ST ANTHONY'S COLLEGE
(A Don Bosco Institution)
SHILLONG 793 001
MEGHALAYA - INDIA
NAAC Re-Accredited with 'A'
College with Potential for Excellence (awarded by UGC)

7.1.6 Quality audits on environment and energy regularly undertaken by the Institution.

A) Green Audit
B) Environmental Audit

The Report depicting how Green audit and Environment audit was done for the main campus of St. Anthony's College, Shillong is given below.

St. Anthony's College Shillong - 793 001

Principal
St. Anthony's College
Shillong - 793001
Meghalaya - India

GREEN AND ENVIRONMENT AUDIT REPORT

2020-2021

Submitted to:

St. Anthony's College, Shillong, Meghalaya

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Content

Preface

We are pleased to place before the readers the Green Audit Report of St. Anthony's College Shillong that was conducted during the year 2020-2021. Institutional self-inquiry of educational institutions is of great importance as it shows a natural concern about environmental degradation and realization of the values of the environment. In its pursuit for improving environmental quality and to maintain a pristine environment for the future generation of students, St. Anthony's College has made a self-inquiry on environmental quality of the campus for fulfillment of the National Assessment and Accreditation Council (NAAC). This report is compiled by a committee constituted by the College, the committee has made short term and long-term suggestions to take environment protection to higher levels and it is hoped that this will receive due attention of college authorities and also all stake-holders of the Institution. We hope that the Teachers, Students and others would find reading this report useful.

Our sincere gratitude goes to the Committee members for brainstorming and deliberating on the entire process of this exercise as there is no standard process or model for such an environment/green audit of campuses in the state.

_The Investigators

INTRODUCTION

Green audit is the process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. The aim of the audit is to analyze the environmental practices within the concerned sites, which will eventually have an impact on the eco-friendly ambience of the site. Green audit is a useful tool for a college to determine how and where most of the resources like water or energy are being used and then changes can be implemented for sustainable use of these resources. It can also be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students with a better understanding of the importance of green impact on the campus. Institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution; Thus, it is imperative that the college evaluates its own contributions towards a sustainable future. As environmental sustainability is becoming an increasingly important issue for development of the nation, therefore the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The rapid urbanization and economic development at the local, regional and global level has led to several environmental and ecological crises. In this note it becomes essential to adopt the system of green campus for the institutes which will lead to sustainable development and at the same time reduce a sizable amount of Carbon dioxide from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

OBJECTIVE

The objective of Green Audit for an institution is a paramount importance for self-assessment which reflects the role of the institution in mitigating the environmental issues of the campus. Efforts are being made from time to time to keep our environment clean since its inception. So, the purpose of the green audit is to prioritize a frame work of environmental sustainability in compliance with the existing policies and standards.

The main objectives of carrying out the Green Audit are:

1. **To map the Geographical location of the institute along with the land use pattern.**
2. **To document the floral and faunal diversity of the college.**
3. **To document the ambient environmental parameters like air, water and noise of the college.**
4. **To document the waste disposal system.**
5. **To record the meteorological parameter of Shillong where the college is located.**

METHODOLOGY

The present study is for six months starting from 18th November 2020 till 20th May 2021 which is based on onsite visits, personal observations and survey tools. The Principal, Coordinator and other Green Audit Committee Members visited different departments and sections of the college and observed all the things related to green auditing of the college campus.

Monitoring and analysis of ambient Air quality (Sample Registration No A/82/20), Water quality (Sample Registration No G/189/20/1-4) and Noise level (Test method reference IS-9989/981RA2001/MPCB/CLSOP/2017-18/21) in the college was done by the Meghalaya State Pollution Control Board, Lumpyngngad, Shillong.

The report on climate and weather conditions prevailing in Shillong city where the college is situated was collected from the Ministry of Earth Science, India Meteorological Department Regional Meteorological Centre, Guwahati.

Faunal and flora diversity in the campus was surveyed and photographic evidences of few fauna species was taken for evidence.

ABOUT THE COLLEGE

Established in 1934 under the religious and educational philosophy of St. John Bosco, the college was born out of the vision of a Don Bosco Father, Fr. Joseph Bacchiarello with the mission to bring about college education within the reach of common man and woman. Ever since the College has been nurtured by the Salesians of Don Bosco to be the vanguard of higher education in North East India. The College aim to equip the students for life, making them not only job-seekers, but also job-creators. Hence, in keeping with the developments in educational strategies worldwide, the College has pioneered courses in application-oriented subjects to answer to the needs of the community and to give graduates a competitive edge in the employment market.

