

vco/sup/2022/1219



OFFICE OF THE PRINCIPAL

LAKHIPUR COLLEGE

P.O. Lakhipur, Dist, Goalpara (Assam)

PIN-783129

WhatsApp & Contact No.9101997329

Email: lakhipurcollegegp@gmail.com

Website: www.lakhipurcollege.in

Ref No. LC/GA/PPB/2022/159

Date: 08/09/2022

To,

The Vice- Chancellor
Gauhati University, Guwahati-14

From,

The Principal,
Lakhipur College, Lakhipur.

Print - P. P. Boruah
(Before)
for N/A

A.H
09/09/2022

Dated: 08-09-2022

Subject: Application for permission for a Green Audit of Lakhipur College by professor Partha Pratim Baruah, Department of Botany G. U.

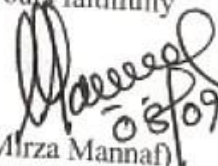
Respected Sir,

I have the honour to stated that Lakhipur College was established in the year 1981 and it was provincialized in the year 1996. The Green Audit of the college has not been done since its establishment. Now, we are determined to do it as soon as possible.

Therefore, I request you to permit us to do the audit by the concerned professor cited above.

Thanking you.

Yours faithfully


08/09/2022

(Mirza Mannaf)

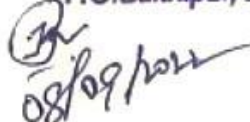
Principal i/c

Lakhipur College, Lakhipur

Principal

Lakhipur College

P.O.Lakhipur, Dt. Goalpara


08/09/2022



DEPARTMENT OF BOTANY

GAUHATI UNIVERSITY
Guwahati-781 014, Assam, INDIA

Dr. P.P. Baruah
Professor and Former Head

Phone: 0361-2570530(O)
Cell: +91-94354-02257(M)
Email: ppbaruah@gauhati.ac.in
partha_ghy16@rediffmail.com

Reference No.

Date: -28.02.2023

To
The Principal
Lakhipur College
Goalpara Assam

Subject:- Regarding Green Audit of Lakhipur College

Madam,

In reference to the subject quoted above, I am submitting herewith the **Green Audit Report: 2021-2022** of Lakhipur College for your needful along with the **Statement of Expenditure** incurred against the same for reimbursement at earliest convenience

Thanking you.

Yours sincerely

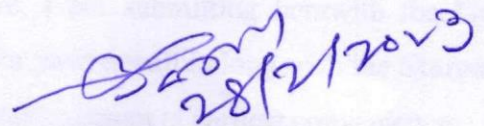
(P. P. Baruah)
Auditor
Green Audit, Lakhipur College
And
Professor, Department of Botany,
Gauhati University

Enclo.

1. Copies of Green Audit Report of Lakhipur College
2. Statement of Expenditure

**Statement of Expenditure incurred in conducting Green Audit of Lakhipur College
for the year 2021-2022**

Remuneration of the Auditor	:	Rs. 10000.00
Remuneration to Audit Assistants	:	Rs. 5000.00
Designing, Printing and DTP	:	Rs. 3150.00
Laboratory expenses	:	Rs. 6000.00
TA	:	Rs. 2000.00
Miscellaneous		Rs. 1250.00
<hr/>		
Total expenditure incurred:		Rs. 27,400.00


28/2/2023

(P. P. Baruah)
Auditor
Green Audit, Lakhipur College
And
Professor, Department of Botany,
Gauhati University

ACKNOWLEDGEMENT

The unprecedented disruptions in climatic activities have compelled us to think about the sustainable practices and policies to be adapted in every aspect of human life. In this context, the University Grants Commission of India has initiated a “Green Campus Clean Campus” mission for all higher educational institutions of the country and hence, the National Assessment and Accreditation Council (NAAC) perhaps made “Environmental Consciousness” as one of the mandatory criteria for grading educational institutes.

Lakhipur College, Goalpara is therefore committed to create an ecologically sound campus by implementing few eco-friendly practices. The present report is the recent Green Audit Report of the College which looked forward to identify the environment related issues in the College campus and to monitor the environmental management practices adopted by the College. A few suggestions are also made accordingly in the gap areas for higher levels of environmental protection in the College campus and its vicinity. It is hoped that the report will certainly receive due attention of the concerned authority and the College shall implement the green practices whatever suggested for better future of all stakeholders of the Lakhipur College.

Dr. Mirza Mannaf, Principal, Lakhipur College deserves the appreciation for his initiative in conducting the Green Audit for the college. The Audit team is thankful to all the students, officiating members of Offices and faculty members of the college for their support and co-operation to compile and complete this report on time. Special thanks are due to Dr. Kashyap Biswas, Dr. Barnali Rabha and Mr. Tirin Krishna Barman of Lakhipur College for their untiring support during the audit process in collating data for the report.

Dr. Partha Pratim Baruah
Auditor
Lakhipur College Green Audit-2022
&
Professor, Department of Botany
Gauhati University, Guwahati-781014, Assam



Date.....

GREEN AUDIT CERTIFICATE

This is to certify that the **LAKHIPUR COLLEGE, GOALPARA** has conducted the **Green Audit** for the year **2021-2022** to highlight and to assess the impact of green initiatives for maintaining the campus eco-friendly.

Principal
Lakhipur College
Goalpara

(Prof. P. P Baruah)
Chairperson, Green Audit committee
Gauhati University

GREEN AUDIT REPORT

2021-2022



Designed & Printed at Gauhati University Press



GREEN AUDIT REPORT

2021-2022



Lakhipur College
Lakhipur, Goalpara, Assam

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Dr. Partha Pratim Baruah
Auditor
Lakhipur College Green Audit-2022
&
Professor, Department of Botany
Gauhati University, Guwahati-781014, Assam

ABOUT LAKHIPUR COLLEGE

Lakhipur College was established on 10th August, 1981 to cater the need of higher education in the rural economically and educationally backward Lakhipur region of South to West Goalpara District of Assam. The college is situated at a distance of 36 km away from the district head quarter Goalpara and well connected by road.

