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Diversity of Squamates (Scaled Reptiles) in Selected Urban Areas of Cagayan de Oro City, Misamis Oriental.

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ABSTRACT

This study was conducted to provide baseline information on the local urban diversity of squamates in the selected areas of Barangay Kauswagan, Barangay Balulang, and Barangay FS Catanico in Cagayan de Oro City. These urban sites are close to the river and are likely to be inhabited by reptiles. Each site had at least ten (10) points and was sampled no less than five (5) times in the months of September to November 2016 using homemade traps and the Cruising-Transect walk method. One representative per species was preserved. A total of two hundred sixty-seven (267) individuals, grouped into four (4) families and ten (10) species were found in the sampling areas. Six (6) snake species were identified, namely: *Boiga cynodon*, *Naja samarensis*, *Chrysopelea paradisi*, *Gonyosoma oxycephalum*, *Colegnathus erythrurus erythrurus*, and *Dendrelaphis pictus*; while four (4) species were lizards namely: *Gekko gekko*, *Hemidactylus platyurus*, *Lamprolepis smaragdina philippinica*, and *Eutropis multifasciata*. In Barangay Kauswagan, *Hemidactylus platyurus* was the most abundant (RA= 52.94%). In Barangay Balulang, the most abundant species was *Hemidactylus platyurus* (RA= 43.82%). In Barangay FS Catanico, the most abundant was *Hemidactylus platyurus* (RA= 40.16%). The area with the highest species diversity was Barangay FS Catanico (H= 1.36), followed by Barangay Balulang (H= 1.28), and Barangay Kauswagan (H= 1.08). High levels of urbanization have a direct effect on the diversity of species.

Keywords: Urban areas, Urban Biodiversity, Reptiles, Squamates

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INTRODUCTION

The Philippine archipelago has been able to progress and maintain substantial numbers of plant and animal diversity throughout time due to its varied geographical features and advantageous location in Southeast Asia, which is in between the Pacific Ocean and the South China Sea (Embassy of the Philippines, 2015 & Hub of Life: Species Diversity in the Philippines, 2016). These characteristics were beneficial for it led to an outstandingly high rate of species that are unique to the country (Hub of Life: Species Diversity in the Philippines, 2016). It is one of the mega-diverse countries in the world wherein there are more than 52, 000 species discovered and described, 20, 000 are species of endemic plants and animals (Status of Philippine Biodiversity, 2014 & Conservation International, 2016). But because of the enduring disturbance to the environment by degradation, pollution of any kind, climate change, and other forms of destruction to the environment such as urbanization, the country is now considered as a biodiversity hotspot (Status of Philippine Biodiversity, 2014).

As of 2014, the reptilian fauna increased in the number of species to 303; 198 species are endemic in the country; however 29 are considered threatened species (Status of Philippine Biodiversity, 2014). Being the biggest order of class Reptilia, Squamata is composed of 245 species, 166 of these are endemic to the Philippines (Diesmos, et al., 2002). Squamata is highly successful in terms of its rich number of species, ecological, and morphological diversity (Pincheira-Donoso, et al., 2013). Squamates are found in almost all parts of the world even in areas that are considered urbanized or urban areas that have patches of land which are habitable to them.

As urbanization develops, this gives rise to an environment that is more complimentary to humans. However, urbanization can lead to serious environmental harms including habitat destruction which would eventually cause the loss of biodiversity (Grimm, et al., 2008). Habitat destruction is an instant and clear danger to reptilian fauna. It occurs from different sources such as pollution, urban development, and overexploitation (Diesmos, et al., 2002 & Valentine-Darby, 2010). Climate change may also cause a decline in reptile diversity since they are receptive to irregular alterations of natural temperature (Valentine-Darby, 2010). Also, decrease in reptile population may be caused by road kills, since squamates such as snakes sometime favor roads because of its warm and smooth surface. Reptile mortality on roads is often increasing during the monsoon season because it is when some species of snakes are on their breeding period (Valentine-Darby, 2010). Despite the fact that the Philippines is a mega-diverse country, but in the same time, considered as a hotspot, the species that inhabit the country are still susceptible to the reduction of population. The conservation status of the species is relevant in determining the condition of the ecosystem and biodiversity. This study will aim to provide baseline information and increase knowledge of the squamates found in the selected urban barangays (FS Catanico, Balulang, and Kauswagan) of Cagayan de Oro City.

