National Parks in Savannah Africa

Ecological requirements of parks must be balanced against socioeconomic constraints in their environs.

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The World Parks Conference at Yellowstone National Park commemorated the founding of the world's first national park 100 years ago. Yellowstone and most of the other parks of North America stand a good chance of lasting another 100 years. One can scarcely be so sanguine about parks and reserves in the savannah zones of Africa. Most of these have been set up in the last 25 years, many of them in the last 10. Whether in another 10 years' time they will be surviving as well as they are now is a moot question; whether most of them will be surviving at all in another 25 years' time is even more speculative.

There can be little doubt of the value of these parks in terms of the world's natural heritage (*1*). They constitute the last large-scale remnant of the tremendous variety of mammals of the Pleistocene, which in turn comprised the most remarkable array of mammal life this planet has known. There has been much acclaim in recent years for the way the new nations of Africa have been safeguarding their wildlife. During its first decade of independence, Tanzania has expanded its network of parks from one to eight. It has been spending a greater proportion of its national income on parks than does the United States—and that from a total annual budget scarcely matching what visitors to Yosemite National Park spend on incidentals. The parks in Kenya, Tanzania, Uganda, and Zambia total 38,000 square miles (Fig. 1), an area the size of New England. The various parks in Malawi, Botswana, Rwanda, eastern Zaire, and Ethiopia, together with a string of similar areas in Mozambique, Rhodesia, and South Africa, make up almost 40,000 square miles. (There are similar parks along the western side of the continent, but these are not as significant for conserving Africa's wildlife as the great chain along the eastern side.) Most of these are savannah parks, although there are also mountain parks and marine parks. Tsavo and Kafue parks are both more than 8000 square miles, Kruger is over 7000, Serengeti almost 6000, Wankie is 5500, Luangwa Valley 5000, Ruaha 4400, Kalahari-Gemsbok 3600, and Albert (once known as Kivu, now renamed Virunga) 3000. Yellowstone, the largest park in the United States, is 3400 square miles. There are also a number of game reserves in eastern Africa, several of them affording sufficient protection to the wildlife to qualify for the United Nations List of National Parks and Equivalent Reserves.

Yet, for the most part, these parks and reserves of Africa are too small. Their boundaries were often fixed in response to political expediency rather than ecological expertise. Conservation in Africa, as elsewhere, has been the art of the possible. There has been scant regard for the year-round needs of the herds of herbivores, which may total 1.5 million as they do now in Serengeti. Serengeti Park should be between one-third and two-thirds larger than it now is in order to meet all the needs of the ecosystem. At the height of a recent drought, for example, the wildebeests were migrating 25 miles outside the perimeter of the park. When Tsavo was established, equally little account was taken of the elephants in the entire ecounit (the geographical range needed to support the ecosystem during its seasonal fluctuations), an area at least twice as large as the park (*2*). In the case of Nairobi, that unique area where one can be among lion prides within half an hour of leaving one's downtown hotel, the average of 100 herbivores for each of its 44 square miles is sustainable during the dry season, but during the wet season the migrating herds need an area ten times as large.

This discrepancy has not mattered much because there has usually been plenty of room in the hinterlands. But now there is scarcely a patch of eastern Africa that someone is not scheming to put to use—sink a hoe in it, put a fence around it. do something with it—and if not now, then soon, very soon. Given the limited agricultural potential of the region, this part of Africa is much more densely populated than is usually recognized (*3*). Already, well over three times as much land per capita is under cultivation as in Western Europe. Despite technology, the carrying capacity of the land has been declining in many places (in some places, because of technology). Six years ago, almost two-fifths of Africa south of the Sahara was believed to be overloaded, and about one-third of the human population could be considered unduly crowded (*4*). In the meantime, Africa's population has been expanding exponentially, faster than anywhere else on Earth. Not only is the human population soaring, but human aspirations are soaring too. When per capita food production is actually declining (*5*), there is an urge to press into use every available scrap of ground, often at a rate faster than the population upsurge itself. As much pressure is being generated on the savannahs, the main protein-producing areas of Africa, as on the arable, cereal-growing regions.

Instead of finding in the hinterlands of the parks a strategic retreat for their migrations, wild creatures are encountering competition for water, grazing—lebensraum in general (*6*). Retreating into the parks with their increased numbers, the herds are then packed into areas that were supposedly established to safeguard their free ranging. For example: the 15,000 square miles of Kenya's Masailand, hitherto almost universally regarded as tribal property—with little let or hindrance to wild animals—are due to be completely demarcated and accorded individual or group registration by 1974. This means that fences and other paraphernalia of modern ranching may be installed, thereby disrupting migratory patterns.

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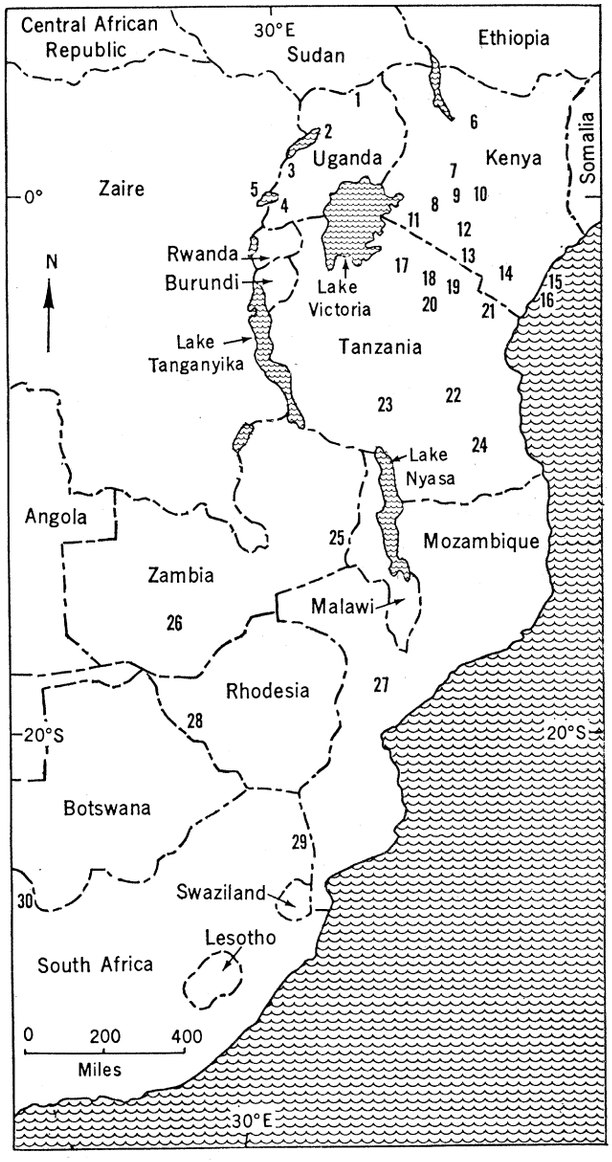
It will also mean that a herd of zebra on the trek becomes private property, to be treated as the ranch owner sees fit, as soon as it steps over the ranch boundary. In other areas, such as parts of the Tsavo region, human population has doubled during the last 25 years, and the amount of land given over to virtually exclusive human practices has often trebled (*7*). In Uganda, the amount of land available to elephants has fallen from 70 percent of the national territory in 1929, to 17 percent in 1959, to less than 10 percent in 1972 (*8*). Human encroachment across savannah Africa means that, while the overall number of elephants is falling, the number of elephants in the parks is often increasing at an extraordinary rate. Wankie is being seasonally invaded by "international elephants" from Botswana (*9*). Kruger, in the most developed part of savannah Africa, had an estimated 560 elephants in 1947, 2400 in 1964, 6600 in 1967, and more than 8000 by 1970 (*10*).

