20 years.”⁶ A Price Waterhouse study of game reserves in Zimbabwe in 1994 said wildlife utilization could return 11 percent on capital, compared to just 1 percent for cattle ranching.⁷

Although a given rancher might have seen this coming, it would have been hard for him to tap the tourism market on his own.⁸ First, there is the “shopping mall” factor. While it may seem optimal for a single business to capture the entire demand for tourist amenities, businesses often do better in the company of other businesses, even direct competitors, because in concert they represent a more salient destination for potential customers. Second, there is a cost-savings issue. There is a grain of truth in the cliché that “good fences make good neighbors,” but erecting and maintaining fences is costly. David Evans, business manager of Mala Mala, Sabi Sand’s largest resort, says one factor leading to the formation of Sabi Sand was “the economy of scale of a larger community. Our 53 miles of fencing is substantially less than were we to be individually fenced. This is an enormous cost savings. So too is the issue of entrance gates, security at such gates, a single administrative structure, a common voice with authorities, etc.”⁹ Similar economies of scale rationalized medieval Europe’s open-field agricultural practices.¹⁰ The institutions on their face have nothing in common, so we were stunned to find so similar a logic in their emergence and persistence.

Some of the forces driving the emerging commons in Sabi Sand are historically unique, although not uncommon in contemporary sub-Saharan Africa. First, the physical scale of individual ranches was not ideal for tourism. Customers do not fly across the ocean to see something resembling a zoo. They want open space. They want their wildlife wild, not “potted.” They want to see animals fending for themselves in a natural ecosystem, born to the land rather than stocked by owners. The kind of customer who flies to Africa wants reality, not the programmed experience of an amusement park. Second, the scale of the ranches was wrong for the animals. A parcel size optimal for a cattle ranch is too small for African megafauna. An elephant spends 80 percent of its life, day and night, eating. Adult elephants can eat 500 pounds of forage per day. They need room. As we explain below, even Kruger National Park, massive as it is, is not a self-contained ecosystem. In short, the parcels were scaled for cattle ranching. To succeed as commercial game preserves, the parcels had to get bigger.

2. Pressure for Change from Kruger Park

Immediately to Sabi Sand’s east is its massive neighbor, Kruger National Park. Sabi Sand is approximately 250 square miles (65,000 hectares). Kruger Park is about

6. Lambrechts (1995) 39.

7. Krug (2001). In addition to ecotourism, wildlife uses include safari hunting, subsistence hunting for meat, and live game sales of meat and skins.

8. To the best of our knowledge, all of the owners were male.

9. David Evans, personal communication, June 4, 2003.

10. Ellickson (1993) 1390.

8,000 square miles (2 million hectares). Fences separated Kruger Park and Sabi Sand since 1961. People at Sabi Sand say the fence was never their idea, and people at Kruger Park say the same.

Ian Whyte is the chief scientist in charge of large herbivore management at Kruger Park.¹¹ According to Whyte, the fence was mandated by the Animal Health Department, known then as Veterinary Services, to control the spread of disease from wildlife to livestock. Some of the owners of Sabi Sand and nearby Timbavati, though, had already dispensed with cattle and had been managing their land as private game reserves since the 1950s, and in some cases longer.¹² According to Evans, Sabi Sand Wildtuin (Afrikaans for “wild place”) formed as a conservation body with a written constitution in 1950. As interest in cattle waned, the members of Sabi Sand began collectively to agitate for removal of the fences. Whyte and other Kruger Park officials were sympathetic, because the larger the area, the closer it comes to being a self-contained ecosystem and the easier it is to manage.

There were two catches. First, for public relations purposes, commercial hunting had to be prohibited before the private preserves could become part of Greater Kruger National Park. Second, to satisfy the Animal Health Department, cattle had to be separated from wildlife areas.¹³ Commercial hunting in Sabi Sand ended by 1986, so the hunting issue was moot. In addition, by that time, no livestock remained within Sabi Sand, so a boundary fence to Sabi Sand’s west could serve the quarantine purpose originally served by the fence to Sabi Sand’s east, between it and Kruger Park.¹⁴ There was little cattle ranching to the west of Sabi Sand, but the preserve and the park had other reasons to erect the new fence to the west: to deter poachers, and protect villagers from big cats and from crop-raiding animals such as hippo, rhino, and elephant. Meanwhile, Sabi Sand and Kruger Park were free to take down the fence between them and did so in 1993.¹⁵

3. Results

Sabi Sand, as part of Greater Kruger Park, is now a single, constitutionally governed management unit. Although individual parcel ownership is retained, restrictions are significant. An executive committee, consisting of eleven elected members, meets every three months. There is an annual meeting to which each of the thirty-six properties sends a voting representative.¹⁶ Each property has one vote, but votes are weighted according to the size of the property the vote represents. Parcels can be sold. They can be inherited. However, they cannot be developed for uses other than

11. Whyte, incidentally, is coauthor of the birdwatcher’s canonical field guide for the region.

12. Krug (2001) 24.

13. Ian Whyte, personal communication (May 7, 2003).

14. Gavin Hulett (warden of Sabi Sand), personal communication, June 2, 2003.

15. Krug (2001, 24) reports this as 1994, but in correspondence, Ian Whyte confirms the 1993 date. Whyte notes, in Krug’s defense, that Krug was relying on Whyte, who inaccurately reported the date as 1994 in his thesis.

