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Abstract: Africa's large cats, lion, leopard and cheetah, are losing numbers at accelerating rates. The attrition is due to 3 inter-related factors, i.e. loss of prey, loss of living space, and conflict with livestock raisers. The cheetah now features by far the lowest numbers (as has always been the case), and its relict populations continue to decline at ever-faster rates. The lion is in the process of being eliminated from many wild lands outside parks and reserves and is quickly becoming reduced to isolated populations. The leopard fares best, though its total stocks and overall range have declined drastically and unnecessarily for the most part. Small cats run into far less conflict with human activities, and they tend to be more covert and nocturnal. In certain circumstances they may even benefit from man's presence. In light of these circumstances, we need to develop a realistic and systematic strategy for conservation of Africa's large cats. This will include a methodical appraisal of priorities i.e. conservation initiatives that are likely to yield the best return per conservation dollar invested; and increased commercialization of the wildlife resources represented by the 3 large cats, provided that expanded exploitation through sport hunting can be practiced in sustainable fashion and best serves the needs of conservation.

CONSERVATION OF AFRICA'S CATS: PROBLEMS AND OPPORTUNITIES

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ABSTRACT:

Africa's large cats, lion, leopard and cheetah, are losing numbers at accelerating rates. The attrition is due to 3 inter-related factors, i.e. loss of prey, loss of living space, and conflict with livestock raisers. The cheetah now features by far the lowest numbers (as has always been the case), and its relict populations continue to decline at ever-faster rates. The lion is in the process of being eliminated from many wildlands outside parks and reserves and is quickly becoming reduced to isolated populations. The leopard fares best, though its total stocks and overall range have declined drastically and unnecessarily for the most part. Small cats run into far less conflict with human activities, and they tend to be more covert and nocturnal. In certain circumstances, they may even benefit from man's presence. In light of these circumstances, we need to develop a realistic and systematic strategy for conservation of Africa's large cats. This will include a methodical appraisal of priorities i.e. conservation initiatives that are likely to yield the best return per conservation dollar invested; and increased commercialization of the wildlife resources represented by the 3 large cats, provided that expanded exploitation through sport hunting can be practiced in sustainable fashion and best serves the needs of conservation.

Key words: Leopard, lion, cheetah, Kenya, Africa, conservation

All of Africa's three large cats, viz. the lion (*Panthera leo*), the leopard (*P. pardus*) and the cheetah (*Acinonyx jubatus*), are losing numbers across their ranges that encompass extensive sectors of Africa south of the Sahara. The depletion of their populations and overall numbers is almost entirely due to disruption of their life-support systems by Man.

This paper addresses several questions. How fast are populations and numbers of these three large cats probably declining right now? What can we reasonably anticipate for the foreseeable future of the next several decades? How differentiated for the three species are the present patterns of distribution, and for their prospective conservation status? What can we do to assist these three species as they encounter increasing pressures from human populations with their growing numbers and growing aspirations?

As is already apparent, this paper will confine its focus to the three large cats of Africa. By contrast, the small cats of Africa are almost certainly faring tolerably well. There are several reasons for this fortunate state of affairs. For one thing, the small cats run into far less conflict with human activities, insofar as they do not suffer when wild herbivores of weight 20 kgs. and upwards are eliminated. Since the small cats depend on food resources in the form of rodents, birds, and other small prey that are not eliminated through Man's economic activities, they sense little incentive to turn to domestic livestock for their prey. Secondly, small cats tend to be more covert and

nocturnal than the large cats, and are very rarely seen by human observers even in parks and other protected areas where they presumably feel secure from human interference. Thirdly, their hides do not represent trophies with sporting or commercial value (a possible exception being the serval's spotted coat), so they do not attract the attention of poachers. In certain circumstances we may even surmise that small cats benefit, albeit in marginal senses, from Man's presence in their habitats, to the extent that Man's habitations tend to foster the growth of populations of rats, mice, grain-eating birds, and the like. While we know all too little about Africa's small cats, we can reasonably conclude that special conservation measures for them should not rank as a priority in the hierarchy of urgent activities needed to be undertaken to safeguard Earth's array of cats, and especially Africa's three large cats. So the small cats will not receive further attention in this paper.

