GAJAH

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Journal of the Asian Elephant Specialist Group

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The journal is intended as a medium of communication on issues that concern the management and conservation of Asian elephants (*Elephas maximus*) both in the wild and in captivity. It is a means by which members of the AsESG and others can communicate their experiences, ideas and perceptions freely, so that the conservation of Asian elephants can benefit. All articles published in *Gajah* reflect the individual views of the authors and not necessarily that of the editorial board or the AsESG.

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Editorial Note

Gajah now comes to you in a slightly modified format. We encourage you to write in with comments or opinions regarding articles published in *Gajah*, These comments and opinions will hereafter be published in a separate section as 'Correspondence'.

Gajah will be published as both a hard copy and an on-line version accessible from the AsESG web site. If you would like to be informed when a new issue comes out, please provide your e-mail address. If you would like to have a hard copy, please send a request with your name and postal address by e-mail to <romalijj@eureka.lk> or to:

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Cover: Wild elephants crossing a highway in China
Photo by IFAW

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Editorial

Jayantha Jayewardene

The Asian Elephant Specialist Group stands out as an icon of the commitment of scientists, governments and civil-society entities to saving the Asian elephant throughout its range states. It is also committed to the conservation of Asian elephants in zoos and with private owners. Yet there is an overwhelming public perception that elephants are fast disappearing, and that the advice of scientists is not being heeded. Is our commitment actually working towards conserving these elephants?

As the focal point for advocacy on Asian elephant conservation plans and actions, there is no gainsaying that the AsESG has been less than effective, given the enormous task it has at hand. In the last six years or so the group has met only once or twice. Communication to members by way of newsletters, e-mails etc also have been minimal. The AsESG has amongst its members conservationists, researchers, scientists, managers, policy makers and amateur enthusiasts who are all interested in making an effort to conserve the Asian elephant. It is essential that the group gives leadership and support to the activities of these people and also makes information available to others.

The AsESG needs to have a programme of work, and such a programme needs to be developed through consultation with the membership, especially with those directly concerned with elephant conservation in each of the range states. There should be an annual plan and strategy, which should also address the issue of finances necessary for implementation. These plans should be prioritized so that funds, if not available in full, could be utilized for the more important actions. It would be interesting to know what the IUCN's budget for the AsESG is. If there are no funds coming in to the AsESG from the IUCN, it risks transforming the Group into little more than a talk shop: some clarity is needed on the role of the AsESG and its relevance within the IUCN family.

When assessed, the actual accomplishment of the AsESG in the last five or six years has been minimal. The group met last in 2000. Each country was supposed to formulate an elephant conservation plan but this has not happened. In Sri Lanka, for example, neither the AsESG nor its members, in that capacity, have been influential in the debate on, for example, the efficacy of electric fences, the definition of range areas, the usefulness of elephant drives, the conservation utility of privately-owned elephants and the *ex situ* population. The public has a right to ask whether the AsESG exists purely to enable its members to wear a colourful badge that awards them a degree of self-importance in the international conservation bureaucracy.

The recent effort to merge *Gajah* with *Pachyderm*, the Journal of the African Elephant Specialist Group, clearly showed the insensitivity of some to real elephant conservation. It showed that though they thought they are in a position to try and dictate terms, they did not really understand the role *Gajah* plays and could play in the future. It also seemed that they did not understand the Asian way of thinking. It took a protracted and sometimes heated e-mail debate to concur to *Gajah* retaining its identity.

