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Food and Foraging Ecology of African Thrush (*Tuedus pellios*) The Federal Polytechnic Ilaro South Western, Nigeria

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Abstract

Feeding is an indispensable activity in the life of birds. It is crucial for their survival but the demands of food acquisition impose significant challenges to both the physiology and behavior of birds. Thus, this study on the feeding ecology of African Thrush is imperative for understanding the species adaptation to environments and also a crucial factor to be considered while examining their economic status. This research study investigated the diet and foraging ecology of the African Thrush (*Turdus pelios*) in Federal Polytechnic Ilaro Ogun state, Nigeria. Direct field observation method was used to collect data for 12 months on the diet and foraging ecology of the bird species. The study area was divided into three compartments according to land use types, (developed area, Residential area, and Fallow/farmlands). The results show that the African Thrush consumed a variety of insects and fruits of some plant species. The insects constituted 45.3% of the diets while earthworms 9.8%, millipedes 9.3% and plant resources made up 38.2%. The major diet resources were Exopropacris spp 8.60%, Ephyriodribus afrocidentalis 6.80%, Kyphopyge granulosa 4.70% and Azadirachta *indica* 9.80%. African Thrush utilized the three compartments within the study area but with the percentage of utilization of habitat type highest in the Fallow/farmland area (45 %), Residential compartment (30%) and Developed compartment (25 %). The diversity index of variety insects consumed by Turdus pellios for both season indicates that dry season 2.783 was higher than wet season 2.358

Keywords: African Thrush, Diet, Foraging Ecology, Conservation

INTRODUCTION

The African thrush or West African thrush (*Turdus pelios*) is a passerine bird in the thrush family Turdidae. It is common in well-wooded areas over much of the western part of sub-Saharan Africa, it was once considered to be conspecific with the olive thrush but that species has now been split further. Populations are resident (non-migratory) (del Hoyo, et al, 1994) The African Thrush has dark olive-grey upperparts. The underparts show a whitish evenly brown-streaked side throat, the breast is greyish brown and the flanks are pale buff-orange with this colour not extending on to the lower breast, the belly and vent are white. It has a yellow-orange bill.[3] It weighs 46–78g and measures 21–23 cm in length (Ferguson-Lees and Christie, 2001)

The African thrush is normally encountered either singly or in pairs and is rather shy and retiring preferring to remain in cover but will come out and gather at fruiting trees. Usually forages in the ground, flicking leaf litter and searching through where undisturbed or habituated to people will feed out in the open in a similar fashion to the song thrush in Europe, and it is also reported to crack open snails on an anvil stone like a song thrush. . Breeding is recorded in all months but breeding activity peaks in the wet season, which is March to September or October in West Africa, April–July in Ethiopia and November to March in the rest of its range. The nest is cup shaped and rather bulky and is constructed using plant fibers and mud lined with fine grasses, leaves and roots. This nest is placed on a horizontal branch, in a tree fork or among vines, usually at a height lower than 10m from the ground. It may re-use the abandoned nest of another species. The females is responsible for incubating the normal clutch of 2-3 eggs, although both sexes feed the young.

Taxonomy complex and not fully understood. Subspecies groups based largely on plumage and distribution. races *chiguancoides*, *nigrilorum*, *poensis* and *centralis* have in the past been treated as races of *T. olivaceus*, and the first two along with *saturates* sometimes placed with *T. libonyana*; *bocagei*, *graueri* a have also been placed with *T. olivaceus*. Situation still not adequately resolved (Sinclair and Davidson 2006). Turdus pelio is not globally threatened. Widespread and fairly common to common. Abundant on Bioko; fairly common in Sudan; very common in Itombwe Mts, in DRCongo including Nigeria. It has a wide range in Nigeria, this is importation (CITES 2014).

Feeding is an indispensable activity in the life of birds. It is crucial for their survival but the demands of food acquisition impose significant challenges to both the physiology and behavior of birds (Chen and Hsieh 2002). Thus, the study of feeding ecology is an imperative for understanding the species adaptation to environments and also a crucial factor to be considered while examining their economic status. The diet and feeding ecology of *Turdus pelios* have been studied in Nigeria hence this research aims at providing the addtional information on the food and feeding ecology that will assist other workers interested in the management of the bird

