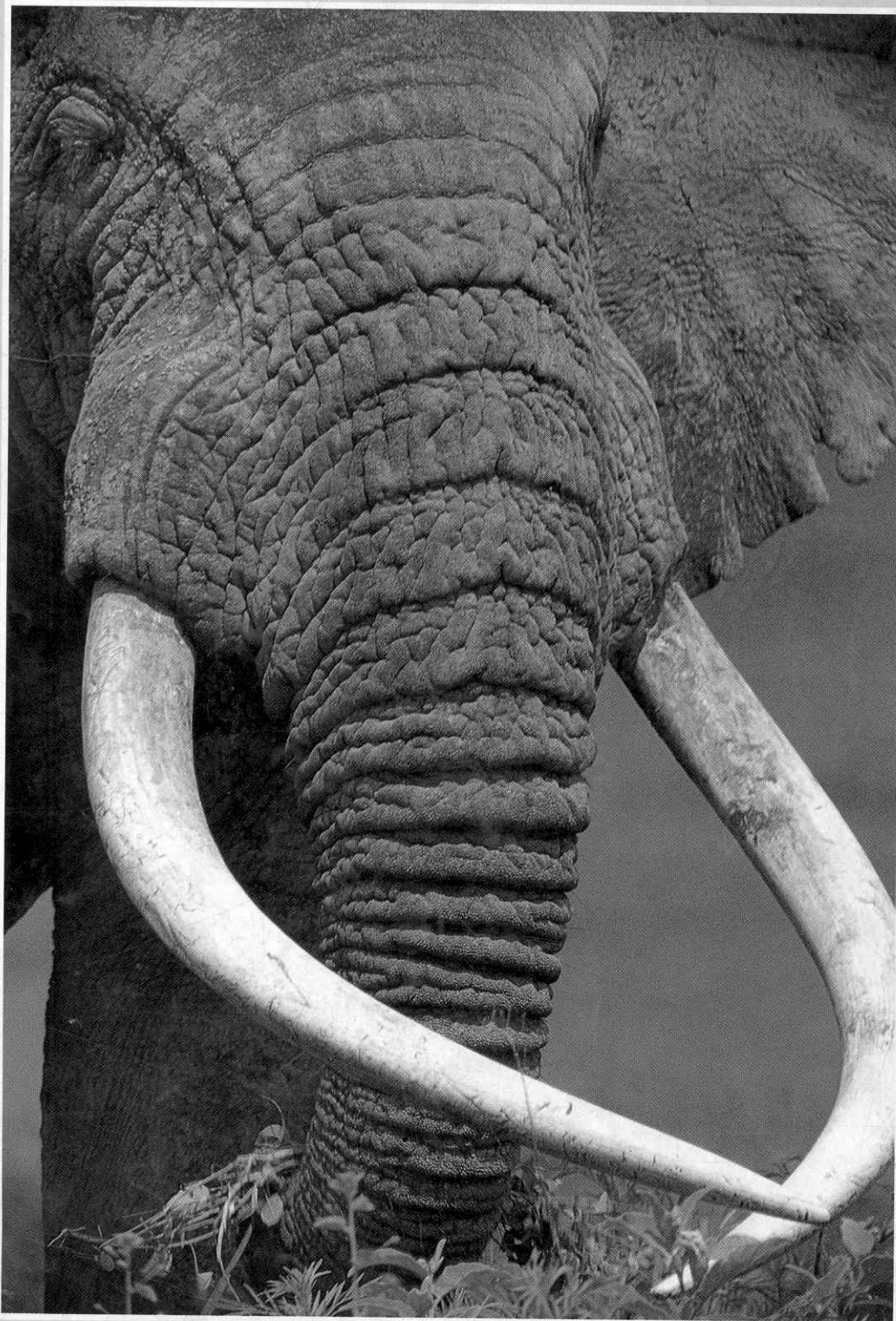


*The Illustrated Encyclopedia of*

# ELEPHANTS

*From Their Origins and Evolution to Their Ceremonial and Working Relationship with Man*



*Consultant: Dr. S.K. Eltringham*

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*Park staff feed baby elephants at the elephant orphanage in the Nairobi National Park, Kenya. Young elephants need specially constituted milk as they cannot digest the fat in cow's milk. They would normally rely on their mother's milk for about two years*

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The future of elephants is threatened by a variety of factors. In Asia, loss of habitat to human settlements is the greatest threat to elephants. Formerly extensive habitats become fragmented, splitting elephant populations into small ones that face a bleak future. In Africa, the rush for ivory has greatly reduced many elephant populations. Certain African countries, such as Kenya, have some of the world's highest human population growth rates. With the compression of elephants into smaller areas, usually protected reserves, the damage to vegetation becomes very obvious. With so many different problems faced by elephants in the two continents, how can their long-term survival be ensured? Obviously solutions may differ for each continent, country and population. The cultural association between elephants and people in Asia, for instance, will have to be taken into consideration in any management plan. Nevertheless, certain basic principles would apply for conserving many elephant populations.

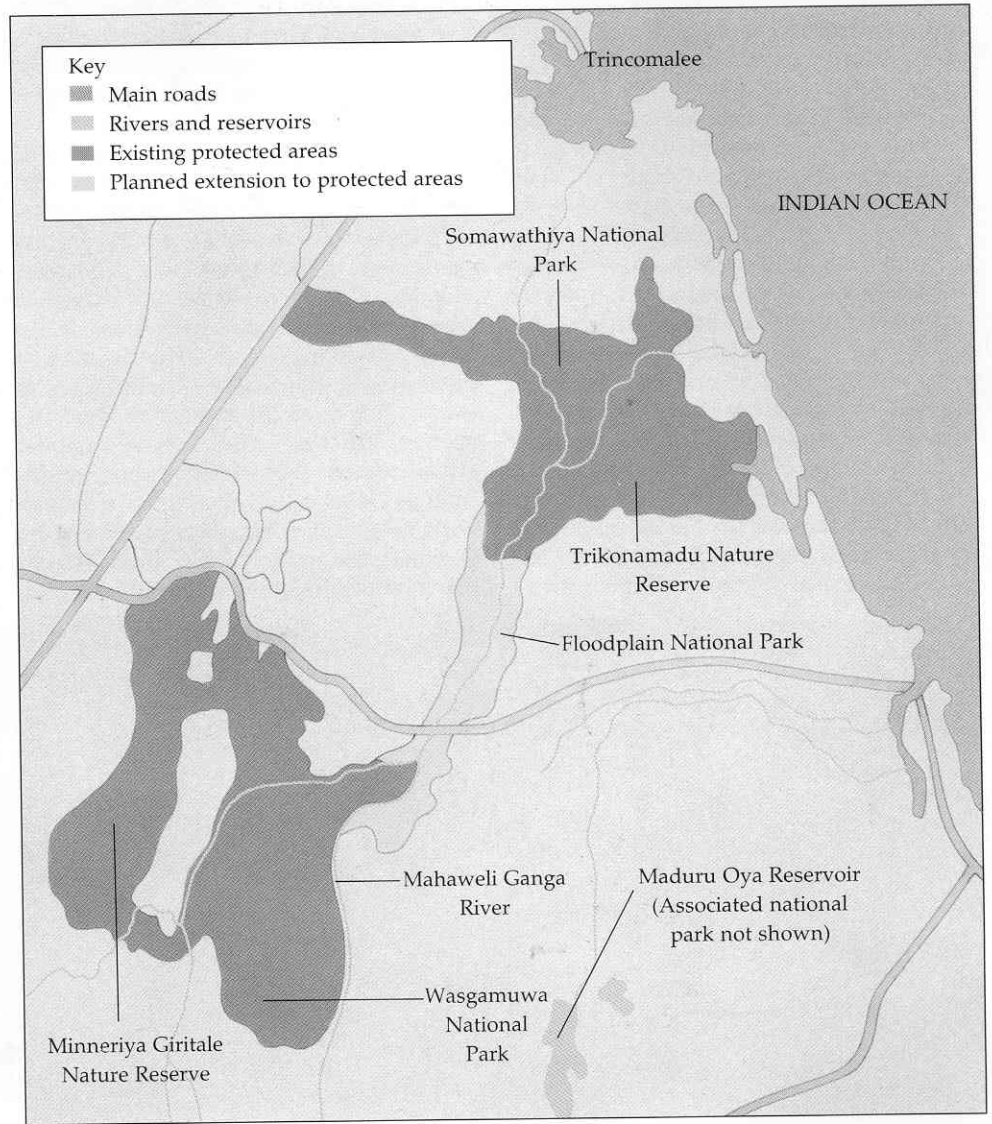


Elephants need a lot of resources and space. Seasonal movements of herds are a striking feature in most elephant populations. An elephant clan may need anywhere from a few hundred to a few thousand square kilometres of habitat as its home range. Unfortunately, this is no longer available to them in many regions, especially in Asian countries. River valleys have been brought under the plough, large dams and canals straddle their former migration routes, entire hills have been stripped for their mineral ores, even roads and railway lines obstruct the elephants' passage.

### Schemes to protect the habitat for elephant populations

Corridors linking habitats that would otherwise remain separated become important in such situations. There can be no hard and fast rule in designing corridors. The main thing is to ensure that elephants will use them and that they will not spill over into adjacent human settlements. The viability of corridors naturally depends on the distance separating the two populations. If the distances are relatively small, say less than 5km(3 miles) then the corridor need not be very broad. A corridor about 1km(1,100yd) wide would suffice to see the elephants through. On the other hand, if the distances are considerably more the width of the corridor has to be about 4km(2.5 miles). A corridor need not even be very good habitat. It can be degraded vegetation, for example, or a monoculture plantation that provides some cover for the migrating elephants.

Sometimes a corridor may be simply a bridge across an irrigation canal that cannot otherwise be traversed by elephants. Such a bridge has to be reasonably broad if herds are to use it; only bulls are bold enough to cross narrow bridges. An example of a system of protected areas connected by corridors can be found in



**Above:** The map shows part of the Mahaweli River Basin in eastern Sri Lanka. A series of dams is planned for the area, followed by agricultural expansion. To help the movement of elephants and other animals, a network of protected areas connected by corridors is being set up – an example of management in action.

**Below:** An elephant herd approaching the reservoir in Periyar Tiger Reserve, India. Although the Periyar Reservoir has not disrupted the movement of elephants, many other dams and canals in India have cut off traditional migration routes, intensifying the conflict between elephants and human interests.





the Mahaweli Basin of Sri Lanka. Without the corridors, the series of dams and agricultural expansions under the Mahaweli Development Project can be expected to fragment the habitat for elephants. To ensure that elephants can move freely between the surviving habitats, a system of corridors has been designed linking a number of national parks and nature reserves. The network is certainly not perfect – all protected areas in the basin are not connected – but at least the need for habitat contiguity has been recognized.

