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(RESEARCH ARTICLE)

Study of the natural habitats of the great grasscutter (*Tryonomys swinderianus TEMINK,* 1827) with a view to its conservation in situ at Sangarédi, Boké prefecture

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Abstract

The Sangarédi area, located in the prefecture of Boké, has vegetation essentially composed of tree and shrub savannah, the natural biotope of the great grasscutter. Today, this vegetation is under serious threat from human activity, with mining companies exploiting large areas, thereby destroying the environment. This state of affairs has contributed to a reduction in the habitat of this animal, which is highly prized by the local population. The aim of the study was to contribute to the identification, location and characterisation of the habitats of the great grasscutter in Lower Guinea, with a view to its conservation in situ. A questionnaire was drawn up and applied to a sample of 260 individuals in 3 selected localities in the Sangarédi sub-prefecture. The results of this study revealed forest galleries and fallow land in which the great grasscutter is found. 54 sites were identified. The existence of the cane rat was confirmed in five (5) habitat types.

In situ conservation of natural habitats is one of the safest alternatives for preserving the grasscutter.

Keywords: Grasscutter; Natural habitat; In situ conservation**;** Natural habitats

1. Introduction

According to some estimates, the area of the world's vegetation cover has shrunk by around 1.8 billion hectares over the last 5,000 years (a reduction equivalent to almost half of today's total area). This loss of surface area is linked to demographic increases and the demand for land for crops and pasture, as well as the unsustainable exploitation of soil, subsoil and forest resources [1-2]. Today, more than ever, the conservation of biological diversity is essential if present and future generations are to benefit from the services provided by ecosystems. To achieve this, protected areas were quickly seen as an effective mechanism [3]. Among the techniques for conserving biodiversity [4], in situ conservation is of capital importance because it makes it possible to combine several management objectives, namely: conservation of specific and genetic diversity, provision of environmental services, ecotourism and recreation, conservation of wildlife, preservation of natural and cultural attributes, education and scientific research [5]. Unfortunately, the strong demographic growth of recent decades and the ensuing expansion in demand for food, fibre, fuel and minerals have accelerated the destruction of forests, especially in developing countries where populations are heavily dependent on forest resources [6]. This situation does not spare the vulnerable living areas of certain endemic species on the African continent, including the Tryonomys swinderianus (Great grasscutter).

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Despite relatively favourable climatic, ecological and human conditions, the Republic of Guinea, and particularly Lower Guinea, is experiencing a very high level of deforestation, given the richness of its subsoil and the pressure of human activity due to its proximity to the capital [7].

The Boké region, a mining area, is not immune to this reality. It is part of a vast national ecosystem that provides a continuum of biological diversity between Lower and Middle Guinea. Despite this ecological and social importance, it is subject to pressures of all kinds.

Consequently, applying this study in an area where mining activity is one of the most intense in Guinea can contribute to understanding the habitat dynamics of one of the country's most vulnerable terrestrial mammals. Although the greater grasscutter is not classified as an endangered species, hunting methods (beating, bush fires, poisoned bait, etc.) mean that this highly prized game is becoming increasingly rare in the tables. Hunting. For this reason, it is imperative to take immediate action to protect it.

The Sangarédi area in the capital of the Boké region, which is the focus of this study, has vegetation consisting mainly of tree and shrub savannah, the natural habitat of the great grasscutter. In addition, the number of mining companies, the size of the areas exploited and the resulting destruction of the environment are all contributing to the reduction in the habitat of this animal, which is highly prized by the local population.

This study assesses the dynamics of pressure indicators on the great grasscutter's habitats (clearing, poaching, fragmentation, logging and mining) in order to propose solutions for preserving and conserving the species.

2. Materials and working method

2.1. Methodological approach

2.1.1. Data collection

Identification and choice of sites

The choice of site was based on the abundance of characteristic forages (*Pennisetum purpureum, Andropogon gayanus, Panicum micratu*).

Seven localities in Sangarédi were involved, of which three were selected.

