

USTM



Unveiling Excellence

ENVIRONMENT AUDIT REPORT

2018-19



UNIVERSITY OF SCIENCE & TECHNOLOGY MEGHALAYA

ENVIRONMENT AUDIT COMMITTEE

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2	Dr Parag Phukon, Professor, Department of Geological Sciences, Gauhati University	Member
3	Dr Utpal Sarma, Associate Professor, Dept of Instrumentation & USIC, Gauhati University	Member
4	Prof P.K. Barman, Professor, Dept of Botany	Member
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9	Mr Shamim Akhtarul Goney, Deputy Registrar (Administration)	Member

Preface

University of Science & Technology Meghalaya is always concerned with the environmental issues to receive the best of attention. Improvement of environmental quality is one of the primary objectives of the University and towards achieving a better environmental health, a self-enquiry on the environmental quality in the campus has been made. This status report is second of its kind and expects that subsequent enquiry will be made on a periodic interval to keep us aware of the environmental status. The Environment Audit Committee constituted by USTM for the year 2018-2019 deliberated on various environmental issues, identified gaps and suggested measures for improvement. It is always heartening to see incremental progress shown due to efforts of University authority. Documentation of the status of environment is an essential component for developing a holistic concept of a University. This report is a compilation of records available as well as new data/information generated as a part of audit.

It is to be admitted that there are limitation in compilation because concept of green audit had late entry into the University system. However this compilation provides an overall insight into the status of campus.

The effort of the committee is commendable in arriving at some important observations which will have definite contribution in our effort for a better environment.

LAND COVER AND LAND USE

Land use / Land cover is result of combined activities of physical and human activities. Land use and Land cover change detection is essential for understanding of physical environment, ecological process, soil erosion, deforestation and also helpful in planning purposes. The landscape of USTM is hilly in nature. Various academic departments, hostels, auditorium come up at the barren hills while the large portion is left as natural green cover. After preparing LULC map from Google Earth shows a total of 80.895 acres of land in the main campus of which 30.939 acres are under natural forest, and 1.909 acres under garden area. Organized plantations in the campus are mainly along the internal roads and together with the different academic departments, they add to the overall green cover. The green cover including natural forests, garden and plantations, form 45.825 percent of total area. USTM campus home to wide diversity of aquatic flora and fauna. Efforts have been made in the campus to conserve natural forests.

Table 1: LULC categories in campus

SL.NO.	CATEGORIES	AREA (ACRES)	PERCENTAGE
01	Admin Block	0.121	0.149
02	Amenity Centre	0.109	0.134
03	Barren Hill	0.776	0.960
04	Academic Blocks	0.909	1.124
05	Botanical Garden	0.101	0.125
06	Bus Stand	0.019	0.024
07	Canteen	0.030	0.037
08	Central Auditorium	0.676	0.836
09	Construction Site For Medical College	5.103	6.308
10	Culvert	0.049	0.060
11	Drains	0.142	0.175
12	Forest	25.294	31.267
13	Garden	0.538	0.665
14	Gate	0.008	0.009
15	Herbal Garden	1.270	1.570
16	Hut	0.008	0.010
17	Kasturba Girl's Hostel	0.165	0.204
18	Marshy Area	2.489	3.077
19	Natural Vegetation	5.645	6.978
20	Nursery Hut	0.037	0.046
21	Open Space	11.745	14.519
22	Over Foot Bridge	0.006	0.008

23	Parking Area	0.506	0.625
24	Pascal Girl's Hostel	0.152	0.188
25	Pedestrian Step Road	0.160	0.197
26	Plantation	6.132	7.580
27	Playground	1.693	2.093
28	Pond	2.208	2.729
29	Residential Area	0.114	0.140
30	Retaining Wall	0.173	0.214
31	Workshop	0.159	0.196
32	Road	8.441	10.435
33	Rock	0.104	0.129
34	Site (Medical College Hospital)	4.454	5.506
35	SSb Boy's Hostel	0.364	0.450
36	Stairs	0.009	0.012
37	Temporary Shed	0.152	0.188
38	Transformer	0.006	0.007
39	TSB Hostel	0.180	0.223
40	USTM Main Gate	0.005	0.007
41	USTM Play Ground	2.184	2.700
42	Wall	0.253	0.313
43	Water bodies	0.087	0.107
44	Wifi Tower	0.011	0.013
TOTAL		80.895	100.000

Source: Google Earth

Built up environment

Table 1 shows different types of LULC area. It is found that a total of about 12.927 acres (15.978 % of total) are under the built up category, of which hostels, roads, and academic departments form a significant part. In absence of available plain area for further new constructions, hills were used for construction of medical colleges and hospitals. In general, the campus presents a perfect environment with lush green cover with many varieties of flora. A peaceful environment is an improvement in recent times by conserving surrounding green cover.