MATERIALS AND METHOD

Study Area

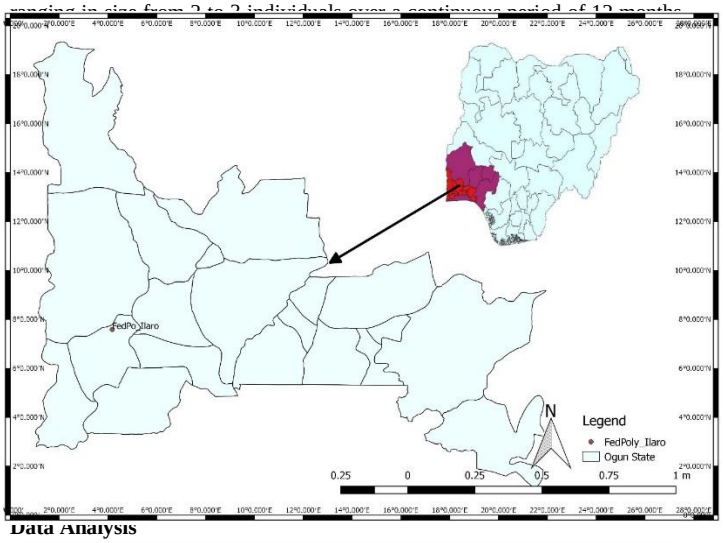
It was opened to students on November 15, 1979 on a temporary site provided by its host community, the ancient town of Ilaro, Ogun State. The first site of the Polytechnic was the premises of the Anglican Grammar School, Ilaro about half a kilometer from Ilaro township junction. The Polytechnic was on this temporary site till 1983 when it moved to its permanent site along Ilaro/Oja-Odan Road, about three kilometers from Ilaro Township. It is also about 60 kilometers from Idiroko, a Nigerian Boarder town with Benin Republic. Ilaro town itself is an ancient town, land locked between Lagos and Abeokuta, the capital of Ogun State. The Polytechnic occupies a total of 898.116 hectares land area on its permanent site. Access to Ilaro and indeed the Polytechnic can be gained from Abeokuta through Abeokuta-Lagos Road via Papalanto [22 km] or through Abeokuta-Owode road via Ibese [10km], from Lagos through Sango-Ota-Idiroko Road via Owode [15km] and from Sagamu through Sagamu-Obele Road via Papalanto. The location of the Federal Polytechnic, Ilaro makes for easy access of road traffic It has a coordinate of 6.8872° N, 2.9876° E. The rainy season in the area occurs from March till November while the dry season is from December until February. Annual rainfall ranges from 1700 to 2000 mm. The annual mean temperature in the area is 26 °C. Soils are predominantly ferruginous tropical, typical of the variety found in intensively weathered areas of basement complex formations in the rainforest zone of south-western Nigeria (Mengistu, and Salami, 2007) The soils are well-drained, mature, red, stony and gravelly in upper parts of the sequence. The texture of topsoil in the area is mainly sandy loam. The school compound is design to retain indeginous tree species and some exotic and ornamental whre also planted making it eco-friendly (Isichei, 1995). The natural vegetation of the area is tropical rainforest characterized by emergent with multiple canopies and lianas. Some of the most commonly found trees in the area include *Melicia excelsa, Afzelia bipindensis, Brachystegia Nigeria, Lovoa trichiliodes, Terminalia ivorensis, Terminalia superba,* and *Triplochiton scleroxylon*. However, the natural vegetation of the area except for the areas devoted to farmland has now been reduced to secondary regrowth forest thickets and grassland (Keay, 1989).

Figure 1, Map of the Study Area

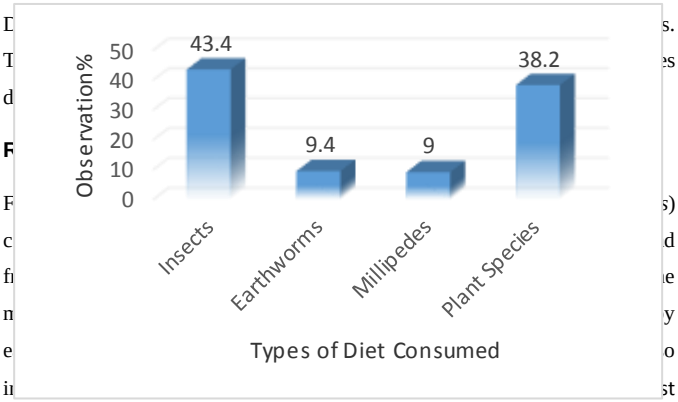
Source: Field survey

Data Collection

The study area was divided into three compartments according to land use types: mature forest, logged area and farmlands. The data collection on the diet and feeding ecology of African harrier-hawk was made on 36 pairs ranging in size from 2 to 3 individuals over a continuous period of 12 months



Data Analysis



consumed insect (8.60%) and *Azadirachta indica (9.80%)* belonging to Meliaceae family is the most plant resources consumed by Turdus pellios in the study area (Figure 3).The result of the habitat utilization indicates that Turdus pellios utilized Farm/fallow compartment (45%) and this was followed by residential area 30% (Figure 4). The result of the Shannon diversity index of the insects consumed indicates that it was higher in the dry season 2.783 than wet season 2.538. SHE analysis and Multiple Generalized Model (t dependent and n independent) of the Insects Species Consumed Turdus pelios in the Study Area was analyzed by Past Model (Figure 5 and 6). Checklist of insects, earthworms, millipedes and plant resources consumed by Turdus pellios is shown in Table 2, 3 and 4)

Figure 4, Percentage of Utilization of Habitat type in the Study Area

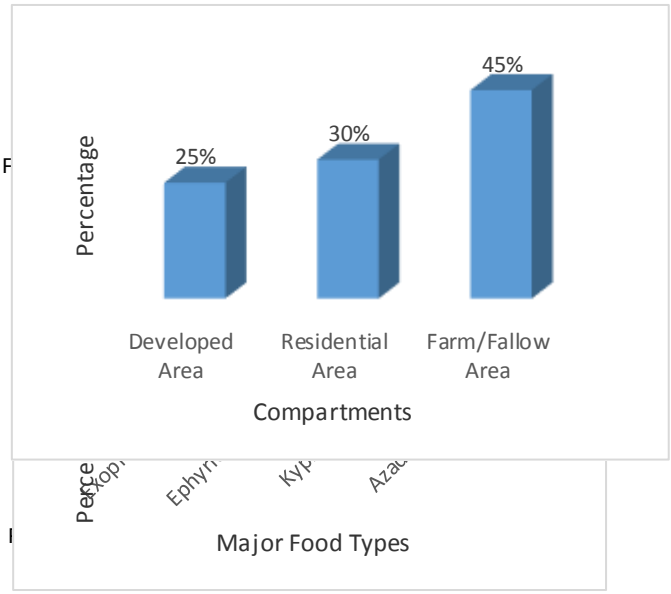


Figure 5: SHE Analysis of Insects Species Diversity consumed by *Turdus pelios* in the Study Area