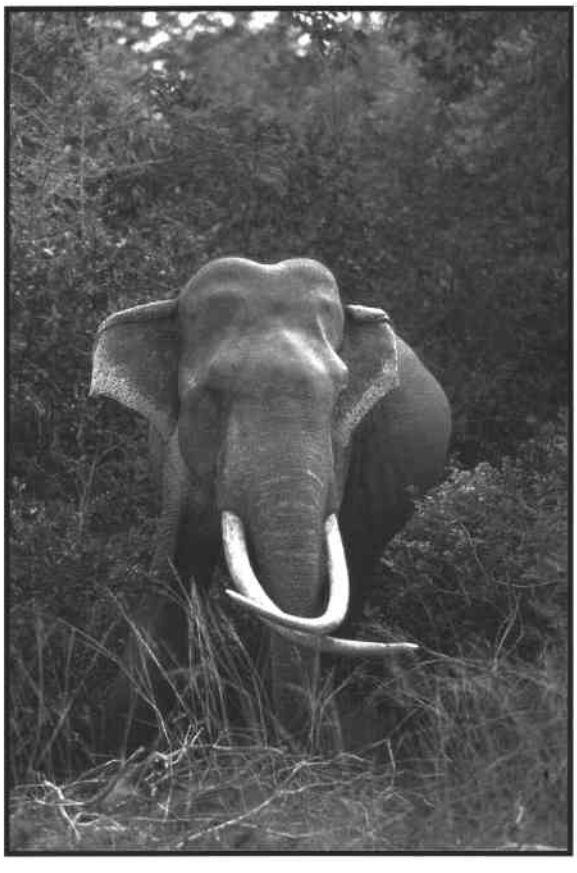
The debate that ensued in the e-mail network on the merits and demerits of continuing with *Gajah* also showed that little seems to have been transferred, in terms of capacity, to local conservationists in most of the range states by those who are carrying out various projects there, especially by some of those who continue to live there. Some wanted *Gajah* to be a peer reviewed journal so that their publications would have scientific credibility. While the quality of publication is undoubtedly important, others wondered how this would

help elephant conservation or strengthen the efforts of conservationists.

Many symposia, workshops, seminars and the like are held regularly, but what have they really achieved in terms of improving the prospects for survival of Asian elephants in each of the range states? Books are written, published and sold, but what effects have these on elephant conservation? Most of these books, in terms of costs, are out of reach of the conservationists working in the field. Of course, books by persons like Raman Sukumar, Richard Lair, Mike Schmidt, Susan Mikota *et al.*, have helped inform elephant conservationists, but much of the literature is purely academic and has little relevance to on-ground actions.

The members of the AsESG itself are not privy to the plans or annual budget of the AsESG, if there indeed is such a plan and budget. It is difficult to escape the conclusion that there is a lack of transparency. In fact, the editor had to solicit funds for the publication of *Gajah*.

My intention is to help make *Gajah* a journal that would encourage those who wish to contribute their knowledge and experience to help the prospects of survival of the Asian elephant, rather than using it as a vehicle for personal academic advancement or for notching up 'publications'. There are, at the moment, many journals, which can accommodate scientific papers on elephant conservation. *Gajah* need not be merely another one of these. Instead, *Gajah* should be a means by which the members of the AsESG and others can communicate their experiences, ideas and perceptions freely, so that the others who are interested in and are committed to the conservation of the Asian elephant, can benefit, bearing in mind that the ultimate beneficiary must not be any one of us, but the Asian elephant.



Cross-tusker of Kumana, Sri Lanka, killed by a homeguard in January 2007
Photo by Palitha Antony

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Tsunami and Elephant "Sixth Sense" in Sri Lanka

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Introduction

Soon after the Asian tsunami on the 26th of December 2004, there were many reports in the local and international press of how people had observed animals reacting in strange ways, in Sri Lanka and other locations thousands of km away from the epicenter, weeks to hours before the tsunami struck:

- http://www.sciencenewsforkids.org/articles/20050413/Feature1.asp
- http://news.nationalgeographic.com/news/2005/01/0104_050104_tsunami_animals.html
- http://news.bbc.co.uk/2/hi/south_asia/4136485.stm
- http://www.reuters.com/newsArticle.jhtml?type=scienceNews&storyID=7207207
- http://www.dawn.com/2005/01/10/int8.htm
- Sheldrake (2005)

