Trees in "Haras Santa María" Urbanization , Loma Verde , Escobar , Buenos Aires , Argentina.

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Summary

Preliminary taxonomic and biometric studies in trees located in "Haras Santa María ", Loma Verde, Escobar, Buenos Aires,Argentina.
The main objective is to increase knowledge about the trees in our neighborhood.
Specifics objectives are : 1) identification and mapping of species in order to make a future catalog and 2) collection of primary data (biometric measurements) to be able to create a database useful for future phenological studies . Research questions are about the composition of species , the frequency of height and circumference of the sampling specimens and the location of older specimens.GLOBE Observer and Tree biometry protocols were used for measurements and uploaded into GLOBE Observer App. For Taxonomy identifications botanical keys were used and Botanists were consulted. Satellite images from Google Earth Pro were used. Random sampling was held by 21 students. We sampled 234 specimens and determined 25 species belonging to 19 families. The most frequent species is Fraxinus americana L. Taxonomic and biometric data (height and circumference)are shown in tables and graphs . Most specimens are exotic (89.9%) and deciduous (76.6%). Most of them are sapling specimens as it is a recent urbanization. Forestation progression has also been compared through historical satellite images in order to locate the older trees.

Keywords: Trees. Taxonomy. GLOBE Observer App. Biometry. Mapping .

Research questions

1. How could taxonomic and biometric studies improve knowledge in local biodiversity ?
   a. Which species grow in our neighborhood?
   b. How is the frequency of species?
   c. How is the frequency of height and circumference of these trees ?
   d. Where are the older trees located?

Introduction

Our neighborhood is called " Haras Santa María". It is located in Loma verde, Escobar, Provincia de Buenos Aires , Argentina. It is a private urbanization, initiated in 2005, and has an extension of 360 has.

In April 2023 we started training ourselves in the use of tree protocols in the GLOBE Observer App in order to participate in the LAC Trees campaign.

We decided to study the trees of our neighborhood when we realized that we were not able to identify them. As there are no publications about this topic we start collecting primary data (including biometry) in our own database in order to create a catalog for the local community in our next stage.We have started researching the progression of this forestation during the last 20 years. Local studies are necessary to provide knowledge and environmental education .

Trees not only provide ecosystemic services but also beauty and wellness. They are part of our beloved memories, so we decided to write "Storytellings" about our favorite ones and develop an interactive map.

Fig.1: Some of the trees measured using GLOBE Observer App.

Fig.2: Students working in the field.

May 30th September 15th

Fig.3: Globe Observer measurements. (Screenshots May and September 2023)

Methodology

1)Study site:

"Haras Santa María" private urbanization in Loma Verde.Escobar.Provincia de Buenos Aires. Argentina. Latitude: 34°20'32,6" S Longitude:58°51'04,7 W Altitude:13 m.s.m

The climate is temperate and humid (annual averages of 17,2 °C and 1104 mm).
Originally area was a grassland but in the last 20 years it has developed into a private urbanization and actually land cover could be considered MUC 821(Parks and athletic field) but day after day more houses and buildings appear so in a few years could be transformed into urban land cover (MUC 91) if "green areas" are not protected.

Fig. 4: Study site maps

2)Sampling :

We started this research in May 2023. As we are 21 students we decide to form 5 different groups and choose some leaders in order to coordinate our work.

Each group took photos and measurements in different areas. Each student took at least 10 measurements of trees near their homes and then created charts where they wrote all the collected data. We have to give exact location and map the measurements in order not to repeat the same .