The tensions between a protected area and its hinterland constitute a problem by no means confined to Africa. In the United States there has been a growing realization that safeguarding a park depends on safeguarding its ecosystem (*11*). Yellowstone's northern herds of elk are dependent on rangeland outside the park for part of their annual needs, although there is not enough pressure on Yellowstone's environs to endanger the entire park. The Everglades National Park presents a situation akin to Africa's. The threat here stems from what may happen to the water supply, which supports the Everglades' biota (*12*). To this degree, the park depends on a much greater area outside its boundaries, outside its jurisdiction too. A similar stranglehold is being exterted on many of Africa's parks, not as much by outsize jetports and similar superscale technology as by much more limited technology in the hands of many more people.



Uganda
1. Kidepo
2. Murchison Falls
3. Semliki Reserve
4. Queen Elizabeth

Zaire
5. Albert

Kenya
6. Marsabit
7. Samburu Reserve
8. Lake Nakuru
9. Aberdares
10. Mount Kenya
11. Mara Reserve
12. Nairobi
13. Amboseli Reserve
14. Tsavo
15. Malindi Marine
16. Watamu Marine

Tanzania
17. Serengeti
18. Lake Manyara
19. Arusha
20. Tarangire
21. Mkomazi Reserve
22. Mikumi
23. Ruaha
24. Selous Reserve

Zambia
25. Luangwa
26. Kafue

Mozambique
27. Gorongosa

Rhodesia
28. Wankie

South Africa
29. Kruger
30. Kalahari-Gemsbok

Fig. 1. National parks and game reserves in eastern Africa.

Population Pressures

Blacks on the eastern side of Africa have a death rate of around 20 persons per 1000 per year, and this rate is generally falling at the rate of 0.5 per 1000 persons per year. Birth rates are around 50 per 1000 persons per year and are often on the increase. With half the total population age 15 or less, there is little reason why this region will not increase by 4 percent per year before the end of the century, and keep on increasing for perhaps another 50 years before it reaches moderate stability. Family planning, let alone population planning, in Africa is way behind such planning in other continents. All the arable areas of Kenya are already being cultivated, most of them to the limits of their capacity, and the end of the century may see 12.1 million people, more than there are in the entire country at present, seeking a plot of land from which to scratch a subsistence living (*13*). For the most part, these people will have to look to the savannah zones for land. Not that the strictly pastoral areas afford much of a relief valve: given the cattle-raising practices of the Masai, for example, which derive from their sociocultural evolution with its commonsense constraints, Masailand is already overpopulated at only six or eight people per square mile (*14*).

These population pressures cause conflicts in the areas bordering the parks. These conflicts will accelerate to crisis proportions unless an attempt to integrate the competitive needs replaces the current confrontation. There is perhaps greater direct or immediate pressure to put some of the parks and reserves in Africa to other uses than there is to install a second dam in the Grand Canyon or to get the oil out of the North Slope of Alaska. Some countries of eastern and southern Africa have not experienced much population pressure as yet; Zambia still has plenty of room, and Botswana was recently able to expand its parks to encompass one-fifth of the nation's total territory. But

in East Africa the pressure is already frequently pronounced. Every district surrounding the great chain of wildlife areas in northern Tanzania (namely, Serengeti Park, Ngorongoro Conservation Unit, Lake Manyara Park, Tarangire Park, and Arusha Park) is already classified as overpopulated or at full capacity (*15*), except for Masailand, which, as has been noted, is already undergoing gradual degradation because of limited resources. Kruger has been trying to tackle the problem of excess animals turning the area into a sanctuary (which a park is not generally supposed to be) by building a fence along the perimeter. A fence 500 miles long and strong enough to withstand elephants is a costly undertaking; it also means that the park may be able to support fewer animals altogether, since they will be cut off from some of their migration routes. But the conflict does not have to arise in the immediate environs of the park. Farmers far away from the boundaries of Kruger are taking more water than ever from the park's feeder rivers for livestock and irrigation, leaving Kruger's external supply of water lower than ever in the dry season (*16*); similarly, the regional water supply has suffered from industries' increased needs for water in the Rand—the Rand's requirements are projected to increase 13 times over the 1947 level by the year 2000 (*17*). A similar threat involves the headwaters of rivers in Gorongosa Park in Mozambique, while the hydrology of Luangwa Valley in Zambia is being progressively disrupted by destructive agriculture in the feeder rivers' watershed, which is ten times bigger than the park (*18*).

Parks in North America and Africa

In some senses, a park in savannah Africa could hardly ever be big enough. An ecosystem in North America or elsewhere in the temperate zones is generally not as complex nor as integrated as those in savannah Africa. This is particularly significant in that a disruption of the former's workings, whether within the protected area or without, does not trigger such profound repercussions throughout the system. Nor do the boundaries of an ecosystem in a temperate zone fluctuate as much with seasonal changes—that is, they are not as radically out of line year by year with the park's static borders. What is unique about African parks is the extreme diversity of their biota. It is precisely this dynamic aspect which makes them much less amenable to being put behind "fences," whether on the ground or on a park warden's maps or in the minds of international connoisseurs of parks. Their ecosystems are more open-ended than the relatively "static" parks of the temperate zones. Moreover, parks in North America are often set up as much to protect landscapes as animals (*19*): El Capitan and Old Faithful are not likely to wander outside the park boundary on a migration. These factors of African parks offer problems and potential; they are constraints on creative policy as much as limitations on functional management. The more these constraints are recognized, the less they need be constraining. A constraint disregarded, on the other hand, may develop into a constriction, strangling the life out of a park's biota.

