JUNE 12, 2023

GREEN AND ENVIRONMENT AUDIT REPORT, MORIDHAL COLLEGE, DHEMAJI

SUBMITTED TO
THE PRINCIPAL
MORIDHAL COLLEGE, MORIDHAL
DHEMAJI, ASSAM 787057

SUBMITTED BY
TRCATS LLP
REGISTERED OFFICE: BARUAH CHUBURI, MAZGAON,
SONITPUR, ASSAM, 784001

TRCATS Transitioning Research Consultancy and Training Services LLP
Transition Ideas to Business

Acknowledgement

We are sincerely thankful to the Management of Moridhal College for giving us the opportunity to conduct Green and Environment Audit of the Institute.

We are also grateful to Dr. Dipen Saikia, Principal, Moridhal College, Moridhal, Assam whose valuable comments / feedback, during various reviews have helped us during the course of the Audit.

We express our sincere gratitude to all other concerned officials for their support and guidance during the conduct of this exercise.

For TRCATS LLP

(Dr. Dipal Baruah)
Director (R&D and Innovation)
TRCATS LLP

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Study Team

1. Dr. Dipal Baruah, PhD, M. Tech (Energy Technology), B.E (Mechanical Engineering)
   TRCATS LLP, Baruah Chuburi, Mazgaon, Sonitpur, Assam, 784001

2. Dr. Sampriti Kataki, PhD (Energy), M.Sc (Environmental Science)
   TRCATS LLP, Baruah Chuburi, Mazgaon, Sonitpur, Assam, 784001

Dr. Dipal Baruah
Director (R&D and Innovation)
TRCATS LLP

Dr. Sampriti Kataki
Environmental Specialist
TRCATS LLP

TRCATS
Transitioning Research Consultancy and Training Services LLP
Transition Ideas to Business
ISO 9001-2015 certified LLP
GSTIN: 18AAUFT1027A1ZB
www.trcats.co.in
trcatsllp@gmail.com
+91-9435383057
Baruah Chuburi, Mazgaon, Tezpur, Sonitpur, Assam - 784001, India

Ref. No. Cert./2023/003 **Date: 12/06/2023**

TO WHOM IT MAY CONCERN

This is to certify that TRCATS LLP having registered office at Baruah Chuburi, Mazgaon, Tezpur, Sonitpur, Assam -784001 has successfully conducted the Green and Environment Audit of MORIDHAL COLLEGE, MORIDHAL, DHEMAJI, ASSAM 787057.

The college has provided necessary data and credential for scrutiny. The activities and measures undertaken by the college has been verified. After collecting and analyzing the required data, the Green and Environment Audit report has been prepared and submitted. The efforts taken by the college towards environmental sustainability is appreciated.

(Dr. Dipal Baruah)
Director (R&D and Innovation)
TRCATS LLP

TRCATS LLP (Transitioning Research Consultancy and Training Services) Regd No. ABZ-8898 Tezpur, Assam-784001

1. INTRODUCTION

Energy is required for the maintenance and sustenance of quality. Fossil fuel is a major source of this energy. The primary causes of climate change are the use of fossil fuels and deforestation. All societal stakeholders must implement green measures to reduce these problems, and higher education institutions play a more significant role in this.

Moridhal College takes steps to contribute towards the reduction in Green House Gas (GHG) from the atmosphere in order to support UN's Sustainable Development Goals. The "Green and Environment Audit" of the college campus, which is a component of this effort, is crucial for the institution's self-evaluation and displays the college's commitment for environmental sustainability.

The authorities of Moridhal College have undertaken some eco-friendly efforts towards environmental sustainability, which have been identified and evaluated in this Green and Environment Audit. A Green and Environment Audit is a useful tool for creating a sustainable culture because it implements sustainability via the systematic identification, measurement, documentation, reporting, and monitoring of key environmental parameters. Evaluation of the campus's floral and faunal diversity is another aspect of the Green and Environment Audit.