The After coming under the fold of permanent Affiliation under Gauhati University in the year 2004 and Deficit Grants-in-Aid system of Govt. of Assam w.e.f. 11-01-1996, the College has been showing the marks of progress in all respects to the satisfaction of the students and guardians along with the education-enthusiasts of greater South West Goalpara area in last four decades. The serene beauty and eco-friendly campus of the College with beautiful garden, plantation plots and play ground is conducive to the pursuit of academic activities. The college has been under provincialised scheme of Govt. of Assam w.e.f. 1st December 2005.

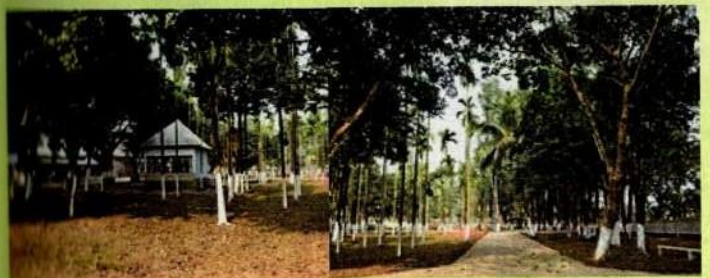


Plate 1 : The Lakhipur College Campus

With the 07 full-fledged Departments under the faculty of Arts, Lakhipur College continues to add new feathers in its cap so far as its academic excellence is concerned. The sustained endeavour and efforts of the College towards quality education and the focus on all round development of the economically weaker

section of the society is commendable. The college has therefore been accredited with 'B' grades (7.4 points) by the National Assessment and Accreditation Council (NAAC) in the year 2005 in its first assessment cycle.

Around 1384 students enrolled in UG, PG (Open and Distance mode) & HS programmes in the session 2021-2022 against the 18 faculty members including one librarian (i/c) and 08 guest faculties. There are 16 permanent supporting staffs at present in the college. The Principal is the chief executive of the college.

GREEN AUDIT AT LAKHIPUR COLLEGE

Participating in the "Green Campus, Clean Campus" mission launched by the University Grants Commission for all higher educational institution of India and in compliance with the 'Environmental Consciousness', a mandatory criterion (Criterion VII) of National Assessment and Accreditation Council (NAAC), the sustainability and sustainable development policies are kept on the agenda of Lakhipur College. Green Audit is one of the steps taken up by the College in order to record, document, analyse and report the environmental constituents of the Campus through an impartial and inclusive method of auditing. It is anticipated that Green Auditing shall help the College in preserving the rich floral and faunal diversity in and around the campus; garnering interest and creating awareness among the stakeholders.

Lakhipur College is committed to responsible stewardship of resources and to demonstrate leadership in sustainable academic practices for a better tomorrow with the policy goals of Green audit as follows:

- Identification and documentation of the eco-friendly practices for a sustainable college campus
- Increasing awareness among all stakeholders for sustainable use of available resources.
- Collection of baseline data on different components of environment before converting into threat to the college and the society.

To achieve the aforementioned goals, the present audit endeavours towards the following objectives:

- ❖ To identify current and emerging environmental issues.
- ❖ To monitor environmental management practices.
- ❖ To create awareness among the various stakeholders of the College.
- ❖ To prepare a status report on environmental compliances

AUDIT STAGE

Green auditing is the process of identifying and determining whether the College maintains eco-friendly and sustainable practices. As an effective ecological tool, it helps to create a culture of sustainability as an administrative policy throughout an organization and it needs to be implemented through regular identification, quantification, documenting, reporting and monitoring of environmentally important components.

Green auditing in Lakhipur College began with the formation of the Green Audit team incorporating faculty members and researchers of Gauhati University and Lakhipur College. The audit team visited the campus on regular basis and monitored different facilities from the audit perspectives and, simultaneously made the assessment of the status of the green cover of the Institution followed by waste management practices and energy conservation strategies, etc. Data collection was done by onsite visit through structured questionnaires in different sectors such as water, energy, waste, biodiversity status. The data were collated accordingly and analyzed to prepare this Green Audit report of Lakhipur College. The Audit team was led by Prof. Partha Pratim Baruah, Department of Botany, Gauhati University and Chairperson, Gauhati University Green Audit Committee (2019-2022).

METHODOLOGY ADOPTED

The methodology adopted to conduct the Green Audit of Lakhipur College had the following components

- On site field visits by the Green Audit Team at and when necessary.
- Data collections were done through distribution of structured questionnaires amongst different stakeholders and interviews with the executives, official staffs and general students.
- The water quality analysis was done at the Plant Ecology Laboratory of Gauhati University.
- GIS tools were used to prepare the map of the campus for LULC survey
- Different standard taxonomic and ecological protocols were followed to document and estimate the floral and faunal account for biodiversity audit.

POST AUDIT STAGE

LAND USE AND LAND COVER

Located within a thinly populated Lakhipur Township, the College campus is a flat piece of land with having little undulation in the topography. The present survey revealed that the college campus has been accommodated in a total area of 42.2 acres (68 bigha 2 katha 6 lecha) of land with having demarcated and dedicated spaces for three ornamental garden, one Mango and Guava orchard, four cultivation plots, two micro forests with mix plantation, one patch of mix Forest and two multi sports play grounds. Regular plantations since the inception of the College make it lush green campus. The trees not only support as sound barriers, but also house a wide spectrum of epiphytic flora and fauna. Organized plantations in the campus are seen which a commendable green practice of the College is. Cultivation practices of different seasonal vegetables and Cucurbits along with the micro-forests patches highlight the best eco-friendly initiatives of skill development programmes for the students with the leadership of a few faculty members inside the college campus. Two ponds are there in the campuses which support recharge and discharge of ground water. The drainage systems seem to be good in the campus. No periodic or regular inundation problems observed.