Prospects for parks in Africa will reflect the extent to which ecological needs are balanced with socioeconomic needs. This equilibrium must occur at the dynamic interface between "nature's world" and "man's world." (I use these two rather imprecise and disputable terms—man is, after all, of "nature," and "nature" is a human concept—because they nevertheless serve to point up the two sides of the argument as it is frequently perceived.) The equilibrium must be constantly maintained by long-term policy controls and by day-to-day management if park planners are to exert much influence on it. If planners do not, then another equilibrium—perhaps not taking sufficient account of man's wilderness needs, and unstable at that—will be set up by the forces of other human communities within the vicinity. If no decision is imposed by man's precision planning, a decision will be imposed by nature.

Achieving an "accord" between man and nature could be a mark of what man considers an acceptable reconciliation with his environments. In developing Africa, he is dealing with environments of great productivity and vulnerability. Far from merely safeguarding interesting relics from the past, parks could offer an indication of man's ecological equilibrium for the future. Moreover, there are usually no two sides to the problem, but a dozen different interests arising from man's immediate needs, his long-term needs, the needs of the various communities in emergent Africa, of the world conservationist bloc, of tourists, of the biotic associations, of the physical environments, and the rest. If the problem can be understood not as two sides in direct opposition but as a range of forces that could be accommodated across a spectrum of interests, then coordination could replace conflict, and the extraordinary potential of savannah ecosystems—for spectacle, meat, money, and a range of associated products—could indeed be mobilized for man's benefit. What is wanted is an appraisal of the various factors—cultural, political, ecological, and socioeconomic—involved in achieving optimum management of wild lands in terms of some objective function. This criterion has not always been properly identified by conservationists, policy makers, park managers, or whoever else is involved in the challenge of utilizing a resource while protecting it from ultimate demise. Here, more than elsewhere, nature does not work by disciplines—a departmental approach will not suffice. The problem can be resolved only through an interdisciplinary approach.

Rationale for Parks

Before one can decide how best to keep a park in existence, one must decide what it should become—namely, how one will allow it (or assist it) to adapt to the encroaching pressures of the environs; before one can decide that, one has to know what the purpose of the park is supposed to be. Some of the African parks have been set up so recently that many of them do not yet have a specific policy from which to derive management objectives (*20*). Insofar as this lack results from the need to determine just what constitutes the ecosystem one is trying to protect, the delay is justified. In the meantime, however, these policy questions are unlikely to get less complex, or, if they do, they may be resolved by default rather than by design. Policy for a park need not be a straitjacket, but it will, by definition, eliminate some options. Nor should policy be a once-and-for-all measure—and implementing policy must be dynamic, able to adjust to new pressures and opportunities. Within these qualifications, it is difficult to understand why a park 10 years old still has no specific policy, yet this is true of a number of parks in Africa that are twice as old.

At the same time, policy should not

reflect some objective at the national level to the detriment of what is unique to a particular area. Tsavo affords a refuge for one of the last great aggregations of elephants on Earth and for the only great aggregation of black rhinoceros. Perhaps it should therefore be managed as an elephant-rhinoceros park instead of as a duplicate of the spectrum of plains herbivores that can be seen in a dozen other parts of Kenya alone. This is not to say that Tsavo should try to protect the elephants whatever the cost to other creatures; the first to suffer would probably be the rhinoceroses, since it is the only other large browser without a regurgitatory digestive system for extracting as much protein as possible from the vegetation. The huge baobab tree has also taken a terrible beating from the elephants. Perhaps one should aim at as large a number of elephants and rhinoceroses as possible, consistent with the ability of the habitat to support a variety of "high interest" species or communities (*7*). Under the impact of excess elephants and hippopotamuses, the south bank zone of Murchison Falls in Uganda has lost most of its chimpanzees, gained huge herds of buffalo, and is now undergoing a drastic impoverishment of almost 40 percent of its 400-plus species of birds (*21*). Luangwa Valley, which also allegedly has too many huge herbivores, is reputed to be suffering severe depletion of 96 genera, comprising 160 species, of plants (*18*).

Man's Role in the Ecology of the Savannah

Some park managers do not seem to have become reconciled to the idea that a wild area has to be managed merely to keep it as it is (*22*). There is often the notion that wilderness is to be protected from the interfering hand of man, especially modern man: these should be parts of the earth on which man can look without seeing the reflection of his own image. In many cases, however, excluding man would be the first occasion in a very long time that an area has not had human inhabitants. Nairobi has served as a refuge for Somali pastoralists, as a favorite locality for horseback riding, and as a firing range during World War II, while peripheral areas have been planted to wheat. Potsherds indicate that there were settlements in Serengeti 2000 years ago; presumably man has lived in Serengeti ever since his early days on the shores of the Pleistocene Lake Olduvai. In recent centuries, Serengeti has been occupied by Masai herdsmen, whose fire-setting tactics have helped to maintain the grassland. Kruger once tried to keep fire out, as a man-induced, hence "bad," phenomenon; as a result, bush growth has encroached on open areas and caused all manner of change in the ecosystem (*16*). A similarly radical reorientation occurred in Albert when the area was maintained as a fire-free zone (*23*). Man lived in Murchison Falls and Queen Elizabeth Park in Uganda until the World War I era when tsetse flies drove him out. To prohibit hunting as a form of land use is to prohibit a long-established activity, as happened in the Kafue region of Zambia, to name only one instance. The people there practiced a kind of "crop rotation" with their hunting grounds, only to find one year that their next season's hunting grounds had been declared off limits (*24*). All in all, perhaps as many as 20,000 people were displaced from the area that became Kafue Park. At Kidepo in northern Uganda, the Ik tribe was ejected from the area that was designated the new park, with apparently catastrophic results for their way of life (*25*). Perhaps there should be some form of compensation for displacement of this kind (*26*), just as there has been for the Masai ranchers, who are to be remunerated for the income they would lose if the boundaries of Nairobi were ever extended into the Athi Plains hinterland.

There can be little hope of resolving this central problem of park rationale—namely, man's role—until it is recognized that man is a component, if not the dominant component, of most ecosystems in Africa. There is an urgent need to appraise his contribution to energy flows and trophic levels, on the lines of the pioneer work done by Western at Amboseli in Kenya's Masailand (*27*). The impact of the Masai has been documented not only in terms of biomass (human and livestock), but also in terms of their roles as "grazers" and "predators" (consumers of milk and meat). Despite the extremely complex interactions of man with his environment, and despite the fact that pastoral man enjoys a lesser degree of ecological insulation from his habitat than do many other contemporary human groups, there is all too seldom an apprehension, let alone a comprehension, of man's influence on savannah ecosystems—and of the extent to which his influence may be modified in the future, especially in areas where his uses of the land conflict with conservation of wildlife.

