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Evaluating the Effect of Bird Population and Diversity of Bird Species at Akure Airport, Oba-Ile Akure, Ondo State, Nigeria

BY

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ABSTRACT:- The study examined the effect of bird population and diversity of bird species at Akure Airport Oba-Ile, Akure, Ondo State, Nigeria. Four objectives were raised and two research hypotheses were formulated to guide the study.

The total population for this study consisted of ten (10) staffs in Wildlife hazard unit in Akure airport, Oba-Ile, Akure, Ondo State, Nigeria who were selected using stratified random sampling technique. Data collected for the study were analyzed using frequencies and simple percentages. The use of tables and charts were also employed to enhance easy understanding of data presentation.

The result of bird species within Akure airport shows 20 bird species that were found within Akure airport. The result shows that habitat around the airport (80%), construction of new infrastructure in airport (100%), sizes and number of birds (100%), daylight hours (90%), Noises of airplanes coming and going (70%) were some of the environmental factors and man-made factors that contribute to bird population. The result reveals that removing seed- bearing plants to eliminate food sources for the birds (80%); certification to the airport should require a wildlife hazard assessment and wildlife hazard management plan (100%); managing of new infrastructure (100%); relevant provision should be made to mitigate risk (100%) and documentation of all hazardous sources that affect flight safety (100%) were some of the measures that can be used to control bird population in the airport. Furthermore, the result of the effect of bird population on flight safety operations shows that bird population inflict damage to the engines (60%); can also cause damage to extended landing gear during landing or take off (50%).

The study therefore recommended among others that Federal Ministry of Aviation (FMA) should collaborate with parastatal under its supervision to create the much-needed synergy to promote safety through technological adoption and rigorous awareness campaign in order to reduce or effectively manage the menace of bird populations and abundance of bird species at the airport. Disposal of garbage by the catering services around the airport should be well managed to discourage scavenging birds from dumps so as to reduce bird population and abundance of bird species. There should be Bird Population Avoidance Radar' equipment that will alert the control tower which will in turn alert the pilot of the presence of birds along his way be installed in major in airports.

I. INTRODUTION

There is no straightforward relationship between the number of birds at a particular geographic location and the risk of bird strikes (Dolbeer, 2004). Location factors (e.g. aerodrome or landfill sites) as well as flock size and flight line patterns play a significant role as it has been shown in Birds were known to be the primary users of airspace until the twentieth century, when the airplane was invented. They have been forced to coexist with aircrafts in the airspace. Bird-aircraft collisions have skyrocketed in recent years as the world has become a global village thanks to technological advancements in communication and significant improvements in aircraft design. Globally, the bird populations have resulted in loss of more than 219 people and 200 aircraft since 1988 (ICAO, 2006).

Using various sources of information (ICAO, UK CAA, EURBASE) it can be derived that most of the bird strikes occur below 2500 feet

(90%-93%), and the majority occurs at altitudes below 200 feet (64%-75% depending on data source). The seasonal pattern of bird strikes is confirmed from all sources, indicating that the highest number of bird strikes occurs in the months between April and October. It is not random that this period coincides with the airline summer schedule of increased air traffic activity.

The long history of bird-aircraft collisions ('bird populations') begins with a bird population during one of the Wright brothers' first powered human flights in 1905 (International Civil Aviation Organization (ICAO), 2006). Human safety is the primary concern for aviation and aviators, but collisions also have a significant financial cost, both directly through equipment damage and indirectly through delays in operations. The annual costs of effect of bird populations on aircraft are estimated to be $1.2 billion worldwide (Allan, 2000). Collisions are almost always fatal to the birds involved due to the high speeds involved (DeVault*et al.,* 2015).