OBJECTIVES

The general objective of the study is to assess the squamates in selected urban areas of Cagayan de Oro City.

The specific objectives are:

1. To classify and describe squamates in the study areas based on their morphological characteristics.
2. To determine the relative abundance of squamates in the study area
3. To determine the species diversity of squamates in the study area.
4. To construct a dichotomous field key of squamates identified in the study areas.

SIGNIFICANCE OF THE STUDY

As urban areas continue to develop, the population of squamates usually declines. This study has classified and described squamates that were present in the selected areas of the city and provided information on their recent condition that may be utilized for future studies of squamate diversity in urban areas.

SCOPE AND LIMITATION OF THE STUDY

The subsequent captured squamate species was identified using its morphological characteristics in comparison with prepared taxonomic keys. Therefore, the bodily appearance and anatomical parts were the primary basis for identification. The sexes of each captured specimen, age and/or maturity may was not noted. Squamate species dwelling within the different households of the respective barangays was not included in the study. An area within the approved study areas which were too difficult to access or were very hazardous was not traversed and the possible specimens weren't required for collection.

MATERIALS AND METHODS

Methods

- 1.) Collection of specimens
 - Traps
 - Cruising-Transect Walk Method
- 2.) Identification and Classification family squamata
- 3.) Preservation techniques and Identification
 - Ethyl Alcohol
 - Formalin
- 4.) Data Analysis
 - (Relative Abundance, Evenness Index, & Shannon-weiner Index)

Study Area

The study was conducted in selected urban barangays of Cagayan De Oro City. The sampling sites were namely: Barangay Kauswagan, Barangay Balulang and Barangay FS Catanico. The urban areas were categorized into barangays, consulted by the City Planning office / GIS. The selected areas were located along river margins and banks. Figure 1 is the map of Kauswagan (8°29'54.65"N, 124°38'53.07"E). Barangay Kauswagan is surrounded by Barangay Bonbon at the North, Barangay Bayabas at the West, Barangay Puntod at the East, and Barangay Carmen at the South. Figure 2 is the map of Barangay Balulang (8°26'16.39"N, 124°38'6.39"E). It can be briefly described as a vast open lot with a few resident squatters. Barangay Balulang is surrounded by Barangay Carmen at the North, Barangay Upper Balulang at the West, the East and the South side of Balulang were limited for the reason Barangay Balulang is located at the borderline of the city towards the East and South direction. Figure 3 is the map of Barangay FS Catanico (8°27'40.50"N, 124°42'44.22"E). Barangay FS Catanico is surrounded by Barangay Tablon at the North; Barangay Cugman at the West, the East and the South is also limited since it is located at the borderline of the city.

Duration and Frequency of Investigation

The sampling in the 3 areas was conducted in 10-15 weekend days within the months of September to November 2016 in one time sampling. Since squamate species are usually found during daylight, the collection of specimens in each site was completed from 8am to 12pm and 1pm to 5pm. The capturing of species which are nocturnal in the respective sites was during late evening around 8pm to 1 am.

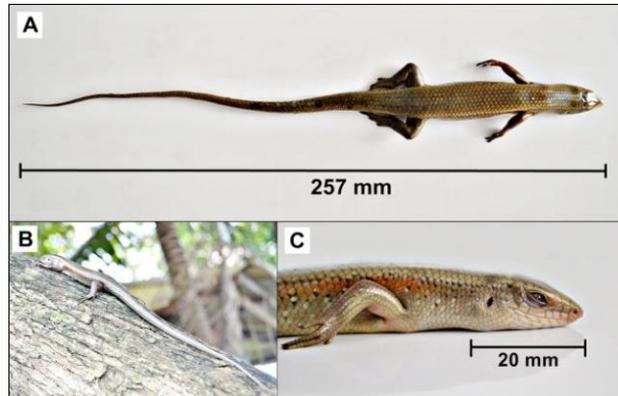
RESULTS AND DISCUSSION

Species Composition of Squamates in Barangay Kauswagan, Barangay Balulang, and Barangay FS Catanico

Species	Barangay Kauswagan	Barangay Balulang	Barangay FS Catanico
<i>Eutropis multifasciata</i>	9	11	17
<i>Gekko gekko</i>	14	32	46
<i>Hemidactylus platyurus</i>	27	39	51
<i>Lamprolepis smaragdina philippinica</i>	0	4	8
<i>Boiga cynodon</i>	0	0	1
<i>Chrysopelea paradisi</i>	1	0	1

