

# Ecology, Ethnozoology, and Trade of the Senegal Bushbaby in the Lama Forest Reserve, Benin, West Africa

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**Abstract:** The Senegal bushbabies are small, cryptic, nocturnal primates belonging to the globally understudied family (Galagidae), which includes 19 extant species. In Benin, all bushbaby species are unstudied and restricted to formally protected areas but are under anthropogenic pressures. This study investigated the distribution, population density, threats, ethnozoology, behaviour, and trade of the Senegal bushbabies in the Lama Forest Reserve. Sightings of individuals were recorded during six nocturnal linear transects that collected data on density and distribution. Local ecological knowledge and details of trade (e.g., selling prices of bushbaby specimens) were collected using semi-structured interviews with 100 residents from five villages and 30 vendors from three traditional medicine markets surrounding the Lama Forest Reserve. The population size of Senegal bushbabies was estimated at 7,642 individuals, with an average density of 159 individuals/km<sup>2</sup> using the distance sampling methods in DISTANCE 6.0 software. The Senegal bushbabies were recorded on 12 tree species and lianas, with the highest preference for *Anogeissus leiocarpa* (23%) and *Dialium guineense* (22%). The most selected stratum was between 5 to 10 m in height. Results from descriptive analyses of interview contents suggest the Senegal bushbabies are a valuable species for local people, who use their body parts mainly for traditional religious practices. They are traded in the traditional medicine markets openly, with an average selling price of 2.2 USD, which varied significantly between markets and follows the age category of the species. Our study highlights the importance of developing a new conservation policy for primates that includes the Senegal bushbaby species in order to guarantee the long-term conservation of this taxonomic group in the Lama Forest Reserve.

**Key words:** Senegal bushbaby, ecology, distribution, density, threats, Lama forest.

## INTRODUCTION

*Galago senegalensis* (Northern Lesser Galgo, here referred to as the Senegal bushbaby or simply "galago") is part of the great diversity of primates occurring in Africa (Pozzi *et al.* 2014). These small, cryptic, nocturnal primates occur in forests, woodlands, and savanna habitats, and their occurrence ranges geographically in sub-Saharan Africa (Svensson & Bearder 2013). Among the 16 nonhuman primates

families described around the world, Galagidae (bushbabies) represents the primate family with the lowest number (~10%) of threatened species on the IUCN Red List (Estrada *et al.* 2017). However, upon revision of the taxonomy of Galagidae and according to Estrada *et al.* (2017), many other species belonging to this taxonomic group could be highly threatened. Recent investigations revealed an international

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trade of African bushbabies and estimated that ~2000 individuals were traded over two decades according to a Convention on International Trade in Endangered Species report (Svensson *et al.* 2016).

Among the species of primates previously recorded in Benin, three were nocturnal (including two bushbabies *Galago senegalensis* ssp. *senegalensis* and *Galagoides demidovii*, and a *potto* *Perodicticus potto*) and eight species were diurnal, including *Cercopithecus erythrogaster erythrogaster*, *Cercopithecus mona*, *Chlorocebus tantalus tantalus*, *Colobus vellerosus*, *Procolobus verus*, *Cercocebus torquatus*, *Erythrocebus patas*, and *Papio anubis* (Emrich *et al.* 1999; Kassa 2001; Nobimè 2002; Djossou, 2003; Nobimè & Sinsin 2003; Djossou *et al.* 2014). More recent reports indicate that *Galagoides demidovii*'s presence in Benin is uncertain (Svensson *et al.* 2019), *Cercocebus torquatus* is likely extinct (Maisels *et al.* 2019), but *Galagoides thomasi* is present (Svensson & Bearder 2019).

In the human-dominated landscape of Benin, bushbabies, like many other primates, are restricted to formally protected areas from the Guineo-Congolian to the Sudanian zone (Nobimè *et al.* 2008). The Lama Forest Reserve (LFR) is one of the key protected areas that host most of the primate species in Southern Benin, including the two above-mentioned bushbabies (Nobimè *et al.* 2008). This area is a relic of the semi-deciduous forest, one of the last refuges for primates in southern Benin, but has been facing unprecedented poaching pressure, fuelled by its proximity to the biggest bushmeat markets (Tègon) in the country and two major traditional medicine markets (Gbèdagba and Avogbannan).

Although almost all the primate species were recorded to be traded in the traditional medicine markets (Djagoun *et al.* 2013, 2018), specimens of bushbabies are among the most often observed mammals displayed in the stalls (pers. obs.). The focal taxonomic group is one of the hunting targets used for consumption by the Hôli ethnic group in LFR (Codjia & Assogbadjo 2004) that is thought to be the main source of wild animals for the bushmeat and traditional medicine markets (Sogbohossou & Kassa 2016). Consequently, LFR is the main source of forest bushbaby specimens openly sold in wildlife markets in southern Benin. Thus, within LFR, bushbabies face unprecedented anthropogenic pressures that could drive this biologically and culturally important taxonomic group to local extinction.

