An overview of the status of the Asian elephant

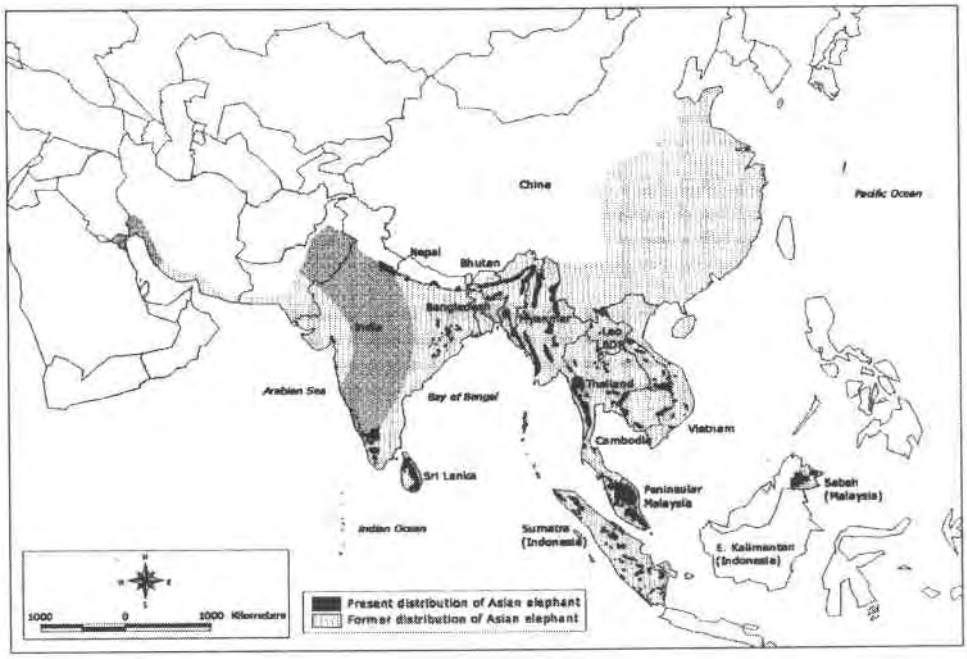
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About 6,000 years ago, at the dawn of human civilization, the Asian elephant (*Elephas maximus*) enjoyed a much wider geographic distribution and higher numbers than it does today. Its range then extended from Mesopotamia in the west across the Indian subcontinent to Southeast Asia and China, as far north at least as the Yangtze-Kiang. Today, as indicated in Fig. 1, the Asian elephant is distributed discontinuously in India, Nepal, Bhutan, Bangladesh, Myanmar, Thailand, Peninsular Malaysia, Sabah (Malaysian part of Borneo), Kalimantan (Indonesian part of Borneo), Cambodia, Laos, Vietnam, south-eastern China, and the islands of Sumatra (Indonesia) and Sri Lanka (Santiapillai and Jackson 1990; Kemf and Santiapillai 2000). A small feral population occurs in the Andaman Islands (India). IUCN lists the Asian elephant as an endangered species, while CITES places it on Appendix 1.

Until recently, three subspecies of the Asian elephant were recognized by zoologists as valid: *Elephas maximus maximus* from Sri Lanka, *E. m. indicus* from the Asian mainland, and *E. m. sumatranus* from the island of Sumatra (Indonesia). From our present understanding of the molecular genetics of Asian elephants though, there is no support for the subspecies status of the Sri Lankan elephant population (*E. m. maximus*) and its differentiation from those in the Asian mainland (*E. m. indicus*) (Fernando *et al.* 2000; Sukumar 2003). However, DNA analysis carried out by Fernando *et al.* (2003) indicates that elephants in Borneo, on the basis of their genetic distinctiveness and evolutionary history, may constitute a separate subspecies, *E. m. borneensis*, thereby extending the natural range of the Asian elephant by 1,300km. More recent studies of elephant genetics (Fernando *et al.* 2000, 2003; Vidya *et al.* 2004) are beginning to provide a much better understanding of the evolutionary history and population genetic structure of the species across its range; such information provides a firmer basis for conservation priorities and management decisions.