16. Hulett, personal communication, June 2, 2003.

as part of a wildlife preserve. Gavin Hulett, Sabi Sand's warden, says parcels cannot be subdivided into portions smaller than 856 hectares. Parcels smaller than that exist but were created before the subdivision restriction was added to the constitution.¹⁷

The number of guest "beds" per resort is restricted to one per 150 hectares (just under two beds per square mile).¹⁸ By limiting the number of beds—that is, the number of guests—Sabi Sand controls overall traffic on the land. Each owner, although constrained in terms of numbers of customers, freely decides what clientele he wishes to attract. Some resorts are extravagant; others are rustic. Most decisions about how to do business remain matters of private choice. Customers who prefer going without electricity and enjoying blissfully quiet evenings by candlelight at a relatively moderate price go to a place like Notten's Bush Camp. Customers wanting world-renowned luxury, with a full bar, refrigerator, "his and hers" bathrooms, and a private swimming pool with each cottage, go to a place like Singita Private Game Reserve or Mala Mala Game Reserve. Each resort finds its own niche and clientele. Managers regard each other with respect, privately voicing philosophical differences about the proper way to experience the bush but not regarding themselves as competing for the same pot of money.

Each resort offers two Land Rover safari tours per day—one at dawn, one at dusk.¹⁹ Other than this, animals are left in peace. Land Rovers routinely leave their home resorts, touring neighboring lands for the sake of a change of scenery (and sometimes in response to hot tips from neighbors about special sightings—see "Matters of Scale" below). This requires a neighbor's invitation, and presupposes reciprocity, but understandings regarding mutual access arise easily enough among neighbors. Pairs of neighbors need not involve other owners in day-to-day negotiations that interest only the pair of them.

Resorts profit by showing animals in seemingly wild habitat, so each resort is motivated to preserve the land. By keeping its own land attractive to wildlife, a resort maintains its stock of wildlife and acts as a good neighbor, making sure it has something to offer in exchange for reciprocal access rights. There is little room for free riding.

Management of wildlife is unobtrusive. The Preserve does not feed animals.²⁰ Feeding makes animals dangerously and unattractively tame. However, individual

17. Hulett, personal communication, June 2, 2003. Interestingly, on details like this we often found discrepancies. One source said subdivisions were not allowed, another that properties could not be subdivided into parcels of less than 2,000 hectares. Most owners don't need to know most of the fine details on such matters, since most are not planning to subdivide.

18. Hulett, personal communication, June 2, 2003. There is an extra bed tax if the number of beds exceeds one per 150 hectares. As with the rules of subdivision, different owners had slightly different versions—all consistent with the idea that it should not be easy for a resort to regularly exceed carrying capacity in guests. Since the constitution can change, and is changing, the legal details are less important to most managers and resorts than that the practices of other resorts be sensible. So their memory of the "rules" is likely to be inexact.

19. The animals are most active around dawn and dusk, so this practice makes sense.

20. We have read of one exception, in the mid-1980s, concerning a female cheetah that wounded her foot in a poacher's trap. Five cubs relied on her. By agreement of Sabi Sand owners, she was temporarily fed so these six rare animals could survive. See Seijas and Vorhies (1989).

owners are free to make sure their water holes do not run dry. Ecologically, the institution seems to work (but see “Ongoing Problems” below). Lambrechts says the private preserves to Kruger Park’s west “contain virtually the full spectrum of wildlife that occurred in the area during historic times. The contribution of the three largest and oldest collaborative nature reserves (i.e., the Sabi Sand, Timbavati, Klaserie) to nature conservation is evident.”²¹ Our personal experiences confirmed that the diversity of wildlife at Sabi Sand is astounding.

4. Why Reinvent the Commons?

To explain why Sabi Sand’s property institutions evolved as they did, we discuss in general terms why communal regimes evolve into private ones. We then apply the same logic to questions about why Sabi Sand went the other way. Then we discuss problems that owners of Sabi Sand face as a consequence of going communal. We discuss how successful communes historically faced analogous problems, and found analogous solutions.

Why People Privatize

The trend toward land privatization is driven by a collision of economic and ecological forces. Private ownership of land often is the best way to prevent overgrazing. An unregulated commons is a recipe for economic and ecological waste. As the level of use exceeds the land’s carrying capacity, the land will be degraded.²² When access to a pasture is unregulated, an individual herd owner has little incentive or opportunity to conserve the pasture. Regardless of what an individual herd owner does, the resource is being depleted by unlimited numbers of unregulated users. Accordingly, private ownership often is offered as the solution to the tragedy of the commons. Private ownership gives an owner a right to exclude. By conferring a right to exclude, the system gives an owner the opportunity to conserve a resource.

