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Attitudes and perceptions of farmers on the African grey parrot in Oba Hills National Park, Osun State, Nigeria

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Abstract This study is focused on people's perceptions and attitudes on the population decline of African Grey Parrots (*Psittacus erithacus*) in Osun state, Nigeria. Data was collected through a structured questionnaire. The population of the study area comprises 234 farmers from communities in the study area. Data were analyzed using descriptive statistics, T-test, Pearson Correlation, and Chi-square test. The results revealed that 78% of the respondents were male, while 22% were female. Majority (51%) of the farmers were between the age group of 41-59 years, Christians (54%), indigenes (76%), and Nigerian (69%). As revealed from the study, 77.5% of the farmers were familiar with the African Grey Parrot (*Psittacus erithacus*). The farmers showed great knowledge of the bird and the ecosystem services rendered, thus they have a positive perception and attitude about African Grey Parrot conservation. The study recommended that the bird conservation club be initiated by forest management which should include youths, adults, and school teachers in the area in order to enlist farmers in the bird conservation program.

Keywords: Conservation, Ecosystem services, Knowledge and Perception.

1 Introduction

The African Grey Parrot (*Psittacus erithacus*) was once a widely distributed bird in wet, lowland tropical forests in western and central Africa. The species is one of the most endangered birds on the planet. Due to habitat degradation, fragmentation, and capturing for the live pet trade, their population has dropped significantly. According to estimates, their population has dropped by 50–90% in areas where they still exist and is locally extinct in others (BirdLife International 2022, IUCN, 2021). African Grey Parrots are sociable, highly intelligent members of the Psittacidae family of birds. They are renowned for gathering in big flocks and roosting in order to find fruit, nuts, and seeds. African Grey Parrot have a maximum lifespan of 15.5 years but a poor reproductive rate (Kalmar 2011).

They usually lay 3-5 eggs every year in the cavities of big trees, but they only produce 1-2 fledglings each year. Additionally, because of their breeding and social habits, African Grey Parrot chicks are simple prey for traders who want to steal them from their nests and sell them for the pet trade. Due to their exceptional aptitude for acoustic learning and memory, African Grey Parrots are highly appreciated as pets. They are a species of highly talkative parrots that can mimic and acquire human language, which has made them a target for traders (Martin *et al.* 2014).

Anthropogenic impacts such as deforestation, over-exploitation, and land conversion are man-made activities that result in rapid decline and loss of biodiversity (Dimitrakopoulos *et al*. 2010). The causes of today's extreme and rapid reduction in global biodiversity are primarily man-made, with extinction rates a thousand times higher than any point in the fossil record (Millennium Ecosystem Assessment 2005). The species has suffered a great loss in its population because of the wildlife trade. Each year, the international wildlife trade is estimated to involve billions of live animals and animal products, putting a third of all bird and mammal species in jeopardy (UNEP-WCMC 2014). The value of the illegal wildlife trade alone is estimated to be in the billions of dollars. Between 1982 and 2001, about 657,000 wild-caught parrots entered international trade in Africa, with only one species of African Grey Parrot (*Psittacus erithacus*) being traded (UNEP-WCMC 2014).

In Nigeria, the markets for parrots is thriving most especially in major cities where foreigners (Westerners) stays like Calabar, Port Harcourt, and Lagos (Eniang *et al.* 2003). Parrot trapping goes on throughout the year with peaks in the Dry season months but dwindles in the rainy season. The adult wild parrot price is 65 dollars (range 70-100 dollars) depending on the location of sale and the buyer and for the trained parrots, 80 dollars (range 100 -150 dollars). Despite the growing public awareness and the adoption of a few conservation strategies and initiatives, global biodiversity continues to diminish (Owolabi *et al.* 2020). Habitat alteration, wildlife capture for the pet trade (Wright *et al.* 2001), hunting for food, persecution as crop pests and diseases contribute to the population declines (Marín-Togo *et al.* 2012). Although several research has linked conservation attitudes to socio-demographic characteristics of the rural dwellers, few studies have linked attitudes to other plausible impacts on conservation (St. John *et al.* 2010). As a result, conservation efforts will frequently aim to change human behavior, such as by prohibiting unlawful activities in protected forest regions (Sommerville *et al.* 2010) and reducing illicit bush meat hunting (Owolabi *et al.* 2021).