Total Land : 68 Bighas 2 Katha 6 lessa
 Converted in Square Meter = 91000 square meter
 Land Allotment letter No. RSS.709/84/13 Dated Dispur the 6th May, 1986
 Dag No. 4 (Ka), 4(Kha) and 495 (Ka)
 Revenue (Settlement) Department, Govt. of Assam
 Lat 26.028544°
 Build up Area in Square Meter Approx Long 90.298239°

Sl No	Name of Building	msm	Sq m	Remarks
1	North Building Class Rooms	51x12=	612	
2	Education Practical & Class	22x12=	264	
3	Lib Building Class Rooms	37x15=	555	
4	KKHSOU , ASOS & Smart Class	21x14=	294	
5	Library & Reading Room	15x15=	225	
6	Teachers' Common Room	15x15=	225	
7	Principal's Room & Office Room	25x15	375	
8	Girls' Common Room	10x15=	150	
9	Boys' Common Room	8x13=	104	
10	Canteen	22x9=	198	
11	Saraswati Temple	5x5=	25	
12	Sports Complex Open stage	5x5=	25	
13	Open Stage (Donated by SB Sarma	14x9=	126	
14	Security Room Near Gate (Donated by Durlav Ch. Ray, O.C)	3x3=	9	
15	Store Room	9x15	135	
16	Generator & Water room	5x7=	35	
17	New Blding	38x14=	532	
18	Toilet Northern side	7x15	105	

3994

Table 1: Built up area within the campus

Observations

- Eco-friendly and exposure to the students on life cultivation of seasonal vegetables along with the micro forest patches with mixed plantation are commendable green initiatives of the College.
- Disturbance is less in dedicated green areas/gardens.
- Avenue trees including sound barriers receive due attention. It is commendable.
- Inundation problem is not there at present.
- The drainage links are suitably managed to dictate the harvested rain water and excess surface runoff towards a pond backside and inside the campus with a view to recharge ground water.

Suggestions and Recommendations

- A task force is to be constituted for monitoring and maintaining the gardens.
- Timely pruning of avenue trees and sound-braking trees is suggested to increase aesthetic beauty of the campus.
- Post plantation of saplings needs to be monitored.
- Considering the land resources and quality of the soils, the authority may think of papaya and dragon fruit cultivation in the vacant spaces which may open up new avenue for income generation.

WATER AUDIT

As water is an essential natural resource, it is therefore, essential to examine the quality and usage of water in the campus. Water auditing is a way to conduct a study on balance between demand and supply of potable and usable water including the quality of the available water. Water audit is therefore considered as an effective management tool for minimizing losses, optimizing various uses leading to conservation of water. Water audit improves the knowledge and documentation of the distribution system, identifies the problem of seepage and leakage leading to reduce water losses, generate ideas for possible recycling of water and the use of rain water. Above all, such auditing improves financial performance of an institute in long run.

Water Management

The source of water used in the Lakhipur College is the ground water. A total of 2000 L of water is pumped out through water pumps every day (Table 2) for regular use in day to day college activities, gardening, canteen uses and lavatory uses.

Table 2: Source and usage

Sl no	Parameters	Response
1	Source of water	Ground water
2	No of Wells	--
3	No of Hand pumps	--
4	No of Over head tanks	3
5	No of water pumps used	3
6	Horse power- water pumps	1.0 HP- 3
7	Depth of well (boring)	280 ft for submersible one 120 ft for others
8	Water level	Normal
9	Type of water tanks	Reservoir
10	Capacity of Tank/ reservoir (Total)	3000 L
11	Quantity of water pumped every day	2000 L per day
12	Indication of water wastage with reasons	No wastage of water was seen excluding little overflow from water tanks/ leakage from taps
13	Water usage for gardening	500 L per day

14	Use of waste water	No
15	Fate of wastewater from labs	Not attended
16	Any wastewater treatment for lab water	No
17	Whether any green chemistry method practiced in Labs	NA
18	Rain water harvest available?	Yes -2 units
19	No of units and amount of water harvested	2 units Capacity 1500 L each
20	No of leaky taps	few
21	Amount of water lost per day	Around 30 L
21	water management plan used	No display card seen
22	water saving techniques followed	Substantially less
23	Signage for reminding peoples to turn off tap	Yes
24	Cleaning of the reservoirs	once in a year

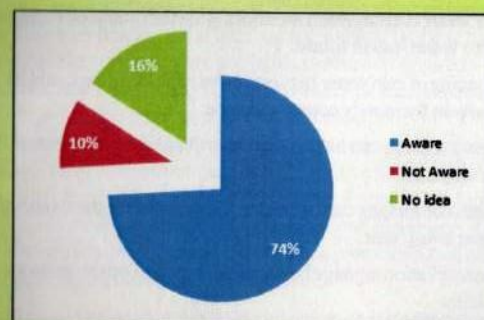
WATER QUALITY ASSESSMENT

Water samples were collected randomly from the sources and analyzed for various physico-chemical parameters (Table 3). All parameters were found under permissible limits as prescribed by different agencies excluding iron in few samples.

Table 3: Water quality analysis report

Sl No	Parameters	Values
1	pH	6.54-7.2
2	Total Hardness (mg/l)	56 -69
3	Alkalinity (mg/l)	74-89
4	Turbidity (N.T.U)	1.05-1.42
5	Calcium Hardness (mg/l)	55-79
6	Total Dissolved Solids (mg/l)	28-58
7	Sulphates (mg/l)	6.44
8	Chloride(mg/l)	24.5
9	Fluoride (mg/l)	Not traced
	Phosphate (mg/l)	0.547-0.593
10	Residual Chlorine (mg/l)	Nil
11	Iron (mg/l)	0.22-0.89
12	Nitrate (mg/l)	Nil
13	Arsenic (mg/l)	Nil
	Calcium (mg/l)	52.04
14	Manganese (mg/l)	0.11-0.119
15	Magnesium (mg/l)	16-20.44
16	Bacteriological count	Nil

Fig 1 : Awareness among the stakeholders regarding water conservation



Observations

- The College is concerned with judicious use of water.
- Awareness for saving water is relatively higher amongst the stakeholders.
- Little wastage of water was marked where attention is required.
- Display signage for water conservation are not maintained which is essential for upcoming students.
- A few strategies need to taken for regular monitoring.
- The waste water from canteen and office kitchens is not suitably controlled.
- The College has taken one initiatives in ground water recharges by dictating all roof top waters through the drains to two rainwater harvesting tanks. It is not only a unique step but also commendable practice of the Lakhipur College for water conservation in the college as well as in the vicinity of the campus as well.

