

NATURE TOURISM POTENTIAL OF BITUMEN BELT OF ODE-IRELE, ONDO STATE, NIGERIA

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ABSTRACT

Wildlife tourism is fast becoming an economic asset that is providing the much needed incentive for poor nations to conserve their rich wildlife heritage and its habitat. This study therefore, focussed on the tourism potential of terrestrial animal species in Ode-Irele bitumen belt of Ondo State, Nigeria. Study was conducted in bitumen belt of Ondo State for three years (2008-2010). Line transect methods were used to enumerate wild animals. Animal diversity on experimental sites in wet and dry seasons were evaluated in Farm Fallow, High Forest (islands), Arable Farmland (edge), Riparian Habitat, Plantation Farmland and Urban Arboreta. Data were analysed using descriptive statistics and t-test at. The animal species occurring in each vegetation type were used to determine abundance and richness of bird species. These were used to assess the number and distribution of native animal species that occur in at least 50% of the habitats sampled. Animals that occur in 100% of the habitats sampled as well as animals of special concern based on their aesthetic value to support tourism in the study area were also assessed. Abundance of animal species in the wet season, 336.67 ± 20.14 , was significantly higher than that of the dry season, 236.67 ± 158.70 . Richness of bird species in the wet season, 153.33 ± 30.11 , was significantly higher than that of the dry season, 123.33 ± 42.74 . 45 animal species belonging to 11 families are native to the bitumen belt, out of which 19 species were found to overlap in at least 50% of the habitats sampled. This represents 42.2% spread over the study area. One animal, *Achartina marginata* was found to occur in 100% of the habitats sampled. The high species abundance of animals, with average percentage species overlap in the habitats of concern is a pointer to the great need to conserve wildlife to enhance the tourism potential of the study area.

Keywords: Abundance, Richness, Tourism, Overlap, Bitumen belt

INTRODUCTION

There are many ethical and philosophical positions on nature and our relationship with it. Some positions, for example, would argue that nature has

value beyond any that humans hold for it. Others would argue that nature is only important to the extent that it can be used for human activity. Therefore, humans relate to nature in a variety of ways. One

commonly used categorisation of biodiversity values to human beings breaks down biodiversity into ecosystem services, biological resources and social benefits, (Furze *et al*, 1996).

Many cultural groups view themselves as an integral part of the natural world and show respect for other living organisms. This respect could be ascribed to the need to conserve biodiversity for recreational activities. Popular activities such as gardening, caring for aquariums and collecting wild fruits and vegetables are all strongly dependent on biodiversity. Philosophically, it could be argued that biodiversity has intrinsic aesthetic and spiritual value to mankind *in and of itself* (Diamond, 1989).

The conservation of biological diversity is a global priority, with strategic conservation plans that are designed to engage public policy and concerns affecting local, regional and global communities and scales of ecosystems and cultures. Conserving biodiversity and action plans identify ways of sustaining human well-being and global economics, including natural capital, market capital, and ecosystem services (Luck *et al*, 2003). One of the strategies of biodiversity conservation involves placing a monetary value on biodiversity through biodiversity banking. Other approaches are the creation of gene banks, as well as the creation of gene banks that have the intention of raising the indigenous species for reintroduction to the ecosystem (Holding-Anyonge and

Roshetko, 2003). Hence, the need to assess terrestrial animal species of the study area and their potentials for tourism development.

METHODOLOGY

Study Area

The study area is Ode-Irele in Ondo State of Nigeria. It is located in the Southern fringe of the State between Longitudes 04° 47' E to 05° 10' E, and Latitudes 06° 16' N to 06° 40' N. The area falls within the Tropical Rainforest ecological zone. Ode-Irele forest area was selected because a Bitumen Mining Company, Jerex Energy, Canada, carried out a preliminary geological mapping and investigation along the Bitumen belt between October 1995 and 1998. The activities of this energy company confirmed the presence of Bitumen seepage in Ode-Irele forest area. This occasioned the setting up of Bitumen Project Implementation Committee in August, 2000 and eventual flag off by President Olusegun Obasanjo.