The overall goal of this study is to analyze people's attitudes and perceptions to the African Grey Parrot population decline in Oba Hills National Park (OHNP), Osun State, Nigeria. The specific goals are to assess people's awareness and understanding of Parrot’s decline, as well as their attitudes towards conservation.

2 Methods

2.1 Study area

The study was conducted in communities around Oba Hills National Park, Nigeria (OHNP) (Figure1). OHNP one of the 10 newly established National Parks in Nigeria). The site covered a land mass of about 52.50 km^2 in size and was located within the Guinea-Congo Forest biome. It is situated between latitudes 7^o 33' and 7 ^{o} 5' N and longitudes 4^o 02' and 4^o 18' E. The wet and dry seasons are between April - October and November – March, respectively. The forest reserve has a perennial source of water and it is managed by the Osun State Government in Nigeria. According to Nigerian Conservation Foundation (2013), it is home to a few large mammals, including bushbuck (*Tragelaphus scriptus*), Blue duiker (*Cephalophus monicola*), Chimpanzee (*Pan troglodytes ellioti*), Patas Monkey (*Cercopithecus erythrocebus patas*), and Red-river hog (*Potamochoerus porcus*). OHNP has been known to harbour a great population of African Grey Parrots in time past, this is more noticeable as Grey Parrot is used the community bird and the image seen at strategic locations within the ancient Iwo kingdom which is the major host community of the OHNP. However, the population and distribution of African grey parrot remain unknown as this is the first study to be carried out in this regard in OHNP.

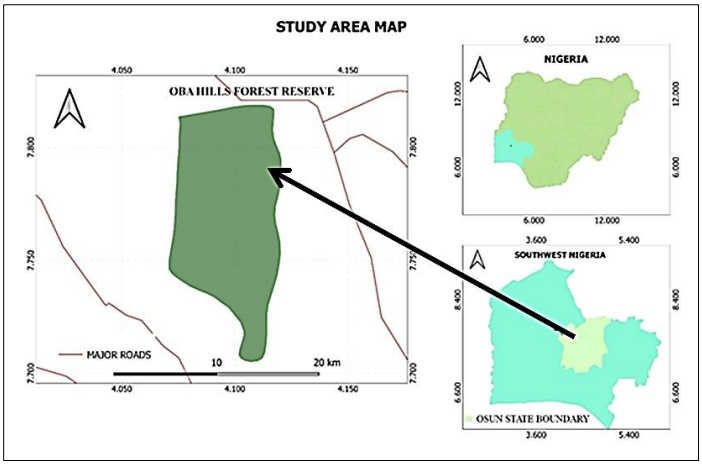

Fig 1. Map of Oba Hills National Park (Source: Field survey 2022)

2.2 Climate and topography

The vegetation of the OHNP is classified as derived savanna, with a mixture of agricultural plots, Teak plantations, woodland habitats, and portions of degraded riparian forests. The vegetation type is broadly defined as a core forest structure

surrounded by a savanna ecosystem and characterized by five (5) hills. However, due to invasions by illicit farmers, loggers, charcoal producers, and hunters, the vegetation has been severely degraded. Except for two teak plantations, most of the savanna and forest ecosystems have been converted to agriculture throughout the years. According to Nigerian Conservation Foundation, (2013), some savanna trees in OHNP include *Borassus aethiopum, Anogeissus lieocarpus, Lophira lanceolata, Sarcocephalus latifolius, Daniellia oliveri, Khaya senegalensis, Newbouldia laevis, Stereospermum kunthianum, Daniellia oliveri, Khaya senegalensis, Newbouldia laevis* within and around the reserve.

2.3 Methods of data collection

Population and Sampling Procedures

The statistics population consisted of rural farmers from eight (Akinleye, Owu-Ile, Ife-Odan, Isero, Ikonifin, Olori, Familopa and Togunde) communities surrounding the OHNP of Osun State in Nigeria. The respondents were chosen for the study based on their willingness to participate. As a result, the selection was deliberate. Questionnaires were distributed to select farmers after adequate consultation and authorization from each community's traditional rulers. Farmers who agreed to participate in the study were chosen at random, and questionnaires were self-administered, with assistance provided to farmers who had difficulties in understanding some of the questions.

