National Parks in Africa.

In 1979 the launch of the World Conservation Strategy signalled the beginning of co-ordinated efforts to put conservation on a rational, systematic and truly global base. The idea of ensuring that every region, ideally every country, should conserve viable areas that are representative of every habitat or ecological zone is therefore a new one. It is a submission that some countries and many individuals reject. That Centres of Endemism within such habitats deserve yet higher priority is an even newer concept, and one that is made less acceptable because such centres are very unevenly, indeed unfairly, distributed. Thus, in a continental perspective poor countries such as Somalia and Tanzania are of much greater importance as wards of Africa's 'genetic resources' than (marginally) richer countries such as Senegal or Zimbabwe, which have relatively unexceptional fauna and flora.

There is now at least one precedent for conserving Centres of Endemism but it comes from a relatively wealthy country with a vast territory. In the last few years Brazil has made Forest Refugia the starting point for identifying and delineating parks within its Protected Areas Plan.

A less systematic but broadly similar approach has already been followed in Zaïre but its adoption will be much more difficult for a poor country such as

Tanzania, which has a fairly dense human population along much of its long coastline. For political and commercial leaders in Tanga only equivalent and immediate benefits could recompense them for the timber and cash-crop revenues that the Eastern Usambaras could produce. (However, it should not be assumed that Tanzania, Africa and the world cannot be woken up to their impending loss in such places.)

Distinguishing between parks that harbour unique endemics and those that sample broader ecosystems may seem invidious. To some extent it is an artificial distinction because all places are unique and the communities that live there are all distinctive to some degree. Nevertheless, as previous chapters have shown, very significant degrees of magnitude are involved. Does the distinction offer any practical insights that could guide the direction of conservation and its priorities? Consider first if there are any parallels between the rather haphazard man-made actions that create islands of wildlife and the natural processes that have generated islands of endemism on particular shores and mountains.

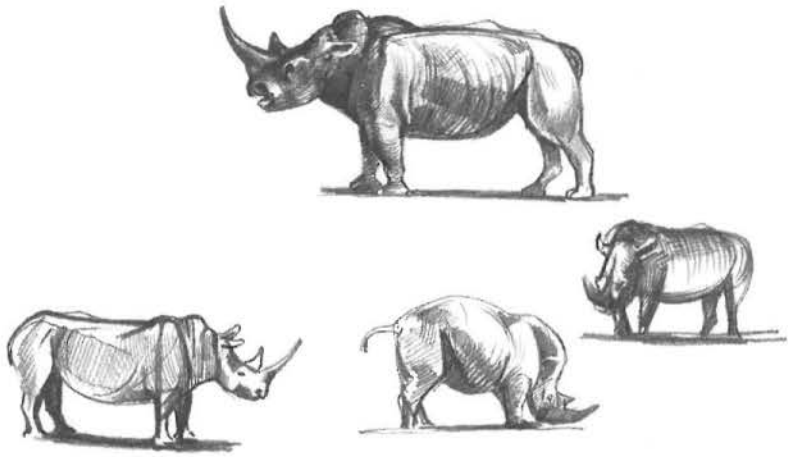
In preceding chapters I have suggested that some of the endemics that are now rare and localized derive from populations that were once widespread and common. The reasons why broader fields have become inhospitable to such species are many: changes in climate, too frequent fires, more competition from other animals (including close relations) and the arrival of new predators and diseases. A habitat may even be closed to an animal because the plants have developed too many poisons.

There is now a single generator of all these forces of exclusion. Until this century people were only capable of making their own islands within the larger habitats of Africa but our generation is witness to the beginnings of a gigantic and completely unprecedented switch-over. Natural habitats are beginning to be the islands in a sea of ranches, plantations, farms and settlements. More than geology, climate or evolution, humans have now become the main creators of biological enclaves. The consequences have never been seriously considered because this biologically cataclysmic event has been the incidental by-product of other concerns. It is the slow, steady result of people with hoes, axes and matches in the fields or the rather faster product of people in bank boardrooms with maps, spectacles and dollars.