We walked in pairs during the fieldwork as a safety precaution

After that, all the charts were gathered in a single database.

https://docs.google.com/spreadsheets/d/1T6iTqHouG75Gw5pzH4OG8azjwH5BHEELH7g8DlTekNs/edit?usp=sharing
If you open the link, you should see our own database:

Tree Number	Date	Student name	Tree average height (m)	Circumference (cm)	Uploaded to the app	Latitude	Longitude	Vulgar name (in spanish)	Scientific name	Status	Foliage
24	2023-06-01	Sofia and Eze	8,87	96	Yes	-34.345.858	-58.870.037	Fresno	Fraxinus americana L.	Exotic	Deciduous
25	2023-06-01	Sofia and Eze	12,29	133	Yes	-34.345.858	-58.870.037	Fresno	Fraxinus americana L.	Exotic	Deciduous
26	2023-06-01	Sofia and Eze	9,67	68,3	Yes	-34.345.973	-58.868.931	Fresno	Fraxinus americana L.	Exotic	Deciduous
27	2023-06-01	Sofia and Eze	9,57	123	Yes	-34.346.858	-58.870.037	Fresno	Fraxinus americana L.	Exotic	Deciduous
28	2023-06-01	Sofia and Eze	11,21	90	Yes	-34.345.957	-58.870.017	Fresno	Fraxinus americana L.	Exotic	Deciduous
29	2023-06-03	Sofia	7,05	154	Yes	-34.347.726	-58.872.235	Liquidambar	Liquidambar styraciflua L.	Exotic	Deciduous
30	2023-06-08	Sofia	7,42	48	Yes	-34.348.944	-58.871.334	Cesarina	Casuarina cunninghamiana Miq.	Exotic	Evergreen
31	2023-06-08	Sofia	6,55	47	Yes	-34.348.861	-58.870.077	Fresno	Fraxinus americana L.	Exotic	Deciduous
32	2023-06-08	Sofia	9,09	56	Yes	-34.348.921	-58.870.077	Fresno	Fraxinus americana L.	Exotic	Deciduous
33	2023-06-08	Sofia	7,06	46	Yes	-34.348.861	-58.870.077	Fresno	Fraxinus americana L.	Exotic	Deciduous
34	2023-06-08	Sofia	7,09	44	Yes	-34.348.861	-58.870.077	Fresno	Fraxinus americana L.	Exotic	Deciduous

Fig.5: Fraction of the table in order to show it as an example of the process.

3) Protocols:

GLOBE Observer and Tree biometry protocols (Height and Circumference) were used for measurements and uploaded into GLOBE Observer app.

4) Materials and tools :

- Metric flexible tape for measurements of circumference .
- Mobile phones with GLOBE Observer App.
- Excel data sheet specially designed for the project in order to create our own database.
- Guides and apps in order to identify species.
- Airbus satellite images from Google Earth.
- Historical satellite images(from 2003 to 2023) from Google Earth Pro to research about changes in Land Cover during the last 20 years.

Results

Data analysis : The following results are preliminary. We have measured 234 specimens and identified 122 of them due to the extremely meticulous work that takes identification of species . In some some cases , photos do not appear in "my observations" so we have to go back to the field. . This project is still going on because it is a large area (360has) to register and study so we are constantly uploading data in our database. We have studied near 36 has.

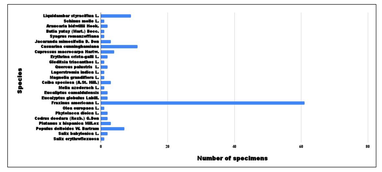
1) Taxonomy.Floristic composition :

1a)Richness of species: 25 species , belonging to 19 families were identified.