Effective conservation requires a prerequisite of baseline data on distribution, ecology, local

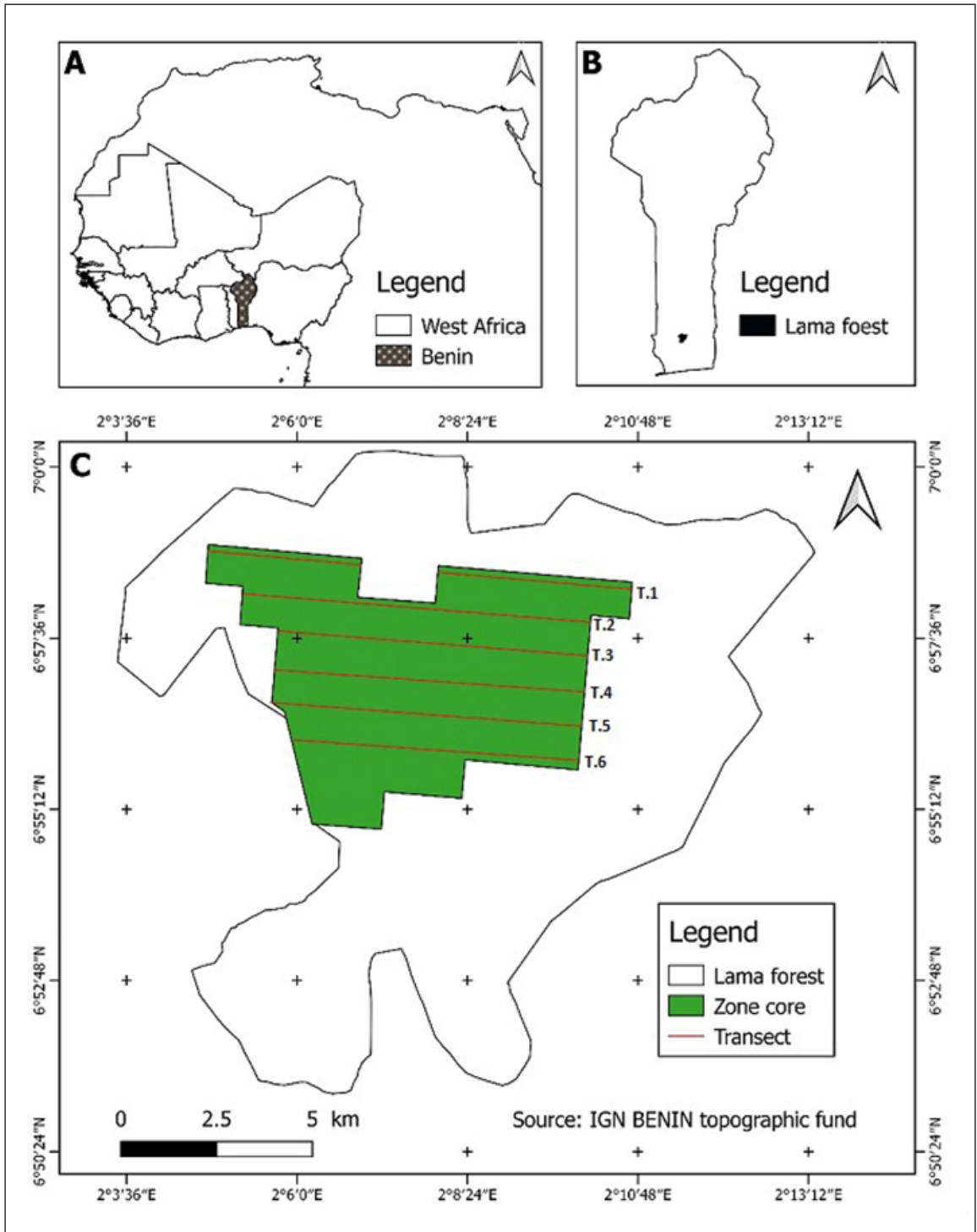
perceptions, and reliable information on the factors that threaten the long-term persistence/extirpation of the focal species (Stephenson & Stengel 2020). The Dahomey Gap research and conservation efforts toward Benin's primates in recent decades (Nobimè *et al.* 2008; Djossou *et al.* 2014) have been mainly focused on the endemic red-bellied monkey (*Cercopithecus erythrogaster erythrogaster*) and the white-thighed colobus (*Colobus vellerosus*), both Critically Endangered on the IUCN Red List (Matsuda *et al.* 2020a, 2020b). Specifically, in LFR, research and conservation priorities were mostly focused on the red-bellied monkey and the white-thighed colobus, which are the flagship species of the target forest. Senegal bushbabies at a countrywide scale and in LFR in particular were not well studied, which hampered their effective conservation. The great gap in knowledge of the Senegal bushbaby could be associated with their global conservation status of Least Concern species (de Jong *et al.* 2019) but also due to their nocturnal activity that makes field-based investigations challenging (Ratajszczak 1997; Nekaris & Nijman 2013; Svensson & Friant 2014). Any efforts toward their conservation will not be possible without first collecting baseline data on the focal species.