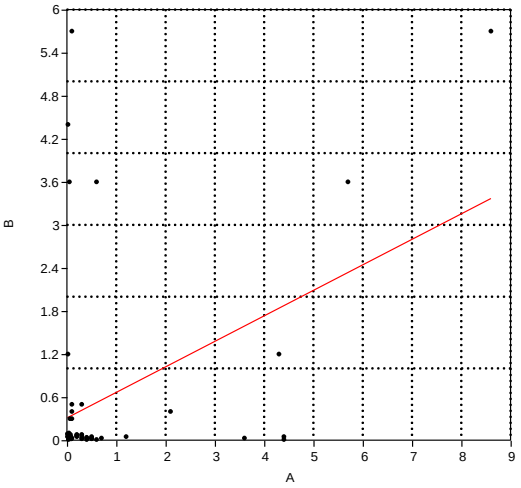


Table 1 Diversity of Insects Consumed in the Study

Area during Dry Season

Diversity index	Dry season	Lower	Upper	Wet Season	Lower	Upper
Taxa_S	58	17	26	58	16	24
Individuals	31	31	31	25	25	25
Dominance_D	0.09856	0.02492	0.07794	0.1138	0.02415	0.0778
Shannon_H	2.783	1.957	2.488	2.538	2.028	2.582
Evenness_e^H/S	0.2786	0.4006	0.4829	0.2181	0.4684	0.5518
Brillouin	1.114	1.329	1.693	1.075	1.364	1.714
Menhinick	8.801	2.58	3.945	10.03	2.767	4.15
Margalef	16.6	4.659	7.28	17.71	4.66	7.145
Equitability_J	0.6853	0.6852	0.7694	0.625	0.7315	0.8126

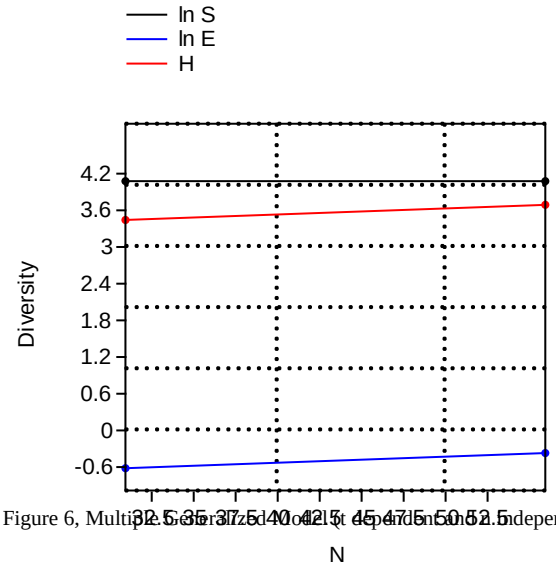


Figure 6, Multiple Generalized Model (Dependent) of the Insects Species Consumed Turdus pelios in the Study Area

Table 2 Checklist of Insect Species and the Parts consumed by *Turdus pelios* in the Study Area

Name of Insects	Family	Order	Parts Eaten	Observations %
Exopropacris spp.	Acrididae	Orthoptera	Whole	8.6
Glypsus conspicus	Acrididae	Orthoptera	Whole	0.3
Lygaeus rivularis	Acrididae	Orthoptera	Whole	0.2
Eumennes maxillosus	Acrididae	Orthoptera	Whole	0.6

Ropalidia cincta	Acrididae	Orthoptera	Whole	0.5
Acridium perigrinum	Acrididae	Orthoptera	Whole	0.4
Cyrtacanthacris aeruginosa unicolor	Acrididae	Orthoptera	Whole	0.6
Catharsius sp	Acrididae	Orthoptera	Whole	4.3
Epistaurus succineus	Acrididae	Orthoptera	Whole	0.7
Exopropacris spp.	Acrididae	Orthoptera	Whole	4.4
Oedaleus nigeiensis	Acrididae	Orthoptera	Whole	0.2
Calepphorus compressicornis	Acrididae	Orthoptera	Whole	0.2
Pyrgamorpha vignaudi	Pyrgomorphidae	Orthoptera	Whole	0.1
Zonocerus vignaudi	Pyrgomorphidae	Orthoptera	Whole	0.2
Brachytypes membranceus	Gryllidae	Orthoptera	Whole	0.3
Melanogryllus morria	Gryllidae	Orthoptera	Whole	0.5
Gryllodes sigillarus	Gryllidae	Orthoptera	Whole	2.1
Dancus Chrysippus	Nymphalidae	Lepidoptera	Whole	0.06
Acreaea anacreaon	Nymphalidae	Lepidoptera	Whole	0.1
Pyrene sp	Nymphalidae	Lepidoptera	Whole	0.1
Coniesta sp.	Pieridae	Lepidoptera	Whole	0.1
Appias drusilla	Pieridae	Lepidoptera	Whole	0.3
Aphrissa statira	Pieridae	Lepidoptera	Whole	0.4
Kricogonia lyside	Pieridae	Lepidoptera	Whole	0.3
Ascia monuste	Pieridae	Lepidoptera	Whole	0.3
Phoebis argante	Pieridae	Lepidoptera	Whole	0.4
Eunica tatila	Pieridae	Lepidoptera	Whole	0.5
Euptoieta Claudia	Pieridae	Lepidoptera	Whole	0.5
Hypolimnas	Pieridae	Lepidoptera	Whole	0.03