The area of a complex of reserves for elephant conservation should be large enough to support a viable population. This would also depend on the carrying capacity of the habitat. For instance, if each elephant needs  $5\text{km}^2$  (2 miles<sup>2</sup>) area and a viable population is 1,000 elephants for long-term conservation, a total contiguous area of  $5,000\text{km}^2$  (1,950 miles<sup>2</sup>)

should be set aside. The carrying capacity of rain forests may be much lower, about one elephant for every  $20\text{km}^2$  (8 miles<sup>2</sup>), and thus much larger areas would be needed for ensuring the long-term survival of elephants.

Apart from ensuring that large areas are set apart for conserving elephants, attention must also be paid to the quality of habitat in conservation areas. Elephants are highly adaptable creatures. They can survive in a variety of habitats – grasslands, scrubland, dry forest, rain forest, montane forest. They are most comfortable, however, where this entire range of diversity is available. They can then select the most suitable habitat according to the season and circumstances. When the grasslands are lush with new growth during the rains, the elephants congregate there in large numbers. When the grasses become dry, the

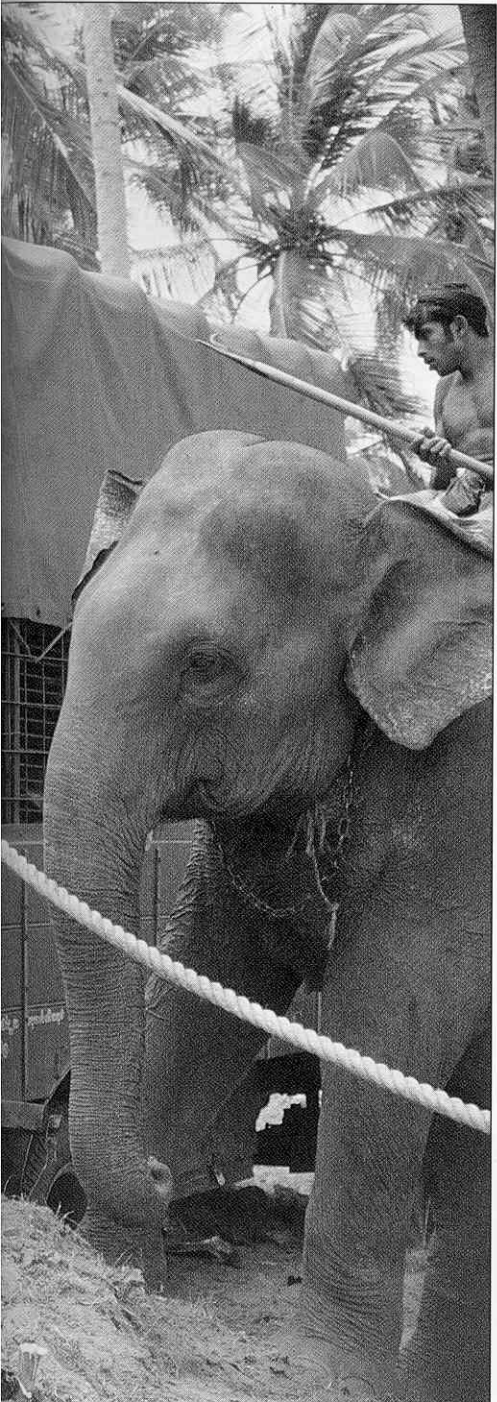
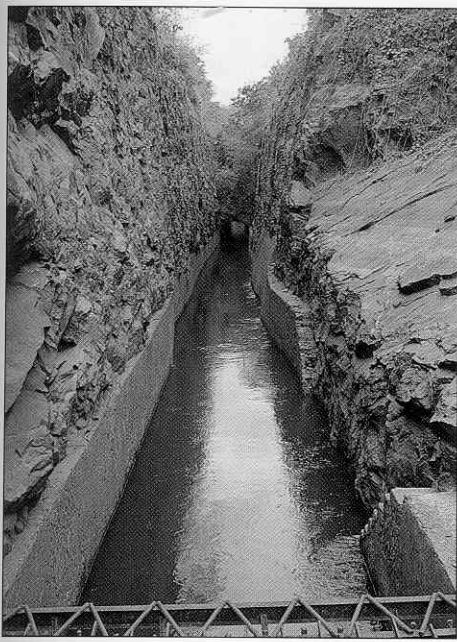
elephants turn to more palatable forage from trees and shrubs. When fires sweep through the grasslands or deciduous forests during the dry season, they seek refuge in forests bordering rivers and lakes or in moist forests that do not burn.

### Strategies for maintaining viable populations

All species change as they adapt to changes in their environment, or become extinct if they are unable to cope with change. If we are to maintain the evolu-

*Right: This canal leading from a reservoir to a power house in the Anamalai Hills of southern India has proved to be an impediment to elephants. Some elephants have been trapped and have drowned here. Bridges built across such canals and irrigation channels would need to be fairly wide and robust to encourage herds of elephants to cross over.*





tionary process we have first to ensure that a species does not disappear before it can adapt to change. Our immediate concern in conservation is usually to prevent extinction over a relatively short period of time, say the next one or two centuries. A small population is highly vulnerable to extinction purely due to bad luck. For a species population there is a critical size below which it is more or less doomed to extinction within a certain time period. The goal, therefore, should be to maintain the size of a population at a level that safeguards it from extinction in the short term. It is impossible to be 100 percent certain that a population, whatever its size, will survive. Therefore, one usually talks in probabilistic terms; the minimum viable population is that which has a 95 percent (or 99 percent) chance of surviving for 100 (or 200 or 500) years.

To determine the minimum viable population, one has to consider the demography and genetic structure of the population, fluctuations in climate and other environmental factors and the probability of a catastrophe. Some of these calculations can be theoretically modelled using computers. For elephants, a population of over 100 individuals is reasonably well buffered against extinction for a century due to chance fluctuations in births and deaths. Such a population is also safe from the genetic problems associated with inbreeding (related individuals will tend to mate in small populations). However, even a population of 100 elephants will continue to lose its genetic variation over the years. How the lack of genetic variation would adversely affect a population is still a controversial matter. It is generally agreed that such populations would not be able to cope with a changing environment and thus would lose their evolutionary potential. From a theoretical viewpoint it has been suggested that a population of 500 breeding individuals is necessary to halt genetic erosion. This would translate into a total population of over 1,000 individual elephants, because less than half the population would be adults capable of breeding. Such a large population would also ensure a measure of safety against epidemics and catastrophes.

What, then, is the prospect for small populations? Should one write them off completely? Fortunately, there are now options available for managing and conserving small populations. If a large

*Left: A tranquilized elephant is being loaded onto a trunk with the help of trained captive elephants in Sri Lanka. This elephant is part of a small isolated population being captured and translocated to a more viable habitat. Where the movement of an entire isolated population is not feasible, another strategy is to exchange sexually mature bulls between populations to introduce genetic variety. This is less complicated than moving female elephants.*

enough area is available for this population, one option would be to manipulate the habitat so as to increase its carrying capacity for elephants. This may include maintaining some secondary growth forest (which is preferred by elephants) or creating waterholes to sustain them through the dry season.

If the habitat is insufficient or if it is doomed to be replaced with sugar cane or other crops, the best course is to translocate the few elephants to a more secure habitat. An excellent example of this kind of management can be seen in Peninsular Malaysia. Many elephant herds here are isolated in forest patches and in conflict with commercial plantations of oil palm and rubber. The first capture of elephants took place in 1974. Since then the technique of capture by chemical immobilization has been perfected. About 150 elephants have been translocated so far to more viable habitats.

If wholesale translocation of a herd to another area is not feasible, small populations can be managed through exchange of individuals between populations in order to maintain genetic variation. In theory the 'migration' and breeding of even one individual per generation (about 15-20 years) is sufficient to halt the erosion of genetic variation in a small population. To take care of unpredictable events, in practice it would be wise to translocate a few individuals every generation. As male elephants naturally disperse from their families when they mature sexually, the easiest option would be for populations to exchange bulls. If females are translocated it may be necessary to move entire families so that the social bonding crucial to their survival is not disrupted.

In order to manage small populations successfully through exchange of individuals between them, it is important to obtain genetic profiles of elephant populations. Such information is not yet available. Research on elephant genetics can begin with the large numbers of captive elephants whose origins are known.

### **Strategies for managing over-abundant populations**

While many Asian elephant populations face the problem of too few individuals, many African elephant populations face the problem of too many, at least on a localized scale. The problem of destruction of woodland and its conversion to grassland by over-abundant elephant populations is well known. Uganda, Kenya, Tanzania, Zambia, Zimbabwe and South Africa are some of the countries that have faced this problem and have tackled it in different ways. With the exception of Kenya and Tanzania, these countries have experimented with culling elephants in a big way since the 1960s. The tide of ivory poaching during the 1970s and 1980s





**Above:** Elephants being shot by skilled professionals in Zimbabwe to keep the elephant populations in various parks below arbitrarily determined carrying capacity levels. The issue of whether or not to cull elephants has been fiercely debated in Africa.



**Left:** Culled elephants in Zimbabwe being examined by the team. All elephants in a herd are dropped within a minute or two to minimize trauma and prevent them communicating distress to other herds in the same area.



largely obliterated the need for any further legal culling in many African countries. Zimbabwe and South Africa are two exceptions that still continue to have organized culling programmes.

When the fierce debate over whether or not to cull elephants erupted in East Africa during the 1960s, Kenya deliberately chose to let nature take its course. Some elephants had been culled in the Tsavo National Park but this was stopped. Then came the drought of 1970-71, when about 6,000 out of 20,000 elephants in Tsavo died of starvation. There was widespread criticism of Kenya's handling of the situation. Many felt that Tsavo's elephant population could have been trimmed by humane culling rather than let the elephants die a painful death. Nevertheless, Kenya stuck to its hands-off policy. One of the first instances of cropping an elephant population for reasons of preventing damage to habitat was in Uganda's Murchison Falls National Park. About 2,000 elephants were killed between 1965 and 1967. This was carried out by professional teams that shot down entire elephant families in order to prevent any survivors with traumatic memories of the event. All members of a family were usually shot within a two-minute time span. On the other hand, many elephants that the Ugandan Game Department attempted to kill as part of their control measures escaped with wounds. Political events in Uganda subsequently overwhelmed any

rational management plans that had been made. During the infamous rule of Idi Amin and the civil war in the wake of his overthrow, Uganda's elephant population crashed by 90 percent.

Zambia organized a major elephant cull between 1965 and 1969 in the Luangwa Valley. Combined with the cull was a scheme for processing elephant meat in an abattoir built specially for this purpose. Elephants were shot with darts containing succinyl-choline chloride, a drug that kills by paralyzing the respiratory muscles. Carcasses were transported to the abattoir for hygienic processing of the meat. The drug used breaks down upon heating and thus the meat is safe for human consumption. After less than 1,500 elephants were culled in this way, the operations were stopped due to a campaign of protests made by conservationists.

