Avifauna of The Gbétitapea Village Forest (Central-Western Côte d'Ivoire): A Tool for Reviving Ecotourisms

Gnininté Maxime ZEAN, Dibié Bernard AHON*, Béné Jean-Claude KOFFI

Laboratory of Biodiversity and Tropical Ecology, University Jean Lorougnon Guédé, BP 150 Daloa, Côte d'Ivoire

Abstract

The scarcity of arable land means that the forest is often seen as a "land bank" that can be used for agriculture when the need or necessity arises. This practice has led, in one way or another, to the erosion of biodiversity. In Côte d'Ivoire very few studies have been carried out on village forest birds. The objective of this work is to find out the avifaunal richness of Gbétitapea village forest (GVF) with a view to diversifying its tourist potential. To this end, censuses were conducted in this forest using listening points, mist net capture and recapture and fixed-term censuses along line transects with five-minute stopping points at listening stations. This methodology resulted in a total richness of 130 bird species divided into 43 families of 17 orders. Resident species (86.15%) and open habitats (59.23%) were the most abundant.

Keywords: Avifauna, diversity, village forest, Gbétitapéa, Côte d'Ivoire.

INTRODUCTION

The rapid degradation of natural resources and the accelerated erosion of biodiversity is nowadays indisputable [1-4]. In Africa, the future of wild flora and fauna is linked to the implementation of a policy for the protection of major areas, sustainable development and rational use of the resources they generate. This policy can obviously only be implemented on the basis of fundamental ecological knowledge, which is still too often lacking [5, 6].

In Côte d'Ivoire, the galloping degradation of the natural environment has unfortunately led to the disappearance of thousands of hectares of forest, with the result that many animal species dependent on it have become extinct [7-10]. Rural forest reserves in particular have become coveted areas for agriculture and the intensive exploitation of non-timber and timber forest products, due to population growth and the increased market value of products derived from forest species [11, 12]. Indeed, soil impoverishment combined with population growth is leading people to seek new arable land [13, 14]. In this search, forests are sometimes exposed [15]. The scarcity of arable land means that forests are often seen as "land banks" that can be used for agriculture when the need or necessity arises [16]. All this practice has led, in one way or another, to the erosion of biodiversity in general and that of birdlife in particular. Hence the need to develop alternative sources of income in order to reduce the pressure on natural resources.

Present in all environments, from the most artificial to the most natural, birds have conquered a multitude of ecological niches [17, 18]. Their specialisations and spatial requirements make many species sensitive to habitat variations, which gives them a clear bio-indicator value [19-24, 18]. Moreover, as the ecology of many bird species is becoming increasingly well known, changes in their abundance can be better interpreted. These characteristics make avifauna an interesting monitoring indicator for biodiversity conservation [25]. Moreover, birds are of exceptional educational interest for raising awareness of the need to preserve natural resources, for emulating scientific culture and ecology and for raising awareness of the importance of aesthetics [18]. Birds are also of socio-economic interest: exploitation for food, magical-religious practices, not forgetting the problems of possible competition with fishermen, farmers or farmers. Finally, the avifaunistic potential of a country or region is nowadays increasingly used as an important tourist resource [18]. Consequently, exploiting this potential would be of scientific, educational and cultural interest.
economic interest. This could make it possible to constitute an axis for the development of ornithological programmes on a regional scale, which is still lacking. Furthermore, the locality of Gbétitapéa is mainly known for its forest fragments rich in monkey species, notably the Lowe monkey Cercopithecus lowei and the White nose monkey Cercopithecus petaurista [26]. It is one of the most popular tourist destinations in the Upper Sassandra region. However, data on its bird biodiversity are non-existent. To make up for this lack of knowledge, this study aims to determine the avifaunal richness of GVF with a view to diversifying its tourist potential.

MATERIALS AND METHODS

Study site

Gbétitapéa is located in the central-western part of Côte d'Ivoire, in the region of Haut-Sassandra and, more precisely, in the Department of Daloa, whose capital is the town of Daloa (Fig. 1). It is situated 10 km from the town of Daloa on the Daloa-Issia axis and extends between 7°06’ and 7°07’ north latitude and between 6°73’ and 6°72’ west longitude. The region which is home to the village of Gbétitapéa is bordered by those of Worodogou to the north, the Fromagers to the south, Marahoué to the east and the Montagnes and Moyen-Cavally to the west.

The population of Gbétitapéa is predominantly Bete. The village has a dense semi-deciduous forest which is home to sacred monkeys. This forest owes its survival to the sacredness of the monkeys. The Haut-Sassandra region is marked by a humid tropical climate and is characterised by two seasons of unequal length. The average annual rainfall is between 1200 mm and 1600 mm per year [8, 27-29]. Hydrographically, the region is under the influence of the Sassandra rivé and its tributaries (the Lobo and Davo rivers) and the lake of the Buyo dam. The shape of the region is monotonous and the landscape is made up of peneplains, which are large, gently undulating surfaces. The Upper Sassandra region benefits from favourable natural conditions for good agricultural development. Thus this region benefits from numerous assets not only for the production of food crops but also for its tourist potential.