Boulhèrè district, 22 km from Sangarédi ;

The Fassaly-Foutabhè sector, 9 km from Sangarédi ;

Hamdalaye district, 5 km from Sangarédi ;

Sampling

The proportional random sample was drawn from the indigenous population of the three localities. Information about the population was obtained from field surveys, supplemented by the Sangarédi Local Development Plan [8].

The sample size was determined using the finitude correction formula required for small populations, the main parameters of which are representativeness, homogeneity and precision. The use of indigenous populations as a reference is explained by the fact that they are more familiar with the reference situation in the localities.

$n_c = \frac{n \cdot N}{n+N-1}$ [9]. Where: nc is the corrected sample size ;

n is the size of the initial sample you wish to calculate; N is the total population size

The questionnaire was administered as a structured personal interview, randomly selected from a village (usually the customary authorities) were also interviewed using an interview guide.

Table 1 Target groups and sample size

Target group	Number of population
Total population of the three localities according to the Sangaredi LDP	4200
Socio-professional categories met	310
Corrected sample	260

In addition to the local authorities, a group of hunters, traditional healers and farmers were also interviewed, as they have presumed or proven knowledge of the usefulness of wildlife in traditional pharmacopoeia. A total of 30 questions were administered.

Table 2 Social groups surveyed

Group	Number
Hunter	75
Farmer	75
Traditional healer	12
Breeder	60
Women	12
Young people	19
Total	253

Interviews

Semi-structured interviews were organised with the administrative, customary and communal authorities over a period of 5 days. During the various interviews, we used focus groups.

Survey of different social strata

Questions were asked over 16 days (women, young people, hunters, herders and traditional practitioners) in the three selected localities.

Focus group

This involved women, adults and young people met at various locations (small markets, Bases around a teapot). Discussions focused mainly on their knowledge of the great grasscutter in the locality. The average size of the focus group was 10 people.

2.1.2. Search for signs of presence

The inventory of signs of grasscutter presence in the study area was carried out using the guided reconnaissance walking technique. This involved walking around the study sites, looking for and identifying signs of the animal's presence. The signs of presence sought were droppings, burrows (active and inactive), hair left on the ground, food remains, passageways and footprints. As the grasscutter is a nocturnal animal, nocturnal surveys were carried out at the edge of the rice fields in order to observe the species. During the census of signs of presence, signs of human activity (setting of traps and poisoned bait, etc.) were also noted in order to analyse threats. The characteristics of the sites or places where the signs of presence are observed are also noted: type of vegetation or habitat, soil, altitude.

The 'guided reconnaissance walk' or 'guided recce' method was used, and paths of least resistance through the vegetation were followed. This consisted of walking virtual straight lines 2 km long within the sites and positioned randomly so as to survey the main habitats of the sites at sufficient distance (500 m). All signs of presence left on the ground after the walk were recorded to certify its presence. These clues were used to calculate the Kilometre Count

Index (KCI), which is essential for monitoring the species and its spatial distribution. All signs of presence seen 1 m either side of the line of march, i.e. over a 2 m strip, are recorded on the collection form.

The surveys in this study were carried out during the day (between 9am and 5pm). Using the mobile's built-in compass, we walked slowly along the walking lines at a speed of 0.6 to 1 km/h in order to collect data on the presence of grasscutter. All observations of signs of presence were recorded on a specially designed inventory sheet. The observations took into account all indirect evidence that could undoubtedly justify the presence of the animal in the reserves at the selected sites.

Each time a sign of presence was found, the inventory team stopped to characterise it, taking geographical coordinates and descriptive elements of the habitat.