It can be argued that our modification of the environment is only one of degree, our biological impact being comparable with a sustained outbreak of locusts or a particularly severe drought. It could also be argued that our impact has only intensified with the passage of time. There is reason to believe that our ancestors reinforced the already destructive effects of extreme drought and cold by killing off the over-specialized large mammals. (This could be predicted because the animals' ranges would have greatly contracted during such periods and these would have been premier hunting grounds for primitive people.) The anatomy of several Pleistocene giants suggests they were unwieldy and probably easy to kill. Their extinction coincided not only with falls in temperature but with the rise of man. At least nine different species of elephant are known to have died out within the period of human history or immediate pre-history; most were actively preyed upon and three of them were African species. At much the same time several giant pigs, a mega-buffalo, three specialized giraffes, three hippos, several equines, sabre-tooths, hyaenas—the list goes on—all have become extinct.

The broader trend in which large mammals become rarer and rarer, continues today. It is exemplified best by the Grass or 'White' Rhinoceros, *Ceratotherium*. In spite of its prehistoric appearance this is not an archaic species but a relatively recently evolved grazing rhinoceros that derived from the same stock as the much older Browse or 'Black' Rhino, *Diceros*.

Grass Rhino skulls and bones turn up with great frequency in a wide scatter of



Grass Rhino, *Ceratotherium simum*

Rock art (Genus not always certain)

Skeletal remains (Genus of record not always certain)

Total recent range (according to historical records, Mauny, 1957; de la Fuente, 1971)

The distribution of Grass Rhino.

late fossil deposits and in archaeological sites. Their portraits are found on rocks in the Sahara, and eastern and southern Africa. They were evidently found throughout the grasslands and savannahs and would have been especially widespread during moister periods (they need to drink daily). Equatorial forests bisected their range into northern and southern populations (which differed slightly). Among rhinoceroses they are unusual in their placidity and willingness to form herds. In 10 BC, a Roman army officer, Julius Maternus, described rhinoceros gatherings in Agysimba (now thought to be the Fezzan country east of Lake Chad). They were still widespread in southern Africa at the time of the first European explorers but by the early years of this century the southern rhinos were estimated to number between 10 and 20. The northern population saw its most drastic contraction more recently, in the 1970s and 1980s, with numbers now down to a few dozen.

Extinction for the southern Grass Rhino was averted by the single-mindedness of one man, B. Vaughan-Kirby, the first Conservator of Game in Zululand, who ensured rigorous protection for the remaining rhinos throughout the 1920s and 1930s. Censuses revealed there were 150 animals by 1929, nearly 1000 by 1960. Their listing as rare and endangered has tended to equate the Grass Rhino with such 'genuine' relicts as Bontebok and White-tailed Gnu. Not so—given a chance they could once again be common and widespread. Their respite from extinction has raised the possibility—in theory if not in practice—that Grass Rhinos could be returned to many parts of their former range.

Few animals could be better suited than *Ceratotherium* to 'island dwelling' (even in quite small areas). Once their relations with humans are secure the animals almost behave like domestic stock. Reintroduction of the Grass Rhino to many reserves has been opposed because of their supposed absence in historic times. Yet there are probably few savannah areas these animals did not once inhabit. It needs to be more widely appreciated that faunas, especially large mammal faunas, were already artificially impoverished long before parks were thought of. We cannot bring back sabre-tooths and chalicotheres but a few of the larger and more ecologically diverse parks could foster a richer spectrum of animals than they do now.

This prospect has become very remote because the rapid extermination of Browse Rhinos throughout the African parks and reserves has demonstrated that few modern parks have the capacity to protect such animals. In fact there is often a discouraging discrepancy between the splendid array of national parks

shown in brochures and maps and the plight of large animals within them. Nevertheless, Africa's current parks and reserves are reasonably well distributed throughout the continent and they are broadly representative of the major zones, from desert to rain forest (see p. 238 and the regional maps).

Some of the largest areas contain a broad spectrum of animals and plants with a reasonable chance that they can survive within the park boundaries. In the smaller ones, long-term survival of the larger mammals (and particularly specialist predators and some rare plants) must be in doubt once all the surrounding areas have become settled. For example, few of the woodland parks in western and central Africa will be able to contain genetically viable populations of Derby's Eland, *Taurotragus derbianus*, an antelope that exists at low densities and wanders extensively.