This study aims to fill the knowledge gap on the Senegal bushbaby in LFR, in order to contribute to their effective conservation. Specifically, our objectives were to: (1) determine the distribution pattern and behavioural ecology of Senegal bushbabies in LFR, (2) estimate the population density of the Senegal bushbabies at the study site and (3) assess the ethnozoology and commercial value of the Senegal bushbaby.

## METHODS

### Study area

This study took place in LFR, located in the southern part of Benin between 6 ° 55' and 7 ° 00' North latitude and between 2 ° 04' and 2 ° 12' East longitude (Figure 1). It covers an area of 16,250 ha comprising a core zone (4,777 ha) of natural forests surrounded by teak plantations (7,000 ha). The forest plantations play the role of a buffer zone for the natural forest but also provide substantial income useful for the effective management of the core zone. The LFR is located in the great clay-marl depression, on clay vertisols rich in organic matter and montmorillonites (Nagel *et al.* 2004). This forest is located in the centre of Guinean-Congolese endemism and is characterized by a bimodal season, comprising two rainy seasons (March to June



**Figure 1.** Geographic location of LFR in southern Benin (A), Benin within West Africa (B) LFR within Benin (C) the Lama forest reserve (T refers to transect).

and September to October) and two dry seasons (November to February and July to August). It is managed by the public forest service through the Office National du Bois. The average annual rainfall varies between 1,000 mm and 1,200 mm. It can be marked by interannual variations with years of rainfall or drought (White 1983).

Recent investigations on the wildlife diversity within LFR revealed a total of 20 mammal species that are hunted for bushmeat (Djagoun *et al.* 2018). This includes 12 shrews and murids in the focal forest, recorded by Nicolas *et al.* (2020). Three main ethnic groups occur in the vicinity of LFR: the Fon, Aizo and Hôli (INSAE 2013).

### Data collection

The line transect method was used to collect ecological data on the Senegal bushbaby in LFR, following the guidance of Link *et al.* (2010). Data were collected during 20 nights each month in September and October 2019 along six pre-existing transects (4 – 9 km), totalizing 50 km. Because Senegal bushbabies are active throughout the night (Bearder *et al.* 2006), transects were walked from 8:00 pm to 5:00 am using a flashlight emitting red light (not detectable by the Senegal bushbaby) at a speed of approximately 1 km h<sup>-1</sup>. As per White & Edwards (2000), we randomly selected the transect walked each night to avoid biases. Researchers walked the transect in a team of two persons in order to create the least disturbance possible and to be safe (Duckworth 1998). All levels of the vegetation were scanned using Petzl 4.5 V headlamps with a combination of red and white Walters (Nekaris & Jayewardene 2004). Upon detecting a Senegal bushbaby group, we remained at the site for 5 to 10 minutes to increase the probability of observing other group members. When a group of the Senegal bushbabies was encountered, we recorded the Global Position System coordinates, time, number of individuals, transect length, perpendicular distance of an animal from the transect, and their height in the tree. The following day we returned to the places of detection to collect data on the tree where animals were observed (taxonomic identification and total height).