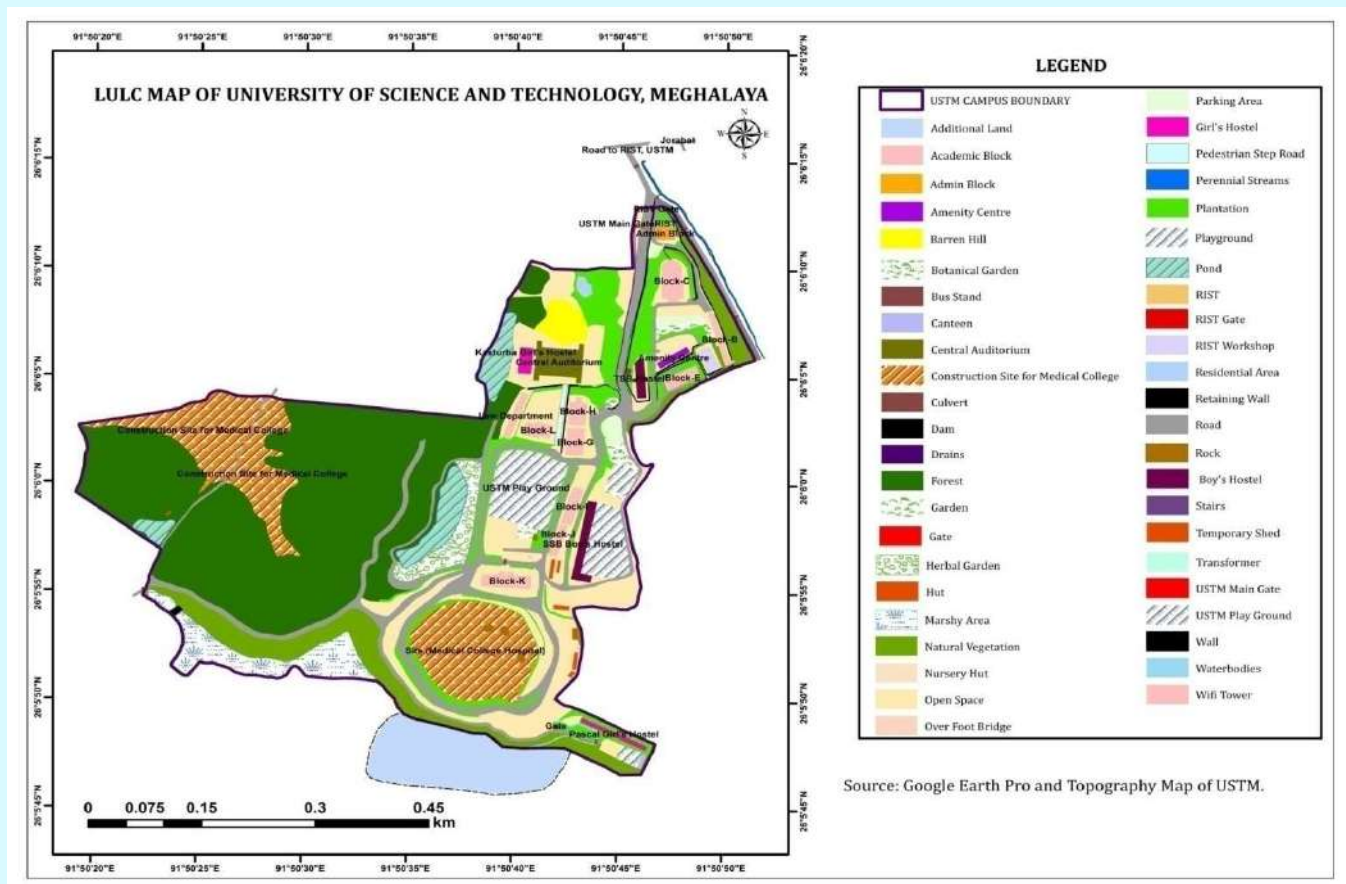


Figure 1: Detail LULC components of USTM Campus, Meghalaya, India

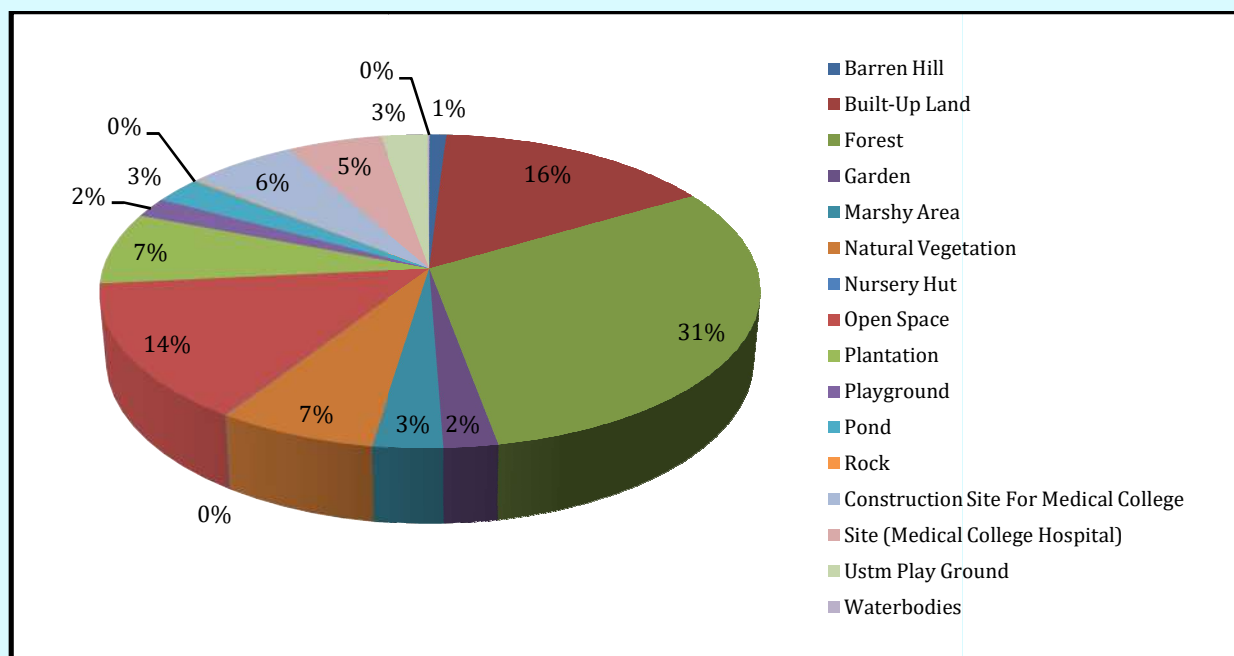


Figure 2: Percentage distribution of LULC classes.