hysius				
Mycelia antholia	Pierida	Lepidoptera	Whole	0.08
Archmestra teleboas	Nymphalidae	Lepidoptera	Whole	0.04
Atoconeura luxata	**Libellulidae**	Odonata	Whole	0.01
Atoconeura biordinata	**Libellulidae**	Odonata	Whole	0.03
Paragomphus sabicus	**Gomphidae**	Odonata	Whole	0.02
Ictinogomphus frassri	**Gomphidae**	Odonata	Whole	0.08
Notogomphus spinosus	**Gomphidae**	Odonata	Adult Winged	0.02
Macrotermes bellicosus	Termitidae	Isopterea	Adult Winged	0.1
Macrotermes natalensis	Termitidae	Isoptera	Adult Winged	0.09
Campinotus pinnilucnicus	Formicidae	Hymenoptera	Adult Winged	0.05
termopsidae	Formicidae	Hymenoptera	Adult Winged	4.4
Rhinotermitidae	Formicidae	Hymenoptera	Whole	0.05
Anapha venata	Notodontidae	Lepidoptera	Whole	0.08
Anaphe reticulata	Notodontidae	Lepidoptera	Whole	5.7
Anaphe infracta	Notodontidae	Lepidoptera	Adult Winged	0.02
Ugada sp	Cicadidae	Homoptera	Adult Winged	0.08
Glypsus conspicus	Pentatomidae	Hemiptera	Adult Winged	0.01
Lygaeus rivularis	Lygaeidae	Heteroptera	Adult Winged	0.03
Anopocnemis curvipes	Coreidae	Heteroptera	Adult Winged	0.04
Eumenes maxillosus	Eumenidae	Heteroptera	Adult Winged	3.6
Ropalodia cincta	Vespidae	Hymenoptera	Adult Winged	1.2
Phragmataecia fuscifusa	Cossidae	Lepidoptera	Adult Winged	0.03
Tanyterys pryeri	**Petalurdae**	Lepidoptera	Whole	0.05

Gymnopleurus sp.	Scarabaeidae	Coleoptera	Larva	0.06
Pachnoda marginata Dry	Scarabaeidae	Coleoptera	Larva	0.07
Anomala mixta F	Scarabaeidae	Coleoptera	Larva	0.03
Campinotus pinnilucnicus	Formicidae	Hymenoptera	Larva	0.05
termopsidae	Formicidae	Hymenoptera	Larva	0.07
Rhinotermitidae	Formicidae	Hymenoptera	Larva	0.05

Table 3 Earthworms and Millipedes Species Parts Consumed in the Study Area

Earthworms Species	Family	Order	Parts Eaten	Observations%
Ephyriodribus afrocidentalis	Almidae	Haplotoxida	Whole	0.7
Euabribus eugenriae	Almidae	Haplotoxida	Whole	6.8
Paropolytorentus abiensis	Eudrilidae	Haplotoxida	Whole	1.2
Libyolribus mericonsis	Acanthodrilidae	Opisthopora	Whole	1.1
Millipedes				**9.8**
Kyphopyge granulosa	Chelodesmidae			4.7
Kyphopyge sp.	Chelodesmidae	Polydesmida	parts	0.6
Kyphopyge sp.	Chelodesmidae	Polydesmida	parts	2.2
Cordyloporus aubryi	Chelodesmidae	Polydesmida	parts	0.7
Paracordyloporus dilatatus	Chelodesmidae	Polydesmida	parts	1.1
				9.3

Table 4 Plant Species and Parts Utilized by the Turdus pelios in the Study Area

Name of Plant Species	Family	Parts Eaten	Observations %
Ficus Thoniigii	Moraceae	Fruits	5.5
Azadirachta indica	Meliaceae	Fruits	9.8
Spondia mombin	Sapindaceae	Fruits	5.5
Dalium qiunense	Fabaceae	Fruits	4.4
Cathium hispicum	Apocynaceae	Seeds	2.1

Moriga Oliveri	Moringaceae	Flowers and Leaves	5.7
Maagnifera indica	Anacardiaceae	Fruits	4.4
Blighia Sapida	Sapindaceae	Fruits	0.8
			38.2

DISCUSSION

From a general dietary perspective, *Turdus pelios*, fed more on several varieties of insects, earthworm worms, millipedes and fruits leaves and flowers of of plant species. This is supported by various authors Greenlaw, 2007 who reported that *Turdus pelios consumed insects, earth worm and fruits of* ***Azadirachta indica*** *in South Africa.* Dorn, et al, (2011) reported that the insects formed the major bulk of *Turdus pelios* matter and numerically important ones were the Orthoptera, Coleoptera and Isoptera which accounted for almost two-thirds of the insects.Heinrich, and Morrison, (1990) reported that the proportion of arthropods in the diet probably increases during the breeding season because protein is particularly important for developing offspring. Foraging is crepuscular and fruit, especially that of the nim *Azadarichta indica*, as well as figs, papaya, berries and seeds, makes up most of the diet supplemented with invertebrates and the occasional small fish. Hockey, et al, (2000) reported that Turdus pelios consumed mainly locust, grasshoppers, termites, caterpillars, earthworms and butterflies, using a

It was observed that they switch their diet to take supplements from fruits and pods of some plant species which is not seasonal but depends on the available food resources. These observations occurred majorly during the wet seasons which is their breeding seasons. These findings is in agreement with Mckilligan, (2005) (2005) reported that Turdus *pelios* are general insectivorous, partly add fruits to their diet, which includes large insects especially locusts, grasshopper, especially earthworms, millipedes and fruits. Morse, 2005 reported that insect are important food resource for birds irrespective of their feeding mode. Klassing 2000 reported the diet of Turdus pelios and other insectivorous constituted about eighty percent of insects in their diet.

Onadeko, (2011) reported that the species of insect consumed often depend on the bird species and its stage in life.(Akinpelu and Oyedipe, (2004) reported that in terms of nutritional value, insect diet is adequate; because it is rich in easily digestible protein and fat although the digestibility of various parts largely depends on their chitin content Insect diet studied by collection of insectivorous passerines affirmed that birds exhibit preference for certain insect orders, as they fed primarily on insect Orders Hymenoptera, Coleoptera, Orthoptera and Diptera thereby generating 36%, 23%, 12% and 9% insect remains in their droppings respectively. Asokan (1998) found that Hymenopterans (dominated by ants) and Coleopterans (dominated by beetles were the principal food items of the Bee-eater *Merops oreintalis* in Nagapattinan District, India.