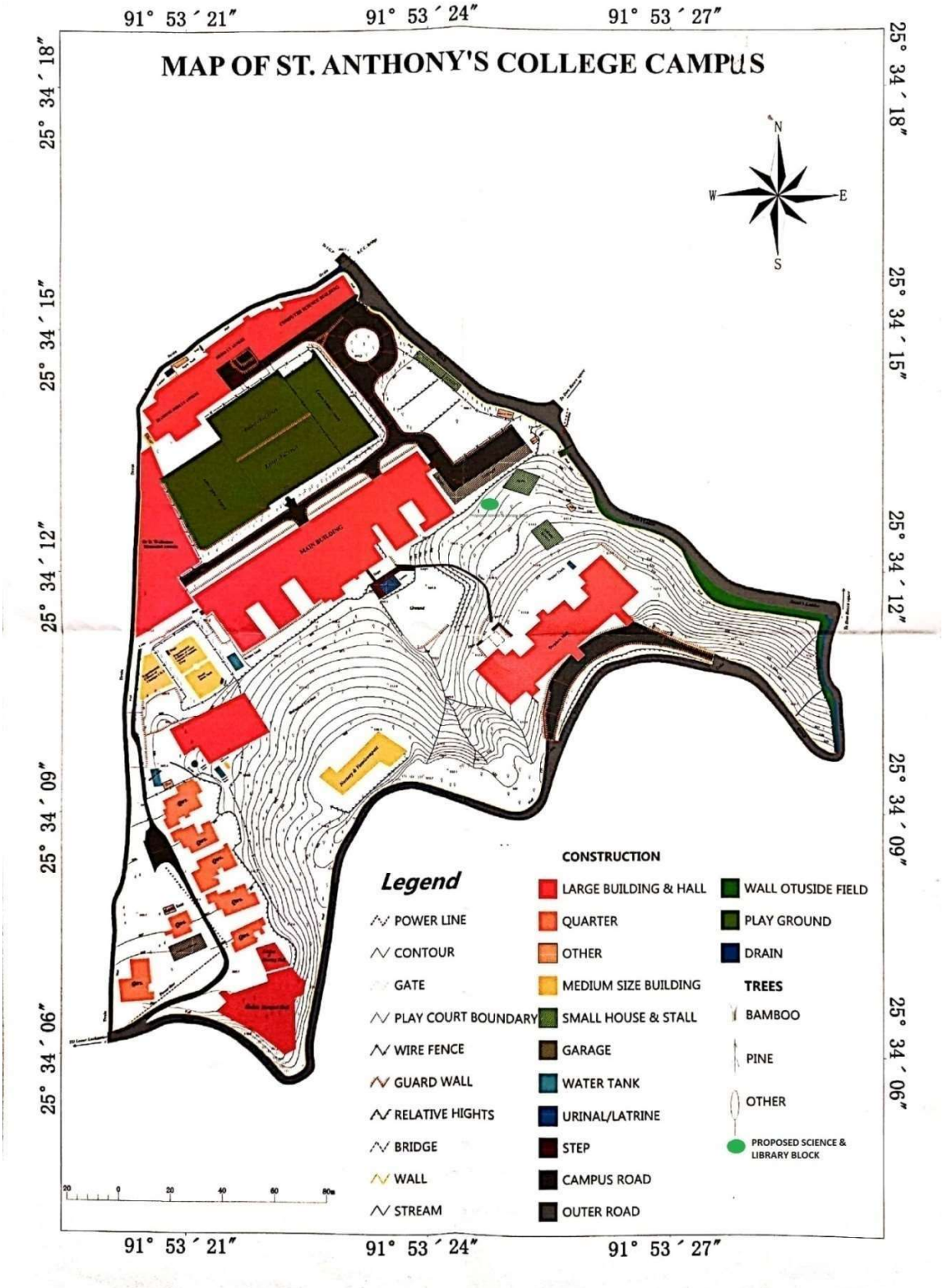
St. Anthony's College has an adequate academic and physical infrastructure catering to 24 honors courses for the Under-Graduate and has regular post-Graduate courses in 4 subjects: Computer Application, Biotechnology, Education and Political Science under the North Eastern Hill University.

VISION AND MISSION STATEMENT

"Providing holistic and quality education within the reach of all"

St. Anthony's College emphasize in life-oriented and value-based teaching to nurture a culture of solidarity. The educators and the educated join hands to mould intellectually competent, morally upright, socially committed and spiritually inspired persons capable of building human social order within the context of the nation's plurality of religions and diversity of cultures. Striving for excellence is our way of life. Our motto tells it all **"Ever More, Better Ever".**

MAP OF ST. ANTHONY'S COLLEGE WITH GEOGRAPHICAL LOCATION



LAND USE ANALYSIS OF ST. ANTHONY'S COLLEGE

GENERAL OVERVIEW ON THE CONCEPT OF LAND USE:

Land use refers to the activities of man that are derived from the various sources, which has now become very crucial in man's activities on the natural resources. Viewing the earth from space provides information on human activities and the utilization of the landscape in situation of rapid changes in land use (Howarth, 1981). New tools like Remote Sensing and GIS techniques have now provide rapid information for advanced land use mapping and planning. Satellite imagery is particularly a useful tool in generating land use mapping.

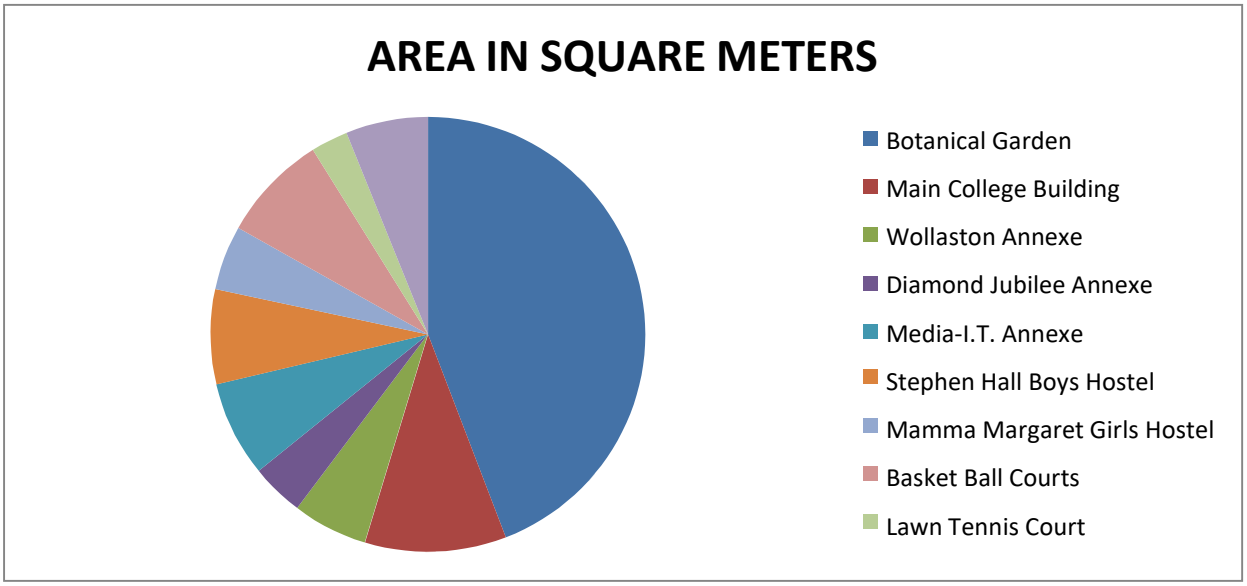
MAPPING ANALYSIS AND DATA PROCESSING:

The land use map was analyzed and processed using the following steps-

Acquisition of data, Geo-referencing and Geo-coding of satellite imageries of Google Earth was used for base map preparation. and the supervised classification was carried out with the aid of data collected during field survey using GPS for Location point and landmark positions. Scanning and digitization of maps and editing of all the Geo-referenced maps were done. Creation of GIS output in the form of land use map showing various land use have been prepared by data analysis and manipulation using GIS software (ArcGIS ver 10.2) for compiling all the layers.