Instruments for data collection

There were five sections in the questionnaire (A, B, C, D, and E). Section A assessed the respondents' demographic information, whereas Section B assessed the farmers' knowledge and identification of the African Grey Parrot. Section C assessed farmers' knowledge and perceptions of African Grey Parrots population reduction; section D assessed farmers' knowledge of the bird's ecological factors, and section E assessed farmers' perceptions and attitudes towards bird conservation. Cronbach's (1957) method of reliability measurement was used to assess the instruments' reliability.

The household heads (HH) of the host communities in and around the OHNP are the major sample unit in this study and their major occupation is farming. The adoption of a computer-based randomization approach or random table to select the HHs was difficult due to the lack of a village record. As a result, a systematic random sample method was used, which included selecting every other HH. The HHs who were interviewed ranged from ages 30 to 60 years, and in the absence of the HH, the wife or any adult in the home over the age of 30 years was asked to participate in the survey.

To avoid non-response to some questions and mistakes by respondents, the researcher, and an assistant completed the questionnaire (HH). Before the interviews, village leaders were visited to obtain permission for study operations. After the first visit, each hamlet was visited at least twice more, with one person being surveyed for

at least 15 minutes each time. Prior to the start of the survey, each HH was asked for their spoken agreement, with the ability to opt out at any time during the process. A structured questionnaire (direct questioning) containing closed-ended binary and Likert scale items was used to collect primary data. In a face-to-face survey of HH, these were developed, piloted, and administered. The home survey was performed in Yoruba, with the help of a bi-lingual indigene who is fluent in Yoruba, Hausa/Fulani, and pidgin (a Nigerian lingua franca).

Cronbach's alpha (or coefficient alpha) is a method for determining the reliability or internal consistency of a psychometric instrument that was devised by Lee Cronbach in 1951. The consistency of a test is defined as its reliability. To check if surveys with many Likert scale questions are reliable, reliability tests such as Cronbach's alpha were most usually utilized.

2.4 Measurement of variables

Independent variables for this study were Gender (Male, 1 and female 2), Age (years), Level of Education (No formal education 1 and formal education 2), Religion (Christianity 1, Islam 2 and traditionalist 3), Native status (Indigene 1 and non-indigene 2), Nationality (Nigerian 1 and foreigners 2) and membership of conservation groups (Yes and No). The dependent variable was the perception and attitude of farmers towards the population decline of African Grey Parrots. This was measured in Likert-scale type and rated as strongly agree 5, agree 4, undecided 3 disagree 2, and strongly disagree 1.

2.5 Data analysis

The descriptive and inferential analytical and statistical tools employed in this investigation were descriptive and inferential. Mean, median, mode, frequencies, percentage, and standard deviation are some of the descriptive tools employed. Tables and graphs were used to present this information. Chi-square, Pearson's correlation, and Farmers t-Test were employed as inferential methods. The independent-samples t-test assesses the difference between the means of two independent or unrelated groups, *i.e.,* whether the means of two independent groups are substantially different. The between-groups t-test, also known as the independent-samples t-test, can be used to analyze a control and experimental group. An independent-samples t-test requires scores on two variables: the grouping (independent) variable and the test (dependent) variable, for each instance. Thus, the data were analyzed using descriptive tools such as frequencies and percentages and will be represented using tables and charts (i.e., bar chart/pie chart).

3 Results

3.1 Demographic information of the respondents

Table 1 shows the demographic data of farmers in a few communities near the Oba Hills National Park (OHNP). Moreover, half of the respondents (78%) were males, while 22% were females. Most of the farmers (51%) were between the ages of 41 and 59, while 33 percent were below of 40 years of age, and 16 percent were 60 years. In addition, 72 percent of those polled had no formal education, while only 28 percent had some. Furthermore, the bulk of the farmers (54%) were Christians, while 36% were Muslims. The bulk of the farmers (76%) were indigenes of the research area, whereas 24% were non-indigenes, according to the study. Nigerians made up most of the farmers (69%) while foreigners made up 31%.