Alternative Justification for Parks

Parks should not be created merely to guard against something—namely, man and his unwanted works. There are other, more positive justifications for parks. The scientific community sometimes sees them as natural areas to be kept in as unmodified a form as possible, for use as "reference points" against which man can measure the effects of his presence in other parts of his habitat. This is a fine objective in global terms, and one major research body in savannah Africa has stated its mission as being, among other things, to use a broad tract of land as a huge laboratory for tracking down clues on feedback mechanisms in ecosystem regulation. But the data this group has collected may now need to be supplemented by information on the parameters of the area's survival, not only in terms of its evolution during the past millenia, but its revolutionary development over the next few decades. In fact, every research program should have the built-in objective of ensuring the research area a future. There is little point in investigating the life history of some obscure creature if few of the major species associated with it—birds, mammals, insects, reptiles, plants—are likely to have a life history there at all in the next century.

Less argument arises about the principle of setting aside an area in order to safeguard the various biota and geological forms indigenous to that area. Especially is this pertinent when these phenomena represent spectacular instances of nature's works. In Africa, however, practical problems emerge at once, especially if one is considering freezing an ecological slice of time in order to perpetuate (or even recreate) a "vignette of pristine Africa" (*28*). Where does one set a baseline for "indigenous to the area"? Lake Manyara now features hardly any wildebeest and zebra, as opposed to the herds that were there 10 years ago when the park was established. This change is largely due to the blocking off of immigration routes along the perimeter of the park. The stands of *Acacia tortillis* trees are being rapidly reduced

by elephants, again a phenomenon that dates roughly from the time the area was designated a park (*29*). At Tsavo, there are sections along the border zone where open savannah inside the park gives way to thick bush outside the park, all within a few hundred yards. It would be difficult to say which is the more man-modified, which the more "natural." Various other parks are now evidencing considerable modification: Murchison Falls, Ruaha, Luangwa Valley, and Kruger are prime instances. In these cases, the changes have often occurred since the time the area was accorded "complete protection." While the processes of natural succession in the biota must be permissible, the changes in the parks listed are caused primarily by man's dominance in the surrounding region.

Serengeti Park

Serengeti illustrates the conflicts facing those who would frame policies for parks (*30*). The surrounding region is still subject to a dozen different authorities (some of them on the other side of the international border in Kenya), none of which is inclined to surrender its sovereignty for the good of the park. Indeed, local loyalties probably urge them in the opposite direction. The park serves a range of overt and covert purposes—for example, encouraging tourism, stimulating the regional economy, serving science (both basic and applied), reflecting the national need for revenue or prestige or both, matching the local need for meat and money, and serving the world's needs for irreplaceable spectacles—and not all of these purposes are compatible. Until the park has a more specific idea of what it is trying to do, it will find it difficult to reconcile its own well-being with that of the human communities in the immediate environs. In early 1972, a local administrator gave his land-hungry people permission to occupy a salient astride the migration routes within the park. The confrontation was resolved by assigning only a tiny area for livestock grazing on a temporary basis. But a more severe warning could scarcely have been given. Local people apparently consider the park as remote from their own lives psychologically as it is from American horizons geographically. During the 1960's, Tanzania was fortunate in having its network of parks extended, with great energy and prescience, while there was still time and space to do so. Now significant socioeconomic changes are taking place in the country, changes as far-reaching for Serengeti in 5 years as those that took 50 years in times before the park was set up.

Ensuring Serengeti's survival into the 1980's might entail a change in philosophy regarding the park. By that time, there could well be ten times as many tourists as the present 60,000. They would be bringing enough foreign currency into the country to leave little doubt as to the most profitable use for Serengeti, provided of course that tourist revenues could be more equitably distributed around the region. As with many another aspect of contemporary life, society badly needs broad-scale schemes to induce people to regard parks as a long-term investment—pay now, benefit later. Areas such as Serengeti might well qualify for what the rest of the world could contribute in the way of "cost difference compensation," especially when the rest of the world is insistent that what is at stake is not the Africans' heritage alone. Something of this sort of compensation might eventually be feasible under the World Heritage Trust system of parks and protected areas being formulated by the United Nations Educational, Scientific, and Cultural Organization and other interested organizations. In the meantime, Tanzania is subsidizing the rest of the world, and Tanzania is low on the U.N. list of the 25 nations designated as the most poverty-stricken in the world. Tanzania could claim it has been getting some indication of how the world perceives its problems, both wildlife and other kinds; at the recent U.N. Conference on Trade and Aid, held in Chile, the developed countries implied that they would not mind much if Tanzania remained a country of subsistence agriculture.

Tourism

A principal use to which these parks and reserves are being put is tourism. This is a very attractive industry (*31*). Kenya had 400,000 visitors in 1971, and this figure is projected to increase at the rate of 20 percent annually. Tourism is currently earning at least $55 million (*32*) of that prime commodity for an emergent economy, foreign exchange, thereby making tourism the nation's most efficient industry in that respect. It generates 3 percent of the gross national product (GNP), or around $4 out of a per capita GNP of $130. It draws resources from the traditional sector into the modern sector. It generates employment faster than do most other activities. From almost every economic standpoint, tourism scores.

In terms of national income, Kenya is already more of a tourist country than Italy or Mexico—and the boom has just begun (*31*). The prospects are excellent, considering that tourism shows a more rapid and stable growth than the usual primary products that most African countries must rely on. In Kenya, it is growing three times as fast as the economy as a whole, and within the next 15 or 20 years it could well earn more than all of Kenya's export commodities put together. By then, however, not only will Kenya's present parks and reserves be facing much more pressure than they are now, but several of them will be experiencing tourist saturation. In the meantime, any other patches of land that could then be designated as parks or reserves to catch the overflow of tourists will almost certainly have been allocated to uses that exclude wildlife (except in the northern desert regions). One could indicate the potential value of a patch of land featuring spectacular wildlife which is not yet protected by park or reserve status by projecting future costs and benefits of alternative forms of land use, calculating the net contribution of each to the GNP for each future year, and then discounting this stream of net contributions to GNP to the present; the largest present value would indicate which use of the land would maximize GNP the most over time (*33*). So great are the pressures on the parks, however, and so rapidly are these pressures accelerating, that a mere 10 years may not be enough time to ensure long life for Nairobi Park and its hinterland, for example, unless some alternative land use beyond the "pure park philosophy" can be implemented in the meantime.

