

# THE PROJECT





Expanding the visibility of the Lagos Herbarium through Digitization and Mobilization of Plant Specimen Data

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## INTRODUCTION



## THE ISSUES

- Uncatalogued or in form of hand written notes in registers
- None digitized
- None visible online





## FUNDER

Project ID: BID-AF2020-009-INS (€18,850)
Grant type: Institution-Level biodiversity data mobilization grants
Duration: 18 months (April 2021 – October 2022)





## AIM

To digitize and publish information from preserved vascular plant collections as well as associated metadata and images at LUH to ensure access for conservation assessments, policy making and stakeholder use.



# METHODOLOGY



# DATA SOURCES

#### 1. Herbarium Collections



• Herbarium sheets and vegetal materials (seeds, foliage, branches, bark, dried/preserved fruits...)

#### 2. Literature





#### Online database for mosquits (Diptera, Culicidae) occurrence records in French Guiana

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Published or in press scientific articles





## OUR PROCESSING WORKFLOW







## ACHIEVEMENT

- Kick off Stakeholders' engagement meeting
- Data Mobilization
  - 10,000 occurrence data
  - ~4,000 checklist data
  - Electronic identification access key LUCID
  - Capacity enhancement workshop for Government agencies MOEWR
  - Regional capacity building workshop on Data Use
  - Specimen imaging 7,000 done others in progress
  - Academic article:
    - Useful plants of Lagos Herbarium (in progress)
    - Medicinal Plants of Gashaka-Gumti National Park (in progress)
  - Data Paper
    - The Higher Plants of the Lagos University Herbarium (in progress)





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#### Expanding the visibility of the Lagos Herbarium through digitization and mobilization of plant specimen data

Expanding the visibility of the Lagos Herbarium Brough digitization and mobilization of plant operation data

🗈 5 April 2021 - 31 October 2022 🛛 € 18,850

NEWS & EVENTS DATASETS

	Construct Petitik
3-Day Capacity Building Workshop	Even
re GBIF-BID Project Team BID-AF2020-023-NAC on Expanding the vasibility of the Lagos Herbarum through glization and mobilization of plant specimen data, invite to a 3-day Capacity Building Works	28 Jun
Nigeria - Lagos - NSPRI Guest House, Akoka Jame 28, 3922 - Jame 30, 2022	2022
E ADD TD CAUENDAR	
apacity Building Training on Biodiversity Digitization for staff of Conservation and cology Department	Even
apacity Building Training on Biodiversity Digitization for staff of Conservation and Ecology Department, Ministry the Environment and Water Resources, is connection with the GBIF-4ID Project Team	23 Feb
Nigeria - Lagos - Mauca, Beija Fabruary 23, 2022 - February 24, 2022	2022
takeholders Engagement Meeting I	Even
re GRIF-4(D Project) Team B(D-N22020-409-RK5 on Expanding the visibility of the Lagos Herbarium through grization and mobilization of plant specimen data, held the front Stakkholders engagement mee.	13 Jan
Nigeria - Lagos - University of Lagos - January 13, 2022 10:00	2022

E 18,850 FUNDED BY



 6/25/22, 10:26 PM

Expanding the visibility of the Lagos Herbarium through digitization and mobilization of plant specimen data