Suggestions and recommendations

- A proper water consumption monitoring system could be engaged to make zero water loss in future.
- Strengthening of rain water harvesting for each building could be done, particularly in the newly constructed one
- Automated sensors can be installed in order to prevent the over flow of water from tanks.
- Awareness campaigns can be held in the campus for the fresh students to save water every year.
- Water conservation signage be installed in potent positions to aware the stakeholders.
- Periodical maintenance of water taps/ water pipes/reservoirs should be done in order to prevent the leakage of water through taps.

AUDITING FOR WASTE MANAGEMENT

Any activities in an establishment create waste and the prime question is how efficiently it could be handled to avoid of any kind of health problems out of it. Pollution from waste is aesthetically displeasing and results in generation of large amounts of litters in our surroundings. A college can generate three types of wastes viz., solid waste, liquid waste and hazardous waste. Solid waste again can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste. Biodegradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Further attention must be taken against hazardous waste that is likely to be a threat to health of the environment. As unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water, and produce greenhouse gases contributing to global climate change respectively, management of waste is utmost necessary. The auditor diagnoses the prevailing waste disposal policies of the college and suggests the best way to combat the problems.

Status of Waste Generation

In the college, only paper and plastic wastes were recorded to be generated in the Administrative Blocks and in the Canteen whereas, organic waste was found to be more in the Canteen premises and in the cultivation sites. Bio-medical waste and e-waste was almost nil during the survey. Waste in academic departments was negligible and whatever generated are systematically disposed off through the sweeping mechanism. The faculty members were actively engaged in segregating and disposing of waste whatever generated. The litters including regularly fallen twigs and leaves from the plants and trees were found to be dumped over in a compost pit. A table is given here to show an estimated generation of different types of waste on monthly basis in the Lakhipur College premises based on interview and data received through a structured questionnaire.

Table 4 : Waste generated on the campus (per monthly basis)

Sr no.	Stakeholders	Types of solid waste	Average waste generated/month
1	Academic Department	Paper waste Plastic waste Organic waste E-waste Biomedical waste	1.1 kg 0.3 kg 2.2 kg 0.00 kg Nil
2	Administrative Office	Paper waste Plastic waste Organic waste E-waste Biomedical waste	05 kg 0.6 kg 2.5 kg 0.02kg Nil
3	Hostels	Paper waste Plastic waste Organic waste E-waste Biomedical waste	Nil Nil Nil Nil Nil
4	Canteens	Paper waste Plastic waste Organic waste E-waste Biomedical waste	1.2 kg 3.6 kg 40 kg Nil Nil

Waste Management

Though college is committed to keep the campus clean and green, no segregation practice has been adopted to separate different wastes. Installation of dustbins has been started in a phase manner. No Signage has installed to aware the stackholders to use different coloured dustbins for disposing any waste.

Installation of vermi-composting unit is in the pipe line which the auditors feel another commendable approach to mitigate the organic waste including the leaf litters in the college.

During a survey carried out among the stockholders of Lakhipur College by the Green Audit Team, a majority of the respondents (82 %) were confident about their understanding of waste and their obligation in disposing of the same (Fig. 3).

Fig 2: Opinion of stakeholders regarding waste disposal mechanism of Lakhipur College

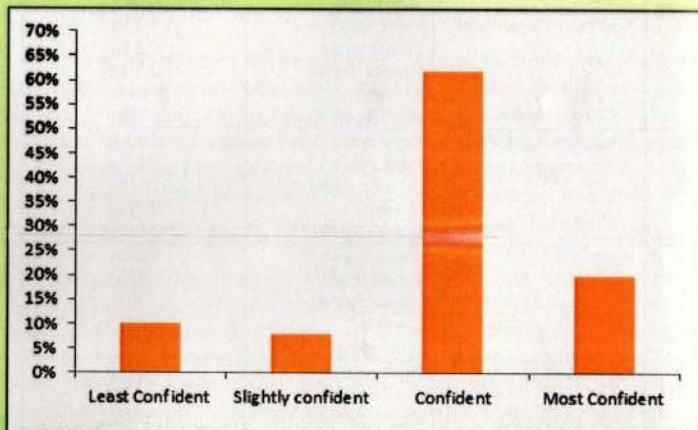


Table 5: waste management practices adopted

Sl No.	Practice/Strategies adopted	Response	Quantification if any
1	Organised collection of organic waste	Yes	On regular basis
2	Leaf Litter disposal	Yes	On regular basis
3	Vermi composting Unit	No	NA
4	Use of Plastic/plastic wares	In use	Much
5	Segregation of waste as per Govt. directives	No	NA
6	Dustbins proper place	Yes	Not sufficient
7	Dustbin clearing	Yes	On daily basis
8	Solid waste recycling process	No	NA
9	Awareness programme organized	Yes	Regular
10	Signage	No	NA



Plate 2: Awareness signage for keeping the College campus clean

Observations

1. Academic Departments do not generate large quantities of waste.
2. Plastic materials are still in use in college campus.
3. Frequency for garbage and litter collection is sufficient.
4. The College does not have any MOU with any Registered Firm for collection of E-waste whatever generated.
5. The waste disposal initiative of Lakhipur College is reflected in management programs, efforts of the ground staffs and activities of NSS and Student Union.

Suggestions and Recommendations

- Lakhipur College campus needs to be declared as a total plastic-free campus.
- The practice of using biodegradable materials should be encouraged.
- Vermi-composting facilities should be operationalized soon to avoid dumping of organic litters here and there.
- Numbers of dustbin need to be increased.
- Waste segregation initiatives should be started soon.
- Signage on waste disposal should be mounted in different locations, particularly near the dustbin/garbage bins/hangers.