These reports suggested the possession of a 'sixth sense' by animals both domestic and wild, which warned them of the impending tsunami and allowed them to take appropriate action to escape it. Elephants featured prominently in these claims with stories of elephants in Sri Lanka and Thailand having saved tourists (Sheldrake 2005). The ability of elephants to detect seismic vibrations and low frequency sounds was thought to provide support for such responses. A person in Yala National Park related how he observed herds of elephants running away in terror from the coastal area half an hour before the tsunami struck. A game guard in Yala related the story of how house sparrows in Okanda on the Eastern coast, had suddenly abandoned their nests two weeks before the tsunami, and that the house were the nests was destroyed by the tsunami. A party of visitors to Yala who were at the Buttuwa bungalow on the coast claimed that on the morning of the tsunami, a herd of spotted deer had climbed up the sand dune behind the bungalow and were gazing out at the sea around an hour before the tsunami struck. They were so transfixed that they did not even take any notice of the humans around. Another stated, that a person took his dogs for walks on the beach every morning, but on the fateful day, the dogs flatly refused to go out, thus saving his life. An observation that no dead animals were found in the Yala National Park soon after the tsunami similarly added credence to the 'sixth sense' story, suggesting that such pre-warning enabled them to save their lives. However, these stories when checked out proved to be either fabrications or the drawing of unjustified association between cursory observations and the tsunami.

The radio collared elephants

An unbiased observation of animal movement before and during the tsunami was that of two radio collared elephants we were tracking in the Yala National Park, South-east Sri Lanka (Wikramanayake *et al.* 2006). The two animals were fitted with GPS-satellite collars that remotely collected a GPS position every 4 hours. The recorded positions were transmitted to an overpass satellite that relayed the data back to us. Elephants have a sexually dimorphic social organization with females and young in herds and adult males being solitary. Both the collared animals we were tracking were herd animals, one a juvenile male 'Kavan' and the other an adult female 'Biso-Menike', hence their move-ments represented that of the whole herd. Both the herds numbered around 30 animals each, although the number of animals that were closely associated together at any given time varied from about four individuals, up to the full herd. As a response to an event such as a tsunami would be uniform at least across all members of a herd, the movements of the two tracked animals can be taken to represent the two herds at the least.

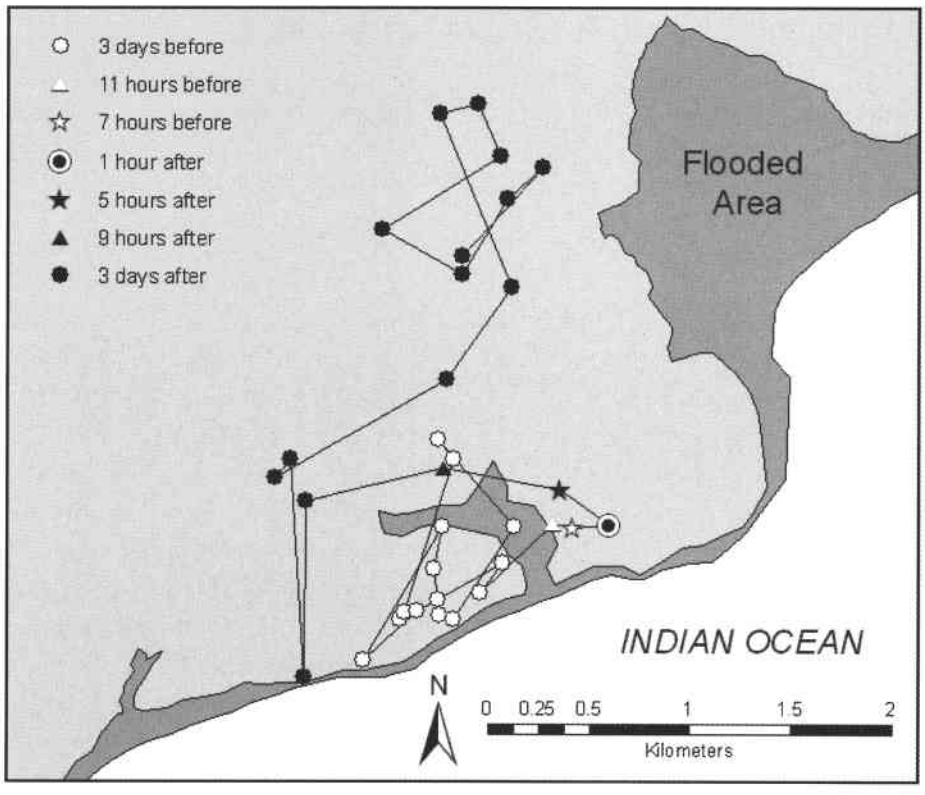

Figure 1. Map showing Biso-Menike's locations in the week of the tsunami (23rd - 29th Dec. 2004).