ENVIRONMENTAL AUDIT

Noise level

A sound level meter was used to measure noise level at different locations of USTM campus during working hours in the Month of February 2019. Results are shown in Table 1.

Table 1. Noise level in campus

Sl no	Location	Minimum level (dB)	Maximum level (dB)	Average level (dB)
1	Central Library	41.2	62.3	58.5
2	Amenity Centre	60.4	73.5	66.7
3	Gyan Circle	48.1	90.7	70.3
4	Corridor, H block	42	53	48
5	In front of G block	50.5	57	52.5
6	Administrative block	52	56.8	55
7	In front of Annexe 1	40.4	52	44.2
8	Block C	53	67	55
9	Block E	43.7	63	57



Central Pollution Control Board has laid down the permissible noise level in India for different areas. In industrial areas, the permissible limit is 75 dB for daytime and 70 dB at night. In commercial areas, it is 65 dB and 55 dB while in residential areas it is 55 dB and 45 dB during daytime and night respectively. In silent zone, permissible limit in day time is 50

Db and in night time the value is 40 dB. Cause of noise at different locations of USTM campus are shown in Table 2.

Table 2. Source of noise

Sl no	Location	Source of noise
1	Central Library	Movement of Ceiling fan, Whispering by students, movement of chairs by students
2	Amenity Centre	Gossiping/ talking by customers (mainly students and faculties), Chair movement, sound from generator
3	Gyan Cirle	Movement of vehicles, Construction work
4	Administrative block	Talking
5	Block C, E	Human movement, Talking, sound from generator
6	In front of blocks	Human movement, Talking, Birds

Due to construction work, noise level in different blocks is more. However, it is temporary. Movement of vehicles during 10 AM- 4 PM is less except during 3PM- 3.30 PM when students of RIST leave campus.

Water Quality Status





There are natural water bodies in the university campus. Overall view of the water bodies is good and support aquatic birds and other organisms. Major threat to water quality in the water bodies are sediments from construction work and/ or cutting of hills for development purpose.

Turbidity

Turbidity is a measure of clarity of a liquid. It is an optical characteristic of water and is an expression of the amount of light that is scattered. Turbidity makes water cloudy or opaque. Turbidity of water in ponds of USTM campus was estimated using a Secchi Disc in Nephelometric Turbidity Unit.



Table 3. Turbidity of water samples

Sl no	Location	Turbidity (NTU)
1	Pond near park	10
2	Pond near girls' hostel	23

Turbidity of waterbody near the Girls' hostel is comparatively more due to construction activities, sediment transport and decomposition of leaves etc.

pH of water samples:

pH is a measure of how acidic/basic water is. The range goes from 0 to 14, with 7 being neutral. pH of less than 7 indicate

acidity, whereas a pH of greater than 7 indicates a base. The pH of water is a very important measurement concerning water quality. pH of water bodies and piped water in USTM campus was estimated using pH meter. The results are shown in Table below:

Table 4. pH of water samples

Sl no	Sample	pH value
1	Pond water	6.3
2	Piped water-1	7.6
3	Piped water-2	7.7

pH was found slightly acidic in pond water whereas pH was slightly basic in piped water samples

Solid waste generated from shops, canteens etc.						
Name of shop	Type	Food taken by (no of persons in a day)	Major waste generated	Amount of waste in a day (Approx.)	Disposal site/mechanism	Suggestions/requirements (by shop keeper/manager)
Techno Cafe	Food Canteen	600	Food waste, plastic, paper	50 kg	Near hostel block B	Daily waste collection and proper management
Urban Junction	Food Canteen	150	Disposable cups, plastic, vegetables (peels)	10 kg	Carried by self and thrown in the bin in front of hostel block B	Bigger dustbin should be provided
Chai Lo	Food canteen	50	Paper cups/glass, straws, food	20 kg	Disposed at place designated	Regular pick-up
Biryani House	Food canteen	60	Paper, Plastics, food waste	20 kg	Wastes are carried by cleaners and thrown at the backside of boys hostel	Regular collection and proper management
JB Food corner	Food canteen	25	Paper, Plastics, food waste	15 kg	Collected at dustbin and then thrown at front side of new hostel	Regular collection and proper management
Medishop & Health Care	Medishop	---	Paper etc.	1 kg/week	Collected by cleaner	Regular collection, proper management
Solid waste generated in hostels						
		Food	Average			

Hostel	No of boarders	prepared for (persons)	amount of waste generated in a day	Major waste generated	Waste disposal mechanism	Other comments
Hostel Block A TS Boys Hostel	290	270	50 kg	Wastage, food waste	Collected at dustbin, then taken by local people for pig etc.	No major problem as of now
Hostel Block B SS Boys Hostel	286	286	60 kg	Food waste, wastage, plates	Taken by local people for pig etc.	-do-
Pascal Girls Hostel	40	44	12 kg	Food waste	Feeding the domestic animals	---

Solid waste generated in academic blocks/ buildings
(information collected in the afternoon in normal working days)

Name of block	Total no of dustbins inside the building	Amount of waste in one dustbin(Approx.)	No of dustbins outside the block
A	5	Less than 1kg	2
B	5	Less than 1 kg	1
C	13	Less than 1 kg	2
D	9	Less than 1 kg	1
E	7	1 kg	1
F	6	1 kg	2
G	11	Less than 1 kg	2
H	7	1 kg	2
I	4	Less than 1 kg	1
J	3	1 kg	1
K	3	Less than 1 kg	1
L	2	Less than 1 kg	1
Annex 1	2	1 kg	0

Total solid waste generated from all shops in a day: 115kg (Approx.)

Total solid waste generated from all hostels in a day: 120 kg (Approx.)

Total solid waste generated from all other blocks/buildings in a day without any event/
function: 20 kg (Approx.)