PROJECT APPROVED

#### Expanding the visibility of the Lagos Herbarium through digitization and mobilization of plant specimen data

E 5 April 2021 - 31 October 2022 € 18,850

ABOUT NEWS & EVENTS DATASETS



113 records

### **UNIVERSITY OF FIRST CHOICE AND THE NATION'S PRIDE**

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ABDUT



The Mobilization Team







**Capacity Building for Lagos State Government Officials** 

LUCID 4.0
<b>KEY DEMO</b>

Flower	Green/brov Often ve Leaves broad	wn flowers. ery small Grass-like leaves	Т	rees an	d Shruk	os	Family nar The name's	ne changes: been changed the same!
Single or pair	Araceae 88534 <sup>495-497</sup> Plantaginaceae 71 <sup>387-389</sup>	Caryophyllaceae 13-16122-38	-	'leurene met e			Correct name v	vith a star*
	Caryophyllaceae 13-16,139-160 Caryophyllaceae 13-16,139-160		F	lowers not g	reen or brow	/n	Aplaceae" = Ur	Compositae
ΙY	Liliaceae 86646-60 503-317		Bilateral 🔒		Radial symmetry		Brassicaceae*	= Cruciferae
	Euphorbiaceae 75316-20		symmetry 丛	White	Yellow	Pink/Purple	Compositae = /	Asteraceae*
In Leaf Axils	Polygonaceae 73-4 (140-27) Chenopodiaceae 71-3 (12) (240-28) Rosaceae 26-31 (240-72) (240-76) Euphorbiaceae 75 (16) (200) Urticaceae 76 (16) (220-28) Calibrichaceae 34 (16) (200) Calibrichaceae 34 (16) (200) Viscaceae 75 (14) (16) (200) Plantaginaceae 71 (404) (16) (16) (16) (16) (16) (16) (16) (16	Carvophyllaceae 13-16 122-58 Chenopodiaceae 71-3 122-58 Chenopodiaceae 71-3 122-58 Chenopodiaceae 71-3 122-58 Chenopodiaceae 71-3 122-58	Fabaceae 21-25 7, 14(202) Capifoliaceae 4 14524 Ericaceae 55 <sub>212-20</sub> 202021 Hippocastanaceae -328	Rosaceae 26-31 $_{240}^{242,342}$ Aquifoliaceae 20 $_{314}^{342,342}$ Caprifoliaceae 41 $_{4524}^{24,422}$ Cornaceae 41 $_{3143}^{23,340}$ Rhamnaceae 20 $_{322}^{312}$ Hippocastanaceae $_{326}^{395}$ Oleaceae 58 $_{406}^{390}$ Ericaceae 55 $_{212,20}^{220,228}$ Hydrangeaceae	Hypericaceae 17,55,47 Berberidaceae 48,87 Grossulariaceae 33,226,37 Fabaceae 21-25,274,302 Comaceae 41,314 Rosaceae 26-31,240,72	Rosaceae 26-31 <sub>240-5</sub> $^{29}$ Buddleiaceae $_{104}^{49}$ Ericaceae 55 <sub>212-20</sub> $^{220-228}$ Grossulariaceae 33 $^{22}_{2268}$ Hippocastanaceae $_{326}^{415}$ Solanaceae 62-65 $^{265}_{366}$ Tamaricaceae 63 $^{27}_{174}$ Thymeleaceae 76 $^{306}_{306-12}$ Caprifoliiaceae $_{452.4}^{47.4436}$	Cruciferae = Br Fabaceae* = Le Graminae = Po Guttiferae = Hy Hypericaceae* Labiatae = Lam Lamiaceae* = L Leguminosae = Papillionaceae	assicaceae* aguminosae aceae* pericaceae* = Guttiferae iaceae* .abiatae Fabaceae* = Fabaceae*
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ALC:	Resedaceae 11212	Typhaceae 88644 502	Shape:	Catkin	Flower shaped	Other	Modern data some	times changes how we
	Euphorbiaceae /5316-20 Urticaceae 76 <sup>125-122</sup> Amaranthaceae 71 <sub>112</sub> <sup>738</sup> Cannabinaceae 76 <sub>96</sub> <sup>124</sup> Cucurbitaceae 36 <sub>174</sub> <sup>490</sup> Potamogetonaceae 89-90 <sup>456-450</sup> / <sub>522,300</sub> Scheuchzeriaceae 79 <sub>500</sub> <sup>496</sup> Ophi	Araceae 88 <sub>534</sub> ****7 Orchidaceae 80-265-82 Acoraceae 88 <sub>534</sub> ***** Potamogetonaceae 89-90522-30 Polygonaceae 73-4 <sub>140</sub> *** Araceae 88 <sub>534</sub> *****7 oglossaceae (fern)		Salicaceae 77-8 <sub>171-18</sub> Betulaceae 76-7 <sub>100</sub> <sup>125-128</sup> Fagaceae 77 <sub>98</sub> <sup>125-128</sup> Myricaceae76 <sub>98</sub> <sup>123</sup> Corylaceae 77 <sub>100</sub> <sup>125-128</sup> Juglandaceae <sup>123</sup>	Aceraceae 20 <sub>324-6</sub> <sup>316</sup> Tiliaceae 18 <sub>164</sub> <sup>179</sup> Celastraceae 20 <sub>314</sub> <sup>304</sup> Rhamnaceae 20 <sub>322</sub> <sup>312</sup> Thymeleaceae 76 <sub>305</sub> <sup>326</sup> Grossulariaceae 33 <sub>225</sub> <sup>426,37</sup> Chenopodiaceae 71-3 <sup>46,34</sup>	Fagaceae $77_{98}^{423+128}$ Ulmaceae $76_{96}^{129}$ Platanaceae . Oleaceae $58_{408}^{297}$ Eleagnaceae $75_{304}^{294}$ Buxaceae $41_{314}^{305}$	group inings: Som merged or broken u families (left) that a within larger familie an asterisk is more Åceraceae Buddlejaceae Chenopordiaceae	e ramiles nave been ip. Below is a list of re sometimes placed is (right). The one with scientifically correct. in Sapindaceae" in Scrophulariacer in Ameranthaceae
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Complex	Polygonaceae 73-4140-52 Cheroportiaceae 71-3	Graminae 95-9*586-642 74-95	Flowers	tiny (<2mm), mos	tly green	Flowers big	Empetraceae Escalloniaceae*	in Ericaceae* in Grossulariacea
group	Euphorbiaceae 75316-20	Juncaceae 86-7537-45 <sup>74-95</sup>	Leaves all	Leaves	Tiny,	and/or	Fumariaceae	in Papaveraceae*
20 20	Rosaceae 26-31240-72 Urticaceae 7605121-122	Chenopodiaceae 71-3102-14 Polygonaceae 73-4140-52	at stem base	all along stem	floating plant	white/coloured	Hippocastanacea Illecebraceae	e in Sapindaceae" in Caryophyllacea
Tight head	Cannabinaceae $76_{96}^{121}$ Amaranthaceae $71_{112}^{126}$ Cuc Saxifragaceae $32_{254}^{326}$ Scor Gunneraceae Ophiog Plantaginaceae $71_{404}^{387,389}$ Euphorbiaceae $73_{405}^{387,389}$ Chenopodiaceae $102_{14}^{129,137}$ Rosaceae $26-31_{240}^{326,372}$ Amaranthaceae $71_{112}^{128}$ Adoxaceae $41_{452}^{426,447}$ Adoxaceae $41_{452}^{426,447}$	curbitaceae 36 <sub>174</sub> <sup>190</sup> hphulariaceae 62-65406-30 Juncaceae (fern) Juncaceae 86-7 <sub>537-46</sub> <sup>74-95</sup> Graminae 95-9 <u>586-642</u> <sup>74-95</sup> Cyperaceae 91-4 <u>548-84</u> <sup>74-95</sup> Sparganiaceae 88 <sub>644</sub> <sup>500-507</sup> Asteraceae 44-54 <sub>460-516</sub> <sup>413417</sup> /iscaceae 75 <sup>304</sup>	Zosteraceae 90 <sub>532</sub> <sup>494</sup> Plantaginaceae 71 <sup>407,499</sup> Scrophulariaceae 62-65 <sup>67,404</sup> Cruciferae 6-11 <sup>46,210</sup> Isoetaceae (fern) <sup>47</sup> Eriocaulaceae 90 <sub>536</sub> <sup>499</sup>	Callitrichaceae $34_{40}^{40}$ Potamogetonaceae $89.90_{4}^{69}$ Haloragaceae $34_{304}^{39}$ Hippuridaceae $34_{402}^{392}$ Hydrocharitaceae $79_{52}^{392}$ Sparganiaceae $88_{54}^{540}$ Ceratophyllaceae $34_{72}^{39}$ Elatinaceae $17_{56}^{74}$ Cyperaceae $91.4_{548.64}^{74.91}$ Ruppiaceae/Najadaceae	Lemnaceae 88 <sub>534.6</sub> Azollaceae (Fern) <sup>499</sup> 90 <sub>532</sub>	Nymphaeaceae $5_{72}^{99}$ Menyanthaceae $59_{370}^{*}$ , 366 Polygonaceae $73-442527$ Hydrocharitaceae $79_{510}^{445.424}$ Alismataceae $79_{518}^{467.444}$ Campanulaceae $5442347$ Lentibulariaceae $6442547$ Ranunculaceae $1-478367$ Primulaceae $57-822267$ Butomaceae $79_{518}^{442}$	Menyanthaceae Monotropaceae Paeoniaceae* Parnassiaceae* Pyrolaceae Tiliaceae Scrophulariaceae h into Orobanchaceae Plantaginaceae (son Liliaceae has been i families by recent wi here. Check everyt	in Ceruanaceae in Ericaceae* in Ranunculaceae in Saxifragaceae in Ericaceae* in Malvaceae* as had species moved. Phrymaceae and hetimes "Veronicaceae" broken into many smalli prk. Not all are named ing on the pages given



