



# HOW IMPORTANT ARE FIGS IN THE CONSERVATION EFFORT AT AMURUM FOREST RESERVE, LAMINGA, NIGERIA BY JACINTA ABALAKA A.P. LEVENTIS ORNITHOLOGICAL RESEARCH INSTITUTE, LAMINGA



# **INTRODUCTION**

Anthropogenic activities such as agriculture, road construction, hunting, bush burning, grazing, e.t.c. have frequently been listed among the factors that cause habitat loss (Wiens 1989, Newton 1998) for animals and consequently cause a decline in their populations. E.g, In the last 400 years alone, human action has eliminated at least 127 of the approximately 9672 modern species of birds (Newton 1998a). These activities of humans cannot be stopped, hence the need to restrict the activities by carving out some areas (reserves) where humans are prohibited from carrying out destructive activities. In Nigeria, Amurum Forest Reserve is one of such areas.

*Ficus* species are known to be keystone species (Terborgh 1986b) that help sustain frugivores during seasons of scarcity, as they display an interspecific and intraspecific asynchrony in fruiting which leads to production of much fruits and show low inter annual variation in their fruit production. These fruiting patterns make figs a reliable food source during times of general food scarcity. They are also known to be good pioneers (Thorntron *et al* 1996).

The Amurum Forest Reserve  $(09^{\circ}53'N, 08^{\circ}59'E)$  is an area of approximately 100 hectares (Vickery and Jones, 2002). It was a community forest to the people of Laminga, Jos East Central Nigeria, until 2001, when the management of the Reserve was officially handed over to the A. P. Leventis Ornithological Research Institute (APLORI). As a result, human activities such as hunting, logging, fuel wood collection and farming have been prohibited in the Reserve. This has helped regenerate the forest to a great extent. In addition to prohibiting wood cutting and logging, the management of the Reserve decided to replant some bear parts of the forest. This programme started two years ago. The trees species that were planted at the beginning stage of this programme were mostly exotic species. Being a reserve that is interested in the conservation of biodiversity, it will be more useful to plant trees that can be utilizes by wildlife, rather than plant tree that will not be of use to the animals. In order to contribute to the reforestation programme of the Institute, this project was carried out on the genus *Ficus* in the Reserve. This project aims at suggesting to the management of the Reserve, trees that are useful to wildlife in the Reserve which should be included among trees used for the reforestation programme.

# **Objectives:**

- To estimate the population density of the various *Ficus* species in the Amurum Forest Reserve.
- To determine which of these *Ficus* species is most utilized by the frugivores in the Amurum Forest Reserve
- To recommend to the management of the Amurum Forest Reserve two *Ficus* species (the one that is most utilized by frugivores and the one that has the lowest population density).
- To increase the number of useful keystone plant species on the Amurum Forest Reserve.

# METHODOLOGY

**Tree identification**: Pictures of all the different species of *Ficus* were taken. We used Arbonnier () and fig tree picture on <u>www.figweb.org</u> wasps/index.htm to identify as many species as were possible. Those we could not identify were mailed to Dr. Simon van Noort of the Iziko Museum Cape Town for identification. Plant samples were collected for species that could not be identified from pictures only and dried in a press and sent to Dr. van Noort to help in the tree identification process. Fig wasps were also collected from fruiting figs that have not yet released their wasps.

Focal observation: As figs ripened, they were observed. Though it was intended that two individual trees of all species will be observed, only one individual tree was observed for most species while

some were not observed at all, as they did not fruit throughout the period of this project (only one individual tree of each of the observed species was used for analysis). All observations were carried out from a distance of about 10m form the focal tree, using a pair of binoculars. Observations were carried out both in the morning and in the evening. The species of animals, the number of individuals per species and the activities (e.g. did they feed? What are they feeding on?) of every animal that visited the observed trees were recorded. Bird identification was done following Borrow & Demey (2001) while mammal identification was done following Kingdon (1997).

**Fig wasp collection and identification**: Wasps were collected from plants that were difficult to identify from only pictures. It was not possible to collect wasps from all the plants that could not be identified by pictures as some of these plants did not fruit during the study and others have already released their wasps before they were located. All wasp samples were sent to Dr. Simon van Noort for identification.

