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).

Mueller-Dombois (1972) has identified crown-distortion as the primary impact of Asiatic elephant browsing activity on woody vegetation. The physiognomy and growth patterns of trees and shrubs are altered as a result of injuries caused by elephants when browsing on bark, leaves, or fruits. Crown distortion is characterized by abnormal crown shapes and growth patterns, and the long term effect is to create reductions in the rates and extent of canopy closure in browsed stands. Canopy species often show high levels of crown distortion, apparently, caused by elephant predation, and this may affect canopy regeneration in areas with high elephant densities (Mueller-Dombois, 1972).

Elephant induced tree mortality also occurs outside of a foraging context. Male elephants sometimes knock down trees without any associated feeding activity, often within a localized area (Eisenberg and Lockhart, 1972). While the low levels of tree mortality associated with browsing by Asiatic elephants apparently has little direct effect on the species composition of forest stands, the selective browsing of early seral canopy species tends to inhibit regeneration of shade-adapted climax forest species by reducing canopy closure. Reduced canopy closure benefits the elephant by increasing the availability of prefered early seral vegetation forms, especially grasses.

Elephant feeding habits show extensive overlaps with those of other sympatric herbivores. Virtually all species of plants, browse and herbs, eaten by other ungulates are also consumed by elephants. In areas with high herbivore densities, elephants may compete with bovids, deer, swine, rhinoceros, porcupines, and hares for available forage. Competition with domestic or feral livestock for access to water and grazing is a significant problem in many areas (Altevogt and Kurt, 1972). Although the potential for exploitative competition clearly exists, other factors tend to ameliorate the negative impact of elephant populations on various other sympatric herbivores.

The mobility and generally low population densities of Asiatic elephants tend to reduce the effects of elephant competition for forage on most endemic wild herbivores, and behavioural facilitation phenomena arising from elephant activity may provide benefits to numerous other species. Although the elephant competes directly with other herbivore species for access to some plant resources, elephants also graze on the tall, lignified stems of mature grasses which cannot be effectively utilized by most other ungulates (McKay and Eisenberg, 1974; Vancuylenberg, 1977). This removal of mature grass stems by elephants can stimulate new growth, increase primary productivity, and improve the accessibility of the underlying herbage to other herbivores (McNaughton, 1979). Young leaves discarded by elephants during browsing and bark feeding may be eaten by deer or other animals which otherwise would be unable to obtain access to these resources (Lekagul and McNeely, 1977).

Elephants dig deep holes in dry watercourses to create seeps when surface water is unavailable, and these are used by other animals when the elephants depart (Eisenberg and Lockhart, 1972). Numerous animals use elephant paths in traversing areas of dense undergrowth (McKay, 1971; Altevogt and Kurt, 1972; Lekagul and McNeely, 1977), and these paths may thereby function as corridors in promoting the movement of species between habitat patches. The opening up of dense understory and lower canopy vegetation promotes growth of grasses and forbs favoured by other ungulates and various other herbivores. Elephant foraging activities thus can benefit various other mammalian species, especially grazing ungulates, by maintaining earlier successional plant communities and ecotone areas at the expense of closed canopy forest species.

Elephant foraging activity can be beneficial to various species in other ways. Mynahs *(Acridotheres tristis)*, cattle egrets *(Bubulcus ibis)*, and egrets (*Egretta* spp.) feed on insects disturbed by elephants in feeding, and these birds may be allowed to perch unmolested on the heads or backs of elephants (McKay, 1971).

The role of elephants in biomass transport and redistribution within ecosystems has been frequently overlooked. In conjuntion with a food intake of some 150kg/day, elephants produce about 80 kg/day of dung (Vancuylenberg, 1977). My own experience with captive elephants indicates this latter figure may be somewhat conservative, and Benedict (1936) records fecal deposition rate in a large captive female at up to 137 kg/day. Nonetheless, using Vancuylenberg's data for estimation, an elephant produces some 15 metric tons of fecal material each year. Two elephant herds in Sri Lanka were estimated by Vancuylenberg (1977) to deposit, respectively, 7507 kg and 9075 kg of dung daily. Asiatic elephant population densities vary widely among different habitats, and densities of 1.0 /km² (Eisenberg, 1980a), 0.27/km² (Olivier, 1978), 0.19/km² (McKay, 1971) have been reported. At a population density of 0.20/km², the elephant fecal deposition rate would be about 5000 kg/km²/year. At a density of 1.0 /km² (which is near the maximum record for Asiatic elephant populations), annual fecal deposition rates would be 30,000 kg/km²/year. Elephant feeding and defecation thus contribute substantially to the recycling and redistribution of plant biomass within their habitats (Eisenberg, 1972; Vancuylenberg, 1977).

