*GAJAH 18: 21- 39*

# THE ASIAN ELEPHANT CONSERVATION: A GLOBAL STRATEGY

Charles Santiapillai
Department of Zoology, University of Peradeniya
Peradeniya, Sri Lanka.

## INTRODUCTION

The Asian elephant *(Elephas maximus)* represents one of the most seriously endangered species of large mammals in the world. While there are over 600,000 African elephant *(Loxodonta africana)* ranging across a total land area of 4.5 million km², in 33 countries in Africa, even optimistic figures indicate that there are no more than 60,000 free-ranging Asian elephants, inhabiting a total land area of only 500,000 km² in 13 countries stretching from India in the west to Indo-China in the east. While the African elephants misfortune is its tusks, as a result of which the ivory poachers have almost halved the number of African elephant's during the past two decades, elephant poaching is a relatively minor problem in Asia today, since the tusks are lacking in females and only a proportion of the males possess them. Hence, ivory poaching cannot be considered the terminal threat to the Asian elephant as it is in Africa (Dawson & Blackburn, 1991). The Asian elephant is threatened by habitat loss and fragmentation as a result of burgeoning human population and its aspirations for a better quality of life (Santiapillai & Jackson, 1990). The major conservation problem is the exploitation of the elephant habitat leading to qualitative degradation and fragmentation of the habitat. Dams and reservoirs have submerged prime valley-habitats of elephants and disrupted traditional migratory patterns and fragmented habitats. The elephants in Asia have lost so much of their former habitat that they are often forced to invade the communities that have displaced them, thereby leading to increased conflicts with man. Without immediate imaginative action, serious political will and an unprecedented level of international cooperation, the elephant, like the Blue Whale and the Black Rhinoceros, will be on the fast track to extinction in most countries in Asia.

The key question is not just how many elephants Asia has at present, but how many elephants will Asia be able to support by the middle of the 21st century, when given the current rate of growth, its human population would have doubled, and the forest cover halved? Unless we are prepared to combine good science with strong population control and political will, the future of *Elephas maximus* in Asia will be grim.

together for thousands of years in the past, and they will have to live together in future through mutual adjustment. This objective has to be achieved in the context of continued increase in the human population, rising living standards, and the need for land for agriculture and settlement. It will not be possible to save all of Asia's elephants, but losses can be kept to a minimum if economic development plans take into account the needs of elephants, and planning for elephant conservation takes into consideration the needs of local people.

Conservation of the elephant in Asia depends on the political will and concerted action of the Government agencies involved. Without political will and commitment, the implementation of many of the conservation recommendations outlined here will be impossible. Government commitment and action must be based on sound ecological, economic, and cultural arguments for conservation of elephant in the light of their positive and negative impacts on the environment.

## *STRATEGY*

The Global Strategy for Asian Elephant Conservation (GSAEC) has the following six broad components: (A) Field Actions, (B) Legislation and Trade-related Actions, (C) Political Actions, (D) Scientific Research, (E) Public Awareness, and (F) Fundarising.

## A: FIELD ACTIONS

### *1. Management of Priority Elephant Populations*

Field actions are designed to provide immediate protection to key elephant populations followed by strengthening of wildlife coservation programmes in important Asian elephant range states over the next five years. The fragmentation of wild elephant habitat requires mangment plans that take into account a range of population sizes. Each country needs national management goals for coserving its elephants.

The Population size categories used in the Action Plan relate to the so called "Effective Population Size" (EPS). The EPS is roughly the number of animals within the population that are breeding and passing on genes to the following generation. Imbalance in the sex ratio of adults results in a decrease in the EPS. Sex ratio imbalances are common in Asian ellephant populations because mortality factors, mainly poaching, favour the loss of males. Estimates of Effective Population Size ($N_e$), are mad, as a first approxmation, on the basis of the formula:-

$$N_e = 4\, N_m \times N_f / (N_m + N_f),$$

where $N_m$ and $N_f$ are the numbers of breeding males and females respectively.

The value of Ne decreases with an increasingly disparate sex ratio (Sukumar, 1989). The ratio of $N_e/N$ gives an estimate of the extent to which the EPS (hence the gene pool size) deviates from the census population size Taking a hypothetical example of a large populaion 2000 animals, it is likely that only 50% of these (or 1,000 animals) with be adults. Assuming an adult male: adult female sex ratio of between 1:3 and 1:5, the above formula gives an EPS for such a population of between 555 and 750 animals (Santiapillai & Jackson, 1990)

Ideally, the minimum size needed for long - term survival of elephants is 500 breeding individuals, with a prevailing sex ratio of I adult male for every 5 adult females, which will translate into a total population size of about 2,200 elephants (Sukumar, 1989; Santiapillai & Jackson, 1990). This number has the potential for continued evolution based on natural selection, during which loss of genetic variation by drift might just be balanced with replacement through new mutations.

