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Newsletter of the Asian Elephant Specialist Group
Number 10 **Spring 1993**

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The Asian Elephant Specialist Group Newsletter is published with the following aims:-

- to highlight the plight of the Asian Elephant
- to promote the conservation of the Asian Elephant
- to provide a forum for communication amongst all the members

Newsworthy articles are invited for consideration for publication and should be sent to Dr Charles Santiapillai at 110 Wattarantenne Road, Kandy, Sri Lanka. All articles may be reprinted. Reprinted articles should give credit to the Newsletter. The editors would appreciate receiving a copy of any article so used. The opinions expressed by the authors do not necessarily reflect the policies of either WWF or IUCN.

Cover : One of the many *makhnas* (tuskless bull elephants) in the Ruhuna National Park, Sri Lanka.

CONTENTS

Feature Articles

Short Communications:

Book Review:

Diary:

COMMENT

It is a truism that, at any but the lowest density, large wild animals and human beings are fundamentally incompatible. As the densities of both large mammals and man increase, this incompatibility increases as well. Throughout Asia, increasing human population and increasing agricultural land use have substantially reduced the area once available to the elephants. The situation has reversed from one in which man lived in small settlements in areas dominated by elephants to one in which the elephants find themselves confined to small patches of habitat, surrounded by a man-dominated landscape. The elephants and other wildlife have lost so much of their former habitat, that they are often forced to invade the communities that have displaced them. This is the crux of the elephant-human conflicts in Asia. Depredation by elephants has become a way of life.

There is a relationship between tolerance of wildlife and human population density. In countries where the human population densities are low, there is generally an acceptance and tolerance of such large mammals as the elephant. Religious sentiments too reinforce this attitude to keep poaching, wanton killing and cruelty to animals to a minimum. However, when the human population becomes too numerous and too sophisticated, this relationship progresses through time from acceptance to intolerance. When this happens, even religion is powerless in preventing the slaughter of wildlife.

In Sri Lanka, despite a strong Buddhist culture a number of wild elephants had been killed in the recent past by irate farmers who had borne the brunt of elephant depredations. In some instances, the killings were carried out by poachers in order to supply tusks to a few carvers, who despite the international ban on ivory, continue to produce pendants and other trinkets from elephant ivory for sale to the tourists who seem to have re-discovered Sri Lanka. In a desperate effort to resolve the human-elephant conflicts in Sri Lanka, a consultant from abroad recommended the capture of some 500 wild elephants for domestication and subsequent sale through public auction! Such a harebrained scheme, if implemented, would adversely affect the long-term survival of the elephants in the wild. In most instances, much of the crop depredations are the result of lone bulls wandering in search of oestrous females to mate. The capture and removal of such animals will seriously undermine reproduction and recruitment in the wild. It would also lead to a significant reduction in the genetic variation in the population. Removal of chronic crop raiding elephants from an area of high human population makes sense if it involves only a few animals. But to recommend the capture and removal of almost 20 percent of the island's elephant population for domestication and sale to the public will only help accelerate the demise of the island's wild elephant population. There are no instant solutions to the complex problem of human-wildlife conflicts in Asia. Time, money and trained manpower act in many cases as brakes on what can be done to resolve the problem. The root cause of elephant depredations throughout Asia is deforestation and conversion of forests to agriculture. Although human population pressure, land hunger and a need for fuel wood have all helped to cause deforestation, it has also been encouraged enormously by bad economics. Even the World Bank has realised that a tropical forest may be far more productive than the scrubland which often succeeds. But governments throughout Asia frequently assume that fragile forests can easily be cleared and farmed. They also frequently ignore the ecological costs of deforestation: soil erodes, rain fall diminishes, water supplies become less reliable, rivers silt up, dams get clogged, human-wildlife conflicts escalate and such extinction-prone species as the elephant and other large mammals often disappear.

It is now becoming increasingly clear that if we want to enhance the long-term survival of the elephants in Asia, some sort of accommodation between man and elephant must be reached. Man and elephant will have to live together by mutual adjustment. Furthermore, management policies must be designed to persuade people to change their attitudes, from intolerance to tolerance or from mere tolerance to acceptance. How can this be achieved? One way is through proper zoning of the conservation areas and their adjacent lands for types of use that integrate conservation needs with those of adjacent human populations. Another possibility is by improving the incentives for local communities to participate in the conservation of wildlife resources. The communities that bear the brunt of elephant depredations must be properly compensated for their losses. Such compensation could be provided through sensible insurance schemes or from revenues from nature tourism. Unfortunately, in many Asian countries, the local communities receive little or no benefit from tourism, whereas the true beneficiaries of tourism are the local tour operators and their international sponsors. Outdoor recreation is valued by a small segment of the more affluent section of the society while the poor remain alienated or indifferent. The local communities must participate fully in decisions affecting their land and resources. International efforts to protect and safeguard the Asian elephant populations throughout their range must include projects and programmes that involve the cooperation and participation of the local communities. Finally, conservation education must be given high priority. Conservation policies, however well-rooted they may be in science, can succeed only if they are intelligible to the people concerned.