When undisturbed, elephants typically defecate while standing in a single spot. Defecation and urination are frequently simultaneous. Excreta are often concentrated in an area approximately one meter square. In captive Asiatic elephants a single defecation typically consists of 6-8 fecal boluses weighing from 0.5-1.5 kg each (on a diet of grass hay with supplemental grain and occasional fresh fruit and vegetables). A single urination may result in the localized deposition of ten liters of nutrient-rich fluid to the soil (Benedict, 1936). Elephant excreta form localized and patchily distributed

nutrient sources which are utilized by numerous members of the biotic community (Eisenberg, 1972; McKay, 1971; Anderson and Coe, 1974).

Elephant excreta provide rich nutrient sources for a wide range of both plant and animal species. The relative inefficiency of the elephant digestive tract ensures that the overall nutrient content of the dung remains higher than that of most other ungulates (Benedict, 1936; Shoshani and Eisenberg, 1982). Elephant excreta provide a rich organic nutrient source for soil bacteria and various other detritivores, which in turn make these resources available for plant use (Anderson and Coe, 1974).

Seeds and tough-skinned fruits eaten by elephants frequently pass through the digestive tract intact. Birds and small mammals are known to seek out dung piles to feed on undigested seeds, fruit, or plant material and various coprophilic invertebrates (Eisenberg, 1972; McKay, 1971; Rood, 1975; Vancuylenberg, 1977). Fungi frequently grow in elephant dung, and undigested seeds may germinate if not subsequently eaten by other animals (Eisenberg, 1972; McKay, 1971). The importance of the Asiatic elephant in the seed dispersal of tropical forest plants is as yet poorly documented. Given the high vagility and extraordinary consumption potential inherent to this species, Asiatic elephants should provide excellent vehicles for redistributing seeds of many plant species employing animal seed dispersal strategies (Janzen, 1983).

Elephant dung is a prime food source for numerous invertebrates such as termites, scarabid beetles, worms, and flies. Termites feed on elephant dung and refuse from elephant foraging activities. New mound and colonies of some termite species are frequently initiated under piles of elephant dung (Eisenberg and Lockhart, 1972). Termites are extremly important members of the biotic community, and the role of termites in the nutrient cycles of tropical ecosystems is frequently underestimated (Eisenberg, 1972).

Termite mounds serve to concentrate resources by forming high nutrient patches in nutrient-poor tropical soils (Golley, 1983; Salick *et al*, 1983). The indirect effects of termite mound building activities include increased levels of soil turnover and soil aeration, aspects of great importance to maintaining optimal growing conditions for plants in tropical soils. The elephant dung/ termite relationship has far reaching implications when viewed in terms of a keystone symbiosis in the biogeochemical nutrient cycles of tropical forest and savanna ecosystems (Eisenberg, personal communication).

Elephants also contribute to soil turnover in other contexts. In feeding on short prostrate grasses elephants scrape the ground with the nails of the forefeet, 'scalping' the grasses and parts of the roots from the upper layer of the soil. When using this feeding method elephants kick up large quantities of soil, and erosion may occur subsequently on these sites (Kurt, 1974; Vancuylenberg, 1977). The mud-bathing or dust-bathing activities of elephants create soil turnover and enable the transport of large quantities of soil between different habitat patches (Vancuylenberg, 1977).

Elephants and other herbivores have high sodium requirements and in many areas mineral licks are of great importance to resident elephant populations (Seidensticker, 1984; Lekagul and McNeely, 1977). Salt soils or friable rock are dug out with tusks or the toenails of the forefeet and then collected with the trunk and ingested. The unused remainder is frequently utilized by other herbivore species (Lekagul and McNeely, 1977). The distribution of mineral licks may have marked effects on the movement patterns of elephant populations in some areas and can be manipulated as a means for regulating movements in some wild elephant populations (Seidensticker, 1984).

