

Composition of *Bufo* species and their diets in Peri-Urban Area of Lafia Metropolis, Nasarawa State, Nigeria

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ABSTRACT Toads are amphibians belonging to Bufonidae family and feed on different invertebrates. Thus, the study on composition of *Bufo* Species and their diets in peri-urban area of Lafia Metropolis, Nasarawa State, Nigeria was carried out from June to August 2021. Random sampling technique was used to collect *Bufo* species using a hand-held torch light in the evening period from 1800 to 2100 hours. Toads collected were put in a jar containing chloroform and then transported to Zoology Laboratory of Federal University of Lafia for further processing. Thirty-three (33) toads were collected which represents two species in which *Bufo muculatus* was more dominant 27 (81.81%) over *Bufo regularis* 6 (18.18%). The diets recorded from sacrificed toads spread across 2 Phyla which include Phylum Arthropoda made up of Orders Hymenoptera (ants) and Coleoptera (beetles) while Phylum Annelida comprised of Opisthopora (earthworm). In conclusion, this study shows the presence of *Bufo muculatus* and *Bufo regularis* which play a vital role in creating the necessary ecosystem balance in peri-urban area.

KEYWORDS: *Bufo* species, Diets, Peri-Urban area

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Short Communication

INTRODUCTION

Bufo are known as African common toad (International Union for Conservation of Nature, 2012). Toads are amphibians of the family Bufonidae. They are distinguished by their large bodies, warts, and ability to live in arid climates, whereas frogs typically live in moist environments close to water sources (Nworah & Olorufemi, 2011). Toads have been found in a variety of nations, including Senegal, Gambia, Guinea Bissau, Sierra Leon, Liberia, Guinea, Mali, Burkina Faso, Ivory Coast, Ghana, Benin, Niger, Nigeria, Cameroon, Equatorial Guinea, Gabon, Angola, Congo, Kenya, Republic of Congo, Chad, Central Republic of Africa, Algeria, Libya, Egypt, Sudan, Ethiopia, America, Germany, Uganda, and Rwanda. However, they are more prevalent in tropical areas, especially in montane, grassland, and forests. These animals are advantageous to have in both farms and home gardens (Vasconcelos *et al.*, 2010; Iyaji *et al.*, 2015). Toads can live in a variety of habitats, including savannahs, grasslands, forests, rural gardens, urban areas, rivers, and freshwater lakes (Tandy *et al.*, 1976). Toads use coetaneous respiration (very abrasive skin) to take in oxygen from water (Relyea, 2005).

The composition of toad's diets is determined by the occurrence of prey species (mostly invertebrates) in their foraging habitat (Guidali *et al.*, 2000) which is a good habitat condition indicator (Gunzburger, 1999). Toads feed mostly on insects and small invertebrate, they eat earthworms, sowbugs, spiders, centipedes, millipedes and caterpillars (Rodel, 2000). Unlike other

amphibians, they do not expand as much energy foraging. They can simply extend their extremely sticky and long tongue to capture prey, whether in the air or ground. *Bufo regularis* is known for limiting levels of pesky creatures in gardens, like slugs, beetles, and fruit flies. A study showed that toad can eat up to 1,000 insects mostly at night. They feed at night because the temperature is too high during the day (Stokeo, 1980).

Bufo nids are usually considered generalists in their feeding habits (Evans & Lampo, 1996; Vences *et al.*, 1998; Sabagh & Carvalhoe-Silva, 2008), and some of them have been considered ant-specialists (Rosa *et al.*, 2002). However, the terrestrial toads predominantly feed on ants, beetles, and other terrestrial invertebrates (Parmelee, 1999; Hirai & Matsui, 2002). Kolenda *et al.* (2019) confirmed that during spring migration, common toads hunt diverse prey, the vast majority of which comprise epigeic forms such as millipedes (Myriapoda: Diplopoda), centipedes (Myriapoda: Chilopoda), woodlice (Crustacea: Isopoda), and various orders of insects including ants (Hymenoptera: Formicidae), earwigs (Dermaptera), beetles (families: Carabidae, Curculionidae, Coccinellidae), true bugs (Hemiptera), and caterpillars (i.e. butterfly larvae). Moreover, larger anurans often consume more and larger prey than smaller individuals (Hirai, 2002; Biavati *et al.*, 2004; Wells, 2007), and males and females often differ in body size and/or foraging circumstances and hence feed on different items (Biavati *et al.*, 2004). Amphibian diet and feeding habits may depend on a seasonal abundance of food, the presence or absence of competitors, and intrinsic factors (Isacch & Barg, 2002). There is paucity of information on the abundance and diversity of toads in peri-urban area of Lafia metropolis. Hence, this study investigated the composition of *Bufo* species and their diets in two selected communities in Lafia Local Government Area of Nasarawa State, Nigeria.