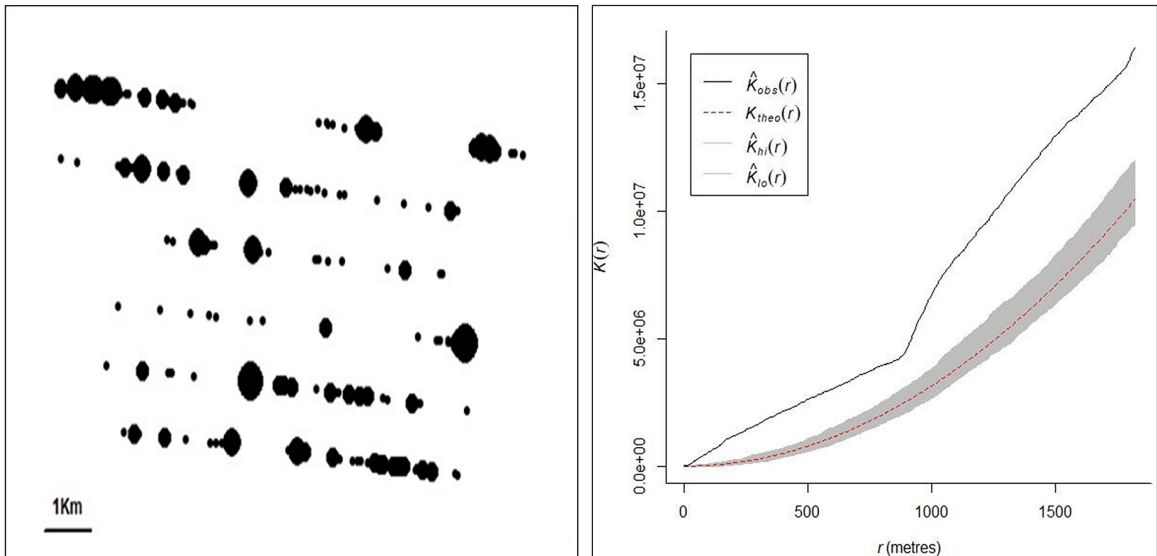
We administered a questionnaire survey using semi-structured interview techniques in five villages (Koto, Massi, Akpè, Tovlamè and Djadjakomè) surrounding the forest to identify activities threatening the Senegal bushbabies in LFR and determine their ethnozoological values. The villages were chosen according to their close proximity to the central core. Twenty randomly selected hunters

were interviewed per village for 100 respondents in all five villages. In addition, we conducted semi-structured interviews with 30 vendors randomly selected and volunteers in three traditional medicine markets (Avogbannan, Gbèdagba and Houègbo) located in the proximity of LFR to gather data on the ethnozoology and the commercial value of the Senegal bushbabies. The questionnaire for vendors in the traditional markets asked for the selling price of bushbaby specimens sold at their stalls.

### Data analysis

The CDS (Conventional Distance Sampling, Buckland *et al.* 2001), implemented in the DISTANCE 6.0 software (Thomas *et al.* 2010) was used to estimate the population density of Senegal bushbabies in LFR. This method consists of fitting a detection function to the perpendicular distances of observation in order to estimate the effective counting width (ESW). Four detection functions (uniform, negative exponential, half-normal, and hazard-rate) were tested, and the model that best described the function was chosen using the Akaike information criterion (AIC) and the  $\chi^2$  Goodness-of-fit (GOF) test (Thomas *et al.* 2010). The model with the lowest AIC was the best. The spatial distribution of the Senegal bushbabies within the survey area (un-corrected for detection bias) was explored using Ripley's K analysis in the R package 'spatstat' (function 'kest', Baddeley & Turner 2005; R Core Team 2016). The test is a second order analysis of spatial point processes that examines the distribution of distances between points over various scales to look for scale-dependent patterns. The cluster statistic, K (d), represents the intensity of points within specified distance bands (d) from other points, and is compared to an expected K value based on 9999 simulations of complete spatial randomness. The resulting plots indicated the spatial pattern of marked groups at various scales. The no pattern, clustered, or over-dispersed (repulsed) is noted respectively when the observed line is between confidence limits, the observed line above is the upper confidence limit and the observed line below is the lower confidence limit. The frequency of use of tree species and the percentage of sightings in the different strata of the forest were computed. The analyses were carried out and the bar plots were constructed using ggplot2 package; in the environment of the R 3.5.1 software (R Core Team 2019).

Descriptive statistics have been used to describe the ethnozoological and commercial values of bushbabies among the local population. Local



**Figure 2.** Spatial distribution and second-order summary K function for the Senegal bushbabies in LFR. a) Observed spatial pattern of the Senegal bushbabies within LFR (closed circles indicate the Senegal bushbaby's location and the size of the circles indicates the abundance at each location), b) univariate spatial distribution pattern from Kest function of aardvark's mound. The solid line indicates the empirical K function while the grey band indicates the envelope from 9,999 simulations, bounded by the high and low simulation values. The dashed (red) line represents the theoretical value of a random Poisson process for the study area.

ecological knowledge (LEK) collected from local residents in the villages surrounding LFR was used to calculate the frequency of citation of each bushbaby body part used in traditional medicine and that of each recorded threat category. Prices of whole specimens registered in traditional medicine markets were compiled by market and age category, converted from FCFA to USD (online conversion: July 30, 2020). Average selling prices were calculated by market and by age category (sub-adult and adult). The differences in selling prices between markets and age categories were tested using an analysis of variance (ANOVA) in the R software.

