Appendix 1. Baboon ranging pattern and behavioral data collection, analysis and results.

Baboon ranging patterns

Data collection

To determine baboon ranging patterns we recorded Global Positioning System (GPS) data points for each troop. We collected GPS data points using handheld devices (Garmin eTrex) operated by field researchers, tracking collars and using a combination of both methods. Field researchers recorded the GPS coordinate of the centre point of the troop (visually estimated geometric centre) at 20-minute intervals between sunrise and sunset for an average of 109 days (±28 days SEM, range: 71–170 days, n=6 troops) per troop. The terrain within these ranges was easily traversable on foot and visibility of baboons within all habitats was excellent. Tracking collars recorded the GPS point of a single troop member at 3-hourly intervals between sunrise and sunset for an average of 302 days (±54 days SEM, range: 247–334 days, n=3 troops) per troop. Additionally, we increased the frequency of collar readings to 20-minute intervals for an average of 14 days (±1 day SEM, range: 12–15 days, n=3 troops) during summer and winter. We tracked troops for full-days (sunrise to sunset with GPS readings every 20-minutes) and part-days. On part-days field researchers typically tracked baboons for half the day (sunrise to midday or midday to sunset) or for only a few hours during the day (e.g., when we had difficulty locating the troop), and tracking collars recorded GPS data points at 3-hourly intervals. We included only GPS data points that had an estimated level of accuracy of ≤10 m. We continued to collect data for each troop until either the number of new cells entered per month (see Hoffman and O'Riain 2012) reached an asymptote or until we had collected a full year of data. In total, we recorded 24,618 GPS data points for the population, with an average of 2735±768 GPS data points SEM (range: 1668-5018, n=9 troops) recorded per troop. Finally, using the GPS data collected by field researchers and tracking collars, we identified all troop sleeping-sites, and categorized these sites as trees, cliffs or buildings.

Baboon Behavior

Data collection and analysis

We investigated the effect of human-modified habitat on baboon behavior by comparing the only two unmonitored troops of equal size (n=16; RH and BB) and similar composition that occupy markedly different habitats (natural versus urban). We compared 10 full-days of ranging and behavioral data recorded during the same season (winter). We did not study the troops simultaneously, but there were no significant differences in minimum temperature (Mann-Whitney U=3551.0, p=0.059) or rainfall (Mann-Whitney U=3738.0, p=0.172) between the data collection periods.

T Hoffman, along with 8 volunteers, collected the required spatial and behavioral data for BB. Volunteers commenced with behavioral data collection only when their records matched Hoffman's with an accepted error level of <5 % for behavioral recordings made over a full day of data collection. We supervised all volunteers on a daily basis to ensure that they adhered strictly to the data collection protocols. Researchers and volunteers collecting behavioral data wore identical field jackets and followed strict behavioral data collection protocols to record troop habitat use and diet. RH was studied as part of an ongoing doctoral thesis within the same research unit (BS Kaplan, UCT, unpubl. data), following identical data collection protocols as those described below.

For each troop we conducted instantaneous scans of individuals at 20-minute intervals. To obtain a representative measure of troop behavior and habitat use during each scan, an observer walked in a straight line (transect) from the visually estimated troop centre (geometric centre) to the edge of the troop (the last baboon visible to the left or right of the transect line), recording en route the behavior and habitat of every baboon within a 90 ° arc centered on the transect trajectory. We randomized the direction of each transect by alternating the bearing (in the order of north, south, east and west) of each successive scan. Transects were not perfectly straight lines as care had to be taken not to walk directly towards baboons. When a baboon was on the transect line the observer deviated around the animal and immediately returned to the original bearing (using a hand held compass) to complete the scan. This method ensured that all troop members had an equal probability of being sampled, while controlling for potential spatial biases of troop members (e.g., flank versus leading edge). We recorded the GPS position of the centre point of the troop at the start of each scan and assigned a habitat category (natural habitat, urban habitat, agricultural habitat or invasive alien vegetation) to each GPS data point. We recorded behavioral data for male and female adults, sub-adults and juveniles. We classified behavior as foraging, socializing, resting or moving, as these activities constitute more than 95 % of a baboon's time budget (Dunbar 1992). In the case of foraging, which included all behavior related to food (searching, handling and feeding), we classified the food item as being from natural or urban food sources. We recorded each animal as a separate data point, with the number of sampled individuals varying across scans because of variability in the spatial distribution of troop members. We recorded a mean of 10±1 (range: 1-16) animals per scan for RH and a mean of 5±0.4 SE (range: 1-13) animals per scan for BB. We used Mann-Whitney U tests to investigate differences in the daily habitat use and diet of RH and BB and used one-way, single factor ANOVAs (with *post hoc* Tukey tests) to determine differences in percentage of scans allocated by RH and BB on a daily basis to foraging, socializing, resting and walking.

Results

The comparison of the two equal-sized, unmonitored troops (RH and BB) added statistical support to the assertion that ecological factors are important in explaining variation in ranging patterns and behavior. The home ranges of both troops in Pair 1 included urban and natural habitat, but the RH home range comprised eight times as much urban habitat (24.6 %) as the BB home range (3.4 %), and RH spent significantly more time in urban habitat than BB (Mann-Whitney U=0.0, p<0.001; Table A), and significantly less time in natural habitat (Mann-Whitney U=0.0, p<0.001). Furthermore, RH – who foraged on anthropogenic food sources significantly more than BB (Mann-Whitney U=0.0, p<0.001; Table A), and on natural food sources significantly less (Mann-Whitney U=0.0, p<0.001) – spent significantly less time foraging ($F_{1,18}$=50.89, df=18, $p \leq 0.001$; Table A) and significantly more time resting ($F_{1,18}$=67.91, df=18, $p \leq 0.001$). The troops spent a similar proportion of time socializing ($F_{1,18}$=2.53, df=18, p=0.129) and walking ($F_{1,18}$=0.86, df=18, p=0.365).

Table A. Mean daily percentage (±SEM) of habitat use, diet and activity budgets of two equal-sized troops (RH and BB) during winter (*n*=10 days). * indicate significant differences at *p*<0.05.

	Habitat use (% per day)		Food items (% per day)		Activity (% per day)			
Troop	Natural*	Human-modified*°	Natural*	Urban*	Forage*	Social	Rest*	Walk
RH	66.8 (±7.4)	33.2 (±7.4)	74.8 (±7.3)	25.2 (±7.3)	27.3 (±3.2)	18.6 (±3.2)	35.3 (±3.2)	18.7 (±3)
BB	94.5 (±2.6)	5.5 (±2.6)	99.0 (±1.1)	1.0 (±1.1)	55.0 (±6.9)	14.3 (±4.3)	14.4 (±3.8)	16.3 (±4.0)

° Human-modified includes urban habitat