During the period of this study, it was observed that *Turdus pelios starts* their daily activities 6.15 hours in the morning and end their daily activities by 18.00 hours. During field encounters during Data collection, it was observed that most their feeding is the ground level, feeding on insects earthworms and millipedes. Sometimes they feed on variety of resources in one day which include insects and plant resources. Within intervals they make short flies and run on the ground. During the breeding period they fed more on insects than plants resources. These fed observations is supported by the following authors. Klasing 2000 reported that protein increased in insectivorous diet from 1.8% to 55% when breeding (Burton, 1998) reported that the presence of these groups of different species of insects for foraging was more frequent on the ground than in the air, he stressed further that this observation buttressed the fact that the birds were poor fliers. Black and Ross, (2005) reported that *Turdus pelios specializes* in using its legs to extract food from ground.

The percentage of utilization was higher in the farms/fallow areas compartments than the rest two compartments. This could be linked to preferred food availability or ecological requirements of these birds. These observations in agreement with work of Brown, and Amadon, (2012) who reported that the Turdus peliosfrequents a variety of landscapes throughout its range in central and southern Africa, including forest, woodland, and savannah. It is most often found at the top of tall trees fringing the larger rivers or in hilly country where there are deep ravines and steep hillsides.

CONCLUSION

The results of this study clearly indicate that *Turdus pelios* consumed insects, earthworms, millipedes and fruits, leaves and flowers of some plant species resources available to them in the study area. But, compared to fruits, the insects are consumed in larger proportions. The *Turdus pelios*, therefore, help in the suppression of insects and help to substain the capacity in the ecosystem and the *Turdus pelios* are useful species for farmers and keep to check on various harmful insects like grasshoppers, beetles, termites, and caterpillars etc., which are injurious. They also help in the dispersal of seeds. To the agricultural crops.

ACKNOWLEDGMENTS

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MATERIALS AND METHOD

Study Area

It was opened to students on November 15, 1979 on a temporary site provided by its host community, the ancient town of Ilaro, Ogun State. The first site of the Polytechnic was the premises of the Anglican Grammar School, Ilaro about half a kilometer from Ilaro township junction. The Polytechnic was on this temporary site till 1983 when it moved to its permanent site along Ilaro/Oja-Odan Road, about three kilometers from Ilaro Township. It is also about 60 kilometers from Idiroko, a Nigerian Boarder town with Benin Republic. Ilaro town itself is an ancient town, land locked between Lagos and Abeokuta, the capital of Ogun State. The Polytechnic occupies a total of 898.116 hectares land area on its permanent site. Access to Ilaro and indeed the Polytechnic can be gained from Abeokuta through Abeokuta-Lagos Road via Papalanto [22 km] or through Abeokuta-Owode road via Ibese [10km], from Lagos through Sango-Ota-Idiroko Road via Owode [15km] and from Sagamu through Sagamu-Obele Road via Papalanto. The location of the Federal Polytechnic, Ilaro makes for easy access of road traffic it has a coordinate of 6.8872° N, 2.9876° E. The rainy season in the area occurs from March till November while the dry season is from December until February. Annual rainfall ranges from 1700 to 2000 mm. The annual mean temperature in the area is 26 °C. Soils are predominantly ferruginous tropical, typical of the variety found in intensively weathered areas of basement complex formations in the rainforest zone of south-western Nigeria (Mengistu, and Salami, 2007) The soils are well-drained, mature, red, stony and gravelly in upper parts of the sequence. The texture of topsoil in the area is mainly sandy loam. The school compound is design to retain indeginous tree species and some exotic and ornamental whre also planted making it eco-friendly (Isichei, 1995). The natural vegetation of the area is

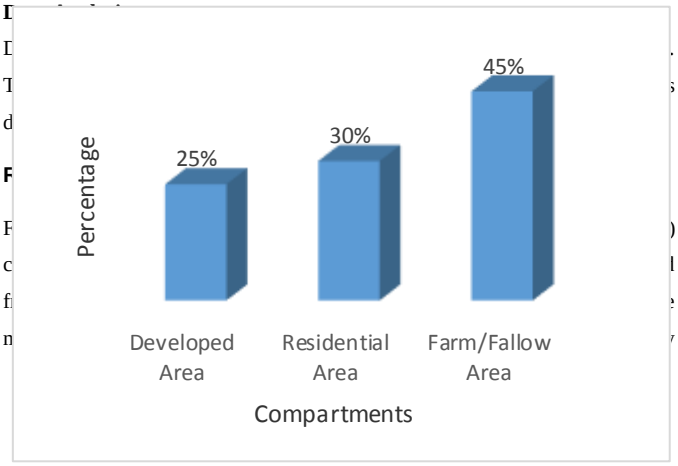
tropical rainforest characterized by emergent with multiple canopies and lianas. Some of the most commonly found trees in the area include *Melicia excelsa, Afzelia bipindensis, Brachystegia Nigeria, Lovoa trichiliodes, Terminalia ivorensis, Terminalia superba,* and *Triplochiton scleroxylon*. However, the natural vegetation of the area except for the areas devoted to farmland has now been reduced to secondary regrowth forest thickets and grassland (Keay, 1989).