Analysis of the two tracked elephants' ranging patterns showed there were no abnormal movements that indicated any response to the tsunami prior to its occurrence. On the days prior to the tsunami, Biso-Menike and her herd were ranging in the coastal area close to Buttuwa and Uraniya (Fig. 1). Biso-Menike was only about 200 m from the sea at the time of the tsunami impact and even continued to range in the same area afterwards (Fig. 1). Her position at the time of the tsunami impact was close to the Uraniya lagoon, through which the tsunami incurred onto the land. The tsunami wave would have passed only a few meters away from where she and the rest of her herd were at the time. Kavan and his herd were ranging about 5-6 km inland from the coast and also did not show any response (Fig. 2). While Kavan's group was beyond the area inundated by the tsunami, a distance of 6 km from the coast would be insignificant if animals perceived, and were responding to the tsunami's genesis occurring over 1500 km away, or its approach through the ocean at hundreds of km per hour. Hence both animals and the associated herds could be expected to show the same response if indeed they were pre-warned of the tsunami.

Thus the only unbiased animal data disproves prior detection and response of animals to the tsunami. For more details see Wikramanayake *et al.* 2006.

It is interesting to analyze the possible mechanisms of a response by animals to an impending tsunami, through a scientific point of view. If animals did responded to the tsunami any time prior to its impact, they had to either perceive its genesis or approach and then respond to it in a meaningful way, i.e. flee inland from the coastal area. This could happen if either the detected event was a disturbance of sufficient magnitude to elicit a general non-specific response or if the animal identified it as a particular cue and conscious-ly or instinctively associated it with the coming of a tsunami.

