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A Simple Method for Assessing Elephant Body Condition

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Introduction

Human-elephant con□ict (HEC) is widespread across Asian elephant range (Sukumar 1989; Santhiapillai & Jackson 1990). The threat to elephants from HEC makes it a serious conservation problem. Loss of human life and limb, and economic losses due to crop raiding and property damage by elephants, makes it a major socio-economic and political issue (Fernando 2006). Rapidly expanding human populations result in ever greater conversion of elephant habitats and increased interaction between humans and elephants, leading to escalation of HEC. 'Development' and wide media coverage of the effects of HEC on people change perceptions and expectations, causing decreased tolerance of damage caused by elephants.

Across the 13 south and south-east Asian countries with free ranging elephants, their management and HEC mitigation is largely focused on relieving the human consequences of HEC, albeit within a framework of elephant conservation. HEC mitigation is one of the main functions of wildlife conservation authorities in these countries. A wide range of activities and tools have been developed to mitigate HEC (for review see Fernando *et al*. 2008). The 'successes' of HEC mitigation is almost exclusively assessed from the standpoint of decreased human impact. The effects of HEC mitigation activities on elephants are rarely assessed and largely unknown. Recent studies suggest that tools such as translocation and barriers can have severe detrimental impacts on elephants in some situations (Fernando 2006).

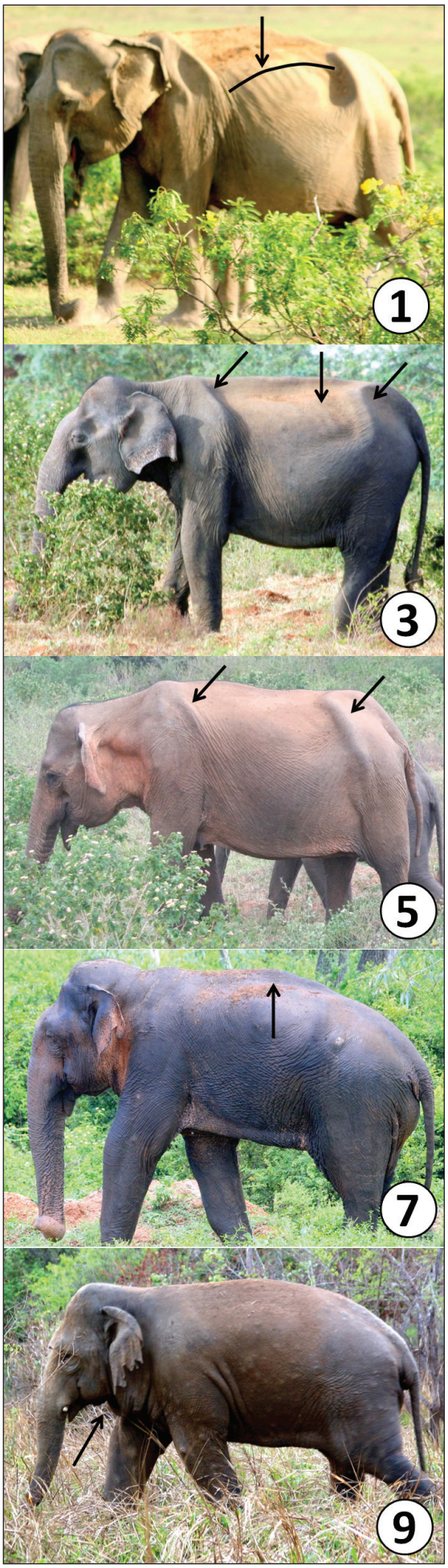
In longitudinal studies to assess the impact of management actions on elephants, monitoring effected elephants should commence pre-implementation to provide baseline data, and continued after till a clear conclusion on impact can be reached. Another approach is to do cross sectional studies, comparing elephants subject to an intervention and those that are not. Monitoring methods range from individual based ones such as radio tracking and behavioral observations, to population based ones such as demographic evaluation. Body condition assessment is individual based, but is most meaningful when applied to a population. It can be used for both longitudinal and cross sectional studies, is comparatively inexpensive and does not require a high technical capacity. It can also be used as an early indicator of the impact of management actions on elephants, in contrast to demographic evaluation, which tracks parameters that take long to manifest.

The method developed by Wemmer *et al*. (2006) has been used to assess body condition in captive (Thitaram *et al.* 2008) and free ranging elephants (Pinter-Wollman 2009) and is recommended by the Asian Elephant Specialist Group (http://asesg.org/PDF□les/2009/Asian Elephant Body Condition Index.pdf). It is based on subjective scoring of the prominence of bony characters, to assess body fat stores and muscle mass. Seven characters are commonly used and an additional 3 characters with palpation are used in the case of elephants that can be handled.

Here we present a new method of body condition assessment which is simpler, can be conducted more rapidly and can be more easily applied to free ranging elephants.

Method

The method is based on the comparison of the target animal to be scored, with a scale of



5 reference photographs (Fig. 1). The scale photographs are assigned scores of 1, 3, 5, 7 and 9, with numerically higher values corresponding to better body condition. The photographs are of free ranging individuals observed in Sri Lanka and represent almost the entire spectrum of body condition encountered in free ranging elephants. However in order to accommodate the possibility of greater variation, the range of scores extend from 0 to 10.

The method is primarily based on direct comparison with the photographic scale, and appraisal of being emaciated, wiry or plump. In order to facilitate scoring and emphasize important landmarks, a rough indicator of characters corresponding to the given scores is provided in non-technical terms (Table 1) and indicated by arrows in Figure 1. However this is only supplementary to the photographic scale and not meant as a scoring system by itself.

The pro le of the elephant is used in scoring. By visually comparing the test animal to the scale, a score is directly assigned. If the elephant in question exactly matches one of the body conditions in the scale, it is assigned that score. If it is dif cult to decide between two points on the scale, as the scale is composed of odd numbers, the score represented by the intervening even number is assigned. An elephant in worse body condition than 1 would be assigned 0 and one in better condition than 9 would be assigned 10.

The method has been eld tested with both free ranging and captive elephants and with photographs of both, and found to be equally applicable in all situations. When tried out with mahouts, Wildlife Department game guards and researchers, all were able to use the method consistently and with ease, after a few minutes instruction and a few trial scores. As the method is a subjective assessment based on visual appraisal and comparison, there is bound to be variation caused by lighting, posture and

Figure 1. Photographic body condition scale. The numeral in the white circle denotes the 'body condition score' of each elephant. Arrows indicate the characters referred to in Table 1.

Table 1. Diagnostic characters pertaining to scores in photographic scale.

Score	Characters
1	All ribs (shoulder to pelvis) visible, some ribs prominent (spaces in between sunken in)
3	Some ribs visible (spaces in between not sunken in), shoulder and pelvic girdles prominent
5	Ribs not visible, shoulder and pelvic girdles visible
7	Backbone visible as a ridge, shoulder and pelvic girdles not visible
9	Back rounded, thick rolls of fat under neck

observer. However, the error was found to be comparatively small and usually ±1 the assigned score. When scoring photographs, preferably a series should be used for each elephant.

It is hoped that the method's rapidity and ease of use will facilitate scoring free ranging elephants across the range by managers, researchers and students, promoting the assessment of HEC mitigation impact on elephants, and providing feedback for management.

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Figure 2. Explaining the method to mahouts.