Most of South Africa's elephants are in the Kruger National Park to the north-east along the border with Mozambique. At the turn of the century there were very few elephants in this region. Subsequent immigration from Mozambique and Zimbabwe, combined with natural growth, increased the population to about 8,000 elephants by the 1960s. This was perceived as a threat to the vegetation and other fauna. A decision was made to keep the population level at 7,000-7,500, which was believed to be the carrying capacity of the 19,485km<sup>2</sup> (7,500 miles<sup>2</sup>) park. Culling began in 1968 and continues regularly

on the basis of results from annual aerial censuses of the population. From a helicopter the elephants are darted with a massive dose of succinyl-choline chloride. Ground teams located nearby are alerted about the darted animals. They quickly move in and shoot them in the brain. The carcasses are removed to an abattoir for processing. The meat is shared among local staff or sold to shops in the park's vicinity. Tusks are auctioned, and skin is sold to tanneries for making leather goods. Feet, tail and tail hair are sold to curio manufacturers. All this generates revenue for the park. Bulls carrying large tusks are usually spared because they are a special tourist attraction, and the young elephant calves are captured for sale.

Zimbabwe is another example of a country that manages its elephant population through culling and where the species is not currently endangered. The elephant population has increased from an estimated 5,000 in 1900 to about 57,000 at present. This country decided to cull even in areas where there was no percep-

*Below: Meat from culled elephants hangs out to dry in Zimbabwe. This is made available to local villagers, and various other products, such as the hide and ivory, are sold to generate revenue for the local economy and to fund the conservation and management programmes. Strict anti-poaching laws are in operation to ensure that the benefits of the elephant culling programme go to the local people.*





tible damage to vegetation from elephants. The population level in the cull areas are determined rather arbitrarily. Regions where elephants have been culled include the Wankie (now Hwange), Chizarira and Matusadona national parks, the Sengwa, Chirisa and Gonarezhou reserves, and the Sebungwe region. There are some important differences in the way Zimbabwe's culling programme operates as compared to South

*Below: Bull elephants reach out with their trunks into a water tank in the Galana ranch in Kenya. Shortage of water during droughts often forces elephants to seek this precious fluid from human settlements. They are even known to break taps and pipelines to obtain water. Even outside drought periods, human settlements in elephant country are at risk from their incursion in search of food and water.*

Africa's. Isolated elephant herds are located and quickly shot by skilled professionals. This minimizes the transmission of trauma to neighbouring elephants. There is a distinct possibility that elephants communicate distress to other elephants through infrasonic vocalization (very low-frequency sounds).

Asian elephant populations have also been culled through the centuries in a different way, by being captured for domestication. The method of driving entire herds into stockades has had a similar effect of keeping wild populations in check. During the past century alone about 100,000 elephants have been captured in Asia, and perhaps a few million since the species was first tamed some 4,000 years ago. In many countries the capture of elephants has been officially banned, except under special circum-

stances. There has been no serious problem of damage to vegetation as in African countries, but it is conceivable that such a situation could arise in future in some regions of high elephant density. The dilemma of whether or not to cull would be as great as it has been in Africa. Religious sentiments in countries such as India, Sri Lanka or Thailand would strongly oppose the outright killing of elephants. Capturing them for domestication would be more acceptable. However, tame elephants are losing their importance in many Asian countries and this would create a fresh dilemma over what to do with captured elephants.

### **Managing elephant populations in conflict with people**

In the words of ecologist Norman Myers, conservation in developing countries has





to sustain not only the spirit but also the stomach. In a world with rapidly changing social values, particularly in the direction of a highly materialistic culture, it would be unrealistic to expect the poorer sections of society to pay the entire price for conservation. One can hardly expect a farmer whose whole food supply for the year has been destroyed by elephants to be an ardent supporter of their protection. Elephants also sometimes kill people, often during their nocturnal incursions into human settlements, and this creates considerable resentment towards them. It is therefore essential that the impact of elephants on people be minimized if conservation is to receive local support. This is easier said than done. The crux of the problem lies in finding cheap methods of keeping elephants away from human settlements. Trenches

and high-voltage electric fences along the forest-settlement boundary have been tried in many regions, with varying degrees of success. (The various strategies being used are discussed in a special feature starting on page 166.)

Crop damage can be reduced to a certain extent by persuading farmers to grow crops that yield good economic returns but are not consumed by elephants. However, it is not an easy task to change traditional patterns of agriculture in developing countries. In certain places conflict has to be reduced by capturing, translocating or even shooting elephants. A small isolated herd of elephants in perpetual conflict with people has to be removed. In some Asian countries it may be possible to take them into captivity. In others, such as Malaysia, a decision may be made to capture and translocate them

to a more viable habitat. Both traditional methods of capture such as kheddahs or modern methods such as chemical immobilization may be used, depending on the expertise available in a particular country. African countries may choose to shoot the elephants. A decision to cull elephants should be easier to take if these happen to be bulls. Male elephants cause far more damage *per capita* than do female-led herds. Bulls also seem to be responsible for the majority of human killings, particularly within settlements. Eliminating some notorious bulls would be one way of managing the population. This would not adversely affect the population, whose growth would depend more on the number of females in the population. Symbolic culling may also create a more favourable climate among local people for conservation.





# KEEPING WILD ELEPHANTS AT BAY

D.K. Lahiri-Choudhury

Elephants and human settlements are generally taken to be incompatible. African elephant conservation policy has been based on this assumption, although of late there has been some rethinking on the subject. In Asia, however, man and elephants have to live together by mutual adjustment. Depredation, therefore, is a way of life in Asia. The problem is not how to stop it altogether, but how to control it. By elephant depredation we mean the damage and destruction caused by wild animals, not aggressiveness by domesticated male elephants in musth.

Elephant depredation has been increasing in recent years. Various reasons have been suggested for this, the chief one being the loss of habitat, leading to increasing man-elephant confrontation. From time immemorial the Asian elephant has been a friend of man; yet wild elephant and human settlements cannot co-exist without some conflict. This was

recognized in the *Arthashastra*, an account of Indian political and governmental strategy compiled between about 300BC and AD300. (Traditionally, this is attributed to Kautilya, chief minister to Chandragupta, founder of the Mauryan Empire.) At the present time, elephant depredation has become one of the major management problems in many forest areas.

## Identifying the problem

The problem of depredation has two major aspects: (a) loss of human life; and (b) loss of property. Loss of property can be further subdivided into three main kinds: (i) loss of a food crop; (ii) loss of a cash crop (oil palm, tea, sugar cane) by trampling or otherwise; (iii) damage to houses and other constructions.

## Loss of human life

The annual toll of human life taken by elephants has risen in northern Bengal,





**Left:** The haunted look in this boy's eyes still remains, even a month after he was picked up and thrown against a fence by a lone tusker emerging from the nearby Buxa Tiger Reserve and entering his village of Noorpur in northern Bengal. Only the fact that the fence was of bamboo and cushioned his fall saved his life.

**Right:** His father and younger brother were not so fortunate. They were in this straw and bamboo hut when the elephant smashed into it. His mother had just emerged from the hut and saw the male elephant – about 3m(10ft tall) – like a ghostly white shape in the moonlight. She ran for her life and managed to escape.

**Below left:** An army supply depot in northern Bengal bears the scars of persistent elephant depredation for the last 20 years. The elephants regularly break through 25cm(10in)-thick walls to get at their favourite booty of army rum, flour and other provisions in the building. Keeping them at bay presents many problems.



from about 30 per year in the 1970s to 60 in 1990. Meanwhile, southwestern Bengal has also been badly affected. The human casualty figures for the two halves of Bengal for the years 1987-90 are:

	1987	1988	1989	1990
Northern Bengal	39	58	45	60
Southwestern Bengal	-	11	23	11

In 1989, elephants killed 52 people in Assam. During 1988-89, straying herds killed 24 people in Bihar. Herds of elephants started spreading into Andhra Pradesh from adjoining Tamil Nadu in 1985. Since that time, about 50 people have been killed in Andhra Pradesh. Estimates suggest that 30-50 people are killed by elephants annually in southern India. Loss of habitat may not be the only reason for this, and when planning anti-elephant depredation measures, it is important to examine the problem more analytically.

Field studies indicate that most – but not all – human casualties are caused by adult male elephants. It has been argued that this may be largely attributable to biological reasons, namely, the increased level of testosterone in the animal's blood during musth, when Asian elephants can become very aggressive and unmanageable. Some adult male elephants regularly chase and sometimes kill men and destroy property during their musth period. Thus, there is a predictable cycle

in their aggressive behaviour.

There is at present no standard prescription for dealing with such animals, except shooting them as rogues. When periodicity marks such aggressive behaviour of identified animals, experiments can be undertaken to keep them chemically sedated during the musth period; but it has still to be seen how this will affect their breeding behaviour. The culling of adult males has been recommended as an anti-depredation measure. Although all aggressive male elephants are not killers, the aggressive ones will naturally head the list in such a culling programme. Unfortunately, the aggressive individuals are precisely those that are most successful in breeding and passing on their genes. Elimination of such animals might interfere with the process of natural selection, and thus have a long-term deleterious effect on the species. Therefore, one needs to exercise some caution in this regard before recommending the prescription as a general management practice. This means that we are back to square one. The problem of man-slaughter by elephants is not as yet amenable to solution except by the elimination of the offending animals.

It is necessary, however, to distinguish between deliberate and accidental man-slaughter. Every year quite a few people are killed by elephants in incidents for which the wild animals cannot be held responsible. A common occurrence is that of a local drunk approaching a wild animal to offer worship to 'Ganesh Baba' (the god Ganesh, or Elephant-headed god). Another common type of accident

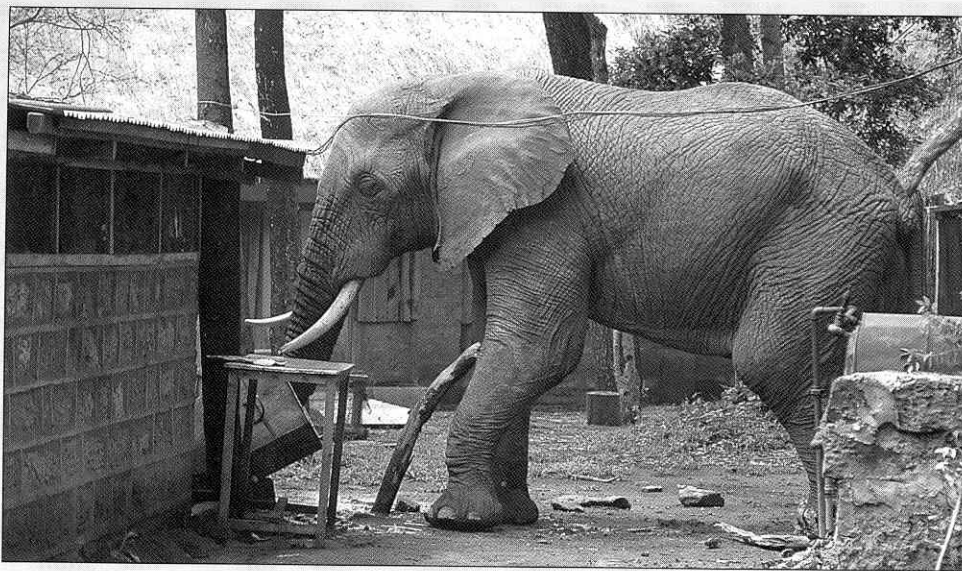
is the pushing over of a hut and the trampling of the people inside by crop-raiding elephants. It is generally agreed, however, that animals that kill men deliberately and without provocation should be eliminated. Despite the vagueness of the phrase 'without provocation', this is perhaps the best that one can do at present.