2. OBJECTIVE

The idea of the Green and Environment Audit is to identify, quantify, describe and prioritize framework of Environmental Sustainability in the college campus. The main objectives of the Green and Environment Audit are assessment of the following in the college campus:

- Land use analysis.
- Floral diversity.
- Faunal diversity.
- Weather data.
- Water analysis.
- Noise level.
- Waste disposal practices.

- Transportation practice.
- Electrical power consumption
- Green practices and activities.

3. BENEFITS OF GREEN AND ENVIRONMENT AUDIT

A Green and Environment Audit has multi-faceted benefits in terms of reinforcing the contribution of an institute towards environmental sustainability. Some key points are summarized below.

- Improved environmental practices of the institute.
- More efficient resource management.
- Benchmarking for environmental conservation initiatives.
- Augmenting the creation of a green campus.
- Improved waste management through reduction of waste generation and recycling.
- Enhancing the awareness for environmental conservation guidelines and duties.
- Cost saving methods through better resource management.
- Developing environmental ethics and value systems among the students and other stakeholders.
- Develop a valuable tool to monitor the environmental and sustainable development practices of the college.
- Improvement of overall college profile.

4. METHODOLOGY ADOPTED FOR GREEN AND ENVIRONMENT AUDIT

The methodology adopted to perform the entire Green and Environment Audit exercise includes: collection of data, physical inspection of the campus, observation and review of the documentation, data analysis and reporting. The steps of the Audit are detailed below.

Step 1 – Data Collection

Data collection was performed by using different tools such as observation, measurements and communicating with responsible/representative persons of the college.

Following steps were taken for data collection:

- The audit team visited each building and department, library, canteen, open space, gardens of the campus and information were collected by interviewing with the representative person.
- Land use data of the college were collected.
- The energy data such as monthly electricity consumption and fuel consumption were collected from the officials and analyzed.
- Waste management facilities such as dustbins, vermicompost unit etc. were observed closely. Other waste disposal processes adopted by the college were reviewed.
- All flora and fauna found in the college campus were identified and listed out.
- Water quality and noise level of the campus were evaluated.

Step 2 – Campus tour and physical inspection

The audit team visited the campus on 29th May, 2023 to collect and review necessary data.

Step 3 - Document review and verification

During the visit, available facility documentation was reviewed with facility representatives. This documentation review includes data related to-

- Land use pattern
- Geographical location
- Flora and faunal diversity
- Water analysis
- Waste management
- Transportation practice
- Energy consumption and conservation measures taken by the College
- Green practices and activities
- Expenditure on green initiatives

Step 4 – Key parameter measurement and testing

- Water analysis of the College
- Noise level of the College campus

Step 5 - Data Analysis

- Analysis of land use land cover data
- Weather data analysis (Average ambient temperature and humidity analysis)
- Analysis of data related to energy consumption (Electricity and fuel consumption)
- Water test report analysis
- Analysis of noise level at different locations of the campus.

Step 6 - Report preparation and recommendation

The results of our findings are summarized in this report. The report includes a description of the college campus including different facilities available. The environmental and energy conservation initiatives already taken by the college authority have been mentioned in the report.

The report incorporates a summary of all the activities and effort performed in past few years to conserve environment and energy within the campus or outside. The report also includes the activities performed by the college authorities along with the local communities for awareness generation and community participation towards better environmental practices to address the present environmental challenges.

5. DESCRIPTION OF THE COLLEGE CAMPUS

Moridhal College was established in 1988. The campus is located in Moridhal area of Dhemaji District of Assam. The college has two campuses, one college field and hostel campus. The geographical location of the main college campus is 27.5330° N, 94.5954° E (Fig. 1).

The district is located at a river confluence where the powerful Brahmaputra river flanks it and its various tributaries flow through it, making it prone to flooding. The climate around the college area is subtropical, with pleasantly warm, dry winters from November to February and a long, hot and rainy period from April to mid-October. The monsoon

runs roughly from June to early or mid-October, but from March to May (and more rarely in February) showers occur, which gradually become more intense and frequent.

Fig. 1 Google Earth Map of Moridhal College

At present the College has 19 Departments distributed in different buildings which includes classrooms, laboratories, library, auditorium, office, store and bathrooms. The college also has canteen, playground, hostels and open green space with vegetation and trees.