Harold Demsetz’s case study of the emergence of private property institutions on the Labrador peninsula shows that people are capable of seeing when they have a commons problem and of responding with judicious institutional change. In that case, people only privatized what had to be privatized to solve the particular commons tragedy at hand.

One lesson of Sabi Sand is that the point of changing only what needs changing goes both ways. When private owners have reasons to switch to a form of collective management and cannot institute more sweeping changes by force, they do not fix what “ain’t broke.” Needing to achieve consensus, their changes tend to be conservative, communizing only what needs to be communal to solve the problem. In creating

21. Lambrechts (1995) 39.

22. The concept of carrying capacity is somewhat problematic. It points to something real, because there really are limits to what the land can support. On the other hand, such limits are not fixed. Carrying capacity is somewhat fluid, and is a function of many variables. Whether Kruger Park can carry fifteen thousand elephants, for example, depends on whether we want to leave room for rhinos, which is not simply an ecological issue.

Sabi Sand Preserve, what needed to be communal was land management, for reasons mentioned earlier. There was no need to share Land Rovers or guests. Communal management's advantages are limited, so at Sabi Sand, communal management was implemented in a judiciously limited way.

Matters of Scale

As noted in chapter 11, Ellickson and Demsetz categorize as small, medium, or large the ways different activities affect neighbors. As also noted, if an individual owner's parcel size can be increased without limit, any event can be made "small." In the case at hand, a single owner could have purchased all of Sabi Sand and run the preserve as a single large business. In that limiting case, all events within the reserve would be small in the technical sense, with externalities fully internalized. Given two dozen owners who had no interest in selling, though, the situation required the sort of cooperation that characterizes medium-event management.

Sabi Sand's owners continue to manage their property as a set of privately owned parcels, in the sense that is relevant for responding to small and medium problems. Neighbors are expected to handle their own affairs and to negotiate with each other on matters of common concern. Individual resorts have problems of their own (i.e., small problems) or problems in concert with immediate neighbors (i.e., they jointly face medium problems). In order to make decisions in the easiest and most informal way, neighbors minimize how many owners are involved in any given decision. They let small events remain small and avoid turning medium events into large ones.

In particular, allowing a neighbor's guests to tour one's property benefits both neighboring owners and their guests. The degree of cooperation in this matter is impressive. If a neighbor has just seen a pride of lions run down a wildebeest, he will treat his own guests to the spectacle, at the same time contacting one or two neighbors by walkie-talkie to let them know he will drive off in a few minutes and they are welcome to take a look. This is made easier by the fact that all Land Rovers are presumed to be touring at the same time. If access is negotiated between immediate neighbors rather than at the preserve level, owners retain rights to regulate access on an ad hoc basis. Neighbors form agreements more readily and fall out of agreement when that is appropriate. Incentives to cooperate and opportunities to coordinate are retained. Thus the tendency to bureaucratize is minimized.²³

Patterns of Successful Communal Management

Privatization is one, but only one, solution to the tragedy of the commons. Many medieval commons lasted, nontragically, for hundreds of years. Ostrom describes a Swiss commons whose written records date back to the thirteenth century. Cattle are privately owned but graze in communal highlands in the summer. People grow private crops on individual plots in the valleys, intending to use part of their crops

23. Individual partners face a trade-off when decision-making falls to the group as a whole: they gain a measure of control to the extent that other partners need to get their consent before doing anything, and lose control to the extent that they, too, need to get consent before doing anything.

to sustain their cattle over the winter. The basic limit on communal summer grazing is that owners can send only as many cattle to the highland meadows as their private parcel can sustain over the winter, with fodder grown during summer.²⁴

The arrangement solves the central problem of how to prevent overgrazing: how to govern decisions regarding herd size. Allowing individual owners freely to decide whether to add to their individual stock is above all what governors of a commons cannot do. To avoid tragedy, governors of a common pasture manage the overall livestock population, based on their estimate of the pasture's overall carrying capacity. To manage overall numbers, communal managers constrain individual decision-making. There are several ways of doing so. Managers can allow a given owner to graze cattle on common land only in proportion to (1) how much hay he produces, (2) what proportion of the land belongs to him, or (3) the number of shares he owns in the cooperative.

Whatever institutions people create must be able to respond to change. Suppose people discover some way to increase crop yields in the valley, increasing their ability to produce winter fodder. As a consequence, the valley's winter carrying capacity rises, but the highland's summer carrying capacity does not. In that case, the rule tying summer grazing rights to winter feeding capacity no longer works; it has become a prescription for summer overgrazing. Managers of the highland meadow will need to change the rule for allocating grazing rights.