Table N° 1: Richness of species

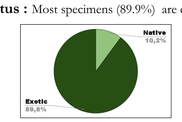
Family	Species	Vulgar name	Status	Foliage
Altingiaceae	*Liquidambar styraciflua L.*	Liquidambar	Exotic	Deciduous
Anacardiaceae	*Schinus molle L.*	Aguaribay	Native	Evergreen
Araucariaceae	*Araucaria bidwillii Hook.*	Araucaria	Exotic	Evergreen
Arecaceae	*Butia yatay (Mart.) Becc.*	Yatay	Native	Evergreen
Arecaceae	*Syagrus romanoffiana (Cham.) Glassman*	Pindó	Native	Evergreen
Bignoniaceae	*Jacaranda mimosifolia D. Don*	Jacarandá	Native	Deciduous
Casuarinaceae	*Casuarina cunninghamiana Miq.*	Casuarina	Exotic	Evergreen
Cupressaceae	*Cupressus macrocarpa Hartw.ex Gord.*	Ciprés	Exotic	Evergreen
Fabaceae	*Erythrina crista-galli L.*	Ceibo	Native	Deciduous
Fabaceae	*Gleditsia triacanthos L.*	Acacia negra	Exotic	Deciduous
Fagaceae	*Quercus palustris L.*	Roble palustre	Exotic	Deciduous
Lythraceae	*Lagerstroemia indica L.*	Crespón	Exotic	Deciduous
Magnoliaceae	*Magnolia grandiflora L.*	Magnolia	Exotic	Evergreen
Malvaceae	*Ceiba speciosa (A.St. Hill.)Ravenna*	Palo borracho	Native	Deciduos
Meliaceae	*Melia azedarach L.*	Paraíso	Exotic	Deciduous
Mirtaceae	*Eucalyptus camaldulensis Dehnh.*	Eucalipto	Exotic	Evergreen
Mirtaceae	*Eucalyptus globulus Labill.*	Eucalipto azul	Exotic	Evergreen
Oleaceae	*Fraxinus americana L.*	Fresno	Exotic	Deciduous
Oleaceae	*Olea europaea L.*	Olivo	Exotic	Evergreen
Phytolaccaceae	*Phytolacca dioica L.*	Ombú	Native	Evergreen
Pinaceae	*Cedrus deodara (Roxb.) G.Don*	Cedro deodara	Exotic	Evergreen
Platanaceae	*Platanus x hispanica Mill.ex Münch*	Plátano	Exotic	Deciduous
Salicaceae	*Populus deltoides W. Bartram ex Marshall*	Alamo	Exotic	Deciduous
Salicaceae	*Salix babylonica L.*	Sauce llorón	Exotic	Deciduous
Salicaceae	*Salix erythroflexuosa Ragonese & Rial Alberti*	Sauce mimbre	Exotic	Evergreen

1b)Species frequency : The most frequent species is Fraxinus americana L.



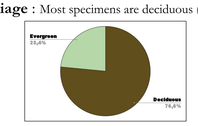
Graph N°1 : Species frequency

1c) Status : Most specimens (89.9%) are exotic



Graph N°2: Status

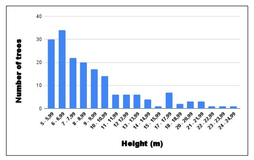
1d) Foliage : Most specimens are deciduous (76.6%)



Graph N°3 : Foliage

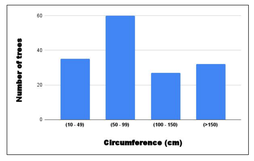
2)Biometry:

2a)Height frequency .



Graph N°4: Height frequency

2b) Circumference frequency



Graph N° 5 : Circumference frequency

3) Location in a Map:

All the trees measured were located by us in the following link.
https://earth.google.com/earth/d/1cZWQm63ooC8QPeOd34sP3Mb0Tu4KYJ0W?usp=sharing

4) Forestation progression :

The following link leads to a series of images showing the changes in land cover and forestation progression in Haras Santa María since 2003:
https://docs.google.com/presentation/d/1Du0bx-y-s40IQC3HwfeydMJxUBvY2Eu89RrG2tFRoFE/edit

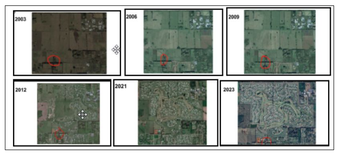


Fig. 6: Satellite images showing the point with the older trees in the study site.

Results (cont.)

Comparing images (Fig .6) allowed us to confirm which are the older trees (in the "marked " area) because they have been present before the urbanization took place. These specimens are the highest specimens and have the largest circumferences (Fig .7)

Tree height (m)	Circumference (cm)	Uploaded to the app	Latitude	Longitude	Vulgar name (in spanish)	Scientific name
16,02	220	Yes	-34.345.389	-5.884.935	Ciprés	Cupressus macrocarpa Hartw.ex Gord.
17,63	177	Yes	-34.345.389	-5.884.935	Ciprés	Cupressus macrocarpa Hartw.ex Gord.
17,79	235	Yes	-34.345.389	-5.884.935	Cedro	Cedrus deodara (Roxb.) G.Don
21,92	280	Yes	-34.345.389	-5.884.935	Araucaria	Araucaria bidwillii Hook.
20,16	417	Yes	-34.345.389	-5.884.935	Araucaria	Araucaria bidwillii Hook.