Biodiversity Audit

Conservation of biodiversity is an important global challenge to ensuring future sustainability. Biodiversity not only supplements our lives through economic, scientific and cultural aids, but more importantly, it maintains the functional and ecological balance of the environment. As such it is considered as one of the key pillars of sustainable development. Despite its important roles in sustainable development, biodiversity and its ecosystem

services continue to be degraded and lost at unprecedented rates. The recent regional assessment reports by the “**Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)**” found that biodiversity is in decline in all regions of the world.

The world’s population is projected to increase from around 7.6 billion today to close to 10 billion people by 2050. The corresponding global demand for food is estimated to grow by 50 percent during this period, introducing enormous pressure on productive land, particularly in developing countries. Land-use changes will further result in a loss of valuable habitats, land degradation, soil erosion, a decrease in clean water and the release of carbon into the atmosphere. The Global Forest Resources Assessment (FRA), coordinated by FAO, found that the world’s forest area decreased from 31.6 percent of the global land area to 30.6 percent between 1990 and 2015, but that the pace of loss has slowed in recent years.

As such, a landmark event “**United Nations Decade on Ecosystem Restoration, 2021–2030**” was apprehended as a means of highlighting the need for greatly increased global cooperation to reestablish degraded and destroyed ecosystems, contributing to efforts to combat climate change and safeguard biodiversity. The 6th Global Biodiversity Summit of Local and Subnational Governments including representatives of the countries parties, observer countries and international organizations was held in Sharm el-Sheikh, Egypt, in parallel to **Convention on Biological Diversity (CBD)** COP 14, November 2018 to negotiate agreements and commitments that give impulse to the conservation and sustainable use of biodiversity as well as the implementation of the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets.

As a part of the action towards the conservation of biodiversity and to promote a green campus, various assessments are being made to reinforce the biodiversity wealth within the campus, starting with the construction of Botanical Garden, Green house, Nursery, Biodiversity Park and also proper documentation of existing plant species (Figure. 1A & 1B). Over the past years, several efforts for tree plantation drives have also been carried out by the University under teacher-student initiative within the campus (Figure. 1C). A more detail account on the campus biodiversity, both floral and faunal was given in (Table 1, 2 and 3).



Figure 1: A) Establishment of Botanical Garden, Green house, Nursery; B) Biodiversity Park and C). Plantation drives within the University Campus

Floral Diversity in Campus

The primary mission for encouraging the USTM Campus vegetation is to create a green campus, enhance the educational, societal awareness and aesthetic value of the campus. University of Science and Technology Meghalaya campus is located within the geo-

coordinates of latitude 26.103° N and longitude 91.846°E in Meghalaya, India. It encompasses an area of about 400 acre. The campus is situated in a hilly terrain and is covered by tropical moist deciduous forest comprising of wide variety of species. Proper documentation for the existing species has been conducted by survey method in the USTM campus in the year 2018-19, which led to identification of as many as 40 herbs and shrubs, 45 Species of tree. Most of the tree species are growing naturally and few of them are either exotic or planted in different areas within the campus (Figure 2 and 3). However the present lists of tree, shrubs and herbs species represented only less than 50% of the total species actually available in USTM campus. Further most of the herbs and shrubs species present within the campus are either medicinal or used as vegetables. But proper documentation of most of the species are still lacking. As such continuous efforts are being made for proper documentation of the species, so that peoples in general and students in particular, can use them for taxonomic and research purpose. Proper maintenance of vegetation within the campus will also serve in providing an extended classroom and living laboratory for the students. Hence, proper conservation initiative is required for these species in the campus. It was further hoped that, the all university campuses will together act as a single large entities in putting a huge impacts on the environment and overall ecosystem sustainability.



Delonix regia



Terminalia arjuna



Erythrina variegata



Bambusa tulda



Alstonia scholaris



Schima wallichii

Figure 2: Few important Tree species found within the USTM campus



Ricinus communis



Ixora coccinea



Setaria viridis



Yucca filamentosa



Cycas revoluta



Livistona japonica



Hevea brasiliensis



Costus speciosus



M. malabathricum

Figure 3: Few important herb, shrub and ornamental species found within the USTM campus

Floral diversity details

Table1: Diversity of Herb species

SN	Common Name	Scientific Name	Family
1	Common trumpetvine	<i>Allamandacathartica</i>	Apocynaceae
2	Setariapallide-fusca	<i>Arundinellabengalensis</i>	Poaceae
3	Common rabi weeds of India	<i>Blumealacera L.,</i>	Asteraceae
4	Indian timber bamboo	<i>Bambusatulda</i>	Poaceae
5	Papper flower	<i>Bougainvillea spectabilis Wild.</i>	Nyctaginaceae
6	Asian pigeonwings	<i>Clitoriaternatea</i>	Fabaceae
7	Croton plant	<i>Croton tiglium</i>	Euphorbiaceae
8	Coleus	<i>Coleus scutellarioides</i>	Araceae
9	Bamboo	<i>DendrocalamushamiltoniiNees.</i>	Poaceae
10	Pleomele dracaena	<i>Dracaena reflexa Lam.</i>	Asparagaceae
11	Cogongrass	<i>Imperatacylindrica</i>	Poaceae
12	Banana tree	<i>Musa champaca Hort.</i>	Musaceae
13	Basil plant	<i>Ocimum sanctum</i>	Lamiaceae
14	Phyllanthus	<i>Phyllanthusnururi</i>	Euphorbiaceae
16	Fence bamboo	<i>Phyllostachysmannii Gamble</i>	Poaceae
17	Mexican flame flower	<i>Poinsettia pulcherrima</i>	Euphorbiaceae
18	Snake tongue	<i>Sansevieriaroxburghiana</i>	Asparagaceae
19	Yellow foxtail	<i>Setariapallide-fusca</i>	Poaceae
20	Tridax daisy	<i>Tridaxprocumbens</i>	Asteraceae
21	Broom grass	<i>ThysanolaenaagrostisNees.</i>	Poaceae
22	Dandotapala	<i>Vernoniacinerea</i>	Asteraceae