Ostrom writes:

All of the Swiss institutions that used to govern commonly owned alpine meadows have one obvious similarity—the appropriators themselves make all major decisions about the use of the common property resource.... Thus, residents of Törbel and other Swiss villages who own communal land spend time governing themselves. Many of the rules they use, however, keep their monitoring and other transactions costs relatively low and reduce the potential for conflict.²⁵

The lesson is twofold: Successful commons are (1) flexible, and (2) under local control. Rules sometimes need to change in response to circumstances, and local people know what needs changing locally.²⁶

Of Sheep and Ecotourists

In the medieval commons, land was held in common. Individual members remained, in a sense, private businessmen—private owners of their livestock. The parallel with Sabi Sand is that a basic resource, land and its wildlife, is managed as a common unit while the business per se remains private. Each individual business within Sabi Sand has its own “flock” of guests. Thus, the analog at Sabi Sand of privately owned but communally grazing sheep is the customer, not the wildlife. In the medieval case,

24. Ostrom (1990) 61.

25. Ostrom (1990) 65.

26. Ostrom (1990) 62. In some cases, the recorded history of these legal arrangements and their changes dates back to the 1200s.

sheep graze the land, and owners profit on a per sheep basis. At Sabi Sand, customers “graze” on wildlife (and other features of the land), and owners profit on a per customer basis.

In the Swiss commons, “no citizen could send more cows to the Alp than he could feed during the winter.”²⁷ Similarly, no partner in Sabi Sand unilaterally decides how many customers to “graze” on the preserve. The problems differ in detail, but the logic is the same. Partners recognize an imperative to avoid commons tragedies and do so by taking the option of overgrazing out of the hands of individual partners. In the case of Sabi Sand, this means executive committee decisions about carrying capacity—in particular, the land’s capacity to carry guests without long-term degradation. On the medieval common, this meant deciding when overgrazing would affect flocks to the point where a head of sheep would be worth less. The parallel at Sabi Sand is the point at which overgrazing by guests will begin to reduce a prospective customer’s desire to visit Sabi Sand.

5. Keys to Success

Ostrom lists keys to long-term survival of any common pool resource. Among them:

1. Boundaries are well defined, both physically and in terms of people.
The resource is clearly delimited. Insiders who do have rightful access are clearly distinguished from outsiders who do not.
2. Rules are sensitive to local conditions.
3. Users get involved in monitoring each other.
4. Users generally can participate in modifying operational rules.²⁸

Sabi Sand’s owners faced many of the same problems as communal herd owners of medieval Europe and developed many of the same solutions. According to economist Wolf Krug, the reasons for the success of private reserves include efficient monitoring of wildlife stocks; well-trained staff; and high levels of investment in antipoaching measures.²⁹ Although Krug speaks of the contributions a well-trained staff can make to the success of private reserves, we should not confuse training with professional certification. Many of the people at Sabi Sand with whom we talked acknowledged invaluable contributions by natives who grew up in the bush. A bush-savvy local staff helps maintain connections with local villagers, which minimizes poaching. If a manager learns that the impala snared a few days ago was eaten by a desperately poor family, it affects how the case is handled. The manager can decide to look the other way, hoping the trespass is limited by the inherent limits of the particular poacher’s need. In contrast, poaching a rhino for its horn is a declaration of war; if the reserve does not defend itself from those seeking rhino horns for international

27. Ostrom (1990, 62), citing Netting (1976) 135, 139.

28. Ostrom (1990) 61.

29. Krug (2001) 25.

markets, it will be overrun. So some poaching of small game by neighboring villagers is tolerated, but Sabi Sand's perimeter is designed to minimize the costs of excluding and monitoring would-be poachers while maximizing the area for wildlife and wildlife observation.

There is no fence at the boundary with Kruger Park or with Manyeleti Preserve, a private reserve to Sabi Sand's north that is also part of Greater Kruger National Park (see fig. 12.1). A perimeter fence remains or was installed on other boundaries. Main roads at times follow this perimeter. Visitors are exposed to a minimum of fences and traffic while on safari, thereby enhancing the safari experience. Land alongside the fence and road also serves as a firebreak—it is cleared and sometimes burned. The fence is hardly impenetrable, but getting through it takes work. The clearing of perimeter land, together with strategic placement of roads, makes trespass easier to spot; breaches of the fence are likely to be spotted by the next vehicle coming along the road. The perimeter road thus reduces trespass and poaching.

The main boundary road is packed dirt, suitable for rental cars and wide enough to leave room for passage of oncoming traffic. Narrow internal roads branch from the main boundary road, allowing access to individual resorts. These may be shared by a few neighbors. The main purpose of sharing is to minimize the land that roads consume, but sharing also facilitates contact among neighbors. There are also internal tracks suitable for Land Rovers, so that there is limited off-track movement. However, the land here evolved to withstand elephants and can handle occasional Land Rover use. We saw a mild degree of visible degradation in 2001 (flattened grass and shrubs) but were told it was from elephants, not Land Rovers. The animals themselves often use the roads, though; walking along the road is easier and quieter than wading through thickets. Roads thus minimize wear and tear on the land by providing established trails not only for vehicles but also for megafauna.