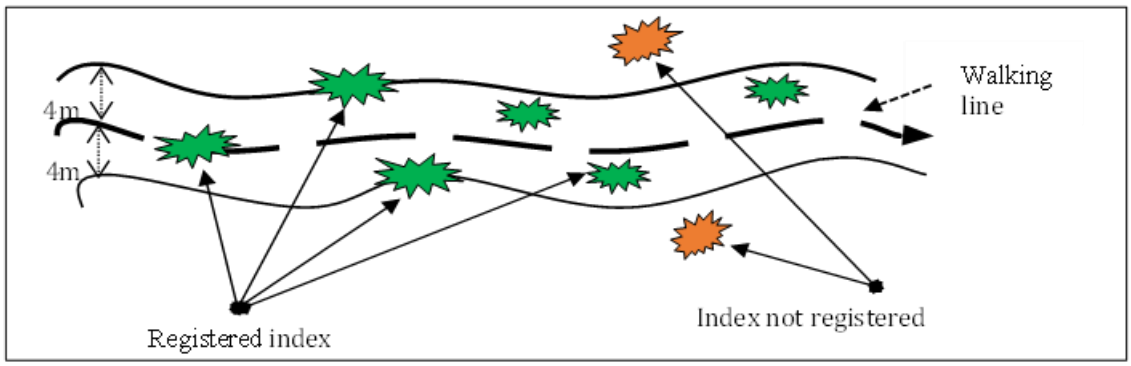
In the case of droppings, the condition of the droppings collected (fresh, recent, old and very old) is also noted. Burrows are characterised (functional, i.e. used or abandoned).

It should also be noted that rounds are made to look for burrows in places where their presence is reported by respondents or indicated by the tracker (the field guide). During these searches, all signs of presence encountered are also noted and geo-referenced. The signs of presence were collected in the various types of habitat: gallery forest, wooded savannah, shrubby savannah.

2.2. Analysis and data processing.

Data processing depends on the nature of the data and the objectives pursued. In this study, the data obtained were processed as follows:

Development of an analysis grid for the survey forms: an analysis grid was developed for each questionnaire using Excel software. This grid took into account the various aspects covered by the questionnaire;



Source : MARA, 2022

Figure 1 Schematic diagram of the process used to search for clues

Codification of the information collected: the various data collected were translated into figures to make it easier to analyse;

Data processing: data processing was carried out using Excel software and made it possible to summarise the information sought by calculating sums, averages, percentages etc. ;

Assessment of the evidence in relation to the various parameters: To assess the evidence found, we used Roger Dajoz's criteria for assessing evidence of presence

(C = Pi/P.100) [10], based on the following aspects of the survey:

- Socio-zoological knowledge of the great grasscutter in the localities;
- Consistency of signs of presence in different plant formations;
- The frequency of encounters with the animal in the different types of formation in the three localities;
- Distribution of habitats according to relief;
- The distribution of habitats according to distance from the 1st waterhole;

- Distribution of distances between breeding sites and cultivated fields.

The results of processing all these data are presented in the form of tables and graphs.

3. Results and discussion

3.1. Socio-zoological knowledge of the great grasscutter in the localities

We applied Dajoz's theory of analysis to the selected sample.

Table 3 Criteria analysis table

Interval of constancy	Assessing consistency
75% ≤ C% < 100%	Constant
50% ≤ C% < 75%	Regular
25% ≤ C% <50%	Accessory
5 % ≤ C%< 25 %	Accidental
C%< 5 %.	Rare

Source : Diajoz (2002)