Fig .7 : Examples of "Older" trees biometry

5) Interactive map " Our favorite tree: Storytelling"

We decided to choose our favourite tree in the neighborhood ,take a photo and explain in a short storytelling why did we choose it.We mapped them and create this interactive map
Our stories and photos can be seen in this link:
https://earth.google.com/earth/d/1klLIbCHx-a9v74-hoOe1IQ31NfF2tvNE?usp=sharing
The following screenshots show how the interactive map works. (Fig .8)

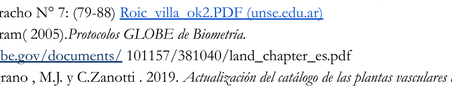


Fig.8: How the interactive map works.

Discussion

Before "Haras Santa María" was created, it was a rural area (grassland) with few cultivated trees around. Land cover is in constant transformation.Satellite images allow us to confirm there is a group of older trees.This urbanization impacts the environment. However, the neighborhood did a good job in compensating, by planting a huge amount of trees. Our data reveals that this is recent forestry (Trees height average : 7.19 m and Trees circumference average : 74,17 cm) .
One of our methodological mistakes was not to take phenological data while we were collecting biometric data. Another mistake was to take photos including people so all that pictures were not uploaded in the GLOBE Observer App.
We hope this research will help people understand their importance and think twice before getting rid of them and stimulate a sustainable management of this forestry. Trees not only provide us better air quality and make the place looks better, but they also regulate the air and soil temperature around and finally offset our carbon footprint.

Making surveys is important but as Cobas (2021) said " No solo se trata de "juntar números" y saber cuántos árboles tiene un municipio, sino que también que esto sirva para planificar las acciones a realizar en el corto, mediano y largo plazo".

Conclusions

Our taxonomic and biometric studies would improve knowledge in local biodiversity data.
Species richness found (25 species were identified) and measurements of height and circumference would help in the creation of a catalog of trees in this area. As Roic & Valverde (1998) we considered that "Green spaces, both public and private, have an important influence on life quality of people living in urban areas" so it is important to improve knowledge and awareness on local communities.
*Fraxinus americana L.*was registered as the most frequent species and it has been also qualified as adequate in Buenos Aires (Gobierno de la Ciudad Autónoma de Buenos Aires, 2018) .

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Bibliography

Cobas A.C.2021. *La importancia del censo forestal urbano*
https:www.argentinaforestal.com/2021/01/10/ la importancia-del-censo-forestal-del-arbolado-urbano/ seen 06/09/2023
https://www.globe.gov/ seen 08/09/2023
Gobierno de la Ciudad Autónoma de Buenos Aires .2018. *Los árboles aptos para Buenos Aires.* https://buenosaires.gob.ar/laciudad/noticias/cuales-son-los-arboles-aptos-para-la-ciudad seen 06/09/2023
Roic. L. D y A.A. Villaverde .1998 *Árboles y arbustos cultivados en la ciudad de Santiago del Estero, Argentina* . Quebracho N° 7: (79-88) Roic_villa_ok2.PDF (unse.edu.ar)
The Globe Program(2005).*Protocolos GLOBE de Biometría.*
https://www.globe.gov/documents/ 101157/381040/land_chapter_es.pdf
Zuloaga, F. ;Belgrano , M.J. y C.Zanotti . 2019. *Actualización del catálogo de las plantas vasculares del Cono Sur.Darwiniana*, nueva serie vol.7 n°2 San Isidro Darwiniana, nueva serie
https://es.climate-data.org/america-del-sur/argentina/buenos-aires/belen-de-escobar-1929/ seen in 15/9/2023
Instituto de Botánica Darwinion seen 06/09/23

THE GLOBE PROGRAM

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