Elephants need daily access to drinking water. Thirty gallons (120 liters) of water or more may be ingested over a short period of time by a large adult. Water is important not only for drinking and bathing but also as a means for avoiding heat stress. Access to water and shade are important for thermoregulation at high ambient temperatures. The elephant's low surface area to mass ratio predispose it to problems of overheating at high temperatures or in direct sunlight (Eisenberg, 1983). African elephants apparently have greater tolerance for exposure to direct sunlight at higher temperatures than do Asiatic elephants (Seidensticker, 1984). The author has observed instances of sunburn on the skin of the forehead in captive Asiatic elephants in temperate North America (Maryland, U.S.A.) following extended exposure to direct sunlight in the spring after a several month period of limited outdoor activity during winter.

Elephants possess both physiological and behavioral mechanism for avoiding problems due to overheating. Physiological adaptations to heat stress include a convection cooling mechanism associated with high vascularization of the large, flattened ear pinnae. Increased blood flow in the ears when coupled with fanning movements permits rapid heat dissipation from the surface of the ears (Shoshani and Eisenberg, 1982; Eisenberg, 1983). The wrinkling and folding of the skin serves to increase skin surface area and promote heat dissipation,. The sparse pelage permits free air movement over the skin surface, while tending to trap soil and vegetation thrown onto the body to form an insulating cover against sun and insects. Behavioral adaptations for reducing heat stress include bathing with water or mud and seeking shade during the heat of the day. When access to drinking water is not limiting, water consumed early in the day may be retained in the stomach, and then hours later regurgitated into the throat, drawn into the trunk, and then sprayed on the body to promote heat loss through evaporation from the skin.

In their daily and seasonal movements elephants will cross large areas, and home ranges of 60 km² or more have been reported for elephant herds in Sri Lanka (McKay, 1973). Olivier (1978a) has estimated the home range for an elephant herd in Malaysian rain forest at over 166 km². Seasonal movements of 30-40 km are known from both south India and Sri Lanka (Eisenberg and Lockhart, 1972). The Asiatic elephant frequently shifts activities between alluvial grasslands, savanna-scrub, grassy ecotone areas and forest interiors in daily foraging activities (McKay, 1971; Vancuylenberg, 1977); feeding bouts are interspersed with visits to drinking, bathing, and wallowing sites.

Considering the capacity of the elephant for both mineral and biomass redistribution between different activity sites in the home range, the elephant may be said to function as a mobile link between the various plant communities within its environment. While elephants are never the numerically dominant mammal species in their habitats, they are nonetheless frequently an ecological dominant in terms of biomass and materials cycling parameters (McKay, 1973; Seidensticker, 1984). Both directly and indirectly elephants contribute substantially to the cycling of mineral and organic components of the ecosystems they inhabit.

Elephant foraging activities affect the configuration and species composition of plant communities within their habitats. Elephants impose landscape-level impacts upon their habitats by maintaining earlier seral stages of plant succession, with far-reaching effects upon the plant and animal species therein. The physical modifications imposed by elephants upon their environments such as pathways, water seeps, and opening up of understory vegetation may tend to offset competition for forage between elephants and other sympatric ungulate species. Herbivores favouring ecotone and forest-grassland mosaic habitats can benefit from the presence of elephants, whose activities tend to maintain these communities at the expense of closed-canopy forest habitats. Species prefering closed-canopy habitats, such as arboreal primates, may be adversely affected for these same reasons (Eisenberg, 1980b).

The actual role of the Asiatic elephant in structuring its environment remains but poorly understood. Although various studies have provided regional insights regarding general trends and the potential mechanisms involved, as yet only a few more obvious aspects of this phenomenon have been investigated. The nature and scope of the known ecological interaction between the Asiatic elephant and its environment as reviewed above probably represent a small fraction of the functional interrelationships actually present.