PRESENT DISTRIBUTION OF THE THREE LARGE CATS

We shall consider the three cats in the order of leopard, lion and cheetah, considering first the species that seems to be surviving best, and considering last the species that seems to be facing greatest accelerating threat.

(a) Leopard

Despite fears among conservationists during the late 1960s and the early 1970s to the effect that the leopard was suffering severe trouble at the hands of the international fur trade, through excessive commercial hunting on the part of both legal and illegal operators, a two-year survey that the author undertook for IUCN and the World Wildlife Fund in 1972-73 revealed that the leopard was then enjoying much more satisfactory status than had been supposed, and better even than that of the lion (Myers, 1976). The survey undertaken during the course of the author's visits to almost 40 out of the 46 countries of Africa south of the Sahara, produced abundant evidence of a systematic sort—evidence which has been confirmed by the author's subsequent travels throughout the region while serving as FAO's Wildlife and Parks Officer for Africa, and while undertaking regional research for the U.S. National Academy of Sciences, among other continent-wide inquiries.

The leopard is adapted to virtually all biomes and ecotopes found in Africa south of the Sahara, except for the more arid desert areas. It appears to be equally at home in lowland, upland and montane environments; and in vegetation formations ranging from aridland scrub through grasslands, bush and woodland savannahs, to dry forest and wet forest. Its lifestyle habits are not readily disturbed by Man's mere presence; the leopard is occasionally found in dense agricultural zones and even on the fringes of urban settlements. The leopard's ecology and behavior allows it to persist and even to prosper in areas that have been substantially modified through Man's activities: The entire elimination of prey forms such as gazelle and other small-to-medium antelopes does not deprive the leopard of substantial prey stocks, since leopard

ards have been found, in diverse circumstances, to live mainly off mole rats, hyraxes, fish, reptiles, amphibians, indeed several dozen types of small-size prey. Moreover, the leopard readily supplements its prey diet by scavenging from such carcass remains as it finds lying about in its hunting ranges (for further details, see Schaller, 1972; and Hamilton, this volume).

In short, the leopard reveals itself to be an exceptionally adaptable carnivore. Although its cryptic habits, its mainly nocturnal hunting style, and its seemingly secretive disposition allow it to be only rarely observed by wildlife researchers (this writer has sighted leopards outside central Serengeti on only half a dozen occasions during 24 years of residence in Africa), the leopard is more widely distributed, and maintains better numbers, than may be supposed on the basis of casual conclusions. By drawing on indirect evidence of the leopard's presence rather than through direct observations (that is, by relying on spoor, scats, signs of kills and the like), it becomes reasonable to deduce that the leopard still survives, sometimes in surprisingly sound numbers, in areas where superficial observations indicate the animal has been eliminated.

During the course of his investigations at various stages during the past ten years, the author has found that within living memory the leopard has been widespread, even sometimes abundant in virtually all nations of the region. In a few cases, such as Somalia and Nigeria, the species started to fade away well before mid-century, due in the first instance to Man's overloading of wildland environments through pastoralism, and in the second instance to "shear weight" of human numbers. But until about 1960, very roughly speaking, the leopard's overall distribution throughout the region probably did not change so very much, even though its numbers may have undergone some reduction in the more heavily settled sectors of its range.