**Tree count**: This was done using point count method. 28 points were systematically distributed around the reserve. Count was carried out only once on each point. All figs encountered at each point were photographed and marked on a GPS, and all trees counted were given individual codes. This was to allow us locate any tree that could not be identified from pictures only. The distance between the observer and every tree counted was taken using a Laser Range Finder. Distance Program was used to estimate density.

# RESULTS

A total of 12 species of *Ficus* were identified on the Amurum Forest Reserve (Table 1). Six other species are yet to be identified (we had difficulty getting wasps and plant samples). *Ficus lutea* had the highest population density in the Reserve, while *F*. polita, *F*. *ingens* and *sycomorus gnaphalocarpa* had the lowest densities (Table 1).

A total of 49 bird species, 3 mammal species and 1 reptile species (Appendix 1) were recorded on the various *Ficus* species observed. *F. lutea* was the fig tree that was utilizes most by animals (Table 1, Figure 1, Appendix 1).

Table 1: Fig trees identified, the number of species of birds and mammals that were observed on each species and the density estimates of the trees.

Ficus Species	No. of avian species visitors	No. of mammalian species visitors	Total	Density of trees
Ficus lutea	32	1	33	0.3283 (95% C.I 0.2257 – 0.4774) trees/100ha
Ficus sur	-	-	-	0.0457 (95% C.I 0.0170 - 0.1231) trees/100ha
Ficus polita	-	-	-	0.0027 (95% C.I 0.0006 – 0.0114) trees/100ha
Ficus abutilifolia	19	3	22	0.2099 (95% C.I 0.141 – 0.313) trees/100ha
Ficus thonningii	16		16	0.2583 (95% C.I 0.1666 – 0.4005) trees/100ha
Ficus umbellata	-	-	-	0.0457 (95% C.I 0.0249 – 0.0839) trees/100ha
Ficus glumosa	-	-	-	0.0350 (95% C.I 0.0186 - 0.0658) trees/100ha
Ficus ingens	15	2	17	0.0027 (95% C.I 0.0006 – 0.0115) trees/100ha
Ficus ovata	14	-	14	0.1049 (95% C.I 0.0494 – 0.2227) trees/100ha
Ficus sycomorus gnaphalocarpa	17	1	18	0.0511 (95%C.I 0.0241 – 0.1084) trees/100ha
Ficus vallis choudae	-	-	-	0.0027 (95% C.I 0.0006 – 0.0127) trees/100ha
Ficus species1	18	1	19	0.0027 (95% C.I 0.0006 - 0.0115) trees/100ha



Figure 1: Utilization of the various fig species by the wildlife of Amurum Forest Reserve (**figs**: the animals fed on figs, **insects**: the animal fed on insects, **others**: the animal carried out other activities like perching, preening, resting looking for prey among feeding animals, e.g. Lanner Falcon),

### DISCUSSION

A large percentage of the animals that visited the fig tree were after the figs (Figure 1). The insects that are seen on these trees are mostly as a result of the fruits on the trees (fig wasps released from the figs and ants coming to take advantage of the juice from the figs, and some enter into figs with holes to pick dead fig wasp males and damaged fig seeds). This shows that fruiting figs are very important to these animals, as not so many animals are seen on non-fruiting fig tree or even fruiting fig trees with unripe figs.

Keystone plants are of great ecological significance as they appear to set the carrying capacity of the fruigivore community (Terborgh 1986a). Increasing their number in a reserve will not only maintain the frugivore populations but will also reduce the animal-human conflict, as animals like monkeys are known to go outside the Reserve, into the farms of the surrounding communities.

*F. lutea* had the highest density and was the most utilizes of the fig species. This suggests that the frugivores that feed on its figs have been successful in dispersing the seeds. *F. lutea* can therefore be considered a successful fig in the Amurum Forest Reserve, thus there is no need for more of this kind of species to be planted. Two species (*F. ingens* and one of the species yet to be identified, *F. species1*) had the lowest population densities. Thought these two species were not the most utilized of the *Ficus* species, they were well utilized by animals (Figure 1). Increasing the stands of these species in the Reserve can therefore be considered to be of benefit to the wildlife of the Amurum Forest Reserve. These two species were therefore suggested as the trees that should be included among trees being used for the reforestation progamme.

