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GAJAH is the official journal of the Asian Elephant Specialist Group (AsESG) of the Species Survival Commission (SSC) of the World Conservation Union (IUCN). The journal is intended as a medium for communication by members of the AsESG of important issues that concern the conservation and management of the Asian Elephant (*Elephas maximus*) both in the wild and in captivity. GAJAH welcomes communications and research papers on all aspects of the Asian elephant. GAJAH is aimed at professionals, biologists and academics carrying out research on Asian elephant, government and non-government organizations involved in its conservation, and interested members of the general public. All articles published in GAJAH are deemed to reflect the individual views of the authors and not the official points of view, either of the Asian Elephant Specialist Group (AsESG) or the Species Survival Commission (SSC). GAJAH is a non-profit publication that is supported by financial assistance from the U.S. Fish and Wildlife Service.

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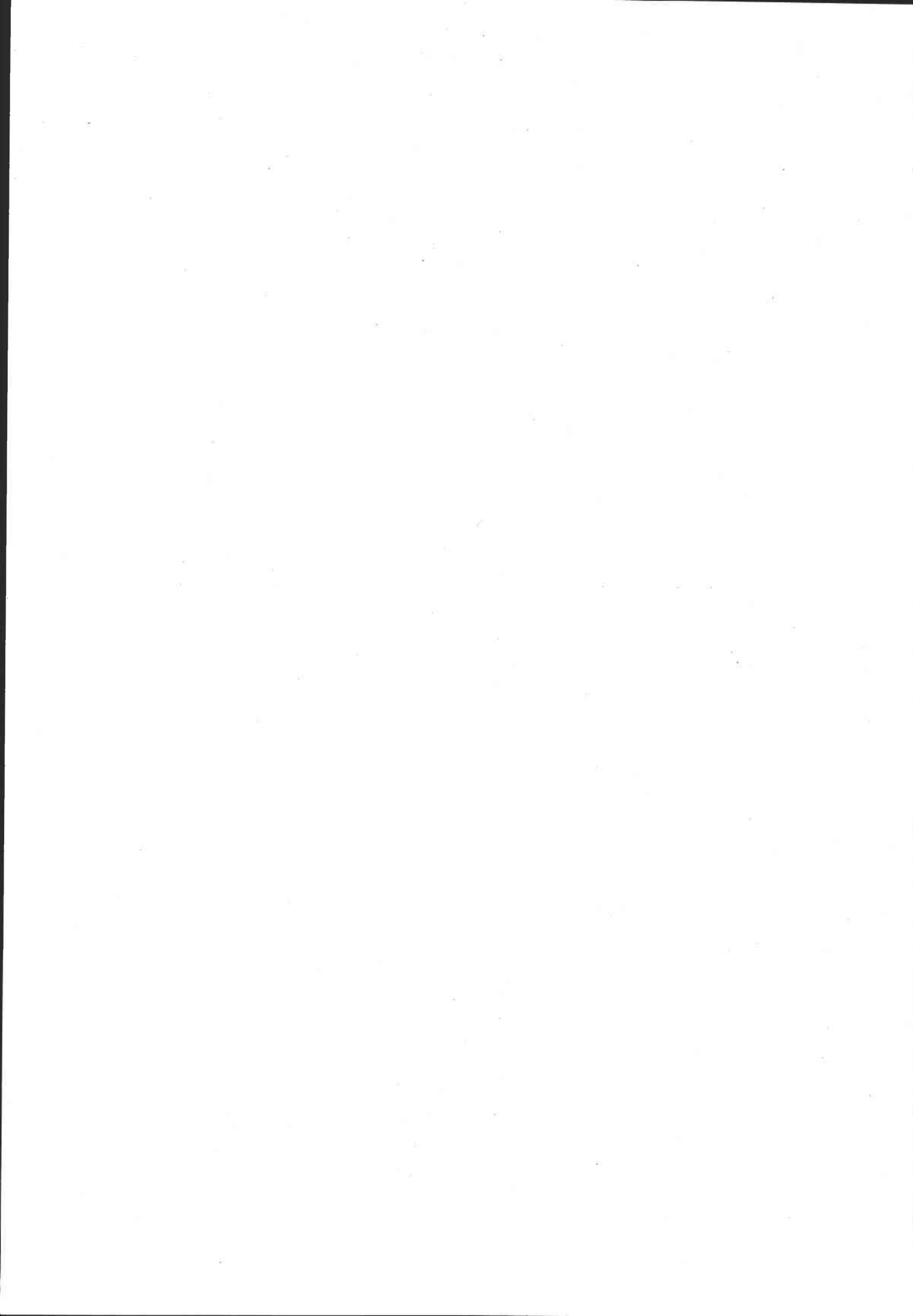
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Conservation News