6. LAND USE ANALYSIS

The geographical location of the campus is at latitude 27.2308° N and longitude 94.0898° E. Total land cover data of the college campus has been collected from the college authority and from Google Earth (Fig. 2). The college occupies land in four different areas viz. College campus I (13.59 Bighas), Hostel campus (4.09 Bighas), College Field (16 Bighas) and College campus II (49 Bighas). The total land area and built-up area of the college are 82.68 Bighas and 72177 m^2, respectively. The college campus area consists of multiple buildings, both single story Assam type and multi-story RCC buildings along with the green vegetation area and trees with varieties of timber, fruit yielding plants, ornamental and medicinal plants. The building details of the college are summarized in Table 1.

Fig. 2 (a) Main College Campus

Fig. 2 (b) Hostels and Auditorium

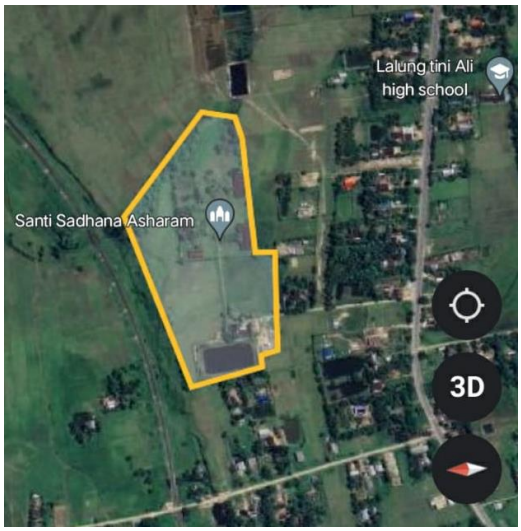


Fig. 2 (c) Extension Area

Fig. 2 (d) College Field

Table 1 Building details

Sl. No.	Building/Block	Number of Floor
1	Distance education, Exam branch, Teachers common room, Academic in-charge room (RCC)	2
2	Auditorium (AT)	1
3	Girl's hostels I (RCC)	2
4	Girl's hostels II (RCC)	2
5	Girl's hostel III (AT)	1

Sl. No.	Building/Block	Number of Floor
6	Boy's hostel (RCC)	2
7	RCC Science Building (RCC)	2
8	Dept. of Geography, Hindi, Zoology, Botany, Chemistry (AT)	1
9	General Class Rooms (AT)	1
10	Indoor stadium and Gymnasium (AT)	1
11	State Govt. Building, Dept. of Education, Laboratory (RCC)	3
12	Computer Science Dept., ICT Laboratory, Library (RCC)	2
13	Canteen and Guest House (RCC)	2
14	RUSA building (RCC)	2
15	Alumni office (AT)	1

7. WEATHER DATA OF THE COLLEGE CAMPUS

The ambient air temperature and relative humidity data were obtained from the NASA website (https://power.larc.nasa.gov/data-access-viewer/)

The NASA data are satellite-retrieved; its parameters are computed on a daily average basis using NASA/GEWEX surface radiation Budget model. The model considers the effect of cloud cover and local atmospheric conditions. Compared to BSRN (Baseline Surface Radiation Network) sites the NASA data show high accuracy with Bias (less than 0.12) and RMSE (Root Mean Square Error) (less than 18%). BSRN sites are the most accurate approved ground sites.

Table 2 shows the monthly average air temperature and relative humidity of Moridhal College campus for the year of 2021 (January to December). It has been observed that the average air temperature of the campus is ranging between 10.9^{0}C to 39.93 ^{0}C, whereas the average relative humidity of the campus varies from to 62.75 % to 83.62%.