Fig-1: Location of the study site in the Daloa Department [30]

Material
Observations were made through pairs of binoculars (Bushnell, 10 x 50 mm). The recording equipment consisted of a digital camera (Panasonic Lumix DMC-TZ61) for taking pictures and a GPS (Global Positioning System) (Garmin 60 CSx) to record geographical coordinates, altitude, route layout and to mark the various observation points. The West African Bird Guide [31] was used to identify the birds at this site.

Sampling devices
The study took place from January to May 2018. In order to cover the entire site, to take into account the heterogeneity of the environment and above all the diversity of the different biotopes, the GVF was subdivided into four sectors. In each sector a 2 km line transect was carried out, making a total of four transects. A fixed observation and counting point or station was also identified for study in a place offering a beautiful view of the entire landscape of this sector. Five listening
stations approximately 500 m apart were observed on each transect (a total of 20 stations in all four sectors). In order to identify discrete and silent species that can easily go unnoticed during visual or auditory observations, a fixed mist net capture and recapture point was identified and carried out throughout the study area for daytime observations. For night observations, inventories were carried out on the transects used for sampling diurnal species. However, three listening stations 1 km apart were identified on each transect (a total of 12 stations in all four sectors). The main methodology was the vocalization replay technique. The songs of all the nocturnal bird species likely to be encountered in the site were reviewed (10 in total). The vocalisation of a given species was listened to for 1 minute, followed by a 1-minute wait before moving on to another species.

DATA COLLECTION AND ANALYSIS

The methods used are respectively the listening point method [32, 4], mist net capture and recapture [33], time-dependent census along line transects [33, 34], with five-minute stopping points at listening stations [4]. Daytime observations (from 06 h 30 min to 18 h 30 min) were carried out on each 2 km line transect (sample route). The inventories were based on a systematic count of all bird species identified, seen or heard along the 12 2-km transects (i.e. three transects 1 km apart in each sector), during a slow (0.5 to 1 km/h) and silent walk. Observations from fixed listening points and mist net captures and recaptures (excluding transects) were used for a whole day between 06 h 30 min and 18 h 30 min (i.e. 12 hours of daily observation per study sector). For night observations, inventories were carried out on the sample routes used for sampling daytime species. The main methodology used was the vocalization replay technique. The songs of all nocturnal bird species such as Nighthawks, some lapwings and birds of prey likely to be encountered in the site were reviewed (10 in total). The vocalisation of a given species was listened to (from the smallest to the largest species) for 1 minute, followed by a 1-minute wait before moving on to another species. Observations were made during the full moon, from 19:00 to 23:00 on the outward journey and from 04:00 to 06:00 on the return journey. For each of the species recorded, the conservation status is [35], the biogeographical status, the preferred habitat and the endemism in West Africa (WA) according to [31]. The indications for biomes are [36, 37]. Nomenclature, taxonomy and species order have been established according to the Handbook of the Birds of the World and BirdLife International as published by [38].

RESULTS

Overall specific composition

The total number of bird species in GVF is 130, divided into 43 families of 17 orders (Table 1). Non-passeriformes dominate the stand with 73 species (56.15%) from 22 families. The order passeriformes represent 43.85% of the stand with 57 species belonging to 21 families. The most diversified families are the Accipitridae and Placididae with 11 species each. They are followed by the family Lybiidae with nine species. Next are the families Nectariniidae and Pycnonotidae with seven species each. Then, the families Cisticolidae, Columbidae and Cuculidae with six species each. These eight main species alone account for 48.46% of the total population. Figure 2 shows photographs of some of the bird species identified in the GVF.