Sri Lanka

Re-introduction of the insurance scheme for mahouts

The Diyawadana Nilame of the Sacred Temple of the Tooth (The Dalada Maligawa, Kandy), Neelanga Dela Bandara plans to re-introduce the insurance scheme for mahouts following an unfortunate incident of a mahout named Mr. M. Piyasena killed by his elephant while he attempted to give it a wash. He was 59-year old father of four children. According to an eye witness, the elephant concerned was boisterous for a while forcing Piyasena to use the goad to control it. The elephant became so furious that he took the goad and broke it in two, before turning on the mahout. This was the second incident of elephants in captivity killing their mahouts within two months. In the past two years, more than six mahouts have been killed by enraged elephants in Kandy alone.

Source: *The Sunday Times (Sri Lanka) November 6, (2005).*

USA

Sanctuary receives Excellence Award

Riddle's Elephant & Wildlife Sanctuary has become the first recipient of the Institution of Excellence Award given by the Elephant Managers Association (EMA), which is a non-profit organization of professional elephant handlers, administrators, veterinarians, researchers and elephant enthusiasts. The award was handed out in the Fall of 2005 during the EMA annual conference hosted by the Portland Zoo in Oregon. The award was granted "for contributions to elephant training, research and care performed with professionalism, integrity and passion". The Sanctuary is operated by an Arkansas non-profit organization dedicated to preserving both Asia and Africa elephants. It offers permanent refuge to any elephant in need. The facility provides training and education in elephant management and conservation and conducts scientific study in the health and physiology of elephants.

Source: *Log Cabin Democrat, December 24, (2005).*

Workshop on Ultrasound and Veterinary Procedures

The 9th Ultrasound and Veterinary Procedures Workshop for Wildlife Veterinarians was hosted by the Riddle's Elephant & Wildlife Sanctuary in May 2005 at Greenbrier, Arkansas. World renowned elephant veterinarian Dr. Dennis Schmitt, assisted by the sanctuary staff, taught the course. Veterinarians from international elephant facilities (Canada, USA and Sri Lanka) attended the course and shared experiences.

Source: *Pachyderm Periodical, 15: 3 (2005).*

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Elephant program at the Smithsonian Institution's National Zoological Park

Elephants in North American Zoos number approximately less than 275 among 70 or so widely dispersed cities. AZA institutions attract over 150 million visitors, more than all professional sports combined. American Zoos have a unique ability to focus and educate these visitors on the critical conservation issues of this century. Within North America itself, there is tremendous need to establish breeding bull groups as management strategies to dramatically increase the captive population and improve genetic diversity. Captive elephants are not breeding fast enough to keep up with natural mortality. The Smithsonian Institution National Zoological Park can change all this now and make a critical leadership step. It plans to proceed with an ambitious plan to renovate its present elephant exhibit. The new facility will take up an 8-acre parcel of land at the Zoo, with approximately 3 acres of ground space for a group comprising 8 Asian elephants. In addition, the Zoo plans to expand its capability to conduct Asian elephant research and propagation by eventually developing a facility at its Front Royal campus - a 3,200 acre parcel of land that constitutes the Zoo's Conservation & Research Center.

Source: *Smithsonian Institution National Zoological Park (2006).*

Cambodia

Community participation in elephant conservation in Cambodia

As wild elephant habitat is eroded by the spread of cultivation and over exploitation of forest resources, wild elephants resort to feeding on crops. In this context, the resolution of human-elephant conflict to prevent death or injury on both sides, is no less important than the conservation of elephant habitat. A recent survey of Cambodian rural communities indicates that the work of Fauna & Flora International (FFI)'s Human-Elephant Conflict (HEC) teams is already changing attitudes to Asian elephants. Community leaders interviewed by Tuy Sureivathana, one of FFI's local counterparts in Cambodia's Ministry of Environment, revealed that villagers no longer retaliate against elephants that raid their crops or damage their property. FFI team has been instrumental in dissuading people from using spring traps and even poison against the elephants. The mitigation of the HEC is a vital element of FFI's Asian Elephant Conservation Programme, which also works to prevent poaching, protect habitats and gather crucial scientific data.