Table 2: Diversity of Shrub species

SN	Common Name	Scientific Name	Family
1	Sentry plant	<i>Agavaeamericana L.</i>	Asperagaceae
2	Camellia	<i>Camellia japonica</i>	Theaceae
3	Key lemon	<i>Citrus aurentifolium</i>	Rutaceae
4	Grapefruit plant	<i>Citrus paradise Macf.</i>	Rutaceae
5	Variegated croton	<i>Codiaeumvariegatum L Bl.</i>	Euphorbiaceae
6	Spiral ginger	<i>Costus specious</i>	Costaceae
7	Duranta	<i>Durantaerecta L.</i>	Verbenaceae
8	China rose	<i>Hibiscus rosasinensis L.</i>	Malvaceae
9	Jungle geranium	<i>IxoracoccineaRoxb.</i>	Rubiaceae
10	Malabar melastome	<i>Melastomamalabathricum</i>	Melastomiaceae
11	Red flag bush	<i>M.erythrophyllaSchumach&Thonn</i>	Rubiaceae
12	Castor oil plant	<i>Ricinuscommunis</i>	Euphorbiaceae
13	Rose plant	<i>Rosa indica</i>	Rosaceae
14	Needle wood tree	<i>Schimawallichi DCKorth.</i>	Transtromiaceae

15	Hairy-fruited eggplant	<i>Solanumferox L.</i>	Solanaceae
16	Pinwheelflower	<i>Tabernaemontanadivericata L R.Br.</i>	Apocynaceae
17	Indian paint	<i>Tradescantia tricolor</i>	Commelinaceae
18	Yucca plant	<i>Yucca aloifoliavariegataNaudin</i>	Asparagaceae

Table 3: Diversity of Tree species

SN	Common Name	Scientific Name	Family
1	Australian acacia	<i>Acacia auriculiformis A. Cunnn. Ex. Benth</i>	Mimosaceae
2	Lebbeck tree	<i>Albizialebbeck</i>	Fabaceae
3	Devil tree	<i>Alstoniascholaris L R. Br.</i>	Apocynaceae
4	Burflower-tree	<i>Anthocephaluscadamba</i>	Rubiaceae
5	Agar tree	<i>AquilariamalacensisLamk.</i>	Thymelaeceae
6	Norfolk pine	<i>Araucaria excelsa R.Br.</i>	Araucariaceae
7	Betelnut tree	<i>Areca catechu L.</i>	Aracaceae
8	Jackfruit	<i>Artocarpusheterophyllus Lam.</i>	Moraceae
9	Breadfruit plant	<i>Artocarpuschama</i>	Moraceae
10	Neem Tree	<i>Azadirachtaindica A. Juss</i>	Meliaceae
11	Camel's foot tree	<i>Bauhinia variegata L.</i>	Caesalpiniaceae
12	Bishmarck plant	<i>BishmarekianobilisHildebr. & H. Wendl</i>	Aracaceae
13	Palmyra palm	<i>Borassuaflabelliformis L.</i>	Aracaceae
14	Golden shower	<i>Cassia fistula L.</i>	Caesalpiniaceae
15	Pink shower tree	<i>Cassia nodossaBuch. Ham. Ex Roxb.</i>	Caesalpiniaceae
16	Araca palm	<i>Chrysalidocarpuslutescense H. Wendl</i>	Aracaceae
17	Coconut tree	<i>Coccosnucifera L.</i>	Aracaceae
18	Sago palm	<i>Cycas revolute Thunb.</i>	Cycadaceae
19	Indian rosewood	<i>Dalbergiasissoo</i>	Fabaceae
20	Gulmohur	<i>DelonixregiaBojr. Raf.</i>	Caesalpiniaceae
21	Pongamoiltree	<i>Derris indica</i>	Fabaceae
22	Butterfly palm	<i>DypsislutecensBeentje&Dransf</i>	Aracaceae
23	Indian olive	<i>Elaeocarpusfloribundus Bl., Bijdr.</i>	Elaeocarpaceae
24	Monkey pod tree	<i>Enterolobiumsaman</i>	Fabaceae
25	Indian corel tree	<i>ErythrinaindicaLamk.</i>	Papilionaceae
26	Benjamin fig tree	<i>Ficusbenjamina L.</i>	Moraceae
27	Common fig plant	<i>Ficushispida</i>	Moraceae
28	Sacred fig	<i>Ficusreligiosa</i>	Moraceae
29	Silver oak	<i>Grevillea robusta R. Br.</i>	Proteaceae
30	Para rubber tree	<i>HeveabrasilliensisMuell-Arg.</i>	Moraceae
31	Thai crape myrtle	<i>Lagerstroemia floribunda</i>	Lythraceae
32	Litchi tree	<i>Litchi chinensesSonnar</i>	Sapindaceae
33	Litsea tree	<i>LitseamonopetalaI Roxb. Pers</i>	Lauraceae

34	Mountain pepper	<i>Litsea cubeba</i>	Lauraceae
35	Fasttech Fan Palm	<i>Livistonachinensis</i>	Aracaceae
36	Drum strick tree	<i>Moringa oleifera</i> Lamk.	Moringaceae
37	Pygmy date palm	<i>Phoenix robelinii</i> O' Brien	Aracaceae
38	Temple tree	<i>Plumeria alba</i> L.	Apocynaceae
39	False ashoka tree	<i>Polyalthia longifolia</i> Sonner Thw.	Annonaceae
40	Guava plant	<i>Psidium guajava</i> L.	Myrtaceae
41	Needlewood tree	<i>Schima wallichii</i>	Theaceae
42	Jumbolan tree	<i>Syzygium cumini</i> L Skeels.	Myrtaceae
43	Arjun tree	<i>Terminalia arjuna</i> DC W. & A.	Combretaceae
44	Thuja plant	<i>Thuja orientalis</i> L.	Cupressaceae
45	Ber tree	<i>Ziziphus juba</i> Lamk.	Rhamnaceae