<i>Coelognathus erythrurus erythrurus</i>	0	1	1
<i>Dendralephis pictus</i>	0	1	0
<i>Gonyosoma oxycephalum</i>	0	0	2
<i>Naja samarensis</i>	0	1	0

Species



Eutropis multifasciata

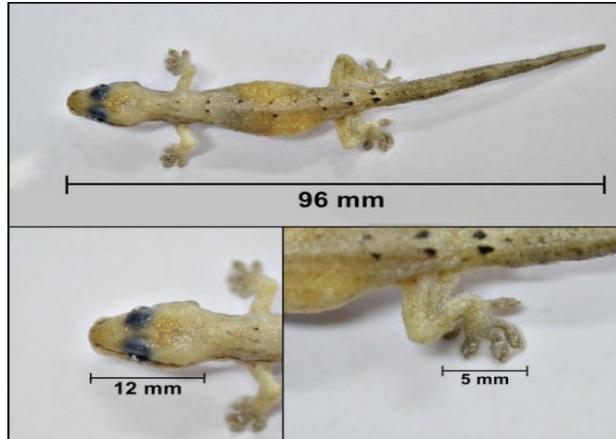
A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

Family: Scinidae

Genus: *Eutropis*

Species: *Eutropis multifasciata* (Kuhl, 1820)

Common Name: Many-lined Sun Skink, Many-striped Skink, or Common Sun Skink



Hemidactylus platyurus

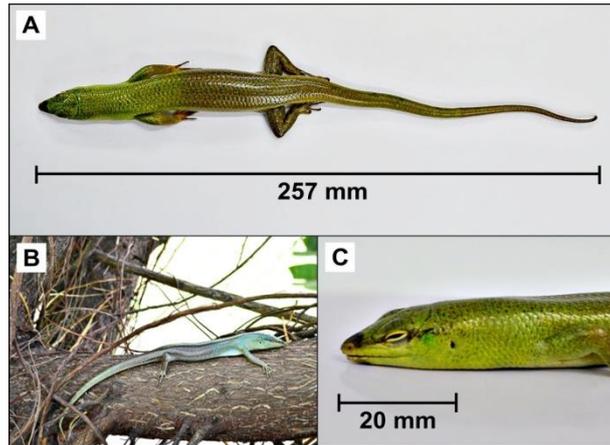
A.) Dorsal view, B.) Inset – Head, C.) Hand detail

Family: Gekkonidae

Genus: *Hemidactylus*

Species: *Hemidactylus platyurus* (Schneider, 1792)

Common Name: Flat-tailed house gecko



Lamprolepis smaragdina philippinica

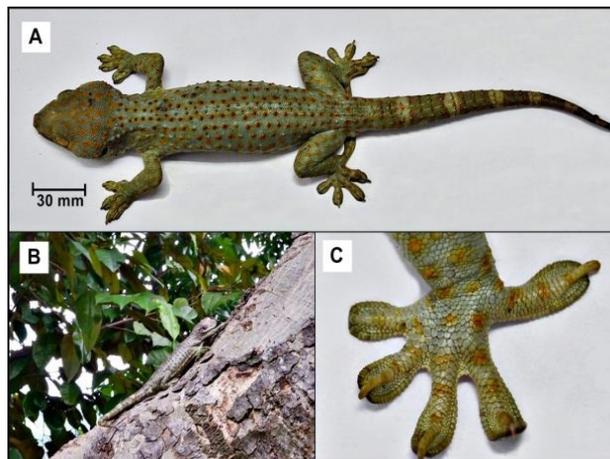
A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

Family: Scinidae

Genus: *Lamprolepis*

Species: *Lamprolepis smaragdina philippinica* (Mertens, 1928)