### CONCLUSION

A report of this project along with our recommendations (Appendix 2) has been submitted to the Director of the Institute (APLORI). The recommendations from this project have been accepted

by the management of the Amurum Forest Reserve. Already, plans are being put in place to attempt to raise the suggested fig species through the use of seeds and propagation.

This project has also contributed to the Institute by providing a baseline data of the *Ficus* species of the Amurum Forest Reserve. We hope to compile an official document of the figs of the Amurum Forest Reserve that will be placed in the Institute Library.

### **ACKNOWLEDGEMENTS:**

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# **Appendix 1:** Animal species recorded on fig trees in the Amurum Forest Reserve.

Animal Species								
	F. lutea	F. s gnaphalocarpa	F. ovata	F. abutilifolia	F. ingens	F. species1	F. species2	F. thonningii
Birds								
Lanner Falcon Falco biarmicus	1	-	-	-	-	-	-	-
Bruce's Green Pigeon Treron waalia	56	-	-	1	-	-	-	-
Adamawa Turtle Dove Streptopelia hypopyrrha	2	-	-	-	-	-	-	-
Vinaceous Dove Streptopelia vinacea	-	-	4	-	-	-	-	-
Laughing Dove Streptopelia senegalensis	1	-	-	-	-	-	-	-
Black-billed Wood Dove Turtur abyssinicus	3	-	-	-	-	-	-	-
Western Grey Plantain-eater Crinifer piscator	14	11	2	29	-	-	-	1
Violet Turaco Musophaga violacea	13	-	-	36	-	2	-	-
Senegal Coucal Centropus senegalensis	-	1	-	-	-	-	-	-
Speckled Mousebird Colius striatus	32	76	73	113	179	55	-	-
Red-throated Bee-eater Merops bulocki	2	-	-	-	-	-	-	-
Africa Grey Hornbill Tockus nasutus	26	9	-	4	1	19	-	1
Red-billed Hornbill Tockus erythrorhynchus	1	-	-	-	-	-	-	1
Yellow-fronted Tinkerbird Pogoniulus chrysoconus	1	-	1	4	1	1	2	1
Vieillot's Barbet Lybius vieilloti	11	-	-	3	-	10	-	7
Bearded barbet Lybius dubius	20	27	-	8	4	1	23	23
Grey-headed Woodpecker Dendropicos goertae	1	-	-	-	-	-	-	-
Cardinal Woodpecker Dendropicos fuscescens	3	1	1	-	-	2	-	-
Common Bulbul Pycnonotus barbatus	18	42	11	44	41	45	9	16
Yellow-throated Leaflove Chlorocichla flavicollis	8	-	-	1	3	-	-	4
African Thrush <i>Turdus pelios</i>	13	20	13	35	2	11	-	-
Cliff Chat Myrmecocichla cinnamomeiventris	-	-	-	11	1	21	-	-
Garden Warbler Sylvia borin	-	-	-	4	-	10	-	-
Common White-throat Sylvia communis	-	13	2	2	20	1	-	-
Willow Warbler <i>Phylloscopus trochilus</i>	-	-	-	-	1	-	-	-
Senegal Eremomela Eremomela pusilla	4	1	-	12	2	1	-	-
Northern Crombec Sylvetta virens	-	-	-	-	-	-	1	1
Grey-backed Camaroptera Camaroptera brachyura	5	-	-	-	-	-	-	1
Tawny-flanked prinia Prinia subflava	-	8	2	-	4	-	-	1
Northern Black Flycatcher Melaenornis edolioides	1	-	-	-	1	-	-	-
African Paradise Flycatcher <i>Terpsiphone viridis</i>	-	-	-	-	-	-	-	3
African Blue Flycatcher Elminia longicauda	1	-	-	-	-	-	-	-
Senegal Batis <i>Batis senegalensis</i>	-	-	-	-	-	-	-	2
Brown Babbler Turdoides plebejus	24	-	-	-	-	-	-	-
Yellow Penduline Tit Anthoscopus parvulus	-	-	-	-	-	-	-	1
Yellow White-eye Zosterops senegalensis	15	22	2	-	3	6	-	4
Scarlet-chested Sunbird Chalcomitra senegalensis	1	15	3	4	1	-	-	-