Engineers explained that jet engines are particularly vulnerable during takeoff, when the engine is rotating at a high rate and the plane is flying at a low altitude, where birds are more likely to be found. The force of the bird's impact on an aircraft is determined by the bird's weight, as well as the difference in speed and direction of impact. The square of the speed difference increases the energy of the impact. As a result, a low-speed collision between a small bird and a car windshield results in relatively minor damage. As with jet aircraft, high-speed impacts can cause significant damage and even catastrophic failure to the vehicle (Dukiya and Vimal, 2013). After a bird population, a damaged jet engine can damage vehicle components and injure passengers. Bird flocks can be extremely dangerous, resulting in multiple strikes and damage. Birds hit at low altitudes or during takeoff and landing are often unable to recover in time and crash, depending on the severity of the damage.

Abundance of bird species is a component of biodiversity and refers to how common or rare bird species is related to other species. Local abundance is the relative representation of a bird species in a particular ecosystem (Preston, 1948). It is usually measured as the number of bird species found in a given area. The ratio of abundance of one bird species to one or multiple other species living in an ecosystem is referred to as relative species abundance. Species abundance tends to conform to specific patterns that are among the best-known and most studied patterns in macro ecology. Bird species are habitat specific and respond especially to habitat structure (MacArther *et al.,* 1962, MacArthur 1964). Different land use practices influence the habitat, structure, composition of species and availability of birds in a specific location (Boren et al. 1999, Brawn *et al.,* 2001).

According to Martin and Blackburn (2010) found no significant variation of birds between international and local Airport in West African countries. However, Fardila and Sjarmidi (2012) said that though the land use and other aspects of environments are interrelated, forest always has higher species richness of birds than other land cover. Rimal (2006) posit that there are many species of birds in Airport near water. According to Basnet (2010) explained that species richness can be found in moderately disturbed area than in disturbed one. Also, having higher alpha diversity of bird in Airport in moderately disturbed area but higher beta diversity in the disturbed landscape.

The abundance of birds, however, tends to reduce in transformed landscapes and is not suitable for birds seeking cover and food (Robinson& Wilcove, 1994; José *et al*, 2009) Isolated patches of habitats are seen as islands and managed as such with the different associated environmental conditions (Wiens, 2008).

Bird populations are also prevalent in Nigeria. Reports has shown cases of bird/wildlife strike in Nigeria. These incidents not only endanger air travel and passengers, but it also raises airline operating costs (Haruna, 2011). From 2005 to 2010, the country experienced a total of 209 bird/wildlife strikes (Haruna, 2011). Bird/wildlife strikes now account for 24 percent of all air accidents in Nigeria, up from around 17.4 percent in 2006 (Nigeria Communications Week, 2011). Bird populations are estimated to cost Nigerian airline operators around N15 billion per year (This Day Online, 2010). The country has also seen a number of cases of terrestrial animal strikes. For example, while landing at Port Harcourt airport in 2005, an Air France plane carrying over 200 passengers collided with a herd of cows (AllAfrica.com, 2005). Another plane collided with a herd of cows and goats in Bauchi airport in March 2011 (AllAfrica.com, 2011).

Birds of preys are attracted to airport because rodents, small birds and other small animals that are harbored by tall poorly maintained grass stands, or bush is present. Waste disposal practices by restaurant and airline flight kitchen, food vendors and other airport users make organic garbage available as foods to birds like crow, pigeon and gulls and other scavenging bird species. Fruiting trees may also attract frugivores species. Dump sites located near airports provide feeding and loafing sites.