## RESULTS

### Distribution of the Senegal bushbabies in LFR

The  $K(r)$  for Senegal bushbaby distribution in LFR showed a more significant clustering pattern in the surrounding neighbourhood than expected by chance (Figure 2a). The clustered pattern was also confirmed by the distribution map (Figure 2b).

### Density and abundance of the Senegal bushbabies in LFR

Perpendicular distance data were truncated at 30 m on either side of the transect, which resulted in a total of 188 sightings of 266 individuals. Of the various estimator models tested within the

DISTANCE program, the uniform cosine model provided the best fit to the data and resulted in an overall abundance of 7,642 individuals with an average density of 159 *G. senegalensis* individuals/km<sup>2</sup> (Table 1). The Senegal bushbabies were solitary in almost all the observations with an estimated group size of 1.4 individuals.

### Time budget and social organisation of the Senegal bushbaby

During nocturnal direct observations, 68% of individuals were alone while 9% were in groups of 2 to 4 individuals. The observations were recorded between 8:00 pm and 5:00 am with two peaks of density at 9:00 pm and 1:00 am (Figure 3), showing the period of intensive activities of the Senegal bushbaby in LFR (Figure 4). No activity was registered before 8:00 pm or after 5:00 am.

### Sighting height and selected trees species

The Senegal bushbabies used all the available strata in LFR from the ground level up to 24 m of tree height (Figure 5). The strata located between 5 and 10 meters were the most used by the Senegal bushbabies with around 112 individuals out of 266 individuals counted in LFR. Few individuals were observed at the stratum above 20 meters in LFR. Among the tree species used by the Senegal bushbabies, the ones in which the species were



**Table 1. Density and distribution parameters of galagos in LFR.**

Parameters	Point Estimate	Standard Error	Percent Coef. of Variation	95% Confidence Interval
E(S)	1.4	0.6	4.04	[1.3 - 1.5]
D	159.7	0.3	18.8	[105.1 - 242.6]
N	7642.0	1433.9	18.8	[5030.0 - 11610]

E(S): Estimate of the expected value for the size of the groups, D: Density: Number of individuals per unit area; N: Estimated number of individuals in the area.

more frequently observed were *Anogeissus leiocarpa* (23% of the total sighting), *Dialum guineense* (22%), *Lonchocarpus sericeus* (14%) and *Albizia zygia* (10%).

### Ethnozoology, threat, and pricing of bushbabies in LFR

LEK showed that bushbaby body parts were mainly used by local people for traditional religious practices (100%). The skin was the most often used organ and was always treated with a chemical substance (Figure 6). The head, legs, body, and skin were the items used by local people mainly for protection against bad looks, thunder, bewitchment, and witchcraft, respectively. Among the threats (hunting, habitat loss, and vegetation fire) recorded during surveys, vegetation fire (52%) was the most cited threat by local people. The average selling price of bushbabies varies significantly according to the market (ANOVA-test: F-value = 9.793;  $p = 0.0003$ ;  $N = 95$  specimens). The average selling prices were estimated at 3 USD, 1.9 USD and 1.7 USD for the markets of Gbegbadamè, Avogbannan, and Houègbo (Figure 7). The average selling price of young and adult individuals were 1.2 and 2.2 USD, respectively and there was a significant difference

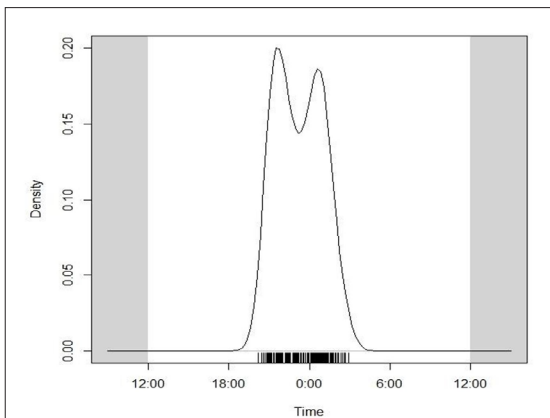
between these average prices (t-test:  $t = 8.3364$ ,  $p < 0.0001$ ,  $N = 95$  specimens).

### DISCUSSION

Effective conservation of wildlife requires informed decision-making (Stephenson & Stengel 2020) that is not achievable when data are lacking. Our study has allowed us to fill the knowledge gaps in LFR by providing baseline data on ecology, ethnozoology, trade, and threats to the conservation of *Galago senegalensis* ssp. *senegalensis* that can help improve substantially the management of the focal species in southern Benin.

