



**GLOBAL SOUTH BIOBLITZ 2020- Biodiversity Inventory at
Giraffe Centre
Rapid Citizen Science Biodiversity Sighting, Conducted on
September 26th 2020**

ABSTRACT

Biodiversity mapping and identification through citizen science contributes to active wildlife education and ecological monitoring. The Global Southern Citizen Science Bioblitz 2020 offered a platform to promote experiential learning and institutional collaboration among wildlife, environment and natural resource enthusiasts. This voluntary exercise also attempted to compile a rapid biodiversity inventory within the Giraffe Sanctuary; support environmental education initiatives and guide policies based on distribution of biodiversity in the city of Nairobi. Over 60 different species were sighted with 56 species identified comprising of plants (n=30); birds (n=9); insects (n=7); macro-fungi (n=7); mammals (n=5); reptiles (n=2); and molluscs (n=1). Over five (5) types of macro-fungi were also observed. Invasive species are one major threats to the Giraffe Centre. The study highlighted a rich diversity of biota in the sanctuary underscoring the need to its conservation, the diverse hosted spaces and habitats (green space in Nairobi) as per the Vision 2030; myriad of UN Sustainable Development Goals; the Convention of Biological Diversity and Aichi Sustainability Targets and other global initiatives. The study proposes continuous extensive biodiversity inventories to document species within the Giraffe Centre and active conservation of the same.

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Introduction

Citizen science is the use of participatory collection, monitoring and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists. The data collected, through active participatory action, can guide advancements in scientific research by improving the scientific communities' capacity, as well as an increasing the public's understanding of science. Citizen science is also known as community science, volunteer monitoring, or public participation in scientific research.

The Global Southern BioBlitz (GSB) Challenge 2020 initiative sort to map and identify local flora and fauna within the southern hemisphere. It called for residents to take pictures of lifeforms together with their locations and then uploading them onto a central database via the iNaturalist app (accessible via smart phones) or computer. This was the inaugural Southern BioBlitz challenge, following the successful participation of Australia in the global 'City Nature Challenge' in 2020.

The 2020 GSB was held from Friday the 25th of September (00:00 local "Area" time) until the end of Monday on the 28th of September (23:59 local "Area" time), incorporating different communities, areas and regions across the Southern Hemisphere¹.

Objective of the Global South BioBlitz 2020

The GSB 2020 sort to promote an intensive biological survey aimed at attempting to record all the living species within several designated areas across the Southern Hemisphere in spring, while engaging the public in science and nature learning.

The outcomes of the bioblitz can also be used by respective jurisdictions in formulating environmental education programs and guiding policies based on distribution of biodiversity (spatial and temporal sighting changes)

Methodology

The Global Southern BioBlitz 2020 inventory at Giraffe Centre was conducted on Sunday 27 September 2020. A transect walk along a pre-determined route was used, led by our guide Mr. Victor, commencing at 10:15am. Whenever unique biodiversity was sighted, the citizen science team stopped, took pictures and their respective geo-tagged locations. The species that were known were identified on the spot with the aid of field guides while those not known noted for further identification. The team later uploaded the pictures and geo-coordinates on the iNaturalist platform as per the protocols. The transect walk offered an opportunity for the team to learn on-site about the Giraffe Centre and related attributes, and across multiple habitats.

¹ Global South BioBlitz 2020 <https://www.inaturalist.org/projects/great-southern-bioblitz-umbrella>



The team comprised of three professional and amateur citizen scientists and biodiversity enthusiasts. They were Mr. Waswala Brian Olewe (Wildlife and Landscape Ecologist; and Lecturer, Maasai Mara University); Mr. Kirapash Saidimu, (undergraduate Environmental Management, African Nazarene University) and Ms. Lucy Wanjiru Njenga (undergraduate Wildlife Conservation and Management, University of Nairobi). The team was accompanied by Mr. Victor Ratego. We had anticipated to host a bigger number of higher education institution student representatives drawn from the wildlife, forestry and natural resources management faculties countrywide in the challenge. However, this was not the case as the students were on recess with most having travelled upcountry (due to the COVID-19 pandemic that has stalled major formal learning opportunities).

The team also adhered to Covid-19 health protocols as per the government regulations and sanctuary requirements. The iNaturalist scientific community, through citizen science, helped in the identification of some of the species within the facility.