HEALTH AUDIT

A healthy ecosystem directly means a healthy livelihood. Hence, to ascertain a healthy society inside the college campus and to create awareness amongst the students, teaching and non teaching members in taking actions against the growing strain on Earth's natural ecosystem, the Lakhipur College fraternity took few initiatives through several events in past couple of years of which, a few are enlisted here.

Table 6: Activities of NSS/Students' Union/ IQAC Cell/ College

Sl. No	Date	Programmes
1	05-05-2022	Plantation for creation of Micro forest in the college Campus in collaboration of Assam Science Society
2	05-06-22	World Environment Day 5 th June, 2022
3	05-07-22	Plantation drives in the college campus on 5 th July, 2022 as a part of Van Mahotsav.
4	18-07-22	Plantation drives from 15 th July to 15 th August under the scheme Chief Minister's Institutional Plantation Programme (CMIPP) coinciding with the completion of the yearlong celebration of Azadi Ka Amrit Mahotsav.
	26-01-2022	Republic Day Celebration with cleanliness drive
	15-08-2022	Independence Day Celebration with a Plantation Drive
	24-09-2022	Cleanliness drive by the College NSS Unit



Plate 3: Environment Day celebration by the Faculty members



Plate 4: Swachhata activities of NSS Cadets of the College



Plate 5: Plantation drive as NSS activity



Plate 6: Innovative idea of creation of Micro Forest within the Campus

As per Energy Conservation Act, 2001; the Energy Audit must include verification, monitoring, and analysis of the use of energy including submission of a technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption. The scope of the energy audit hence includes the collection of all relevant data, documents, electricity bills, log books relating to electricity use & operations etc., inspection of the buildings & installations and then, to analyze the data to evaluate and assess energy use and also, to suggest measures to reduce energy use and improvement of performance. The present audit therefore aimed to cover the aggregate consumption of electrical and natural gas energy in Lakhipur College covering all academic and administrative blocks and hostels. Energy use is clearly an important aspect of campus sustainability and thus, requires no explanation for its inclusion in the assessment.

Source and consumption of Energy

In Lakhipur College, energy is mainly used to manage and run the 1) lighting's load, 2) laboratory equipments, 3) office equipments, 4) air conditioners, 5) water cooler 6) fan, 7) water pump and 8) Cleaning and construction gadgets.

The primary source of the energy for Lakhipur College is the electricity received from Assam Power Distribution Company Limited supplied through a 14 KW connected load under the Consumer No. 041010115125 under the LT Category. The College has also 01 Diesel run generator set of 25 KW capacity which is mainly used during power failure in the Examination seasons. LPG is utilised in Canteen and office kitchen only.

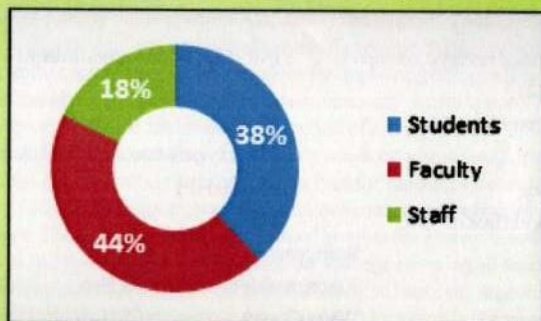
Table 7: Energy consumption in Lakhipur College

Annual Electrical Energy consumption (2021-2022)	: INR 10121.00 per month (In terms of money)
LPG requirement per year	: 60 Nos
Fuel (Diesel)	: 330 L/ year (Average 27.5 L./month)
Water Pump	: 03 (1.0 HP)
No of energy efficient AC	: Nil
Refrigerator	: Nil
Xerox machine	: 03 Nos
Water Cooler	: 01 Nos
Inverter	: 02 Nos
Online UPS	: Nil
Fan	: 85 Nos
Percentage replacement of Non- energy efficient machines in last 2 years	: 0%
Installation of energy installation machine in last 2 years	: 2 Nos.
No of LED installation at present:	: 88 (Bulb/Tube)
Percentage of increase of LED installation in last 2 years	: 100%
Building energy performance index	: 10.13 Kwh/m ² /year

Energy efficiency assessment

The Energy efficiency assessment was conducted for the load connected to the mains supply of college buildings. The entire campus including common facilities is equipped with LED lamps and LED tube lights. All computers are set to automatic power saving mode when not in use.

A good habit of the stakeholders was observed that all the electrical appliances including the bulbs are usually shut down when not in use, more specifically during the vacations excluding a few essential points which are essential to illuminate the campus. Monitoring mechanism exists in put-on and put-off the electrical appliances is a laudable eco-friendly effort of the College (Fig 4)



Suggestions and recommendations

- Looking at the energy consumption rate, the College must think for energy conservation practices along with exploring of green energy in future.
- Augmentation of solar power will make the college self sufficient in energy consumption and production.
- Old and non efficient electrical gadgets are to be replaced as far as practicable.
- 5 star rated ACs, Fans and other electrical appliances should be used in the campus to reduce further loss of energy.
- Cleaning of tube lights and bulbs to be done periodically to remove the dust over it.
- Regular maintenance of electrical gadgets be done.

BIODIVERSITY AUDIT

Biodiversity is the key to a healthy ecosystem. Morton & Hill (2014) in a biodiversity book published by the “Commonwealth Scientific and Industrial Research Organisation (CSIRO)” nicely mentioned 5 core values of biodiversity, viz. economic, ecological, recreation, cultural and scientific values. Biodiversity provides humans with raw materials for consumption and production. Ecologically biodiversity take part in functioning of ecosystems that supply oxygen, clean air and water, felicitating pollination in plants, control of pest, wastewater treatment and many ecosystem services. Scientific intervention may disclose a wealth of systematic ecological data that help us to understand the natural activities and necessities in the context of human behavior. Many recreational pursuits rely on the biodiversity of region, such as bird-watching, hiking, camping and fishing. The tourism industry also depends on biodiversity. Above all, our culture is closely connected to biodiversity through the expression of identity, through spirituality and through aesthetic appreciation. Any loss or deterioration in the condition of biodiversity can compromise all the values outlined above and affect human wellbeing particularly in North Eastern region which is located between two biodiversity hotspot, Himalaya and Indo Burma.