Source: *FFI Update 2 (2005).*

 Kenya

Elephant translocation

The elephant population in the Tsavo National Park in the 1960s numbered 40,000. However, poaching for ivory has since reduced the numbers to less than 7,000. In August 2005, the Kenya Wildlife Service (KWS) began rounding up 400 of the 700 elephants in Shimba Hills and moving them to Tsavo East, a much bigger park in southern Kenya with the hope of repopulating the national park. Family groups were selected for translocation by marksmen in helicopters who fired tranquilizer darts at their targets, before loading the elephants into a giant steel crate for the 300 km journey. KWS hopes to track the relocated elephants using GPS collars, fitted to the matriarchs who led each family. The operation will cost the KWS about \$ 3 million, and is welcomed by the villagers near Shimba Hills who complain that elephants regularly stray from the park and raid their crops. A previous attempt in 1996 to translocate about 30 bull elephants from Shimba Hills to parkland about 65 km away resulted in the animals becoming disoriented and trekking back towards the coast, eventually reaching another forest reserve further north. Conservationists are divided in their views about such massive translocations of elephants. Daphne Sheldrick who runs the David Sheldrick Wildlife Trust feels that the money could be better spent in erecting a proper barrier fence. Besides, moving elephants from such lush habitats in Shimba Hills to the dry area of Tsavo East national park, may be harmful. But KWS is of the view that unless the overcrowding is eased, elephants will continue to break down barriers.

Source: Jeevan Vasagar in Guardian Weekly, September 2-8, (2005).

 South Africa, Mozambique & Zimbabwe

World's biggest Transfrontier Park

An initiative of the Peace Parks Foundation (PPF), the proposed Great Limpopo Transfrontier Park will be the world's biggest animal kingdom covering an area equivalent to half of Scotland and crossing the borders of South Africa, Mozambique and Zimbabwe. These countries are merging three game reserves, thereby creating a 35,000 sq. km conservation area that will expand eventually to cover 100,000 sq. km. The project has been praised as an example of regional cooperation and sustainable development, raising foreign investment and creating much-needed jobs. But some people are not happy. In Mozambique, people from Salani village fear that they will no longer be the hunters but the hunted. Some villagers complain that animal rights have taken precedence over human rights, while others are waiting to see what happens.

Source: Kristy Siegfried in Guardian Weekly, Oct. 28-Nov.3, (2005).

 Malaysia

Asian Elephant Range States Meeting

The Meeting of the Asian Elephant Range States was held on January 24-26, 2006 in Malaysia. The meeting commenced with an inaugural session, where Dr. Holly Dublin - the Chair of IUCN Species Survival Commission delivered the key note address, followed by addresses made by the Director General of the Department of Wildlife and National Parks, Malaysia (Perhilitan), and the Parliamentary Secretary of the Ministry of Natural Resources and Environment (NRE). Dr. Dublin highlighted the importance of this meeting, considering the participation of all 13 range states of the Asian Elephant at this occasion to discuss conservation issues relating to the Asian Elephant. The DG of Perhilitan highlighted several issues related to the conservation of Asian Elephants, and stressed the need for dialogue and collaboration between range states. Subsequent to the inaugural session, Dr. Dublin gave a general introduction to the meeting, stressing that the objective was to initiate a dialogue among range states to discuss issues and experiences, and develop consensus towards achieving long-term conservation of Asian Elephants. Dr. Meenakshi Nagendran from the US Fish and Wildlife Service (USFWS) Asian Elephant Conservation Fund highlighted the participation of all 13 range states at this meeting as a great achievement and stated that this was a good opportunity for the range states to discuss the whole range of issues related to the conservation of Asian Elephants, and she indicated that the USFWS would be able to help implement some of the follow-up actions suggested at this meeting through their grant programme.

The key issues highlighted were (a) population management, such as addressing cross border problems, is hindered by information gaps on distribution and population status; (b) lack of standardized methods for population survey and monitoring leading to a lack of good quality data about population distribution and status; and (c) dangers of designing conservation strategies based on guesses about population sizes and trends (efficient allocation of resources for conservation of Asian elephants requires much better data). The recommendations included the need to establish a standardized database on the status and distribution of the Asian Elephant; and the update of existing information through well-designed field surveys using modern peer-reviewed techniques.

Source: AsESG Co-Chairs (2006).