### Density and relative abundance of the Senegal bushbaby species

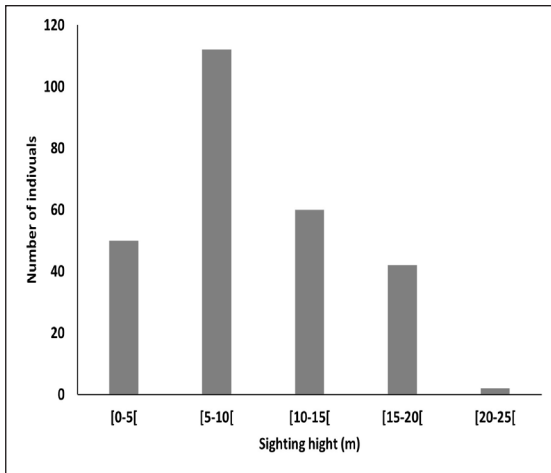
The overall abundance of the Senegal bushbaby population in LFR was estimated at 7,642 individuals, i.e., varying between a minimum of 5,030 individuals and a maximum of 11,610 individuals, with an average density of 159 individuals/km<sup>2</sup>. Previous studies using the line transect method estimated a similar density (150 individuals/km<sup>2</sup>) of *G. senegalensis* in a Acacia-woodland, in Kenya (Nash



**Figure 3.** Time budget of the Senegal bushbabies in Lama Forest Reserve.



**Figure 4.** A solitary Senegal bushbaby observed climbing tree in the under canopy stratum in Lama Forest Reserve.



**Figure 5.** The number of individuals of the Senegal bushbabies observed per class of height in Lama Forest Reserve trees.

& Whitten 1989); our estimated density fits within the range of density reported (40-240 individuals/km<sup>2</sup>; Off *et al.* 2008). In contrast, our estimate is higher than the estimated density of *G. moholi* (1 individual/km<sup>2</sup>) recently reported in the Loskop

Dam Nature Reserve in South Africa using the same census method (Ray *et al.* 2017). In addition, telemetry-based estimates in south Africa suggested a density 5.13 times lower for bushbabies than our estimate (Bearder & Martin 1979). These differences could be related to many factors such as the focal species (*Galago senegalensis* ssp. *senegalensis* vs. *Galago moholi*), methods (walking on foot vs. use of vehicles or telemetry) and regions (West Africa vs. East and South Africa). It is, therefore, important to consider the choice of counting method that is reliable and suited to the study environment in order to limit biases in the density estimate.

The density of Senegal bushbabies in LFR is higher than those of *Cercopithecus erythrogaster erythrogaster* (10-31 individuals/km<sup>2</sup>), *Chlorocebus tantalus tantalus* (4 individuals/km<sup>2</sup>), and *Cercopithecus mona* (92-99 individuals/km<sup>2</sup>) recorded in the same forest by Nobimè & Sinsin (2007). These results are in line with previous investigations that demonstrated that large-bodied species have low reproductive rates and generally occur at low density in wild habitats (Tomiya 2013; Ripple *et al.* 2017). This is an expected pattern



**Figure 6.** Specimens of whole Senegal bushbabies at a stall in the traditional medicine markets. Specimens are treated with chemical substance and dried. Photographs by B. Kpossa.