The problems for scarce, widely spaced species finding mates in an artificially constricted area are compounded by the risk of inbreeding. In this respect geneticists and population biologists have come up with a rule of thumb. The minimum population size is 50. At best, this represents a 1 per cent rate of inbreeding which represents the maximum acceptable level without threatening a population's long-term fitness.

On such criteria, a park of several thousand square kilometres would be needed to maintain a population of say, Martial Eagles, each pair of which ranges over 200 sq km. Before the smaller parks are engulfed by settlement, their longer-term prospects will need to be reviewed, especially present and future parks intended for the protection of major Centres of Endemism.

Earlier chapters have established that the ancient refuges have enjoyed a good measure of climatic stability, sometimes for many millions of years. Some species living there have therefore changed very little over the same period and are utterly dependent on a stable predictable environment. Golden moles in southern Africa, otter-shrews in Ruwenzori, guinea- and rock-fowls in west Africa, and the Golden-rumped Elephant-shrew on the Zanj coast are all likely to be sensitive to disturbance or fragmentation of their habitats and populations.

The loss of such species, which belong to unique archaic families with very few living forms, is more serious than the disappearance of regional representatives of common types. Africa has more families of higher vertebrates than Europe and Asia. For example, there are 84 bird families (compared with 67 in the vast Palearctic region and 74 in the Oriental region) and 50 mammal families (compared with a mere 27 in the Palearctic and 43 in the Oriental).

It is known that at least a quarter of the species found as fossils in Pliocene deposits of around 3 million years ago are still with us, although some of them are now rare relicts (such as the Mountain Nyala and Gelada in Ethiopia, or the Okapi in Zaïre). By 2 million years ago the medium–large mammal fauna of Africa was essentially modern. This is in striking contrast with Europe and most of Asia where a modern fauna emerged more recently, with the last of the Ice Ages.

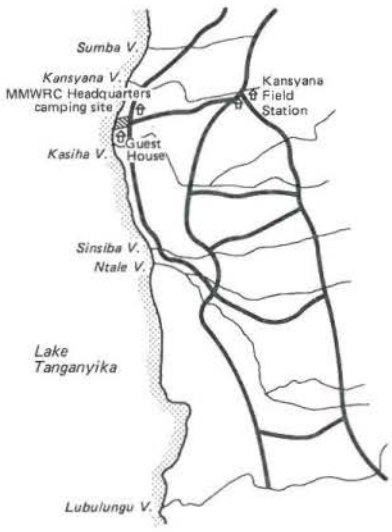
Even the most remote of African parks therefore conserve faunas that are considerably richer and of greater antiquity than those of the northern hemisphere and the Far East. African parks are also important for conserving the habitats in between the moist forest and dry open habitats, these are dynamic ecological zones that have not begun to be adequately explored. There is a particular reason why they should be studied. The fossil record shows that these were preferred habitats for early man and that their basic ecological structure has not changed a great deal since the first emergence of humans in Africa. Many parks contain mosaics of open grasslands, woodlands, forested river valleys and lake shores where southern apes, *Australopithecus* or early forms of *Homo* could probably still make a living were they not extinct. The sense of continuity is

reinforced in Serengeti and Lake Turkana by the presence of actual fossil sites within the parks. Here many bones scarcely differ from those of the species still living there. Perhaps even more spectacular, in the Mahali Mountains National Park, in western Tanzania, bands of Chimpanzees range through the savannahs in as close an approximation to early man as it is possible to get without actually resuscitating the dead. Here the apes make very significant seasonal shifts between moist forests, dry open woodlands, thickets and riverine valleys. The steep slopes of the Mahali Mountains are still very largely unexplored.