Common Name: Emerald Green Tree Skink or Tabili



Gekko gecko

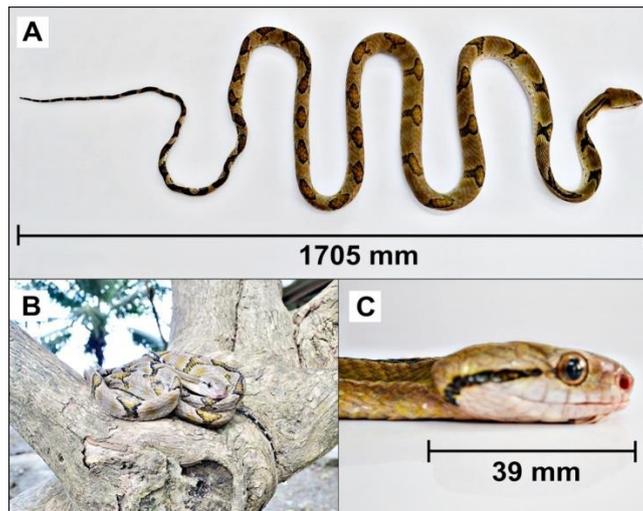
A.) Dorsal view, B.) Natural habitat, C.) Hand detail

Family: Gekkonidae

Genus: *Gekko*

Species: *Gekko gecko* (Linnaeus, 1758)

Common Name: Tokay gecko or Tuko



Boiga cynodon

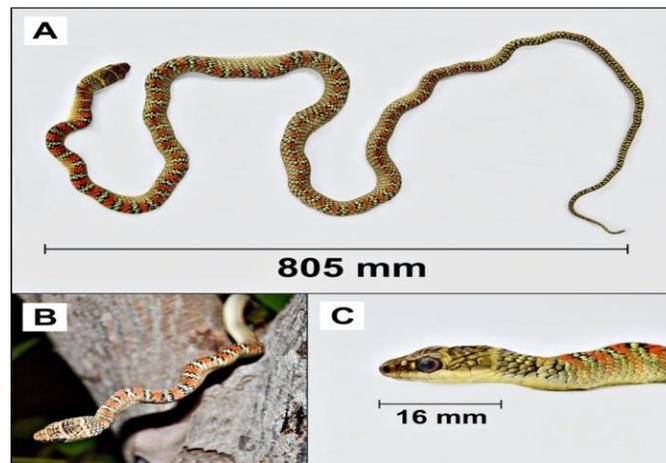
A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

Family: Colubridae

Genus: *Boiga*

Species: *Boiga cynodon* (Boie, 1827)

Common Name: Dog-toothed Cat Snake



Chrysopelea paradisi

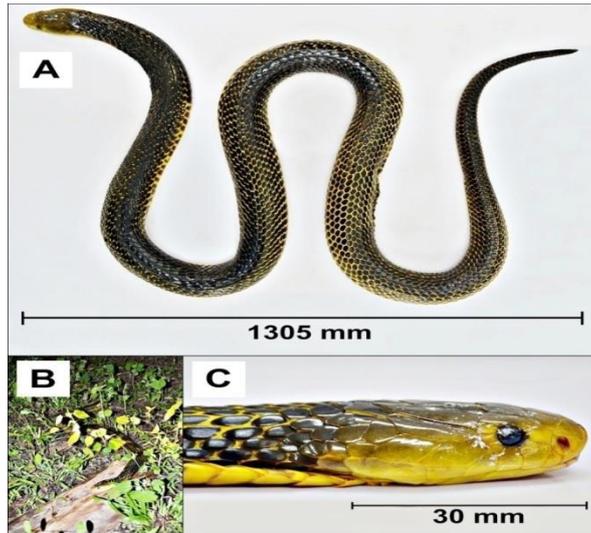
A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

Family: Colubridae

Genus: *Chrysopelea*

Species: *Chrysopelea paradisi* (Boie, 1827)

Common Name: Garden Flying Snake, Paradise Flying Snake, Paradise Tree Snake



Naja samarensis

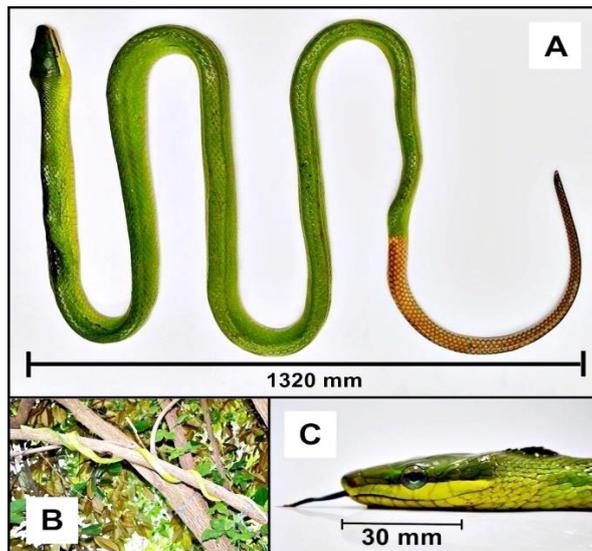
A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

