

# Take a nap: sleeping behaviour of free-ranging male African elephants (*Loxodonta africana*) during the day

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## BACKGROUND INFORMATION

Information on the sleeping habits of both elephant species is limited and predominantly based on data collected at night, because elephants are often classified as diurnal animals. Due to the fact that elephants in captivity are much easier to observe, especially during the night, most of the studies so far conducted on sleeping behaviour of elephants focused on individuals living in zoological institutions or animal parks (see Table 1).

Table 1: Studies on sleeping habits of elephants

Observation of animals in	Species	Time of observation	References
captivity	<i>Elephas maximus</i>	?	Benedict FG: The physiology of the elephant, 1936
captivity	<i>Elephas maximus</i>	?	Hediger H: Med Klin 20:938-946, 1959
captivity	<i>Elephas maximus</i>	night	Kurt F: Mammalia 24:259-272, 1960
captivity	<i>Elephas maximus</i>	night	Hartmann E et al.: Psychophysiology 4:389, 1968
captivity	<i>Elephas maximus</i>	night	Tobler I: Sleep 15:1-12, 1992
captivity	<i>Elephas maximus</i>	night	Meller CL et al.: Zoo Biol 16:51-61, 2007
captivity	<i>Loxodonta africana</i>	night	Kurt F: Mammalia 24:259-272, 1960
captivity	<i>Loxodonta africana</i>	night	Kühme W: Int Zoo Yearb 6:113-121, 1962
captivity	<i>Loxodonta africana</i>	night	Hartmann E et al.: Psychophysiology 4:389, 1968
captivity	<i>Loxodonta africana</i>	night	Adams J et al.: Appl Anim Ethol 6:257-276, 1980
captivity	<i>Loxodonta africana</i>	day?	Brockett RC et al.: Zoo Biol 18:101-109, 1999
captivity	<i>Loxodonta africana</i>	night	
natural habitat	<i>Elephas maximus</i>	day?	McKay GM: Smithon Contrib Zool 125:1-113, 1973
natural habitat	<i>Loxodonta africana</i>	night	Hendrichs H: Dikdik und Elephanten, 1971
natural habitat	<i>Loxodonta africana</i>	night	Wyatt JR: East Afr Wildl J 12:273-289, 1974
natural habitat	<i>Loxodonta africana</i>	day	Guy PR: East Afr Wildl J 14:285-295, 1976



Figure 1: Locations in KNP where elephants were observed sleeping in lateral recumbency between Jun and Dec 2007

Although elephants can sleep standing, most of the studies indicate that elephants sleep in a recumbent position (RP) if undisturbed, and have an individual preference for lying on the right or left side. Observations revealed that elephants, if they lay down to sleep during the night, will often get up to feed and then lay back down to sleep again. The breathing rate so far observed in adult elephants sleeping in RP was 4.4 and 3.8 breaths/min, respectively. Similar sleep patterns have been described for adult African and Asian elephants in captivity, with a total sleeping time of 3.1-6.9 hours (1-4.5 hours in lateral recumbency) between the hours of 23:00 and 07:00. Further studies indicate that elephants in their natural habitat spend less time sleeping in RP (0.67-2 hours) compared to elephants in captivity, although the limitations of data collection under natural conditions could have contributed to the differences found.

However, in addition to sleeping position and duration, another interesting point that needs more clarification is at which time during the course of the day elephants sleep in RP. Some reports mention that elephants lay down to sleep in the daytime, whereas other studies point out, that adult animals were rarely or never observed lying asleep during the day. For example in a study which focused on the diurnal activity pattern of elephants in the wild, 48 African elephants were observed for a total of 365 hours between the hours of 08:00 and 17:00, and not one adult was seen lying down.

## RECENT OBSERVATIONS

During an ongoing study focussing on male elephant reproduction, adult bulls could be observed several times sleeping in RP during the day. Between June and December 2007, a total of twelve observations of sleeping behaviour were recorded in the northern part of Kruger National Park on nine of 177 days spent in the field (see Figure 1).

Sleeping behaviour has been observed between the hours of 08:00 and 15:00 and sleep periods in RP lasted  $41 \pm 13.5$  min (mean  $\pm$  SD, see Figure 2). The breathing rate measured (3.75 breaths/min) was comparable to the rates formerly reported for adult elephants.

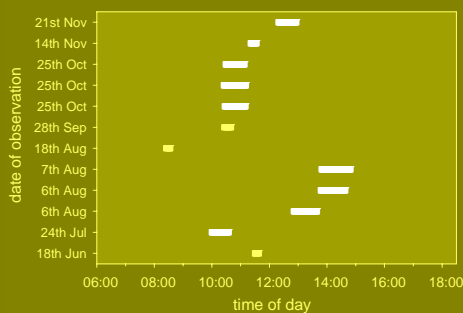
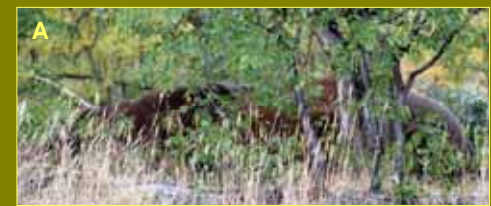


Figure 2: Twelve observations of elephants sleeping in lateral recumbency (incomplete observations  $\square$ , complete observations  $\blacksquare$ ) recorded for eight individuals over a seven month study period



Typical sleeping place of an elephant on even ground - similar places were regularly found during field work



Elephant bull sleeping in RP - first on the left side (A) for 48 min and after an eight minute break lying down again on the right side (B) for 51min



A group of elephant bulls (n=3, two visible in the photo) was observed sleeping in RP simultaneously for about 40 min in Mopane thicket on a rainy day - the distance between the individuals was approximately 8-10 m



Elephants sleeping in RP were observed in dense and fairly open vegetation, far away from (>1000 m) and close to (< 50 m) roads, as well as sleeping without (A) and with elephants in immediate vicinity (B), respectively

## CONCLUSION

- The current observations clearly demonstrate that adult elephants sleep in lateral recumbency during the day.
- However, the importance of daytime sleeping for elephants, the relationship between sleeping in standing or recumbent position, and environmental factors influencing the sleeping behaviour of elephants remain to be determined.
- The fact that adult elephants lie down to sleep should be taken into consideration by zoological institutions and animal parks when building or reconstructing in- and outdoor enclosures.

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