Table 1: Demographic Information of the Respondents (N = 250)

Variables	Frequency	Percentage
Gender		
Male	196	78%
Female	54	22%
Age		
<40 years	82	33%
41-59 years	128	51%
60 years	40	16%
Education		
Informal education	189	72%
Formal education	72	28%
Religion		
Christianity	100	54%
Traditionalist	59	10%
Islam	91	36%
Nativity		
Indigene	189	76%
Non-indigene	61	24%
Nationality		
Nigerian	172	69%
Foreigner	78	31%

3.2 Sources of farmers' knowledge about African grey parrot

Figure 2 depicts the sources of farmers' knowledge on African Grey Parrot. It demonstrates that farming activities provided 46% of the respondents with information, followed by hunting activities (36%), and conservation education (10%),

Television and radio programs and social media had the least amount (4% each) of representation.

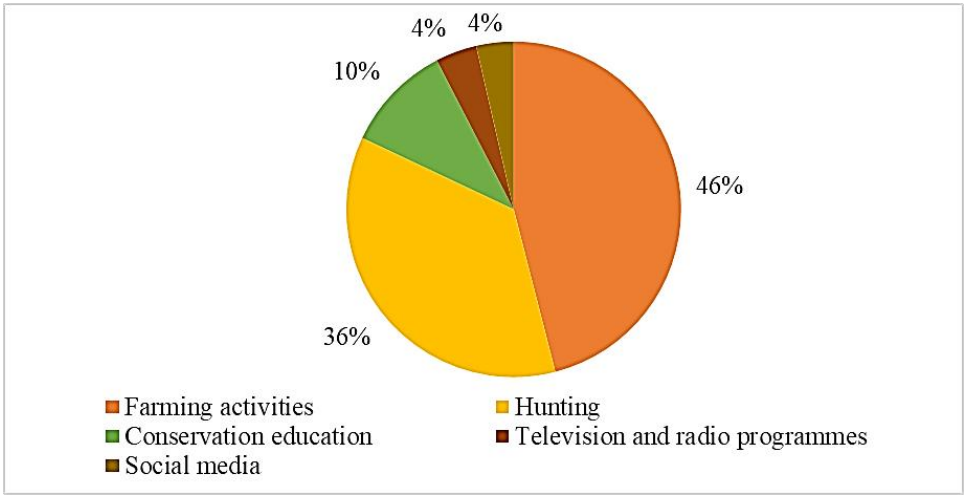

Fig 2. Sources of farmers' knowledge about African grey parrots

3.3 Farmers' knowledge of African grey parrot's diet and nesting materials

The farmers' knowledge of the African grey parrots' diet and the nesting materials (Figure 3) display that a larger number of the respondents (58%) agreed that fruits make up the highest percentage of the African grey parrot's diet, followed by seeds (26%), grains (10%), and insects (6%). While in Figure 4, majority of respondents (95%) believe that African Grey Parrots are cavity nesters, nesting in tree holes, whereas only 2% believe that the examined species nest on trees and palm trees. Only 1% of respondents said that African Grey Parrots make their nests out of the mud.

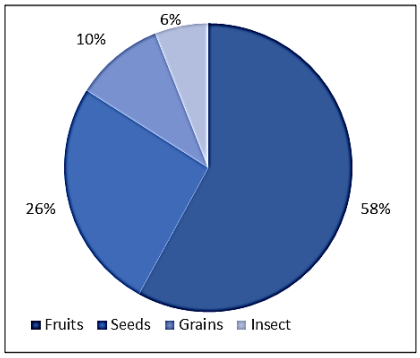

Fig 3. Farmers' Knowledge of African Grey Parrot's Diet

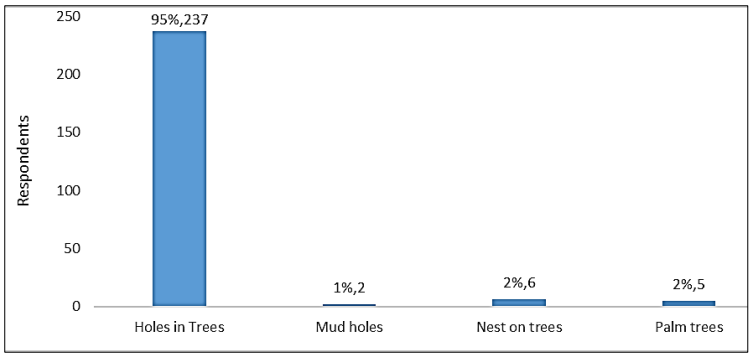

Fig 4. Farmers' Knowledge of African grey parrot's nesting materials.