Assessment of Habitat Use by Animals Animal Survey

The following methods were used to assess the relative abundance of animals:

A. Unstructured Interviews

Presence or absence and an evaluation of relative abundance of fauna resources was first established using hunters' unstructured interviews (in-depth interview or ethnographic interviews as described by Taylor and Bodgen Cited in Minichiello *et al*, 1990:93).

Hunter Success Data

Interviews with hunters also provided further information on the wildlife diversity, abundance and use in the areas (plates 1, 2 and 3).

Biodiversity Assessment Process

The ecosystem-level indicators as described by (Olson, 2001) were used to assess the animal species that are found in all the habitats sampled, occurrence of rare species, and habitat specificity of species. These were used to assess the number and distribution of native animal species and animals that occur in at least 50% of the habitats sampled. Animals that occur in 100% of the habitats sampled as well as animals of special concern of the study area which are of aesthetic value to support tourism were also assessed.

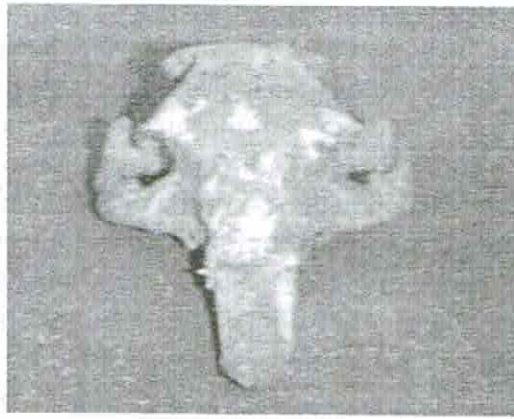


Plate2. Head of Wild Pig Found During Hunters' Ethnographic Interview in the Bitumen Belt of Ondo State



Plate 1. Head of Duiker Found During Hunters' Ethnographic Interview in Ondo State Bitumen Belt



Plate3. Horn of Waterbuck Found During Hunters' Ethnographic Interview in Ondo State Bitumen Belt Population Indices

Indirect estimate of animal abundance through population indices in the habitats was used to enumerate terrestrial wildlife, because, direct observation of animal population is not suitable for West and Central African rain forests. Indices to population trends are easier to obtain and normally sufficient for management and research purposes (Lewis, 1970).

This involved a survey/census of mammals, reptiles and amphibians along transects of 50x10 meters in the study areas. Direct count method, using a pair of binoculars, was employed for the census of the animals which readily offered themselves for observation. The presence of some of the animals was ascertained by probing such humid habitat like logs (plate 4), heaps of dead decaying leaves, forest undergrowths, ponds and burrows (plate 4). Thus, all sighted, captured or dislodged animals were identified, often on the spot, to possible taxonomic levels using field guides and keys. The indirect method which makes use of evidence of animal's presence was used for species which do not offer themselves readily for observation. Signs of animal presence such as burrows, faecal pellets (plate 5), hairs, foot prints or tracks plate, sloughed skin, devoured food (cassava, yam, oil palm nuts, etc) as well as vocalization, skeleton/carcass and trampled grass were of immense use in the course of the investigation. All the identification for animal species followed the mammals of Nigeria (Happold, 1987).



Plate 4. Downed Log and Burrow Found in Ondo State Bitumen Belt



Plate 5. Faecal Droppings of Maxwell's Duiker, *Cephalophus maxwelli* Found in Ondo State Bitumen Belt

RESULTS AND DISCUSSION

Relative Abundance of Animals in Ondo State Bitumen Belt

Relative abundance of animals in the Bitumen belt is shown in Table 1. The results shows that the number of individual animals, i.e., abundance, and number of species, i.e., richness censured in the various habitats significantly differ

from one another ($P < 0.05$). The effect of seasonal variation on number of individual animals and number of different species is also significant ($P < 0.05$). Interaction of the habitat and seasons, however, had no significant effect on these two parameters ($P > 0.05$) (Table 2).