TABLE 1: LAND USE DATA OF ST. ANTHONY'S COLLEGE

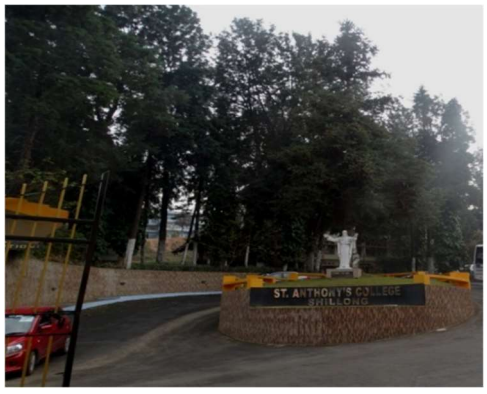
CATEGORY OF LAND USE	AREA IN SQUARE METERS
Botanical Garden	7310.02
Main College Building	1736.6
Wollaston Annexe	929.03
Diamond Jubilee Annexe	645.33
Media-I.T. Annexe	1178.5
Stephen Hall Boys Hostel	1162.75
Mamma Margaret Girls Hostel	795.6
Basket Ball Courts	1318.70
Lawn Tennis Court	458.75
Staff Quarters	1011.7



Graphical Representation of the Land use Pattern of St. Anthony's College, Shillong

FLORAL DIVERSITY OF ST. ANTHONY'S COLLEGE CAMPUS

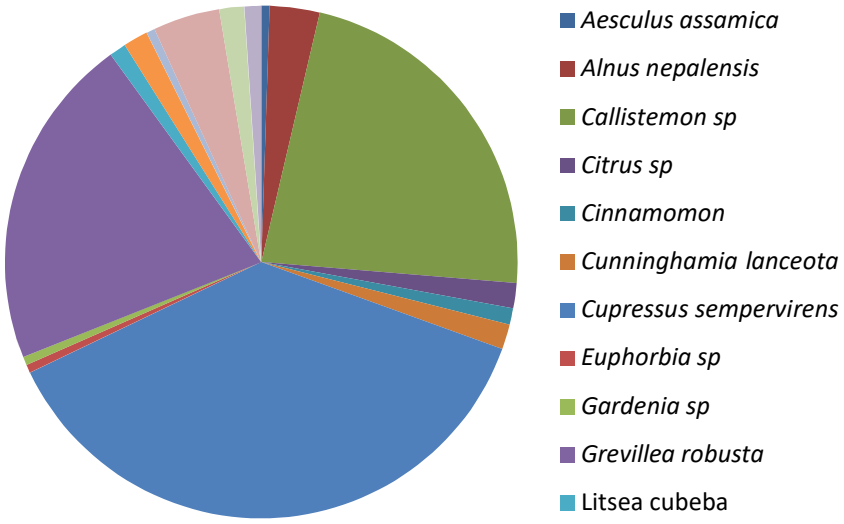
The green audit was conducted in the month of November 2020. The college has a green campus with around 3000 plant species belonging to different taxonomic groups of plants like trees, shrubs, herbs, climbers and orchids. Trees like *Cupressus, Cunninghamia*, *grevilea robusta* etc are planted in main entrance of the campus. The college also has a Botanical Garden with an area of approximately 4 acres. The botanical garden has enormous collections of different species of trees, orchids, medicinal plant, horticultural plants and other plants of botanical interest. The botanical garden aims to protect and conserve the biodiversity of the state, scientific research, display, and education. It also provides clean fresh air and makes pleasant and eco-friendly feeling to students and to every visitor in the campus.



GREEN BELT IN THE COLLEGE CAMPUS

TABLE 2: LIST OF TREES GROWING IN THE CAMPUS

SL NO	SCIENTIFIC NAME	FAMILY	Number
1	*Aesculus assamica*	Sapindaceae	1
2	*Alnus nepalensis*	Betulaceae	6
3	*Callistemon sp.*	Myrtaceae	43
4	*Citrus sp.*	Rutaceae	3
5	*Cinnamomon sp.*	Lauraceae	2
6	*Cunninghamia lanceota*	Taxodiaceae	3
7	*Cupressus sempervirens*	Cupressaceae	71
8	*Euphorbia sp.*	Euphorbiaceae	1
9	*Gardenia sp.*	Rubiaceae	1
10	*Grevillea robusta*	Proteaceae	40
11	*Litsea cubeba*	Lauraceae	2
12	*Magnolia gradifolia*	Magnoliaceae	3
13	*Myrica esculenta*	Myricaceae	1
14	*Prunus cerecoides*	Rosaceae	8
15	*Pyrus pashia*	Rosaceae	3
16	*Schima wallichi*	Theaceae	2