Careful attention must be paid to the demography, age structure, sex ratio, mortality, fecundity, and trends in each population to avoid demographic catastrophe or accidental loss of genetic variability. It follows that the highest priority should be given to maintaining the integrity of known populations of 2,000 or more elephants (Sanitiapillai & Jackson, 1990). However, the reality is that most elephant populations are much smaller, and hence the recommendations that follow have been devised for four basic population size categories, which require different levels of management effort.

Populations of 500 to 2,000 animals will require minimal genetic intervention in the next 100 years (about five elephant generations). Every effort should be exerted to maintain or allow an increase in these populations, and considerations should be given to the introduction of new genetic material (one breeding bull per generation is considered adequate). These populations can be managed as part of a national or regional population to achieve the goal of a naturally reproductive population of 2,000 + animals.

## *1.0 Population of more than 2,000 elephants*

**1.1 South India: Nagarhole - Nilgiris - Eastern Ghats elephant population:** This population consists of 3,600 - 4,300 animals (Sukumar, 1989). During 1981 - 1983, with an observed adult sex ratio of 1:5 in favour of females, this population translated into an effective population size, EPS (Ne) of 840 breeding individuals, sufficient to counter the loss of genetic variation through drift (Sukumar, 1989), However, by 1987 ivory poachers reduced the population of adult males from 7% to 4.5% of the population, with the consequent reduction of the EPS to about 574 breeding individuals.

This shows how changes in sex ratio alone, without any significant drop in total numbers, can lower the genetic fitness of an elephant population (Sukumar, 1989). Therefore, inter-state cooperation in manaing the area should be improved in order to maintain forest corridors and improve anti-poaching measures. Habitat should be conserved and rehabilitated by controlling exotic weed plants which suppress natural vegetation, and througth resettlement of people.

**1.2 North-east India: Bhutan-Arunachal Pradesh-North Assam elephant population:** Forest should be conserved, particularly in the foothill areas where agricultural encroachment is taking place on the southern fringe of the Himalayas. It is important to maintain the forest corridor along the foothills from North Bengal to Arunachal Pradesh via Bhutan and Assam. Even so, it may not be possible to conserve sufficient habitat to maintain a contiguous Population of more than 2,000 elephants.

**1.3 North-east India: Meghalaya elephant population:** A large elephant population estimated to be between 2,500 and 3,000 animals in known to occur in the Garo hills and Kashi hills of Meghalya. Sufficient habitat is not likely to be conserved to maintain a contiguous population of more than 2,000 elephants. It is more probable that the population will be fragmented. Pockets of fewer than 500 elephants should be managed overall as a meta-population.

## *2.0 Population between 1,000 and 2,000 elephants*

**2.1 North-east India: Nagaland-Assam (south of Brahmaputra) elephant population:** The estimated population size in this area was 1,900 animals but it is unlikely that such a high population could be maintained in the future at this level. Elephant range in Kaziranga National Park (whose area is proposed to be extended from the current size of 378.22 km$^2$ to 865.71 km$^2$ (Assam Forest Department, 1995). The Population should be managed as a population of 1,000+ animals, with exchange of adult bulls once every 20 years from other populations. Forest corridors with Myanmar must be maintained.

**2.2 Myanmar: Myitkynia-Bhamo elephant population:** is estimated to be 1,637 in 1982. Today it is likely that this elephant population might have declined both in range and number. The emphasis must be on strengthening the elephants' forest habitat and control of poaching. Large tracts of forest should be maintained for the survival of elephants and other wildlife.

**2.3 Myanmar : Kachin-Shan Yoma elephant population:** Myanmar's best hopes for elephant conservation lies in the northern states of Kachin and Shan which are estimated to support a population in excess of 1,000 animals. The population should be managed as a meta population, with the exchange of adult bulls once every 20 years.

**2.4 Myanmar : Elephants in the Western Hill Ranges :** The extent and degree of connections between elephant population (including connections with those in India and Bangladesh) needs to be assessed. It is possible that these elephants form part of a larger population of well over 1,000 animals. Protection of habitat is essential.