The mean numbers of individual animals in each transect ranges between

six and 26. High Forest has the highest total number of animals, 26, followed by Riparian Habitat, 25, Farm Fallow, 13. While the duo of Arable Farmland and Plantation Farmland has eight individuals each, with Urban Arboreta recording the least species abundance. Wet season has mean number of 20 as against dry season, which are 16.

Table 1. Relative Abundance of Animals in Ondo State Bitumen Belt

Variable	AF		FF		RH		HF		PF		UA	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Abundance of Animals/500m ²	6	10	12	14	25	26	17	35	6	9	5	7
Richness of Animal Species/500m ²	8	8	7	9	8	8	7	9	4	7	3	5
Abundance/ha	Mean				SD							
	Dry		Wet		Dry		Wet					
	236.67		336.67		158.70		223.94					
	123.33		153.33		42.74		30.11					

Source: Field Survey, 2009

AF= Arable Farmland, FF= Farm Fallow, RH= Riparian Habitat, HF= High Forest, PF= Plantation Forest, UA= Urban Arboreta

Table 2: Relative Abundance of Animals and Richness As Affected By Habitat and Seasonal Changes on Baseline Site

HO: The Relative Abundance and Richness of Animals Are Not Affected By Seasonal Changes

VARIABLE	EFFECT	df Effect	ms Effect	df Error	ms Error	F	P Level
Abundance of animals	Habitat	5*	298.72*	12.91*	12.91*	23.14*	0.00*
	seasons	1*	102.08*	12.91*	12.91*	7.91*	0.01*
	Interaction	5	17.03	12.91	12.91	1.32	0.28
Richness of animal species	Habitat	5*	15.80*	40*	1.80*	8.80*	0.000*
	season	1*	17.52*	40*	1.80*	9.76*	0.003*
	interaction	5	1.41	40	1.80	0.78	0.51

Distribution of Native Animal Species of Ondo State Bitumen Belt

45 animal species belonging to 11 families are native to the bitumen belt (Table 3). Out of these, 20 species are found in FF, 20 in AF, 24 in RH, 19 in HF, 20 in PF, and 12 in UA. Some of the

native animals are shown in plates 1 to 15. Out of the 45 animal species, 19 species were found to occur in at least 50% of the habitats sampled. One animal, *Achartina marginata* was found to occur in 100% of the habitats sampled.

Table 3. Native Animal Species in Ondo State Bitumen Belt

S/No	Common Name	Scientific Name	Order	Habitats where found
1	Ground squirrel	<i>Xerups erythropus</i>	Rodentia	AF,UA
2	Porcupine	<i>Artheriurus africanus</i>	Rodentia	FF,AF,HF,PF
3	Cane rat	<i>Thryonomys swinderianus</i>	Rodentia	FF,AF,PF,UA
4	Stripped grass mouse	<i>Xerups erythropus</i>	..	AF,PF,UA
	Rusty bellied rat	<i>Xerups erythropus</i>	..	AF
5	Black rat	<i>Rattus rattus</i>	Rodentia	FF,AF,PF,UA
6	Flying squirrel	<i>Anomalorus beecrofti</i>	..	FF,HF
7	G.F. Squirrel	<i>Potoxerus strangeri</i>	..	FF,RH,HF,PF
8	O. H. Squirrel	<i>Funnusciurus anchrythrus</i>	..	FF,RH,HF,PF
9	Emin,s giant rat	<i>Cricetomys emini</i>	..	FF
10	Giant rat	<i>Cricetomys gambianus</i>	..	FF,AF,HF,PF,UA
11	Climbing mouse	<i>Dendromys mystacalis</i>	..	FF,AF,PF
12	Tree pangolin	<i>Manis tricuspis</i>	Pholidota	HF
13	Wild cat	<i>Xerups erythropus</i>	Carnivora	AF
14	Cusimanse mongoose	<i>Crossarchus obscures</i>	..	FF,AF
15	Civet	<i>Civettictis civetta</i>	..	FF,AF,PF
17	Forest genet	<i>Geneta poensis</i>	..	FF,AF
18	Tree hyrax	<i>Dendrohyrax dorsalis</i>	Hyracoidea	RH,HF
19	Wild pig	<i>Potamochoerus aethiopicus</i>	Artiodactyla	RH,HF
20	Bush buck	<i>Tragelaphus niger</i>	Artiodactyla	AF,RH,HF
21	Maxwel duiker	<i>Cephalophus maxwelli</i>	..	RH,HF
22	Black duiker	<i>Cephalophus niger</i>	..	FF,AF,RH,HF,PF