The excursion at Giraffe Centre offered an intergenerational learning and transformative leadership platform, as it allowed the students familiarize themselves with various habitats; wildlife (macro-fungi, plant and animals) within the Giraffe Centre. The students also interacted with diverse members of Giraffe Centre staff; and were also able to see some of the anthropogenic challenges and possible environmental education solutions facing conservation in the city of Nairobi. The small number of active participants was due to the adherence of government health protocols.

Results

Habitats

The transect walk traversed multiple habitats and ecotones of Giraffe Centre. These habitats and ecotones include the closed canopy forest; woodland savannah and multiple riparian ecosystems comprised of (river/streams and constructed wetlands).

Species at Giraffe Centre

Over 60 species were visibly sighted, with 56 species actively identified by the team and the iNaturalist scientists, during the GSB 2020² (Table 3). The rapid biodiversity inventory covered 6.8 kilometres in 1 hour 38 minutes.

² GBS Nairobi 2020: <https://www.inaturalist.org/projects/greater-southern-bioblitz-2020-kenya>



Figure 1: Trail used during the Global South BioBlitz 2020

Identification / Species sighted	In Giraffe Centre	In Kenya	Globally
Observations	77	449	91,354
Positively IDed Species	56	222	12,451
Identifiers	5	73	2,180
Observers	4	33	3,128

Table 1: Species sighted during the Global South BioBlitz 2020

Plants were the most sighted taxa, with 30 species actively identified; followed by birds (n=9); insects (n=7); macro-fungi (n=7); mammals (n=5); reptiles (n=2); and molluscs (n=1). Over five (5) types of macro-fungi (view annex) were sighted on rotting wood. This underscores the importance of microbe assemblies as detritivores, vital in the nutrient and energy cycles.