**2.5 Sri Lanka: Elephant population in the South and South-east:** Plans to establish forest corridors to link the system of national parks in the south and south-east of the island should he carried out to ensure the conservation of a contiguous population of more than 1, 000 elephants. The population will however, need serious management to reduce human-elephant conflicts.

**2.6 Malaysia : Elephant population in Sabah:** The amount of available lowland forest habitat in Sabah of about 10,000km$^2$ could support a viable population of about 2,000 elephants. The entire elephant population of Sabah has a high potential of long-term survival, given the resources available to the Sabah State Government. For elephant conservation to succeed here, there is no need to stop logging completely. It only needs to be controlled to make timber extraction compatible with elephant conservation.

## *3.0 Populations of between 500 and 1,000 elephants.*

**3.1 Northwestern India and Nepal:** About 500 elephants are known to inhabit the Himalayan foothills in the Terai forest region between Northern India and Nepal but it is feared that the population could easily decline as a result of the on going expansion in the agricultural areas in the vicinity of elephant ranges. The population is therefore better managed in the future as a samll population numbering less than 500 animals. Consevation of a forest corridor from Chilla to Motichur is of im portance. Threats to the elephant habitat come from the Ramganga reservoir, the Rishikesh-Chilla power channel and a proposed paper mill (Sukumar, 1989).

**3.2 South India: Elephant population in the Nelliampathi-Anamali-Palani Hills area:** This area includes two important elephant sanctuaries: the Parambikulam (270 km$^2$) and the Anamalai (958 km$^2$) sanctuaries are known to support an elephant population estimated to be between 800 and 1,000 animals (Sukumar, 1989).

**3.3 South India: Elphant population in the Periyar - Elamalai - Varushanad Hills:** The reservoir on the Periyar river provides year - round supply of water to a population of elephants estimated to number between 700 and 900 animals. The area includes the well known Periyar Tiger Reserve (777 km²).

## *4.0 Populations of less than 500 animals:*

Each country should review its list of populations fewer than 500 elephents. The effective population size is calculated as four times the number of breeding males multiplied by the number of breeding females divieded by the sum of breeding males and breeding females. Populations of 500 animals will always have an effective population size of less than half that number and this will be further reduced if the sex ratio becomes disorted or if the contribution of adults to breeding is very unequal. Even populations more than 500 animals might have distrotedly low effective population sizes, and should be managed accordingly.

Poaching of adult males is significantly distoring the sex ratio in some populations, with the result that the effective population size (those animals actully contributing genes to the population) is reduced and the rate of genetic drift (the loss of genetic material through random events) is increased. These two factors threaten the long - term survival of a number of populations of the Asian elephant across its geographic range. The species will gradually lose the ability to respond to environmental change by adaptation. These changes dictate that the principles of small population biology will play an essential role in the conservation and management of the Asian elephant in the wild.

Country management plans should include the following elements:-

- ❒ an assessment of the current population, reliability of census data, and data on the sex ratios of population of adults and age structure of each population.
- ❒ assessment of remaining habitatas where evidence from various sources suggest that elephant populations could be increased.
- ❒ plans for genetic management
- ❒ careful consideration of mangement procedures that lead to minimal human - elephant conflict.

Following the principles of small population biology, each country should manage its small, fragmented populations as a single large population through translocations within the group. If the total country population is less than 2,000 animals, (e.g. Cambodia, China, Bangladesh, Bhutan, Kalimantan, Laos, Nepal, Peninsular Malaysia and Vietnam), international cooperation in exchanging animals is recommended. Bhutan and Vietnam have less than 600 elephants, but these

form parts of much larger populations in India and Laos respectively. Part of a population in Bangladesh may be contiguous through India with those in Myanmar.

**4.1 Elephant populations numbering less than 500 animals** but still capable of long-term viability under strict protection and management occur throughout Asia. These populations should not be overlooked in any conservation programme as being " doomed". Some of the important samll populations inculde the following:-

***India:*** Agasthymalai-Ashambu Hills in South India, with an estimated population of 150 - 200 elephants.

Nilambur - West and South Nilgiris - Ataapadi Hills in South India is Known to support an estimated population of between 300 and 500 elephants in an area of 1,700km$^2$.

Simplipal Tiger Reserve: About 375 elephants are known from this reserve in Orissa. The populations inhabits a total area of 2,750 km$^2$. Satkosia Gorge Sanctuary in Orissa with a land area of 1,274km$^2$ is known to support a population of 300 elephants.