| Scientific name | Common name | CS | BS | PH | End. | Biome |
|-----------------|-------------|----|----|----|------|-------|
| **GALLIFORMES** |             |    |    |    |      |       |
| Phasianidae     |             |    |    |    |      |       |
| Pheperdix lathami (Hartlaub, 1854) | Latham's Forest Francolin | LC | R | FF | GC  |
| Pternistis abantensis (Temminck, 1854) | Francolin d Abanta | LC | R | F  | GC  |
| Pternistis bicalaratus (Linnaeus, 1766) | Double-spurred Francolin | LC | R | f  |     |
| **ANATIDAE**    |             |    |    |    |      |       |
| Dendrocygna viduata (Linnaeus, 1766) | White-faced Whistling Duck | LC | R/M | Ea  |       |
| **COLUMBIFORMES** |           |    |    |    |      |       |
| Cuculidae       |             |    |    |    |      |       |
| Treron calvus (Temminck, 1811) | African Green Pigeon | LC | R | F  | GC  |
| Turtur bregmieri (Hartlaub, 1865) | Blue-headed Wood Dove | LC | R | F  | GC  |
| Turtur tymanipistria (Temminck, 1809) | Tambourine Dove | LC | R | F  |     |
| Turtur afr (Linnaeus, 1766) | Blue-spotted Wood Dove | LC | R | f  |     |
| Streptopelia semitorquata (Rüppell, 1837) | Red-eyed Dove | LC | R | f  |     |
| Spilopelia senegalensis (Linné, 1766) | Laughing Dove | LC | R | f  |     |
| **CAPRIMULGIIFORMES** |             |    |    |    |      |       |
| Caprimulgidae   |             |    |    |    |      |       |
| Caprimulgus tristigma (Rüppell, 1840) | Freckled Nightjar | LC | R | f  |     |
| Caprimulgus europaeus (Linnaeus, 1758) | European Nightjar | LC | P | f  |     |
| Caprimulgus longipennis (Shaw, 1796) | Standard-winged Nightjar | LC | M | f  |     |
| **CUCULIFORMES** |             |    |    |    |      |       |
| Cuculidae       |             |    |    |    |      |       |
| Chrysocecyx cupreus (Shaw, 1792) | African Emerald Cuckoo | LC | R | F  |     |
| Scientific name | Common name | CS | BS | PH | End. | Biome |
|-----------------|-------------|----|----|----|------|-------|
| **RALLIDAE**    |             |    |    |    |      |       |
| Zapornia flavirostra (Swainson, 1837) | Black Crake | LC | R | Ea |      |       |
| Ardrola ralloides (Scopoli, 1769) | Squacco Heron | LC | R/P | Ea |      |       |
| Butorides striata (Linnaeus, 1758) | Green-backed Heron | LC | R | Ea |      |       |
| Erythromerus plancius (Finsch, 1884) | Kurrichane | LC | R/M | f  |      |       |
| **MUSOPHAGIFORMES** |            |    |    |    |      |       |
| Musophaga violacea (Isert, 1778) | Violet Turaco | LC | R | Ea |      |       |
| **PELECANIFORMES** |            |    |    |    |      |       |
| Nycticorax nycticorax (Linnaeus, 1758) | Black-crowned Night Heron | LC | R | Ea |      |       |
| Butorides striata (Linnaeus, 1758) | Green-backed Heron | LC | R | Ea |      |       |
| Erythromerus plancius (Finsch, 1884) | Kurrichane | LC | R/M | f  |      |       |
| **CHARADRIIFORMES** |            |    |    |    |      |       |
| Vanelius senegallus (Linnaeus, 1766) | African Wattled Lapwing | LC | R | Ea |      |       |
| Actophorornis africanus (Gmelin, 1789) | African Jacana | LC | R | Ea |      |       |
| **SULIFORMES** |            |    |    |    |      |       |
| Microcarbo africanus (Gmelin, 1789) | Great Cormorant | LC | R | Ea |      |       |
| **GRUIFORMES** |            |    |    |    |      |       |
| Anseriformes |             |    |    |    |      |       |
| **ACCIPITRIFORMES** |            |    |    |    |      |       |
| Pernis apivorus (Linnaeus, 1758) | European Honey Buzzard | LC | P | f  |      |       |
| Elanus caeruleus (Desfontaines, 1799) | Black-shouldered Kite | LC | R | f  |      |       |
| Milvus migrans (Boddart, 1783) | Black Kite | LC | M | f  |      |       |
| Polyboroides typus (Smith, 1829) | African Harrier Hawk | LC | R | F  |      |       |
| Circus malouinus (Linnaeus, 1758) | Montagu's Harrier | LC | P | f  |      |       |
| Micronisus gabar (Daudin, 1800) | Gabar Goshawk | LC | R | f  |      |       |
| Accipiter tachiro (Daudin, 1800) | African Goshawk | LC | R | FF |      |       |
| Accipiter badius (Gmelin, 1788) | Shikra | LC | R | f  |      |       |
| Kaupifalco monogrammicus (Temminck, 1824) | Lizard Buzzard | LC | R | f  |      |       |
| Buteo auguralis (Salvadori, 1865) | Red-necked Buzzard | LC | R/M | f  |      |       |
| Aquila rapax (Temminck, 1824) | Tawny Eagle | LC | R | f  |      |       |