Although hunting is banned at Sabi Sand, if an animal is seriously injured, it can be killed.³⁰ If there is time, a veterinarian is consulted before the animal is killed; if not, a veterinarian certifies after the killing. We asked one resort manager whether the hunting ban was absolute or whether a wealthy would-be hunter could get away with bribing a particular owner or tour guide to look the other way. The manager said no resort would ever risk that. If discovered, there would be legal penalties, and there would be little chance of avoiding discovery, given the constant observation of neighbors. The system thus discourages defection.

Regular scheduling of Land Rover tours, at dawn and dusk, means animals know when Land Rovers are coming, owners know when they are expected, and everyone knows something is wrong if Land Rovers are heard when or where they shouldn't be. Everyone knows they should never hear gunshots.³¹ So monitoring becomes simpler. As one manager said, "There are too many eyes and ears to make illegal hunting much of an option." Indeed, guests pay to be the eyes and ears! The cost of internal

30. Hulett, personal communication, June 2, 2003. Hulett reports one exception. In 2001, a male cheetah broke its leg. Unable to hunt, it would have died. Since cheetah are endangered, and since it could still serve in the cheetah gene pool, this cheetah was sent to the De Wildt Cheetah Breeding Station.

31. Poachers often hunt with snares, though, not rifles. Snare hunting is quiet, uses only inexpensive materials, and does not require a lot of time on the part of the poacher. It is also a ghastly way for an animal to die.

monitoring often is the downfall of communal managers, but at Sabi Sand, internal monitoring is part of the package that resorts are selling.

Knowledge is a prerequisite for successfully managing the preserve's ecosystem. Day-by-day observations supplemented by high technology such as remote sensing or aerial photography can help managers gauge an ecosystem's long-term viability. To do this well, one wants collaboration between bush-savvy people and high-tech scientists. Note that hiring people who know and love the land is not enough. Also needed are employees who know and love people—who can run resorts and interact well with villagers outside the park. The preserve needs to understand its customer base, so it needs to understand marketing and sociology.

Different resorts use different strategies for catering to guests, hiring staff, and long-term monitoring of wildlife. Some of these strategies will work, some will not. But the temporary failure of one resort need not jeopardize the whole preserve. Failure of one resort can remain a small event. Resorts that do not adequately monitor ecosystem sustainability may (perhaps quickly) become less profitable, but they need not take the rest of Sabi Sand down with them. Conversely, if they have a new idea, they need not wait for everyone else to be convinced. They can go ahead and experiment, and if the experiment goes well, other owners can imitate. The system at Sabi Sand has room to evolve and thus to endure.

6. Problems External to Sabi Sand

Several obstacles limit private investment in sub-Saharan wildlife conservation. There are perverse economic and political incentives as well as difficult legal and social problems to overcome. For example, the South African government subsidizes cattle ranching, while the European Community guarantees quotas of imported beef at above-market prices.³² It is hard to imagine the South African government subsidizing cattle ranching to a point where Sabi Sand would be tempted to abandon ecotourism in favor of cattle. Still, people elsewhere are making a living as ranchers. Subsidies keep them in business when market price signals otherwise would tempt them to turn their land over to wildlife conservation.

Problems also arise from the lack of an appropriate legal framework, especially a lack of secure property rights, for the wildlife business. The problem is most acute in Zimbabwe, but as managers of Sabi Sand are aware, there is no guarantee that such problems will not spill over into South Africa. The manager at Singita said his family fled political oppression and civil war in Zimbabwe when he was a child. Just before we visited Singita in 2001, some of his Zimbabwean cousins needed to flee to relative safety in South Africa with only one suitcase each. With that kind of uncertainty, people may choose not to make long-term investments, such as developing the kind of infrastructure necessary to profitably convert from ranching to game preservation.

Evans says that at present, Sabi Sand is facing claims of people who say they were there first and that they were displaced. Evans says current owners can (with

32. Krug (2001) 32.

one exception) trace their claims back to Crown grants in 1869. Moreover, it is generally acknowledged that the area was only sparsely and intermittently inhabited before then on account of the prevalence of malaria. The law allows claims for reparation going back only to 1913. Thus, Sabi Sand appears to be on solid legal ground. Still, the law is only as solid as a ruling party's respect for it. Most of Sabi Sand's owners trust the current regime, but history has not been kind to Africa. Like all Africans, Sabi Sand's owners know that things can change with little warning.