## Imaging Activities







# Regional 3-Day Capacity Building Workshop

## OUTPUT

Approximately 14,000 plant specimen data is mobilized. User Friendly Electronic Identification key is developed for species identification.

Training in biodiversity informatics while also publicizing data resource and exportable model of data mobilization Insight into spatiotemporal distribution of plant species for improved conservation schemes.

Promote data sharing and collaboration



## Outcomes

- Foster data-mobilization relationships and responsibilities for effective assessment of biodiversity data in Lagos.
- Capacity development in biodiversity data handling.
- Improved access to and use of accurate biodiversity information in conservation and development planning.
- Policy implementation which is being coordinated by the Ministry of the Environment.



# LESSONS LEARNT

CHALLENGES AND SOLUTIONS



# CURATION



## **CURATION**

- Mounting of specimens on herbarium sheets
- Rearrangement and classification of specimens in the herbarium according to families
- Labeling of herbarium sheets.
- Name change of species e.g. *Nauclea latifolia* is now a synonym of Sarcocephalus latifolius.



## Reconciliations

- Some species' names were written without the names of the authorities. We added the authorities to the name of the species e.
- Reconciliation of LUH Number: In some instances, 3-4 species were wrongly assigned the same LUH number. This was resolved using the collection dates
- •
- Merging of Papilionoideae, Caesalpinioideae, and Mimosoideae as a single family (Fabaceae)
- Compositae was corrected as Asteraceae.



# SPECIMEN DIGITIZATION



# Imaging of the Specimen

- Specimens were placed on a White background Surface.
- Pictures were taken using a High definition Nikon 600d Camera with 50mm Lens, A tripod fitted with Umbrella reflector and AD 600 Light for Shadow removal.
- Pictures were taken with a camera due to the High cost of a Scanner.
- Pictures were edited using Adobe Photoshop Lightroom with Precaution of maintaining The Natural Look.
- Pictures were named using the Herbarium Voucher Code (Lagos University Herbarium LUH).







## **Cloud Storage and Link Generation**

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#### **Cloud Images**

(a)



https://drive.google.com/file/d/1DrcIZY3y\_IW9T7A\_zcjyfoi2YTvNFT8L/view?usp=sharing https://drive.google.com/file/d/1DrnG2tGqN2\_ulz2bsWfuACGxluuJRHZO/view?usp=sharing https://drive.google.com/file/d/1dROHcsg1orElTMEB- bQ8Uq1jYSXIMqy/view?usp=sharing https://drive.google.com/file/d/1DRsn3Ql0ql-iNgNKHuNgQXF6cwnmgWuJ/view?usp=sharing https://drive.google.com/file/d/1DSKkUhJVZBct4W6U-vcolZwO3iOHy9YH/view?usp=sharing https://drive.google.com/file/d/1DsKORKucXzKBpR4\_AZM9ipQtg5vUo4Q3/view?usp=sharing https://drive.google.com/file/d/1dSKxiNkfVBbUsGzSzDJNaxJ9sYgd6RRf/view?usp=sharing https://drive.google.com/file/d/1DSpCPAMAYXYDxUXNKIMem6Z10bkDWSWF/view?usp=sharin https://drive.google.com/file/d/1dsvAkQeayymu6hCFgSZLGhp6hERJFy2N/view?usp=sharing https://drive.google.com/file/d/1DSWMykrREDMhvsu9uHSqUthOSpOEaP2Y/view?usp=sharing https://drive.google.com/file/d/1dSWUQuflbj2xzpQbXns XiKh2rq-fbLK/view?usp=sharing https://drive.google.com/file/d/1DT w7YtDscijbybABj fu0mPuKOCOYq-/view?usp=sharing https://drive.google.com/file/d/1dT8c0TAtMj1WnNPHnXdbnHlclSBPgKnG/view?usp=sharing https://drive.google.com/file/d/1DTAvJpNARPixdYn9M3t7DQwEeomYLh9o/view?usp=sharing https://drive.google.com/file/d/1DtGxgwUtu-gz2ez4Tyew5fr66tTxDTax/view?usp=sharing https://drive.google.com/file/d/1DTYRZSVzxuUx6bk2zm-F2s762lOCOgi3/view?usp=sharing https://drive.google.com/file/d/1DuAvnTW9TofHUoKj-JStL-84yv337d59/view?usp=sharing https://drive.google.com/file/d/1dUBye WiSxWDdbr2b5RahtUJR4VOIGqL/view?usp=sharing https://drive.google.com/file/d/1DunDUQ4S2l8CCafM7J6jy3B9TUye7fqG/view?usp=sharing https://drive.google.com/file/d/1dus51F4Um7VUl2KqOXenMLWNYIAfZi28/view?usp=sharing https://drive.google.com/file/d/1dv9bTyhhhA9o7cREmsYcfmJNVy6v90 2/view?usp=sharing https://drive.google.com/file/d/1DvlhDeNGrDY9PpdfeA8lKjuqx\_VCByLD/view?usp=sharing https://drive.google.com/file/d/1dvLSZ-6zbcMTi2t3t4kf6SuWmNJJNpFV/view?usp=sharing https://drive.google.com/file/d/1dVXhi10BoplZWgmgohdBYrwL5Lq2Eh\_P/view?usp=sharing https://drive.google.com/file/d/1dWb9A52PpDqcOkLCSMsOf TQS3pLnYsB/view?usp=sharing https://drive.google.com/file/d/1DwkGAUQC-HvYvgdCWiNu6tRZDMKeS1uz/view?usp=sharini https://drive.google.com/file/d/1DWrMvmwtrtvtQiRnR0n9aWT\_GeOPTfDA/view?usp=sharini https://drive.google.com/file/d/1dwT7nUEBG1wksWoWvPEgc\_LfNaisXY3b/view?usp=sharing https://drive.google.com/file/d/1DWWPpiv1g7JwB2Evl3z48iRoWngCeesK/view?usp=sharin