The situation is further complicated by subadult male animals (generally below 2.1m/7ft in height) turning aggressive towards man. This aggression is behavioural and is unconnected with musth. When subadult male elephants are expelled from the herd, they often become aggressive and become killers. This may be a temporary phase, but we do not know as yet how to deal with such animals, other than to kill them.

### Loss of property and crops

Destruction of property is the other aspect of the elephant problem. Analysis of elephant depredation in northern Bengal suggests that before adequate corrective measures are taken, it is necessary to understand the nature of the depredation. Crop raiding is mainly due to the plants being more attractive as food to elephants than wild vegetation, which may be plentiful. Crop plants have a higher food value for elephants, and they may feed on them as a matter of preference. Attempts at driving away unattached males from a crop are more difficult than driving away family groups. Such determined, and often aggressive solitary adult bulls require special treatment; but the compensation paid for actual damage to crops seems to have a





**Above:** Conflict between elephants and the human population causes problems in both Africa and Asia. Here an elephant explores the grounds of a camp in the Masai Mara Nature Reserve in Kenya, looking for food.

definite correlation with the movement or presence of herds. Further, the damage done by trampling animals in a herd could be much more per head than that caused by the trampling of unattached males; admittedly, though, this is yet to be quantified.

### Coming up with solutions

Depredation by family groups or herds is the kind most open to preventive measures. The International Workshop on Management of Elephants in the Wild and in Captivity, held in 1982, devoted a whole session to the demonstration of such measures, many of which have subsequently been incorporated or reported in various publications. In the main, these measures are of two kinds: combat, which deals with elephants actually raiding a crop; and preventive measures, which are designed to prevent elephants from such raiding. Preventive measures can also be divided into two categories: deterrents, i.e. measures such as barriers, which physically prevent elephants from raiding a crop; and repellents such as lights or chemicals, which, though not actual physical barriers, discourage elephants from raiding a crop. Translocation of troublesome animals to 'safer' areas is hardly the solution; experience in Sri Lanka and India has shown that such animals tend to return to the original point of capture.

### Combat measures

Among the combative measures used against elephants, powerful car battery-operated spotlights have been found to be very effective, because elephants move away from powerful beams of light, except for some particularly belligerent adult males. Less bright battery-

operated torchlights can be dangerous, because elephants sometimes charge at them, perhaps because as crop-raiders they associate such light with the pain from the arrows or guns of the farmers.

Koonkies – domesticated especially trained elephants – are also used to chase away herds in forests, and they were first used in a planned manner in 1980. Koonkies are meant to be used mainly during daytime, but they have also been used sometimes at night, although this is risky because of the danger of attack by large wild bulls.

Experiments with tear-gas were conducted in northern Bengal in 1975, but the evidence was not conclusive. Its worth is dubious because of its dependence on the wind factor. Rockets that end with a bang are effective, particularly with family groups. Crackers and other such devices producing loud bangs are useful until elephants become habituated to them.

Results of controlled experiments with tape-recorded tiger calls have not been conclusive. It seems that there have been no experiments with low- or high-frequency sound waves to deter elephants, and this could be a fruitful line of further experiment.

### Preventive measures

The first consideration is to keep elephants away from vulnerable areas; the second is preventing them from entering vulnerable areas. (If these fail then combat measures take over).

The first approach involves changing the human land-use pattern, for example by not planting food crops on the fringe of the elephants' habitat. The human pressure on land being what it is in South and Southeast Asia, the idea looks fine on paper but is rarely practicable. Koonkies play a crucial role here by chasing away wild elephants from forests fringing vulnerable human settlements.

Sometimes elephants use small pockets of forest solely as refuges from which to carry out crop raiding. This can be

dealt with by thinning of the forest, to make these pockets non-viable as daytime cover, without any significant loss either to forestry or to the total area of the elephants' home range.

In patchy forest areas in northern Bengal, Madhya Pradesh or western Bihar, elephants moving from one forest area to another can cause serious loss of human life and damage to property. Where such paths are well established, the problem can be contained by removing human settlements away from these corridors, which are often no more than a few hundred metres wide.

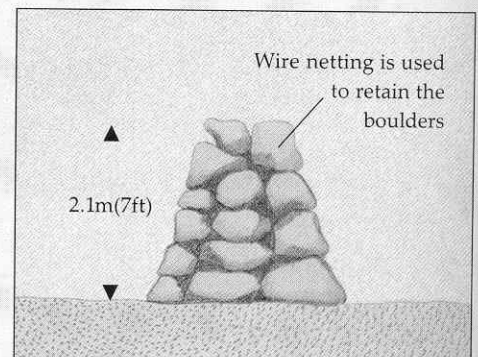
Chemical repellents have been used as barriers, but without much effect so far. A multinational chemical company brought out such a repellent in the mid-1970s on an experimental basis, but this did not prove effective in high-rainfall areas such as northeastern India. Experiments with tiger urine, which could be called a form of chemical repellent, have not given conclusive results. Developing chemical repellents is a line of research that seems worth pursuing.

It is also well known that white or glittering objects attract elephants' attention, whereas constructions painted black or dark green enjoy immunity.

Lastly, physical barriers can be used. Many forms have been tried, again with varying degrees of success, including elephant-proof trenches, dry walls of boulders held together with galvanized wire-netting, spikes embedded in concrete slabs, and electrified fences.

Electrified fencing, first used extensively and effectively against elephants in Malaysia, is undoubtedly the cheapest and the most effective form of all physical barriers. Malaysian companies using these fences to safeguard oil-palm and rubber plantations report an 80 percent reduction in elephant depredation. The success or otherwise of the fence depends largely on adherence to proper

### Barriers used against elephants



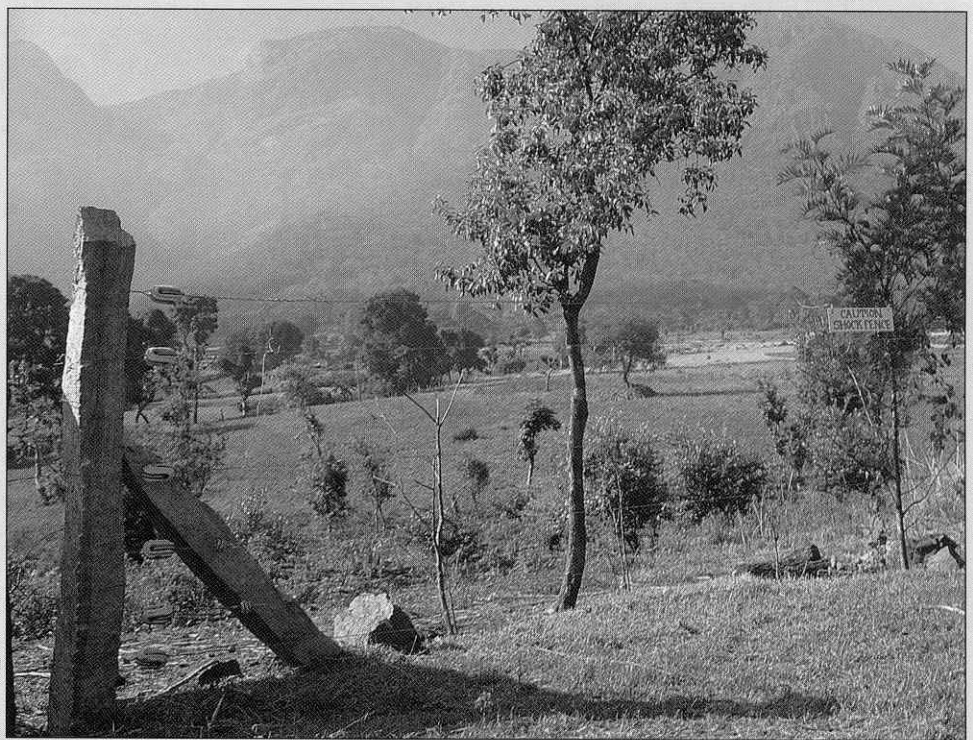
**Above:** A dry boulder wall held together with wire mesh provides an effective physical barrier that will keep domestic animals in and wild elephants out. This is a cheap option where suitable boulders are available locally and heavy transport costs are not involved.



design and maintenance. It is not easy to fool elephants. They use their tusks or the soles of their front feet, which are poor conductors of electricity, to break the fence wires. Some elephants even push trees over the fence to break the wires and enter crop fields!

For small areas of permanent vulnerability, such as a tourist complex or forestry department huts in the middle of a forest, permanent physical barriers would seem to be preferable, although they are more expensive. Ditches with non-masonry sides are often useless, particularly in unstable or boggy soil. In hard lateritic soil, however, they can be effective, needing little attention for maintenance. Spikes can be dangerous, for both man and elephants.

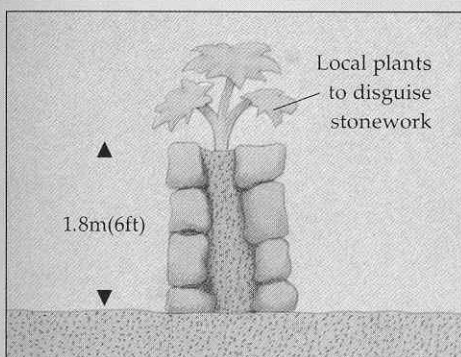
The basic idea underlying any experiment in measures to prevent elephant depredation is to try to evolve a *modus vivendi* for man and elephant together. A complete separation of elephant and human habitat is hardly feasible.



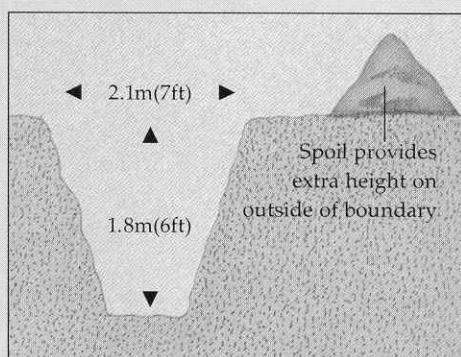
**Above:** High-voltage electrified fences such as this have been quite successful in keeping elephants away from agricultural land. An 'energizer' boosts the current from a 12-volt car battery (which can be charged from the mains or even by a solar panel) to a very high voltage, typically 4,000-5,000 volts. Any animal coming into contact with the fence receives a severe but non-fatal shock in a series of short pulses. One energizer can power 20-50km (12-30 miles) of fencing. These fences are relatively cheap but need careful maintenance.