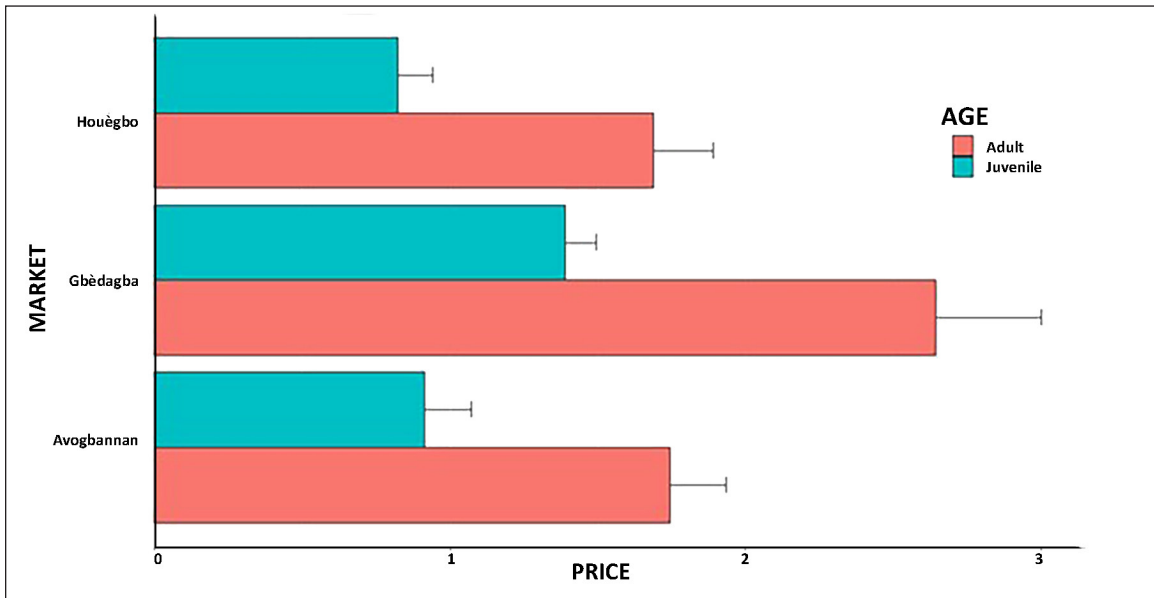


Figure 7. Prices (in USD) of Senegal bushbabies in three markets surrounding Lama Forest Reserve.

considering the positive correlation between body size and extinction risk in mammals, especially in a forest habitat under anthropogenic pressures (Lyons *et al.* 2004; Liow *et al.* 2008). Moreover, Senegal bushbabies are easily detectable in the wild due to the bright reflection of their eyes when in contact with light, which greatly improves the detectability of this species compared to some diurnal primates. However, previous investigations in LFR suggested two species of bushbabies, *Galago senegalensis* ssp. *senegalensis* and *Galagoides demidoff* (Emrich *et al.* 1999; Kassa 2001) or more likely *Galagoides thomasi* (Svensson & Bearder 2019). So, our estimate may have included two species and it is therefore impossible to conclude the density per species. Further studies could focus on estimating the density per species since this information is essential for effective conservation efforts toward the Senegal bushbabies in LFR.

#### Preferential habitat of the Senegal bushbabies in LFR

The data recorded during night counts suggests that the Senegal bushbabies found in LFR prefer dense semi-deciduous forests to plantations. No observation was recorded in the patches of teak plantations located on the transects 1 and 5; from the top to bottom, Figures 1 and 2a. Similar results were observed in Cameroon where *Galago alleni*, *Galagoides demidovii* and *Euoticus elegantulus*, were commonly found in semi deciduous forests (Molez 1976). They prefer less human-impacted habitats

such as teak plantations. The Senegal bushbabies in LFR appear to use a diversity of tree species; the species was more frequently observed using *Anogeissus leiocarpa* (23%), *Dialium guineense* (22%) in contrast to *Galago senegalensis braccatus* in the Ewaso Nyiro River, Laikipia, Kenya that was found exclusively in *Accacia xanthophloea* (Off *et al.* 2008). However, the use of lianas by *Galago senegalensis braccatus* have been confirmed to be used by our study subjects.

Senegal bushbabies were frequently observed in the stratum between 4 and 8 m with an average height of 7.8 m ( $n = 266$ ). This result does not compare with those recorded for *Galago senegalensis senegalensis* (4.1 m) in Niimi National Park in Gambi (Svensson & Bearder 2013) and in Uganda (10 to 12 m; Ambrose 2002), none those reported for *Galago senegalensis* (1 to 4 m) two decades ago (Nekaris & Bearder 2011). For the sub-species *Galago senegalensis braccatus* in Kenya, almost the same average height (7.4 m) was recorded for a stratum between 4 and 6 m (Off *et al.* 2008). Our study revealed that Senegal bushbabies use the strata below 10 m for 60% of observations as it was observed by Off *et al.* (2008) for *Galago senegalensis braccatus* (59% of sightings), unlike the 96.5% reported for *Galago senegalensis senegalensis* (Svensson & Bearder 2013). This could be explained by the fact that the stratum between 4 and 8 m in LFR offers a tangle of lianas and tree branches that would allow this species to move easily from one tree to another and avoid jumps that could expose them to possible predators. Moreover, other factors



could possibly influence the vertical distribution of bushbabies in their wild habitats and this requires further studies on habitat characteristics to decipher the drivers of habitat preference in LFR.