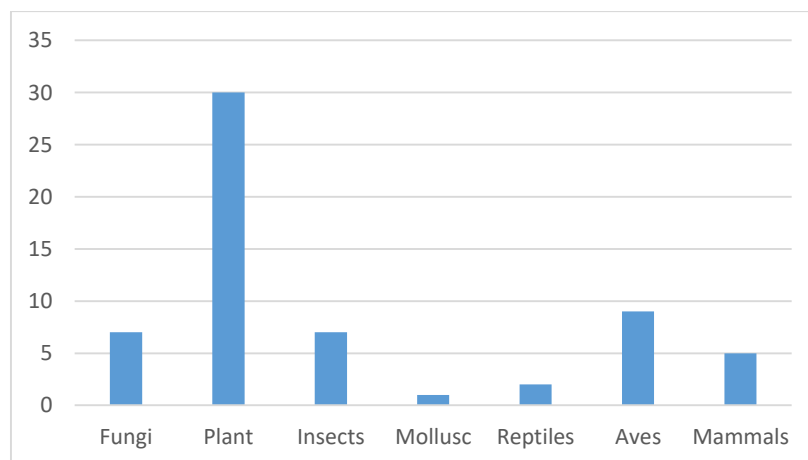


Table 2: Species diversity of sighted taxa during GSB 2020 at Giraffe Centre



No.	English name	Binomial nomenclature	Taxa
1	Shield Lichen	Subfamily Mimosoideae	Fungi
2	Devil's Horsewhip	<i>Achyranthes aspera</i>	Plant
3	Eve's Needle Cactus	<i>Austrocylindropuntia subulata</i>	Plant
4	Black-Jack	<i>Bidens pilosa</i>	Plant
5	Arabian Num-Num	<i>Carissa edulis</i>	Plant
6	Ferns	Class Polypodiopsida	Plant
7	Sudanese Tree-Euphorbia	<i>Euphorbia candelabrum</i>	Plant
8	Crown-of-Thorns	<i>Euphorbia milii</i>	Plant
9	Nabooms and Noorses	<i>Euphorbia</i> sp.	Plant
10	Aloes (Kamba: Kiluma; Kikuyu: Kiruma, Thukurui; Luo: Ogaka; Maasai: Osuguroi)	Genus <i>Aloe</i>	Plant
11	Asparagus	Genus <i>Asparagus</i>	Plant
12	Roselings	Genus <i>Callisia</i>	Plant
13	Dayflowers	Genus <i>Commelina</i>	Plant
14	Crotons (Kikuyu / Embu / Meru: Mukinduri; Luhya: Musine; Maasai: Olmerguet; Nandi: Masineitet; Samburu: Marakuwet)	Genus <i>Croton</i>	Plant
15	Milkweeds	Genus <i>Gomphocarpus</i>	Plant
16	Morning-Glories	Genus <i>Ipomoea</i>	Plant
17	Lantana* (Luo: atek / nyabend winy; Giriama: Mushomoro; Kamba: Mukiti; Kikuyu: Mukigi; Kiswahil: Mshomoro)	Genus <i>Lantana</i>	Plant
18	Prickly Pears*	Genus <i>Opuntia</i>	Plant
19	Sages	Genus <i>Salvia</i>	Plant
20	Nightshades*	Genus <i>Solanum</i>	Plant
21	Teclea (Munderendu, Olgelai, Kuriot)	<i>Vepris nobilis</i>	Plant
22	Bulrushes and Cattails	Genus <i>Typha</i>	Plant
23	Sea Hibiscus	<i>Hibiscus tiliaceus</i>	Plant
24	Mother of Thousands*	<i>Kalanchoe delagoensis</i>	Plant
25	Red and Blue Water Lily*	<i>Nymphaea nouchali</i>	Plant
26	African Olive (Mutamaiyu, Mlamuru, Muthata)	<i>Olea europaea</i> ssp. <i>Cuspidate</i>	Plant
27	Grasses, Sedges, and Allies	Order Poales	Plant
28	Moss	Phylum Bryophyta	Plant
29	Giant Salvinia	<i>Salvinia molesta</i>	Plant
30	East African wild sisal	<i>Sansevieria ehrenbergii</i>	Plant
31	Cat-Thorn	<i>Scutia myrtina</i>	Plant



32	Black-eyed Susan Vine	<i>Thunbergia alata</i>	Plant
33	Western Honey Bee	<i>Apis mellifera</i>	Insect
34	Dragon Fly / Skimmers	<i>Orthetrum julia</i>	Insect
35	Carpenter and Sugar Ants	Genus Camponotus	Insect
36	Grasshopper	Order Orthoptera	Insect
37	Stick Insects	Order Phasmida	Insect
38	Clouded Mother-of-Pearl Butterfly	<i>Protogoniomorpha anacardii</i>	Insect
39	House Flies and Allies	Tribe Muscini	Insect
40	Slug	Class Gastropoda	Mollusc
41	Wall Lizard	<i>Adolfus sp.</i>	Reptile
42	Forest Lizard	<i>Adolfus sp.</i>	Reptile
43	Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>	Ave
44	Amethyst Sunbird	<i>Chalcomitra amethystine</i>	Ave
45	Variable Sunbird	<i>Cinnyris venustus</i>	Ave
46	Streaky Seedeater	<i>Crithagra striolata</i>	Ave
47	Black-backed Puffback	<i>Dryoscopus cubla</i>	Ave
48	African Fish-Eagle	<i>Haliaeetus vocifer</i>	Ave
49	White-eyed Slaty-Flycatcher	<i>Melaenornis fischeri</i>	Ave
50	Common Bulbul	<i>Pycnonotus barbatus</i>	Ave
51	Abyssinian Thrush	<i>Turdus abyssinicus</i>	Ave
52	Southern Tree Hyrax	<i>Dendrohyrax arboreus</i>	Mammal
53	African Bush Squirrels	Genus Paraxerus	Mammal
54	Rothschild's Giraffe	<i>Giraffa camelopardalis ssp. Rothschildi</i>	Mammal
55	Blue Monkey	<i>Cercopithecus mitis</i>	Mammal
56	Common warthog	<i>Phacochoerus africanus</i>	Mammal

Table 3: Identified species at the Giraffe Centre (GBS 2020)

* invasive species

Threats to the Giraffe Centre

Proliferation of invasive species are the major threat to the Giraffe Centre. These species have the ability to alter the ecological niches, community structure, composition, and ecosystem processes within the sanctuary in ways that may not be anticipated or desirable. It is therefore vital that the sanctuary is well preserved to reduce their proliferation. Some of the noticeable invasive species are: tickberry (*Lantana sp.*); prickly pears / cactus (*Opuntia sp.*); nightshades (*Solanum sp.*); and mother of thousands (*Kalanchoe delagoensis*).