Drawbacks to Tourism

Tourism, then, is not all jam—not even jam tomorrow in lands that do not have enough bread today. Moreover, tourism induces an impression that the parks are set aside for rich white foreigners to disport themselves in (how significant is that phrase "set aside," as

if the parks are somehow separated from the mainstream of daily living). Although the parks are generally located a long way from the main population centers, cultural pollution could nevertheless become prevalent, as in Kenya, for example. Tanzania, with its socialist philosophy of self-reliance, is especially wary of over-affluent foreigners using its territory for free-spending relaxation. The man who knows only a subsistence level of existence may look askance at his government's spending money on luxury facilities for outsiders. He himself has little prospect of benefiting from much of this tourist infrastructure, let alone the parks (*34*).

Tourism sometimes conflicts with the basic purpose for which parks are ostensibly established—namely, protection of wild-land ecosystems. Disturbances caused by tourists have been considered on a par with poaching in reducing the population of crocodiles on the Nile in Murchison Falls. When herds of herbivores are persuaded—by salt licks and other artificial allurements—to match their use of an area with that of tourist throngs (that is, as near year-round as possible), there often results severe overuse of the habitat, as at "Treetops" in the Aberdare Park. Harrassment of the lions by camera addicts in Serengeti has led to so many kills being missed that lion cubs sometimes starve. Cheetah cubs in Amboseli have been known to be separated from their mothers and lost. On a Sunday afternoon in Nairobi Park, one sometimes sees as many automobiles as antelopes. One can enjoy the Grand Canyon as much with 10,000 fellow-spectators at one's elbow as with 10 (or can one?); but when a pride of 10 lions is surrounded by 20 tourist trucks, it is no longer a pride of wild lions in wild Africa: one might just as well be at "Lion Country Safari" in California—indeed, conditions there are better, since vehicles are not allowed to motor off the tracks to surround the animals (*35*). And if tourism sometimes conflicts with the purpose of safeguarding wildlife, only a small part of its revenues goes back into conservation. In Kenya, with a 1971 income from tourism of $55 million, the wildlife budgets amounted to little over $5 million.

An even more serious criticism of tourism comes from the man living in the park hinterlands or within a game reserve itself. With a monthly income perhaps totaling what a single truckload of tourists pays at the entrance gate, and with a waistline that betrays different nutritional problems from those of the foreigners in his midst, he is little interested in talk of foreign exchange (*36*). Less than literate, as he is likely to be, he is no more impressed by tourism's impact on the economy than is the American rancher who sees his rangelands disrupted by the Yellowstone elk herds. He knows a leopard not as a splendid subject for the viewfinder, but as a beast that may ravage his livestock. Even if this man is a modern Masai participating in a ranching cooperative and becoming more convinced of the benefits of a cash economy, he will probably react to wildebeests on his grazing grounds or to rhinoceroses sharing his water installations with much the same spirit as those white settlers who had their own way of dealing with "ranching in a zoo"—by eliminating the wild animals. The gate fees of most parks go to the national exchequer, although a proportion is sometimes diverted to the district treasury. Game reserves are usually run by the local council, which gets a far higher share, if not all, of the revenues. Safari lodge owners and other concessionaires in both parks and reserves generally pay a bed levy and various other taxes. These allocations of revenue, however, are rarely what the local man thinks of as local. Amboseli's central sanctuary of 30 square miles is producing well over half the total income for the 8000-square-mile district (*37*). These profits should allow for dispensaries, schools, and cattle dips all across the land for those Masai who have been particularly deprived by tourist needs, but hitherto they have received all too little.

Game Cropping

What might work better for the local man, as well as for park administrators with excess wildlife, is game cropping. The ecological merits of cropping have been documented in detail (*38*). They are matched by the economic potential of harvesting wild creatures (*39*). Zebras provide enough meat to cover operational costs, while their hides bring profits of at least $20 to the first-stage producer and retail prices of $200 in New York. Cropping, like tourism, need not be an exclusive activity unless people want it to be. It can prove complementary to subsistence or commercial livestock raising (*40*). It can also support rather than conflict with park policies—even if these policies are seen as protecting wilderness for its esthetic, cultural, and scientific values alone, while cropping is viewed as turning wild nature into meat and money. When 20 million pounds of elephant and hippopotamus meat from park-cropping projects were put on the market in Uganda, butchers came from 100 miles away to get at a product which they had no doubt would prove readily acceptable to their customers. Presumably the protein-deficient customers had no qualms about whether the meat was the result of a spear or a bullet, whether it derived from conservation management or commercial exploitation—they would gladly leave the allocation of cause and consequence to wilderness theologians.

There has often been difficulty enough in getting park administrators to accept the rationale of reduction cropping within park boundaries (*22*), let alone sustained-yield cropping of park populations in areas outside park territories when the herds are on a seasonal migration. Tsavo still rejects the idea of reducing the number of excess elephants, in part because it would negate the notion of not interfering with pristine Africa. A number of parks and reserves have permitted culling as an emergency measure, notably Murchison Falls and Queen Elizabeth, Mkomazi Reserve, Luangwa Valley, Wankie, and Kruger. Cropping of this sort can be very remunerative for park funds: for example, an elephant—the most frequent "culprit"—is worth $250 (*41*). A sustained harvest of 10 percent of the Serengeti zebra each year could yield a profit of at least $500,000, even before allowing for economies of scale. The National Parks agency in Kenya is a low-priority item on the national budget (as is true in most other countries in emergent Africa). A reduction campaign of 10 percent per year of the surplus elephants at Tsavo would double the present financial allocation for all of Kenya's parks, while a sustained-yield harvest of 5 percent per year would triple the total wildlife research budget. Even if the harvest should be only 2.5 percent per year (*42*), there would still be much potential.

Institutional Systems for Protected Areas

The philosophical approach to parks, as opposed to more pragmatic approaches, is acceptable for regions in which there is little pressure for specific land uses and where there is affluence enough. Parks in North America are even represented as a refuge from

materialism. As Julian Huxley has remarked (*43*), a more appropriate attitude in Africa might be to regard parks as sources of protection, prestige, profit, and protein. Huxley does not attempt any hierarchical ordering of priorities, and he does not elucidate the conflicts arising between some of these objectives. More to the point, however, he points out that parks should be seen as no more than heartlands within broad ranges of supporting territory that provides for genetic exchange, protection against disease, and scope for the various dynamic and compensatory factors which may be viewed as what is ultimately unique about African parks (*44*). It is not only the African lion that is a marvel of nature in Africa, it is the African ecosystem within which the lion exists in its own distinctive manner.