As the Biodiversity plays a key role in providing numerous irreplaceable services to any community, biodiversity audit is one of the best practices for sustainability of an institute. The main objective of biodiversity audit is therefore to document different biodiversity components within the College campus, to observe ecosystem structures and functions along with regular monitoring to check the new addition and analysis of biotic interactions amongst different components of biotic resources. The outcome of such audit will certainly be helpful in designing different conservation measures that need to be taken for a better and self-sustaining ecosystem in the campus.

The Lakhipur College campus is spreading over a plot of 42.2 acres (68 bigha 2 katha 6 lecha as per land record, out of which, around 54 % area are under green coverage which houses different varieties of natural fauna and flora. A few plants are introduced to enhance the aesthetic beauty of the campus.

FAUNAL DIVERSITY

The Lakhipur College campus houses a good number of animals from each different phylum which on the other hand, indicates a good health of the campus. In the present study, 55 number of vertebrates were reported in the college campus belonging to different phylum and classes. Altogether 9 amphibian, 9 reptile species and 30 birds were recorded during the audit period. Mammalian diversity is represented by only 7 species. Invertebrates includes several species of butterflies, grasshoppers, earthworms, leech, Many species of other insects like bees, wasps, ants, bugs, beetles, spiders etc. It is very interesting to note that the college campus provide a sound nesting ground of Squirrel, mongoose, dove, crow, parrot, oriole, drongo, bee eaters, common mynas and bulbul etc. .



Plate 7 : Resident Birds in the College Campus

Table 8: Fauna of Lakhipur College Campus

Sl. No	Birds	Scientific Name
	Common myna	<i>Acridotheres tristis</i>
	Spotted owl	<i>Athene brama</i>
	Cattle egret	<i>Bubulcus ibis</i>
	Lesser Coucal	<i>Centropus bengalensis</i>
	Lesser Pied kingfisher	<i>Ceryle rudis</i>
	Oriental Magpie Robin	<i>Copsychus saularis</i>
	House crow	<i>Corvus splendens</i>
	Common cuckoo	<i>Cuculus canorous</i>
	Indian cuckoo	<i>Cuculus micropterus</i>
	Indian Tree Pie	<i>Dendrocitta vagabunda</i>
	Black drongo	<i>Dicrurus macrocercus</i>
	Common golden backed woodpecker	<i>Dinopium javanense</i>
	Jungle owl	<i>Glaucidium radiatum</i>
	White breasted Kingfisher	<i>Halcyon smyrensis</i>
	Brainfever bird	<i>Hierococyx varius</i>
	Brown shrike	<i>Lanius cristatus</i>
	Black headed Munia	<i>Lonchura Malacca</i>
	Blue throated barbet	<i>Megalaima asiatica</i>
	Chestnut headed bee eater	<i>Merops leschenaultia</i>
	Small bee eater	<i>Merops orientalis</i>
	Blue cheeked bee eater	<i>Merops persicus</i>
	Black headed oriole	<i>Oriolus xanthornus</i>
	Common Tailor bird	<i>Orthotomus sutorius</i>
	House sparrow	<i>Passer domesticus</i>
	Rose ringed parakeet	<i>Psittacula krameri</i>
	Red Vented Bulbul	<i>Pycnonotus cafer</i>
	Spotted dove	<i>Streptopelia chinensis</i>
	Asian pied starling	<i>Sturnus contra</i>
	Jungle babbler	<i>Turdoides striatus</i>
	Common Hoopoe	<i>Upupa epops</i>

Sl No	Common Name	Scientific Name
31	Striped Keelback	<i>Amphiesma stotatum</i>
32	Garden lizard	<i>Calotes versicolor</i>
33	Painted Bronzeback	<i>Dendrelaphis pictus</i>
34	Many lined grass Skink	<i>Europis multifasciata</i>
35	Asian House Gecko	<i>Hamidactylus frenatus</i>
37	Red-necked Keelback	<i>Rhabdophis subminiatus</i>
38	Checkered Keelback Water Snake	<i>Xenochrophis piscator</i>
39	Bengal monitor Lizard	<i>Varanus bengalensis</i>
Amphibia		
40	Common Asian Toad	<i>Duttaphrymus melanostictus</i>
41	Crickit frog	<i>Fejervarya pierrei</i>
42	Indian Bull frog	<i>Hoplobatrachus tigerinus</i>
43	Bhamo frog	<i>Humerana humeralis</i>
44	long-tongued frog	<i>Hylarana leptoglossa</i>
45	Yellow striped frog	<i>Hylarana tyleri</i>
46	Litter Frog	<i>Leptobranchium smithi</i>
47	Common tree frog	<i>Polypedates leucomystax</i>
48	Common tree frog	<i>Polypedates teraiensis</i>
Mammals		
49	Common mongoose	<i>Herpestes edwardsi</i>
50	The common house rat	<i>Rattus rattus</i>
52	House mouse	<i>Mus musculus</i>
53	Common House shrew	<i>Suncus murinus</i>
54	squirrel	<i>Callosciurus pygerythrus</i>
55	Indian flying fox	<i>Pteropus giganteus</i>

Arthropods

Apis indica; Apis dorsata; Apis florea, Crocothemis erythraea; Pantala flavescens; Philoamia ricini; Junonia atlites atlites ; Ethope himachala ; Melanitis leda leda ; Paltoporia paraka paraka; Acraea terpsicore ;Elymnias hypermnestra undularis ; Mycalesis perseus blasius ; Tanaecia lepidea lepidae ; Euploea core core; Myrmachne orientalis ; Nephila plipes; Heteropoda sp; Phisella vitatta

FLORAL DIVERSITY

The College campus is an evergreen beautiful area with a variety of trees, bushes and grasses. The aesthetic beauty of the campus has been enhanced by introducing a few ornamental and economically important plants. All the plants provide good ecological services in maintaining a green College campus within the Lakhipur town. Altogether 64 species of plants belonging to herb, shrub and tree categories are recorded and enlisted below.