List of Vertebrates

Mammals :

SL No.	Common name	Scientific name
1	Rhesus macaque	<i>Macaca mulatta</i>
2	Leopard cat	<i>Prionailurus bengalensis</i>
3	Jungle cat	<i>Felis chaus affinis</i>
4	Grey Mongoose	<i>Herpestes edwardsii</i>
5	Small Indian Mongoose	<i>Herpestes javanicus</i>
6	Golden Jackal	<i>Canis aureus</i>
7	House shrew	<i>Suncus murinus</i>
8	White-tailed mole	<i>Parascaptor leucura</i>
9	Orange-bellied Himalayan Squirrel	<i>Dremomys lokriah</i>
10	Indian Flying Fox	<i>Pteropus giganteus</i>
11	Indian Leaf-nosed Bat	<i>Hipposideros lankadiva</i>

Birds :

SL No.	Common name	Scientific name
1	White-breasted waterhen	<i>Amaurornis phoenicurus</i>
2	Cattle egret	<i>Bubulcus ibis</i>
3	Little egret	<i>Egretta garzetta</i>
4	Great egret	<i>Ardea alba</i>
5	Indian pond heron	<i>Ardeola grayii</i>
6	Spotted dove	<i>Spilopelia chinensis</i>
7	Rose-ringed parakeet	<i>Psittacula krameri</i>
8	Common goldenback	<i>Dinopium javanense</i>
9	White-throated kingfisher	<i>Halcyon smyrnensis</i>
10	Lineated barbet	<i>Megalaima lineata</i>

11	Blue-throated barbet	<i>Megalaima asiatica</i>
12	Black kite	<i>Milvus migrans</i>
13	Brown fish owl	<i>Ketupa zeylonensis</i>
14	Eastern jungle crow	<i>Corvus levaillantii</i>
15	House crow	<i>Corvus splendens</i>
16	Asian koel	<i>Eudynamys scolopaceus</i>
17	Lesser coucal	<i>Centropus bengalensis</i>
18	Black drongo	<i>Dicrurus macrocerus</i>
19	Ashy drongo	<i>Dicrurus leucophaeus</i>
20	Ashy woodswallow	<i>Artamus fuscus</i>
21	Black-hooded oriole	<i>Oriolus xanthornus</i>
22	Common myna	<i>Acridotheres tristis</i>
23	Jungle myna	<i>Acridotheres fuscus</i>
24	Asian-pied starling	<i>Gracupica contra</i>
25	Chestnut-tailed starling	<i>Sturnia malabarica</i>
26	Red-vented bulbul	<i>Pycnonotus cafer</i>
27	Red-whiskered bulbul	<i>Pycnonotus jocosus</i>
28	Oriental-magpie robin	<i>Copsychus saularis</i>
29	White wagtail	<i>Motacilla alba</i>
30	Asian palm swift	<i>Cypsiurus balasiensis</i>
31	Indian roller	<i>Coracias benghalensis</i>
32	Green bee-eater	<i>Merops orientalis</i>
33	Chestnut-headed bee-eater	<i>Merops leschenaulti</i>
34	Purple sunbird	<i>Cinnyris asiaticus</i>
35	Great tit	<i>Parus major</i>
36	House sparrow	<i>Passer domesticus</i>
37	Eurasian tree sparrow	<i>Passer montanus</i>
38	White-rumped munia	<i>Lonchura striata</i>

Lizards :

Family		Scientific name
Agamidae	1	<i>Calotes versicolor</i>
	2	<i>Sitana ponticeriana</i>
Gekkonidae	3	<i>Hemidactylus frenatus</i>
Scincidae	4	<i>Sphenomorphus maculatus</i>
Scincidae	5	<i>Eutropis multifasciata</i>
Varanidae	6	<i>Varanus bengalensis</i>

Amphibia :

Family		Scientific Name
	1.	<u><i>Ichthyophis garoensis</i></u>
	2.	<u><i>Megophrys parva</i></u>
	3.	<u><i>Duttaphrynus melanostictus</i></u>
	4.	<u><i>Microhyla ornata</i></u>
	5.	<u><i>Chirixalus vittatus</i></u>
	6.	<u><i>Philautus garo</i></u>
	7.	<u><i>Polypedates leucomystax</i></u>
	8.	<u><i>Fejervarya teraiensis</i></u>
	9.	<u><i>Fejervarya nepalensis</i></u>
	10.	<u><i>Hylarana leptoglossa</i></u>
	11.	<u><i>Humerana humeralis</i></u>
	12.	<u><i>Duttaphrynus melanostictus</i></u>
	13.	<i>Hoplobatrachus tigerina</i>
	14.	<i>Euphlyctes cyanophlyctes</i>

Fishes :

Family	Common name		Scientific name
Cyprinidae	Indian flying barb	1	<i>Esomus danricus</i>
	Giant danio	2	<i>Danio aequipinnatus</i>
	Moustached danio	3	<i>Danio dangila</i>
	Zebrafish	4	<i>Brachydanio rerio</i>
	Mola carplet	5	<i>Amblypharyngodon mola</i>
	Common carp	6	<i>Cyprinus carpio</i>
	Copper mahseer	7	<i>Neolissochilus hexagonolepis</i>
	Labura	8	<i>N. hexastichus</i>
	Swamp barb	9	<i>Puntius chola</i>
	Shalyni barb	10	<i>Puntius shalynius</i>
Balitoridae	Gray's stone loach	11	<i>Balitora brucei</i>
	Mottled zipper loach	12	<i>Acanthocobitis botia</i>
Cobitidae	Queen Loach	13	<i>Botia dario</i>
	Guntea loach	14	<i>Lepidocephalus guntea</i>