A third kind of problem involves social pressures created by international wildlife groups and restrictions on international trade in wildlife products, which reduce a reserve's profit opportunities. When hunting is not allowed, not even to control overpopulation, profits drop. When ivory sales are banned, profits drop. When trade in meat and other wildlife products is not allowed, profits drop. One lesson of wildlife conservation efforts in Africa is that we can go too far trying to preserve nature sans people. Unable to profit from wildlife because they were blocked by animal rights groups that were insufficiently sensitive to local ecology (including human ecology), rural people who could have made a living from wildlife instead drive wildlife off their land to make room for (relatively unprofitable) crops and cattle.³³

Evans notes that Mala Mala is storing ivory, rhino horn, and other wildlife products, collected from animals that died on its land, pending the lifting of CITES bans on the trade of such products.³⁴ Evans argues that the ban ought to be lifted, perhaps on the condition that revenue from sales be used to acquire additional land for wildlife reserves.³⁵

We have discussed political and economic problems external to Sabi Sand. There are ecological reasons why legislators would want to solve them. Lambrechts says that as of 1993, the Transvaal region had about 2.5 million hectares of national and provincial parks and 4 million hectares of private reserve. The latter figure is over 17 percent of the region's total land area.³⁶ Given other pressing problems, such as AIDS, illiteracy, and unemployment, little prospect exists for devoting further government resources to biodiversity. At the very least, private conservation is complementing governmental efforts.

There are also economic reasons for solving these problems. Private wildlife preserves such as the properties of Sabi Sand often are primary employers. Mala Mala properties, owning over a quarter of the land within Sabi Sand, has three lodges, which Lambrechts estimates employ a staff of 220, of whom 190, with an estimated 2,000 dependents, come from surrounding rural communities. Lambrechts adds: "Although accurate figures are impossible to obtain, the number of individuals employed within the private sector wildlife industry in Transvaal is estimated at 12,000, with 100,000 dependents."³⁷

33. Bonner (1993); a relevant excerpt is reprinted in Schmidt and Willott (2002) 306–19.

34. David Evans, personal communication, June 2, 2003.

35. Evans, personal communication, June 2, 2003.

36. Lambrechts (1995) 38, table 1. The former Transvaal Province has since been split into the Limpopo (or Northern), Northwest, Gauteng, and Mpumalanga provinces.

37. Lambrechts (1995) 39. Spenceley and Seif (2003) estimate that Sabi Sabi Resort employs sixty local villagers, who support 460 residents of the village (Huntingdon, population sixty-five hundred) located just outside Sabi Sand; Sabi Sabi Resort is only one of many employers in Sabi Sand.

7. Sabi Sand's Internal Problems

Greater Kruger Park is home to several endangered species, including rhinoceros and cheetah. The rhinoceros is threatened by an overabundance of elephants, since elephants consistently outcompete the rhinoceros for forage. Elephants are bigger, smarter, and socially organized in a way that is beyond the rhinoceros. There is a bit of a biological mystery here. Accurate records from Kruger National Park and elsewhere in southern Africa indicate elephant populations increase roughly 5–7 percent per year in the absence of human killing.³⁸ What can account for these high rates of increase? Why isn't everything else in Africa (or for that matter, in other parts of the world historically populated by elephants and their ancestors) already extinct? What normally controls elephant populations?

In North America, humans are what we call an exotic or introduced species. Large human populations have been in North America for perhaps twelve thousand years. We typically see nature as something separate from humans and as something that would carry on nicely but for human interference. That may be true in North America, but it is not true in Africa. Elephants appeared in Africa about 5 million years ago.³⁹ So did humans.⁴⁰ Humans and elephants coevolved. Humans have hunted elephants since before humans and elephants evolved to become what they are today.

Elephants are too big, too smart, and too well-organized for a feline predator, even a lion, to have much chance of taking a baby elephant, unless a herd is disrupted. We have no evidence of elephants ever being routinely hunted by any species other than humans. Just as in North America, where exterminating wolves and cougars caused deer and elk populations to explode, so, too, in parts of Africa where hunting by humans was stopped, elephant populations exploded. Without its keystone predator, any ecosystem is unstable. We can let natural processes control impala populations, but if we ask why we cannot likewise let natural processes control elephant populations, the answer is that, when it comes to elephants, hunting by humans *is* the natural process, or the closest thing to it. In Africa there is no such thing as humans simply “letting nature be.”

How much damage could humans in Africa do before acquiring guns? More than one might imagine. Just as some Native Americans hunted bison by stampeding herds over cliffs, there is evidence that *Homo erectus* hunted elephants by stampeding whole herds into swamps.⁴¹ Note that elephant herds consist entirely of females and their young. Since the introduction of firearms, trophy hunters have hunted the

38. A minimum 5 percent increase is reported in an internal memorandum (Joubert 1996). Kruger National Park's elephant population was increasing at an average of 7–8 percent annually, according to Butler (1998) 76.

39. Jackson (1982) 15.

40. Michael D. Lemonick, and Andrea Dorfman. “Up from the Apes: Remarkable New Evidence Is Filling in the Story of How We Became Human,” *Time*, August 23, 1999, 50.

41. Johanson and Edey (1981, 73). F. Clark Howell discovered evidence of *Homo erectus* living in Spain and hunting elephants as long as four hundred thousand years ago. He found large numbers of elephant fossils, together with evidence of fires used to stampede them, and stone tools used to butcher them.

more solitary bulls. Before firearms, stampede-style hunters took out whole herds, in effect taking out multiple generations of breeding-age females at a stroke. This incredible selection pressure may help to explain how such an incredible animal as the elephant could evolve and persist, eating as prodigiously and reproducing as prolifically as it does, without driving itself and its ecosystem into oblivion.