S/No	Common Name	Scientific Name	Order	Habitats where found
23	R. F. Duiker	<i>Cephalophus rufilatus</i>	..	RH
24	Water buck	<i>Kobus ellipsiprymmus</i>	..	RH
25	Eland	<i>Taurotragus sp.</i>	..	PF
25	Buffalo	<i>Synceerus cafer</i>	..	RH
25	Shrew	<i>Crocidura dolichura</i>	Insectivora	FF,AF
26	Dwarf galago	<i>Galagoides demidovii</i>	Primata	FF,UA
27	W. T. Guenon	<i>Cercopithecus erythrogaster</i>	..	RH
28	Swamp monkey	<i>C. nigroviridis</i>	..	RH
29	Anubis baboon	<i>Papio anubis</i>	..	RH
30	Potto	<i>Peridictus potto</i>	..	FF
31	Dwarf guenon	<i>C. talapoin</i>	..	RH,PF
32	W. N. Guenon	<i>C. petaurista</i>	..	RH
33	Green mamba	<i>Dendroaspis vindis</i>	Squamata	FF
34	Black mamba	<i>Dendroaspis polylepis</i>	..	FF,AF,PF,UA
35	Viper	<i>Bitis gabonica</i>	..	FF,PF,UA
36	Python	<i>Python sp.</i>	..	FF,RH,HF,PF
37	Royal python	<i>Python regius</i>	..	FF,AF,HF,PF
38	African Python	<i>Python sebae</i>	..	RH
39	Cobra	<i>Naja nigricollis</i>	..	AF,PF,UA
40	Alligator	<i>Alligator sp.</i>	Crocodila	RH, HF
41	Tortoise	<i>Testudo sp.</i>	Testudina	RH,HF
42	Turtle	<i>Kinosternon subrumum</i>	..	RH
43	Giant land snail	<i>Achachartina marginata</i>	Molusca	FF,AF,HF; RH,PF,UA
44	Medium land snail	<i>Achatina achatina</i>	..	AF,RH,PF,UA
45	Small land snail	<i>Achatina sp</i>	..	AF,FF,RH,PF,UA

Source: Field Survey, 2009

Animals of Special Concern in Ondo State Bitumen Belt

Ten animals are rare, threatened or endangered in their range in the bitumen

belt (tables 4). The conservation statuses of the animals are shown in plates 4 to 18.

Table 4. Rare, Threatened and Endangered Species of Animals in Ondo State Bitumen Belt

Family	Species	Status	Threat
Pholidota	<i>Manis tricuspis</i>	Endangered	Destruction of primary habitat
Artiodactyla	<i>Taurotragus sp.</i>	..	Destruction of primary habitat
Artiodactyla	<i>Kobus ellipsiprymmus</i>	Threatened	Destruction of primary habitat
Primata	<i>Cercopithecus erythrogaster</i>	..	Destruction of primary habitat
Mollusca	<i>Achachartina sp</i>	Threatened	Destruction of primary habitat
Insectivora	<i>Crocidura dolichura</i>	Endangered	Destruction of primary habitat
Rodentia	<i>Dendromys mystacalis</i>	..	Destruction of primary habitat
Testudina	<i>Testudo sp.</i>	Threatened	Collection and sale, pollution of freshwater
..	<i>Kinostermon subrurum</i>	..	Food and trade, draining of wetland
Crocodila	<i>Alligator sp</i>		Loss of wetland habitat