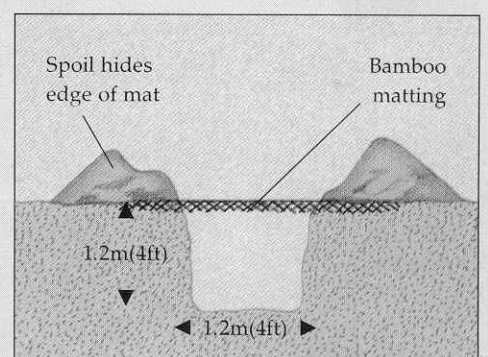
**Left:** Forest department elephants waiting to cross the drawbridge over an elephant-proof trench. The recorded history of trenches as barriers against the incursion of elephants goes back to about 315 BC. They are effective but expensive. In wet or unstable soils they must have masonry sides, otherwise they become useless during the rains. Well-built permanent trenches with drawbridges are the best option to protect small vulnerable areas, such as the forest camp featured here.



**Above:** A variation of the boulder wall with earth infilling. This design requires far less stone and provides the opportunity to create a living hedge that will eventually mask much of the unsightly stonework. It is important to use local plants that will thrive in the conditions.



**Above:** A basic design for a deep elephant-proof trench. An elephant cannot stride more than 2.1m (7ft) and so this is the ideal width. Vertical sides are better because they prevent elephants sliding down on their haunches, but they are difficult to maintain in unstable soils.



**Above:** Shallow trenches covered with a layer of bamboo matting present a psychological rather than a physical barrier. Elephants feeling the mat with their trunks find it unstable and avoid treading on it. They have an instinctive sense about what surface will bear their weight.



## Breeding in captivity

Captive elephant populations have historically never been self-sustaining. Chieftains and kings holding elephants in their armies have always had to replenish their stocks with fresh captures from the wild. In more recent times, zoos have generally had a poor record of breeding elephants. Does this mean that captive breeding does not have any place in efforts to save elephants?

The problems with breeding elephants in captivity have been largely sociological. When bulls are in musth and are most likely to mate with cows in oestrus, they are segregated because they are aggressive and do not respond to commands. In most situations captive elephants are kept in surroundings that are a far cry from their natural habitat. Most zoos in western countries do not want to keep bull elephants, because they are difficult to handle and have occasionally killed people.

By contrast, elephants kept under semi-natural conditions, as in many forest camps in India and Burma, have a promising record of breeding. In southern Indian forest camps the captive elephants have regularly bred during this century. The data suggest that these

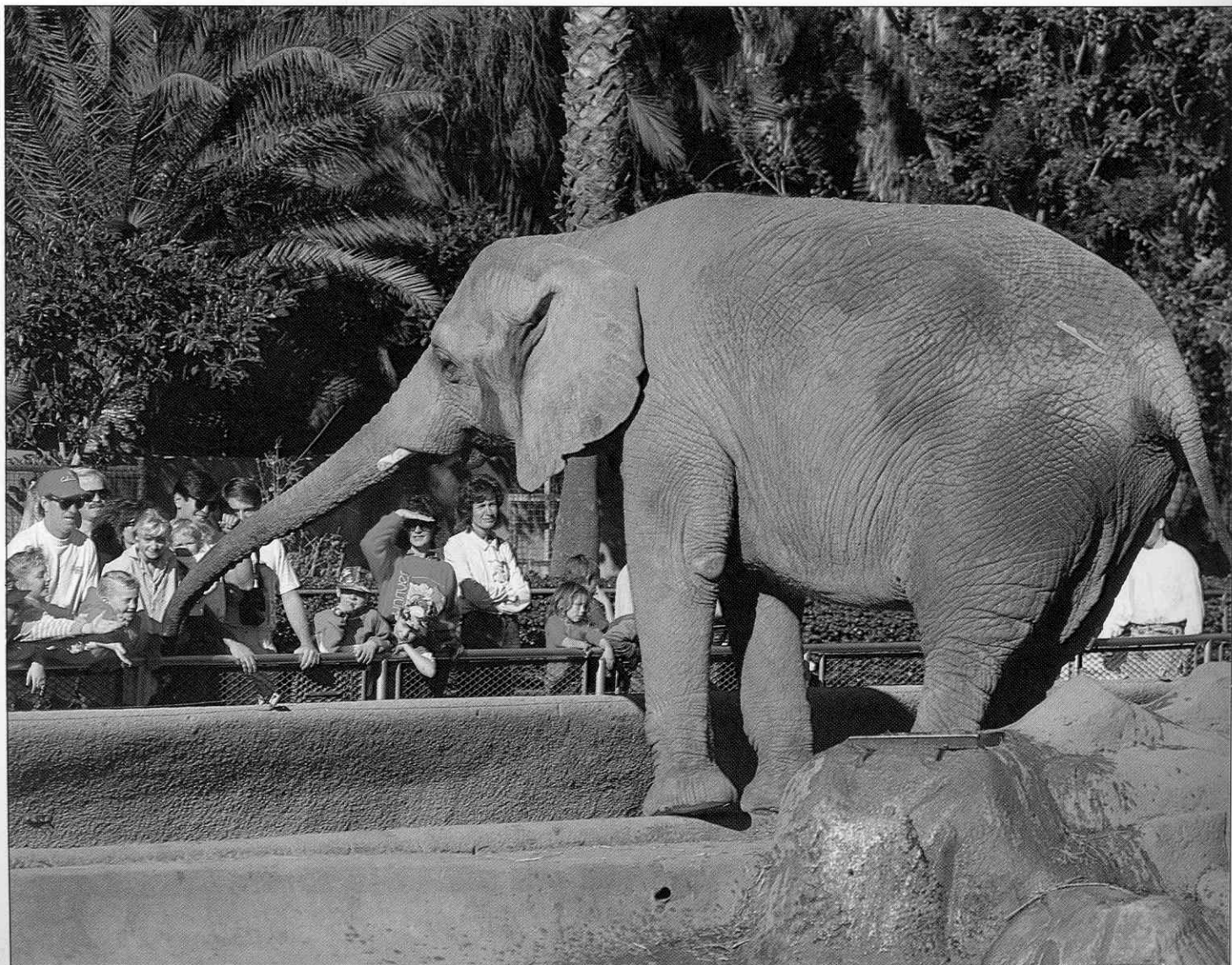
populations could sustain themselves even without any additions from the wild through new captures. Both bulls and cows of all ages are kept together in these forest camps and allowed to mingle. The elephants are also left in the forest during the night so that they can feed. Many of the calves born in captivity are sired by wild bulls that mate with the cows inside the forest. The best record for breeding elephants in zoos seems to be held by the Washington Park Zoo in Portland, USA. Other zoos have not been very successful in captive breeding. Nevertheless, zoos have been important centres for research on reproductive biology in elephants. Modern techniques such as artificial insemination have been tried by some zoos in an attempt to breed elephants, but these have not succeeded so far. Some zoos have plans to create large elephant enclosures that would mimic their natural habitat but such schemes would be very expensive.

Captive breeding certainly has a role in elephant conservation, but this can only be secondary to conserving elephants in the wild. The ecological role of elephants in their natural habitat cannot be duplicated in captivity. There is still plenty of hope for in situ conservation of elephants

both in Africa and in Asia. Captive elephants can help their wild relatives through their value in research, educating the public visiting zoos, raising funds for conservation programmes and reinforcing the rich cultural traditions, at least in Asian countries, that would contribute to their conservation.

**Right:** This famous African elephant, Eleanor, has fostered many orphaned elephants in the Tsavo National Park, Kenya. Raised by David and Daphne Sheldrick from a calf, Eleanor has in turn helped to nurse many orphaned and rejected calves back to full health. Such foster mothers, or allomothers, can make all the difference between life and death for an orphaned calf. (This a theme explored in more detail on page 50 in the chapter on Social Life.) Here Eleanor waits patiently for a sweet titbit to be unwrapped and offered to her.

**Below:** Visitors to the San Diego Zoo in the USA watch a young male Asian elephant, who is clearly interested in the crowd. Zoos can contribute to conservation of elephants through research, public education, fund raising and captive breeding. Most western zoos, however, are reluctant to keep adult bull elephants, which may become aggressive during the musth period and thus difficult to handle.









## Fighting the poachers

By far the most important factor contributing to the decline of the African elephant during the past two decades has been poaching for ivory. From an estimated 1,343,340 elephants in 1979 the population fell to less than half this number eight years later. (See page 96 for more information on these population estimates.) Scientists predicted that at this rate the elephant would become virtually extinct in East Africa within five to seven years and perhaps all over the con-

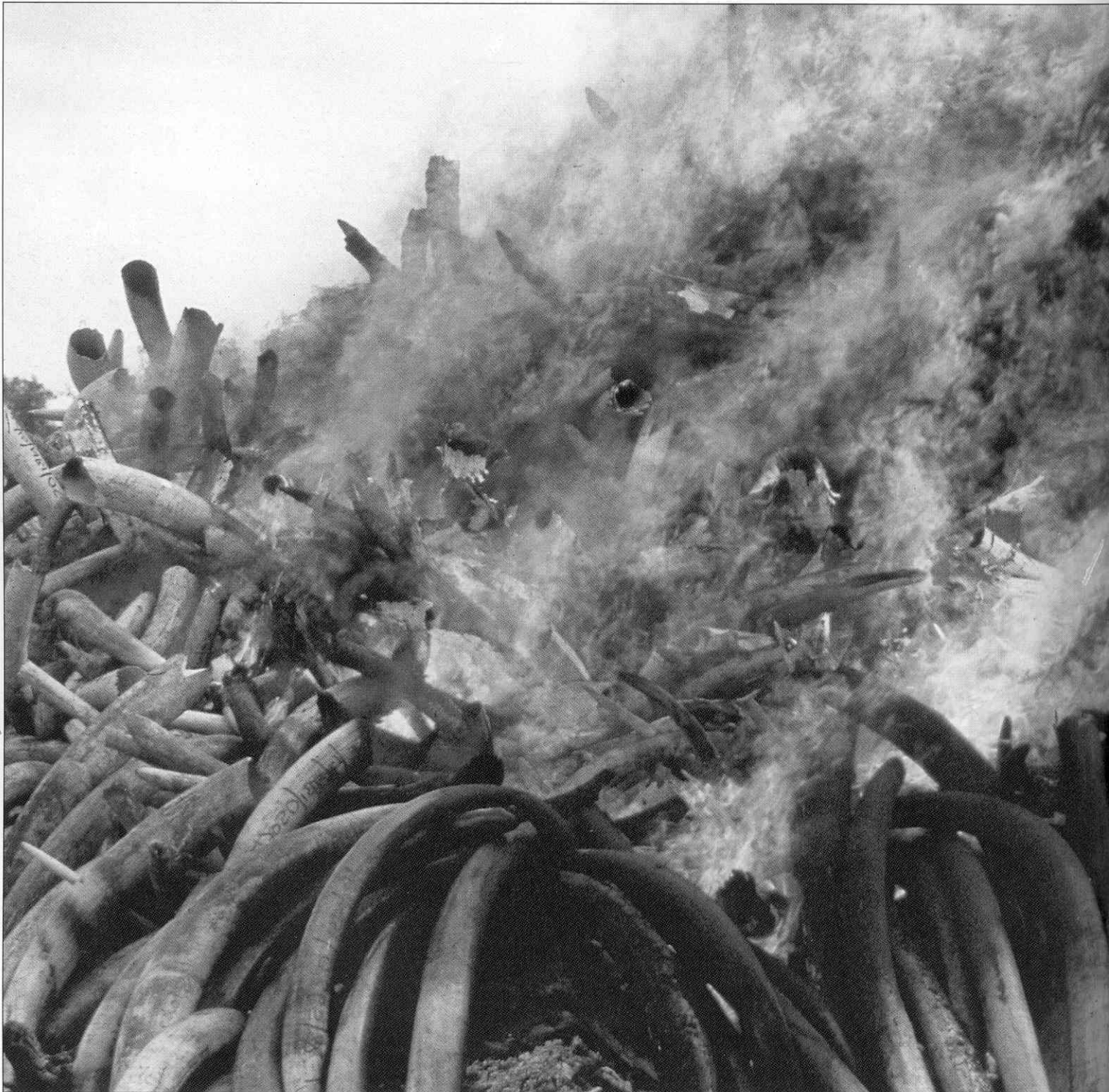
*Below: Kenya President Daniel Arap Moi makes a huge bonfire of ivory on 18th July 1989, in an internationally publicized event. The total ban on the ivory trade has sent ivory prices crashing on the world market.*