Nigeria with her rich bird population and diversity and with a total of 904 species so far recorded does not have a good aviation safety track record of bird population incidences (Allan and Orosz, 2001). One of the very few cases is the Pan African News Agency report of the 29th of September 2001 of a bird population incidence caused by some egrets at the Lagos Airport. Prevention of bird population begins at the Airport because over 80% of the bird population incidents occur in airports environment during takeoff (as earlier stated), final climb, approach landing and taxi phases of flight (Dolbeer and Bucknal, 1994). Due to the little information of bird population occurrence in the airports in Nigeria, it is difficult to establish risk to life and wildlife that may exist due to bird population.
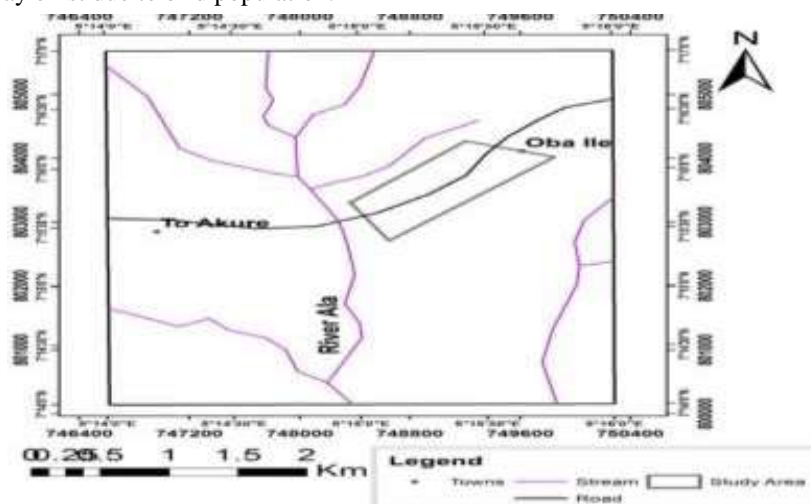
This study is limited to study only bird populations at Akure Airport, Oba-Ile Akure, Ondo State. Birds pose more threat to aviation and environmental safety than other Wildlife. This prompted the preliminary ornithological assessment to identify bird species within the airport environment. Some of the birds identified were found to be hazardous while others are not. This study helped to determine their flight pattern and attractant within the airport and also served as a guide to determine the proper control measure applied.

II.   METHLOGY

The Study Area

Akure airport is located at Oba-Ile, Akure North, Ondo State Nigeria. It is situated between latitudes 70 17'N and longitudes 50 14'E and 50 15'E. The area falls within the Precambrian basement complex terrain of the country (Rahaman, 1998). The main rock types found in Oba-Ile area are migmatite, undifferentiated granite gneiss, quartzite and porphyritic granite with schist impregnation. Oba-Ile enjoys a tropical climate with the natural vegetation of rain forest. The mean annual rainfall in the re ranges from 700 to 800 mm approximately. The evaporation in the area is high due to the humidity, relatively high sunshine hours and low precipitation. The area is drained by River Ala, River Ogijan and other tributaries (Adeyemi, 2015; Ogunrayi *et al.,* 2016).

Base map of study area

Method of Data Collection

The research instrument was administered to the respondents personally by the researcher. Observatory survey was also carried out around the runway, the two runways (06/24, 05/23). Other areas surveyed using slow driven car include the airport perimeter fencing, water hydrant and refused dump sites. Some of the basic methods used in bird census in this research include;

- **Line transects:** Suitable for estimating density an abundance which involves moving along a fixed route (transect) and recording the bird species seen and heard on both sides of the transect.

- **Googlelens:** a tool that uses image recognition to help navigate the real world through google assistant. And also gain more information about a thing.

The bird species were surveyed using the 5 randomly located accessible routes (transects) carefully selected from a drawn layout of the airport. Bird counts were carried out in the mornings between 6:00a.m-8:00am. and evenings 5:00pm-7:00pm. Each transect was walked at a set pace of 200/10min to record the bird species heard and seen. Google lens were used to confirm the identification of the birds located by sight.

Research Design

This study adopted a descriptive research design of the survey type. This research design enabled the researcher to collect data from a sample of respondents.

Population of the Study

The target population for this study consists of all the staffs in Wildlife hazard unit in Akure airport, Oba-Ile, Akure, Ondo State, Nigeria.

Sample and Sampling Technique

Sample size for this study consists of ten (10) staffs in Wildlife hazard unit in Akure airport. Stratified random sampling technique was adopted to select the staffs in Wildlife hazard unit in Akure airport, Oba-Ile, Akure, Ondo State, Nigeria.

