

Green-auditing of trees in the campus of Goalpara College, Goalpara, Assam

Assessment team

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INTRODUCTION

Plants being the most important life form in the planet earth is an indispensable element. They provide food, feed, shelter, fuel, medicine and other aesthetic needs. Not only humans but all other living things are dependent on plants directly or indirectly. Apart from the tangible aspects of the plant world they also add the importance of beauty and relaxation. Since animals are surrounded by and dependent upon plants, the factors that influence plant growth, structure, and distribution, affect the animal world as well (University of Florida). Hence, conserving them along with the associated biodiversity has become a great challenge as well as a global concern, which needs basic studies to be addressed first (Borah et al. 2020). Plant diversity assessments have proven to be an essential tool for the quantitative studies of total carbon stock adding to the green footprint as well as functioning of the associated ecosystem (Gordon & Newton, 2006).

Goalpara College situated in the centre of the Goalpara town in Assam is one of the most reputed educational institute maintaining all aspects of education and capacity building for the people involved. The campus holds a large area, hosting several large trees. However, with view of the large area, a total assessment for the present area is in need, to undertake plantation and other reforestation activities with proper planning. The study will enumerate the total species of trees present in the campus, the structure as well as provide the stock presenting a baseline data for future prospects.

METHODOLOGY

All the plants growing inside the campus were studied. For maintaining definite quadrats of almost approximate size, the campus was divided into 10 sites/quadrats.

Sl. no.	Sites
1	Bike Stand Block
2	Boys Hostel
3	Commerce Block
4	Idol + First Gate entrance
5	In front of Girl's Hostel
6	New Experimental Garden
7	Park (In front of Administrative Block)
8	Proposed Botanical Garden
9	Science Block
10	Second Gate Entrance

The study was conducted from November 2020 to March 2021. The woody vegetation was sampled by laying ten quadrats and all the individuals with breast height diameter (GBH > 30 cm), were tagged, measured and collected giving a specific collection number that was used throughout the field study. The collected samples were later processed following the methods of Jain & Rao (1977). It was then identified using relevant literatures and submitted in the Herbarium of Department of Botany, Goalpara College, Assam. Community characteristics such as frequency, density, abundance, basal area was calculated. Importance Value Index (IVI) for each species was also computed and it was expressed as the sum of relative density, relative dominance, and relative frequency of species in and among plots (Curtis, 1959). Population structure of tree species (> 30 cm) gbh was characterized as the size distribution using gbh classes. All individual trees were grouped into five girth classes i.e. 30–60 cm, 61–90 cm, 91–120 cm, 121–150 cm, and > 150 cm. The updated nomenclature of plant species was followed using the database Plants of the World online of Royal Botanical Garden Kew (<http://powo.science.kew.org/>).

RESULTS AND DISCUSSION

Our approach was to study the woody species diversity and calculate the community characteristics. We have sampled the total woody species diversity of the campus area dividing into ten study sites. The floristic diversity analysis in the study sites within the campus indicated instance of a total 50 woody species belonging to 24 families. List of taxonomic diversity in terms of family and their community characteristics in tabulated in Table 2. The families showing the most diversity in terms of the number of species were Fabaceae (11 species), Moraceae (6 species), Arecaceae and Myrtaceae (4 species each), Rutaceae (3 species), Anacardiaceae, Meliaceae and Phyllanthaceae (2 species each), and the rest sixteen families with one species each. Genera wise, *Ficus* was the most dominant with 5 species. The census of individuals having GBH ≥ 30 cm in the campus recorded a total of 317 woody individuals. Among the ten sites within the Campus, Park (In front of Administrative Block) recorded the highest number of individuals (73), followed by Bike Stand Block (61) (Table 1). Data collected and classified from each site is presented in Tables 3-12.