| **BUCEROTIFORMES** |            |    |    |    |      |       |
| Lophoceros semimafasciatus (Hartlaub, 1855) | African Pied Hornbill | LC | R | F  |      |       |
| Lophoceros nasutus (Linnaeus, 1766) | African Grey Hornbill | LC | R | f  |      |       |
| **CORACIFORMES** |            |    |    |    |      |       |
| Meropidae |             |    |    |    |      |       |
| Merops pusillus (Müller, 1776) | Little Bee-eater | LC | R | f  |      |       |
| Merops albicollis (Vieillot, 1817) | White-throated Bee-eater | LC | M | f  |      |       |
| Merops apicauda (Linnaeus, 1758) | European Bee-eater | LC | P | f  |      |       |
| Coraciidae |             |    |    |    |      |       |
| Coracias cyanogaster (Cuvier, 1817) | Blue-bellied Roller | LC | R | f  |      |       |
| Coracias aulica (Hermann, 1783) | Abyssinian Roller | LC | M | F  |      |       |
| Euryzostomus gularis (Vieillot, 1819) | Blue-throated Roller | LC | R | F  |      |       |
| Scientific name                      | Common name               | CS | BS | PH | End. | Biome |
|-------------------------------------|---------------------------|----|----|----|------|-------|
| Eurystomus glaucurus (Müller, 1776) | Broad-billed Roller       | LC | R/M|    |      |       |
| ALCEDINIDAE                         |                           |    |    |    |      |       |
| Halcyon leucocephala (Müller, 1776) | Grey-headed Kingfisher    | LC | M  |    |      | GC    |
| Halcyon malimibia (Shaw, 1811)      | Blue-breasted Kingfisher  | LC | R  | F  |      | GC    |
| Halcyon senegalensis (Linnaeus, 1766)| Woodland Kingfisher      | LC | R  |    |      | GC    |
| Ispidina lecontei (Cassin, 1856)    | African Dwarf Kingfisher  | LC | R  | f  |      |       |
| Ispidina pictus (Boddart, 1783)     | African Pygmy Kingfisher  | LC | R  | f  |      |       |
| PIGIIDAE                            |                           |    |    |    |      |       |
| Gymnophoecus variegatus (Laforêt, 1841) | Variegated Drongo       | LC | R  | F  |      | GC    |
| Pogonias humiae (Linnaeus, 1766)    | Black-mantled Drongo     | LC | R  |    |      | GC    |
| Indicator indicator (Sparman, 1777) | Indicator indicator      | LC | R  | f  |      |       |
| PICIDAE                             |                           |    |    |    |      |       |
| Turdus merula (Linnaeus, 1766)      | Blackbird                 | LC | R  | f  |      |       |
| MACROSPHENIDAE                      |                           |    |    |    |      |       |
| Sylvia atricapilla (Linnaeus, 1766) | Common Redpoll            | LC | R  | f  |      |       |
| DROZIIDAE                           |                           |    |    |    |      |       |
| Corvus corax (Linnaeus, 1758)       | Common Raven              | LC | R  | f  |      |       |
| MACROSPHENIDAE                      |                           |    |    |    |      |       |
| Sylvia atricapilla (Linnaeus, 1766) | Common Redpoll            | LC | R  | f  |      |       |
| CISTICOLIDAE                        |                           |    |    |    |      |       |
| Sylvia atricapilla (Linnaeus, 1766) | Common Redpoll            | LC | R  | f  |      |       |
| PSALIDOPONEAE                       |                           |    |    |    |      |       |
| Passer domesticus (Linnaeus, 1758)  | Domestic Pigeon           | LC | R  | f  |      |       |
| Cisticola chrysocephala (Linnaeus, 1766) | Yellow-fronted Canary | LC | R  | f  |      |       |
| Cisticola frontalis (Sharpe, 1870)  | Short-winged Cisticola   | LC | R  | f  |      |       |
| Prinia subflava (Gmelin, 1789)      | Tawny-flanked Prinia      | LC | R  | f  |      |       |
| HIRUNDINIDAE                        |                           |    |    |    |      |       |
| Psalidoponeae nitens (Cassin, 1857) | Square-tailed Saw-wing   | LC | R  | f  |      | GC    |
| Cecropis abyssinica (Guérin-Méneville, 1843) | Common African Swallow | LC | R  | f  |      |       |
| Hirundo rustica (Linnaeus, 1758)    | Barn Swallow              | LC | R  | f  |      |       |
| PYCNOTIDAE                          |                           |    |    |    |      |       |
| Table 1 (Continued 3)               |                           |    |    |    |      |       |
**Eurillas virens (Cassin, 1858)** | Little Greenbul | LC | R | F |
---|---|---|---|---|
**Pycnonotus barbatus (Desfontaine, 1789)** | Common Bulbul | LC | R | f |