Table 9: Plants of Lakhipur College Campus

Sl no.	Name of plants	Family	Life Form
1	<i>Shorea robusuta</i>	Dipterocarpaceae	Tree
2	<i>Hevea brasilensis</i>	Euphorbiaceae	Tree
3	<i>Tectona grandis</i>	Lamiaceae	Tree
4	<i>Mimusops elengi</i>	Sapotaceae	Tree
5	<i>Phyllanthus emblica</i>	Phyllanthaceae	Tree
6	<i>Eucalyptus sp.</i>	Myrtaceae	Tree
7	<i>Terminalia arjuna</i>	Combretaceae	Tree
8	<i>Zizyphus jujuba</i>	Rhamnaceae	Tree
9	<i>Terminalia chebula</i>	Combretaceae	Tree
10	<i>Terminalia bellirica</i>	Combretaceae	Tree
11	<i>Gmelina arborea</i>	Lamiaceae	Tree

12	<i>Ficus benghalensis</i>	Moraceae	Tree
13	<i>Azadirachta indica</i>	Meliaceae	Tree
14	<i>Syzygium cumini</i>	Myrtaceae	Tree
15	<i>Olea europaea</i>	Oleaceae	Tree
16	<i>Lagerstroemia speciosa</i>	Lythraceae	Tree
17	<i>Mesua ferrea</i>	Calophyllaceae	Tree
18	<i>Neolamarckia cadamba</i>	Rubiaceae	Tree
19	<i>Michelia champaca</i>	Magnoliaceae	Tree
20	<i>Dalbergia sissoo</i>	Fabaceae	Tree
21	<i>Calotropis gigantea</i>	Epocynaceae	Tree
22	<i>Terminalia arjuna</i>	Combretaceae	Tree
23	<i>Thuja sp</i>	Cupressaceae	Tree
24	<i>Bombax ceiba</i>	Malvaceae	Tree
25	<i>Areca cateshu</i>	Aracaceae	Tree
26	<i>Peperonia pellucida</i>	Piperaceae	Herb
27	<i>Polyalthia longifolia</i>	Annonaceae	Tree
28	<i>Epipremnum aureum</i>	Araceae	Herb
29	<i>Aloe vera</i>	Asphodelaceae	Herb
30	<i>Chlorophytum comosum</i>	Asparagaceae	Herb
31	<i>Dracaena trifasciata</i>	Asparagaceae	Herb
32	<i>Cocos nucifera</i>	Arecaceae	Tree
33	<i>Tradescantia pallida</i>	Commelinaceae	Herb
34	<i>Curcuma longa</i>	Zingiberaceae	Herb
35	<i>Cyperus rotundus</i>	Cyperaceae	Herb

36	<i>Cynodon dactylon</i>	Poaceae	Herb
37	<i>Albizia debbeck</i>	Fabaceae	Tree
38	<i>Delonix regia</i>	Fabaceae	Tree
39	<i>Rosa alba</i>	Rosaceae	Shrub
40	<i>Ziziphus jujube</i>	Rhamnaceae	Tree
41	<i>Artocarpus heterophyllus</i>	Moraceae	Tree
42	<i>Ficus religiosa</i>	Moraceae	Tree
43	<i>Chrysalidocarpus lutescens</i>	Arecaceae	Shrub
44	<i>Oxalis sp</i>	Oxalidaceae	Herb
45	<i>Flacourtia jangomas</i>	Salicaceae	Tree
46	<i>Euphorbia hirta</i>	Euphorbiaceae	Herb
47	<i>Phyllanthus fraternus</i>	Phyllanthaceae	Herb
48	<i>Psidium guajava</i>	Myrtaceae	Shrub
49	<i>Hibiscus rosa sinensis</i>	Malvaceae	Shrub
50	<i>Carica papaya</i>	Caricaceae	Shrub
51	<i>Amaranthus spinosus</i>	Amaranthaceae	Herb
52	<i>Amaranthus viridis</i>	Amaranthaceae	Herb
53	<i>Bougainvillea glabra</i>	Nyctaginaceae	Climbing shrub
54	<i>Mimusops elengi</i>	Sapotaceae	Tree
55	<i>Ixora chinensis</i>	Rubiaceae	Shrub
56	<i>Catharanthus roseus</i>	Apocynaceae	Herb
57	<i>Capsicum annum</i>	Solanaceae	Herb
58	<i>Solanum melongena</i>	Solanaceae	Herb
59	<i>Ocimum sanctum</i>	Lamiaceae	Shrub

60	<i>Eclipta prostrata</i>	Asteraceae	Herb
61	<i>Spilanthes paniculata</i>	Asteraceae	Herb
62	<i>Musa spp.</i>	Musaceae	Shrub
63.	<i>Neolamarckia cadamba</i>	Rubiaceae	Tree
64.	<i>Litchi chinensis</i>	Sapindaceae	Tree

Observations

- The College maintains a sound green environment. It is commendable.
- Beautiful and well maintained gardens enhance the aesthetic beauty of the campus.
- The trees and bushes are providing nesting support to some specific indigenous wildlife. It is a specific sign of calm and quite eco- friendly environment of the campus.
- The College is imparting training on life skills on cultivation of Mango and Guava. It is obviously, a commendable green and environment friendly imitative of the college to encourage budding citizens to nurture nature.
- Cultivation plots of Mango and Guava along with the forest patches and gardens not only help in cleaning air through sequestration of CO₂ and maintaining humidity, but also motivating students for organic cultivation and entrepreneurship.



Plate 8 : Views of Mixed Plantation



Plate 9: students taking part in life skill training on cultivation and management

Suggestions and Recommendations

- The existing campus of Lakhipur supports a good number of plants and animals of which a few are ecologically, aesthetically and culturally important. All these plant species should be conserved in a proper way to support and to achieve more biodiversity values in future.
- The dedicated garden areas need to be monitored regularly to enhance the aesthetic beauty of the campus.
- Boundary areas may be systematically planted in consultation with a horticulturist or botanist.
- Students may be encouraged to take care of the plants and the campus.