MATERIALS AND METHODS

Study Area

The study was conducted in Lafia Local Government Area (LGA) of Nasarawa state, Nigeria. Lafia Local Government Area, of Nasarawa state has 509,300 inhabitants in 2022 (City Population, 2023). Lafia is located on Latitude 08° 35'E with an altitude of 181 m above sea level, temperature ranging from 32 - 35°C relative humidity between 58 and 63%, average rainfall of 1,400 mm per annum (Agidi *et al.*, 2018). The state lies within guinea savannah region and has a tropical climate. The major occupation of people in Lafia are farming, trading, civil servants, Artisan's with Hausa being the major language spoken in respective of different tribes that live in the area. The survey was conducted in Gandu and Mararraba-Akunza communities which fall in the peri-urban area of Lafia LGA, Nasarawa state, Nigeria.

Sample Collection and Identification

Toads were randomly collected from Gandu and Mararraba-Akunza communities of Lafia Local Government Area of Nasarawa State using torch lights. Visual encounter and acoustic survey method as describe by Rodel (2000) was used to collect the toads from the communities. Survey was conducted in the night between 1800 and 2100 hours. Toads were identified according to the field guide by Rodel (2000).

Processing of Toads

Toads were collected, sacrificed in a chloroform-filled jar, and then transported to Federal University of Lafia Zoology Laboratory. They were dissected ventrally on the dissecting board, from the cloacea region to the anterior end, and pinned with an office pin (Nworah & Olorunfemi, 2011; Iyaji *et al.*, 2015).

Examination of Diets in Toads

Intestine, stomach rectum and esophagus were placed in separate petri dishes and thoroughly searched for food fragments.

Statistical Analysis

Data obtained was expressed using simple percentages and analyzed using R Console software version 4.1.1. Proportions between toad species as well as abundance in relation to sites were compared using Pearson's Chi-square test. Level of significance was set at $P < 0.05$.

RESULTS AND DISCUSSION

Abundance and Composition of Toads in Unprotected Site

A total number of 33 toads were collected out of which *Bufo muculatus* (square mark toad) was more 27 (81.8%) than *Bufo regularis* (rough spotted skin toad) 6 (18.18%) as shown in Table 1. The differences in proportion in relation to the two toad species varied significantly ($\chi^2 = 40.483$, $df = 1$, $P < 0.001$). A significant variation ($\chi^2 = 26.626$, $df = 1$, $P < 0.001$) was observed in toad abundance in relation to the two survey sites in which Mararraba-Akunza community had higher number of toads 25 (75.8%) compared to Gandu community 8 (24.2%) as shown in Table 1. The presence of the two *Bufo* species in this study agrees with the work done by Aisien et al. (2004) and Nworah and Olorunfemi (2011) collected *Bufo regularis* and *Bufo muculatus* in their studies in Central and South-eastern, Nigeria. Also, some *Bufo* species in other parts of Nigeria were recorded by Aisien et al. (2011) and Bassey et al. (2018) in Penjari Biosphere Reserve, Benin State and Wilberforce Island, Bayelsa State, respectively. Similarly, Iyaji et al. (2015) reported the presence of *Amietophrynus regularis* in Anyigba Local Government Area of Kogi State, Nigeria.

Table 1. Toad Species in Peri-Urban Area in Lafia Metropolis, Nasarawa State, Nigeria

Location	Toad Species (%)		Total (%)
	<i>Bufo regularis</i>	<i>Bufo muculatus</i>	
Gandu	1 (12.5)	7 (87.5)	8 (24.2)
Mararraba-Akunza	4 (16.0)	21 (84.0)	25 (75.8)
Total (%)	6 (18.18)	27 (81.8)	33 (100)

Diet of Toads in Peri-urban Area

The processed toads fed on different fauna represented by two phyla, Arthropoda and Annelida as shown in Table 2. In the course of the survey, a *Bufo muculatus* was seen consuming earthworm (Plate 1). The particles of undigested food fragments recorded showed that toads predominantly fed on fauna belonging to Order Hymenoptera in which fragments of black ant and sugar ant were highly consumed (58.8%) followed by beetles of the Order Coleoptera (29.4%) while earthworm (Order: Opisthoptora) was the least consumed diet (11.8%). Various unidentified heads, legs, and abdomens were also found which belong to various fauna groups and classes. The results of toads' diets recorded in this study correlates with the studies done by Parmelee (1999), Hirai and Matsui (2002), Kolenda et al. (2019) and Oliveira-Souza et al. (2022) who reported that toads fed on ants, beetles and other terrestrial invertebrates. Also, Natalija et al. (2018) reported that adult and juvenile toads' diets were coleopterans, clittela and hymenopterans. On the contrary, Natalija et al. (2018) stated that toad fed on plants.

Table 2. Fauna Fed by Toads

Phylum	Class	Order	Common name	No. of fragments (%)
Anthropoda	Insecta	Hymenoptera	Sugar Ant and Black Ant	10 (58.8)
		Coleoptera	Beetles	5 (29.4)
Annelida	Clitellata	Opisthopora	Earthworm	2 (11.8)

**Plate 1:** *Bufo muculatus* feeding on earthworm (Field Photo)

CONCLUSION

This study revealed the presence of two toad species. *Bufo muculatus* was more predominant in the area than *Bufo regularis*. It was also observed that the toads surveyed fed on various invertebrate fauna, most especially the hymenopterans. *Bufo* should be well conserved in unprotected sites based on the vital role they play in contributing to the necessary ecosystem balance in peri-urban area.

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