In Bihar, there are three distinct populations of elephant inhabiting the Palamau Tiger Reserve (1,000 km$^2$), Singhbhum tract (2,250 km$^2$) and the Dalbhum tract (250 km$^2$). It is best to regard and manage these elephants as belonging to a metapopulation.

***China*** China's last remaining elephants estimated to be between 330 and 370 animals (Santipillai *et al.*, 1994) occur in the Xishuangbanna Nature Reserve to talling 2,420 km$^2$.

***Sri Lanka*** The entire complex of Ruhuna National Park (1,268 km$^2$.) of scrub forest habitat supports between 350 and 400 elephants (Santiapillai & Jackson, 1990).

Gal Oya National Park and environs, totalling 630 km$^2$, is known to be inhabited by an elephant population estimated to be between 300 and 325 (A.B. Fernando, pers comm.)

Lahugala - Kitulana national park, situataed in the basin of the Heda Oya in the Eastern Province of Sri Lanka, despite its small size (1,554 ha) provides rich feeding grounds for a known population of about 150 elephants which regularly untilize the Beru (*Sacciopelsis interrupta)* grasslands (Jayewardene, 1994). The preservation of these grasslands is vital for the long term survival of the elephants.

***Thailand*** Huai Kha Khaeng - Thung Yai wildlife sanctuaries together with the adjoining Sri Nakarin and Erawan national parks cover an area of 6,900 km² of good elephant habitat, where about 300 + elephants are known to occur (Dobias, 1987).

Phu Kradung- Nam Nao national parks and the Phu Khieo wildlife sanctuary located on the Phetchabum mountain range in North - central Thailand, with a total area of 2,870km² is inhabited by an elephant population estimated to be between 250 and 300 +(Dobias, 1987).

Khoa Yai-Thap Lan-Phang Sida national parks complex, with a total land area of 5,252 km² is estimated to support more than 250 elephants (Dobias, 1987.)

Maenam Pha Chi wildlife sanctuary-Krachen national park complex located southwest of Bangkok on the Tenasserim Mountain range bordering Myanmar, is about 2,967 km² in area, with an estimated elephant population of more than 2000 animals (Dobias, 1987).

***Myanmar***: Alaungdaw Kathapa national park, with an area of 1,607 km² represents one of the best managed conservation areas in Myanmar. It is known to support a minimum of 101 animals estimated on the basis of dung density (U Myint Aung, 1994). However, it is possible that there could be much more than about 100 animals and therefore conservation of this important elephant population must rank a high priority, despite its small size.

***Sumatra*** : Lampung Province: Way Kambas national park, with an area of 1,230 km² represents a rich elephant habitat since the area was previously logged. The lowland secondary forest in the park is inhabited by an elephant population of between 200 and 250 animals (Santiapillai & Suprahman, 1995).

Riau Province: There are at least three viable populations of elephant in North Central Riau (200- 250 animals); Southern Riau (200 - 250 animals) and Siak Kecil Game Reserve (100 - 200 + animals). Although much of the lowland forests in Riau has already been converted to other land uses, the elephant populations are too valuable to be ignored. Poaching is a serous problem here.

Aceh Province: The Gunung Leuser national park, with a total area of 7,927 km², is known to support an estimated population of elephants numbering between 290 and 450 (Tilson *et al.,* 1994). In addition, there are two additional areas, Western Aceh and North - eastern Aceh, where the populations of elephant are estimated to be between 30 - 350 and 350 - 400 respectively (Tilson *et al.,* 1994).

## II. Doomed Elephant Populations

Doomed Populations are those which have no future because they are few in number, have poor or no breeding potential, or will lose their habitat to development projects. Doomed elephants can be translocated to suitable habitat where there are elephant populations well below the carrying capacity, or they can be removed for domestication.

## III. Establishment of Managed Elephant Ranges (MER) and Protected Areas

Each Asian country where elephants occur in the wild, should develop a network of protected areas for elephant conservation. Such areas are of critical importance. They need to be of sufficient size and ecological diversity to accommodate flourishing populations of elephant. It is not sufficient to maintain a so - called " Minimum Viable Population" (MVP), as this does not have the ability to withstand natural hazards and fluctuations in elephant populations. The objective should be to maintain an elephant population in a protected area at least double the MVP. Protected areas provide the necessry sanctuaries for elephants from human activities. They should be part of larger Managed Elephant Ranges (MER) to provide sufficint space for elephant movements. In a Managed Elephant Range, priority is given to the requriements of elephants, but compatible human activites are permitted, such as sustained - yield harvesting of timber, slow rotataion shifting cultivation, control of livestock grazing, and subsistence hunting. Priority must be given to elephant requirememts. Controlled logging can contribute to making good habitats for elephants as regrowth and secondary vegetation often provide excellent food resources and can manitain lager elephant densities than primary forest. MERs are complemetary to, and not a substitute for, protected areas.