The Kruger Park area may never have had many elephants or people. Elsewhere in Africa, pictographs record evidence of ancient elephant hunting. By contrast, of 109 shelters containing rock art so far discovered in Kruger Park, only one depicts elephants. This suggests there were elephants in what is now Kruger Park somewhere between 7000 BCE and 300 CE, but they may have been rare.⁴² Since the park's formation in the early 1900s, elephant populations have increased. In the 1960s, scientists and rangers estimated the park's carrying capacity to be about seven thousand elephants. Culling began in 1972 to maintain the elephant population between 6,800 and 7,200. Even at the peak of poaching, during the 1980s, culling was needed to stabilize elephant numbers.⁴³ In response to pressure from animal rights groups, the culling stopped in 1995. There were 7,200 elephants at the time. Today there are 10,500;⁴⁴ and it is visibly apparent that the Park cannot sustain them indefinitely. If a park has few elephants, then adding a few promotes biodiversity. If a park already has too many, adding more reduces biodiversity. A maximum elephant population is not compatible with maximum biodiversity.

One key ecological role of elephants is to keep forests in check and maintain open savanna. Adult male elephants will push over four or five trees per night and nibble on the roots. At high numbers, instead of keeping forests in check, elephants destroy too many trees and endanger other flora and fauna, including rhinoceros. Mpalo Setshwantsho was our guide in Botswana's Okavango Delta in 1999. He had been working as a guide for eighteen years and had lived in the neighborhood of the delta his whole life. When we asked him whether he had seen major changes in the delta in his lifetime, he said there are more animals now. He also said there are fewer trees. In Chobe National Park, as elephant populations rose, woodland vegetation decreased from 60 percent coverage to 30 percent between 1962 and 1998.⁴⁵ In 1999, Aari Schreiber, a Kruger Park section ranger who manages roughly a quarter of the park, told us that if all elephants were removed, Kruger Park would need twenty years to recover from elephant damage done since 1995.

42. Whyte (2002).

43. Kobus Krüger was among a handful of rangers who took responsibility for putting an end to the poaching, at great personal risk. He spent days and weeks on his own in the bush, without fire and without radio contact, tracking and apprehending poachers. Kobus was also one of the rangers principally responsible for the culling. He was famous for his marksmanship, and it takes a superb marksman to hit an elephant's brain with a single shot from an AK-47 rifle while standing on a helicopter platform. But Kobus loves animals as much as anyone we have ever met, and the task of shooting elephants was literally the stuff of nightmares.

44. Whyte and Fayer-Hosken (forthcoming). This is Ian Whyte's estimate as of 2003. Whyte estimates that at this size, 735 elephants would have to be culled each year to stabilize the population. If the population base were smaller, fewer elephants would need to be culled.

45. Mosugelo et al. (2002). For more on destruction of woodlands by elephants, see Whyte, van Aarde, and Pimm (1998).

Kruger Park gave away as many elephants as it could—140 as of 1999, when we first visited there—but not many people want to own an African elephant, and not many can be trusted with the responsibility. (Indian elephants are cuter, smaller, and more docile, and are the kind found in circuses and most zoos.) The cost of translocation is also prohibitive. Ian Whyte estimated the cost of moving eleven hundred elephants to adjacent land in Mozambique at 15 million rand (\$2 million).⁴⁶

Moving elephants turns out also to be a sociological problem. In their normal social setting, juveniles are kept in check by older males. Juvenile males translocated without their educational support groups have in some cases become delinquents: harassing rhinoceros and other animals, and sometimes humans, too.

Kruger Park has a problem with elephant overpopulation, a problem that, because of pressure from animal rights groups, it cannot readily solve. When the factor that prevents an ecosystem from being stable is that it lacks a keystone predator, merely enlarging the ecosystem will not solve the problem. Ultimately, something must play the role of that missing predator. The park is not a viable ecosystem in the long run unless something is done about the elephants, which is also to say the private reserves that now form part of Greater Kruger are not ecologically viable unless something is done. Adding more land does no more than buy time during which other solutions may emerge.

One approach is to develop a method of birth control suitable for elephants. Personnel of Kruger National Park, in conjunction with other scientists, have been investigating several methods. The first test of hormone-based birth control, analogous to the human birth control pill, was technically successful, insofar as females did become temporarily sterile. However, the method failed, because bulls thought the treated females were in estrus and continually harassed them, causing them to panic and leave their young unprotected and unfed. The test was stopped for humane reasons.⁴⁷

Another method currently is being tested. Zona pellucida proteins, which normally surround the egg, are injected into female elephants. The resulting immune response in the female creates proteins (antibodies) that bind to the egg, thereby preventing sperm from fertilizing the egg. Females are thus temporarily rendered sterile. Since this method does not directly affect hormone levels, it has not led to the same problem as the initial method. So far, no side effects are known, although there has not yet been enough time for social side effects to manifest.⁴⁸