A game reserve differs from a park in that it does not exclude man—man and animals live side by side. This relationship is now becoming competitive because rangeland resources are running out. Rather than trying to separate the two contestants, except in areas of exceptional interest such as central Amboseli, where the concentration of animals—and the conflicts—are greatest, the aim should be to establish a symbiotic relationship. The Selous Reserve in southern Tanzania, a 15,500-square-mile area almost twice the size of the next largest park in Africa, is too remote and too "wild" to attract many tourists, so the goal is a mixture of sport hunting, cropping, and similar activities in which man is much more than "a visitor who does not remain." The Mkomazi Reserve in northern Tanzania would not maximize its returns either through cattle raising or game cropping alone, but through a mixture of the two (*41*). Multiple use of land is practiced in the Semliki Reserve of western Uganda and in a number of similar areas. Game reserves possess a flexibility that is supposedly not possible for parks as presently constituted. The drawback to a reserve as a basis for resource conservation, however, is that all too often the reserve is not a regional unit based on biotic associations within a broad-scale physical framework (for example, a watershed); hence, it is frequently not as self-sufficient as it should be to ensure long-term exploitation of its resources.

An advanced approach to multiple use of land is being attempted at the 3200-square-mile Ngorongoro Conservation Unit in northern Tanzania, where there is a broad range of resources and an integrated strategy. Not only wildlife-based activities, but cultivation, pastoralism, and forestry are fostered. There are also several purely protective practices, such as watershed management. The major objectives include tourism and game cropping, as well as safeguarding the Ngorongoro Crater. Cropping is seen as harvesting the natural bounty of the earth—not very far removed in spirit from agriculture. The water tables of the 100-square-mile crater are dependent on catchment areas 20 miles beyond its rim, hence the forest resources are exploited in a manner that is not inimical to the crater's interests. This conservation unit thus permits man to manage ecosystems for the two returns he desires from the environment—simplicity of food production and enough variety in life forms to protect the environment (*12*). The largest share of the unit's revenues comes from tourism, and that resource base is protected in return for tourism's inputs to the local economy. If the crater were declared a national park, much of the income would go to the national exchequer in Dar es Salaam, 400 miles away. Meanwhile, this conservation unit enjoys virtually all of the advantages it did when part of Serengeti, and it seems better fitted to meet the pressures of the future by being integrated with the surrounding land uses. A management plan has been drafted in some detail (*45*), identifying the mutually interacting physiobiological and sociological functions. Insofar as the Ngorongoro Unit's institutional framework fails to match the dynamic mechanisms of its ecosystems, this is because it does not permit a rotational form of resource utilization, such as those proposed for similar differentiated areas (*46*). However revolutionary this Ngorongoro plan may seem to conservationists who like their sanctuaries in neat packets, it is not very extraordinary to local people, who have long combined various forms of land use. What seems revolutionary to them, if not regrettable, is the idea of parks in segregated segments.

It is this recognition of man's input-output relation to savannah Africa that underpins a proposal for a similar conservation unit at Murchison Falls. This scheme aims at exploiting the resources of the entire area in an integrated management plan, with a single conservation authority operating at the regional level (*47*). The blueprint affords scope for the old-time park objectives, likewise tourism, while incorporating opportunities for regulating hippopotamus and elephant populations; for commercial cropping of buffalo, antelope, and other species; for upgraded ranching; and for other activities appropriate to the environs. The hinterland would constitute a buffer zone affording the park a breathing space, instead of a no-man's-land "noose" constricting the park's life-support systems. Radiating from the park at the center, with its policy of minimal influence from man, would be zones of increasingly more intensive subsistence and commercial activities, such as those now threatening the ultimate survival of the park. The park would continue, with little modification of its basic purpose other than accepting the fact that there is little prospect of surviving in an overcrowded, antithetical world by building its administrative barriers higher. Rather, the park would be encouraged to talk peace with the outside world and live in accord with it instead of in direct competition with it. The entire proposal has not yet been implemented, and meanwhile the region is being divided up among various local schemes, each with its own semi-autonomous authority. The upshot could well be that the region's right hand will fall into conflict with its half-dozen left hands, and the park will become isolated in the midst of an assortment of activities that are basically antagonistic to it.

Multiple Use of Land in Parks

Several of the parks are already multiple-use areas in fact, if not in intention. Tsavo, a stronghold of the "leave-alone" preservationists, undertakes primarily to protect ancient Africa (although frequently this is done by means of large-scale manipulation of environmental factors through firebreaks and huge dams). It also promotes tourism, even claiming that the recent opening-up of the landscape through damage done by elephants, plus the ensuing "plains game explosion," makes the park an enhanced amenity to the tourist's eye. It acts as a sanctuary for dart-drugged rhinoceroses and leopards from outside, and it admits alien species such as Grevy's zebra and Hunter's hartebeest. It has even engaged in commercial exploitation of the fish from one of the park's artificial reservoirs. The rest of the Tsavo ecounit (which is twice as big as the park) features a number of other activities that constitute management of the region's resources, whether they are considered as such or not. There is a large area set aside for ranching and sport hunting; there is

pastoralism and cultivation (which is rather destructive in that arid environment); there is a charcoal industry forming part of a national activity that has expanded 1300 percent over the past 4 years; and there is commercial exploitation of wildlife for food and trophies, albeit the practice is "illegal."

Queen Elizabeth Park in Uganda features not only the usual protectionist practices, but has included massive management of hippopotamus populations. It has served as a sanctuary for elephants, allowing the number to double during the 1960's (*48*). It has supplied a site for scientific research on an exceptional scale for Africa. It incorporates various forestry practices. It experiences the usual stream of tourists. It permits several hundred commercial fishermen to operate within its boundaries. It also supplies meat from wild animals to local communities. Whether within the park or its peripheral areas, there are several different authorities running these various activities. Queen Elizabeth Park is already a conservation unit in practice, whatever it is by formal definition, except that it does not yet enjoy the advantages of a regional framework for coordinating all of the activities of the ecounit. Luangwa Valley and Kruger afford the opportunity for similar activities. One could expect something of the sort to obtain at Wankie, with its cropping, or at Ruaha and Mikumi parks in southern Tanzania (which are too remote to depend on tourists for their raison d'être). Multiple use will come, whether welcomed or ignored or resisted. If it is unavoidable, one might think that even the most ardent exclusionist would prefer to try keeping the monster within bounds by accepting it in some minimal degree, rather than letting it develop under its own momentum.