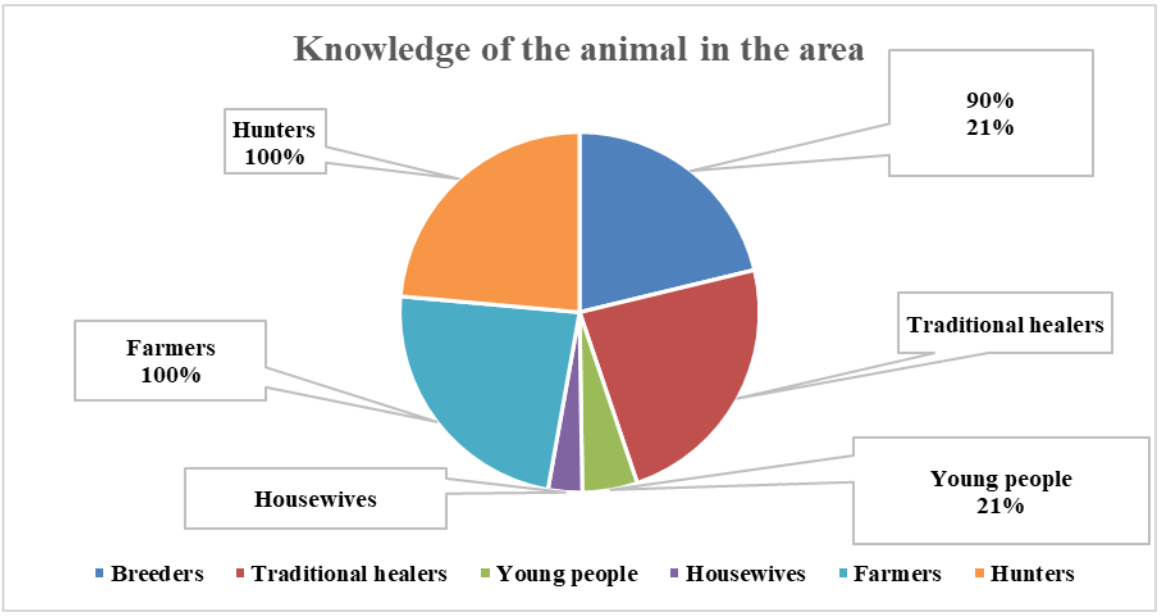


Figure 2 Diagram of socio-zoological knowledge of the grasscutter in the study area

This figure shows that, of the 260 individuals surveyed, hunters, farmers and stockbreeders have the most consistent criteria for assessing the animal, and are very well informed overall about the presence of the grasscutter in their area. This is because they come into contact with the animal either directly (physical encounters) or indirectly (encounters with tracks and signs), with an index of 100%. For women and young people who can only rely on physical presence. Their knowledge is 21% and 13% respectively.

3.2. Frequency of animal encounters in different types of plant formations

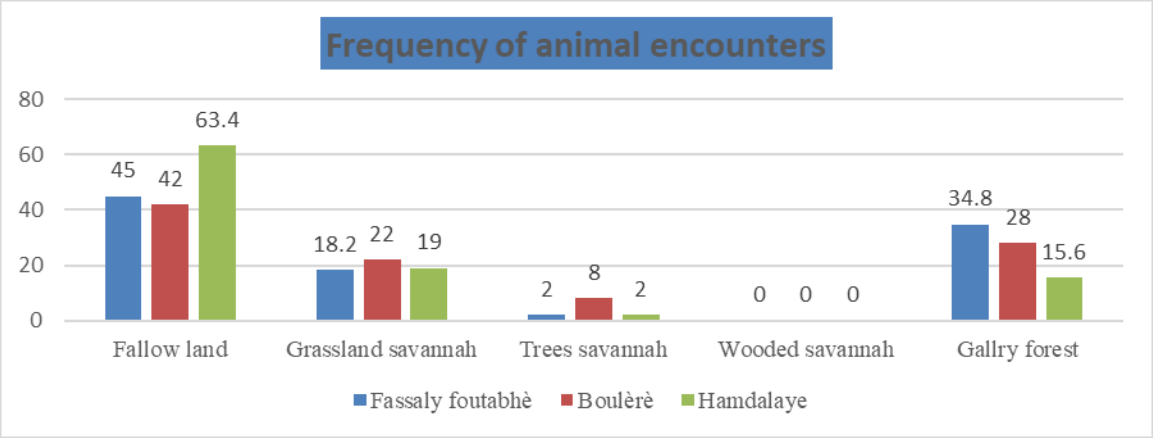


Figure 3 Frequency of animal encounters in different types of plant formations

Analysis of this graph gives the following results:

In the fallow land at the three localities, the frequency of presence is

75% ≤ C% < 100%, which means that the animal is permanent in the habitat.

In the grassy savannahs at the three localities, the frequency of presence is: C < 25 >20 which means that the presence of the animal is circumstantial in the habitat.

In the wooded savannahs at the three localities, frequency of presence is if 5% ≤ C%< 25%, which means that the animal's presence is accidental in this habitat.

In the wooded savannahs at the three localities, the frequency of presence is Rare if C%< 5% indicating that the presence of the animal in the habitat is rare in the forest galleries at the three localities, the frequency of presence is 50% ≤ C% < 75% indicating that the presence of the animal in the habitat is regular.