## IV. Mitigation of Human- elephant conflicts

Ideally, reserves should be designed to provide for elephant needs so that the stimulus to move elsewhere is minimized. However in present conditions, elephants are likely to clash with human interests in many places. Depredation of crops (such as oil palm, rubber, sugarcane, rice, cereals, millet etc) costs millions of dollars every year in some countries, and manslaughter by elephants is a serious problem. Elephants kill about 100 - 150 people each year in India alone. The elephant will be accepted by the local people only if its impact on human interests can be minimized.

Elephant movements can be controlled by the use of barriers of various kinds to exclude them from areas used by people or to keep them in reserves. Natural barriers are to be prefered, such as belts around protected areas, or Managed Elephant Ranges, where crops which would attract elephants are not grown. Nor should there be water sources which elephants would use. A belt of

at least one kilometre of land inhospitable to elephants should be maintained in order to minimize conflict with people. Crops such as tea and oilseeds are suitable for planting, as they are unpalatable to elephants. Other types of barriers may be used, such as:-

- trenches, provided they are in solid soils and well maintained, otherwise elephants will soon make breaches. Elephants can also erode the trenches (Elephant Arse Erosion, or EAE). Trenches seldom survive rainy seasons, and the maintenance costs are high.

- High voltage electric fencing, which gives a sharp, short, safe but memorable shock to the unsuspecting elephant. This can be every effective and relatively cheap compared with other methods. Several thousand kilometres have been erected in Malaysia and it has been calculated that, over a period of five years, they may save crops valued at as much as 70 times the cost of installation. Such fences need sound maintenance and monitoring to ensure that they are in good working order.

- Steep sided canals which elephants cannot enter. Crossings for elephants can be constructed at carefully selected points, bearing in mind known elephant movements and preferences.

- In emergencies, trained elephants *(koonkies)* can be used to chase marauding wild elephants away.

Adult male elephants have been observed to raid crops more frequently than females and to damage more crops in each raid. Most instances of manslaughter are also by male elephants. If there is no there option but to capture or destroy crop raiding elephants, only adult males should be removed. The effect of culling males from the population will not only reduce conflict to a greater extent than removing females, but will also have the least impact on the population's fertility and growth. When a small number of elephants are in regular conflict with people, they should be translocated or captured and domesticated, if they could be put to work. If none of these solutions is possible, the elephants have to be shot.

*Guidelines for minimizing elephant depredation*

*The World Bank Technical Paper entitled, "Managing Elephant Depredation in Agricultural and Forestry Projects" by John Seidensticker (1984) is a valuable source of guidelines for minimzing elephant depredation. Important recommendations are:-*

- *A pre-project design assessment should be conducted in association with local wildlife authorities, to predict the response of elephants to a proposed project. This provides a basis for incorporating measures into the project to avoid major conflcts.*

- *Final project design should include features that prevent elephants from entering production areas, but ensure local elephants access to critical resources, or provide these through habitat enrichment.*

- *Emphasis in project design should be placed on passive elephant management features. These can include minor modification in infrastructure, either to facilitate or block elephant movements, and the creation of buffer zones to separate production areasand forest refuges.*

- *Project activities should be scheduled to ensure groups of elephants are not isolated or "pocketed" in production areas. Such elephants can be very dangerous and destructive.*

- *A strong local institutional support base is required for successful elephant management.*

- *Local wildlife management authorities should be provided with technical and financial assistance.*

## V. Compensation Scheme

Comensation and insurance for crop damage can be organized on a limited basis. Due to numerous practical problems in paying compensation, this cannot be considered a permanent solution.

## VI. Establishment of forest cooridors for elephants

Where it is not possible to establish sufficiently large individual protected areas for an elephant population, forest corridors should be maintained to facilitate migration between pocketed areas. Land - use planning should recognize established migration routes and protect them form incompatible forms of development and settlement. Maintenance of migration corridors will minimize conflict between elephant and people. It will also prevent the isolation of herds, and improve the genetic viability of the overall population.