List of Invertebrates

Spider :

Family	Scientific name	
Tetragnathidae	1	<i>Leucauge pondae</i>
	2	<i>Tetragnatha mandibulata</i>
	3	<i>Leucauge decorata</i>
Thomisidae	4	<i>Misumena vatia</i>
	5	<i>Camaricus formosus</i>
	6	<i>Amyciaea forticeps</i>
Hersilidae	7	<i>Hersilia savignyi</i>
Nephilidae	8	<i>Nephila pilipes</i>
	9	<i>Herennia multipuncta</i>
Araenidae	10	<i>Gastercantha kuhli</i>
	11	<i>Cyrtophora feai</i>
	12	<i>Neoscona nautica</i>
	13	<i>Gasteracantha dalyi</i>
	14	<i>Neoscona mokerjei</i>
Oxyopidae	15	<i>Oxyopes rufisternum</i>
	16	<i>Oxyopes shweta</i>
Salticidae	17	<i>Scytodes thoracica</i>
Lycocidae	18	<i>Hippasa sp</i>
	19	<i>Lycosa mackenziei</i>
Theraphosidae	20	<i>Morphospecies sp.</i>
Theridiidae	21	<i>Chrysso pulcherrima</i>
	22	<i>Chrysso nigra</i>

Moths :

Family	Species	Scientific name
Arctiidae	1 Tiger moth	<i>Asura sp.</i>
	2 Marble white moth	<i>Nyctemera adversata</i>
Crambidae	3 Beet web worm moth	<i>Spoladea recurvalis</i>
	4 Rice leaf folder	<i>Cnaphalocrocis medinalis</i>
	5 Yellow Peach Moth	<i>Conogethes punctiferalis</i>
	6 Grass moth	<i>Endocrossis flavibasalis</i>
	7 Crambid moth	<i>Glyphodes canthusalis</i>
	8 Mung Bean moth	<i>Marucavitrata</i>
	9 Rice caseworm	<i>Parapoinx stagnalis</i>
	10 Grass moth	<i>Botyodes asialis</i>
Erebidae	11 Snouted Tiger moth	<i>Asota caricae</i>

	12	Tussock Moth	<i>Lymnantria dispar</i>
Geometridae	13	True loopers	<i>Eucyclodes sp.</i>
	14	Loopers moth	<i>Ruttellerona pallicostaria</i>
	15	True loopers	<i>Scopula sp.</i>
	16	Geometrid Moth	<i>Eucyclodes divapala</i>
Hyblaeidae	17	Teak defoliator moth	<i>Hyblaeapuera</i>
Noctuidae	18	Owlet Moth	<i>Gramodes geometrica</i>
Nolidae	19	Borer	<i>Beana terminigera</i>
Pyalidae	20	Snout Moth	<i>Pyalis farinalis</i>
Sphingidae	21	Tiger Hawk Moth	<i>Hippotion sp.</i>
Thyrididae	22	Sapodilla Borer	<i>Banisia myrsusalis</i>

Butterfly diversity :

Family		Scientific name	IUCN status
Hesperiidae	1	<i>Baoris farri</i>	Not rare
	2	<i>Barbo bevani</i>	
	3	<i>Caltoris kumara</i>	
	4	<i>Caltoris philippina</i>	
	5	<i>Caltoris plebeia</i>	
	6	<i>Caprona ransonnetti</i>	
	7	<i>Cephrenes acalle</i>	
	8	<i>Cupitha Purreea</i>	Not rare
	9	<i>Halpe homolea</i>	
	10	<i>Lambrix salsala</i>	Common
	11	<i>Notocrypta curvifascia</i>	Common
	12	<i>Oriens gola</i>	Not rare
	13	<i>Parnara bada</i>	
	14	<i>Parnara guttata</i>	Common
	15	<i>Pelopidas mathias</i>	Common
	16	<i>Pseudocoladenia dan</i>	Common
	17	<i>Psolos fuligo</i>	Common
	18	<i>Saranga dasahara</i>	Common
	19	<i>Suastus gremius</i>	
	20	<i>Tagiades japedus</i>	Common
	21	<i>Udaspes folus</i>	Common
Lycaenidae	22	<i>Amblypodia anita</i>	
	23	<i>Anthene emolus</i>	Common
	24	<i>Arhopala atrax</i>	
	25	<i>Arhopala centaurus</i>	Not rare

	26	<i>Caleta caleta</i>	
	27	<i>Castalius rosimon</i>	Common
	28	<i>Heliphorous epicles</i>	Common
	29	<i>Hypolycaena erylus</i>	Common
	30	<i>Ionolyte helicon</i>	
	31	<i>Jamides bochus</i>	Common
	32	<i>Lampides boeticus</i>	Common
	33	<i>Loxura atymnus</i>	Common
	34	<i>Nacaduba hermus</i>	Not rare
	35	<i>Prosotas nora</i>	Common
	36	<i>Pseudozizeeria core</i>	
	37	<i>Pseudozizeeria maha</i>	Very common
	38	<i>Virachola isocrates</i>	
	39	<i>Zeltus amasa</i>	Not rare
	40	<i>Zinaspa todara</i>	
	41	<i>Zizeeria karsandra</i>	Common
	42	<i>Zizina otis</i>	Common
Nymphalidae	43	<i>Ariadne areadne</i>	Common
	44	<i>Athyma inara</i>	Not rare
	45	<i>Athyma perius</i>	Common
	46	<i>Athyma ranga</i>	Rare
	47	<i>Cethosia cyane</i>	Not rare
	48	<i>Charaxes agrarius</i>	
	49	<i>Cirrochroa aoris</i>	Not rare
	50	<i>Cynitia lepidea</i>	Common
	51	<i>Cyrestis thyodamas</i>	Common
	52	<i>Danaus crysippus</i>	Very common
	53	<i>Elymnias caudata</i>	
	54	<i>Elymnias hypermnestra</i>	Common
	55	<i>Elymnias malclas</i>	
	56	<i>Euploea core</i>	Common
	57	<i>Euploea sylvester</i>	
	58	<i>Euthalia aconthea</i>	Not rare
	59	<i>Euthalia lubentina</i>	
	60	<i>Hypolimnas bolina</i>	
	61	<i>Junonia almana</i>	Common
	62	<i>Junonia atlites</i>	Not rare
	63	<i>Junonia hierta</i>	Common
	64	<i>Junonia iphita</i>	Common
	65	<i>Junonia lemonias</i>	Common
	66	<i>Kaniska canace</i>	
	67	<i>Lebadea martha</i>	Not rare