Viewing the parks as natural resource ecosystems, rather than as refuges for wild animals and tourists from a crowded world, would at least allow a start on the mobilization of all exploitable resources (*49*). This measure would anticipate the time when such huge tracts of land will have to justify their existence by meeting local needs—as they surely must before long, if they are not to have appeared and disappeared within the space of a few dozen years. Such multiple-purpose units would still leave scope for the purist to experience wild nature, ostensibly undefiled by man's hand. Two thousand elephants and 3000 hippopotamuses have been taken out of Murchison Falls, and no tourist can tell the difference, whether within 1 mile or 30, within 1 week or 5 years. The visitor to Ngorongoro Crater does not find his day's enjoyment diminished because he is not in a park or because the terrain is shared by a few Masai bomas or because he is offered wildebeest steak for dinner at the safari lodge.

The crux of the issue is whether a national park is the best alternative for permitting whatever management is necessary. In some instances, the question may simply be one of nomenclature—a rose by any other name, et cetera. In some instances, again, the park would enjoy its ideal existence as a commerce-free zone (except for tourism) in the center of concentric zones in which man's influence becomes increasingly predominant as one moves outward. While such a design would have been feasible 10 years ago, the area that would now be the buffer zone has all too often been occupied by competitive activities, and the park planners must make do as best they can with what is left. By recognizing what will happen in years to come, they could avoid a similar restriction in, say, 1980, by which time the situation will leave far less room to maneuver.

In the main, however, the category "national park" does not really allow managers to deploy the full range of techniques for conserving wild-land resources. But in terms of the scores of on-the-spot abrasions that determine a park's well-being and its capacity to accommodate to the factors of its environs' well-being, a park must be considered a regional affair. At a time when the regional relationship should be growing more mutually beneficial than ever, the deterministic processes are becoming more one-way than ever. A park could never have perfect boundaries in Africa, since the ecosystems show too much flux from one season to another. By contrast, human institutions tend to be inflexible, to emphasize boundaries of local authority, and to encourage administrative autonomy. All the more, then, must park boundaries be hyperflexible in concept in order to match the dynamics of the parks' ecosystems and the constraints of the socioeconomic environs.

Summary

A national park is as integral to its regional environment as it is to the nation. Whether one wants to manage it that way or not, a park is dependent on the resources—human and physio-biological—of the environs, just as the environs are modified by the park's existence. This view may not jibe with the spirit of those who strive to protect a patch of old-time Africa as a refuge of serenity and stability in a world of tumult and change. But the park has its own ecology, just as does any creature within it, although the park's, being more abstract, is more difficult to discern. Planned or not, a park's future is even more enmeshed with the region's future than with the nation's. The ramifications of this relationship, especially the socioeconomic ones, are not always recognized, with the result that the enmeshing process sometimes sounds like a crunching of the gears. The worlds on both sides of the park boundary would get along better if there were a clear indication of what each can do for the other. By contrast, if they spend their energy resisting one another, there is little doubt as to which must be the ultimate "winner."

References and Notes

1. Not only are these areas fortunate in having extremely diverse wildlife—plants as well as animals—but one can easily enjoy the spectacle. I have found nothing in the rain forests of the Amazon or the cloud forests of the Andes to match the African savannah in visitor appeal, even though a tropical rain forest probably contains a greater range of intrinsic biological interest than any other biome.
2. R. M. Laws, *J. Reprod. Fert.* **6** (Suppl.), 495 (1969).
3. W. A. Allen, *The African Husbandman* (Oliver & Boyd, Edinburgh, 1965).
4. W. A. Hance, *Afr. Rep.* **13**, 6 (1968).
5. *The State of Food and Agriculture, 1970* (Food and Agriculture Organization, Rome, 1971).
6. A. De Vos and T. Jones, Eds., *East Afr. Agr. Forest. J.* **33**, 1 (1968); P. M. Olindo, Ed., *First Wildlife Conference for Eastern Africa* (Kenya National Parks, Nairobi, 1969).
7. N. Myers, *Biol. Conserv.*, in press.
8. ———, *BioScience* **21**, 1071 (1971); R. M. Watson, R. H. V. Bell, I. S. C. Parker, *Africana* **4**, 20 (1972).
9. B. Williamson, personal communication.
10. P. Van Wyk and N. Fairall, *Koedoe* **12**, 59 (1969); U. de V. Pienaar, personal communication.
11. D. B. Houston, *Science* **172**, 648 (1971).
12. E. P. Odum, *ibid.* **164**, 262 (1969).
13. S. C. Lock, *Rift Valley Province Physical Development Plan* (Ministry of Lands and Settlement, Nairobi, Kenya, 1971).
14. L. H. Brown, *Biol. Conserv.* **3**, 93 (1971).
15. J. E. Moore, *Rural Population Carrying Capacities of the Districts of Tanzania* (Bureau of Resource Assessment and Land Use Planning Research Paper No. 18) (University of Dar es Salaam, Dar es Salaam, Tanzania, 1971).
16. U. de V. Pienaar, *Koedoe* **12**, 108 (1969).
17. P. Fordham, *A Geography of African Affairs* (Pelican, London, 1972), p. 234.
18. D. G. Dodds and D. R. Patton, *Wildlife and Land-Use Survey of the Luangwa Valley* (Food and Agriculture Organization, Publ. No. TA 2591, Rome, 1968).
19. F. F. Darling and N. D. Eichhorn, *Man and Nature in the National Parks* (Conservation Foundation, Washington, D.C., 1967).
20. The organization of the parks in Kenya, for instance, is based on the vague principle of "preservation of wild animal life, wild vegetation and objects of aesthetic, geological, prehistoric, archeological, historical or other

scientific interest therein" [*Laws of Kenya*, National Parks Ordinance, CAP 377, 1945]. The ordinance in Uganda is just as vague, Tanzania's more so. Such general terms do not assist an individual park in deciding what particular policy it should attempt. International criteria are somewhat more specific, if often less suited to Africa's particular requirements: The United Nations List of National Parks and Equivalent Reserves postulates "a relatively large area where one or several ecosystems are not materially altered by human exploitation and occupation . . . and where the highest competent authority of the country has taken steps to prevent or to eliminate as soon as possible exploitation or occupation in the whole area" [*I.U.C.N. International Commission on National Parks* (Hayez, Brussels, ed. 2, 1971), p. 13]. The U.N. list goes on to state that "an area should enjoy general *legal* protection against all human exploitation of its natural resources and against all other derogations of its integrity resulting from human activity"; specifically excluded are agricultural and pastoral activities, hunting, fishing, lumbering and mining, dam construction, and so on (p. 24). This definition would eliminate almost all parks in East Africa if the final phrase, "all other derogations . . ." is taken to mean human activity outside the park as well as within it.