3.4 Farmers' knowledge of African grey parrots' ecosystem services

Table 2 shows the farmers' understanding of the ecological services provided by the African Grey Parrot. The table below shows the percentage values of the supporting ecosystem services given by African Grey Parrot. The service that they are employed for research investigations had the maximum score of 96 percent, while "African Grey Parrots help in pest management" received the lowest score with 41 percent.

Table 2. Respondents' knowledge of African grey parrot's ecosystem services (expressed as frequency and % within brackets).

Ecosystem Services	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Supporting Services:					
Helps in pest control	240 (96)	10 (4)	0 (0)	0 (0)	0 (0)
Aids in seed dispersal	205 (82)	39 (15)	4 (2)	2 (1)	0 (0)
Fertilize the soil	156 (62)	49 (20)	30 (12)	13 (13)	2 (1)
Provisioning services:					
Good source of protein	236 (94)	10 (4)	4 (2)	0 (0)	0 (0)
Feathers are used for clothing and ornaments	200 (80)	31 (12)	9 (4)	4 (2)	6 (2)
Regulating services:					
Regulate forest growth	180 (72)	35 (14)	20 (8)	10 (4)	5 (2)
Cultural/ Ecotourism Services:					
Used in rituals and festivals	110 (44)	56 (22)	34 (14)	29 (12)	21 (8)
Beautiful and kept as pets	156 (62)	74 (30)	20 (8)	0 (0)	0 (0)
Used for research studies	102 (41)	90 (36)	50 (20)	4 (1)	4 (1)

As a result, the respondents strongly agreed with the statement "Birds function as ecosystem engineers through forest regeneration as African Grey Parrots aid in seed dispersal with 82 percent of the respondent in strong agreement and help in enriching the soil with 62 percent of the respondent in strong agreement."

Ironically, 94 percent of respondents strongly agreed that "African Grey Parrots are good source of protein," and 80 percent strongly agreed that "African Grey Parrots' feathers are utilized for clothes and ornaments."

A large percentage of respondents highly agreed to the numerous ecosystem services provided, with 41% strongly agreeing to the various ecosystem services provided by African grey parrots in the environment (Table 2). 72% of the respondents strongly agree that the bird plays a role in regulating forest growth, while 44 % strongly agree that they are used for cultural activities such as rituals and festivals. The beauty of these parrots is acknowledged (62%), while 41% also confirmed that these birds are used in research studies. All the assertions about regulating services, provisioning services, and cultural/ ecotourism services were overwhelmingly supported by the respondents.

3.5 Perception and knowledge of African grey parrot population decline and conservation

Table 3: Farmers' Perception towards African grey parrot population reduction (expressed as frequency and % within brackets).

Perception Statement about African grey parrots	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
They are a source of food and raw materials	138 (55)	67 (27)	31 (13)	6 (2)	8 (3)
They are pleasing to the eye and should be conserved	219 (88)	31 (12)	0 (0)	0 (0)	0 (0)
They are environmental indicators	123 (46)	76 (30)	49 (20)	2 (1)	0 (0)
They are a source of income	129 (52)	87 (35)	34 (13)	0 (0)	0 (0)
Have cultural significance in my area	121 (48)	83 (33)	23 (9)	2 (1)	2 (1)
They destroy farmland and crops	162 (65)	88 (35)	0 (0)	0 (0)	0 (0)
They transmit diseases	45 (18)	52 (21)	129 (52)	8 (8)	16 (6)
Human attitudes affect their community	120 (48)	66 (26)	57 (23)	5 (2)	2 (1)
Watching them improve human health and well-being (physical and mental)	89 (36)	66 (26)	74 (30)	12 (5)	9 (3)
Their population is fast disappearing	178 (71)	62 (25)	10 (4)	0 (0)	0 (0)
Forest degradation and anthropogenic activities affect their population	136 (54)	80 (32)	34 (14)	0 (0)	0 (0)
Trade-in of them as pet should be discouraged	120 (48)	83 (33)	24 (10)	2 (1)	21 (8)
They are very difficult to come by in the forest	186 (74)	64 (26)	0 (0)	0(0)	0 (0)
They are high-elevation and forest-dependent birds	129 (52)	65 (26)	56 (22)	0 (0)	0 (0)

The impression and understanding of African grey parrot population reduction and conservation are presented in Table 3. The importance of perceptual assertions varies.