3.3. Consistency of signs of presence at the sites

For this study, after determining the frequency of encounters with the animal in the different types of plant formations, we determined the consistency of the signs found to ensure that the animal was permanent at the different sites.

The various samples taken and observations made revealed the existence of all the signs at the selected sites. To analyse these results, we used Roger DAJOZ's formula (2006)

C = Pi/P.100

The categories highlighted are

- Consistency (C) is the ratio of the number of samples containing the index studied (Pi) to the total number of samples (P); expressed as a percentage;
- Pi represents the total number of samples containing index i ;
- P is the total number of samples taken.

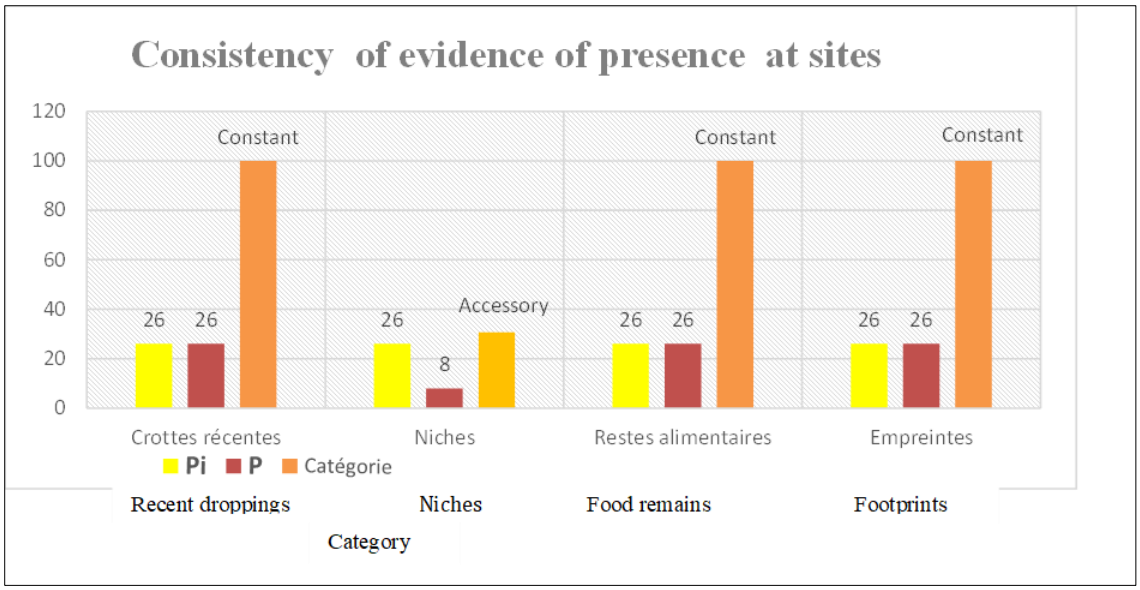


Figure 4 Assessment of presence indicators

To analyse the data, the results obtained were combined with Excel software

Analysis of this graph shows that of the four signs of presence sought during this study, three are in the constant category (droppings, food remains and footprints) according to Dajoz's assessment criteria. The assessment of the fourth is due to its temporary nature in the various formations. This state of affairs shows the active nature of the animal in the chosen environments and opens up the possibility of conservation of the species.

3.4. Distribution of habitats according to the relief of the environment

In the course of this study, we carried out surveys to identify clues. The results of these surveys were supplemented by indigenous knowledge with a number of questions.

Table 4 Results of the distribution of habitats according to relief

Type of relief	Hamdallaye	Fassaly-Foutabhè	Boulléré	Average distribution
Summits	3.4	9.7	2.3	5.13
Slopes	0	0	0	0
Glacis	0	0	0	0
Peneplains	2	1.4	1	1.4
Valleys/dales	93.6	88.9	96.7	63.52
Total	100	100	100	

Source : MARA ; 2022

To the question, ‘‘In what type of terrain do you find grasscutters during hunting or cultivation periods’’, the respondents replied in all sincerity.