6914 Cole O.

4817 Mr | rew

3794 Daramola, B. O.

9369 David Hammond

2687 Ogunremi Adeola

8445 M.S.Ogundipe

7228 Oyebanji, O.O.

1558 Kejiola, A.O.

9375 Prof. Ogundipe

4897 Folajimi Arubuola

515 Dr Akinsoji

4201 T.K.Odewo

6459 Dr Lawal

2429 Chukwu

2441 Obiorah Tonia

113 Adewuyi Adejumoke

405 Prof.Olowokudejo | T.K.Odewo

7120 Adijat Buraihmoh | Odewo, T.K.

2

2

5998 Anisere Abiola

7376 Daniel Abuka

1257 TK Odewo

3569 Dr. E. Jonathar

2450 Opadeji Kehinde A

284 Oyenubi Ajibike

6519 Sopeyin Aminat

4460 Maxwell Juilet .C.

7474 Mrs Okunola

9493 J.D Chapman

2675 Edema Samuel Olusola | Dr A.B. Kadiri

#### Links generated



# DATA MOBILIZATION



# Mobilization

• Specimens were not properly classified; Only Name and Families were provided

 Classification of Specimens were done following Darwin Core standard and validated through the GBIF portal (<u>https://www.gbif.org/</u>)



# Types of Information Mobilized

- Taxonomic information
- Spatial information
- Collection information
- Descriptive information