Source: Field Survey, 2009

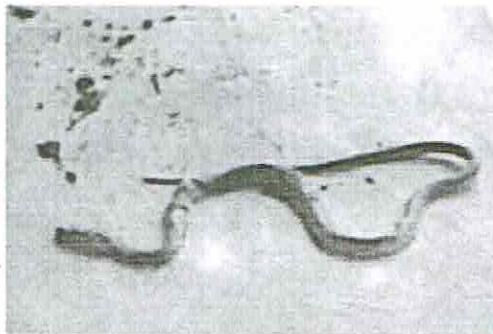


Plate 4. Black Mamba, *Dendroaspis polylepis* Found in Ondo State Bitumen Belt
 Conservation Status- least Concern (IUCN2.3)

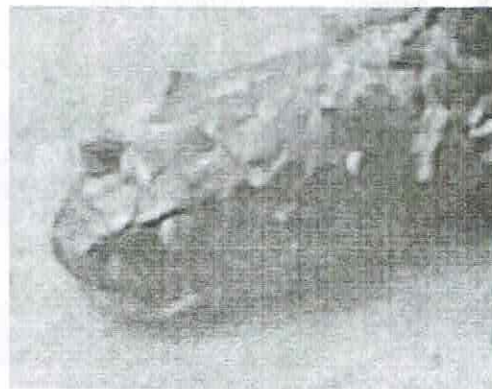


Plate 5. Head of Black Mamba, *Dendroaspis sp.* Found in Ondo State Bitumen Belt

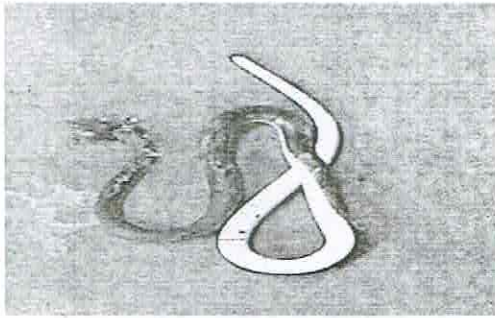


Plate 6. Green Mamba, *Dendroaspis viridis* Found in Ondo State Bitumen Belt
Conservation Status- least Concern (IUCN 3.1)



Plate 8. Gaboon Viper, *Bitis gabonica* Found in Ondo State Bitumen Belt
Conservation Status- Vulnerable (IUCN 3.1)

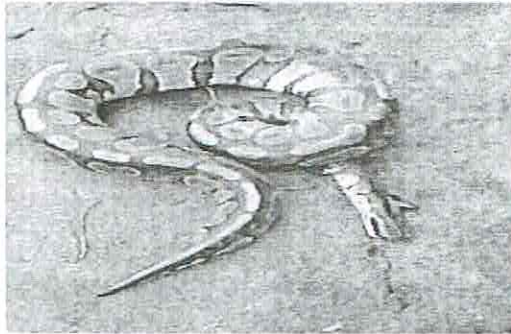


Plate 6. Royal Python, *Python regius* Found in Ondo State Bitumen Belt
Conservation Status- Not Evaluated (CITES appendix ii)

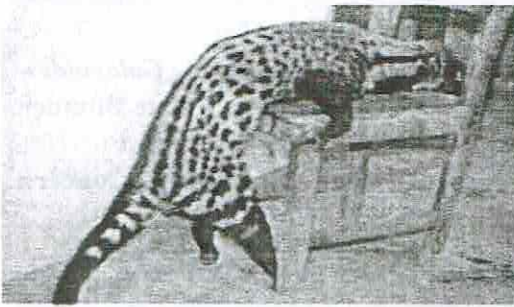


Plate 9. Side View of African Civet, *Civettictis civetta* Found in Ondo State Bitumen Belt