Method of Data Analyses

Data collected from difference sources were analyzed using both descriptive and quantitative statistics. Descriptive statistics involved the use of frequencies, simple percentages, measures of central tendencies to present the data collected. The use of tables and charts were also employed to enhance easy understanding of data presentation.

III.   RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

Table 1 reveals that 60% of the respondents were male while 40% of the respondents were female. However, this shows that majority of the staff in wildlife hazard unit in Akure airport were males. Also, 50% of the respondents were less than 30years of age while 30% and 20% of the respondents were within the age of 30-50years and above 50years respectively. Almost all the wildlife staffs in Akure airport have not spend up to 10years in service, they accounted for 90% of the respondents. More so, (100%) of the respondents had higher education, and majority (70%) of wildlife staffs were Christians. The result further reveals that majority (50%) of the wildlife staffs had moderate knowledge on bird population, this was followed by 30% of the staff which had low knowledge on bird population and 20% with high knowledge on bird population. Therefore, it may be concluded that staff in wildlife hazard unit in Akure airport had moderate knowledge on bird population.

Table 1: Demographic Characteristics of Respondents.

Variable		Frequency	Percentage (%)
GENDER	Male	6	60.0
	Female	4	40.0
	Total	**10**	**100.0**
AGE	Less than 30years	5	50.0
	30-50years	3	30.0
	50year and Above	2	20.0
	Total	**10**	**100.0**
LENGTH OF YEARS IN SERVICE	Below 10years	9	90.0
	10years and Above	1	10.0
	Total	**10**	**100.0**
EDUCATION	No Formal Education	-	-
	Primary Education	-	-
	Secondary Education	-	-
	Tertiary Education	10	100.0
	Total	**10**	**100.0**
RELIGION	Christian	7	70.0
	Muslim	3	30.0
	Total	**10**	**100.0**
KNOWLEDGE OF BIRD POPULATION	Very Low	-	-
	Low	3	30.0
	Moderate	5	50.0
	High	2	20.0
	Very High	-	-
	Total	**10**	**100.0**

Source: (Field Survey, 2022)

Table 2: Bird Species within Akure Airport.

S/N	Bird Species	Scientific names
1.	Little Swifts	*Apus affinis*
2.	Black Kite	*Milvus migrans*
3.	Grey Apalis	*Apalis cinerea*
4.	Ca Crows	*Corvus brachyrhynchos*
5.	Pied Crow	*Corvus albus*
6.	African Hawk Eagle	*Aquila spilogaster*
7.	Bush Fowl	*Francolinus bicalcaratus*
8.	Pied Avocet	*Recurvi rostraavosetta*
9.	African Black Oystercatcher	*Haematospus moquini*
10.	Spotted Crake	*Porzana porzana*
11.	Black Guinea Fowl	*Agelastes niger*
12.	African Goshawk	*Accipiter tachiro*
13.	Macroselides	*Macroscelides proboscideus*
14.	Pallid Harrier	*Circus macrourus*
15.	Dark Morph	*Hieraaetus morphnoides*
16.	Lizard buzzard	*Kaupifalco monogrammicus*
17.	Lesser Kestrel	*Falco naumanni*
18	Lanner Falcon	*Falco biarmicus*
19.	Congo serpent Eagle	*Dryotriorchis spectabilis*
20.	Yellow billed	*Coccyzu samericanus*
21.	Grey Kestrel	*Falco ardosiaceus*

Source: Field Survey, 2022

Table 3: Environmental and Man-made factor contributing to Birds Population and Abundance of Bird Specie at Akure Airport