During the past two decades, however, there has ensued a marked deterioration in the leopard's status. While this has been occasioned, in many instances, by simple expansion of human numbers which, through expanding cultivation, cause all wild creatures to lose habitat, the main factor in the leopard's declining fortunes has been the stock raiser. The species has started to run afoul of stock raisers of all sorts, from commercial ranchers to subsistence pastoralists. Partly because of their increasing numbers and partly because of their growing economic expectations, these stock raisers have been seeking to make both more extensive and intensive use of Africa's grassland savannahs and other rangelands. In order to make their stock-husbandry operations more productive, they have tried to eliminate sources of loss, in the form of both wild herbivores that compete for grazing and water, and of wild predators that occasionally maraud on domestic herds. Through diverse forms of "squeeze," stock raisers have steadily caused the numbers of wildlife, of whatever form, to decrease. In short, wild herbivores and wild predators alike have been steadily disappearing from the scene in many parts of Africa.

But the most destructive factor of all for the leopard has been the arrival of a new phenomenon that has made itself felt only during the last ten years or so. Stock raisers have started to take broadscale advantage of a relatively

cheap and readily available "weapon" with which to resist wild predators, a weapon that is much more effective than the gun or the trap, viz. poison. The advent of organochlorines, at a cost within the means of virtually all stock raisers and obtainable at any local shopping center in the savannahs, has enabled stock raisers to lay out treated lumps of meat for whatever wild predator is inclined to take them—and this includes leopards, lions, hyenas and jackals, in fact all the major predators except for the cheetah (which hardly ever scavenges) and the wild dog (which likewise does not scavenge and hardly ever attacks domestic stock anyway).

Without the use of cheap poison, stock raisers would find great difficulty in eliminating the leopard from their properties. The creature is very rarely seen by day, and almost invariably it immediately seeks cover when a human arrives on the horizon. So it does not lend itself to dispatch by firearms. At the same time, the leopard's wary and "crafty" nature makes it more than difficult to dispose of by trapping. Hence poison appears to be a splendid "solution" to the stock raiser's "problems."

Thus the leading factor in the leopard's decline in most countries of its range. Moreover, the leopard has suffered not only from poisoning by stock raisers. It has also tended to lose living space to the growing density of human populations in arable-farming zones. True, intensive cultivation need not necessarily mean the final elimination of the leopard from heavily populated farming areas. But the author's researches indicate that where, for example, a patch of forest is given over to cultivation, the leopard's numbers are likely to drop by at least 95 percent. For sure, a few stragglers will persist, and the conservationist cannot accurately declare that the leopard has been "wiped out." But neither can anyone realistically assert that because a few individual leopards still survive, the population is not severely threatened, if not acutely endangered. The term "conservation" surely refers to the maintenance of self-sustaining numbers at levels not too reduced below what would be "normal" under relatively undisturbed conditions.

If we take this criterion as a worthwhile measure of the leopard's status in Africa, we find that in most countries of the region the leopard thoroughly deserves to be classified as "threatened." In only ten countries at most, namely Zaire, Congo, Gabon, Botswana, Tanzania (southern sector), Zambia, Angola, Sudan (southern part), Central African Republic, and Cameroun, can the species be described as maintaining satisfactory status.

True, there are still thousands of leopards in countries such as Kenya. But if these are only a fraction of what there were at mid-century stage, and if they are only a fraction of numbers that could exist through proper management measures, can we still call this "conservation" in the proper sense of the term? We should note, furthermore, that when a determined attempt is made through the use of poison to eliminate the leopard from extensive tracts, this can be achieved in fairly short order, as witness the "success" of stock raisers in many thousands of square miles in South Africa and in much of Zimbabwe, also, though to lesser extent, in Namibia. Nor does this con-

sideration apply only to highly commercialized ranching operations. The experience of pastoralist zones in a dozen countries indicates that local tribal people can effectively extirpate the leopard from large areas. We should not be surprised that this resourceful and persistent species is nonetheless being all but eliminated in extensive parts of its erstwhile range.

In short, whereas a simple map of the leopard's distribution in sub-Saharan Africa still indicates that the species retains most of its former range, a more realistic appraisal reveals that we should think in terms of more than just mere occurrence. We should look at overall numbers, population patterns and trends, the nature and scale of depletive pressures, and, above all, realistic projections for the leopard's status in, say, the year 2000.