Figure 1, Map of the Study Area

Source: Field survey

Data Collection

The study area was divided into three compartments according to land use types: mature forest, logged area and farmlands. The data collection on the diet and feeding ecology of African harrier-hawk was made on 36 pairs ranging in size from 2 to 3 individuals over a continuous period of 12 months (January-December 2016). The Direct Observation method as described by Akinpelu (2004) and Okosodo *et al.* (2016) was used for this study. Field observations with binocular (Bushnell 7×50), whenever found necessary, were made early in the morning or late in the evening when birds actively fed with least disturbance. Individual pairs were followed for periods varying from 2 to 5 hours during which it was usually possible to keep some birds in view at all times but rarely possible to see all members of the group together. During each visit, observations were recorded on the foraging habitat, type of feeding method employed, feeding session, number of birds, type of diets and association with other bird species. Seasonal changes in the feeding habits of the bird were studied. Pellets were not examined because of the height of the nests from the ground level and girth of the trees.



earthworms and millipedes in the study area. (Figure2). The result also indicates that Exopropacris spp.belonging to Acrididae family is the most consumed insect (8.60%) and *Azadirachta indica (9.80%)* belonging to Meliaceae family is the most plant resources consumed by Turdus pellios in the study area (Figure 3). The result of the habitat utilization indicates that Turdus pellios utilized Farm/fallow compartment (45%)

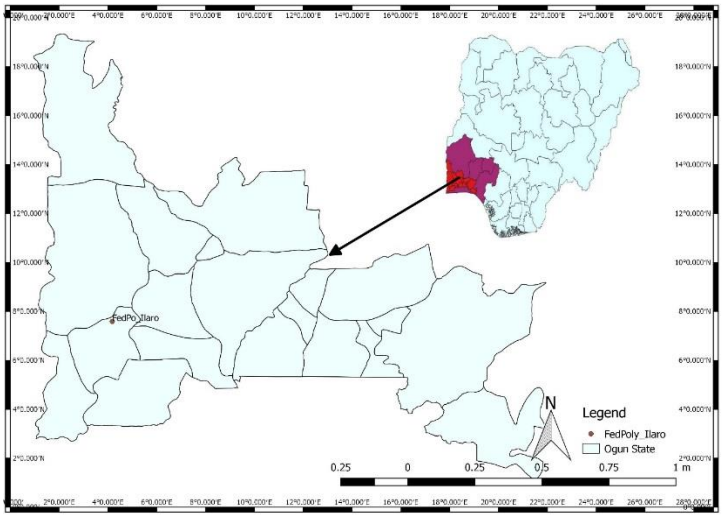


Figure 2 Food Types of *Turdus pelios* in the Study Area

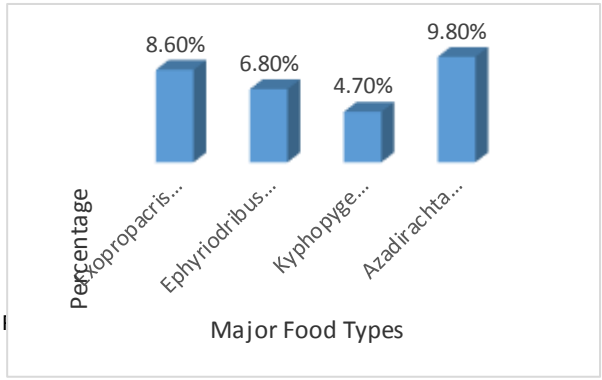
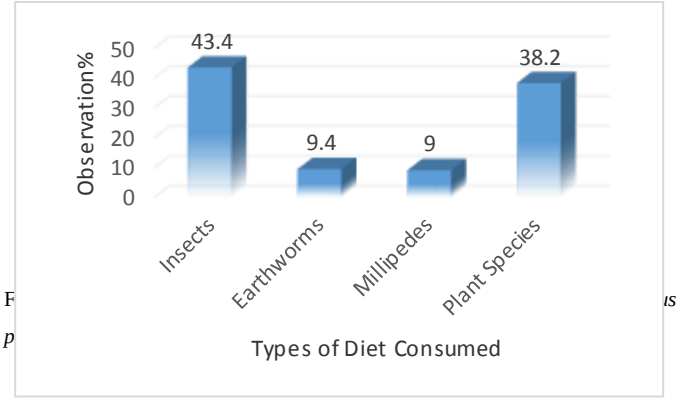


Figure 4, Percentage of Utilization of Habitat type in the Study Area



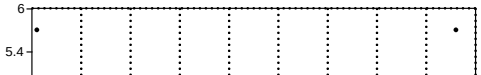


Table 1 Diversity of Insects Consumed in the Study

Area during Dry Season

Diversity index	Dry season	Lower	Upper	Wet Season	Lower	Upper
Taxa_S	58	17	26	58	16	24
Individuals	31	31	31	25	25	25
Dominance_D	0.09856	0.02492	0.07794	0.1138	0.02415	0.0778
Shannon_H	2.783	1.957	2.488	2.538	2.028	2.582
Evenness_e^H/S	0.2786	0.4006	0.4829	0.2181	0.4684	0.5518
Brillouin	1.114	1.329	1.693	1.075	1.364	1.714
Menhinick	8.801	2.58	3.945	10.03	2.767	4.15
Margalef	16.6	4.659	7.28	17.71	4.66	7.145
Equitability_J	0.6853	0.6852	0.7694	0.625	0.7315	0.8126