Table 1. Number of individuals among the ten study sites

Site	Total number of individuals
Park (In front of Administrative Block)	73
Bike Stand Block	61
Second Gate Entrance	35
Boys Hostel	34
Science Block	33
Idol + First Gate entrance	31
Proposed Botanical Garden	29
New Experimental Garden	11
Commerce Block	8
In front of Girl's Hostel	2

Table 2. Density, frequency, basal area and Importance Value Index of the studied vegetation in Goalpara College Campus (Assam, India)

Taxon	Family	Quadrats of occurrence	Total individuals	Frequency	Density	Basal area (m ²)	Importance Value Index
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<i>Acacia auriculiformis</i> A.Cunn. ex Benth.	Fabaceae	3	4	0.3	0.00015	0.00013	5.16
<i>Albizia julibrissin</i> Durazz.	Fabaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Areca catechu</i> L.	Arecaceae	2	3	0.2	0.00011	0.00009	3.64
<i>Artocarpus heterophyllus</i> Lam.	Moraceae	1	1	0.1	0.00004	0.00003	1.52
<i>Averrhoa carambola</i> L.	Oxalidaceae	2	2	0.2	0.00007	0.00006	3.04
<i>Azadirachta indica</i> A.Juss.	Meliaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Bauhinia purpurea</i> L.	Fabaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Bischofia javanica</i> Blume	Phyllanthaceae	2	57	0.2	0.00207	0.00180	36.12
<i>Borassus flabellifer</i> L.	Arecaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Cascabela thevetia</i> (L.) Lippold	Apocynaceae	2	3	0.2	0.00011	0.00009	3.64
<i>Cassia fistula</i> L.	Fabaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Cassia javanica</i> subsp. <i>agnes</i> (de Wit) K.Larsen	Fabaceae	3	11	0.3	0.00040	0.00035	9.37
<i>Citrus maxima</i> (Burm.) Merr.	Rutaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Citrus</i> sp.	Rutaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Cocos nucifera</i> L.	Arecaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Dalbergia sissoo</i> Roxb. ex DC.	Fabaceae	4	16	0.4	0.00058	0.00050	13.29
<i>Delonix regia</i> (Bojer ex Hook.) Raf.	Fabaceae	3	5	0.3	0.00018	0.00016	5.76
<i>Duranta erecta</i> L.	Verbenaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Ehretia acuminata</i> R.Br.	Boraginaceae	6	18	0.6	0.00065	0.00057	16.33
<i>Eucalyptus</i> sp.	Myrtaceae	3	3	0.3	0.00011	0.00009	4.56
<i>Ficus benjamina</i> var. <i>comosa</i> (Roxb.) Kurz	Moraceae	1	1	0.1	0.00004	0.00003	1.52
<i>Ficus elastica</i> Roxb. ex Hornem.	Moraceae	1	1	0.1	0.00004	0.00003	1.52
<i>Ficus heteropleura</i> Blume	Moraceae	1	1	0.1	0.00004	0.00003	1.52
<i>Ficus hispida</i> L.f.	Moraceae	1	1	0.1	0.00004	0.00003	1.52
<i>Ficus rumphii</i> Blume	Moraceae	1	4	0.1	0.00015	0.00013	3.32
<i>Lagerstroemia speciosa</i> (L.) Pers.	Myrtaceae	1	15	0.1	0.00054	0.00047	9.94
<i>Litsea monopetala</i> (Roxb.) Pers.	Lauraceae	1	1	0.1	0.00004	0.00003	1.52
<i>Mallotus nudiflorus</i> (L.) Kulju & Welzen	Euphorbiaceae	2	7	0.2	0.00025	0.00022	6.05
<i>Mangifera indica</i> L.	Anacardiaceae	2	8	0.2	0.00029	0.00025	6.65
<i>Melia azedarach</i> L.	Meliaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Mesua ferrea</i> L.	Clusiaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Mimusops elengi</i> L.	Sapotaceae	2	6	0.2	0.00022	0.00019	5.44
<i>Monoon longifolium</i> (Sonn.) B.Xue & R.M.K.Saunders	Annonaceae	2	8	0.2	0.00029	0.00025	6.65
<i>Murraya koenigii</i> (L.) Spreng.	Rutaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Rubiaceae	7	14	0.7	0.00051	0.00044	14.84
<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Phoenix dactylifera</i> L.	Arecaceae	2	6	0.2	0.00022	0.00019	5.44
<i>Phyllanthus emblica</i> L.	Phyllanthaceae	5	9	0.5	0.00033	0.00028	10.00
<i>Pongamia pinnata</i> (L.) Pierre	Fabaceae	6	11	0.6	0.00040	0.00035	12.12
<i>Psidium guajava</i> L.	Myrtaceae	3	3	0.3	0.00011	0.00009	4.56
<i>Punica granatum</i> L.	Lythraceae	1	1	0.1	0.00004	0.00003	1.52
<i>Samanea saman</i> (Jacq.) Merr.	Fabaceae	8	32	0.8	0.00116	0.00101	26.59
<i>Saraca asoca</i> (Roxb.) J.J.de Wilde	Fabaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Schefflera</i> sp.	Araliaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Spondias pinnata</i> (L.f.) Kurz	Anacardiaceae	1	1	0.1	0.00004	0.00003	1.52