Family: Elapidae

Genus: *Naja*

Species: *Naja samarensis* (Peters, 1861)

Common Name: Samar cobra or Southeastern Philippine Cobra



Gonyosoma oxycephalum

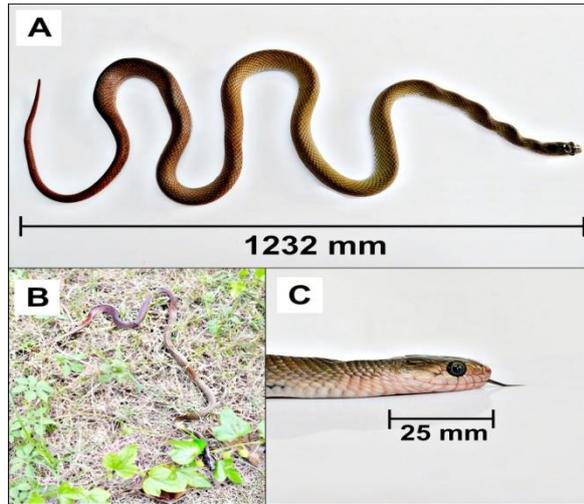
A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

Family: Colubridae

Genus: *Gonyosoma*

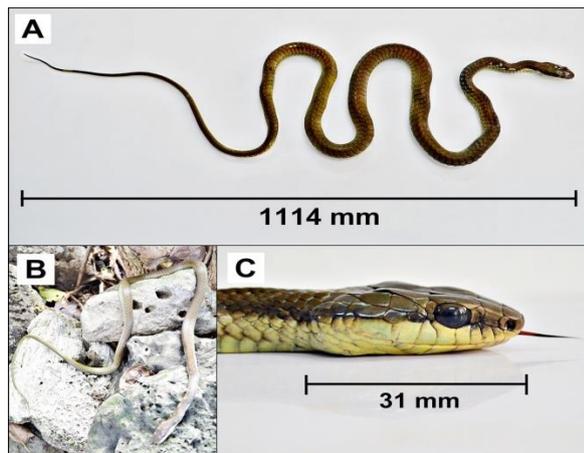
Species: *Gonyosoma oxycephalum* (Boie, 1827)

Common Name: Red-Tailed Racer, Red-tailed Green Ratsnake, or Arboreal Rat Snake



Coelognathus erythrurus erythrurus
 A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

Family: Colubridae
Genus: *Coelognathus*
Species: *Coelognathus erythrurus* (Duméril, Bibron & Duméril, 1854)
Common Name: Philippine Red-Tailed Brown Rat Snak



Dendrelaphis pictus
 A.) Dorsal view, B.) Natural habitat, C.) Inset – Head

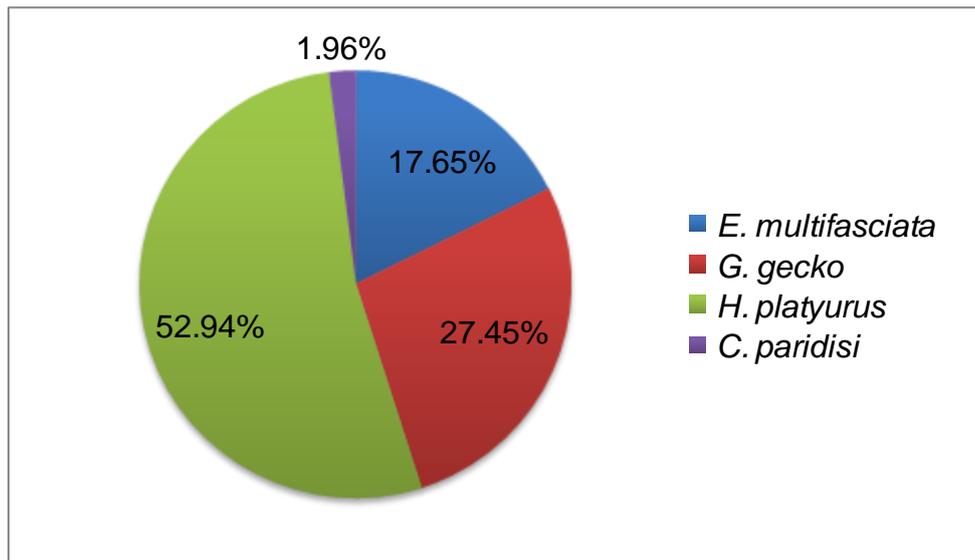
Family: Colubridae
Genus: *Dendrelaphis*
Species: *Dendrelaphis pictus* (Gmelin, 1789)
Common Name: Painted Bronzeback