Comment

In a recent issue of the journal *Nature* (438: 1097-1098; December 22-29, 2005), David R. Greenwood, Dan Comeskey, Martin B. Hunt & L. Elizabeth L. Rasmussen have published a paper that deals with the impact of the pheromones associated with the phenomenon of musth on reproductive behaviour of Asian elephants. The word 'musth' means 'intoxicated' in Urdu, and the phenomenon has been known to elephant handlers and keepers for many centuries in India and Sri Lanka. But it is only now, thanks to the studies of Dr. Bets Rasmussen and her colleagues (both in the USA and New Zealand) we seem to understand the role played by the pheromones involved in musth. During musth, Asian bull elephants go through a heightened period of sexual and aggressive activity. The hormone testosterone controls such sexual and aggressive behaviour in bull elephants. In Africa, a musth bull walks with an assertive, purposeful stride and holds the head higher than the shoulders most of the time (Poole, 1987). Kahl & Armstrong (2002) refer to such musth walk as the "John Wayne walk" 'because of its self-confident, take-charge swagger'.

Musth is exhibited only by mature males, usually over 24 years of age (Poole, 1987) and the behaviour of the bulls in musth is the same in both Asian and African elephants (Kahl & Armstrong, 2002). Musth in Asian elephants is an annual phenomenon, and its duration varies from individual to individual depending on age, physical condition and social status. It may last from a few weeks to even months. In captive situation, bulls in musth are always separated from conspecifics and cared for until the musth period is over. When elephants get out of musth, they tend to become more social, amicable and manageable. Although non-musth bull elephants can mate successfully, musth improves the competitive ability of the bulls in their efforts to have access to estrus females. In Asia, older bulls in musth seem to have a significant reproductive advantage over younger bulls. In the captive elephant facility known as the Elephant Orphanage at Pinnawala, Sri Lanka, almost all the young ones that were born were sired by just a few old bulls.

During musth, Asian bull elephants secrete a powerful, pungent smelling fluid from the temporal glands situated on the face. A previous study carried out by Rasmussen *et al.* (2002) on musth in Asian elephants has shown that young socially immature bulls release honey-like odours to avoid conflict with mature bulls, while older bulls in musth broadcast foul-smelling odours to deter young bulls. This was a significant finding that confirmed what the ancient Hindu poetry refers to the phenomenon of bees being attracted by the secretions of the temporal glands in young musth elephants.

As Greenwood *et al.* (2005) point out, musth among Asian elephants is mediated by the release of a pheromone called

frontalin, which exists in two chiral forms or molecular mirror images or enantiomers. They are referred to as + and - enantiomers. The researchers have found that these enantiomers of frontalin are released in specific ratio that depends on the animal's state of musth and age. Depending on the ratio of the enantiomers released, other bulls and cows in a population may react and respond in different manners.

Asian bull elephants reach sexual maturity when they are between 12-15 years old, but until they become socially mature, they have very little reproductive success in the wild. Social maturity may take another 5-8 years. The study also shows that frontalin is released in young bulls in late teens and the secretion increases 15-fold in 25 year age span - the time when the bulls become socially mature. As young bulls become sexually mature, they secrete more of the + variety of frontalin than the - variety but as they become socially mature, the proportions of the two enantiomers become equal (1:1 ratio). It is this ratio that enables other elephants (both bulls and cows) to distinguish both the maturity of the bull concerned as well as its phase of musth and respond appropriately.

Other studies have shown that the length of musth increases as bull elephants mature, with the fittest demonstrating a long mid-phase. The Greenwood *et al.* (2005), studies demonstrated that during mid-musth these older males release 'an optimal ratio of frontalin enantiomers'. Estrous females respond positively to such mid-phase release of pheromones, especially during the time of ovulation, and the musth bulls concerned are therefore able to send a precise message to females in estrus, perhaps helping their reproductive success over other less mature bulls. Since female elephants are in estrus only for about 4 days every 4-5 years in the wild, it is important that bulls find them and mate with them. As Kahl & Armstrong point out, musth helps a mature bull in finding and impregnating a receptive female.

The findings of Greenwood *et al.* (2005) and Rasmussen *et al.* (2002) have important relevance in the dealing with crop-raiding wild elephants in Asia where most of them are bulls and quite a number of them are in musth. An understanding of musth and behaviour of musth bulls would help formulate more effective deterrent measures to mitigate the perennial human-elephant conflict in Asia.

While the misfortunes of the African elephant are due to its tusks for which it is being slaughtered in large numbers irrespective of sex, in Asia given that females do not have tusks and not all males carry them either, elephant poaching may be a minor problem and so poaching cannot be the terminal threat it is in Africa. Nevertheless,

elephants in Asia are being killed as they interfere with agriculture. The long-term future of elephants, outside the protected areas in Asia is inextricably linked to the tolerance of man.