GRAPHICAL REPRESENTATION OF DOMINANT SPECIES GROWING IN THE CAMPUS

TABLE 3: LIST OF TREES GROWING IN BOTANICAL GARDEN

SL. NO.	SCIENTIFIC NAME	COMMON NAME/ LOCAL NAME	FAMILY
1	*Acacia mearnsii*		Mimosoideae
2	*Alnus nepalensis*	Indian Alder,Nepalese Alder	Betulaceae
3	*Albizzia sp*.		Mimosaceae
4	*Betula alnoides*		Betulaceae
5	*Cassia floribunda*	Hill-Cassia, Smooth Senna,	Caesalpiniaceae
6	*Cedrus deodara*	Dieng-deodar Bol-Deodar	Pinaceae
7	*Cinnamomum tamala*	Slatyrpad (K)Tejpat	Lauraceae
8	*Cinnamomum zeylanicum*	Ceylon cinnamon, Dalchini	Lauraceae
9	*Citrus medica* Linn.		Rutaceae
10	*Commelina benghalensis*		Commelinaceae
11	*Cryptomeria japonica*	Japanese Cedar	Taxodiaceae
12	*Cupressus sempervirens*	Mediterranean Cypress	Pinaceae
13	*Exbucklandia populnea*		Hamamelidaceae
14	*Grevillea robusta*	Silver Oak, Silky Oak	Proteaceae
15	*Jacaranda acutifolia*		Bignoniaceae
16	*Juglans regia*	Walnut	Juglandaceae
17	*Litsea cubeb*a	Dieng-si-ing; Zeng-jil(G)	Lauraceae
18	*Litsea sebifera*	Dieng –ja-lowan (K)	Lauraceae
19	*Mahonia acanthifolia*	Dieng niang mat	Berberidaceae
20	*Magnolia grandiflora*		Magnoliaceae
21	*Melia azedarach* Linn	Dieng-jah-rasang	Meliaceae
22	*Michelia champaca* L.	Diengrai/shap Bal-nabat	Magnoliaceae
23	*Myrica esculenta*	Soh phie	Myricaceae
24	*Pinus kesiya*	Dieng Kseh, Dieng kysi	Pinaceae
25	*Prunus cerasoides*		Rosaceae
26	*Prunus undulata*		Rosaceae
27	*Pyrus baccata*	Soh-shur-um	Rosaceae
28	*Pyrus pyrifolia*		Rosaceae
29	*Pyrus pashia* Ham.	Soh-shur,Soh-jhur	Rosaceae
30	*Quercus sp.*		Fagaceae
31	*Rhododendron arboreum*	Tin-saw, dieng-tin-thuin	Ericaceae
32	*Rhododendron formosum*		Ericaceae
33	*Schima wallichii*		Theaceae
34	*Taxus wallichiana*	Dingsableh Common Yew	Taxaceae
35	*Thuja orientalis*	Broom-Grass	Cupressaceae

TABLE 4: LIST OF HERBS AND SHRUBS GROWING IN BOTANICAL GARDEN

SL NO	SCIENTIFIC NAME	COMMON NAME/ LOCAL NAME	FAMILY
1	*Achyranthes aspera*	Soh-byrthied	Amaranthaceae
2	*Ageratum conyzoides*	Bat karo, Bat myngai,	Asteraceae
3	*Allium tuberosum*	Jyllang	Liliaceae
4	*Anemone rivularis*	Bat-soh-plia	Ranunculaceae
5	*Alnus nepalensis*	Alder	Betulaceae
6	*Arisaema concinnum*	Chinese cobra family	Araceae
7	*Artemisia vulgaris*	U Jaiaw (K); Khel-bijak (G)	Compositae
8	*Asparagus racemosus*	Bat niangsohpet	Asparagaceae
9	*Bidens pilosa*	Sohbyrthit	Asteraceae
10	*Caryota urens*	Bastard Sago, Fishtail-palm.	Arecaceae
11	*Callicarpa arborea*	Beautyberry tree	Verbenaceae
12	*Centella asiatica*	Kynbat Moina / Khlein Syiar (J)	Apiaceae
13	*Curculigo capitulata*	Palm grass	Amaryllidaceae
14	*Curculigo orchioides*	Palm grass	Amaryllidaceae
15	*Cyathea brunoniana*	Indian tree fern	Cyatheaceae
16	*Cyathea andersonii*	Indian tree fern	Cyatheaceae
17	*Cycas pectinata*	Dieng-sia-goda	Cycadaceae
18	*Daphne involucrata*	Dientliuh	Thymelaeaceae
19	*Dioscorea bulbifera*	Aerial yam	Dioscoreaceae
20	*Elaeagnus latifolia*	Sohshang (K)	Elaeagnaceae
21	*Ageratina adenophora*	Phlang Burma,	Asteraceae
22	*Ageratina riparum*	Slaburma (J)	Asteraceae
23	*Galinsoga parviflora*	Quick weed	Asteraceae
24	*Fagopyrum cymosum*	Ja-rain(k)	Polygonaceae
25	*Fagopyrum esculentum*	Common Buckwheat	Polygonaceae
26	*Hedychium sp.*	Tiewsying (K)	Zingeberaceae
27	*Houttuynia cordata*	Jamyrdoh	Saururaceae
28	*Hypochoeris radicata*		Asteraceae
29	*Lantana camara*	Soh pang khlieh	Verbenaceae
30	*Lycopodium clavatum*	Lycopodiaceae	Common Clubmoss
31	*Thysanolaena maxima*	Synsar (K), Suroo (J)	Gramineae
32	*Osbeckia crinita*	Ja-lang-kthem	Melastomataceae
33	*Osbeckia chinensis*		Melastomataceae
34	*Oxalis corniculata* Linn.	Bat soh khnai	Oxalidaceae
35	*Oxalis latifolia* Calder.		Oxalidaceae
36	*Passiflora edulis*	Passion Fruit	Passifloraceae

37	*Peperomia reflexa*		Peperomiaceae
38	*Phoenix humilis*	Dwarf date palm	Arecaceae
39	*Rubus acuminatus*	Sym- khlim	Rosaceae
40	*Rubus ellipticus sp.*	Soh shiah	Rosaceae
41	*Rumex nepalensis*	Jabar (K)	Polygonaceae
42	*Sarcandra glabra*	Syntiewkrismas (K)	Chloranthaceae
43	*Scutellaria discolor*		Labiatae
44	*Sida rhombifolia*	Soh-byrthit-rit	Malvaceae
45	*Smilax aspera* Linn		Smilacaceae
46	*Solanum nigrum*	Soh ngang	Solanaceae
47	*Solanum sisymbrifolium*		Solanaceae
48	*Trifolium repens*	White Clover	Papilionaceae
49	*Urena lobata*		Malvaceae
50	*Viburnum foetidum*	Dieng-soh-lang	Caprifoliaceae
51	Bamboos		
52	Mosses		
53	Ferns		

