

## Forum

# Asian elephants in zoos face global extinction: should zoos accept the inevitable?

Paul A. Rees

**Abstract** Captive breeding programmes for the Asian elephant *Elephas maximus* have failed to establish self-sustaining zoo populations. Birth rates are low and calf mortality rates are high. The zoo population is widely dispersed, with few animals being moved on breeding loan. New techniques may increase birth rates but current predictions suggest demographic extinction within 50 years. It would be difficult to justify importing elephants from sustainable zoo reserves in Asia to

participate in *ex situ* breeding programmes where reproductive success is low. Zoos should either urgently regroup animals to form breeding units, or accept that Asian elephants will die out in zoos and that funds should be diverted to *in situ* conservation projects.

**Keywords** Asian elephant, captive breeding, *Elephas maximus*, zoo reserves, zoos.

In response to the decline in wild Asian elephant *Elephas maximus* populations, *ex situ* captive breeding programmes for the species face the challenge of creating self-sustaining zoo populations. This objective is frustrated by an imbalance in the sex ratio, low fecundity, high calf mortality, inadequate accommodation and the emergence of new diseases within zoo populations. The Asian elephant Species Survival Plan (SSP) was established by the American Zoo and Aquarium Association in 1985. Schulte (2000) reported that there were 46 males (eight castrated) and 239 females in the North American population in 73 facilities in 1999. Both sexes were present in 23 facilities (31.5%). Wiese (2000) used a population model to predict that the North American population will drop to approximately 10 elephants in 50 years and become demographically extinct. The European Endangered species Programme (EEP) for Asian elephants was established in 1991. By 31 December 1998, the EEP included 79 zoos holding 50 bulls and 199 cows (Anon, 2000). At the beginning of 1993, the ratio of bulls to cows was 1:5 but by 2000 it had increased to 1:4.4.

Information on the holdings of Asian elephants in captivity is available from the International Species Information System (ISIS), which serves around 550 zoological institutional members from 54 countries. In 2002, ISIS members held a total of 100 bulls and 378 cows worldwide. Seventy-seven per cent of all bulls and 88%

of all cows were held in Europe and North America (Table 1). Fifty per cent of all ISIS zoos had either one or two elephants and three quarters of groups consisted of four or fewer individuals.

Birth rates are low in zoos, and calf mortality is high (Kurt, 1994; Taylor & Poole, 1998). There were 141 births in European zoos and circuses between 1902 and August 1996 (Haufellner *et al.*, 1993; Anon., 1996); 37% of which died within their first year, 48% were stillborn and 27% were killed by their mothers. Infanticide has not been reported from captive elephants in Asia (Schmid, 1998). In 1998 the Asian elephant EEP reported just 11 births (Anon, 2000). Of these only three bulls and one cow survived. During 1999 just two births were recorded. Fecundity in the North American population is also low and first year mortality is over 30% (Wiese, 2000).

Well-managed captive populations of Asian elephants, such as those found in forest logging camps, may have a breeding performance comparable to wild populations and better than zoo animals (Krishnamurthy, 1995; Taylor & Poole, 1998). The mean life expectancy of calves born in Europe, however, is only 6.1 years (Schmid, 1998) compared with nearly 30 years in Burmese working elephants (Schmidt & Khyne U Mar, 1996). To try and address the problem of low reproductive rates in zoos, ultrasonography of the urogenital tract has been used to assess female and male reproductive function (Hildebrandt *et al.*, 2000a, b), and in 1999 the first successful artificial insemination pregnancy was reported by Dickerson Park Zoo, USA (Hodgkins, 2000). Such techniques may improve fecundity in the future, but breeding failure is a zoo phenomenon and not inherent in the species.

**Paul A. Rees** School of Environment & Life Sciences, Allerton Building, University of Salford, M6 6PU, UK. E-mail: p.a.rees@salford.ac.uk

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**Table 1** Regional distribution of Asian elephants recorded on the ISIS database for 131 zoos as at February 2002 (Anon, 2002).