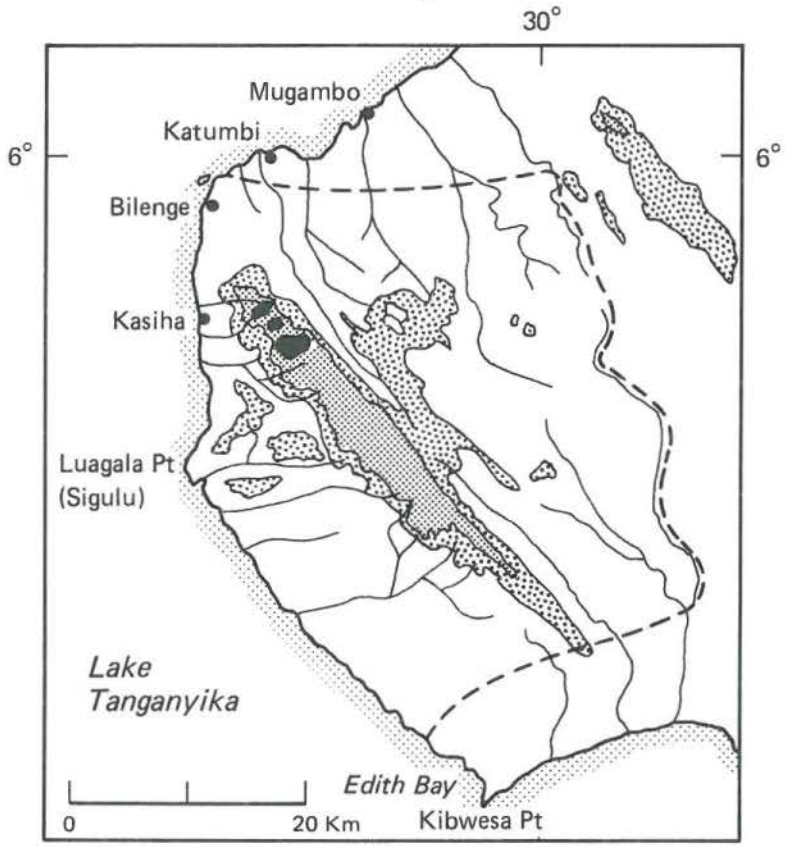
There are numerous instances of rare plants and animals confined to narrow interfaces (particularly in zones lying between climatic extremes). The minimum area that can support such species is very difficult to compute and choice habitats of this sort are sometimes inadequately represented because they were settled by people before a park was declared and were therefore excluded from the park. The species from such narrow habitats may take a while to die out but their fate in some instances may already be sealed (for example, the Gabela Robin, *Sheppardia gabela*, comes from just such a narrow zone on the Angola escarpment, which is being rapidly settled).

Once the great savannahs or woodlands have been carved up into a few widely separate island parks, some of the animals within them can be expected to change. Alterations in population densities or total numbers can have knock-on effects on sex ratios, social organization and behaviour. Even the anatomy or appearance of a genetically isolated group may change.

As an illustration of the sort of long-term changes that may take place, consider the shape and length of antelope horns. Trophy hunters have long known that animals from particular localities grow larger horns than those from other areas. For example Reedbuck, *Redunca, redunca*, pack in on the eastern *levées* of



Mahale Mountains National Park.

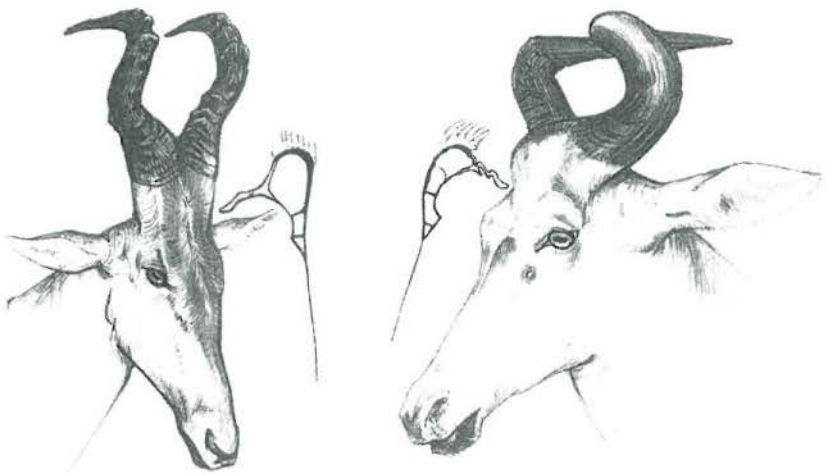


the Nile in south Sudan at up to 63 per square kilometre and the males boast longer horns than those from anywhere else in Africa. In most instances larger horns correlate with higher population densities because more frequent fighting exerts greater selection for stronger weapons. The horns of the Hartebeest, *Alcelaphus buselaphus*, typify those of a high-density antelope. Rutting males spend almost all their time chasing, threatening and fighting (even the females are caught up in the generally high levels of Hartebeest aggression). The heaviest horns growing from an elongated pedicel or skull mounting come from the open savannahs of west Africa where the local race, *A. b. major*, was once one of the commonest antelopes.