tinent in 15 to 20 years. Governments in most countries from Kenya to Zaire were ill-equipped to deal with the large gangs of poachers armed with sophisticated weapons. In some countries there was even a collusion between poachers and the authorities. As ivory prices soared it seemed as though the battle to save the elephant was already lost.

Following the unprecedented international concern over the plight of the African elephant, a number of steps were taken to stem the flow of illegal ivory. Kenya and Tanzania led the way in the fight against poachers. In May 1989, Kenyan President Daniel Arap Moi appointed the well-known palaeontologist Richard Leakey as head of the country's wildlife department. Leakey

moved swiftly to reduce inefficiency and corruption, and to equip the department to fight poachers. Since he took charge Kenya has lost relatively few elephants to poachers. On 18th July 1989, President Arap Moi set fire to a stockpile of the country's ivory stock, worth three million dollars, in a spectacular event that was publicized throughout the world. He told the world that "obviously Kenya cannot appeal to the world to stop buying ivory if at the same moment we are selling the very same commodity".

The next step was to try to choke the entire ivory trade and to bring down the high economic pedestal that sustained it. The meeting of the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)



held at Lausanne in Switzerland in October 1989 was surely a historic one for the African elephant. The 103 member nations of CITES voted overwhelmingly to ban indefinitely the international trade in ivory. Major ivory-importing nations, including Japan, Hong Kong, the United States and the European Community, imposed a total ban on imports of ivory. Following this, the ivory trade seems to be heading towards a collapse. The price of ivory has fallen by 90 percent within Africa and by 60 percent elsewhere. In some East African countries, such as Kenya and Tanzania, and in Central Africa there has certainly been a fall in poaching due to the lack of financial incentive and the effectiveness of anti-poaching efforts by governments.



Some African countries were not happy with the total ban on the ivory trade and voted against this at the CITES meeting. These included Botswana, Burundi, Cameroon, Congo, Gabon, Mozambique, South Africa, Zambia and Zimbabwe. The arguments of some of these countries such as Zimbabwe were simple. They were managing their elephant populations well, with the result that elephants were not declining in their countries. In Botswana and Zimbabwe, the elephant population had actually been increasing. Considerable revenue accrued to the country through the sale of ivory. Why, then, the ban, they asked. These countries made it clear that they would flout the ban. Zimbabwe and Botswana proposed the setting-up of a single auction floor, possibly in Botswana, for selling raw ivory from the southern African nations. The auctions would be controlled by a new body and would include Malawi, Mozambique, Zambia and Angola. Perhaps even South Africa would be asked to join later.

It is true that countries such as Zimbabwe did not face the problem of declining elephant populations. Zimbabwe had been managing its elephant populations on a sustainable basis through its culling programme. Its Communal Area Management Programme for Indigenous Resources (CAMPFIRE) gives the local village councils rights over wildlife in their areas. This has generated considerable economic benefits for the community from the sale of elephants and other animals through culling and hunting. It has been estimated that the elephant populations here are growing at a rate of 5 percent per year. Of this, 2 percent is sold for trophy hunting and the rest is available for culling. From sale proceeds of the trophy hunting or photographic safaris, the village councils get a half share. From culled elephants, the villagers get the meat, and the money from sales of ivory and hide is used for the management of wildlife. As the local people have a stake in protecting the wildlife, they also act as guards against poaching by outsiders. Poachers would find it very difficult to operate without the help of the local people. Zimbabwe also has strict anti-poaching laws under which a poacher could be shot on sight.

Zambia is another country which has a similar wildlife management programme. Local villagers are employed as scouts in the protection of reserves. Hunting and culling schemes generate cash that go to the villagers. The result is a sharp decrease in the poaching of elephants. The South Luangwa National Park, which had lost 40 percent of its elephants between 1979 and 1985, has since maintained a steady population. Zambia and Zimbabwe have shown how important it is to enlist the cooperation and assistance of local people if one is suc-

cessfully to fight the menace of poaching.

In Asian countries, poaching for tusks has not been such a serious problem. Ivory poaching is restricted to male elephants, the females do not carry tusks. Unlike in Africa, this selective poaching of males has generally not affected the population growth. Southern India had one of the highest rates of ivory poaching during the 1970s and 1980s. Even here the incidence has come down sharply since 1987 as a result of increased efforts to catch the poachers. The complete ban on trade in Asian elephant ivory and the more recent ban on African ivory have also helped. Burma, however, seems to have a serious problem of poaching along its borders with Thailand. There are reports of large numbers of elephants, presumably both males and females, being shot for ivory, meat and hide. These elephant products are then smuggled into Thailand for sale.

As we enter the last decade of the twentieth century, there is certainly hope for the elephants in Africa and Asia. The speed with which the international community moved in imposing a total ban on the sale of ivory has choked the trade. As poaching has declined, the elephant populations seem poised for a resurgence. When elephants are below the carrying capacity of their habitats they could potentially increase at a rate of between 3 percent and 5 percent per year. If this trend continues, the elephant populations in Africa could double within 14 to 24 years. It is too early to predict how long the lull in poaching will last. It also remains to be seen what course the southern African countries will chart to manage their elephant populations through sustainable harvest. At present there is no market for their ivory. Japan has stopped buying ivory and even China, a major centre of ivory carving, is considering a ban on the trade.

The survival of the Asian elephant depends on the extent of the habitat it can secure for itself. About a quarter of its range is currently protected in some form of reserves, such as a sanctuary or a national park. The rich cultural association between elephants and people can appeal powerfully in favour of its conservation.

The two living species of elephant are survivors of a spectacular evolutionary history of proboscideans over a period of about 55 million years. These intelligent, sensitive and charismatic animals have the potential of acting as flagship species in the global effort to save the multitude of its living creatures and their habitats from destruction. For this reason alone they are priceless treasures that have to be saved for posterity. As V.S. Pritchett put it, when reviewing *The Roots of Heaven*, "If the elephant vanished the loss to human laughter, wonder and tenderness would be a calamity".



# TOURISM AND NATIONAL PARKS

Lyn de Alwis

When the first Duke of Wellington was shown the first railway locomotive, he is said to have exclaimed vehemently 'Progress be damned, this will only mean that people will get about unnecessarily.' His outburst, of course, did nothing to stem the tide of inventions that led to the complex transport industry of modern times. On the contrary, today, over 150 years later, these machines have acted as catalysts in the birth of another industry, namely tourism, which spreads people around the world at a steadily increasing pace.

Some 400 million tourists cross international borders by air, sea, rail and road every year. In doing so they generate huge amounts of money, at times making the industry second only to oil in international trade. Such earnings could mean much to economic development, particularly of the poorer nations if they could attract tourists away from the traditional European and American destinations.

Fortunately, in recent time there has been a tendency for tourism to spread to tropical countries of South and South-east Asia, South America, the South Pacific and Africa, where most developing countries are located.

This has seen the emergence of a new category of tourist, one that wishes to escape the pollution rampant in their own countries and the traditional resorts. It is back to nature for them, the wilderness for its tranquillity or the thrill of coming face to face with rhinos, elephants, lions and tigers, immortalized in the epics of the hunters of yesteryear.

And with rapid transit systems readily available and western currencies in great demand in developing nations, tourists have a choice of African safaris or Asian shikars at very reasonable prices.

Correspondingly, many third world countries perceiving that a share of the tourism 'cake' is within their grasp have made hefty investments on the infrastructure necessary to attract both the high-spending tourist groups or the free independent traveller. Their governments eager to please their new 'benefactors' were even naive enough to soft-pedal the possible negative effects on the social and cultural make-up of their people. These mostly poor people were mesmerised by the tourist dollar and bartered their simple ways of life, their natural resources and cultural artifacts for it. Almost too late, governments realized that a much longer look at this seemingly benevolent industry was necessary and that a long-term tourism plan was essential.

What did these countries have to offer? Apart from warm seas and clean, wide beaches under a tropical sun – which were compelling enough – the lush vegetation teeming with animal life, archaeological treasures and the mysticism of ancient civilizations that were ravaged by time, beckoned tourists to explore and learn. But all these attractions are very susceptible to over-usage and, unless carefully exploited, suffer irreparable damage. There had to be consensus among planners, sociologists, economists and conservationists before these

highly vulnerable assets could be utilized for the promotion of tourism. One of these assets, namely wildlife and hence national parks, forms the subject of this feature.

## The role of national parks

Today, national parks are accessible to the public but 50 years ago their forerunners, the game reserves of Africa and Asia, were the best kept secrets of the colonial rulers. Some purists still believe that national parks, particularly those in Asia and Africa, should not be thrown open to the public but enjoyed only by a coterie of so-called conservationists, researchers and very important people. Fortunately, they have been out-voted and national parks are being recognised as having an important role in tourism.

Actually, national parks have many uses, from affording absolute protection to the animals and plants, through educating visitors on the importance of the natural environment, to recreation derived from observing animals in the peace and quiet of jungle settings.