Conservation Status (IUCN, 2016) of Squamates in Barangay Kauswagan, Barangay Balulang, and Barangay FS Catanico

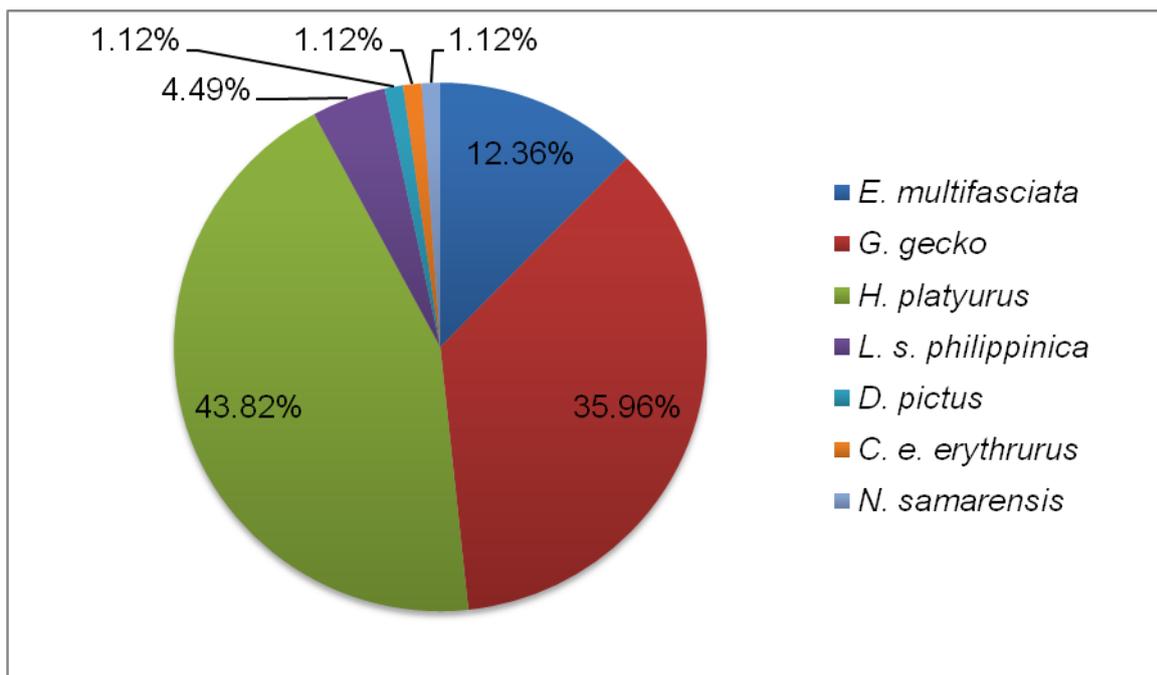
Species Name	Conservation Status
<i>Eutropis multifasciata</i>	Data Deficient (DD)
<i>Gekko gekko</i>	Least Concern (LC)
<i>Hemidactylus platyurus</i>	Least Concern (LC)

<i>Lamprolepis smaragdina philippinica</i>	Least Concern (LC)
<i>Boiga cynodon</i>	Least Concern (LC)
<i>Chrysopelea paradise</i>	Least Concern (LC)
<i>Coelognathus erythrurus erythrurus</i>	Not Evaluated (NE)
<i>Dendrelaphis pictus</i>	Least Concern (LC)
<i>Gonyosoma oxycephalum</i>	Least Concern (LC)
<i>Naja samarensis</i>	Least Concern (LC)