S/N	Items	SA (%)	A (%)	U (%)	D (%)	SD (%)
1.	Man-made factor contribute to the population and abundance of bird species	6 (60.0)	2 (20.0)	-	2 (20.0)	-
2.	Construction of new infrastructure in airport will attract birds which will increase the population and abundance of bird species	8 (80.0)	2 (20.0)			-
3.	Sizes and number of birds are factors that cause bird population	2 (20.0)	8 (80.0)	-	-	-
4..	Bird populations is high mainly in daylight hours	5 (50.0)	4 (40.0)	1 (10.0)	-	-
5.	Noises of airplanes coming and going prevent birds from airport	1 (10.0)	6 (60.0)	-	3 (30.0)	-
Chi Square	X^2 3.200					
	df 5					
	p <.05					

Source: (Field Survey, 2022)

Table 4: Measures for Curbing Birds Population and Abundance of Bird Species in Akure Airport, Oba Ile.

S/N	Items	SA (%)	A (%)	U (%)	D (%)	SD (%)
1.	Birds can be controlled by removing seed-bearing plants to eliminate food sources for the birds	4 (40.0)	4 (40.0)	-	2 (20.0)	-
2.	Maintaining the necessary grass level at the airport will help in controlling bird population	2 (20.0)	8 (80.0)	-	-	-
3.	Certification to the airport should require a wildlife	3	7	-	-	-

S/N		SA (%)	A (%)	U (%)	D (%)	SD (%)
	hazard assessment and wildlife hazard management plan	(30.0)	(70.0)			
4.	New infrastructure around airport should be managed and controlled by aviation	2 (20.0)	8 (80.0)	-	-	-
5.	All hazardous sources that affect aircraft should be documented	4 (40.0)	6 (60.0)	-	-	-
6.	Relevant provision should be made to mitigate risk	7 (70.0)	3 (30.0)	-	-	-
Chi square	X^2.800 df **5** p **<.05**					

Source: (Field Survey, 2022)

Table 5. Effect of bird populations and abundance of bird species on Aircraft.

S/N	Items	SA (%)	A (%)	U (%)	D (%)	SD (%)
1.	Bird population inflict damage to the engines	4 (40.0)	6 (60.0)	-	-	-
2.	During landing or take off, bird can cause damage to extended landing gear	5 (50.0)	5 (50.0)	-	-	-
3.	Birds can hit any part of an airplane	5 (50.0)	5 (50.0)	-	-	-
Chi square	$X^2$3.000 df **4** P **<.05**					

Source: (Field Survey, 2022)

IV.   CONCLUSION AND RECOMMENDATIONS

The study evaluates the effect of bird population and abundance of bird species at Akure Airport Oba-Ile, Akure, Ondo State, Nigeria. Based on the findings of the study, it was concluded that majority of the respondents strongly agreed that bird habitation around the airport is as a result of environmental and man-made factor.

Furthermore, the study concluded that majority of the respondents strongly agree that habitat around the airport, construction of new infrastructure in airport, availability of potholes and dump site around the runway were some of the environmental factors and man-made factors that contribute to bird population. It was also concluded that bird population and abundance of bird species has influence on aircraft. However, the study suggests that good management and control activities of bird within the airport should be controlled so as to avoid the effect of environmental factor and man-made factor in aircraft at the airport.

Based on the findings of the study the following recommendation were made

1.   Federal Ministry of Aviation (FMA) should collaborate with parastatal under its supervision to create the much-needed synergy to promote safety through technological adoption and rigorous awareness campaign in order to reduce or effectively manage the menace of bird populations and abundance of bird species at the airport.

2.   Disposal of garbage by the catering services around the airport should be well managed to discourage scavenging birds from dumps so as to reduce bird population and abundance of bird species.

3.   There should be Bird Population Avoidance Radar' equipment that will alert the control tower which will in turn alert the pilot of the presence of birds along his way be installed in major in airports.

4.   There should be efficiency of Wildlife Hazard Control unit at the airport to help repel bird population and abundance of bird species around the ports.

5.   Farming activities around the airport should be kept away so as to avoid using the airport environment as feeding place for birds.

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