AUDIT SUMMARY

This report on "Green Audit" of Lakhipur College for the year 2021-2022 was prepared with an objective to highlight and prepare a statement on the green practices followed by the College. The present Green auditing began with the assessment of the status of the green cover of the college followed by water audit, analysing waste management practices and energy conservation strategies etc. The audit team visited different facilities at the College campus, monitored different appliances/utilities and documented the relevant consumption patterns. The Faculty members, staffs and learners were interviewed through structured questionnaires to

get details of usage, frequency, or general characteristics of different appliances. Data collection was done by onsite visit and also through questionnaires in all the sectors related to environmental quality. The data thus collated were analyzed to prepare this audit report of Lakhipur College.

The college is located on a huge plot of land of 44.2 acres and the campus is systematically arranged with having demarcated and dedicated spaces for three ornamental garden, one Mango and Guava orchard, four cultivation plots, two micro forests with mix plantation, one patch of mix Forest and two multi sports play grounds. Little disturbances within the dedicated green areas/gardens were observed that need monitoring and intervention. Boundaries of the college are almost covered with plantation which performs as sound barrier for the campus. Regular monitoring and trimming/pruning is therefore suggested at and when necessary. Cultivation of Mango and Guava along with a few vegetable crop highlight the best eco-friendly initiatives of skill development programmes for the students under the leadership of a few faculty members inside the college campus.

The Lakhipur College extract @ 2000 L ground water per day to fill up the 3 water reservoirs of the capacity 3000 L. It was noted that wastage of water is very meager which was also reflected in the consciousness of the stakeholders. Till now the potable water quality was within the permissible limit as prescribed by different agencies excluding the iron content which the College is trying to manage by installing necessary filters. The authority is proactive in conserving water and the awareness of Stakeholders on water conservation is commendable as well. Display signage for water conservation and regular monitoring was found to be missing which need to be installed at earliest. The initiative of rain water harvesting is made and channels were connected to two tanks for recharge of ground water. Though no fault was found, it is suggested for periodical maintenance of water taps/ water pipes/reservoirs to prevent the loss of water.

In the college, more paper and plastic wastes were recorded to be generated in the Administrative Blocks and from the Canteen whereas, organic waste was found to be more in the canteen. No report was found on generation of bio-medical waste. The e-waste generation is little in the campus for which disposal mechanism is yet to be developed. The college has a centralized collection mechanism for any kind of waste excluding the litters and biomass generated due to shedding from trees and weeding in the campus. As the college has been initiated few Life skill training on gardening, propagation and caring of horticultural crops like mango and guava etc., installation of vermi-composting, or otherwise conventional composting

in a designated site is suggested with a structured monitoring mechanism. Further, in order to carry forward the commitment to keep the campus waste free, installation of dustbins has been started in phase manner. It is also noted that no visible segregation practice exists to separate different wastes which need active attention.

But, it is good to see that around 82 per cent of stakeholders were confident about their understanding of waste and their obligation in disposing of material. Academic Departments do not generate large quantities of waste. Plastic materials are still in use, of course, in small quantities. It is hence suggested that Lakhipur College campus is to be declared as a 'Complete Plastic-Free Campus'.

In order to encourage students to respect the environment and think about conservation, the college in collaboration with NSS Cell and IQAC regularly organise different awareness programme on Swachhata and maintenance of healthy environment. A couple of cleanliness drive and plantation programmes were also organised in and around the Lakhipur College campus during last couple of years.

Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. Energy is mainly used in this college campus for 1) lighting's load, 2) laboratory equipments, 3) office equipment, 4) air conditioners, 5) water cooler 6) Fan, 7) water pump and 8) cleaning and construction purposes.

The primary source of the energy for Lakhipur College is the electricity received from Assam Power Distribution Company Limited. The College has also 01 Diesel run generator sets of 25 KW capacities which are mainly used during power failure in the Examination seasons. LPG is utilised in Canteen and office kitchen only. The Energy efficiency assessment was conducted for the load connected to the mains supply of college buildings including canteen. The entire campus including common facility centres are equipped with LED lamps and LED tube lights which can be considered as one of the best practices of energy saving. Though percentage replacement of non energy efficient machines/gadgets in last 2 years was almost nil, the percentage of increase LED installation in last 2 years was almost 100 per cent.

A good practice was noted that all the computers are set to automatic power saving mode when not in use. Monitoring mechanism exists in putting-on and off of the electrical appliances is a laudable eco-friendly effort of the College. Solar installation is also suggested in the campus.

As the Biodiversity plays a key role in providing numerous irreplaceable services to any community, biodiversity audit is one of the best practices for sustainability of an institute. The Lakhipur College accommodates about 9 amphibian,

9 reptile species, 30 birds 7 Mammalian species. Invertebrates present in the campus includes several species of butterflies, grasshoppers, earthworms, leech, many species of other insects like bees, wasps, ants, bugs, beetles, spiders etc. Harboring of rich faunal diversity indicates a good health of the campus. It is also interesting to note that the college campus provide a sound nesting ground of Squirrel, mongoose, dove, crow, parrot, oriole, drongo, bee eaters, common mynas and bulbul etc.

The campus is evergreen with 65 species of trees, shrubs and herbs including grasses. A few ornamental and economically important plants are introduced into the campus not only to beautify the campus but also to add values to it. Since plants provide a good ecological services in maintaining a green campus these should be conserved in a proper way to support and to achieve more biodiversity values in future.

The Life Skill initiatives through imparting training on cultivation techniques of Mango and Guava is a commendable green and environment friendly initiative of the college to encourage budding citizens to nurture nature. Cultivation plots, micro forest patches, and mixed plantation patches not only help in cleaning air through sequestering CO₂ and maintaining humidity, but also motivating students for organic cultivation and entrepreneurship.

In spite of having budgetary and management constraints that limits the effectiveness of green practices; Lakhipur College has put every effort to streamline all those practices to develop an eco-friendly and aesthetic campus.

The report contains some specific suggestions and recommendations in each category which need to be implemented to improve the existing environment-related practices of Lakhipur College.