U	V	W	X	Ŷ	L	AA	АВ	AL	AD	AŁ
kingdom	phylum	class	order	family	genus	specificEpithet	scientificNameAuthourship	organismName	acceptedNameUsage	taxonRank
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Cyrtosperma	senegalense	(Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Cyrtosperma	senegalense	(Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Cyrtosperma	senegalense	(Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Cyrtosperma	senegalense	(Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Cyrtosperma	senegalense	(Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Cyrtosperma senegalense (Schott) Engl.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Pistia	stratiotes	L	Pistia stratiotes L.	Pistia stratiotes L.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Pistia	stratiotes	L.	Pistia stratiotes L.	Pistia stratiotes L.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Pistia	stratiotes	L	Pistia stratiotes L.	Pistia stratiotes L.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Pistia	stratiotes	L	Pistia stratiotes L.	Pistia stratiotes L.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Pistia	stratiotes	L	Pistia stratiotes L.	Pistia stratiotes L.	Species
Plantae	Tracheophyta	Liliopsida	Alismatales	Araceae	Pistia	stratiotes	L.	Pistia stratiotes L.	Pistia stratiotes L.	Species
Plantae	Tracheophyta	Liliopsida	Arecales	Arecaceae	Calamus	deerratus	Man & Wendl	Calamus deerratus Man & Wendl	Calamus deerratus Man & Wendl	Species
Plantae	Tracheophyta	Liliopsida	Arecales	Arecaceae	Elaeis	guineensis	Jacq.	Elaeis guineensis Jacq.	Elaeis guineensis Jacq.	Species
Plantae	Tracheophyta	Magnoliopsida	Piperales	Aristolochiaceae	Asarum	canadense	L.	Asarum canadense L.	Asarum canadense L.	Species
Plantae	Tracheophyta	Magnoliopsida	Gentianales	Asclepiadaceae	Calotropis	procera	(Aiton) W.T.Aiton	Calotropis procera (Aiton) W.T.Aiton	Calotropis procera (Aiton) W.T.Aiton	Species
Plantae	Tracheophyta	Magnoliopsida	Gentianales	Asclepiadaceae	Leptadenia	pyrotechnica	(Forssk.) Decne.	Leptadenia pyrotechnica (Forssk.) Decne.	Leptadenia pyrotechnica (Forssk.) Decne.	Species
Plantae	Tracheophyta	Magnoliopsida	Asterales	Asteraceae	Vernonia	camporum	A.Chev.	Vernonia camporum A.Chev.	Vernonia camporum A.Chev.	Species
Plantae	Tracheophyta	Magnoliopsida	Asterales	Asteraceae	Ageratum	conyzoides	L	Ageratum conyzoides L.	Ageratum conyzoides L.	Species
Plantae	Tracheophyta	Magnoliopsida	Asterales	Asteraceae	Ageratum	conyzoides	L	Ageratum conyzoides L.	Ageratum conyzoides L.	Species
Plantae	Tracheophyta	Magnoliopsida	Asterales	Asteraceae	Ageratum	conyzoides	L.	Ageratum conyzoides L.	Ageratum conyzoides L.	Species
Plantae	Tracheophyta	Magnoliopsida	Asterales	Asteraceae	Ageratum	conyzoides	L	Ageratum conyzoides L.	Ageratum conyzoides L.	Species
Diantes	T	Manual Secondar	A	A	A		1	A ( )	A (	Constant









**GBIF** Portal

# Geo-referencing of Specimens

 Majority of the samples had only locations indicated on the sheets. So, Google Maps 2022 (<u>https://www.google.com/maps</u>) was used to get the coordinates for such specimens.

 Specimens with verbatim Coordinates were converted to decimal latitude and longitude using GPS Coordinates converter (<u>https://www.gps-coordinates.net/)</u>.





(a) GPS coordinates form Google Maps

(b) GPS Converter Used

# DATA CLEANING



## Data cleaning

- Both checklist and occurrence datasets were initially cleaned on excel spreadsheet.
- Additional cleaning done using Open Refine following GBIF data standards.
- Darwin Core terms were recorded appropriately and checked for mismatch and errors.



## Data cleaning

A	В			С				D	E	F	G	н	
1 occurrenceID	institutionCode	associated media						catalogNumber	recordedBy	da	month	year	even
2 NG:LUH:EVH:000	0001 LUH		http:	://drive.google.com/file	/d/1pnLCnuxlKBewH)	K tHyrKbqJ4736z12A	e/view?usp=sharing	4951	Bamgbade Olaoluwa	1	1 5	2012	11/05
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# DATABASE AND E-KEY



- Database stored on excel spreadsheet
- Electronic multi access key was developed using Lucid 4.0 software
- Entities were recorded as species name and ranked accordingly
- Features were recorded as character and character states
- Characters and states were scored appropriately



## Electronic multi-access key

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# LUH Collection

#### Description

This is an electronic multi-access key for the Liliopsida collection of the Lagos University Herbaium, Lagos, Nigera.

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# DATA PUBLISHING



# Publishing

- Data was published using the GBIF Integrated Publishing Toolkit
- Occurrence and Taxon Core were mainly used with Audubond extension for image files
- Meta data were inputted directly
- Errors identified were routinely corrected and re-publication made as necessary



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## Workshops

- Two Workshops held within the project
  - For Lagos State Ministry of Environment Officials (15 people)
  - For Conservationists and Policy Makers.
    - Forty-four (44) participants including: undergraduate (4) and postgraduate (11) students, researchers (11), conservations (2), academics (12) and policy makers (4) from twelve (12) institutions across Lagos state, Kwara and Africa.
    - Modules include: Introduction to GBIF, The Project, Data Types and Data Capture, Darwin Core format, Data Mobilization and Planning, Data Cleaning and Publishing Tools, IUCN red-listing of Species and Species Distribution Modelling.



# Challenges

- Industrial strike actions
- Permission from participating institutions



# Stakeholders' Engagement



## Strategies Adopted

Stakeholder
Mapping

Understanding Roles and Influence

# Identifying the triggers

Identifying the opportunities













## **OPPORTUNITIES**











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