by Lyn de Alwis & Charles Santiapillai

Feature Articles

COMMUNITY ECOLOGY OF THE ASIATIC ELEPHANT

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In prehistoric times the Asiatic elephant *(Elephas maximus)* occupied a large terrestrial generalist-herbivore niche within the alluvial plain, savanna, and gallery forest ecosystems of southern Asia. Currently wild Asiatic elephant populations are largely restricted to relict lowland forest fragments and upland forest areas of Southeast Asia, whereas formerly this species occupied a much larger range and a greater variety of habitats.

Asiatic elephants were known in historical times to have lived throughout much of southern Asia from the montane regions of the Himalayas to the coastal lowlands of Southeast Asia. Asiatic elephants ranged from the Tigris-Euphrates valley of Asia Minor in the west across the Indian sub-continent to the Huang He (Yellow River) valley of China in the north and east; and south through the Malay penninsula to the island of Sumatra. The modern population of Asiatic elephants on Borneo is thought to have been derived from introduced domesticated stock. (Altevogt and Kurt, 1972; Olivier, 1978b).

The Asiatic elephant is able to utilize a wide variety of habitats provided that basic requirements for water, shade, and forage can be met. Freezing temperatures and daily access to fresh water are major limiting factors. Savanna, forest-scrub, secondary forest, and grassland-forest mosaics are the preferred habitat types (Eisenberg, 1980a). The availability of grasses (Graminae, Poaceae) is an important factor, since grasses typically constitute at least 50% of the Asian elephant's diet (Vancuylenberg, 1977). Closed-canopy forests can thus support only limited elephant populations unless clearings or alluvial corridors are available to provide grasses for forage. Seasonal variations in the availability of water and forage may result in regular migrations of 40 km or more, and formerly aggregations of elephants containing thousands of individuals occurred in some areas as the result of seasonal migrations to areas of exceptional resource abundance.

The surviving Asiatic elephant populations are for the most part small, isolated, and declining rapidly. The alienation of habitat to agriculture, plantation forestry, wholesale clearcutting of forests, competition from domestic livestock, and direct human predation (for food, ivory, or crop protection) are constant threats to the few remaining wild elephant populations. Until fairly recently the human-elephant relationship in Southeast Asia was a relatively benevolent character with losses of alluvial plain habitats to stable agriculture balanced by increases in the availability of suitable forest habitat as a result of human-induced fires, low-intensity selective logging, and traditional patterns of shifting cultivation.

The impact of explosive human population increases in the past century and concurrent demands for greater agriculture and forestry production have steadily eroded the limited remaining areas of wild elephant habitat. Most surviving wild populations of Asiatic elephants are small and isolated among relict forest fragments widely scattered across human-dominated landscapes, a situation which offers little hope for long-term survival (Soule, 1980; Allendorf *et al,* 1986). The Asiatic elephant is now extinct throughout most of its former range and excluded from many preferred habitats (Olivier, 1978b). This trend appears unlikely to change in the forseeable future, and the pressure on relict populations is increasing steadily with the passage of time.

Elephants are the largest living terrestrial mammals. The Asiatic elephant is somewhat smaller than the African bush elephant *(Loxodonta africana africana)* and similar in size to the African forest elephant (*L. a. cyclotis).* Mature Asiatic elephant bulls attain weights of 5400 kg. and shoulder heights of 3.2 m. Females average about one-third smaller than males. Large tusks are found only in the male Asiatic elephant, and the proportion of tusked and untusked males varies among populations. In Sri Lanka tusked males are rare (<10%), and this phenomenon may be due to centuries of selective removal of tuskers from the breeding population by man, either through killing for ivory or by capture for domestication (Eisenberg, personal communication). In the nearby mainland populations of south India 90% of males are tusked (Sukumar, 1986). The elongate proboscis or trunk functions effectively as a fifth limb, and enables the elephant to extend its feeding range to a height of five meters or more vertically, enabling efficient use of scrub and low canopy forest habitats (Eisenberg and Mckay, 1974; Grzimek, 1972; Shoshani and Eisenberg, 1982).

Man has been an important predator of elephants since at least the late Pleistocene. Only the largest of the great cats, tiger and lion, can be considered with man as a significant predator of elephants.

Formerly tigers were a major predator of young elephants, and Williams (1950) estimated that tigers killed about one fourth of all elephant calves during their first few years of life. While healthy adult and sub-adult elephants are for the most part immune to predation by big cats, a few instances of tigers killing adult elephants are known (Shoshani and Eisenberg, 1982). Elephants are hosts for various internal and external parasites including various species of roundworms, flukes, lice, ticks, bacteria, and protozoans (Benedict, 1936; Eltringham, 1982).