46. Whyte, personal communication (2001).

47. Butler (1998) 53. See also Fayer-Hosken et al. (2000).

48. McComb et al. (2001). If conditions are good, a cow may have eight calves in her life, of which half could be expected to be female. Herds are matriarchal and are led by the oldest female, typically a postmenopausal female in her fifties. Females remain in the herd for their whole lives. (Males leave at puberty.) The herd is thus an extended family consisting of the old matriarch and several generations of her and perhaps her younger sisters' female offspring. If a contraception program aimed to stabilize elephant numbers, each cow would theoretically have only two offspring. How would that affect the herds? Given standard probabilities, about half the matriarchs would have one daughter. A quarter would have two. A quarter would have two sons, thus no daughters. A female having two sons would thus find her sons leaving at puberty, leaving her with no herd over which to be a matriarch. She would be the end of the matrilineal line. If, like half of all females by hypothesis, she has no sisters, or if her one sister has no daughters, then she is the end of her mother's line as well. Again, given standard probabilities, twenty-five

There is a logistical problem, too. To stabilize populations, approximately 70 percent of breeding females would need to be under treatment at any one time. In Kruger Park alone, this means thousands of female elephants. Animals require repeated dosages. Each animal would need to be individually radio-collared or tagged in some way. This expense would be astronomical. However, it might be feasible on private preserves with larger staffs and smaller numbers of elephants.

What is the situation in Sabi Sand? Before the removal of the fence in 1993, there were sixty elephants in Sabi Sand. The trend since then is as follows:

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
60	116	202	202	311	429	497	531	601	757

This trend is obviously worrisome. Kruger Park’s carrying capacity traditionally is estimated to be a little less than one elephant per square mile. In 2002, the population density within Sabi Sand rose to three per square mile. Plants that elephants most favor became rarer in Kruger Park but proliferated in Sabi Sand, while elephants were mostly absent. That may be why elephants are migrating to Sabi Sand. Ian Whyte guesses Sabi Sand’s elephant population density will return to something like Kruger’s when elephants damage Sabi Sand to the same degree that they have damaged Kruger Park since 1995, when the culling stopped.⁴⁹ Presumably, Sabi Sand does not want to go down that road. There may come a day when the moratorium on elephant culling at Kruger Park will force Sabi Sand’s managers to put the fences back up again.

One solution to the overpopulation problem that would also raise revenue would be to run the game preserves as part-time hunting lodges, as many were run in the past. In 1999, we visited Khami Game Preserve in Zimbabwe. At the time, Khami operated as a hunting lodge one month of the year and as a no-hunting game preserve for the other eleven. Although this option is ethically or politically unacceptable to some people, it would have advantages over current alternatives, insofar as it is technologically and financially feasible. Indeed, unlike the alternatives, hunting would generate income that could be plowed back into communities and conservation efforts. The bottom line is that whatever policy Sabi Sand adopts, it will have to help local people make a living if it is to be sustainable.

8. Conclusion

Looking at principles derived from the study of long-enduring commons, it becomes clear that wherever possible, people let small events remain small. This is evident at

out of sixty-four females would have no granddaughters. So it is not merely numbers within a generation that would be thinned out. Also declining would be the number of generations per herd. Would remnant females, no longer having young to tend and thus losing their central reason to constitute themselves as a herd—or, for that matter, to live at all—want to join another herd, helping to raise a small number of offspring to which they are not closely related? Would remnant females be welcome in another female’s herd? Is it *obvious* that limiting population this way would be more humane than culling?

49. Sabi Sand is being monitored. Tree damage increased considerably, and bull elephants were responsible for 92 percent of uprooted trees in the area studied (Hiscocks, 1999).

Sabi Sand, where individual resorts profit from making good decisions, suffer from making bad decisions, and neighbors learn from example.

Ellickson summarizes:

The agricultural activities for which there were efficiencies of scale—harvesting, fencing, shepherding—were performed jointly on commonly accessible land according to explicit bylaw or implicit contract (“the custom of the manor”). The small agricultural events that lacked returns to scale—planting, weeding, thinning—were stimulated through the direct material incentives of private land ownership.⁵⁰

Thus, at Sabi Sand, activities for which there are efficiencies or necessities of scale—managing wide-ranging megafauna, fencing, securing legal rights to river water—are performed jointly. Another key characteristic of long-enduring commons is their ability to change as required. Sabi Sand sometimes needs to modify its rules and customs to meet new ecological, financial, social, and political challenges. Being an organized group committed to building a sustainable preserve puts Sabi Sand’s owners in a better position to address larger challenges. Being privately owned resorts gives owners an incentive to take individual responsibility for smaller ones.

This essay revises one originally published in University of California at Davis Law Review 36 (2003): 203–32. Copyright 2003 by David Schmitz and Elizabeth Willott and the Regents of the University of California. All rights reserved. Reprinted by permission. Elizabeth Willott is a Lecturer in the Entomology Department and a member of the Institute for Study of Planet Earth at the University of Arizona.

50. Ellickson (1993) 1391.