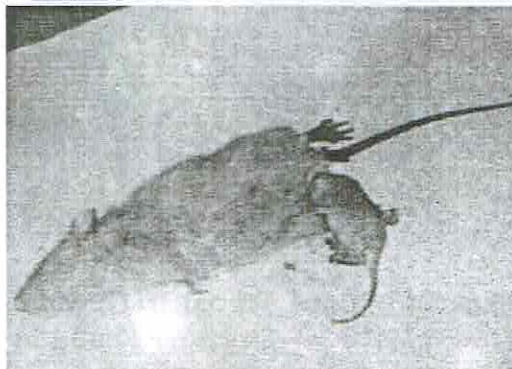


Plate 7. Grass Mouse, *Xerupsery thropus* With a Suckling Babe Found in Ondo State Bitumen Belt
Conservation Status- least Concern (IUCN 3.1)

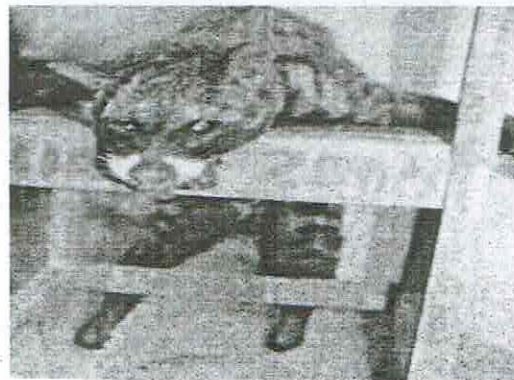
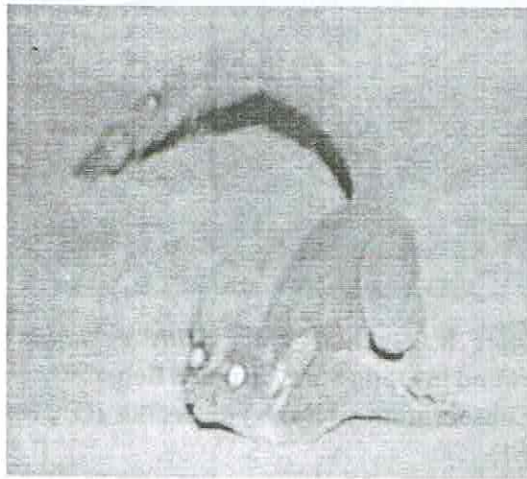


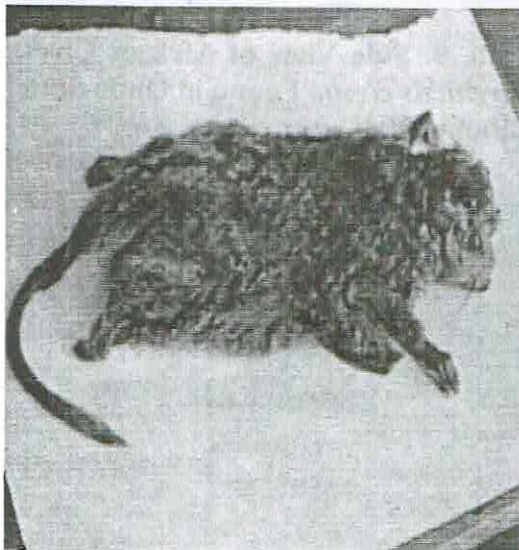
Plate 10. Front View of African Civet, *Civettictis civetta* Found in Ondo State Bitumen Belt
Conservation Status- least Concern (IUCN 3.1)