International cooperation is required when migration routes cross frontiers. The elephant migration routes along the foothills of the eastern Himalayas from North Bengal to Arunachal Pradesh through Bhutan and Assam which require national and international action are an example. It is particularly important that migration routes are not disrupted, or very serious conflicts between elephants and people may result, involving some of the largest remaining Asian elephant populations.

### VII. Translocation of elephants

Elephants may have to be translocated from areas which are being developed or where they have become pests. Herds heve been successfully driven to new habitats in India, Indonesia, Malaysia and Sri Lanka. Advance plannning is necessary to route the elephants through suitable corridors and to make barriers to prevent their return. Chemical immobilization and transport is possible under strict veterinary supervision, but even so entails risks for the elephants and people involved. Elephants may be captured for domestication or for zoos, but in both cases, the number that can be absorbed is very small.

### VIII. *Ex-situ* conservation and management of elephants

In countries where domesticated elephants are needed for work or ceremonial purposes, and recruits are customarily captured from the wild, strenuous attempts should be made to encourage reproduction amongst the domesticated elephants so as to reduce the need to capture wild elephants. Governments must also encourage the collection and analysis of data on their domestic elephants.

The IUCN Asian Elephant Conservation Centre (AECC) should compile information on elephant management for dissemination among those using domestic elephants. The AECC should develop an international format for registering/licensing domestic elephants to facilitate monitoring of breeding, veterinary care, translocation, economic analysis, enforcement of work regulations etc. Countries with domestic elephants should establish databases on their domestic elephants and province data to the AECC.

Cytogenetic and molecular genetic analysis of domesticated elephants of known wild provenance may facilitate the exploration of subspeciation and unique racial strains in elephants. This information will be useful for setting conservation action priorities, and when examining questions of future trade and breeding, as well as for its purely scientific value.

## B. LEGISLATION AND TRADE-RELATED ACTIONS

### I. Enforcement of natioal laws

Existing laws to conserve elephants and their habitats need to be fully enforced, and they should be supplemented wherever necessary to ensure the fullest protection. Protection of elephants is especially valuable because it simultaneously protects the habitats of a vast range of species sympatric with elephant.

## II. Enforcement of CITES Regulations

Governments should enforce regulations under the Conservention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) concerning the trade in Aisan elephant products. The demand for ivory is leading to the elimination of tuskers from some populations in Asia while the recently developed industries in China using hide for bags, shoes, belts and other items represents a grave threat to elephants of all ages and sexes. The following actions are essential to the control of the ivory trade:-

- ❒ All countries should be Parties to CITES, Bhutan, Camodia, Laos, Myanmar and Vietnam, which have not yet become signatories to CITES should adhere as soon as possible in the long - term interest of their elephants.
- ❒ All Parties to CITES should ensure that they have domestic legislation to implement the convention.
- ❒ Adequate funds, staff, and facilities should be made available to enforce CITES regulations.
- ❒ Customs and wildlife staff should be trained to administer CITES regulations and to recognize ivory, hide and other elephant products.
- ❒ Stocks of ivory with traders should be registered and frequently inspected to ensure that they are not used as a cover for illegal trade.
- ❒ Countries with ivory and hide industries should conduct detailed studies of the industries and trade in raw ivory, and hide and artifacts. They should develop and implement policies that will eliminate illegal trade in ivory and hide and enforce adequate controls on legal trade. The traditional craft of ivory carving should be kept within acceptable limits.
- ❒ Research should be intensified to find practical methods of differentiating between African and Asian elephant ivory.
- ❒ Education campaigns on the value of elephants should be carried out to win the support of all sections of the community for suppression of illegal ivory and hide trade. This is an appropriate activity for non-governmental organizations.
- ❒ Countries which still use African ivory for local carvers should ensure that it is not used as a cover for illegal trade in local ivory from poached Asian elephant tuskers.
- ❒ Controls on domestic ivory and hide commerce should be enacted and enforced to match CITES international provisions.

### III. Control of Poaching

Poaching for ivory is primarily a threat to the tuskers, and thereby to the genetic health of elephant populations. Recent evidence also suggests servere poaching of elephants for their hide in Myanmar. The hides are apparently traded to China, some of them through northen Thailand. There is also poaching for meat in some areas (e.g. Nagaland in North-east India, and Vietnam) and of live animals, which are illegally employed or smuggled. Adequate staff, funds, and equipment should be allocated to anti-poaching units. Creation of paramilitary units should be considered. Intelligenece units should be established to uncover poaching networks, and cooperation with police and other civil authorities should be ensured.

