Southern Ground-Hornbill Research and Conservation Program
Quarterly Report

October 2015

Microclimate experienced inside natural and artificial nests

Over a period of three weeks in the winter of 2015, iButtons were mounted to record temperatures inside artificial and natural cavity nests in the Associated Private Nature Reserves. The aim was to establish whether the artificial nests installed there provide similar nesting conditions to natural nests. Recording temperature during summer was not possible as nesting birds quickly evicted mounted iButtons from nests.

iButtons were placed directly below nest entrances to avoid direct contact with the sun. In the case of natural nests which were mostly open to the top, iButtons were mounted beneath wooden covers. At each nest, an iButton was placed externally in the shade to document ambient temperature.

Results

Microclimates inside used artificial nests mimicked used natural cavities closely (Table 1). There was no evidence to suggest that unused artificial and cavity nests experienced less favourable microclimates than used nests. Maximum, mean and rate of increase (T_{rate}) in unused artificial nests were similar to used artificial nests (Table 1). Unused artificial nests experienced significantly cooler minimums on average than used artificial nests (Table 1). Unused natural cavities experienced milder microclimates than used natural cavities (Table 1).

The highest maximum temperature, 36.03^{o}C, was recorded inside a used artificial nest (Rhino Road, Timbavati, Figure 1). The nest with the fastest rate of temperature increase was Hyena Road nest, a used natural nest (Figure 1). The nest with the slowest T_{rate} was inside Keer Keer nest, a deep natural cavity nest inside a shady Jackalberry (Figure 1).

Table 1. Daily temperatures inside artificial and natural Southern Ground-Hornbill nests from 13 July–03 August 2015, presented as mean ± SD. Tukey comparisons are provided: nest types sharing the same letter in each temperature variable are not significantly different. T_{rate} = the number of degrees increased per hour between the minimum and maximum temperature over a 24 hour period.

		Artificial		Natural cavity	
Variable		Used (*N* = 11)	Unused (*N* = 5)	Used (*N* = 9)	Unused (*N* = 6)
T_{min}		12.31 ± 3.38	11.36 ± 3.08	11.97 ± 3.04	13.78 ± 2.67
	Range	3.91–20.45	4.91–19.11	3.80–18.69	8.38–20.39
	Tukey	b	c	bc	a
T_{max}		25.87 ± 3.23	26.09 ± 2.78	25.54 ± 2.98	23.90 ± 2.72
	Range	17.58–36.03	20.01–33.42	18.94–35.20	17.12–31.68
	Tukey	a	a	a	b
T_{mean}		18.66 ± 2.31	18.55 ± 2.38	18.40 ± 2.13	18.81 ± 2.11
	Range	10.14–24.10	10.70–23.41	9.94–23.83	12.28–23.97
	Tukey	a	a	a	a
T_{rate}*		2.24 ± 0.55	2.40 ± 0.27	2.45 ± 0.67	1.58 ± 0.49
	Range	(0.80–3.01)	(2.03–2.68)	(1.61–3.98)	(1.09–2.33)
	Tukey	a	a	a	b

*recorded on 31 July 2015

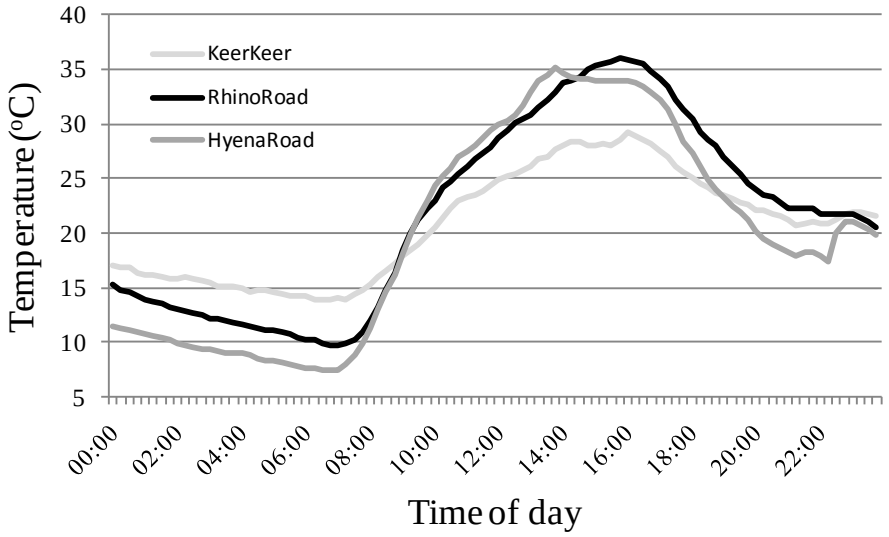

Figure 1. Temperatures experienced inside three Southern Ground-Hornbill nests on 31 July 2015. KeerKeer and HyenaRoad, used natural nests; RhinoRoad, used artificial nest.

Discussion

The similar microclimates experienced inside used nest boxes and natural cavities showed that incubating females and nestlings in both nest types are subject to the same conditions. Artificial nests therefore appear to be no more attractive than natural nests in this regard. There was no clear evidence that unused nest boxes and natural cavities experienced unfavourable microclimate conditions since the ranges of all four temperature variables experienced were within the ranges of used nests. Unused artificial nests experienced similar microclimates to used artificial nests. Surprisingly, the nest box with the quickest T_{rate}, and thus most susceptible to temperature spikes, was used by one of the most successful nesting groups. In addition, the natural cavity with the fastest T_{rate} was also a used nest. Nesting attempts of Southern Ground-Hornbills therefore do not appear to be negatively affected by temperature spikes. The similarity of microclimates between used nest boxes and natural cavities indicated that the large wooden nest boxes offer suitably similar nesting climate conditions to natural nests of this species.

Nest box replacements, and a new nest for Jejane

Senalala and Hermansburg nests were in need of replacing after the nest floors started to disintegrate. Both nests were replaced this year with new pine logs. The old nests were removed and the new nests were placed at the same position as the old nests. Already both nests are lined, a good sign that the groups have accepted their new properties.

Figure 2.
New Senalala nest showing recent lining.

The old Hermansburg nest was repaired and donated to the pair at the Hoedspruit Endangered Species Centre. Although this nest is a bit old and dilapidated, it is hoped that the HESC pair who have been without a nest for over a year, will appreciate their new addition to their enclosure. The pair on Jejane also received a new nest which was installed on Nyala. We will be watching this nest closely for signs of nesting activity.

Figure 3.
Left: Nyala nest placed 2015 on Jejane.
Right: installing Hermansburg nest.

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