**SCOTOCERCIDAE**

**Hylia prasina (Cassin, 1855)** | Green Hylia | LC | R | f | GC |

**STURNIDAE**

**Lamprotornis splendidus (Vieillot, 1822)** | Splendid Glossy Starling | LC | R | F |

**MUSCICAPIDAE**

**Musicapa cassini (Heine, 1859)** | Cassin's Flycatcher | LC | R | F | GC |
**Agricola paliloides (von Müller, 1851)** | Pale Flycatcher | LC | R | f |
**Hedydipna collaris (Vieillot, 1819)** | Collared Sunbird | LC | R | f |
**Cyanomitra olivacea (Smith, 1840)** | Olive Sunbird | LC | R | FF |

**NECTARINIIDAE**

**Hedydipna collaris (Vieillot, 1819)** | Collared Sunbird | LC | R | f | WA | GC |
**Cyanomitra olivacea** | Olive Sunbird | LC | R | FF |
**Chalcomitra senegalensis (Linnaeus, 1766)** | Scarlet-chested Sunbird | LC | R | FF |

**MUSCICAPIDAE**

**Agricola pallidus (von Müller, 1851)** | Pale Flycatcher | LC | O | f |
**Euplectes hordeaceus (Linnaeus, 1758)** | Black-winged Red Bishop | LC | R | f |
**Euplectes macroura (Gmelin, 1789)** | Yellow-mantled Widowbird | LC | R | f |
**Ploceus nigricolis (Vieillot, 1805)** | Black-necked Weaver | LC | R | f |
**Ploceus cucullatus (Müller, 1776)** | Village Weaver | LC | R | f |
**Ploceus tricolor (Hartlaub, 1854)** | Yellow-mantled Weaver | LC | R | FF | GC |
**Ploceus superciliosus (Shelley, 1873)** | Compact Weaver | LC | R | f |
**Ploceus nigerrimus (Vieillot, 1819)** | Vieillot's Black Weaver | LC | R | f | GC |
**Malimbus rubricollis (Swainson, 1838)** | Red-headed Malimbe | LC | R | f | GC |
**Malimbus malimbicus (Daudin, 1802)** | Crested Malimbe | LC | R | F | GC |

**ESTRILIDAE**

**Estrilda melpoda (Vieillot, 1817)** | Orange-cheeked Waxbill | LC | R | f |
**Spermestes cucullatus (Swainson, 1837)** | Bronze Mannikin | LC | R | f |
**Spermestes bicolor (Fraser, 1843)** | Black-and-white Mannikin | LC | R | f |

**VIDUIDAE**

**Vidua macroura (Pallas, 1764)** | Pin-tailed Whydah | LC | R | f |

**PASERIDAE**

**Passer griseus (Vieillot, 1817)** | Northern Grey-headed Sparrow | LC | R | f |

**MOTACILLIDAE**

**Anthus leucophrys (Vieillot, 1818)** | Plain-backed Pipit | LC | R | f |
**Motacilla aguimp (Dumont, 1821)** | African Pied Wagtail | LC | R | f |

End.: WA: Endemic to West Africa; BS: Biogeographic Status; Biomes: GC: Guinean-Congolese forest; SG: Sudano-Guinean savannah; PH: Preferred Habitat; CS: Conservation status; LC: Least Concern; M: Intra-African migratory; P: Palaearctic migratory; R: Resident; O: Occasional; E: Wetland; FF: Primary forest; F: Secondary forest; f: Open area.

---

![Fig 2: Photographs of some bird species identified in the VGF](image-url)
Stand characterization

Characterisation of bird species on the basis of biogeographical status reveals that the stand is dominated by 86.15% of resident species (R), 5.38% of species with mixed status (R/M, M/R and/or R/P), 3.85% of intra-African migratory species (M), 3.85% of Palearctic migratory species (P) and 0.77% of occasional species (O).

As for the preferred habitat, 8.46% of the species that prefer well-conserved forests (FF); 23.85% of general forest species (F); 59.23% of species that preferentially occur in open environments (f) and 8.46% of species that have wetlands as their habitat (Ea).

Species of conservation interest

In terms of vulnerability, no endangered species were observed. Scientific data are insufficient (DD) for the Maned Owl Jubiella lettrii. The other species are of minor concern. However, the GVF is home to three species endemic to West Africa including the Violet Turaco Musophaga violacea (Isert, 1788), the Oriole Warbler Hyperpergerus atriceps (Lesson, 1831) and the Buff-throated Sunbird Chalcomitra adelberti (Gervais, 1833). At biome level, 29 species belonging to the Guinean-Congolese forest (GC) and four bird species from the Sudano-Guinean savannah (SG) biome are present in the study site (Table 1).

DISCUSSION

There are a total of 130 species of birds in the GVF. This species richness represents 17.15% of the 758 bird species present in Côte d'Ivoire. This number is quite remarkable and indicative compared to the classified forests of Téné [39] and N’ganda N’ganda [40] which respectively record 103 and 132 species. This could highlight the good local management of the forests. In addition, the GVF shares 63 and 73 bird species with the classified forests of Téné and N’ganda N’ganda respectively. This would justify the similarity of habitats (swampy areas, islands of secondary forest, plantations, fallow land). Thus, several authors have referred to the need to draw certain lessons from these local management systems [41, 42]. Contrary to the studies carried out in the classified forests of Besso [43] and Téné [39], the order of non-Passeriformes is best represented. The Accipitridae family with 11 species is the most diversified. Our results corroborate those of [44] in the forest of the Tanoé-Ehy marshes (20 species). On the other hand, in the classified forests of Besso [43] and Téné [39] the families Pycnonotidae (17 species) and Nectariniidae (11 species) are the most represented respectively.