The perception statement that 'the bird is pleasing to the eye and should be conserved' received the strongest attestation (88%) from respondents. The least number of votes (18%) was received for them being involved in transmitting diseases. Accordingly, the respondents had a favorable impression of African grey parrots' beauty and agree that the bird's conservation should be prioritized.

Table 4 shows how farmers in the study area feel about bird protection. The importance of attitudinal remarks varies. The statement "I prefer to Protect African grey parrots' habitat" had the highest value (64%), while "Planting trees that can supply food for birds" had the lowest value (32%). The majority of the respondents agreed wholeheartedly with the attitude statement of "Planting fruit trees that can produce fruits that will serve as food for birds". As a result, the respondents were enthusiastic about bird conservation.

Table 4: Farmers' Attitude towards African grey parrots' conservation (expressed as frequency and % within brackets).

Perception Statement	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Conservation awareness program on African grey parrots' importance	146 (58)	84 (34)	20 (8)	0 (0)	0 (0)
Create bird watching/conservation club	110 (44)	90 (36)	50 (20)	0 (0)	0 (0)
Protect African grey parrot habitat	160 (64)	85 (34)	5 (2)	0 (0)	0 (0)
Reduce environmental pollution	150 (60)	97 (39)	3 (1)	0 (0)	0 (0)
Stop killing and trading of African grey parrot	100 (40)	96 (38)	50 (20)	4 (2)	0 (0)
Planting trees that can provide food for birds	81 (32)	129 (52)	40 (16)	0 (0)	0 (0)
Use environment-friendly bird scarecrows in farmlands	93 (93)	126 (50)	31 (13)	0 (0)	0 (0)
African grey parrot should not be caged as pet	121 (48)	87 (35)	27 (11)	11 (4)	4 (2)
Stop the sale and exportation of wild birds	106 (106)	93 (37)	41 (16)	7 (3)	3 (1)
Establish more Ramsar sites and IBAs	137 (55)	87 (35)	20 (8)	6 (2)	0 (0)
There should be severe sanctions for bird poachers	155 (62)	83 (33)	12 (5)	0 (0)	0 (0)

Table 5: Correlation between age and income, and relationship between gender, religion, nativity and nationality.

Variable	Relationship value x^2	Significance value	Decision
Relationship			
Gender	27.00	0.01**	Significant
Religion	14.80	0.23	Not Significant
Nativity	43.63	0.47	Not Significant
Nationality	70.02	0.98	Not Significant
Correlation	Correlation value (r)	Significance value	Decision
Age	0.30	<0.001**	Significant
Income	0.33	0.56	Not Significant

** Significant at $P < 0.01$

Table 5 presents the relationship between the farmers' demographic characteristics and their perception of bird's conservation. Statistically, there was a significant relationship between age and their perception of conservation ($r = 0.30$, $p < 0.001$). Also, Gender ($x^2 = 27$, $p<0.01$) had a significant relationship with their perception towards conservation.

4 Discussion

A total of 234 HH were chosen at random from the eight villages: Akinleye (10), Owu-Ile (35), Ife-Odan (100), Isero (10), Ikonifin (45), Olori (15), Familopa (15), and Togunde (15) using cluster sampling (20). The farmers had a solid awareness of the African grey parrots in the study area, as well as the food and nesting materials that are frequently used by the bird. This discovery is unrelated to the fact that the local population is the true stewards of the natural environment. The locals display a variety of traits that suggest they commonly come into contact with African grey parrots as well as other bird species.