The total population of Asian elephant in the wild is estimated between about 36,000 and 52,000 (Table 1). Country populations vary from perhaps less than 100 in Vietnam to well over 24,500 in India. Although there are only about one tenth as many Asian as African elephants (*Loxodonta africana*), much more international attention has been focused on the latter in recent years. While the African elephant's misfortune is its tusk for which it is being killed in large numbers, as far as the Asian elephant is concerned, given that some males and all females lack tusks, ivory poaching cannot be the terminal threat it is in Africa (Dawson and Blackburn 1991). Nevertheless, the lust for 'white gold' has a serious impact, for when tuskers are killed before they have bred, their valuable genes are lost forever and, as such, tusklessness could ultimately become the norm (Santiapillai and Jackson 1990). Regional variation in the number or proportion of tuskers in the male segment may reflect the intensity of past hunting for ivory or selective capture of tusked males, a process that has been going on for thousands of years. The Roman chronicler, Pliny commented in AD 77: "Large elephant teeth are now rarely found, except in India, the demands of luxury having exhausted

Fig. 1 Former and present distribution of the Asian elephant



all those in our part of the world". He was referring to the Mediterranean basin where both African and Asian elephants were found, for sub-Saharan Africa with its innumerable elephants, was then unknown. Thus, the predominantly tuskless bull populations of Sri Lanka and the considerable numbers or proportions of tuskless bulls in north-eastern India and Myanmar may reflect this historical process of human selection against tuskers (Tiedemann and Kurt 1995; Sukumar 2003).

In recent decades, ivory poaching in southern India has progressively skewed the adult male:female sex ratio in several populations, in some instances such as the Periyar Tiger Reserve, to extreme values (Sukumar 1989; Ramakrishnan *et al.* 1998). At the same time, large-scale hunting of elephants for not just ivory but also meat, hide, and other products has reduced their populations significantly over a wide area from Myanmar to Vietnam in Southeast Asia (Menon 2002). Thus, the elephant population of Vietnam has plummeted to perhaps below 100 individuals at present while that of Cambodia is believed to be only a few hundred.

Table 1.. Estimated minimum and maximum number of elephants in the wild in Asia.

Country		Area (km²)	Elephant range (km²)	Minimum - Maximum
Bangladesh		147,570	1,800	190-230
Bhutan		46,600	1,500	250-500
Cambodia		181,035	c. 40,000	400-600
China		9,579,000	2,500	170-200
India		3,287,590	110,000	22,800-32,400
	South		(39,500)	(10,300-17,400)
	Central		(23,500)	(2,400-2,700)
	North-east		(41,000)	(9,200-11,300)
	North-west		(5,500)	(900-1,000)
Indonesia		1,919,440	105,000	1,180-1,500
	Kalimantan	(550,200)	(c. 5,000)	?-?
	Sumatra	(524,100)	(c. 100,000)	1,180-1,557
Laos		236,800	c. 20,000	780-1,200
Malaysia		329,750	c. 45,000	2,250-3,000
	Peninsular		(c. 20,000)	1,251-1,466
	Sabah		(c. 25,000)	1,100-1,600
Myanmar		678,000	115,000	4,000-5,300
Nepal		141,400	c. 2,500	100-130
Sri Lanka		65,610	c. 15,000	2,100-3,000
Thailand		513,115	25,000	2,500-3,000
Vietnam		340,000	c. 3,000	70-100
Total		17,465,910	486,800	36,790-51,160

Most important in parts of Asia are habitat loss and fragmentation, and the pressures of an expanding human population, which in turn leads to increasing conflict between man and elephant. Competition for living space and natural resources has resulted in a dramatic loss of forest cover, reduced elephant numbers in the wild, and increased human suffering through conflict with elephants. The absence of good data, and the difficulty of counting elephants that live in dense tropical forests, mean that it is almost impossible to precisely quantify the decline in Asian elephant numbers, but it can be safely assumed on the basis of available information, that there has been a substantial reduction in elephant populations in many Range States in recent decades. In many Asian countries, elephants are being destroyed simply because they interfere with agriculture. The long-term future of elephants outside the Protected Areas (PA) is inextricably linked to the tolerance of humans. Asian elephants live in the region of the world with the densest human population, growing at a rate of between 1-3% per year. Clearance of forests for settlement and agriculture is disrupting traditional elephant movement paths and leading to violent clashes between humans and animals when elephants raid crops, especially along the boundaries of PAs (Kemf and Santiapillai 2000). Because the elephant requires much larger areas of natural range than any other terrestrial mammal in Asia, it is often the first species to suffer the consequences of habitat fragmentation and destruction (Santiapillai and Jackson 1990). In some places, agriculture and human settlement are resulting in continuous contraction of its habitat. Because of its great size and intemperate appetite, the elephant cannot co-exist with people in areas where agriculture is the dominant form of land-use, and the conversion of forested areas for agriculture has had serious consequences. In extreme cases, elephants have been confined as so called 'pocketed herds' in small patches of forest in landscapes dominated by man. Such 'pocketed herds' represent an extreme stage in the human-elephant conflict (Olivier 1978).