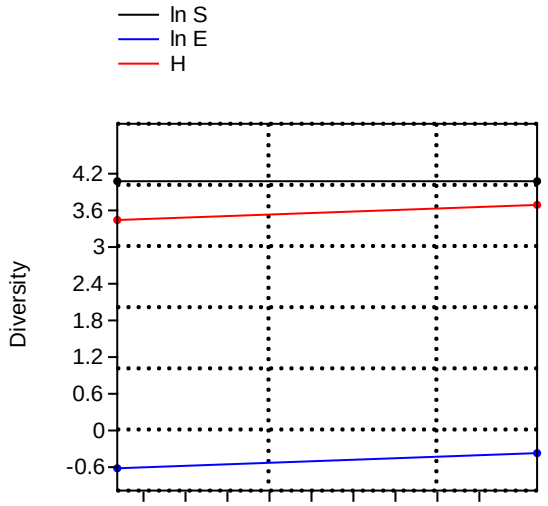


Figure 6, Multiple Generalized Models (t-dependent and independent) of the Insects Species Consumed Turdus pelios in the Study Area

Table 2 Checklist of Insect Species and the Parts consumed by *Turdus pelios* in the Study Area

Name of Insects	Family	Order	Parts Eaten	Observations %
Exopropacris spp.	Acrididae	Orthoptera	Whole	8.6
Glypsus conspicus	Acrididae	Orthoptera	Whole	0.3
Lygaeus rivularis	Acrididae	Orthoptera	Whole	0.2
Eumennes maxillosus	Acrididae	Orthoptera	Whole	0.6
Ropalidia cincta	Acrididae	Orthoptera	Whole	0.5
Acridium perigrinum	Acrididae	Orthoptera	Whole	0.4
Cyrtacanthacris aeruginosa unicolor	Acrididae	Orthoptera	Whole	0.6
Catharsius sp	Acrididae	Orthoptera	Whole	4.3
Epistaurus succineus	Acrididae	Orthoptera	Whole	0.7
Exopropacris spp.	Acrididae	Orthoptera	Whole	4.4
Oedaleus nigeiensis	Acrididae	Orthoptera	Whole	0.2
Calepphorus compressicornis	Acrididae	Orthoptera	Whole	0.2
Pyrgamorpha vignaudi	Pyrgomorphidae	Orthoptera	Whole	0.1
Zonocerus vignaudi	Pyrgomorphidae	Orthoptera	Whole	0.2
Brachytypes membranceus	Gryllidae	Orthoptera	Whole	0.3
Melanogryllus morria	Gryllidae	Orthoptera	Whole	0.5
Gryllodes sigillarus	Gryllidae	Orthoptera	Whole	2.1
Dancus Chrysippus	Nymphalidae	Lepidoptera	Whole	0.06
Acreaea anacreaon	Nymphalidae	Lepidoptera	Whole	0.1
Pyrene sp	Nymphalidae	Lepidoptera	Whole	0.1
Coniesta sp.	Pieridae	Lepidoptera	Whole	0.1
Appias drusilla	Pieridae	Lepidoptera	Whole	0.3
Aphrissa statira	Pieridae	Lepidoptera	Whole	0.4
Kricogonia lyside	Pieridae	Lepidoptera	Whole	0.3
Ascia monuste	Pieridae	Lepidoptera	Whole	0.3
Phoebis	Pieridae	Lepidoptera	Whole	0.4

argante				
Eunica tatila	Pieridae	Lepidoptera	Whole	0.5
Euptoieta Claudia	Pieridae	Lepidoptera	Whole	0.5
Hypolimnas hysius	Pieridae	Lepidoptera	Whole	0.03
Mycelia antholia	Pierida	Lepidoptera	Whole	0.08
Archmestra teleboas	Nymphalidae	Lepidoptera	Whole	0.04
Atoconeura luxata	**Libellulidae**	Odonata	Whole	0.01
Atoconeura biordinata	**Libellulidae**	Odonata	Whole	0.03
Paragomphus sabicus	**Gomphidae**	Odonata	Whole	0.02
Ictinogomphus frassri	**Gomphidae**	Odonata	Whole	0.08
Notogomphus spinosus	**Gomphidae**	Odonata	Adult Winged	0.02
Macrotermes bellicosus	Termitidae	Isopterea	Adult Winged	0.1
Macrotermes natalensis	Termitidae	Isoptera	Adult Winged	0.09
Campinotus pinnilucnicus	Formicidae	Hymenoptera	Adult Winged	0.05
termopsidae	Formicidae	Hymenoptera	Adult Winged	4.4
Rhinotermitidae	Formicidae	Hymenoptera	Whole	0.05
Anapha venata	Notodontidae	Lepidoptera	Whole	0.08
Anaphe reticulata	Notodontidae	Lepidoptera	Whole	5.7
Anaphe infracta	Notodontidae	Lepidoptera	Adult Winged	0.02
Ugada sp	Cicadidae	Homoptera	Adult Winged	0.08
Glypsus conspicus	Pentatomidae	Hemiptera	Adult Winged	0.01
Lygaeus rivularis	Lygaeidae	Heteroptera	Adult Winged	0.03
Anopocnemis curvipes	Coreidae	Heteroptera	Adult Winged	0.04
Eumenes maxillosus	Eumenidae	Heteroptera	Adult Winged	3.6
Ropalodia cincta	Vespidae	Hymenoptera	Adult Winged	1.2
Phragmataecia fuscifusa	Cossidae	Lepidoptera	Adult Winged	0.03
Tanyterys pryeri	**Petalurdae**	Lepidoptera	Whole	0.05
Gymnopleurus sp.	Scarabaeidae	Coleoptera	Larva	0.06
Pachnoda marginata Dry	Scarabaeidae	Coleoptera	Larva	0.07
Anomala mixta F	Scarabaeidae	Coleoptera	Larva	0.03
Campinotus pinnilucnicus	Formicidae	Hymenoptera	Larva	0.05
termopsidae	Formicidae	Hymenoptera	Larva	0.07
Rhinotermitidae	Formicidae	Hymenoptera	Larva	0.05