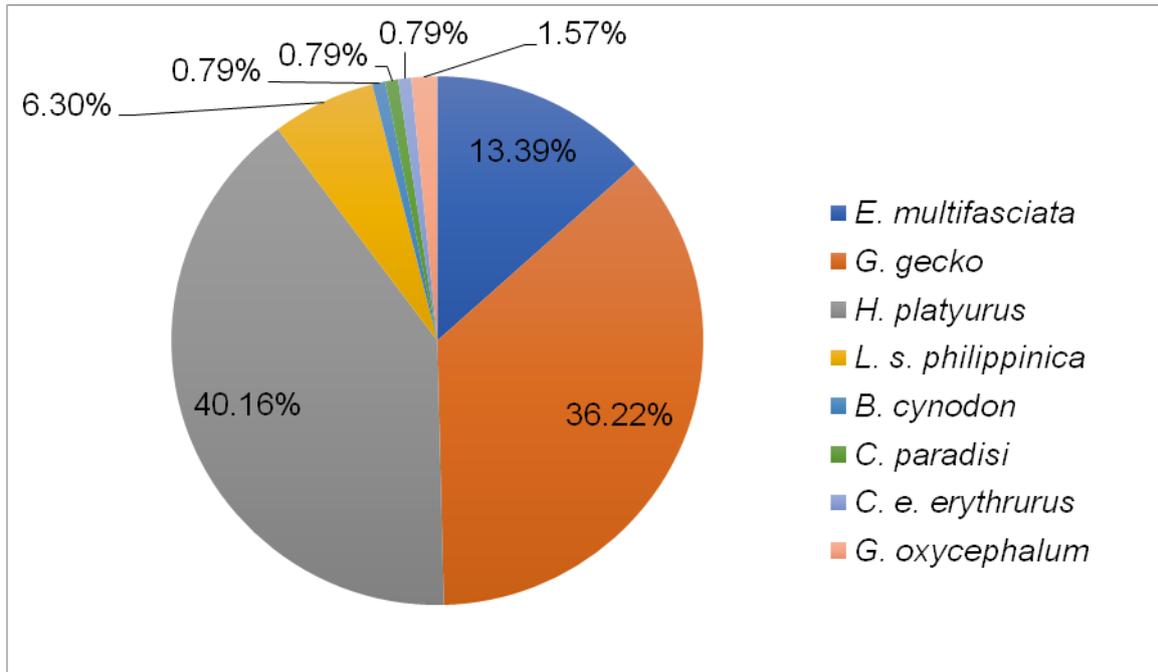
RELATIVE ABUNDANCE OF SQUAMATES



Relative Abundance of Squamates in **Barangay Kauswagan**



Relative Abundance of Squamates in **Barangay Balulang**



Relative Abundance of Squamates in **Barangay FS Catanico**

SPECIES DIVERSITY AND SPECIES EVENNESS

Computed Species Diversity and Species Evenness of Squamates in the Three (3) Areas

Sampling Area	H'	Species Evenness
Barangay Kauswagan	1.08	0.73
Barangay Balulang	1.28	0.51
Barangay FS Catanico	1.36	0.49
Overall	1.32	0.37

SUMMARY AND CONCLUSIONS

The study was conducted to assess the squamates species and their recent conditions in Barangay Kauswagan, Barangay Balulang, and Barangay FS Catanico, Cagayan De Oro City. At least ten (10) sampling sites were established in each area and located nearly to the river. Each area was sampled not less than five (5) times within the months of September to November 2016. Improvised traps and Cruising-Transsect walk method were used during the sampling. Captured species were measured, documented and then released back to their designated habitat. Representatives of each species were preserved.

A total of ten (10) squamates species and 267 individuals were found in the three (3) barangay areas, four (4) species of lizards namely: *Gekko gecko*, *Hemidactylus platyurus*, *Lamprolepis smaragdina philippinica*, and *Eutropis multifasciata* while six (6) different species of snakes: *Boiga cynodon*, *Naja samarensis*, *Chrysopelea paradisi*, *Gonyosoma oxycephalum*, *Coelegnathus erythrurus erythrurus*, and *Dendrelaphis pictus* were identified belonging to four (4) families.

Barangay FS Catanico had the highest species diversity with 1.36, followed by Barangay Balulang with 1.28, while Barangay Kauswagan had the least species diversity of 1.08.

RECOMMENDATIONS

The sampling time for this study should be longer to capture more squamate species. There should be follow-up studies every year to monitor the diversity of squamates in urban areas and to assess their conservation status.

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