### **Ethology of the Senegal bushbabies in LFR**

In our study, we most often observed solitary Senegal bushbabies (68% of total observations), which is similar to the pattern found in Kenya for *Galago senegalensis braccatus* (81 % of solitary encounters; Off *et al.* 2008) and in Uganda for *Galago senegalensis senegalensis* (56%; Ambrose 2002). However, a recent study has reported a dominance of gregarious behaviour for *Galago senegalensis senegalensis* in Gambia, in which 60% of encounters were with groups formed by at least two individuals (Svensson & Bearder 2013). In addition, other studies have demonstrated that bushbabies are not necessarily solitary, as a thorough search of the sleeping nests revealed groups of up to 6 or 7 individuals per nest (Vincent 1969). Therefore, the sociability of bushbabies is perhaps best quantified by the size of the group at the sleeping site, which can vary from one solitary individual to a maximum of ten bushbabies, depending on the period of activity considered (when foraging, grooming, etc.) (Bearder 1987). Unfortunately, during this study, we were not able to observe the Senegal bushbabies in their sleeping sites. Regarding the high active period of the Senegal bushbabies, we were able to record an increase in their density ( $d_{max} = 0.20$ ) in the early evening from 7:00 pm to 9:00 pm followed by a decrease in activity or rest between 10:00 pm and 11:00 pm ( $d = 0.15$ ). Thereafter, there was a resumption of activity at around midnight with an increase in density that peaked at 1:00 am and gradually decreased until it reached zero at 5:00 am. These results are similar to those focused on Allen's galago, highlighting the nocturnal activity of the Galagidae. Similar relationships have already been demonstrated in captivity for *Galagoideus demidovii* (now *Galagoideus demidoffi*, Vincent 1969), *Galago senegalensis* (Sauer & Sauer 1963), *Galago crassicaudatus* (now *Otolemur crassicaudatus*, Welker 1974), and in the wild habitat by Charles-Dominique (1971).

### **Ethnozoology, threats and trade of Galagos**

Local ecological knowledge identified vegetation fire, agriculture encroachment, and hunting as the main threats to the conservation of the Senegal bushbabies in LFR. These activities are the ones most commonly reported in the world as threats for most primates (Estrada *et al.* 2017, Mainigi *et*

*al.* 2021) and for the primate species occurring in Benin in particular (Nobimè & Sinsin 2007, Nobimè *et al.* 2008). During nocturnal fieldwork in the core zone of LFR, an average of 5 to 6 gunshots were recorded per night highlighting a high poaching pressure in LFR. In this regard, it is important to take the low hunting score reported by local people (6%) with caution because the participants probably fear reporting hunting since this activity is strictly forbidden in the focal forest. Our statement is supported by the forest management authorities of LFR who identified poaching as the main threat to wildlife as previously highlighted by Sogbohossou & Kassa (2016) and da Silva *et al.* (2021). Moreover, during our surveys, evidence of high hunting pressure is suggested by the observation of five to 10 specimens of bushbabies recorded per stall in the traditional medicine markets of Avogbannan, Gbèdagba and Houègbo. This observation is in line with previous studies that highlighted the trade of other mammals such as pangolin in the traditional medicine markets of Benin (Djagoun *et al.* 2013; Zanzo *et al.* 2021, 2022).

Galagos are valuable primates in traditional medicine practices for local people who use their body parts (such as head, skin, legs, and body) for spiritual purposes. This is also the case for the white-bellied pangolin in southern Benin (Zanzo *et al.* 2021). Galagos are among the wild animals visibly sold in the traditional medicine markets. We found that the average selling price varied significantly (1.7 to 3 USD) from one market to another and between young and adult individuals (1.2 to 2.2 USD). Although the galagos represent an income source for local people, they are cheaper than pangolins (which are sold between 18.96–73.38 USD in the traditional medicine market) (Zanzo *et al.* 2021). Contrary to bushbabies, high demand for pangolins in illegal international trade could explain their high prices (UNODC 2016). However, in the markets, it is more common to find specimens of galagos in stalls than pangolins (pers. obs.). So, even being cheaper, the trade of galagos could generate more income per year for local people than pangolins which tend to be rarer in Benin (Zanzo *et al.* 2021). In traditional medicine, vendors reported that in the rainy season, each stakeholder could get up to 100 individuals at his stall. The above statements combined with the low number of pangolins (71 individuals) sampled in nine major traditional medicine markets, including our focal markets by Zanzo *et al.* (2022) for two years of fieldwork confirm that bushbabies represent a valuable income source for those doing business in the markets.

## CONCLUSION

This study provided baseline data on the Senegal bushbabies in LFR that could be used for informed decision-making to improve conservation. The results suggested a gregarious distribution pattern of the Senegal bushbabies in LFR, with a population density similar to those estimated for other reports from East and South Africa. The Senegal bushbabies in LFR are under anthropogenic pressures fueled by the trade of their body parts in traditional medicine markets for spiritual purposes. This calls for a new management policy with updated information on the conservation status in LFR. Further studies using camera trap surveys are necessary to provide reliable data on species richness and the population density per species in LFR.

## ACKNOWLEDGMENTS

The fieldwork equipment used in this research was funded by IDEA WILD through a grant provided to Dr. Chabi A. M. Djagoun. We are grateful to the local communities and sellers in the traditional medicine market who participated in this research. We also thank our field guide Mr. Konetche who has helped us with our field work.

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Received: 20 August 2022

Accepted: 20 December 2022