OVERVIEW OF BOTANICAL GARDEN

TABLE5: LIST OF MEDICINAL PLANTS GROWING IN BOTANICAL GARDEN

SL NO	SCIENTIFIC NAME	COMMON NAME/ LOCAL NAME	FAMILY
1	*Aloe vera*	Aloe	Liliaceae
2	*Acorus calamus*	Sweet flag	Araceae
3	*Centella asiatica*	KynbatMoina / KhleinSyiar	Apiaceae
4	*Costus speciosus*	Spiral Ginger	Zingiberaceae
5	*Drymaria cordata*	*La pia-pia, Sliaslia*	*Caryophyllaceae*
6	*Gaultheria fragrantissima*	Jalynthrait	Ericaceae
7	*Mahonia acanthifolia*	Dieng niang mat	Berberidaceae
8	*Plantago erosa*	ShkorBlang	Plantaginaceae
9	*Potentilla fulgens*	Lyngniang-bru (Langniang) (K)	Rosaceae
10	*Pouzolzia hirta*	Jamynasleh, Tyngkhnor	Urticaceae
11	*Rubia cordifolia*	Ryhoi, soh-misem	Rubiaceae
12	*Smilax glabra*	Shiahkrot (K)	Smilacaceae
13	*Solanum torvum sp.*	Dieng-sohngang	Solanaceae
15	*Spilanthes acmella*	Niangmieng (K)	Compositae
16	*Zingiber officinalis*	Sying	Zingiberaceae
17	*Kaempferia rotunda*	Ing khmoh	Zingiberaceae

HERBAL GARDEN IN THE CAMPUS

TABLE 6: LIST OF ORCHID CONSERVING IN BOTANICAL GARDEN

SL NO	SCIENTIFIC NAME	COMMON NAME/ LOCAL NAME	FAMILY
1	*Dendrobium sp.*	Tiewdieng	Orchidaceae
2	*Cymbidium sp*.	Boat orchids	Orchidaceae
3	*Coelogyne sp*.	Tiewdieng	Orchidaceae
4	*Paphiopedilum sp.*	Tiewdohmaw	Orchidaceae
5	*Rhynchostylis sp*.	Tiewdieng	Orchidaceae
6	*Eria sp*.	Tiewdieng	Orchidaceae
7	*Vanda sp.*	Blue vanda	Orchidaceae
8	*Bulbophylum sp.*	Tiewdieng	Orchidaceae
9	*Arundinaria sp.*	Tiewdieng	Orchidaceae
10	*Liparis sp*.	Tiewdieng	Orchidaceae
11	*Kingidium sp.*	Tiewdieng	Orchidaceae

CONSERVATION OF *Paphiiophedilum insigne* IN THE CAMPUS

Cymbidium sp.

Dendrobium sp.

COLLECTION OF ORCHID SPECIES IN THE BOTANICAL GARDEN

TABLE7: LIST OF PLANTS OF BOTANICAL INTEREST GROWING IN BOTANICAL GARDEN

SL NO	SCIENTIFIC NAME	COMMON NAME/ LOCAL NAME	FAMILY
1	*Nepenthes khasiana*	Tiewrakot	Nepenthaceae
2	*Balanophora elkinsii*		Balanophoraceae
3	*Brainae insignis*	Tyrkhang heh	Blechnaceae

Nepenthes khasiana

Brainae insignis

TABLE8 : LIST OF AQUATIC PLANTS GROWING IN BOTANICAL GARDEN

SL NO	SCIENTIFIC NAME	COMMON NAME/ LOCAL NAME	FAMILY
1	*Azolla sp.*	Water fern	Salvianiaceae
2	*Pistia sp.*	Water lettuce	Araceae
3	*Nymphaea sp.*	Water lilies	Nymphaeaceae
4	*Hydrilla sp.*	Water thymes	Hydrocharitaceae
5	*Algae*	Eitsalen, Sohpailen um	

POND INSIDE THE BOTANICAL GARDEN

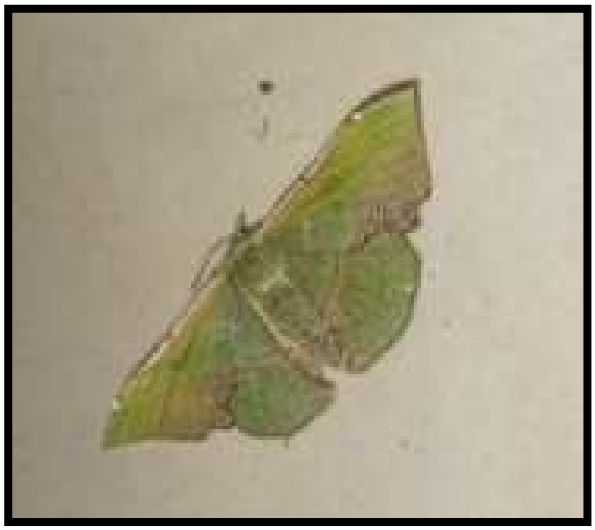
FAUNAL DIVERSITY OF ST. ANTHONY'S COLLEGE, SHILLONG, MEGHALAYA

St. Anthony's College is one of the premiere educational institutions situated in the East Khasi Hills District of Meghalaya in the capital city of Shillong. The state in which the college is located sits at an altitude of 1529 meters (4990 feet) above sea level with an average mean rainfall of 2954 mm. Meghalaya boasts of being a major hotspot of faunal and floral diversity and is part of the Indo-Burma biodiversity hot spot and identified as a key area for biodiversity conservation due to high species diversity and high level of endemism. The College with its vast campus containing a botanical garden of about 4 acres is home to diverse and endemic species of animals.