In their view, when the mining companies arrived in the area, the summits and vast plateaux were occupied, and this occupation led to a concentration of wild animal populations in the lower parts (valleys). This state of affairs lasted for a while before most of the animals disappeared. Since then, our consumption of bushmeat has been limited to small rodents, mainly the cane rat, and only in very rare and periodic cases. For them, the only places where these animals can be expected to be found are in the vicinity of maize, rice and groundnut fields, among others.

Our investigations in the field have enabled us to confirm these assertions.

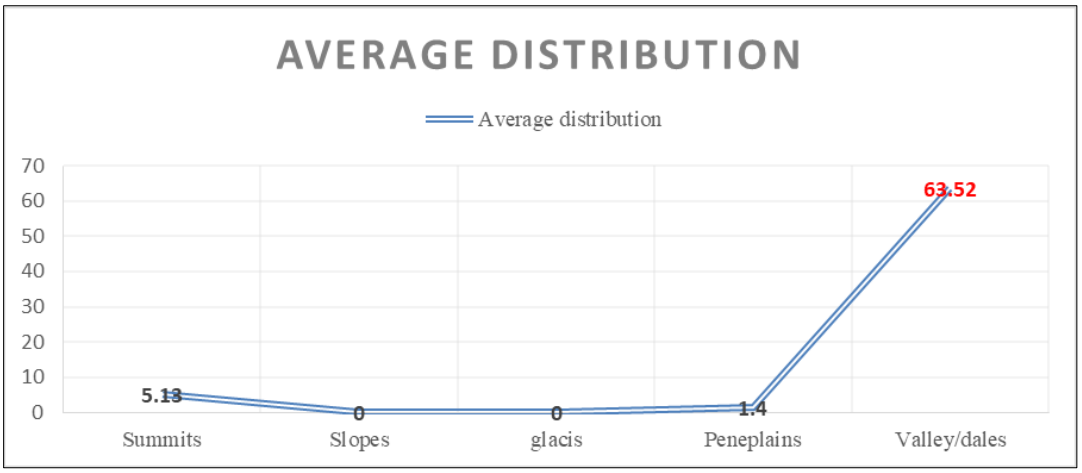


Figure 5 Distribution curve of habitats according to relief

This curve shows that, on average, only 5.13% of the showings are found on the plateaux (summits), which are the areas most degraded by mining activities in the three localities. In contrast, the valleys alone account for 63.52% of the showings found. This disproportionate distribution of clues is a worrying sign of the animal's vulnerability. It increases the threat to the animal because this terrain is the only one available for agricultural activities in the three localities.

3.5. Distribution of breeding sites according to distance from the first waterhole

As defenceless rodents, cane rats have developed specific behaviours with regard to the position of their roosts in relation to water points. These animals often have high water requirements, and proximity to a water source is crucial to their survival.

Table 5 Distribution of breeding sites according to distance from the 1st waterhole

Number of gites	Distance	Hamdallaye	Fassaly-Foutabhè	Boulléré	Total	Rate %
56	0-1 km	12	15	18	45	80.3
	1-3 km	3	5	3	11	19.7
	Total	15	20	21	56	100

Source : MARA ; 2022

In the context of this study, given the extensive degradation of the various habitats and the pressure on existing ones, we found that grasscutter habitats are much more concentrated around the main watering holes in all seasons, i.e. less than 1 km away, with a concentration rate of around 80.3%. This confirms the vulnerability of the animal, given the population's craving for its meat.

3.6. Distribution of distances between roosts and crop fields

Several ecological factors can influence the proximity or distance of cane rat roosts to cultivated fields, including food availability, shelter and cover, structures for reproduction, security and landscape connectivity.

Understanding these factors enabled us to carry out our surveys during this study.

The results showed a high concentration of breeding sites around cultivated fields. Although this high concentration is a natural behaviour of the animal given the influencing factors, in the case of our study area it is largely due to the discontinuity of habitats that have been heavily fragmented by mining activities and the concentration of crop fields on the only ecosystems exempt from these activities.

Table 6 Results of the distribution of distances between breeding sites and cultivated fields (%).