Region	Male	Female	Unknown	Births*	Total	% of total
Europe	48	189	1	5	238	49.7
N America	29	143	0	1	172	35.9
S America	2	5	0	0	7	1.5
SE Asia	18	34	0	1	52	10.9
Australasia	3	7	0	0	10	2.1
Total	100	378	1	7	479	100.0

\*Births reported during the previous 6 months and counted in totals for males and females.

Kurt (1994) found that only 20% of elephant transfers between zoos resulted in pregnancies, possibly due to stress caused by the removal of the cow from its social group (Schmid, 1998). Movements of elephants between zoos are rare. In 1992 EEP zoos held 212 elephants but no movements were reported. In 1999 there were 83 zoos participating in the Asian elephant EEP, holding 49 bulls and 217 cows at 31 December 1999 (Dorresteyn, 2001). During the year only 3 bulls and 8 cows were transferred between EEP zoos, but eight of these movements related to a single zoo. In addition a single bull and 11 cows were transferred into the EEP from non-EEP zoos. Dorresteyn (2001) estimates that more than 50% of the females that are in the best breeding age category (<25 years old) have never been in a potential breeding position, although almost all are believed to be capable of breeding. The risks associated with the movement of elephants between collections have increased since the appearance of new fatal herpes viruses (Rickman *et al.*, 2000) and tuberculosis (Mikota *et al.*, 2000) in the zoo population.

A survey of 'elephant space' in European zoos conducted in 1999 (Griede, 2000) found that of 80 respondent institutions, 66 planned to have Asian elephants in 2009. There will be a net loss of two institutions intending to hold the species by 2004. The study predicted an increase of 9 bulls and 76 cows in EEP zoos between 1999 and 2009, and suggested that five bachelor herds might eventually be created.

The North American Asian elephant population is not self-sustaining (Wiese, 2000) and an estimated four elephants per year need to be imported simply to maintain the population at its current level, based on a model that makes extremely optimistic assumptions. Wiese (2000) suggested the Asian elephant is a perfect candidate for the establishment of an extractive zoo reserve (Conway, 1998). This concept proposes the intensive management of habitat reserves so that wild populations can sustain an extractive harvest for use by zoos. Some forest timber camps in India are reported to be self-sustaining or growing (Sukumar *et al.*, 1997), and Wiese has

suggested that these camps may be a logical source for trial extractions. However, Dorresteyn & Terkel (2000) considered this proposal to be unacceptable as a means of supporting the European breeding programme.

If wild or *in situ* captive populations become sustainable to the point where they are able to supply zoos with excess animals, this must put into question the conservation need for an *ex situ* zoo population, with no immediate prospect of returning captive-bred elephants to the wild. The translocation of excess animals within range states would arguably make a greater contribution to elephant conservation.

In conclusion, there is little evidence of commitment on the part of zoo directors to translocate elephants between zoos either temporarily or to form viable breeding units. Zoos that are investing in new elephant accommodation are gambling large sums of money on being able to breed or otherwise acquire elephants in the future, while in India the solar-powered electrified elephant fencing used to reduce human-elephant conflict only costs c. Rs 15,000 (\$300) per km (Appayya, 1995).

It may be time to reconsider the role of zoos in elephant conservation. Many zoos have already stopped keeping elephants. If there is no realistic prospect of establishing self-sustaining *ex situ* captive-breeding populations in western zoos it may be more productive to use the existing animals as ambassadors to raise money exclusively for *in situ* conservation in the range states until they die out naturally.

Perhaps future strategies for Asian elephant conservation should be influenced by careful consideration of the answer to a single question. If Asian elephants did not already exist in zoos would we spend scarce resources developing an *ex situ* captive breeding programme with no guarantee of success?

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### Biographical sketch

Dr. Paul Rees' research interests include wildlife law and the behaviour, ecology and conservation of large mammals, especially elephants.