The stand is dominated by 86.15% of the resident species. One of the reasons for this sedentary lifestyle is linked to the availability of sufficient trophic resources for their survival, as well as the appropriate climatic conditions, as highlighted by [40]. Species from open environments predominate in the stands, given the gradual transformation of forest areas into plantations and built-up areas. Indeed, the degradation of the forest plant cover by agricultural activities leads to the appearance of fallow land [45, 46]. These observations were also made by [47, 39] respectively in the Ehotilé Islands National Park (south-eastern Côte d’Ivoire) and in the classified forest of Téné (central-western Côte d’Ivoire). This forest could be the subject of ornithological monitoring because three species endemic to West Africa, namely the Violet Turaco Musophaga violacea (Isert, 1788), the Oriole Warbler Hyperpergerus atriceps (Lesson, 1831) and the Buff-throated Sunbird Chalcomitra adelberti (Gervais, 1833), 29 bird species from the Guinean-Congolese forest biome and four species from the Sudano-Guinean savannah known in Côte d’Ivoire are present. This database on the diversity of the avifauna of the GVF is important for making a decision on the drafting of conservation measures for species with a special status and which could constitute an ecotourism attraction for the site, and finally proposals for management guidelines for this site to integrate the avifauna as a revival asset.

CONCLUSION

A study of the avifauna of the Gbetitapea village forest has made it possible to identify 130 species of birds divided into 43 families of 17 orders. Globally, the order Non-Passeriformes and the family Accipitridae with 11 species are the most diverse. Resident species (86.15%) and open habitats (59.23%) were the most abundant. GVF requires special attention as it contains three species endemic to West Africa, 29 species belonging to the Guinean-Congolese forest (GC) and four bird species from the Sudano-Guinean savannah biome (SG). The avifauna of this forest relic is rich and diverse. Further studies will certainly be necessary and will give much more arguments regarding the importance of this site for ecotourism activities.

ACKNOWLEDGEMENTS

We would like to express our sincere thanks to the village authorities of Gbetitapea for the authorisation to access the forest. Our thanks go to the local population for their hospitality and sympathy during their stay in the field.

REFERENCES

1. Agence française de développement. La gestion durable des forêts, Une solution nécessaire mais partielle pour la biodiversité, Question de développement 1, septembre; 2013.
2. Bamba K, Béné J-CK, Célestin YK, Kouamé AN, Victorien KC. Diversité, distribution et statut de conservation des primates dans les reliques de forêts dans la région du Tonkpi, à l’ouest de la Côte d’Ivoire. European Scientific Journal. 2017; 26(13): 20–41.
3. Béné J-CK, Kouakou CV, Kpangui KB, Vroh Bi TA, Djaha K, Adou YCY. Diversité de la faune sauvage mammalienne dans les agroforêts à cacao du bassin de la zone de contact forêt-savane au centre de la Côte d’Ivoire. Journal of Animal & Plant Sciences. 2018; 35(3): 5734-5748

4. Zean GM, Ahon DB, Béné J-CK. Peuplement avifaunique du Campus Universitaire Jean-Lorougnon Guédé, Daloa et sa périphérie (Centre-Ouest de la Côte d’Ivoire). International Journal of Biological and Chemical Sciences. 2018; 12(6): 2503-2518.

5. James A, Gaston K, Balmford A. Balancing the Earth’s accounts. Nature. 1999; 401: 323-324.

6. Loughégnon T. Écologie et biodiversité des communautés d’oiseaux des milieux naturels forestiers et de substitution du Sud du Bénin. Vers une conservation de la biodiversité ornithologique. Protocole de thèse. 2004; 6.

7. Mayaux P, Bartholomé E, Massart M, Van Cutsem C, Cabral A, Nonguemera A, Diallo O, Pretorius C, Thompson M, Cherlet M, Pekel J-F, Defourny P, Vasconcelos M, Di Gregorio A, Fritz S, De Grandi G, Elvidge C, Vogt P, Belward A. Carte de l’occupation de l’Afrique, EUR 20665 EN, European Commission, Joint Research Center. 2003; 56.

8. Brou YT. Climat, mutation socio-économiques et paysages en Côte d’Ivoire. Mémoire de synthèse des activités scientifiques présenté en vue de l’obtention de l’habilitation à des Recherches. Université des Sciences et Technologie de Lille, France. 2005; 212.

9. N’Da DH, N’Guessan KE, Wadja EM, Kouadio A. Apport de la téledétection au suivi de la déforestation dans le parc national de la Marahoué (Côte d’Ivoire). Télédétection. 2008; 8(1): 17-34.