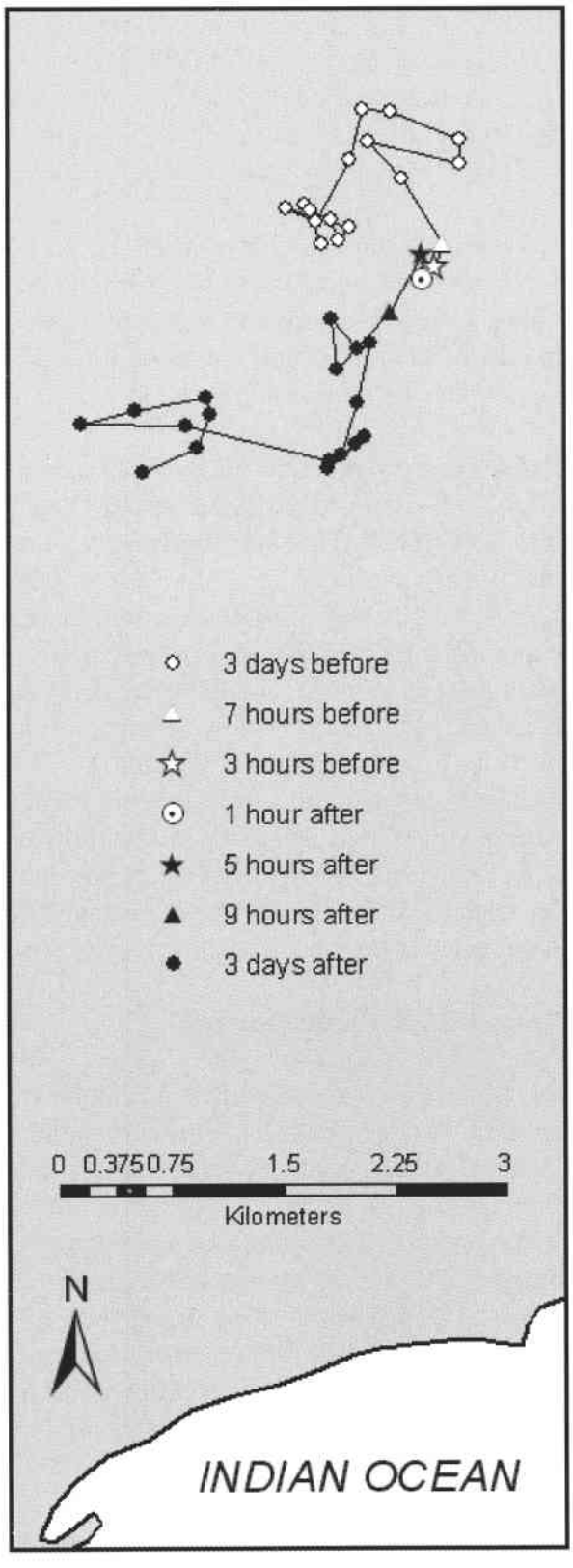

Figure 2. Map showing Kavan's locations in the week of the tsunami (23. to 29. Dec. 2004).

A general response to disturbance

The 2004 Asian tsunami was generated by a massive sub oceanic earthquake. Therefore it is possible that animals in Sri Lanka perceived a seismic signal at its genesis. However, if they responded to the seismic signal of the earthquake, every time an earthquake occurs, irrespective of whether it was sub-oceanic and would generate a tsunami or inland and not generate a tsunami, animals should flee in the opposite direction. Since Sri Lanka is an island, a strong nonspecific general response to disturbance would predict that animals on the western side should run to the coast, as the disturbance would be from the east. However, since the epicenter of the earthquake that gave rise to the tsunami was over 1500 km away from Sri Lanka, any seismic signal perceived would have been of very small magnitude. Even if detected, the disturbance would be very minor. Animals would not respond to such a minor signal with a non-specific fleeing response, as one of equal or greater magnitude would be generated by a very much smaller tremor that occurred at a lesser distance, or any number of other events such as something impacting the ground, an explosion, or even a thunder clap.

The approaching tsunami while it was travelling through the deep ocean would not provide a sufficient disturbance to elicit a non-specific response as the tsunami is just another wave, only a meter or so in height in mid ocean. Therefore, it is unlikely that animals could have perceived the earthquake or the tsunami any significant time before its impact, or if they did, would have responded to it as a non-specific general response to disturbance, other than maybe to prick up their ears.

A specific response

Recognition of the disturbance as an event that portends a tsunami suggests that animals associated the detected disturbance, however minor, with the subsequent arrival of a tsunami. Such association would have to be through personal experience or through 'instinct'.

Response based on previous personal experience by individual animals is not possible in Sri Lanka, as when compared to the lifetime of animals, tsunamis occur extremely rarely in this part of the world. Consequently, no animal living in Sri Lanka at the time of the tsunami could have previously experienced such an event. In fact the enormous human death toll bears stark evidence to the rarity of tsunamis. Tsunamis did not feature in the collective human consciousness in this part of the world, even though we have a collective 'memory' that goes back thousands of years through our written records. A possible reference to a tsunami in ancient Sri Lankan literature is that of the story of the 'sea coming ashore', in Kelaniya (western coast) during the reign of king Kelanitissa many centuries ago. The only other recorded tsunami event in recent history was the one generated by the cataclysmic explosion of Krakatoa in 1883, which took the life of a single person in Hambantota on the south-eastern coast (Winchester 2003). Thus, for any animal to have responded to the tsunami of 2004 through personal experience, it had to be well over 121 years old.

Could the reaction to the perceived cue be instinctive, or genetically inherited? Many behaviors have genetic components. However, for any behavior to have a genetic component or be 'inherited', it needs to be selected for. Such selection could occur if it impacted an entire population or a fragment of the population frequently. Now when a tsunami occurs, if the animals that ran away by detecting the tsunami were the only ones of the species that survived the tsunami, then the tsunami would exert a strong selective pressure on the ability of animals to detect it and run away in time. If so, even if a tsunami happened every few thousand years or generations, only the ones that would run away would survive from the whole species every time. Therefore a tsunami would exert a strong selective force and would select for animals that have such a 'tsunami sense'. On the other hand, if the tsunami impacted only a fragment of the species or population, the animals that ran away would survive, but so would a large number of individuals that did not run away but were beyond the reach of the tsunami. In re-colonizing the area impacted by the tsunami, the ones that ran away would have to compete with the ones that did not show that behavior but survived because they were out of reach of the tsunami. If tsunamis occurred very frequently, each time it would select the ones that ran away. Hence depending on the area and frequency of impact, over a period of time tsunamis could again select for that behavior.