(b) Lion

So far as we can tell, the lion has never enjoyed nearly such a broad distribution as the leopard. Nor has it generally been able to maintain densities to match the leopard's. The reasons for these factors are widely described in the literature (notably Schaller, 1972), and will not be dealt with further here. We have a good idea of the lion's distribution as it existed a little after mid-century, as revealed through maps prepared by Schaller and others. These maps, or "educated estimates," reveal that the lion probably was restricted to only one third of the region at best. In light of evidence from all the main countries of its range, the lion has been undergoing decline in both range and numbers, often an accelerating decline, during the past two decades. Generally speaking, the reasons for this decline are the same as those that have applied to the leopard.

But in the lion's case, we should note that the species is more critically affected by stock raisers' "squeezing out" of wild herbivores. When the lion finds itself deprived of its usual prey, it readily feels disposed to maraud on domestic herds, more so than is the case with the leopard which can alternatively subsist off much smaller natural prey, such as birds, rodents and the like. Furthermore, the lion is more easily traced by a disenchanted rancher with a gun, and it presents a more amenable target. Equally to the point, the lion does not hesitate to scavenge, so it is at least as vulnerable as the leopard to treated pieces of meat left laying around rangelands.

What shall we say about the lion's present status, and its likely outlook? So far as this writer can determine, on the basis of inquiry files maintained since 1972, the lion may not have completely disappeared from so very much of the range indicated in the map of Schaller. But in sizeable sectors of this range, the species' numbers have been reduced, sometimes greatly reduced, until we now find that there are only fragmentary relicts of populations that were well established as recently as the mid-1960s. Of course in these areas, the lion is still "hanging on," in that occasional individuals are still located. But again, as in the case of the leopard, we must confront a key question: What constitutes "adequate conservation status" for a large wild predator

that is never numerous at the best of times, and indeed maintains only relatively moderate numbers even in favorable habitats?

In response to this question, we should take account of a factor that is central to the survival of a species' populations, yet is frequently overlooked by conservationists. This relates to the issue of gene pools, and their critical minimum size. In the case of the lion, we should note that many populations are becoming isolated, with no further gene exchange possible vis-à-vis other populations. This applies notably to the so-called "safe" populations of lion in parks and reserves, such as Amboseli in Kenya, Lake Manyara in Tanzania, Kabalega in Uganda, Kruger in South Africa, and many others—and this regrettable situation will overtake still many more lion populations within the near future. We have scant knowledge, to describe the position at its best, regarding the genetics of wild lion populations, the amount of genetic variability that characterizes them and that is necessary to maintain genetic viability; and we have virtually zero knowledge of the management measures that may be needed within just a few years if we are to attempt artificial gene exchange between these isolated populations.

In this writer's view, there are few scientific questions and conservation issues that deserve more urgent attention in the entire felid field, than this one of critical minimum gene pool sizes. Research resources, notably scientific skills and support funds, would be much better spent on this crucial factor than on anti-poaching patrols and other stop-gap measures. What is the point, one might well ask, in safeguarding a lion population in any of the dozens of major parks and reserves in savannah Africa, if we then find, in another one century or so, that the survivors start to grow two heads? Of course one century hence is a long time away when viewed within most conservation perspectives and planning time horizons. But surely conservation should concern itself with the needs of the indefinite future, as well as with the demands of the present? The implications for a Cat Conservation Strategy, formulated in systematic and comprehensive fashion, must be profound—and if we respond properly to the challenge, our conservation measures will represent a quantum advance in our hopes of safeguarding large cats into the 22nd, and the 30th, centuries.