Hundreds of people and elephants are killed annually in the conflict between man and elephant. The human-elephant conflict has emerged as one of the biggest conservation issues in Asia, an urgent challenge facing governments today. People living in elephant areas should be assisted in protecting their homes so that they do not turn hostile towards elephants. In some situations, compensation should be paid to the villagers for loss of crops (Kemf and Santiapillai 2000). As Ferrar (1983) argues, there is a relationship between tolerance of wildlife and human population density, for at any but the lowest density, large wild animals and humans are fundamentally incompatible. This incompatibility increases rapidly as both animal and human densities increase. Elephants are incompatible with peasant agriculture unless the damage they cause is compensated (Child 1995). This is the crux of the human-elephant conflict in Asia, and it is leading in just one direction: the destruction and eventual elimination of elephants from agricultural areas, unless innovative measures are adopted to address the concerns of the farmers. Ways to minimize the human-elephant conflict need to be devised as one of Asia's highest conservation priorities (Kemf and Santiapillai 2000). The management of human-elephant conflict has to be integrated into a proper land-use policy and it must also recognize the elephant as an economic asset. If local people could perceive the elephant as an economic asset instead of an agricultural pest, then they will tolerate it in their neighbourhood (Child 1995). Unless people value living with elephants, the slaughter will go on. Given that the human-elephant conflict is already bad today, it may become worse tomorrow. Even if we cannot eliminate the conflict altogether, we need to reduce it to tolerable levels. The rapidly changing socio-economic and cultural contours of South and Southeast Asia are also bound to change the human-animal relationship and hence it is imperative that steps are taken to mitigate the conflict.

Changes in land-use patterns are resulting in continuous contraction of habitat available to the elephant, whose range has already declined from over 9 million km^2 in the distant past to less than 500,000km^2 at present (Sukumar 2003), and continues to fragment and isolate elephant populations through the 13 countries in which they still live. Asian elephants are forest animals that require shade, unlike the 'bush' elephants of Africa, which are able to better tolerate the sun. Therefore, conservation of forests is crucial to saving the Asian elephant (Santiapillai and Jackson 1990). Elephants also need access to areas with permanent water and which provide adequate browse and grass, both important components of their mixed diet.

The Asian elephant is one of the last few megaherbivores (i.e., those plant-eating mammals that reach an adult body weight in excess of 1,000kg) still extant on earth (Owen-Smith 1988). The two sexes initially grow at the same rate but in males, after puberty there is a marked acceleration in the growth - the post-pubertal growth spurt - leading to great differences in the size of mature males and females. Hence, adult bulls are taller and twice as heavy as adult cows; a 50-year old bull in healthy condition could reach 6,000kg in some regions.

The basic social unit among elephants is the family, consisting of an adult cow and her immature offspring. Elephant society is multi-layered, ranging from the mother-calf or nursery unit, through the family unit, the 'kin' or bond group (2-5 family units which associate frequently), the clan (a number of family units and bond groups in an area that coordinate their movements), the subpopulation (a number of clans using a particular part of the range), to the whole population as with the African species (Moss and Poole 1983; Moss 1988; Sukumar 1989; Baskaran *et al.* 1995). Females remain in the cow herds of their birth, which are essentially a matriarchy being led and coordinated by the oldest reproducing cow, who is also probably the mother, aunt or grandmother to most of the rest of the herd members. Such a female-centred or matriarchal nature of Asian elephant society was known

to some astute naturalists of the 19th century (Sanderson 1878). Using molecular genetics, Fernando and Lande (2000) have confirmed that elephants constituting a group could be related to one another. Larger herds with older, more experienced matriarchs are more successful in exploiting high quality habitats, and thus ensure better survival of young. Herd size ranges from 8-20 animals. The matriarch's presence is crucial to the survival of the herd, for she is the repository of knowledge.

While females become sexually active between 9-12 years, males reach sexual maturity between 12-15 years, at which time they disperse from their natal herds to prevent inbreeding. Adult bulls live alone, or in small temporary groups ('bull herds') with weak social bonds. The composition of the bull groups changes both in space and time. Bull elephants exhibit the phenomenon of *musth*, analogous to the rut in deer, during which testosterone levels in blood soar to much higher levels than usual. Although the secretions of the temporal glands are associated with heightened sexual activity and aggressiveness among bulls, males can successfully mate with females even in the absence of musth. Elephants are extraordinarily vocal animals; their auditory communication extends down into the infrasound range that is not audible to humans (Payne *et al.* 1986). Females are in estrus only for a short time every 14-16 weeks, and they announce their brief receptive periods through chemical, auditory and behavioural signals increasing the likelihood that multiple males will be available as mates to choose from. Older males and those in musth generally have higher chances of mating; Females have a long reproductive period, from about 12 to 60 years, during which time they could produce as many as 12 calves. From the moment a calf is born, after a gestation period of nearly two years, it becomes the centre of attention of the herd, fussed over and cared for by the herd members (Moss 1988). Female helpers known as 'allomothers' are important in the rearing of calves (Gadgill and Nair 1984). A calf that is born into a large family with several allomothers has a better chance of surviving than one born into a small family with few or no allomothers (Poole 1994).