TABLE 9: LIST OF FAUNAL DIVERSITY IN THE COLLEGE CAMPUS

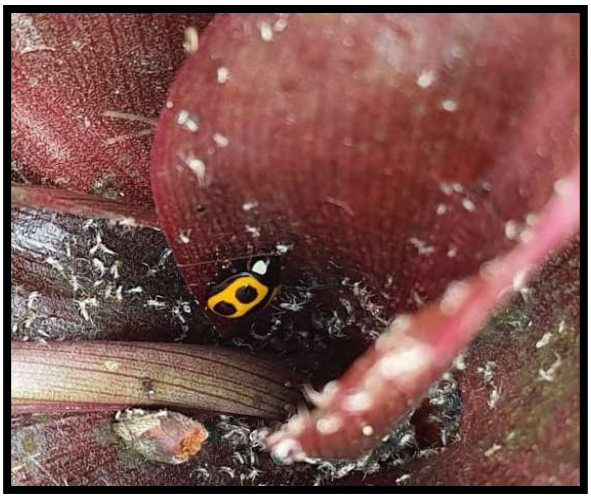
FAUNA	SCIENTIFIC NAMES
Spiders	*Achaearanea tepidariorum* (House Spider), *Eratigena sp*. (Hobo spider), *Myrmachne orientalis* (Family Salticidae), *Heteropoda sp.* (Huntsman Spider), *Nephila pilipes* (Giant Golden Orb Weaver).
Amphibians	Rhacophorus sp., *Bufo sp.* (Common Toad).
Butterflies & Moths	*Pieris rapae* (Cabbage white), *Papilio polytes* (Common mormon), *Papilio helenus* (Red Helen), *Triodes helena* (Common birdwing), *Eurema brigitta* (Small Grass Yellow), *Attacus atlas* (Atlas moth), *Actias sp.* (Malaysian Moon Moth), *Macroglossum sp.***,** *Amata cysseus* (Handmaiden moth), *Fascellina plagiata* (Family-Geometridae), *Delias pasithoe* (Red-based Jezabel)
Other Arthropods	*Harmonia sp*. (Harlequin Ladybug), *Cotinus nitida* (Green Scarab Beetle), *Oryctes rhinoceros* (Rhinoceros beetle), *Anoplophora sp.* (Long Horn Beetle), *Pheretima sp.* (Earthworm), *Scolopendra sp.* (Centipede), *Diplacodes sp*. (Dragon Fly), *Oxya hyla hyla* (Grasshopper), *Apiscerana indica* (Indian Bee), *Vespula vulgaris* (Wasp), *Pimpla sp.* (Parasitoid wasp), *Planococcus* sp. (Mealybugs), *Suillia sp.* (Flies), *Cynomya sp.* (Blue Bottle Fly).
Reptiles	*Hemidactylus frenatus* (House Lizard), *Calotes sp*., *Hemidactylus brookii, Sphenomorphus maculates* (Skink).

Birds	*Eumyias thalassinus* (Flycatcher), *Pycnonotus cafér* (Red vented Bulbul), *Athene noctua* (Little Owl), *Anser sp*. (Goose), *Tyto alba* (Barn Owl), *Corvus macrorhynchos* (Crow), *Passer domesticus* (House Sparrow),
Mammals	*Suncus murinus* (Asian House Shrew), *Pteropusmedius* (The Indian Flying Fox), *Sciurus carolinensis* (Eastern Grey Squirrel).



Fascellina plagiata

***Harmonia sp*. (Larva)**



Ladybug

Anomala sp.

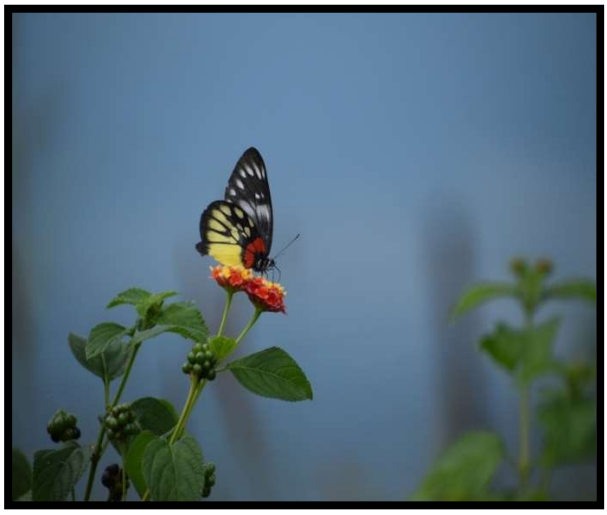
***Cotinus nitida* (Green Scarab Beetle)**

***Apiscerana* (Honey Bee)**

Parasitoid Wasp: *Pimpla sp.*

Planococcus sp.

***Cynomya sp.* (Blue Bottle Fly)**



***Delias pasithoe* (Red-based Jezabel)**

WEATHER DATA OF SHILLONG FOR THE YEAR 2020

STATION: SHILLONG **Period: 01.01.2020 to 31.12.2020**

TABLE 10: MONTHLY TOTAL RAINFALL (in mm)

YEAR	MONTHS											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	16.5	19.3	25.9	183.6	438.7	552.2	704.3	312.5	697.0	261.5	4.7	0.6

TABLE 11: MONTHLY MEAN MAXIMUM AND MINIMUM TEMPERATURE (in °C)

YEAR		MONTHS											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	Max	14.5	16.2	20.3	22.5	22.5	24.3	24.0	25.2	24.1	23.4	21.6	17.0
	Min	4.8	6.2	11.5	N/A	N/A	N/A	18.6	18.6	18.0	16.5	11.8	7.1

TABLE 12: MONTHLY MEAN RELATIVE HUMIDITY (in %)

YEAR	TIME	MONTHS											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	At 08:30 hrs IST	65	63	54	67	80	87	88	84	86	77	52	64
	At 17:30 hrs IST	88	81	71	70	86	82	88	86	91	90	80	92

TABLE 13: MONTHLY TOTAL SUNSHINE (IN HOURS)

YEAR	MONTHS											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2020	168.4	136.7	188.6	172.7	131.4	114.7	50.5	126.3	85.5	151.0	206.7	206.5

Source: *Ministry of Earth Science, India Meteorological Department Regional Meteorological Centre, Guwahati*

TABLE 14: MONTHLY VARIATION IN THE DIFFERENT WEATHER PARAMETERS

Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly total rainfall (in mm)	16.5	19	25.9	184	439	552	704	313	697	262	4.7	0.6
Monthly mean maximum temperature (in degree Celcius)	14.5	16	20.3	22.5	23	24.3	24	25	24	23.4	21.6	17
Monthly mean minimum temperature (in degree Celcius)	4.8	6.2	11.5	N/A	N/A	N/A	19	19	18	16.5	11.8	7.1
Monthly mean relative humidity in % (at 0830 hrs IST)	65	63	54	67	80	87	88	84	86	77	52	64
Monthly mean relative humidity in % (at 1730 hrs IST)	88	81	71	70	86	82	88	86	91	90	80	92
Monthly total sun shine hours	168	137	188.6	173	131	115	51	126	86	151	207	207