Distance	Hamdallaye	Fassaly-Foutabhè	Boullèré	Average
0-1 km	75	83.7	84,2	80.9
1-2.5 km	12.5	10.3	9.7	10.8
2.5-3 km	8,5	6	6.1	6.8
3-3.5 km	4	0	0	1.33
Total	100	100	100	

4. Conclusion

The study of the natural habitats of the great grasscutter with a view to its conservation in situ at Sangaredi is of great importance for the preservation of this precious species. The great cane rat (Thryonomys swinderianus) is the second largest African rodent and plays a crucial role in the ecosystems in which it is found. However, due to habitat loss, over-hunting and other anthropogenic factors, its population has declined significantly over the years.

Research into the natural habitats of the greater cane rat at Sangaredi has enabled us to gain a better understanding of the ecological requirements of this species and to identify the measures needed to ensure its long-term survival. Thanks to this field study, we were able to gather valuable data on these habitat preferences and the current level of knowledge of the local population of the species.

The results of this research highlight the importance of the wetlands (forest galleries) and fallow land in which the great grasscutter is found. These habitats provide an abundant source of food. It was also found that the availability of water is a crucial factor in the survival of the species, as cane rats depend on water sources for hydration and to maintain thermal regulation.

Analysis of the data collected as part of this study has enabled us to understand the current state of the natural habitats of the great grasscutter in the areas studied, and the main features that characterise the animal's choice of habitat.

As the study sites are heavily disturbed by mining and human activities, the strategy developed by grasscutters to ensure their survival seems to be to occupy all environments where plant cover is available.

In terms of vegetation types, grasscutters prefer shrubby savannahs where they seek a minimum of cover to spend the hot hours of the day, especially in the dry season.

The presence of a watering hole near the roost seems to be a criterion that determines the grasscutter’s choice of habitat. The fact that the majority of the identified roosts are located less than km from a waterhole is an indication of the animal's inability to adapt to the difficult situations observed, especially in the dry season. It can also be argued that the great grasscutter cannot travel long distances in search of water. It is also unable to go around waterholes, which would obviously shorten the distances it has to cover. Water is in fact its daily drink. However, it can go several days without drinking in the dry season when water sources dry up.

Consequently, in situ conservation, which involves protecting existing natural habitats, is considered the best approach for ensuring the long-term survival of the great grasscutter. Based on the results of the study, a number of recommendations can be made for the conservation of the species at Sangaredi. These include:

Establishment of nature reserves: It is essential to create nature reserves or protected areas specifically for the conservation of the great cane rat. These areas should be selected taking into account the historical presence of the species and the quality of the habitat;

Protection of wetlands and grasslands: Wetlands and grasslands are key habitats for the great grasscutter. It is crucial to put in place specific protection measures to preserve these ecosystems, such as strict regulations on land use and responsible farming activities;

Creation of ecological corridors: Ecological corridors are areas that link fragmented habitats, allowing animals to move safely between different areas. Creating ecological corridors between the habitats of the great cane rat encourages the dispersal of individuals and facilitates genetic exchange, thus helping to maintain healthy and resilient populations;

Adoption of sustainable farming practices: Farming activities can have a negative impact on the habitats of the great grasscutter. It is essential to promote the adoption of sustainable agricultural practices that minimise land degradation, such as organic farming, crop rotation and the responsible use of pesticides and fertilisers;

Awareness-raising and education: Educating local communities about the importance of conserving the great grasscutter is essential. Awareness and education programmes can be set up to inform communities about the ecological benefits of the species and encourage sustainable natural resource management practices;

Monitoring and ongoing research: It is important to establish regular monitoring of the great grasscutter population and its habitat. Ongoing research will provide a better understanding of the species' needs and enable conservation measures to be adjusted accordingly;

Collaboration between stakeholders: Conservation of the great great grasscutter aulacode requires collaboration between governments, conservation organisations, local communities and researchers. It is important to establish strong partnerships and work together to develop and implement effective conservation strategies.

By implementing these recommendations, it will be possible to preserve the natural habitats of the great great grasscutter and ensure the long-term survival of this much-loved species.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest is to be disclosed.

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