21. R. M. Laws, I. S. C. Parker, R. C. B. Johnstone, *East Afr. Wildl. J.* **8**, 163 (1970).
22. The principle of active management, on an extensive scale if necessary, was clearly established by the *First World Conference on National Parks* (Government Printing Office, Washington, D.C., 1962), which stated: "Where animal populations get out of balance with their habitat and threaten the continued existence of a desired environment, population control becomes essential. This principle applies, for example, in situations where ungulate populations have exceeded the carrying capacity of their habitat through loss of predators, immigration from surrounding areas, or compression of normal migration patterns."
23. F. Bourliere, *Zool. Afr.* **1**, 1 (1965).
24. W. J. Hart, *A Systems Approach to Park Planning* (International Union for the Conservation of Nature, Morges, Switzerland, 1966).
25. C. M. Turnbull, *The Mountain People* (Simon & Schuster, New York, 1972).
26. By extension, there is hardly a factor of wildlife conservation in Africa that better deserves a rigorous analysis than poaching: Is it immoral by some objective standard, or merely illegal by some transient, European notion?
27. D. Western, *Animals* **13**, 532 (1971); *Afr. Wildl. Leadership Found. Newsl.* **7**, 1 (1972).
28. A "vignette of primitive America" was proposed as an objective for U.S. parks by A. S. Leopold, *N. Amer. Wildl. Natur. Resour. Conf. Trans.* **28**, 28 (1963).
29. Serengeti Research Institute, *Annual Report* (Tanzania National Parks, Arusha, 1969).
30. E. W. Russell, *Management Policy in the National Parks* (Tanzania National Parks, Arusha, 1968).
31. F. Mitchell, *East Afr. Econ. Rev.* **2**, 1 (1970).
32. All figures given are in U.S. dollars.
33. F. Mitchell, *East Afr. Agr. Forest. J.* **33**, 98 (1968).
34. Mitchell (*31*) mentions that, until Lake Nakuru Park was accorded the administration for a full national park, anyone who arrived at the entrance on foot was allowed in free. Now all must pay, and they may enter only if traveling by car.
35. It is ironic that, at a time when Africa's wildlife in its natural habitat is coming under increasing pressure from competitive uses of the land, extensive tracts of land are being set aside in several parts of the United States in order that people can view African animals "safari style"; even in densely populated Great Britain, France, and other countries of Western Europe, good agricultural land can make more money from similar establishments than from agriculture—for example, "Lions of Longleat."
36. To this extent, it is important that educational projects not restrict their emphasis to the school child in Kikuyuland who has never seen a lion. They must place far more emphasis on the man who has seen more wildebeests than he ever wants to see (trampling his maize crops) and to whom the question is not whether international prestige is a good thing, but whether it is a better thing than other uses of the land in the environs.
37. D. Western, *Institute of Development Studies Staff Paper No. 53* (University of Nairobi, Nairobi, Kenya, 1969).
38. There is now extensive reporting on this topic, but for a detailed account, see L. M. Talbot, W. J. A. Payne, H. P. Ledger, L. D. Verdcourt, M. H. Talbot, *The Meat Production Potential of Wild Animals in Africa: A Review of Biological Knowledge* (Commonwealth Agricultural Bureau, Tech. Commun. No. 16, Farnham Royal, U.K., 1965). For details of a more recent project see J. A. Bindernagel, *Game Cropping in Uganda*, (Uganda Game Department, Entebbe, 1968).
39. *Wildlife Management in Kenya* (Food and Agriculture Organization, Publ. No. WS/A6404, Rome, 1970); I. S. C. Parker, *Anim. Prod. Soc. Kenya* **1**, 14 (1968); *ibid.* **2**, 51 (1969).
40. W. H. Longhurst and H. F. Heady, Eds., *East African Range Problems* (Rockefeller Foundation, New York, 1968).
41. I. S. C. Parker and A. L. Archer, unpublished manuscript.
42. G. Caughley, *Proceedings of Ad Hoc Working Party on Wildlife Management* (Food and Agriculture Organization, Publ. No. WM/C4459, Rome, 1972).
43. J. Huxley, *IUCN New Series* **1**, 203 (1963).
44. F. F. Darling has expressed a similar idea ". . . national parks are nuclei of cells in the body of the nation. The rest of the country must supply the cytoplasm, as it were, both to help in the renewal of the nuclei and to sustain the biological systems of the country" [*Nat. Parks Mag.* **43**, 21 (1969)].
45. H. J. Dirschl, *Management and Development Plan for the Ngorongoro Conservation Area* (Ministry of Agriculture, Forests, and Wildlife, Dar es Salaam, Tanganika, 1966).
46. W. C. Verboom, personal communication.
47. *Report on a Project to Develop the Murchison Falls Area of Uganda* (Uganda Development Corporation, Kampala, 1967).
48. C. R. Field, *East Afr. Wildl. J.* **9**, 99 (1971).
49. J. M. Boyd, *New Sci.* **30**, 254 (1966); *East Afr. Agr. Forest. J.* **33**, 178 (1968).

Lessons from the History of American Broadcasting

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In their article outlining the possibilities of cable television (CATV), Edwin Parker and Donald Dunn suggest that "the information utility that we have described is a system designed to provide better quality education and information to everyone in the United States. . . . In order to accomplish these positive social goals, a detailed plan for federal action and participation is needed" (*1*, p. 1398).

A look at the 50-year history of broadcasting in the United States suggests that a full realization of CATV's potential will be an uphill struggle. Those powerful forces generated by the ways in which we allocate access to and finance broadcasting over AM, FM, and television channels will act as strong counterinfluences.

Erik Barnouw, in his three-volume history of American broadcasting, quotes a 1922 speech by Herbert Hoover, who was then Secretary of Commerce in the Harding Administration. Hoover addressed the Washington Radio Conference with these words on the future of first-generation radio, then scarcely in its infancy: "It is inconceivable that we should allow so great an opportunity for public service to be drowned in advertising chatter" (*2*).

Yet we proceeded to fumble our way toward a system under which advertising and its influence, while not "drowning" the media, certainly dominated its development, preempted its time, and controlled its programming. This system has seen three generations of electronic communications—AM, FM, and over-the-air television—experience abysmal failures to achieve the social benefits that the developing technology could have produced. Now, in the 1970's, we see television showered with time-consuming, obtrusive, and sometimes dishonest commercials endeavoring to sell a captive audience products that the viewers often do not need—or that may be useless or down-

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