Unfortunately, the keystone function of the Asiatic elephant has already, been lost to ecosystems throughout most of the species original range. The Asiatic elephant may well become extinct before comprehensive ecological studies can assess the full significance of the elephant's role in the tropical forest ecosystems of Southeast Asia. These forests form the final refuge for this once ubiquitous species of southern Aisa, and provide the sole remaining opportunity for determining the ecological interaction of the Asiatic elephant in its native habitat. These forest systems themselves are in great jeopardy due to human exploitation, and given the present situation, as the forest goes so must the elephant.

The potential exists for maintaining viable population of Asiatic elephants within multiple-use forest reserves (Olivier, 1978c; Dudley, ms). Elephant populations can respond favourably to certain forms of habitat perturbation associated with forest resource harvesting activity. The development of multiple-use forest areas ('Elephant Ranges') has been proposed by Olivier (1978c), McNeely (1980), and others as a potential means for ensuring the survival of the wild Asiatic elephant. The Elephant Range model resembles that of the Biosphere Reserve (MAB, 1979; see also Harris, 1984).

The Elephant Range concept envisions a multiple-use forest reserve comprised of one or more inviolate core preserve areas enveloped by one or more concentric designated-use areas (buffer-zones), managed in such a way as to enable the maintenance of wild elephant populations in concert with development of compatible renewable resource forestry techniques. Buffer-zones should be managed under sustainable-yield resource harvest regimes appropriate to the goal of maintaining critical genetic resources contained in endemic plant and animal species, and would function in protecting core preserve areas from the detrimental impacts of the surrounding human-dominated landscape (and vice-versa).

The Elephant Range concept represents a potential framework for the establishment of forest reserves integrating wildlife conservation and sustainable-yield agroforestry methods. Such a system might ultimately provide a means whereby the coexistance of elephant and man in Asia could be maintained in the face of inexorable human pressures on the forest communities which are the last refuge of the Asiatic elephant.

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ELEPHANTS UNDER THREAT IN LAOS

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Laos was known as **Muong Lan Xang Hom Khao** or the "Land of the Million Elephants and the White Parasol" in the fourteenth century when it was founded. It was first called "Laos" by the French when they annexed it to their Far Eastern Empire in the last century. Today Laos, with a total land area of about 236,800 km² is estimated to have not more than 4,000 elephants in the wild and about 850 animals in captivity. One of the legacies of the Indo-China war is the ready availability of guns and firearms. Today, it is estimated that there are nearly 1.2 guns per mile in this strategic, land-locked, innocuous, little Buddhist country of 4 million people (Martin, 1992). Between 1990 and 1992, about 50 elephants had been killed by poachers for their tusks, skin and meat (Vientiane Mai, 1992). These killings occurred mostly in the Nam Theun area in the Khammouane province in central Laos. The killings of elephants were attributed to some poachers who crossed into Laos from neighbouring Vietnam (Vientiane, Mai, 1992). (Some of the poachers who were caught red-handed by the Laotian authorities turned out to be Vietnamese nationals!). At over 400,000 ha Nakai Plataeu/Nam Theun is by far the largest proposed protected area in Laos with Vietnam as its eastern boundary (Salter *et al.*, 1991). This area has a known resident population of elephants, and is inhabited largely by Lao Loum and Lao Theung ethnic groups who practise slash and burn agriculture. Price of unworked raw ivory is about US$ 50 per kg. Ivory carvers in Vientiane and Luang Prabang using hand tools carve out small souvenirs such as Buddha pendants from ivory for sale to tourists (Martin, 1992). Most of the tourists are form Thailand and the problem will only be exacerbated if the proposed plan to build a bridge (with Australian aid) across the Mekong river, linking Thailand to Laos goes ahead! Laos needs international assistance (mainly funds and equipment) to improve the protection of almost all the proposed conservation areas. Arresting the illegal trade in wildlife across its border with China, Burma, Thailand, Cambodia and Vietnam will not be easy. It is recommended that Laos becomes a party to CITES (Convention on International Trade in Endangered Species). A British historian once casually remarked that "Laos is like the Cheshire cat. One minute it's there, the next it has disappeared; and sometimes, while you're watching, it begins to fade, until there's nothing left but the smile - the Lao smile" (Field, 1965). If poachers are allowed to ply their trade with impunity in Laos, then only the White Parasol will be left!

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