(c) Cheetah

Virtually all observers—at least, those with sustained field experience throughout the region—agree that the cheetah has never enjoyed nearly such a broad distribution, nor such comparatively high densities, as the lion, let alone the leopard. Indeed only a small portion of Africa south of the Sahara can be characterized as "suitable cheetah habitat"—an assessment that is supported by reports of expatriate explorers and field naturalists from 100 years ago. Whatever the numbers of cheetah right now, whatever they were in 1970 and 1950, and whatever we project them to be in 1990 and 2000, we can accept that the cheetah is only very rarely present in numbers that

are more than "pretty thin on the ground." More important still, there is widespread and consistent evidence from at least one dozen countries of the region that the cheetah, as a so-called shy animal that is sensitive to human disruption in its surroundings, is inclined to "fade from the scene" for a variety of reasons. Its disinclination to tolerate Man's presence in its environs is compounded by its vulnerability to undue competition and predation by associated carnivores. Fortunately, the species hardly ever scavenges, thus saving it from the pervasive threat of poison (for further details, see Myers, 1975; Hamilton, this volume; Labuschagne, 1975; and Wrogemann, 1975).

Of course we cannot assert that just because the cheetah maintains densities that are much below those of the lion and the leopard, it therefore occurs in numbers that should be characterized as "low." The cheetah's densities are apparently those that suit it in accord with the constraints and limitations of diverse ecosystem types with their particular attributes.

In a very few atypical instances, such as Nairobi National Park, the cheetah maintains unusually high densities. But this is so exceptional, and is so probably due to the park authorities' elimination of local hyenas (Myers, 1977), that we certainly cannot consider this situation as indicative of "normal" cheetah densities. The same applies to claims by stock raisers in parts of Kenya, Namibia and Zimbabwe, to the effect that the cheetah can be more numerous than is often supposed, and that its numbers can currently be increasing; these assertions, which are virtually undocumented, unsystematic and subjective at best, may possibly be biased on the grounds that the ranchers in question, finding themselves operating on ever-slimmer profit margins, seek to illuminate all forms of loss—which causes them to keep a sharper eye open than before in order to sight any cheetah that appears on their ranchlands. In addition, certain ranchers can receive "compensatory revenues" if they permit the cheetahs' hides to be sold, or the offending animals to be captured alive—which obviously offers financial incentive for the ranchers to become keenly aware of any cheetah at all on their properties, indeed to go out and actively seek any cheetah that is to be found. (For further details and analysis of this skewed interpretation of the cheetah's present status in ranching areas, see Myers, 1976, and subsequent field reports on file.)

At the same time, we should consider that a species with apparently low densities is presumably, at first blush, more susceptible to depletion beyond a point of no return than is the case for a species whose populations feature densities and totals that ostensibly offer more "breathing space" before numbers are reduced to critical-risk thresholds. Furthermore, a good deal of evidence is now emerging, albeit selective but consistent nonetheless, to the effect that the cheetah's genetic profile reveals uniform homozygosity; and the genetic monomorphism that appears to characterize the species could raise urgent questions about the minimum sizes of gene pools if populations are to persist in viable form into the indefinite future. If the cheetah does indeed experience a "fine-grained niche," its optimum strategy under undisturbed circumstances could well lie with a single phenotype specialized to the

most frequently encountered set of environmental conditions. For sure, this species, with little genetic plasticity, has survived successfully in pristine Africa, and on many occasions in African environments that are moderately disturbed by modern Man. But if its ecological circumstances start to experience persistent perturbation, the specialized nature of the species' ecology and behavior, and of its genetic makeup, could leave it little able to adapt to the disruptive conditions imposed by human communities in emergent Africa. Again, as with the leopard and the lion, we may need to introduce a more dynamic concept of "a threatened status" for Africa's large cats—as indeed for many K-selected species, perhaps for the majority of large predators, and for any other categories of species whose survival prospects may approach a "risk zone" even while their numbers and distribution apparently remain satisfactory as judged by conventional (undynamic) criteria of conservation.