Variable Sunbird Cinnyris venustus	-	-	-	-	-	-	-	-
Copper Sunbird Cinnyris cupreus	-	-	1	-	-	-	-	-
Neumann's Starling Onychognathus neumanni	3	-	-	12	-	-	-	-
Purple Glossy Starling Lamprotornis purpureus	60	35	-	-	-	30	1	-
Violet-backed Starling Cinnyricinclus leucogaster	24	-	-	-	-	6	-	-
Lesser Blue-earred Starling Lamprotornis chloropterus	20	28	-	-	-	-	-	-
Northern Grey-headed Sparrow Passer griseus	-	-	-	-	-	-	-	-
Heuglin's Masked Weaver Ploceus heuglini	2	-	-	-	-	-	-	-
Village Weaver Ploceus cucullatus	-	87	4	5	-	-	-	-
Lavender Waxbill Estrilda caerulescens	43	1	1	31	-	3	8	-
Red-billed Firefinch Lagonosticta senegala	-	-	-	-	-	-	-	-
Rock Firefinch Lagonosticta sanguinodorsalis	-	-	-	-	-	1	-	1
Mammals								
Tantalus Monkey Cercopithecus (aethiops) tantalus	-	2	-	14	9	10	-	-
Rock Hyrax Procavia capensis	-	-	-	4	-	-	-	-
African Tree Squirrel	2	-	-	14	13	-	1	-
Reptile								
Agama Lizard (Agama agama)	1	-	-	2	10	1	1	-

# **Appendix 2:**

# A REPORT ON THE SURVEY OF THE FIG TREES IN AMURUM FOREST AND THE ANIMALS THAT UTILIZE THEM By

# Jacinta Abalaka

# Introduction:

Two years back, a reforestation programme was set up in the Amurum Forest Reserve in an attempt to replant some bare parts of the Reserve. That program motivated this project. Being a reserve that has interest in the conservation of biodiversity, it is important to consider the impact that the plants used for reforestation will make on the animal populations. Seeing that the reforestation was being done using mostly exotic plant species, I decided to carry out a survey of fig trees which are known to be keystone species and good pioneers and to determine the animals, especially birds and mammals that utilize these trees.

### Aim:

This project was aimed at determining the population of the various fig species in the reserve, and to determine which of the figs was most utilized by the animals. On the basis of its findings, the and recommend the most used and the least in population density to the Director of the Institute, who was the one running the reforestation programme so that such plant could be included in the plants used for reforestation.

### **Activities:**

To carry out this project, I applied for a grant with Rufford Small Grant, and in February 2008, the project commenced. We carried out point counts to estimate the diversity and population densities of the fig species in Amurum Forest Reserve, while focal observations were used to determine the type of animals that utilized the plants.

### **Outcome:**

In total, we identified 12 species of figs. These include *Ficus exasperata*, *F. ingens*, *F. glumosa*, *F. abutilifolia*, *F. polita*, *F. lutea*, *F. umbellata*, *F. thoninngii*, *F. sycomorus gnaphalocarpa*, *F. sur*, *F. ovata* and *F. vallis-choudae*. *F. lutea* had the highest density of 0.3283 trees/100ha (95% C.I. 0.2257 - 0.4774/100ha), while *F. ingens*, 0.0027 (95% C.I 0.0006 - 0.0115) trees/100ha, *F. vallis choudae*, 0.0027 (95% C.I 0.0006 - 0.0127) trees/100ha, and *F. polita*, 0.0027 (95% C.I 0.0006 - 0.0114) trees/100ha had the lowest densities. There are still 6 other species that are yet to be identified.

From focal observation, *F. lutea* is the most utilized by widlife species in the Amurum Forest Reserve, being used by 32 species of birds and 2 species of mammals. *F. ingens* which had only one individual counted was utilized by 15 species of birds and 2 species of mammals.

### **Recommendations:**

This project was carried out in order to recommend to the Institute, figs trees that could be included among the trees that may be used for reforestation. From the research, the most abundant species (*F. lutea*) is the most used by animals. This means that there will be no need for more stands of this species in the forest. Among the *Ficus* species that have only one stand in the forest, *Ficus ingens* and another *Ficus* species which is yet to be identified were highly utilized by both birds and mammals. In order to make more of these trees available to animals, especially during the time of fruit scarcity, I recommend that these two *Ficus* species be included among the plant species being used for reforestation of the Reserve.