The human-elephant conflict in Sri Lanka is real, and it is leading in just one direction: the destruction and eventual elimination of elephants, males in particular, from agricultural areas, unless innovative measures are adopted to address the legitimate concerns of the farmers. The management of human-elephant conflict has to be integrated into a proper land-use policy and also must recognize the elephant as an economic asset to the community. Unless people value living with elephants, the slaughter will go on. If the local people could perceive the elephant as an economic asset instead of as an agricultural pest, they will tolerate it on their land. One way that local people can benefit from the

Charles Santiapillai

elephant in their midst is from revenues it generates, whether through small-scale ecotourism or from projects that help manufacture paper from dung, produce biogas from dung, or promote organic farming using dung.

The human-elephant conflict has replaced poaching as the biggest threat to the elephant in Asia. While the international conservation organizations are concerned over the trade in ivory, non-tuskers or *makhnas* continue to be slaughtered in large numbers. The debate over elephants is an emotional one, between the preservationists and the pragmatists. The problem with wildlife is that the people who wish to preserve it, are rarely those who have to bear the cost. 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. This is the biggest challenge facing the AsESG.

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Photo: Dr. H. I. E. Katugaha

Genetic assessment of Borneo elephants: origin and conservation implications

Prithiviraj Fernando, John Payne, Geoffrey Davison, Raymond J. Alfred, Michael Stuewe and Don J. Melnick.

Abstract The origin of elephants on Borneo has been controversial, with competing suggestions that they were introduced by humans, or indigenous to the island. Genetic analysis of Borneo elephants and comparison to other Asian elephant populations across their range has shown that they are genetically unique and divergent from all other populations (Fernando *et al.*, 2003). The genetic uniqueness of Borneo elephants suggests that elephants colonized Borneo in the Pleistocene and that they have had an independent evolutionary trajectory since then. Here we discuss the possible factors limiting the distribution of the species in Borneo, and the conservation implications of their newly discovered genetic status.

Introduction

The origin of elephants (*Elephas maximus*) in Borneo is controversial. While some authors have suggested elephants were not indigenous to Borneo but introduced by humans (Shoshani & Eisenberg, 1982), others (Deraniyagala, 1950; 1955) have postulated a natural origin. With a land area of approximately 745,000 km², Borneo is the third largest island in the world. Sabah, a state in the federation of Malaysia, occupies the north-eastern tip of Borneo, while contiguous and to the south

is the Indonesian province of East Kalimantan (Fig. 1). Elephants are restricted to north-east Borneo (eastern Sabah and the northern part of East Kalimantan) within an area approximately 5% of the island. The north-east, south-west orientation of the longitudinal axis of Borneo, makes this area the farthest part of the island from the closest free ranging elephant populations outside of Borneo, in Sumatra and Peninsular Malaysia (Fig. 1).

The earliest detailed description of Borneo by a visitor to the island is that of Antonio Pigafetta, the Italian chronicler of Magellan's Spanish fleet, which sailed into Brunei on the north-west coast of Borneo, in 1521. Pigafetta's group was taken to visit the sultan of Brunei on two tame elephants (Harrisson & Harrisson, 1971). There have been no subsequent reports of elephants in Brunei or western Borneo. The next published record of elephants in Borneo is that of Dalrymple, who reported in 1767 that "the eastern part of Unsang abounds with wild elephants". Tanjung Unsang, presumably the Unsang mentioned by Dalrymple, is near the easternmost tip of Sabah. In 1811 Hunt reported that wild elephants occurred at Kenibatangan (= Kinabatangan), Unsang and Sabahan, and that ivory was traded from Kinabatangan. The reports of Dalrymple (1767) and Hunt (1811) suggest the presence of a large free ranging elephant population in northeastern Borneo in mid 18th century. Ivory from Borneo is reported to have been imported into China in the middle ages (Laufer, 1925). The massive expeditions of Admiral Cheng Ho, which sailed from southern China to South-east Asia in 1405, may have visited the southern Philippines and possibly Kinabatangan (Harrisson & Harrisson, 1971) but did not leave a written record concerning elephants or ivory.

Were elephants introduced?

There are two factors that suggest elephants may not be indigenous to Borneo. Firstly, it is the common belief, of uncertain but long-standing origin, among people who live or work within the Borneo elephant range (J. Payne pers. obs.). Secondly, it seemingly offers a parsimonious explanation for the limited and unusual distribution of the species in Borneo.

Many authors have commented on the possible

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