10. Koné M, Kouadio YL, Neuba DFR, Malan DF, Coulibaly L. Evolution de la couverture forestière de la Côte d’Ivoire des années 1960 au début du 21e siècle. International Journal of Innovation and Applied Studies. 2014; 7(2): 782-794.

11. Betti JL, Mebere Yemef’a SR. Contribution à la connaissance des produits forestiers non ligneux du parc national de Kalamaloué, Extrême-Nord Cameroun: les plantes alimentaires. International Journal of Biological and Chemical Sciences. 2011; 5(1): 291-303.

12. Kagambega FW, Kadeba A, Zampaligre N, Nitiema BZ, Sawadogo L, Boussim JI. Influence de l’anthropisation sur la structure de quatre espèces utilisées dans le Chantier d’Aménagement Forestier de Cassou, Burkina Faso. International Journal of Biological and Chemical Sciences. 2019; 13(6): 2666-2682.

13. Belem M, Zoungreana M, Nabaloum M. Les effets combinés du climat et des pressions anthropiques sur la forêt classée de Toéssin, Burkina Faso. International Journal of Biological and Chemical Sciences. 2018; 12 (5): 2186-2201.

14. Kely MR, Kouakou CV, Béné J-CK, Koffi AD, N’guessan KA, Tiedoue MR. Spatial distribution and period of activity of the forest elephant (Loxodonta africana cyclotis) at Taï National Park, south western Côte d’Ivoire. Journal of Applied Biosciences. 2019; 133: 13542 - 13551

15. Coulin G, Amadou B. Rapport de mission Suivi de l’état de la conservation du Parc National de Taï en Côte d’Ivoire, site de Patrimoine Mondial. IUCN & UNESCO, Switzerland & Paris. 2006; 27.

16. Sawadogo P. Pâturages de la forêt classée de Tiogo: diversité végétale, valeur nutritive et utilisations. Mémoire d’ingénierie, Université Polytechnique de Bobo Dioulasso. 2002; 149.

17. Saloy L. L’avispa sauvage sur le campus de l’école nationale vétérinaire de Toulouse : évolution en 30 ans, protocole reproductible d’observations et mesures d’accroissement de la biodiversité. Thèse d'exercice, Médecine vétérinaire, Ecole Nationale Vétérinaire de Toulouse – ENVT. 2014; 172.

18. Loughégnon OT, Lobois MR. Chap. 19. Oiseaux, Birds. In Neuenschwander P, Sinsin B, Goergen G. (eds). Protection de la nature en Afrique de l’Ouest : une liste rouge pour le Bénin, Nature conservation in West Africa : red list for Benin. International Institute of Tropical Agriculture, Ibadan, Nigeria. 2011: 204-228

19. Martin JL, Thibault JC. Les oiseaux de la réserve naturelle de Scandola (Corse) : inventaire et structure des peuplements. Bulletin Ecologique. 1983; 14(4): 279-296.

20. Bibby CJ, Burgess ND, Hill DA. Bird Census Techniques. Academic Press, London, England. 1992; 257.

21. Bersier LF, Meyer DR. Relationships between bird assemblages, vegetation structure, and floristic composition of mosaic patches in riparian forests. Review of Ecology. 1995; 50: 15-33.

22. Skowno AL, Bond WJ. Bird community composition in an actively managed savanna reserve, importance of vegetation structure and vegetation composition. Biodiversity and Conservation. 2003; 12: 2279–2294.

23. Demey R, Rainey H. Inventaire rapide des forêts classées de la Haute Dodo et du Cavally. Une Evaluation Biologique de Deux Forêts Classées du Sud-Ouest de la Côte d’Ivoire. Bulletin RAP d’Evaluation Rapide 34, Conservation International : Washington, D.C. 2005; 76 - 83.

24. Gottschalk TK, Eksschmitt K, Bairlein F. Relationships between vegetation and bird community composition in grasslands of the Serengeti. African Journal of Ecology. 2007; 45(4): 557-565.