Source: *Ministry of Earth Science, India Meteorological Department Regional Meteorological Centre,Guwahati*

TABLE 15: DAILY WIND DIRECTION & SPEED IN KMPH (at 0830 HRS IST) PERIOD : 01-01-2020 TO 31-12-2020

Date	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.	Dir.	Spd.
1	32	002	00	000	00	000	32	002	00	000	00	000	00	000	00	000	00	000	00	000	00	000	00	000
2	00	000	23	002	00	000	23	002	00	000	00	000	00	000	00	000	00	000	00	000	00	000	00	000
3	14	002	00	000	23	002	23	004	00	000	00	000	00	000	00	000	32	002	00	000	00	000	00	000
4	00	000	14	004	00	000	32	004	00	000	00	000	00	000	14	010	00	000	00	000	23	002	00	000
5	00	000	00	000	00	000	32	002	00	000	00	000	00	000	14	008	00	000	00	000	32	000	00	000
6	00	000	23	004	00	000	00	000	00	000	23	002	00	000	32	004	32	002	00	000	00	000	00	000
7	00	000	14	002	23	002	23	004	00	000	23	002	00	000	14	004	23	004	00	000	00	000	00	000
8	00	000	14	002	00	000	32	004	00	000	00	000	00	000	32	002	00	000	00	000	14	002	00	000
9	00	000	23	004	00	000	14	004	00	000	00	000	23	004	32	002	00	000	00	000	00	000	00	000
10	00	000	05	002	00	000	23	004	00	000	00	000	00	000	32	002	00	000	00	000	36	004	00	000
11	05	002	00	002	00	000	23	004	00	000	00	000	23	004	32	004	29	002	00	000	14	002	00	000
12	23	002	00	000	32	002	32	002	00	000	00	000	00	000	32	004	00	000	00	000	00	000	00	000
13	00	000	00	000	00	000	00	000	00	000	00	000	00	000	05	002	23	002	00	000	00	000	00	000
14	00	000	00	000	00	000	00	000	00	000	14	000	00	000	05	002	00	000	00	000	00	000	00	000
15	00	000	00	000	23	002	00	000	00	000	00	000	00	000	32	002	00	000	00	000	00	000	00	000
16	00	000	00	000	29	002	00	000	00	000	00	000	00	000	23	008	00	000	00	000	00	000	00	000
17	00	000	05	002	05	004	32	006	32	002	00	000	00	000	23	004	23	002	00	000	32	000	32	002
18	00	000	23	002	32	004	00	000	00	000	00	000	23	004	32	002	00	000	00	000	00	000	00	000
19	23	004	14	002	00	000	23	006	00	000	00	020	00	000	14	004	00	000	00	000	00	000	00	000
20	23	004	00	000	23	004	00	000	00	000	00	000	00	000	32	002	14	004	00	000	00	000	00	000
21	23	004	05	004	00	000	00	000	14	006	23	002	00	000	00	000	14	004	00	000	00	000	36	004
22	32	002	00	000	00	000	32	002	00	000	00	000	00	000	00	000	00	000	00	000	00	000	00	000
23	00	000	32	002	00	000	23	004	14	004	00	000	00	000	00	000	00	000	00	000	00	000	00	000
24	00	000	23	004	32	002	00	000	23	006	23	002	00	000	00	000	00	000	00	000	02	002	00	000
25	00	000	00	000	32	004	00	000	32	006	23	004	00	000	14	002	23	002	23	000	00	000	00	000
26	00	000	14	002	32	002	00	000	23	006	23	004	00	000	00	000	23	002	00	000	00	000	00	000
27	00	000	32	002	32	004	14	004	23	006	23	002	00	000	00	000	00	000	00	000	00	000	00	000
28	05	002	00	000	23	004	00	000	00	000	00	000	00	000	00	000	00	000	05	002	00	000	00	000
29	00	000	00	000	32	006	00	000	00	000	00	000	00	000	00	000	00	000	00	000	00	000	00	000
30	32	004			32	002	00	000	00	000	00	000	00	000	00	000	00	000	00	000	00	000	00	000
31	00	000			00	000			00	000			00	000	00	000			00	000			00	000

Note : Dir.-Direction**, Spd.-** Speed

(1) Direction in 16 compass, i.e. N → 36 , NNE → 02, NE → 05, ENE → 07 , E → 09, ESE → 11 , SE → 14 , SSE → 16 , S → 18 , SSW →20, SW →23, WSW→ 25, W → 27, WNW → 29 , NW → 32 , NNW → 34 , N → 36 & calm → 00.

(2) Speed in KMPH unit.

AMBIENT AIR QUALITY OF ST. ANTHONY'S COLLEGE, SHILLONG

1	Name of the Project	Ambient Air Quality of St. Anthony's College	
2	Sample Matrix	Ambient Air	
3	Time duration of sampling	24 hrs (8 hrs interval for rspm, 4 hrs interval for gaseous)	
Meteorological Parameters			
1	General Weather condition	P Clear/ Clear	
2	Temperature (^{0}C)	Min: 5.8	Max: 17.9
3	Relative Humidity (%)	Min: 48.4	Max: 79.6
4	Wind Speed (km/hr)	Min: 1.6	Max: 10.1
5	Wind Direction (most prevailing)	NE-SW	
6	Rainfall (mm)	-	

TABLE 16: LIST OF PARAMETERS, METHODS AND PERMISSIBLE LIMITS OF AIR QUALITY IN THE CAMPUS

Parameters	**Test Method**	**Permissible Limits (24 hours average) EPA Notification GSR 826 (E) dated New Delhi, the 16th Nov, 2009**	**Sampling Station Code/Name**
			A/82/20
			Basketball Court
Particulate Matter (PM 10) (µg/m^3) (24 hrs avg.)	IS: 5182 (Pt-23)	100	47.6
Particulate Matter (PM 2.5) (µg/m^3) (24 hrs avg.)	EPA CFR-40 (Pt-50)	60	26.7
Sulphur dioxide (SO_2) (µg/m^3) (24 hrs avg.)	IS: 5182 (Pt-2)	80	2.0
Nitrogen dioxide (NO_2) (µg/m^3) (24 hrs avg.)	IS: 5182 (Pt-6)	80	11.2

***Source**: Meghalaya State Pollution Control Board (MSPCB), Shillong, Meghalaya*

Remarks: The parameters tested were found to be within the prescribed limits of National Ambient Air Quality Standards (NAAQS) as per EPA Notification GRS 826(E), dated New Delhi, the 16th Nov, 2009.