	68	<i>Lethe confusa gambara</i>	
	69	<i>Melanitis</i>	Common
	70	<i>Melanitis leda</i>	Very common
	71	<i>Melanitis phedima</i>	Common
	72	<i>Melanitis zitenius</i>	Not rare
	73	<i>Mycalesis mineus</i>	Very common
	74	<i>Mycalesis perseus</i>	very common
	75	<i>Mycalesis sp.</i>	Common
	76	<i>Neptis clinia</i>	Rare
	77	<i>Neptis hylus</i>	very common
	78	<i>Neptis nata</i>	Rare
	79	<i>Orsotriaena medus</i>	Common
	80	<i>Pantoporia hordonia</i>	Common
	81	<i>Phalanta phalantha</i>	Common
	82	<i>Symbrenthia lilaea</i>	Common
	83	<i>Tanaecia lepidea</i>	Not rare
	84	<i>Tirumala limniace</i>	Very common
	85	<i>vagrans egista</i>	Not rare
	86	<i>Vindula erota</i>	Not rare
Papilionidae	87	<i>Ypthima baldus</i>	Very common
	88	<i>Ypthima striata</i>	
	89	<i>Ypthima tabella</i>	
	90	<i>Graphium sarpedon</i>	
	91	<i>Papilio castor</i>	Not rare
Pieridae	92	<i>Papilio demoleus</i>	Very common
	93	<i>Papilio helenus</i>	Common
	94	<i>Papilio polytes romulus</i>	Very common
	95	<i>Appias albina</i>	Rare
	96	<i>Appias libythea</i>	Rare
	97	<i>Appias lyncida</i>	Common
	98	<i>catopsilia pomona</i>	Common
	99	<i>Catopsilia pyranthe</i>	Common
	100	<i>Delias pasithoe</i>	Not rare
	101	<i>Eurema andersonii</i>	Rare
	102	<i>Eurema balanda</i>	Common
	103	<i>Eurema hecabe</i>	very common
Riodinidae	104	<i>Gandaca harina</i>	?
	105	<i>Leptosia nina</i>	Common
	106	<i>Pieris canidia</i>	Very common
	107	<i>Abisara bifasciata suffusa</i>	Not rare
	108	<i>Zemerous flegyas</i>	Very common

Grasshopper

Family		Scientific name
	1	<i>Oxya yezonsis</i>
	2	<i>Oxya hylahyla</i>
	3	<i>Oxya chinensis</i>
	4	<i>Phlaeoba infumata</i>
	5	<i>Trimerotropis pallidipennis</i>
	6	<i>Trilophidia annulata</i>
	7	<i>Spathosternum prasiniferum</i>
	8	<i>Concephalus semivittatus</i>
	9	<i>Concephalus nigropleurum</i>
	10	<i>Hexacentrus unicolor</i>
	11	<i>Euconocephalus pallidus</i>
	12	<i>Atractomorpha crenulata</i>
	13	<i>Atractomorpha similis</i>
	14	<i>Tetrix subulata</i>

Zooplankton

Types		Scientific name
Protozoans	1	<i>Centropyxis</i>
	2	<i>Dinobryon</i>
	3	<i>Diffugia</i>
	4	<i>Eudorina</i>
	5	<i>Euglypha</i>
	6	<i>Pandorina</i>
	7	<i>Vorticella</i>
Rotifera	8	<i>Brachionus</i>
	9	<i>Asplanchna</i>
	10	<i>Chromogaster</i>
	11	<i>Euchlanis</i>
	12	<i>Filinia</i>
	13	<i>Hexarthra</i>
	14	<i>Keratella</i>
	15	<i>Lecane</i>
	16	<i>Mytilina</i>
	17	<i>Monostyla</i>
	18	<i>Polyarthra</i>
	19	<i>Rotatoria</i>
	20	<i>Synchaeta</i>
	21	<i>Trichocera</i>
Copepods	22	<i>Alonella</i>
	23	<i>Bosmina</i>
	24	<i>Canthocampus</i>
	25	<i>Chydorus</i>
	26	<i>Daphnia</i>
	27	<i>Moinasida</i>
	28	<i>Simocephalus</i>
	29	<i>Diaphanosoma</i>

RECOMMENDATIONS

The following recommendations are made for short and medium term implementations.

1. To put in place a comprehensive waste disposal system. The system in place should be displayed in strategic positions to keep everybody aware.
2. Installation of separate, dustbins in a few locations to encourage segregation of wastes and separately collect the biodegradable and new biodegradation wastes.
3. In-house documentation and analysis of air, water and noise in the campus with validation by NABL accredited laboratory should be made at regular interval.
4. In order to promote diversity, systematic plantations should be carried out in the campus emphasising on indigenous species.
5. Creation of “Green Fund” with individual and institutional contribution.
6. Awareness programme should be carried out at periodic intervals to ensure plastic free campus.

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