Table 3 Earthworms and Millipedes Species Parts Consumed in the Study Area

Earthworms Species	Family	Order	Parts Eaten	Observations%
Ephyriodribus afrocidentalis	Almidae	Haplotoxida	Whole	0.7
Euabribus eugenriae	Almidae	Haplotoxida	Whole	6.8
Paropolytorentus abiensis	Eudrilidae	Haplotoxida	Whole	1.2

Libyolribus mericonsis	Acanthodrilidae	Opisthopora	Whole	1.1
Millipedes				**9.8**
Kyphopyge granulosa	Chelodesmidae			4.7
Kyphopyge sp.	Chelodesmidae	Polydesmida	parts	0.6
Kyphopyge sp.	Chelodesmidae	Polydesmida	parts	2.2
Cordyloporus aubryi	Chelodesmidae	Polydesmida	parts	0.7
Paracordyloporus dilatatus	Chelodesmidae	Polydesmida	parts	1.1
				9.3

Table 4 Plant Species and Parts Utilized by the Turdus pelios in the Study Area

Name of Plant Species	Family	Parts Eaten	Observations %
Ficus Thoniigii	Moraceae	Fruits	5.5
Azadirachta indica	Meliaceae	Fruits	9.8
Spondia mombin	Sapindaceae	Fruits	5.5
Dalium qiunense	Fabaceae	Fruits	4.4
Cathium hispicum	Apocynaceae	Seeds	2.1
Moriga Oliveri	Moringaceae	Flowers and Leaves	5.7
Maagnifera indica	Anacardiaceae	Fruits	4.4
Blighia Sapida	Sapindaceae	Fruits	0.8
			38.2

DISCUSSION

From a general dietary perspective, *Turdus pelios*, fed more on several varieties of insects, eartworm worms, millipedes and fruits leaves and flowers of of plant species. This is supported by various authors Greenlaw, 2007 who reported that *Turdus pelios consumed insects, earth worm and fruits of* ***Azadirachta indica*** *in South Africa.* Dorn,et al, (2011) reported that the insects formed the major bulk of *Turdus pelios* matter and numerically important ones were the Orthoptera, Coleoptera and Isoptera which accounted for almost two-thirds of the insects.Heinrich, and Morrison, (1990) reported that the proportion of arthropods in the diet probably increases during the breeding season because protein is particularly important for developing offspring. Foraging is crepuscular and fruit, especially that of the nim *Azadarichta indica*, as well as figs, papaya, berries and seeds, makes up most of the diet supplemented with invertebrates and the occasional small fish. Hockey, et al, (2000) reported that Turdus pelios consumed mainly locust, grasshoppers, termites, caterpillars, earthworms and butterflies, using a

It was observed that they switch their diet to take supplements from fruits and pods of some plant species which is not seasonal but depends on the available food resources. These observations occurred majorly during the wet seasons which is their breeding seasons. These findings is in agreement with Mckilligan, (2005) (2005) reported that *Turdus pelios* are general insectivorous, partly add fruits to their diet, which includes large insects especially locusts, grasshopper, especially earthworms, millipedes and fruits. Morse, 2005 reported that insect are important food resource for birds irrespective of their feeding mode. Klassing 2000 reported the diet of Turdus pelios and other insectivorous constituted about eighty percent of insects in their diet.

Onadeko, (2011) reported that the species of insect consumed often depend on the bird species and its stage in life.(Akinpelu and Oyedipe, (2004) reported that in terms of nutritional value, insect diet is adequate; because it is rich in easily digestible protein and fat although the digestibility of various parts largely depends on their chitin content Insect diet studied by collection of insectivorous passerines affirmed that birds exhibit preference for certain insect orders, as they fed primarily on insect Orders Hymenoptera, Coleoptera, Orthoptera and Diptera thereby generating 36%, 23%, 12% and 9% insect remains in their droppings respectively. Asokan (1998) found that Hymenopterans (dominated by ants) and Coleopterans (dominated by beetles were the principal food items of the Bee-eater *Merops oreintalis* in Nagapattinan District, India.

During the period of this study, it was observed that *Turdus pelios* starts their daily activities 6.15 hours in the morning and end their daily activities by 18.00 hours. During field encounters during Data collection, it was observed that most their feeding is the ground level, feeding on insects earthworms and millipedes. Sometimes they feed on variety of resources in one day which include insects and plant resouces. Within intervals they make short flies and run on the ground. During the breeding period they fed more on insects than plants resources. These fed observations is supported by the following authors. Klasing 2000 reported that protein increased in insectivorous diet from 1.8% to 55% when breeding (Burton, 1998) reported that the presence of these groups of different species of insects for foraging was more frequent on the ground than in the air,he stressed futher that this observation buttressed the fact that the birds were poor fliers.Black and Ross, (2005) reported that *Turdus pelios* specialises in using its legs to extract food from ground.

The percentage of utilization was higher in the farms/fallow areas compartments than the rest two compartments. This could be linked to preferred food availability or ecological requirements of these birds. These

observations in agreement with work of Brown, and Amadon, (2012) who reported that the Turdus peliosfrequents a variety of landscapes throughout its range in central and southern Africa, including forest, woodland, and savannah. It is most often found at the top of tall trees fringing the larger rivers or in hilly country where there are deep ravines and steep hillsides.

CONCLUSION

The results of this study clearly indicate that *Turdus pelios* consumed insects, earthworms, millipedes and fruits,leaves and flowers of some plant species resources available to them in the study area. But, compared to fruits, the insects are consumed in larger proportions. The *Turdus pelios* , therefore, help in the suppression of insects and help to substain the capacity in the ecosystem and the *Turdus pelios* are useful species for farmers and keep to check on various harmful insects like grasshoppers, beetles, termites, caterpillars etc., which are injurious. They also help in the dispersal of seeds. to the agricultural crops.

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