Despite the African grey parrot's low conservation status, farmers are well-versed in the multiple ecological services it provides and are willing to conserve the bird species as the population of this bird is largely on the decline. This is however negating the statement by Clevo and Clem (2004) that low public knowledge of wildlife inevitably leads to low conservation because some wildlife species will be less known than other species. The individual's proximity to protected areas may affect that individual's knowledge and understanding of birds which may imply the conservation of more well-known species in such areas (Mmassy and Røskaft 2013).

The ability of the respondents to demonstrate fair knowledge of the African grey parrot obtained in the study could be a result of the cultural and traditional significance of this bird around Iwo land. Furthermore, the pictorial presentation during the visual stimulus could also be linked to the respondents' age categories, as reported by Beck *et al*. (2001), who stated that younger people had a better ability to recognize birds than older pupils.

Farmers accounted for 46% of the respondents, with knowledge of the African grey parrot gained through various farming operations. These findings better explain the report of Owolabi *et al.* (2020) that participation is an important tool in achieving conservation success, as such, local understanding and perceptions of wildlife need to be given more attention. Also, Ogunjobi *et al*. (2018) reported that 60% of secondary students in Okitipupa, Ondo State had knowledge about avifauna through outdoor activities.

Fruits are the primary dietary source for the African grey parrot, according to 58 percent of respondents. This shows that African grey parrots are frugivores like their other sister species in the order Psittaciformes (Gregory *et al.* 2010). Also, the majority of the respondents (95%) confirmed that these parrots are cavity nesters. The study further shows that the farmers strongly agreed with the provisioning services offered

by the birds in the ecosystem. This finding is also in tandem with the statement by (Chardonnet *et al*. 2002), that in developed countries as well as in many rural areas, birds are hunted, and their eggs are also collected for consumption and sport. Moreover, it stated that bird feathers provide bedding, insulation, and ornamentation. In yet another way, Mahendiran and Azeez (2018) stated that nesting colonies of birds transfer nutrients across ecosystems annually through birds' guano, an important provisioning service.

Furthermore, the majority of the farmers strongly agreed with the regulating services provided by the birds in the ecosystem. This is validating the assertion of Denny, (2014) that foraging by birds has the potential to provide a critical service in controlling the numbers of agricultural pests, such as insects and rodents.

The respondents strongly agreed that African grey parrots provide both cultural and ecotourism services. This is in tandem with the statement of Carver (2013) that bird watching globally represents the primary form of ecotourism, and one of the most popular outdoor recreational activities in the United States and around the world. It has direct economic benefits as well as indirect benefits through numerous citizen science programs involving birdwatchers. Schwartz *et al*. (2014) document positive relationships between human well-being and real/perceived bird species richness. On their own Tidemann and Gosler (2010) opined that birds offer a significant focus for studies of cultural services within the ecosystem paradigm, known as the field of ethno-ornithology.

5 Conclusions and recommendations

Generally, farmers had good knowledge about African grey parrots' food and nesting materials and the ecosystem services and roles this bird plays in the ecosystem. The farmers opined that as members of the ecosystem, African grey parrots play important roles, including pollination, seed dispersal, nutrient cycling, and ecosystem engineering and modifying the environment in ways that benefit other species. Birds were also acknowledged to have food, cultural, and ecotourism/economic values. Thus, the farmers had a positive perception and good attitude towards bird conservation in the study area.

In order to advance biodiversity protection, the Nigerian National Parks Service (NNPS) must be strengthened. Effective conservation will be enhanced by providing communities around the protected area with conservation education and enlightenment programs that will further encourage them to join the conservation. The study recommends the following:

a) Bird conservation clubs can be initiated by the school management which should include youths, adults, and teachers in the area to enlist farmers into a African grey parrot conservation programme.
b) Integrating information regarding environmental resources management with emphasis on wildlife species of ecological interest such as avifauna into the school

curriculum will be a welcome development in booting the knowledge of the farmers on wildlife ecology and management.

c) Involvement of farmers across age groups in future avifauna conservation and sustainable use of this resource particularly for nature-based tourism.

d) Educational programme should be introduced to the farmers to include learning to recognize bird species, the conservation status of the species, threats to the species, and how to mitigate the threats. These programmes should involve knowledge of biodiversity conservation as an important long-term survival tool for the wildlife.

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