<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	6	25	0.6	0.00091	0.00079	20.54
<i>Tamarindus indica</i> L.	Fabaceae	1	1	0.1	0.00004	0.00003	1.52
<i>Tectona grandis</i> L.f.	Lamiaceae	2	7	0.2	0.00025	0.00022	6.05
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae	4	13	0.4	0.00047	0.00041	11.49
<i>Ziziphus jujuba</i> Mill.	Rhamnaceae	2	3	0.2	0.00011	0.00009	3.64

Table 3. Bike Stand Block (girth in cm)

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Bischofia javanica</i>	27	3671		1	6	16	4
<i>Dalbergia sissoo</i>	3	285		2		1	
<i>Eucalyptus sp.</i>	1	158					1
<i>Lagerstroemia speciosa</i>	15	1697	1	4	4	4	2
<i>Mallotus nudiflorus</i>	6	693		1	3	2	
<i>Neolamarckia cadamba</i>	1	164					1
<i>Phyllanthus emblica</i>	4	241	2	2			
<i>Samanea saman</i>	4	635	1			1	2

Table 4. Boys Hostel

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Duranta erecta</i>	1	31	1				
<i>Areca catechu</i>	1	42	1				
<i>Cascabela thevetia</i>	1	57	1				
<i>Terminalia arjuna</i>	4	528		1		2	1
<i>Ficus rumphii</i>	4	563		2		1	1
<i>Ficus benjamina</i> var. <i>comosa</i>	1	150				1	
<i>Neolamarckia cadamba</i>	1	69		1			
<i>Phoenix dactylifera</i>	4	790		1		1	2
<i>Spondias pinnata</i>	1	82		1			
<i>Ziziphus jujuba</i>	2	267		1			1
<i>Mangifera indica</i>	5	957			2		3
<i>Syzygium cumini</i>	2	281			1		1
<i>Samanea saman</i>	5	1137					5
<i>Schefflera sp</i>	1	209					1
<i>Ficus heteroppleura</i>	1	268					1

Table 5. Commerce Block

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Areca catechu</i>	2	64	2				
<i>Litsea monopetala</i>	1	34	1				
<i>Averrhoa carambola</i>	1	37	1				
<i>Ehretia acuminata</i>	1	48	1				
<i>Cassia fistula</i>	1	85		1			
<i>Samanea saman</i>	1	96			1		
<i>Saraca asoca</i>	1	106			1		

Table 6. Idol + First Gate entrance

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Samanea saman</i>	3	102	3				
<i>Tectona grandis</i>	5	187	5				
<i>Ehretia acuminata</i>	5	247	4	1			
<i>Acacia auriculiformis</i>	1	34	1				
<i>Delonix regia</i>	2	147	1		1		
<i>Neolamarckia cadamba</i>	3	338	1			1	1
<i>Mesua ferrea</i>	1	45	1				
<i>Phyllanthus emblica</i>	1	48	1				
<i>Borassus flabellifer</i>	1	83		1			
<i>Melia azedarach</i>	1	83		1			
<i>Cassia javanica</i> subsp. <i>agnes</i>	1	124				1	
<i>Pongamia pinnata</i>	1	202					1

Table 7. In Front of Girls' Hostel

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Dalbergia sissoo</i>	1	34	1				
<i>Pongamia pinnata</i>	1	74		1			

Table 8. New Experimental Garden

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Terminalia arjuna</i>	3	200	2			1	
<i>Ehretia acuminata</i>	2	77	2				
<i>Psidium guajava</i>	1	37	1				
<i>Ficus hispida</i>	1	59	1				
<i>Syzygium cumini</i>	2	244		1			1
<i>Mimusops elengi</i>	1	74		1			

Table 9. Park (in front of administrative block)

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Samanea saman</i>	5	555	2			1	2
<i>Neolamarckia cadamba</i>	4	433	1			2	1
<i>Bischofia javanica</i>	30	3796	1	7	4	10	8
<i>Pongamia pinnata</i>	1	33	1				
<i>Ficus elastica</i>	1	40	1				
<i>Mangifera indica</i>	3	267	1		1	1	

<i>Syzygium cumini</i>	12	1774		1	1	6	4
<i>Dalbergia sissoo</i>	9	991		3	4	1	1
<i>Monoon longifolium</i>	4	476		1	1	2	
<i>Acacia auriculiformis</i>	1	155					1
<i>Eucalyptus</i> sp.	1	184					1
<i>Terminalia arjuna</i>	1	237					1
<i>Tamarindus indica</i>	1	354					1

Table 10. Proposed Botanical Garden.