However, if tsunamis impacted only a small fragment of the population *and* occurred very rarely, which is the case in relation to Sri Lanka, the selective force would be so small that it would have no effect.

Extensive surveys conducted by us (Fernando *et al.* 2006) showed that the tsunami impact was very localized and patchy. The extent of the tsunami impact on land, in relation to the species distribution of most terrestrial fauna, especially in relation to groups such as mammals, was minute. Therefore, tsunamis do not have an impact on most animals, of an intensity, extent, or frequency, required to exert a selective pressure. In essence, tsunami impact on terrestrial fauna is that of a low magnitude rare event, hence of little evolutionary potential for selection of a behavioral response such as running away in response to its pre-detection.

Animal deaths in the tsunami

Our surveys also showed that a number of animals that did perish from the tsunami included buffalo, wild boar, hare, a python etc. (Fernando *et al.* 2006). While the numbers were very small when compared to the massive human toll, it can be explained without invoking sixth senses or instincts. Firstly, the number of animals and especially large mammals, in the coastal area at any point in time is insignificant compared to the number of humans in similar areas, a comparison of just a few animals to millions of people. The highest threat from the tsunami was to those that were on the beach at tsunami impact. However, unlike humans, one very rarely finds any large animals on the beach itself, especially during daytime. For example, seeing an elephant on the beach is an exceedingly rare sight. Therefore, the possibility of a large

animal getting caught in a tsunami is very remote.

The tsunami impact was very patchy and incursion of the tsunami occurred mainly through breaks in the coastal sand dunes such as lagoon and river outlets and low-lying areas. Therefore, even animals that were in the coastal zone but just outside the area of incursion were perfectly safe, as was the case with Biso-Menike. In contrast to its approach through the ocean, the tsunami wave impacting the shore and advancing through the lagoons and fringe forests would create an enormous disturbance and every animal would instantly react to it and try to get out of the way. As most animals depend on their speed and reactions to escape from hunters or to hunt themselves, practically any wild animal would respond to such an event far better than any human could. Therefore, even if everything else was equal, fewer animals would be caught in a tsunami than humans.

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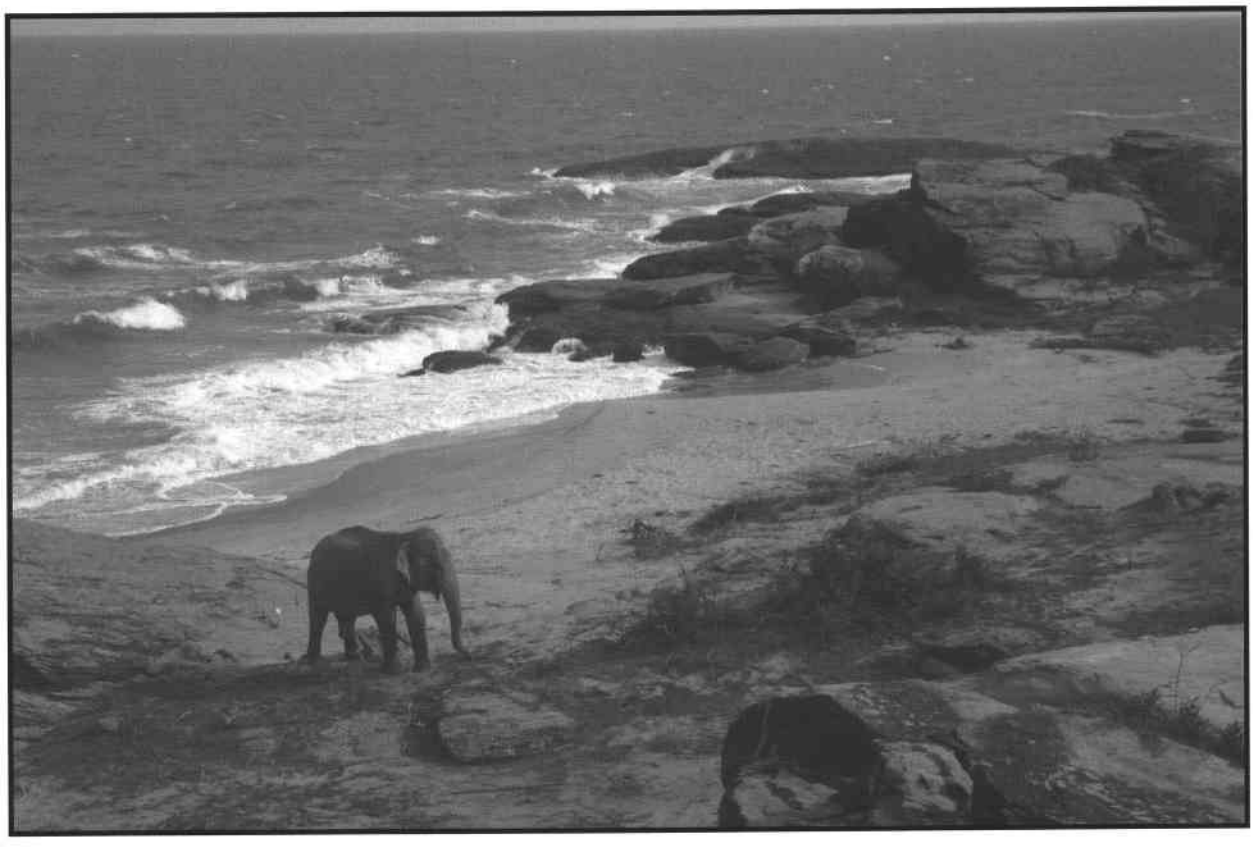