25. Ahon DB, Camara MM, Assemian NE, Kadjo B, Zean GM. Avifaunal diversity of the biodiversity conservation area of the soubre hydropower dam (south-west, Côte d’Ivoire). Journal of Global Biosciences. 2020; 9(5): 7320-7338
26. Kouakou CV, Béné J-C K, N’Guessan KA, Kouakou YC, Bamba K. Diversity, Distribution and Social Structure of Monkey Species in Forest Fragments of Gbetitapea, Central-Western Ivory Coast. Journal of Chemical, Biological and Physical Sciences. 2017; 8(1): 127-143
27. Kouamé B, Koné D, Yoro GR. La pluviométrie en 2005 et 2006 dans la moitié Sud de la Côte d’Ivoire. Bulletin le CNRA, document technique. 2006; 12-13.
28. Norbert NK, François KN, Hauverset AN, Pierre WN, Yao T. Variations saisonnières des populations de mirides du cacaoyer dans la région du Haut Sassandra en Côte d’Ivoire. Journal of Animal & Plant Sciences. (2015); 25 (1) : 3787-3798.
29. Koffé-Bikpo CY, Kra KS. La région du Haut-Sassandra dans la distribution des produits vivriers agricoles en Côte d’Ivoire Institut de Géographie Tropical, Université Félix Houphouët-Boigny de Cocody, Abidjan, Côte d’Ivoire. 2013; 9.
30. Kouakou CV. Importance des fragments de forêt dans la conservation des primates non-humains en Côte d’Ivoire: cas de la forêt sacrée et des forêts villageoises à Ghépitapéa dans la région du Haut-Sassandra. Thèse de Doctorat, UFR Environnement, Université Jean Lorougnon Guédé, Daloa, Côte d’Ivoire. 2019; 155.
31. Borrow N, Demey R. “Birds of Western Africa”, Christopher Helm, Londres, England, UK. 2001, 832.
32. Blondel J, Ferry C, Frochot B. Points counts with unlimited distance. In estimating the numbers of terrestrial birds. Stud. Avian Biol. 6. C. J. Ralph and Scott éditeurs. 1981; 414-420
33. Yaokokoré-Béibro KH. Avifaune des forêts classées de l’Est de la Côte d’Ivoire : données sur l’écologie des espèces et effet de la déforestation sur les peuplements. Cas des forêts classées de la Béki et de la Bossematé (Abengourou). Thèse de Doctorat de l’Université de Cocody, Côte d’Ivoire. 2001; 245.
34. Issiaka Y. Importances des zones humides du parc National du W du Niger pour les oiseaux d’eau Afro-tropicaux et migrateurs du Paléarctique Occidental. Thèse de Doctorat. Université Abdou Moumouni, Niger. 2011; 149.
35. UICN. IUCN Red List of Threatened Species, Version 2015, 2, [En ligne], URL: http://www.iucnredlist.org. 2020; Consulté le 16/05/2020.
36. Stattersfield AJ, Crosby MJ, Long AJ, Wege DC. “Endemic Bird Areas of the World: Priorities for Biodiversity Conservation”, BirdLife International. Cambridge, UK. 1998; Series No 7, 846.
37. Fishpool LDC. "Côte d’Ivoire” In Important Bird Areas in Africa and Associated Islands: Priority Sites for Conservation. Newbury: Pisces Publications and Cambridge, UK : BirdLife International. 2001: 219-232.
38. Lepage D. Liste des oiseaux de Côte d’Ivoire. Avibase, la base de données mondiale des oiseaux. 2017; Consulté sur. https://avibase.bsc-eoc.org, le [24/04/2019].
39. Konan EM, Yaokokoré-Béibro HK, Kouadio KP, Odoukpe KSG, Koue BTM. Avifaune d’un milieu forestier perturbé par la cacaoculture au centre-ouest de la Côte d’Ivoire: la Forêt Classée de la Téné. Agronomie Africaine. 2015; 27 (3) : 189-200.
40. Kouadio KP, Yaokokoré-Béibro KH, Odoukpe KSG, Konan EM, N’guessan AM, Kouassi KP. Diversité avifaunique de la forêt classée de N’ganda N’ganda (Sud-Est de la Côte d’Ivoire). Afrique Science. 2014; 10 (1):1-13.
41. Ostrom E. Local institutions for resource management. In: Beyond fences: seeking social sustainability in conservation. Volume 2. Borrimi-Feyerabend G. (ed). Iucn, Gland, Suisse. 1997; 14-16.
42. Ramakrishnan PS, Saxena KG, Chandrashnan UM. Conserving the sacred: for biodiversity management. Unesco, Oxford IBH Publ, New Delhi, India. 1998; 480.
43. Yaokokoré-Béibro KH. Diversité avifaunique de la forêt classée de la Besso, Sud-Est de la Côte d’Ivoire. Sciences & Nature. 2010b; 7(2): 207
44. Ahon BD, Egnankou MW, Kouadio RK, Kouamé OML. Inventaires préliminaires des oiseaux de la Forêt des Marais Tanoé-Ehy en Côte d’Ivoire. International Journal of Biological and Chemical Sciences. 2012; 6 (6): 4031-4045.
45. Lauginie F. Conservation de la nature et des aires protégées en Côte d’Ivoire. CEDA/NEI, Abidjan; 2007.
46. Lougbégnon TO, Codjia JCT, Libois MR. Distribution de l’avifaune des milieux forestiers de substitution (plantation et jachères) au Sud du Bénin en relation avec les facteurs de l’habitat. International Journal of Biological and Chemical Sciences. 2010; 4(4): 1191-1216.
47. Yaokokoré-Béibro KH. Oiseaux du Parc National des iles Ehotilé, sud-est Côte d’Ivoire. Malimbus. 2010a; 32: 89-102.