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Terminalia arjuna</i>	5	199	5				
<i>Ziziphus jujuba</i>	1	30	1				
<i>Pongamia pinnata</i>	3	175	2		1		
<i>Dalbergia sissoo</i>	3	136	2	1			
<i>Ehretia acuminata</i>	2	73	2				
<i>Phyllanthus emblica</i>	1	41	1				
<i>Cassia javanica</i> subsp. <i>agnes</i>	3	217	2			1	
<i>Citrus</i> sp.	1	56	1				
<i>Samanea saman</i>	5	524		2	2		1
<i>Psidium guajava</i>	1	70		1			
<i>Albizia julibrissin</i>	1	79		1			
<i>Eucalyptus</i> sp.	1	133				1	
<i>Mallotus nudiflorus</i>	1	144				1	
<i>Delonix regia</i>	1	147				1	

Table 11. Science Block

Taxon	Basic data		Girth classes				
	No. of	Total	30-60	61-	91-	121-	>150

	individuals	Girth		90	120	150	
<i>Ehretia acuminata</i>	3	139	3				
<i>Murraya koenigii</i>	1	30	1				
<i>Neolamarckia cadamba</i>	1	30	1				
<i>Cascabela thevetia</i>	2	120	1	1			
<i>Phyllanthus emblica</i>	2	67	2				
<i>Averrhoa carambola</i>	1	36	1				
<i>Pongamia pinnata</i>	2	134	1		1		
<i>Citrus maxima</i>	1	38	1				
<i>Nyctanthes arbor-tristis</i>	1	40	1				
<i>Samanea saman</i>	5	964	1		1		3
<i>Psidium guajava</i>	1	44	1				
<i>Punica granatum</i>	1	49	1				
<i>Cassia javanica</i> subsp. <i>agnes</i>	7	516	3	3	1		
<i>Cocos nucifera</i>	1	59	1				
<i>Azadirachta indica</i>	1	67		1			
<i>Syzygium cumini</i>	1	67		1			
<i>Phoenix dactylifera</i>	2	115			2		

Table 12. Second Gate Entrance

Taxon	Basic data		Girth classes				
	No. of individuals	Total Girth	30-60	61-90	91-120	121-150	>150
<i>Acacia auriculiformis</i>	2	60	2				
<i>Mimusops elengi</i>	5	232	4	1			
<i>Monoon longifolium</i>	4	149	4				
<i>Phyllanthus emblica</i>	1	35	1				
<i>Pongamia pinnata</i>	1	112	3				
<i>Tectona grandis</i>	2	74	2				
<i>Delonix regia</i>	2	132	1		1		
<i>Ehretia acuminata</i>	5	270	3	2			

<i>Syzygium cumini</i>	2	151	1		1		
<i>Artocarpus heterophyllus</i>	1	67		1			
<i>Neolamarckia cadamba</i>	3	376		1	1		1
<i>Samanea saman</i>	4	471		1	1	2	
<i>Bauhinia</i> sp.	1	112			1		



Figure 1. The team of Green auditing the Goalpara College Campus, Assam



Figure 2. Measuring the tree girth in Goalpara College Campus, Assam



Figure 3. Measuring the tree girth in Bike Stand Block, Goalpara College Campus, Assam

CONCLUSION

Goalpara College exhibits an excellent display of Green Campus, with variety of woody plants surrounding the campus for the students to witness their diversity and study them. Among the ten sites, the Park (in front of the administrative block) and the Bike Stand Block hold the highest number of trees with a girth >150 cm. The importance of the presence of woody trees in an environment is clearly felt in the campus. The greenery of the campus provides an escape from the busy town hustle and heat, the difference can be felt immediately when one enters the campus and gets to enjoy the shaded pavement. The college is constantly involved in promotion of plantation and protection of the plants creating the awareness among the students and inspiring them to do the same. In addition to the beautification of the campus, the college has very well kept in mind the importance of educating the students about the plants in their vicinity thus when observed carefully variety in species within a family of the woody plants is seen.