## C. POLITICAL ACTIONS

### I. National Coservation Strategies

The World Conservation Strategy (WCS) jointly published in 1980 by IUCN, UNEP (United Nationas Enviroment Programme), and WWF (World Wide Fund for Nature) recemmmened the preparation of National Conservation Strategeies (NCS). Among the countries with Asian elephants, Nepal, Sri Lanka and Vietnam have completed strategies while Bangladesh and India are preparing them, and Laos may soon do so. Malaysia is preparing state-by-state strategies. Other countries with elephants should follow suit. Provision for elephant conservation should be included in an NCS because the long-term survival of the Asian elephant needs to be a part of overall environental conservation plans.

Conservation and development programmes need to be integrated in such a manner as to reduce conflict. This can only be brought about by policy makers at the highest levels. Elephants conservation should not be viewed as preoccupation with a single species. It should be considered a practical means to enhance the country's overall conservation programme, because elephants can only be conseverd by ensuring the integrity of their forest habitats with all other species found there.

### II. National Elephant Conservation Action Plans

In addition to inculding elephants in their National Conservation Strategies, governments in Asia with elephants should develop National Elephant Conservation Action Plans. These Action Plans. Thses Action Plans must identify the conservation prioritres for implemertation. Already Sri Lanka and Vietanm have prepared National Action Plans for Conservation of the Elephant, while India has formulated the "Project Elephant" which will broadly follow the ecological approach used in "Project Tiger".

The IUCN/SSC Asian Elepahnt Specialist Group (AESG) is available to advise governments and conservation organizations on the prepartion and implemetaion of such Action Plans throuh the IUCN Asian Elephant Conservation Centre (AECC), which has been established at the Indian Institute of Science in Bangalaore, South India.

## D. SCIENTIFIC RESEARCH

Elephant management should be based on scientific research and principles, both in the wild and in captivity. Much research is needed into the implications of Minimum Viable Population (MVP) size and the imbalanced sex ratios and their effects on fertility. Poaching and habitat loss have reduced the size of elephant populations to critical sizes in several areas and so the minimum viable unit for an elephant population needs to be established in relation to the area and quality of the remaining habitat. The highest priority research issues are:-

1. *Standard ised Elephant Census Techniques:* a vital aspect of designing more realistic conservation measures is the ability to census the elephant in is natural forest habitats (Sale, 1992). It is moreover highly desireable that this is done using standardized census techniques that allow valid comparisons to be made between the densities and numbers of the various populations, scattered throughout the 13 Asian countries. A lack of uniform methodology hitherto has hampered all who wish to assess the overall status of the species and assist nations that have elephants in improving the quality of their management. Dawson & Dekker (1992) have developed a rigorous, yet practical census methodology for elephants, using dung counts. This technique has been tested in India, Malaysia , Vietnam and Thailand and has been invaluable in estimating elephant densities in dense tropical rain forest habitats, where visibility is poor.Such a technique should be introduced into each Asian country where elephants occur in the wild. This will ensure that the future data are standardized and comparable.

2. *Sex-ratios:* Long - term studies should address the implications of a unbalanced sex ratio, especially in elephants populations living in areas surrounded by cultivation and human settlements. A biased sex ratio in favour of the males can only exacerbate elephant-human conflicts.

3. *Distinguishing African and Asian Ivory:* Practical means are required to disting uish ivory from African and Asian elephant. Research should also be carried our into the possibility of determining the geographic origins of tusks using genetic and mineralogical analytic techniques. This would help to identify the source of illegal ivory.

4. *Effectiveness of Elephant Corridors:* Reliable data on the usefulness of jungle/ forest corridors as conduits for elephant movements are lacking. If these corridors do infact aid the dispersal of elephants and function as a hole for the animals to move from a disturbed area into a less distubed one, then they would be beneficial in areas where timber extraction is the dominant from of land use. Such corridors could also reduce the efforts of inbreeding among small populations. Research should look into the effectiveness of corridors in permitting the movement of animals from one area to another.

5. *Habitat Evaluation :* Research is needed to assess more accurately the area of habitat required by viable elephant populations, and also the quality of the habitat that elephants need. In particular, it is important to know what constitutes serious habittal degradation for elephants; what causes such degradation; and how it can alleviated.