A rare sight - elephant on the beach in Yala National Park, Sri Lanka
Photo by Jennifer Pastorini

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Some Practical Guidelines for Users of the ARGOS Satellite-Telemetry System

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Abstract

The Argos location and data collection system has been used widely in wildlife research though many workers have identified problems with it, particularly its lack of precision. The Indochina Elephant Programme (Fauna & Flora International) and the Cambodian Forestry Administration undertook a satellite telemetry project in Cambodia, which ended prematurely due to an apparent failure in the system. The transmitter was recovered and several methods used to determine when the system failed as well as to calculate error estimates for the PTT-derived data. It was discovered that the collar had become static only five months into the study and that LC 3 provided the most reliable locations, followed by LCs A & 2. Users of the Argos system are strongly advised to make their own error estimates and although these tests use ad hoc data, modification to suit pre-deployment tests would be straight-forward.

Introduction

The study of animal movements through satellite telemetry has played an increasingly important role in conservation biology over the past couple of decades. One of the most widely used, the Argos location and data collection system, is operated and managed by Collecte, Localisation, Satellites (CLS). This system utilizes dedicated receivers placed on-board several polar-orbiting satellites, which collect and analyse signals (up-links) from Platform Terminal Transmitters (PTTs). This data is then relayed to processing centers, in France and America, where the PTT's location during the initial up-link, is calculated. This final calculation is based on the change in frequency of the original signal as the satellite passed overhead; the Doppler shift effect. The result is sent to the system user in the form of a lat/long location in decimal degrees. Each location is classified into one of seven Location Classes (LC) four of which (LCs 0-3) give an estimation of the locations accuracy (Table 1).

Table 1. CLS error estimates.

Location Class	Accuracy
3	< 150m
2	150 m accuracy < 350 m
1	350 m accuracy < 1000 m
0	> 1000m
A	No estimate of accuracy
B	No estimate of accuracy
Z	Invalid location

The performance of the system depends on several factors that affect both the transmitter (e.g. altitude, latitude, topography and oscill-ator stability) and the on-board receiver (e.g. geometrics, number of messages and their dis-tribution in time). Any combination of these factors acting upon the system means that its overall performance can vary both within and between studies (Keating *et al.* 1991).

Operational since the 1970's the system has been used widely in wildlife research and has been increasingly applied to the study of both African (Lindeque & Lindeque 1991; Tchamba *et al.* 1995; Verlinden & Gavor 1998; DeBoer *et al.* 2000) and Asian elephants (Stuwe *et al.* 1998; Goldthorpe & Heffernan in press). Although the use of the system has resulted in a plethora of information, many workers have identified problems with it including locational inaccuracy (Hillman-