However, in harnessing a national park as a tourist amenity, both for the indigenous people as well as for foreign tourists, park managers have to tread cautiously lest over-visitation defeats its

*Below: Launching the tourists! Trained elephants from 'Tiger Tops' in Nepal's Chitwan National Park ferry tourists from the airstrip across a river to the lodges from where, later, they will continue into the tall grass on the trail of the great one-horned rhinoceros.*







*Above: "If you want to follow me, you're welcome". The thoughts perhaps of this lone elephant in one of Kenya's national parks. He has other problems on his mind rather than worrying about tourists tagging along.*

very ideals. They must first identify the negative impacts and consciously plan to mitigate them. The biggest danger from too many visitors is the environmental damage that can be caused by construction – of roads, lodges and related infrastructure. These reduce the size of animal habitats significantly and their constant use affects the soil and vegetation, interferes with animal movement and possibly disrupts life cycles and causes air and noise pollution, particularly from the hundreds of vehicles that traverse a park daily. This is bad enough, but if the conduct of visitors does not fall in line with the rules, the park will lose its integrity and become quite meaningless.

### **Park management strategies**

What is the solution to the park manager's dilemma of regulating visitors to a national park? An easy course of action would be to close the park when an arbitrary figure is reached. But limiting numbers in this way would defeat one of the primary objectives, namely, that a national park is created for public appreciation of a country's natural environment. Without valid reason, such a step could also be unacceptable, politically.

Fortunately, through scientific study, trial and error, experience and common sense, an acceptable science of the management of recreation in national parks is available today. This science is based on the application of strategies or a choice of options to avoid damage to the environment. Of course, the manner in which these strategies are applied

depends to a large extent on the nature of the park in question. As stated before, there are two distinct types: those that merely form a backdrop for public recreation, and those that preserve an ecological balance.

Four basic strategies emerge from the science of recreation management. Robert E. Manning, in *Parks* magazine Vol 4 Number 1, lists these as:

1. An increase in supply of available space and time. Available space could be increased by physical expansion (which is not always possible) or by using more of the already existing land for visitor use (most national parks keep certain areas undeveloped). By staggering visitor arrivals it is possible to avoid the 'peak-hour' situation and to ensure that there will be a better dispersal of visitors throughout the day. Similarly the weekend rush can be avoided by differential pricing, or by arranging special tours on week-days, or both.
2. Reduce recreation demand by regulating the length of stay or by spacing out activities that have a high impact on the environment (the latter applies more to parks in temperate countries, which may have hillsides for skiing or lakes for motor boats).
3. Reduce the impact of use by zoning the park, i.e. selecting areas most suitable for certain kinds of use e.g. camp-sites, trekking, fishing, bird-watching, etc. and directing only interested groups to those areas.
4. Improve the resources by park management practices such as increasing the size or number of watering places, improving grazing areas, replacing trees

that have perished, and thereby increasing the carrying capacity of the park.

For developing countries the most attractive option is the first – to increase the number of national parks. It is indeed an imperative in those countries where the natural forests are disappearing at an alarming rate. Such an increase automatically reduces the other negative impacts by dispersing tourists over a wider geographical area. It would also make it possible to close certain parks while keeping others open, e.g. if one park is in the throes of a severe drought in one part of the country and has to be closed, another, say in the hill country, can be kept open. It is politically acceptable, too, to bring more areas under protection as decision-makers see the economic benefits that can accrue from tourism to both the state and the surrounding villages.

It can be said therefore that tourism has become a key factor in the preservation of national parks for posterity. It helps to ease the burden cast on governments to provide subsidies for their upkeep, a situation that was a disincentive to park administrators to dedicate themselves to their task. It makes it easier to convince politicians that in certain instances the declaration of a protected area should be given priority over clearing for development that may yield dubious results.

The impact of tourist development on the villages in the vicinity of the park can cause socio-economic problems. The villagers resent the double blow that has been dealt. On the one hand, they feel that they have been dispossessed of vast areas of their country and, on the other, that the state is using it for what they perceive as the benefit of tourists instead of their own upliftment. This is manifested in the form of organized poaching, illicit clearing and agitation for parcels of land from the park for village expansion, which immediately brings the management into conflict with the politicians, who espouse the cause of the people.

The need, therefore, for the development of a strategy based on scientific study, experience and common sense should be addressed in formulating a management plan for each park, for there has to be a balance between this and development necessary for visitors.

### **Making national parks pay**

There are four principal channels through which tourist currency can be made to flow into the coffers of both the park administration and the tourism department. These are:



1. Fees levied to enter the park and to hire vehicles and guides.
2. Rentals for tourist lodges, tents and restaurants.
3. Fees from observation towers, special 'game' walks, and the use of movie and video cameras (where applicable).
4. The sale of books, pamphlets and suitable souvenirs.

Apart from the hard currency earned directly, there are the intangibles: employment opportunities in the park and supporting services, profits from catering to tourists requirements, production of saleable goods, accommodation outside the park and so on. Properly channelled, these can make a significant contribution to the economy.

### The lure of faraway places

What attracts people to these far-away places? True, the media, especially documentary films on such catchphrases as 'environmental pollution', 'the green house effect' or 'acid rain' arouse interest globally, but there is no doubt that those on animal life are the most appealing. People from urbanized societies that willingly or unwillingly live in 'concrete' jungles are those most appreciative of the natural jungles and crave for even a brief experience within them. Small wonder then that tourists flock to national parks and sanctuaries to see a herd of elephants drinking at a jungle pool or a magnificent tiger lying in dappled sunlight on the forest floor, or listen to a morning chorus of shamas, thrushes and minivets.

East Africa became the Mecca of wildlife tourists and very soon exotic names like Tsavo, Kilimanjaro, Serengeti, the

Ngorongoro crater and Murchison Falls rolled off their tongues as though they were new names for the Tower of London, matadors, Venetian gondolas or the Eiffel Tower. Not only did tourists go on safari, paying thousands of dollars for them, but they also began crusading for the conservation of rapidly dwindling numbers of rhinos, elephants, gorillas and chimpanzees. Enormous sums of money were channelled into research projects to find ways and means of saving both animal and habitat, to fight poaching and stop the illegal trade in ivory.

### National parks in Asia

During this time the Asian scene hadn't yet unfolded. Now at last the emphasis is shifting to countries such as India, Sri Lanka, Malaysia and Thailand. To the adventurous western tourist, the thinly distributed animals in mostly inaccessible jungles in Asia paled into insignificance beside the millions of antelope, zebra and wildebeeste parading the vast open plains of the Ngorongoro and the Serengeti. But suddenly everybody wants to go to Nepal's Chitwan National Park to 'rub shoulders' with the great one-horned rhino, to Kanha in India to 'stalk', with their cameras, the majestic Royal Bengal tiger straight out of Kipling's *Jungle Book*, or to Sri Lanka's Yala National Park to pull up alongside a family group of the most handsome representatives of the Asian elephant.

The elephant has become a flagship species of wildlife conservation in all 13 countries of Asia in which it still occurs. Forged in prehistoric times and surviving mass destruction during waves of European occupation, the unique bond between man and elephant remains indestructible in Asia, and augurs well for the future of this truly magnificent animal in

the wild. (See pages 98-101 for its status.)

It is not merely a bond of sentiment or awe, but one of mutual respect for and trust in each other. One has only to see how proudly a huge tusker, superbly attired for the occasion, carries a shining casket containing sacred relics of the Lord Buddha on its back, or kneels low enough to allow a bridal couple to step into the decorated platform it is carrying, to understand that here is an animal created for a long partnership with man, and a partnership that must be preserved for the benefit of generations yet to be born.

An ever increasing number of westerners are going in search of these incredible encounters. Tourists flock to temple festivals to see elephants in their regalia, to remote villages where some social ritual is in progress or to a forest where they perform the more serious task of hauling timber. And many Asian countries are developing their national parks to make observing elephants simpler. Wild herds can be seen in Khao Yai National Park in Thailand, in India's Kaziranga or Bandipur, but nowhere do they seem to be closer to a tourist than in Sri Lanka's Yala National Park.

### Elephant-spotting in Yala National Park

There, in one of the park's six 'blocks', some 60 elephants mill around in 135km<sup>2</sup> (52 miles<sup>2</sup>) of high forest, rock-scapes and low scrub. Criss-crossed with seasonal streams and interspersed with

*Below: Family groups of Asian elephants take to the water in Yala National Park in Sri Lanka. In this superb open setting in the southeastern corner of the island tourists can watch and photograph groups of elephants, as well as other wild animals, fulfil their relatively undisturbed lives.*





lakes, the scrub frequently parts to give stunning vistas of the blue Indian Ocean. This multiplicity of ecological niches gives rise to prime elephant habitat and its open scenery makes elephant watching from a safe distance the easiest thing in the world.

In a two-hour 'game-run' from 6am to 8am several thrills may be experienced – a lone bull will amble along the main track with no intention of even looking behind him until he finds his own entrance into the scrub, a small family group will be defying orders to grab that last bunch of leaves before going home, or trumpeting mothers will be warning their offspring to stay close to each other. The evening run from 4pm to 6pm is even more rewarding. Herds will converge on the grassy plains or at large watering places and this is when tourists will get their fill of elephant family life. Endearing scenes of young cousins at play, an austere matriarch seemingly interested only in scraping grass off the plain, but actually watching every move of her wards (as well as the tourists) and the hilarious spectacle of adult elephants rolling in the water, often submerged with only the tip of the trunk showing like a periscope, will live long in the memory of the viewer and urge him to return.

If there are scores to be settled by competing bulls, this is the time it is done. The she-elephant in question feeds nonchalantly as the two suitors approach and begin their sparring. The contest is monitored by the leader who, in her wisdom, decides which is the better and cold shoulders the other.

Tourists have only to move around the park slowly and in silence, and the guide, reading the sign language of colleagues in passing vehicles, will take them to other animals that are out that evening – leopard, sloth bear, wild boar and deer. Such scenes in a national park help replace an inborn fear of animals with an understanding and respect for them.

### The way forward

The development of national parks as sources of revenue from tourists is spreading throughout Asia. Besides Chitwan, Kanha and Yala already mentioned, Malaysia's Taman Negara, Thailand's Khao Yai, Indonesia's Ujung Kulaong and China's Xishuangbanna in the salubrious south are parks that are rapidly preparing for tourism's swift march eastwards.

The Khao Yai National Park in Thailand merits special mention here for it provides a model for politicians beleaguered by their constituents opposing the wresting of land from them. Through cooperation between park management and villagers, the latter have formed a conservation society whose members are trained to act as guides within the park.

## The Asian Elephant Specialist Group

On paper, the Asian elephant still has a wide distribution, occurring in 13 countries: India, Sri Lanka, Bangladesh, Nepal, Bhutan, Peninsular Malaysia, Indonesia (Sumatra), Sabah, Thailand, Cambodia, Laos, Vietnam and China. However, this impressive range is misleading, for nowhere are they plentiful, nor is their future assured, as they are driven from their home ranges into ever-diminishing pockets of jungle. Indeed, the total estimated population in its entire range is between 35,000 and 55,000 in 500,000km<sup>2</sup> (193,000 miles<sup>2</sup>) of discontinuous plantation forest and jungle. (See also pages 98-101.)