Conclusion

Giraffe Centre is a vital green space in Nairobi offering supportive, provisional, regulatory, and cultural ecosystem services. It is also refuge to diverse biota and migratory corridor between Ngong Forest and Nairobi National park. The Giraffe Centre management together with stakeholders need to actively preserve the giraffe sanctuary for future generations. The GBS 2020 was a great citizen science opportunity advocating for continued and sustained institutional collaboration, networking, research and monitoring of species. It underscored the need for upscaling action based environmental education in line with Science, Technology, Engineering and Math (STEM); increased mapping of biodiversity especially by the youth; and promotion of inter-generational learning and transformative leadership through mentorship especially through mentorship.

The GBS 2020 activity contributes to conservation of biodiversity and advocacy for green spaces in line with Kenya's Vision 2030; Africa Union Vision 2063; myriad of UN Sustainable Development Goals; the Convention of Biological Diversity and Aichi Sustainability Targets; the post-2020 Global Biodiversity Framework; and the upcoming UN Decade on Ecosystem Restoration 2021-2030.

Recommendations

- i. **Conduct an intensive biodiversity inventory.** This would contribute to biodiversity conservation and monitoring as per Kenya's National Wildlife Strategy 2030, the Convention of Biological Diversity (CBD) and the Aichi Suitable Targets, among other national, regional and international conservation strategies. This can be conducted every 2-3 years to update the baseline;
- ii. **Conduct continuous frequent rapid biodiversity inventories** (quarterly, bi-annually or seasonally). The sightings should be held at various times (morning, mid-day and evening) as various animals are active at different times. The inventories will increase chances of seasonal biodiversity sightings and documentation and compliment the intensive biodiversity inventory;
- iii. **Development of multiple biodiversity check-lists** that can be used by visitors/tourists who visit the giraffe sanctuary for species identification. These checklists can be on selected plants; birds and mammals; and invertebrates;
- iv. **Increase awareness of the public about Giraffe Centre as a remnant green space** in Nairobi, and a **wildlife corridor** between Ngong Hills and Nairobi National Park. This can be done by mainstreaming environmental education and public participation to highlight the under-tapped ecotourism potential;
- v. **Erect signage and disposal bins** to reduce incidents of poor solid waste disposal. Tourists can also be informed on impacts of plastic waste on the ecosystem;
- vi. **Active management of invasive species.** Biological and mechanical methods can be employed to manage *Solunum* sp., *Opuntia* sp. and *Lantana* sp., before they proliferate and colonise vital wildlife areas. Tourists visiting the facility can also be enlightened on these species and their impacts in the ecosystem; and



- vii. **Propose and develop collaborations with academia and taxonomists** as the sanctuary is a good experiential learning outdoor classroom. It was noted that many taxonomists neither get involved in citizen science nor offer mentorship to wildlife enthusiasts. The monthly bird-walks hosted at the Giraffe Centre can be shared with wildlife and natural resource enthusiast students in most higher education institutions to increase their bird identification and ecosystem knowledge. They can also contribute to the taxonomical naming of trees and related diversity.




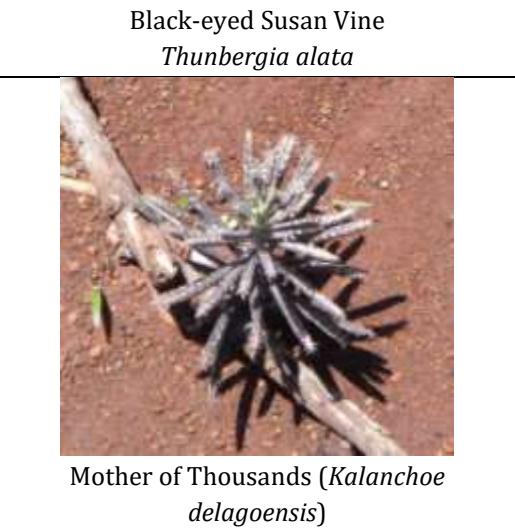
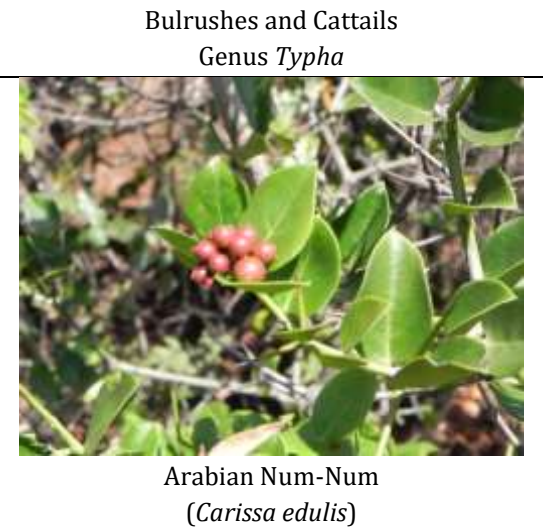