This last paragraph has raised the topic of Man-caused disturbances in emergent Africa. Although we have heard much about growth rates for human populations, let us briefly review the situation in Africa. In this region, and in marked contrast to Asia and Latin America, the growth rates for human populations continue to rise. Whereas the average growth rate for all developing countries is now around two percent per year, and falling with accelerating speed, growth rates in Africa are rising, often with progressive momentum. Many countries of the region now feature growth rates above three percent; a number are around 3.5 percent; and a few look likely to follow Kenya's example by bursting the four percent level within the coming few years. The present population of Africa, some 450 million, is generating unsustainable pressures on many wildland areas and wildlife communities. In areas outside parks and reserves, wildlife is, generally speaking, losing ground to the advance of human communities. Still more significant, many protected areas are suffering through human pressures up against their borders. And these adverse circumstances arise with a population in the continent of "only" 450 million or thereabouts. Population projections by the World Bank, the United Nations Fund for Population Activities and the Agency for International Development all indicate that, even with sustained success (sic) with family planning programs, Africa's population may expand until it reaches 2.5 billion before it attains stability in the first part of the 22nd century.

Whatever the situation in Kenya right now, with 20 million people, how can we hope that there will be much future for wildlife if the country ever attains its projected total of 159 million people before population growth peters out? True, we can anticipate that the country will never feature such a huge total of people. Either human initiatives will stem fertility, or nature will increase mortality. Since the second scenario is the more likely (extremely regrettable as the prospect must be), we can suppose that Kenya of the next few decades will feature vast throngs of impoverished peasants seeking any place where they can sink a digging hoe. The people on the planet who cause greatest harm to natural environments include not only the super-rich, but

the ultra-poor. Starving millions in Kenya will not be deterred from taking over wildlife habitats, even in parks and reserves, just because government statutes say they should not. Kenya's two largest and best wildlife areas, Tsavo Park and Mara Reserve are both scheduled for "salami treatment," i.e. they are to lose slivers of their territory through excision to satisfy the needs of landless human communities in their environs—and further slivers next year, and so on. The writing on the wall could hardly be clearer.

In face of this population explosion in Africa—an explosion that has not really begun as yet; and that should be given its proper name of "population implosion"—we need to consider whether our conservation strategies should be limited to "The same as before, only more so." In this writer's view, we need to adopt an approach that recognizes the urgent need to supplement established approaches with additional and innovative approaches—further approaches which will supplement, rather than supplant, the erstwhile approaches. Among these further approaches, we should consider increased commercialization of wildlife, in order that it can "pay its way." Possible strategies along these lines include sustained-yield cropping, game ranching, sport hunting, and the like. While an approach of these sorts remains anathema to many long-established conservationists, whose sincere convictions cannot be doubted, it is unlikely that conservation will survive as a viable activity in developing Africa unless it can demonstrate its capacity to prove a competitive form of land use. Within a policy framework which seeks to exploit African wildlife for every nickel it is worth, we should perhaps look again at measures to enable Africa's large cats to generate as many dollars as they can, including—particularly including—sport hunting. But, BUT, sport hunting should be countenanced only when it will be demonstrably implemented with utmost good faith via comprehensive and workable regulations. That good faith must be demonstrated all the way along the line, by both regulators and regulated. In this writer's considered opinion, and on the basis of repeated on-the-ground investigations in the countries concerned, very few governments of Africa can undertake this challenging option at the present time, the exceptions being Botswana, Zimbabwe, and Namibia (South Africa is excluded on the grounds that it has all too little wildlife left outside protected areas). Of course the three countries listed possess far and away more leopards and lions than are needed to satisfy the hunting needs of the American sport-hunting fraternity, who have been insistent for years on end in their desire to resume hunting of the leopard in Africa. Organizations such as Safari Club International could demonstrate their best-faith support of the conservation cause in Africa by confining their attentions to these three countries, which—to repeat a key point—can sustainably supply many more leopards for annual hunting purposes, i.e. several hundreds, than have been taken from the whole of Africa in recent years. By the same token, American sport hunters would make a sizeable contribution to wildlife conservation in e.g. Kenya if they were to recognize that the institutional capacity of Kenya wildlife agencies,

in the way of regulation enforcement, is, at the present stage, not nearly so capable of effective management as are the wildlife agencies of the three countries listed.

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