WATER ANALYSIS REPORT OF ST. ANTHONY'S COLLEGE

Name of the Project	Water analysisof St. Anthony's College
Sample Matrix	Water
Samples Collected by	Meghalaya State Pollution Control Board (MSPCB), Shillong, Meghalaya

TABLE 17: LIST OF PARAMETERS, METHODS AND PERMISSIBLE LIMITS OF WATER QUALITY COLLECTED FROM DIFFERENT SITES IN THE CAMPUS

Parameters	Test Method: APHA: 23er Ed. No.	Limits	Sample code/Sampling location			
		Indian Standard for Drinking Water (IS: 105500-2012)	G/189/20/1 Ground Water Media IT Annexe	G/189/20/2 Borewell, Fisheries Dept.	G/189/20/3 Spring Water, Mamma Margaret Hall	G/189/20/4 Administrative Building
pH	4500-H^+ B	6.5-8.5	6.1	4.6	6.6	5.7
Conductivity (µmho/cm)	2510 A	*	152.0	159.0	293.0	98.0
Turbidity (NTU)	2130 B	1.0	1.3	3.1	6.1	0.55
Chloride (mg/l)	4500-Cl B	250.0	24.0	21.0	24.0	21.0
Total Alkalinity as $CaCO_3$ (mg/l)	2320 B	200.0	14.0	6.0	74.0	10.0
Total Hardness as $CaCO_3$ (mg/l)	2340 C	200.0	32.0	42.0	98.0	20.0
Nitrate-N (mg/l)	4500-NO_3 D	45.0	6.5	12.2	12.5	2.6
Iron (mg/l)	3500-Fe B	0.3	0.11	0.11	0.28	0.09
Total Coliform (MPN/100ml)	9221 B	Shall not be detectable	ND**	ND**	79	33

Not Prescribed/ ** Not Detectable

Source: *Meghalaya State Pollution Control Board (MSPCB), Shillong, Meghalaya*

ENERGY MANAGEMENT

Energy auditing deals with the sustainable and optimized utilization of energy in the college campus. Main supply of energy source in our campus is from Meghalaya Energy Corporation Limited (MeECL). The total Electric energy consumption in college campus is 960 KWh / year. Maximum consumption of the energy is in office, laboratories, classrooms and hostel. To analyze the total energy consumption, 3 different blocks in the college are categorized viz. Administrative building, Wollaston annexe, Media-IT annexe and Hostels. Electricity can be used efficiently by replacing CFL bulbs and tube lights with LED bulbs. The total number of LED bulbs in administrative building is 498; in Media Annex is 220 and 384 in Wallaston annexe. Besides this, solar energy cell of capacity 47 Kw is also installed in the campus as an alternative source of renewable energy.

SOLAR ENERGY IN THE CAMPUS

WASTE MANAGEMENT

Waste Management in colleges and universities is important in achieving a higher level of environmental performance. Recycling and reusing contributes to the conservation of natural resources, saving energy and helping to protect the environment. This therefore reduces the impact on the environment by minimizing pollutions with proper waste management. St. Anthony's College adopts environmentally friendly practices in waste management such as segregation of waste at the source by installing separate bins for bio-degradable and non-biodegradable waste. Biodegradable wastes are collected to the vermin compost unit for making vermi-compost. The segregated waste is then place in segregating dumps which are then collected by the municipal authorities to be transported to the municipal dumping ground, animal waste from laboratories are treated with 10% sodium hypochlorite before handling them to the municipality for disposal.

OVERVIEW OF WASTE SEGREGATION UNIT

RAIN WATER HARVESTING

The college is equipped with rain water harvesting system to conserve rain water. Two large size storage tanks are constructed in Stephan Hall boys hostel with the capacity of 1, 36,000 liters and in Mama Margaret girls hostel with capacity of 4,00,000 liters. The water from rooftops and floors is collected through down pipes and discharged in the ground as well as storing it in underground storage tank through pipe lines in the campus. The rain water harvesting project was funded by Meghalaya Water Harvesting Mission and installed by State Council of Science Technology and Environment (SCSTE), Planning Department, Government of Meghalaya.

OVERVIEW OF RAIN WATER HARVESTING UNIT

DRINKING WATER SUPPLY

The college is equipped with a centrally located reverse osmosis drinking water supply that is filtered and supplied at different locations in the campus for the drinking purposes of the students, staffs and for people who visits the college.

REVERSE OSMOSIS DRINKING WATER SUPPLY UNIT

CONCLUSION

Green auditing is the process of identifying and determining an ecofriendly and sustainable utilization of resources in an institution. During the process details of flora and faunal diversity, environmental parameters, energy consumption, water and waste management were recorded. The following conclusions and suggestions can be adopted for maintaining an eco-friendly and green environment.

The college campus has several species of trees including flowering plants, medicinal plants, fruit plants and local varieties. There are different species of fauna which includes birds, butterflies and moths, reptiles, amphibians etc.. which account for rich biodiversity of the campus.

Ambient air quality and other parameters are within the prescribed limits.

The college has installed solar panel systems for electricity generation which is helpful for minimizing energy consumption. LED lamps are used in all sections, use of fluorescent tubes and bulb is minimized.

Biodegradable waste is used efficiently for composting and vermi composting.

RECOMMENDATIONS

- To maintain green cover and carbon sequestration potential of the college campus.
- Setting up of water treatment and recycling unit where the recycled water can be used for various purposes in the college campus and hostels.
- The solid waste should be reused or recycled at maximum possible places.
- Establishment of an E-waste collection center in the campus.

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