Acknowledgment

The GBS 2020 at Giraffe Centre would not have been possible without the help of God (for good health and life); Mrs. Nyang'aya Christine, the Chief Executive Officer, African Fund for Endangered Wildlife Kenya, for according us a waiver to access the facility; and the Education Department team. We are also grateful to Mr. Emmanuel Ngumbi for his collaborative support; Mr. Stanley Kosgei, Mr. Victor Ratego and Mrs. Judy Sembe for cordial hospitality, not to forget the security team for their warm reception and customer care.

Annex

Annex 1: Photo Mosaic of selected taxa during the Global Southern BioBlitz 2020

Lichen and Moss	 <p data-bbox="647 734 708 763">Moss</p>	 <p data-bbox="1182 734 1259 763">Lichen</p>
Macro-fungi	 <p data-bbox="635 1153 719 1182">Fungi 1</p>	 <p data-bbox="1177 1153 1262 1182">Fungi 2</p>
	 <p data-bbox="635 1579 719 1608">Fungi 3</p>	 <p data-bbox="1086 1579 1353 1608">Fungi 4 - Bracket Fungi</p>
	 <p data-bbox="544 2004 810 2033">Fungi 5 - Bracket Fungi</p>	 <p data-bbox="1031 2004 1409 2033">Fungi 6 - Genus <i>Anthracophyllum</i></p>

		
Plants		
		
		

Fungi 7

Black-eyed Susan Vine
Thunbergia alata

Bulrushes and Cattails
Genus *Typha*

Mother of Thousands (*Kalanchoe delagoensis*)

Arabian Num-Num
(*Carissa edulis*)

Aloe sp.

Section Euphorbia - Nabooms and Noorses



East African wild sisal (*Sansevieria ehrenbergii*)



Night-shade (*Solanum*)



Crown-of-Thorns (*Euphorbia milii*)



Sea Hibiscus (*Hibiscus tiliaceus*)



Giant Salvinia (*Salvinia molesta*)



Red and Blue Water Lily (*Nymphaea nouchali*)



Prickly Pears (Genus *Opuntia*)



Milkweed (Genus *Gomphocarpus*)

Invertebrates



Clouded Mother-of-Pearl butterfly
(*Protophormora anacardii*)



Skimmer dragonfly
(*Orthethrum julia*)



Carpenter and Sugar Ants



Mollosc - slug



Grasshopper



House Flies (Family Muscidae)



Stick Insects (Order Phasmida)



Western Honey Bee (*Apis mellifera*)

Lizards



Tree Lizard
(*Adolfus* sp.)



Wall Lizard
(*Adolfus* sp.)

Birds



Streaky Seedeater
(*Crithagra striolata*)



Amethyst Sunbird
(*Chalcomitra amethystina*)



White-eyed Slaty-Flycatcher
(*Melaenornis fischeri*)






Abyssinian Thrush
(*Turdus abyssinicus*)



Red-billed Ox-pecker
(*Buphagus erythrorhynchus*)




Mammals	 <p data-bbox="558 593 798 658">Blue Monkey (<i>Cercopithecus mitis</i>)</p>	 <p data-bbox="1085 593 1356 658">Southern Tree Hyrax (<i>Dendrohyrax arboreus</i>)</p>
	 <p data-bbox="542 1046 813 1111">African Bush Squirrels (<i>Paraxerus</i> sp.)</p>	


Annex 2: Global Southern Bioblitz 2020 Call

Global Southern, Bioblitz 2020 Kenya Edition

**25 to 28
SEPTEMBER**

Theme: Using Citizen Science for Biodiversity Conservation and Environment Education





Taking Part is Easy

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Take Pictures of What you Find

Be sure to note the location of the nature using location services on your phone

Share Your Observation

By uploading your findings to iNaturalist on your phone or computer: 25-28 September (midnight)

@GSBioBlitz, @iNaturalist and #CitizenScience <https://www.inaturalist.org/projects/greater-southern-bioblitz-2020-kenya>