6. *Transloaction of Elephants :* Techniques of elephant translocation have been developed, but there is very little information on how or whether translocated animals integrate with the local population. This information is fundamental if translocations are to be used as a means of maintaining the genitic variability of small populations. Some observations suggest that translocated animals move away from the release area. Translocated elephants should be radio collared and tracked to establish whether translocation is a solution to saving small problem herds.

7. *Use of chemicals as a repellant against elephants:* Given the seriousness of the elephant depredations across much of Asia, and the attendent economic losses incurred by people and plantations, there is a pressing economic and social need for a reliable, low-cost, easy-to-use elephant repellant (Osborn & Rasmussen, 1995), Farmers in Kenya are known to burn chilli pepers in order to keep the elephants away ! Recent research carried out by Osborn & Rasmussen (1995) seem to indicate that *Capsicum* oleo-resin spray possesses short-term repellancy towards African elephants. Similar research needs to be carried out to identify natural chemicals that can deter crop-raiding elephants.

## E. PUBLIC AWARENESS

Elephant conservation will be ineffective without widesperad public awareness of the problems and their support for solutions. Public awareness programmes sould be carried out to educate the public regarding the problems involved in conserving such a megaherbivore in Asian countries with increasing human populations and decreasing forest cover. Publicity should be given to agricultural, resettlement and hydroelectric projects where elephant habitat would be affected, so that possible impacts can be evaluated before their implementation. This activity is well suited to non-governmental agencies.

## F. FUNDRAISING

Fundraising is an integral part of the Asian elephant conservation strategy . For in the long run, scientific and technological expertise is worthless if the money and resources required to implement the expertise is absent. Many Asian countries that have viable elephant populations, face a dilemma: on the one hand, as custodians of biodiversity and charismatic megafauna they are forced to assume responsibility for their protection. Yet at the same time, most of these countries faced with expanding human populations, collapsing economies and crippling foreign debts are in desperate need of new resources to bolster their ailing economies. Thus it is essential that the international conservation community should pay more than mere lip-service and provide real, tangible financial assistance to help the countries in Asia to implement the Action Plan for the Conservation of Asian Elephant.

## REFERENCES

Assam Forest Department. 1995. Status Report on Kaziranga National Park. Assam Forest Department, Nov. 1995. 42pp.

Dawson, S.& Blackburn, T. 1991, Asian elephant threatened. *Nature*,352:274

Dawson, S.& Dekker, A.J.F.M. 1992. *Counting Asian Elephants in Forests.* FAO Bankok.

Dobias, R. 1987 Elephants in Thailand : an overview of their status and conservation. *Tigerpaper.* 14 (1): 19-24

Jayewardene, J. 1994. *The Elephant in Sri Lanka.* The Wildlife Heritage Trust of Sri Lanka, Colombo.

Lahiri-Choudhury, D.K. 1991. Saving elephants for posterity. *Asian Elephant Specialist Group Newsletter.* 6:18-19.

Osborn, F.V. & Rasmussen, L.E.L. 1995 Evidence for the effectiveness of an Oleo-resin Capsicum aerosol as a repellent against wild elephants in Zimbabwe. *Pachyderm* 20:55-64.

Sale, J.B.1992. Preface. *In Counting Asian Elephants in Forest.* FAO, Bangkok.

Santiapillai, C. & Jackson, P. 1990. *The Asian Elephant: An Action Plan or its Conservation.* IUCN, Gland. Switzerland.

Santiapillai, C. Xiang, Z,. Hua, D.Y. & Zhong, S.Q. 1994. Distribution of elephant in Xishungbanna Dai Autonomous Prefecture, China. *Gajah.* 12: 34-45

Santiapillai, C. & Suprahman, H. 1995. The Sumatran elephant *(Elephans maximus sumatranus):* its population structure and impact on woody vegetation in the Way Kambas National Park, Sumatra, Indonesia. *Gajah.* 14:10-27

Seidensticker, J. 1984. *Managing elephant depredation in agriculture and forestry projects.* A World Bank Technical Paper, Washington DC.

Sukumar, R. 1989. *The Asian Elephant: ecology and management.* Cambridge University Press, Cambridge.

Tilson, R., Soemarna, K., Widodo, R., Sukumar, R., Traylor-Holzer, K, & Santiapillai, C. 1994. *Asain Elephant in Sumatra: Population and Habitat Analysis Report.* Minnesota, USA.

U Myint Aung. 1994. A preliminary estimate of the abundance of wild elephants in the Alaungdaw Kathapa National Park. Yangon, Myanmar.