In the woodlands of south-eastern Africa, open grasslands occur as small pockets within much more extensive areas of well-shaded woodland. These small glades and valleys support a much smaller and very scattered population of Hartebeest that lives in small groups with little contact. Like the island birds that have dispensed with unwanted muscle and bone, the antelope that carries unnecessarily heavy horns soon selects for smaller ones and this the low-density woodland Hartebeest, *A. b. lichtensteini*, would seem to have done. Cross-sections of their skulls show wrinkled 'collapsing' patterns in the bone that suggest that a once-sturdy pedicel has shrunk down to more modest proportions.

Not only may intermediate populations disappear, leaving long-horned antelopes in one island park and short-horns in another, but many parks will inevitably see fairly consistent alterations in the densities of their animal populations (with all the changes in behaviour and ecology that that entails). Eventually, the animals in different parks could be identifiable from their behaviour and by the shape or size of features such as horns. These alterations will be the direct result of our having fragmented a formerly continuous population. As creators of islands, we will become, willy-nilly, species-makers or at the very least sponsors for new 'park subspecies'. We can expect to see the development of a 'Serengeti race' of gazelles or a 'Golden Gate oribi'.

Earlier on I asked whether it was useful to distinguish between parks in Centres of Endemism and those that sample broader ecological zones. Are there implications for practical policy and are we offered any insights that might guide our priorities in conservation? I think there are. When the terrestrial flora and fauna of Africa are viewed as a whole, the larger part is (within the limits of three major habitats: desert, savannah, forest) adaptable and wide-ranging.



Individuals from low and high density populations of hartebeest have very different horns. *Left*, *Alcelaphus buselaphus lelwel*, *right*, *A. b. lichtenstein*. The inset sketches show the hollow pedestals that underlie the horn bosses. 'Wrinkled' bone in *lichtenstein* suggests a secondary shrinkage or collapse of the pedicel.

During the last million years or so these are the species that have expanded and contracted their ranges with each climatic shift. These could be called 'staple' species to distinguish them from the less mobile species that have remained in stable centres on mountains, coasts or in river basins. The relative importance of endemics *vis-á-vis* generally distributed 'staple' species will vary very greatly from taxon to taxon. Some groups have many isolates, others none, some tend to become regional or ecological specialists, others remain wide-ranging types.

Until this century, three-quarters of Africa's mammal fauna ranged widely within their own life-zones. One-quarter was of very restricted distribution. If these ratios roughly approximate to those of other groups it can be said that about a quarter of the flora and fauna is tied up in enclaves that account for a tiny proportion of the continent's surface. As has been shown in previous chapters, these species are not just relicts. Many are specialists with unique adaptations and biological properties, some are the nearest we are likely to get to 'living fossils' and remembering the many new tools, techniques and concepts that are emerging from microbiology and genetic engineering, the closest we will get to possessing 'time capsules' from Africa's past.

To equate living species with fossils invites the criticism that relict organisms are merely redundant junk and Centres of Endemism are evolutionary scrapyards. The existence of uncompetitive species heading for natural extinction reinforces such a criticism. The same argument is often applied to elephants, rhinos and giraffes. It is a small step from there to claim that all reserves are museums of the obsolete and redundant. I hope that such views will have been offset by previous chapters and by the sketches they contain of an immensely dynamic continent. Here, through combinations of geography, climate and historical accident, substantial traces of Africa's biological history are preserved in enclaves. Numerous and often tiny, these enclaves offer us a vivid display of Africa's diversity, a diversity that many more people would treasure were they to learn of its existence and meaning. In preserving larger and supposedly more robust communities from destruction, human civilization may now be extending and mimicking the natural processes that have already made Africa 'a pattern of islands'.

ISLAND AFRICA

The Evolution of Africa's Rare Animals and Plants

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