These countries have not only the elephant in common but also the will to protect them for the benefit of future generations. With the help of the Species Survival Commission (SSC) of the International Union for Conservation of Nature and Natural Resources (IUCN) and the World Wide Fund for Nature (WWF), conservationists in these countries have banded together to form an Asian Elephant Specialist Group (AESG). This group has many objectives but the principal ones consist of compiling scientific information on the threats leading to the decline of the elephant, which will help convince governments on necessary conservation actions, the sharing of knowledge and expertise between countries to help solve problems arising from man/elephant conflict and persuading the people of each country to participate in programmes aimed at protecting elephants and their habitats.

In its 12 years of existence, the AESG has made significant progress. Members feel free to discuss problems and arrive at solutions at the regular meet-

ings and workshops organized in different countries and through the publication of a newsletter. Since 1989, the AESG has maintained an Asian Elephant Conservation Centre in Bangalore, India, which is capable of coordinating all group activities and ministering to the needs of member countries that seek advice in elephant conservation.

To underscore the importance of concerted action, IUCN has recently published an action plan for Asian elephant conservation and is in the process of implementing it. By these timely actions we wish to ensure that the habitat of the Asian elephant will not be further reduced or completely destroyed, as has happened in western Asia, Afghanistan and Java during the last two thousand years.

Despite the thinning out of elephant populations in the countries of its present range, the reverence for these noble animals and the desire to protect them as national treasures have in no way diminished. Backed by international concern and support, the Asian elephant still has a fighting chance to survive the havoc caused by exploding populations' demand for more land for agriculture and economic development. There is fresh hope for them as more nations accept the World Conservation Strategy and prepare their own national strategy based on IUCN's formula that economic development is not feasible without conservation. If we do not work with all our strength and all our determination towards protecting it during our lifetime, we shall be denying posterity the companionship, enjoyment and usefulness of a truly remarkable animal.

The fees charged for this service go to the villagers themselves. Villagers also run cooperative shops close to the park, which are stocked with items required by or of interest to tourists. Furthermore, villagers are permitted to continue collecting the forest products upon which they traditionally depended for their livelihood. A spin-off from this situation is a feeling that the park 'belongs' to the villages and that they stand to benefit from tourism.

Such far-sighted and radical thinking also exists in a few other countries where a symbiotic relationship exists between park managers and villagers. Applying this formula to all protected areas is the best insurance against a demand for settlement within them, and will also enable countries to increase the number

of protected areas for wildlife without meeting the hostility and suspicion that hitherto were the biggest obstacles to taking such a step. And these new areas can be selected for species diversity, climatic variability and watershed and catchment protection.

Through the significant contribution tourism can make towards economic development it can also be recognized as a key factor in the preservation of national parks for posterity. Tourism also paves the way for the local inhabitants on the periphery of national parks and reserves to become partners in conservation. The earlier concept of a national park as a 'Garden of Eden' for the privileged has been replaced by a more realistic perception that 'conservation is the human use of natural resources'.



# HOW TO PHOTOGRAPH WILD ELEPHANTS

It may seem fairly easy to photograph a big beast such as the elephant. If you aim your camera at an elephant you obviously cannot miss getting it somewhere in the frame! To get a *good* picture of elephants, however, is not that easy. As with all other wild creatures, successful photography requires a great deal of knowledge of the animal, proper planning, the right equipment, patience, courage, a good eye for a picture and a bit of luck. If you are very successful, you might even be able to get some of your 'elephants' published!

## Where to find elephants

First of all you have to go to the right places to photograph elephants. Elephants are found in 13 Asian and 33 African countries, but not all of these are ideal places for photographing them. The Asian elephant is mainly an animal of dense rain forest, often in rugged mountainous terrain. In most Asian countries you can spend days wandering through the elephant's habitat without getting even a glimpse of these creatures. Your only way of seeing them may be to wait at a natural salt lick and hope that some of them will visit it. Two exceptions to this are India and Sri Lanka. Here they can be easily seen and photographed in certain wildlife parks.

In India the best places to see elephants are Nagarhole National Park, Bandipur National Park, Mudumalai Sanctuary and Periyar Tiger Reserve in the south, Corbett National Park in the north and Kaziranga National Park in the north east. In some of these, such as Corbett and Kaziranga, the viewing of elephants is seasonal, usually during the dry months between January and April. In all these parks, except Periyar, you can go on elephant-back to see and photograph wild elephants. In Periyar you do it in a different way: you go by boat around a reservoir and see them grazing on the meadows along the shore or even swimming across the lake. One outstanding place in Sri Lanka for seeing elephants is the Yala National Park in the south west.

In Africa there is a much wider choice of places for viewing the savanna elephant than the forest elephant. Amboseli and Tsavo in Kenya, Lake Manyara, Selous and Ruaha in Tanzania, Hwange (formerly Wankie) in Zimbabwe, Luangwa Valley in Zambia and Kruger in South Africa are some of the best places to see the savanna elephant. Zaire, Gabon and Congo are strongholds of the forest elephant, but this is much more difficult to observe.



*Above: Tourists watch and photograph elephants from the verandah of their lodge in Aberdares National Park, Kenya.*

## Choosing the best location

When you visit a park with the specific intention of photographing elephants, the best locations are of course waterholes. Not only during the dry season, but even during the rainy months, elephants come to drink and bathe at a pond or a river. Many parks have watchtowers from which you can safely watch and photograph elephants. Elephants generally begin to come to water after 11am. In the tropics, photography is possible until 5 or 6pm.; after that the light is too poor for good pictures.

A waterhole is a good place to photograph elephants not only drinking, bathing and wallowing, but also in a variety of other situations. A bull may court and mate with a cow elephant, two bulls may have a sparring match, elephants in a family interact socially in many ways, or a sick or old elephant may even come to die at a waterhole. After a bath they may dust themselves and begin feeding on plants in the vicinity. Your goal must be not only to take portraits of bulls or herds, but also to capture some of the interesting and diverse behaviours they indulge in – a calf putting its trunk into the mouth of its mother to sample a titbit, a youngster clambering playfully on another's back, bulls clashing their tusks together or, if you have the nerves, a matriarch staging an impressive mock charge ending in a

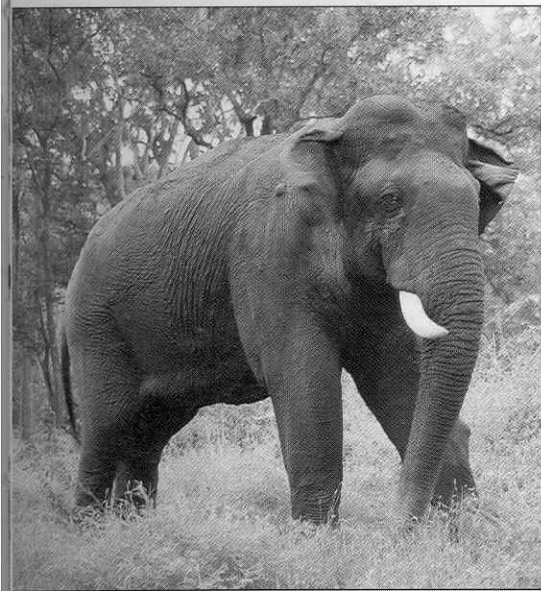
cloud of dust a few paces away from you. You are fairly safe in a vehicle, but make sure that the ignition responds immediately . . . just in case! Elephants can be very dangerous.

## What sort of camera to use?

The camera you use is really your personal choice. A 35mm single-lens reflex is most convenient when travelling. A motor-driven camera is very useful for action pictures of a charging elephant. I have found that the most convenient lens to use when photographing elephants is a 70-210mm or 80-200mm focal length zoom in the medium telephoto range. Most often I end up using the lens at its longest focal length, but many times I have photographed herds or even a single elephant with the lens set at 70mm when I have got very close to them. I also use a 200mm fixed focal length telephoto for the superior picture quality it gives compared to a zoom lens. A 2x converter or a lens of 300mm or 400mm focal length is useful at waterholes, when a herd or a lone bull may be more than 100m(110yd) away. In such cases a monopod or a tripod is necessary to get shake-free pictures.

Unless it is very bright I use a lens at its widest aperture – f4 or 5.6 – in order to go for the highest possible shutter speed to prevent camera shake. A useful rule of thumb is to use a shutter speed that is at least as fast as the focal length of the lens. For instance, with a 200mm lens this should be 1/250 of a second shutter speed.





***Above:** This one-tusked bull Asian elephant was photographed at close quarters with a standard focal length lens. It can be extremely dangerous to approach elephants this close.*

***Below:** When photographing elephants at a distance across a swamp or grassland, a lens with a focal length of 300mm or 400mm can produce dramatic pictures in safety.*



If you have a steady hand you may be able to go down to 1/125 shutter speed. With some support for the camera this can even be as low as 1/60 of a second.

### **Films and film speed**

When you are photographing elephants in the open your best choice of colour transparency film would be one with a speed of 64 ISO, but this is of limited use inside a forest, especially on cloudy days. A film speed of 100 ISO is a good choice for use both in the open and under the forest canopy. You can still manage a 1/125 shutter speed in a forest environment with this film. I do not like the colour balance in transparency film with 400 ISO rating and so rarely use them. Transparency film with a speed rating of 200 ISO is an excellent compromise, which has sufficiently fine grain and good colours. The problem with prepaid films is that you may not be able to get it processed in the country in which you photograph elephants; be sure you have

a supply of prepaid mailers for getting your rolls promptly processed. I also keep a camera body loaded with 400 ISO black-and-white film for use in poor light. The art of black-and-white photography is unfortunately dying out; this is regrettable, because elephants are especially good subjects for this medium.

### **Composing your photographs**

It is important to pay attention to the angle of light when photographing elephants. If you plan to wait at a waterhole for a few days, be sure to take note of the elephants' path to the water and the sun's track during the hours you are going to be present. If elephants are going to be lit from the back when they come for water in the afternoon you may want to shift your position to get more frontal lighting on them. You may wish to take some dramatic silhouettes of elephants during sunset or when they are dusting themselves with red soil. In any case, midday is not a good time to photograph them if the sun is shining brightly. The harsh shadows on the lower half of the elephant do not make an aesthetic picture. You may wait for a passing cloud before clicking in order to reduce the contrast. If you have no other choice, make sure that you expose for the shadows; you may have to overexpose by one stop as compared with what your light meter prescribes. If your camera has matrix metering this may be automatically taken care of. When you photograph elephants in or near water a great deal of light is reflected from the water's surface that fools your light meter into underexposure; open up your aperture by half or one stop to expose correctly for the elephants. In many instances you simply have to be satisfied with whatever you get.

When composing elephants in your viewfinder, pay attention to their habitat. You may wish to take full-frame shots of a lone bull or a family of elephants. All your pictures should not be composed this way. If you have a zoom lens, set it to a shorter focal length if necessary, place the elephants in the foreground and show that forest, lake or mountain in the background. Frame an entire acacia tree along with that elephant standing beneath it. Get a low angle shot if you can, to make the elephants appear even more formidable. But in whatever manner you photograph elephants, do not take foolish chances with them. Both in Africa and in Asia photographers have been killed by their subjects. Take care, have fun and return from your safari intact with pictures to show your friends.