Elephants are less discriminating than other herbivores in what they eat. They browse and graze on a variety of plants but their proportions vary both in time and space. During the dry season, 70% of an elephant's diet is browse, while in the wet season, grasses make up the major part of the diet when available (Sukumar 1989). Elephants may feed on over a hundred plant species in an area but plants from just a few botanical families may account for most of their total intake (McKay 1973; Sukumar 1989). Fruits are an important component of their diet in rainforests (Olivier 1978). Elephants may also include bark, which contains minerals such as calcium and also provides roughage. As the elephant does not have a rumen, cellulose is digested in the large caecum and the colon, with the help of symbiotic microorganisms. The passage of food through the gut is fast, and the ingested food is only partially digested, with about 40-50% ending up as waste. Elephants may spend 12-18 hours a day feeding, during which they may consume up to 10% of their body weight as fresh weight fodder (Vancuylenberg 1977; Sukumar 1989). They also defecate about 16-18 times a day, producing large quantities of dung. The recycling of dung is very important for nutrient cycling of the ecosystem and also helps disperse seeds.

Asian elephants do not seem to make long distance migrations as their cousins do in semi-arid Africa. While home ranges of individual African bush elephants (*Loxodonta africana*) may stretch across thousands of square kilometres, those in Asia tend to be rather smaller. Radio-telemetric studies carried out in India (e.g., Baskaran *et al.* 1995; Sukumar *et al.* 2003) and in Sri Lanka (e.g. McKay 1973; Fernando and Lande 2000) indicate home range sizes of 250-1,000km^2 for family herds in Indian populations but a much more restricted 50-150km^2 in Sri Lanka. The area over which elephants move is dependent on the availability of food and water. Where both are plentiful throughout the year, elephants may move over relatively small distances, but elsewhere they may move over much larger areas to find nourishment. Regional information on home range sizes and elephant movement is thus important for conservation planning.

The relationship between man and elephant in Asia is so unique that the animal has become a sacred and beloved symbol to millions of people. The association of the Asian elephant with man began in the misty past, thousands of years ago. Perhaps baby elephants, isolated from their herds, were tamed by forest people, who found they could be ridden and taught to obey commands. Ancient Hindu works refer frequently to elephants, and one of the most popular gods to this day is the elephant-headed Ganesh, son of Siva, one of the most important deities of the Hindu Pantheon, and his consort Parvati.

White elephants are believed by man to be the reincarnation of Lord Buddha and wars have been fought over them (Kemf and Santiapillai 2000). As Lahiri-Choudhury (1988) points out, it is difficult to imagine India without elephants, for they are so much a part of its history, myths, culture and religion. In Sri Lanka, elephants continue to figure in pageantry and religious festivals. A caparisoned tusker, escorted by other richly-decorated elephants, carries the reputed tooth of Lord Buddha in stately procession at the annual Esala Perahera in Kandy. Many Hindu temples in south India maintain captive elephants in stables for ceremonial occasions. Thailand reveres the sacred white elephant. But the species that once adorned flags and ancient temple grounds of royal kingdoms is in grave danger today. A pragmatic synergy of scientific knowledge, cultural pride and political will is needed today to ensure that the elephant, among the last of the megafauna, survives in the coming decades and centuries.

Given the broad habitat requirements and the present distributional range of the species across the rich tropical

forests of Asia, including several so-called 'hot spots' of biodiversity such as the Western Ghats/Sri Lanka, Indo-Burma and Sundaland, it is often regarded as an 'umbrella' species; hence, any conservation programme for the elephant will also confer protection for a number of other species living with the elephant. The Asian elephant is also one of the world's most important charismatic 'flagship' species. The elephant is also known as a 'keystone' species, to emphasize the vital role it plays in the structuring of natural communities (Dublin *et al.* 1997). Thus, the conservation of the elephant will ensure the maintenance of biological diversity across a much larger area.

The conservation of the elephant in Asia is of international significance, but linked inextricably to the welfare of the people with whom the animal shares the land and resources. Reconciling conservation of the Asian elephant with human interests has to be given the highest priority. This is the aim of this Action Plan.

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