The Asiatic elephant typically assumes a role as the ecologically dominant mammalian species within its habitat (Eisenberg, 1981; McKay, 1973; Seidensticker, 1984). Elephant foraging activities may have profound impact on the diversity, distribution, and abundance of numerous components of the biotic community (Janzen, 1983; Ishwaran, 1983; Mueller-Dumbois, 1972; Laws *et al*, 1975; Mulkey *et al*, 1984; Wing and Buss, 1970). Studies on the feeding habits of *E. maximus maximus* in Sri Lanka have assessed the impact of elephant foraging behavior on the physiognomy and species composition of forest vegetation (Ishwaran, 1983; Vancuylenberg, 1977; Muller-Dumbois, 1972). Food preferences in general are highest for open scrub species of plants and lowest for forest species. Among woody vegetation species consumed, early seral species are prefered over later seral or climax species (McKay and Eisenberg, 1974).

Although Asiatic elephant foraging behavior has significant effects on the plant communities within their habitats, major changes in habitat characteristics have not been correlated with feeding activity by *E. maximus* populations. In contrast to the radical landscape-altering impacts attributed to African elephants *(Loxodonta africana)* in various East African ecosystems (Laws *et al*, 1975; Mulkey *et al* 1984; Wing and Buss, 1970), the influence of *E. maximus maximus* populations on their habitats has been found to be of a more subtle character. Among study populations of the Asiatic elephant in Sri Lanka the principle effect of elephant activity has been to maintain existing successional community characteristics without inducing major changes in existing habitat structure or species composition (Ishwaran, 1983; Vancuylenberg, 1977; Mueller-Dumbois, 1972). However, this difference may be due in part to the lower densities of Asiatic elephant populations and not entirely to differences in feeding habits (Mueller-Dombois, 1972).

Elephants are generalist herbivores which utilize a broad range of herbaceous and woody vegetation, fruits, roots, tubes - virtually any form of plant material may be consumed. Grasses are a prefered food source and comprise a high proportion of the diet when conditions permit (McKay, 1971; Vancuylenberg, 1977). Bamboo may be an important food source in heavily forested habitats where the availability of other grasses is limited, and other monocots such as palms and rattans may be of importance in the diet in rain forest communities (Olivier, 1978a; Blower, 1985). Forbs, shrubs, and trees are incorporated in the diet to varying degrees according to site and season. Forbs, seedlings, and smaller trees may be consumed entirely, but leaf and/or bark may be selectively eaten in foraging on woody vegetation.

Feeding activity may be highly destructive in certain instances. Grasses are often ripped up and eaten root, culm, and leaf while trees may be pushed over or broken down in order to gain access to fruit or leaves which are out of reach (Mueller-Dombois, 1972; Kurt, 1974; Lekagul and McNeely, 1977). In selective feeding on bark or leaves up to 80% of the biomass removed in foraging may be discarded (Ishwaran, 1983; Lekagul and McNeely, 1977). Seeds frequently pass unharmed through the digestive tract and may subsequently germinate or be eaten by other animals (McKay, 1973).

Elephants are hindgut fermenters with a fairly rapid gut transit time and relatively low digestive efficiency (Benedict, 1936). Nonetheless, adequate nutrition can be maintained on a relatively poor quality (low protien/high cellulose) diet provided sufficient quantities of forage are available (Janis, 1976; Eltringham, 1982). Elephants can utilize coarse and highly lignified mature grasses which are unpalatable to other ungulates. Mature elephants consume 150-200 kg per day of green vegetation (Lekagul and McNeely, 1977; Seidensticker, 1984; Vancuylenberg, 1977). Wild elephants may need to spend 70% to 80% of their waking time in foraging in order to maintain an adequate nutritional plane (Eisenberg, 1981; McKay, 1973; Altevogt and Kurt, 1972; Vancuylenberg, 1977).

In Sri Lanka, elephants typically forage in small groups of one to ten individuals which feed for a few days in the vicinity of a particular water source and then move on. Feeding areas are shifted several times daily and in Sri Lanka elephants feed on grasses in open areas during the cooler morning and evening periods, and browse in shaded areas during the heat of the day (McKay, 1971). Although up to 70% of the plant species in a given habitat may be eaten, elephants tend to drift and spot-feed upon only a small percentage of individuals of any one species at a given site (Vancuylenberg, 1977; Eisenberg and Lockhart, 1972; Mueller-Dombois, 1972; McKay, 1971).

Mortality of large trees due to browsing by the Asiatic elephant is very low, perhaps attributable in part to the limited distribution of elephants with large tusks among the population as a whole. Browsing activity focuses on woody plants in the 2.0 - 32.0 cm size class, and observations indicate that less than 9% of feeding on trees or shrubs involves the pushing over or breaking down of the individuals fed upon (Ishwaran, 1983).