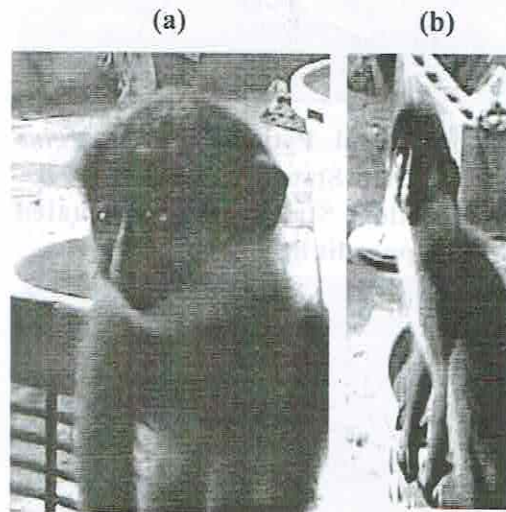
**Plate 11. Dwarf Galago, *Galagoides demidovii* Found in Ondo State Bitumen Belt
Conservation Status- least Concern (IUCN 3.1)**



**Plate 13. Baboon, *Papio Anubis* Found in Ondo State Bitumen Belt
Conservation Status- least Concern (IUCN 3.1)**



**Plate 12. Flying Squirrel, *Anomalurus beecroftii* Found in Ondo State Bitumen Belt
Conservation Status-least Concern (IUCN 3.1)**



**Plate 14. White Throated Guenon, *Cercopithecus erythrogaster* Found in Ondo State Bitumen Belt
Conservation Status- Endangered**

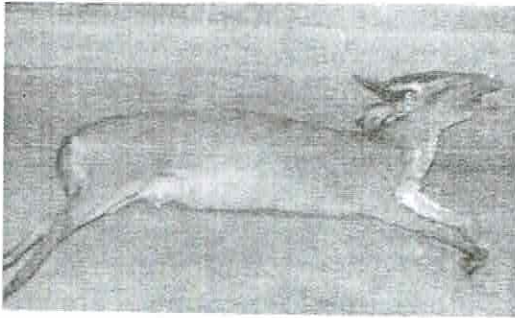


Plate 15. Maxwell's Duiker, *Cephalophus maxwelli* Found in Ondo State Bitumen Belt

Conservation Status- least Concern (IUCN 3.1)

DISCUSSION

A total of forty five (45) animal species, native to this region is a reflection of the rich biological diversity that abounds in this ecological zone. Out of these, 20 species are found in FF, 20 in AF, 24 in RH, 19 in HF, 20 in PF, and 12 in UA. This agreed with IUCN, 2008 that biodiversity is consistently richer in the tropics and in other localized regions. Flora and fauna diversity depends on climate, altitude, soils and the presence of other species. Ten of the animals are rare, threatened or endangered in their range in the bitumen belt.

Wildlife has been an essential part of human culture for at least 12,000 years. Prehistoric occupants hunted wild animals for food, and used the by-products for clothing, shelter, and tools.

The variation of bird species within each ecosystem, biome, could enhance wildlife tourism so as to generate

substantial income for Irele Local government, Ondo state and Nigeria as a whole. In modern times, game has become a major recreational, aesthetic and economic asset, while a large portion of the world population (more than 85%) especially in developing countries depend on traditional systems of medicine for treatment of a variety of diseases. This has been attributed to inaccessibility of modern drugs to many people in the rural areas, and the economic factor (WHO, 1993; Hassan *et al*, 2006).

Bush meat as an important source of human benefits may be harvested through informal and illegal activities, particularly via non-aboriginal hunting pressure, (Caspary, 1999).

Apart from wildlife based tourisms, trophy hunting from the body parts of the animals could contribute millions to the national economy. This agreed with the reports of FONAFIFO, 2000; Alexander *et al*, 2002; Landell and Porras, 2002 that biodiversity and the ecosystem goods and services it provides are considered to be fundamental to healthy economic systems.

Also, local people in the areas where animals are found could take concessions so as to take tourists around. This will be a huge source of income and employment to the concessionaires. This alone will generate employment for many jobless people.

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