Table 2 Variation of monthly temperature and relative humidity in the Moridhal College campus

Months	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Max. Air Temp (^{0}C)	26.7	29.08	33.83	37.87	37.63	35.87	39.93	38.68	38.62	36.97	31.05	27.66
Min. Air Temp (^{0}C)	10.9	11.8	15.07	18.18	19.72	23.58	24.8	22.44	24.01	19.06	13.11	10.62
Avg RH (%)	74.75	66.56	63	62.75	70.62	81.69	80.38	83.62	76.81	76.25	73.25	70.69

8. WATER QUALITY OF THE COLLEGE CAMPUS

Water quality testing is an important aspect as it identifies contaminants and thus helps to avoid spread of water borne diseases. Moridhal College uses ground water for their daily needs. Water is being used in the campus as drinking water, used in bathrooms both in canteen and academic buildings and for gardening and other purposes. Therefore, it is very important to test the water to ensure the quality to use for all purposes.

The indicators tested for water quality include alkalinity; color of water; pH Value; Taste and odor; dissolved metals and salts; presence of microorganisms such as fecal coliform bacteria (*Escherichia coli*), Cryptosporidium, and *Giardia lamblia*; dissolved metals and metalloids (lead, mercury, arsenic, etc.); colored dissolved organic matter (CDOM); dissolved organic carbon (DOC), heavy metals.

Water quality test was carried out by the District Level Laboratory (NABL accredited), Public Health Engineering, Dhemaji Division, Dhemaji for Moridhal College. The reports of the same are shown in Fig. 3.

The water quality tests were carried out on filtered water extracted through deep tube well. The values of the reported parameters are within permissible limits.

The existing filtration system in the college seems to be effective as far as the results of the reported parameters are concerned. However, it is recommended that filter water should be exclusively used for all purposes.

TC-10713

Email ID: dlldhemaji@gmail.com Ph. No.: 8638215028/9101208818

TEST REPORT

Test Report No: PHED/DHJ/DLL/2023-24/000118 Issue Date : 06/06/2023

ULR No	**: TC107132300000000118F**		
Issued To	: MORIDHAL COLLEGE		
Customer Reference No	: GOVT-118	Sample Received on Dated	: 03/06/2023
Sample Description	: Drinking Water	Sample Location	: MORIDHAL, Dhemaji
Sample Type	: PWSS	Sample Quantity	: 1.5 L
Sample Collected on Dated	: 03/06/2023	Date of Analysis Started	: 03/06/2023
Sample Collected by	:	Date of Analysis Completed	: 06/06/2023

RESULTS

Sl. No.	Parameter	Protocol Used	Results	IS: 10500:2012 (Second Revision)		Unit
				Desirable limit	Max. Permissible limit (in absence better alternate source)	
1	pH	IS: 3025: Part 11 @ 25 °C	7.34	6.5 – 8.5	No relaxation	Ph Units
2	Total Dissolved Solids	IS: 3025: Part 16	98	500	2000	mg/L
3	Turbidity	IS: 3025: Part 10	1	1	5	NTU
4	Iron	APHA 3500- Fe B	0.37	1	No relaxation	mg/L
5	Chloride	IS: 3025: Part 32	21.27	250	1000	mg/L
6	Total Hardness	IS: 3025: Part 21	64	200	600	mg/L
7	Total Alkalinity	IS: 3025: Part 23	54	200	600	mg/L
8	Fluoride	APHA 4500 – F D	0.10	1.0	1.5	mg/L
9	Colour	IS: 3025: Part 4	0.5	5	15	Hazen
10	Odour	IS: 3025: Part 5	Agreeable	Agreeable	Agreeable	
11	Taste	IS: 3025: Part 8	Agreeable	Agreeable	Agreeable	
12	Calcium	IS: 3025: Part 40	Not Performed	75	200	mg/L
13	Magnesium	APHA 3500- Mg B	Not Performed	30	100	mg/L

Opinion: The Parameter Tested at Sl. No ____ in the test report does not meet the requirement of IS 10500:2012 (Second revision)

Notes:

1. The results given above are related to the sample as received and tested in this laboratory. Reliability of sample lies with the sender.
2. The test report cannot be regenerated/re-produced in whole or in part without written permission of Laboratory.
3. The test report cannot be used for any publicity or any legal purpose.
4. The test samples meant for chemical analysis will be disposed of after 15 days from the date of issue of test report unless until specifically requested by the customer for retaining over a longer period.

Sample Analysed by

Lab. Asstt.
DLL Dhemaji (PHED)
Dhemaji Division, Dhemaji

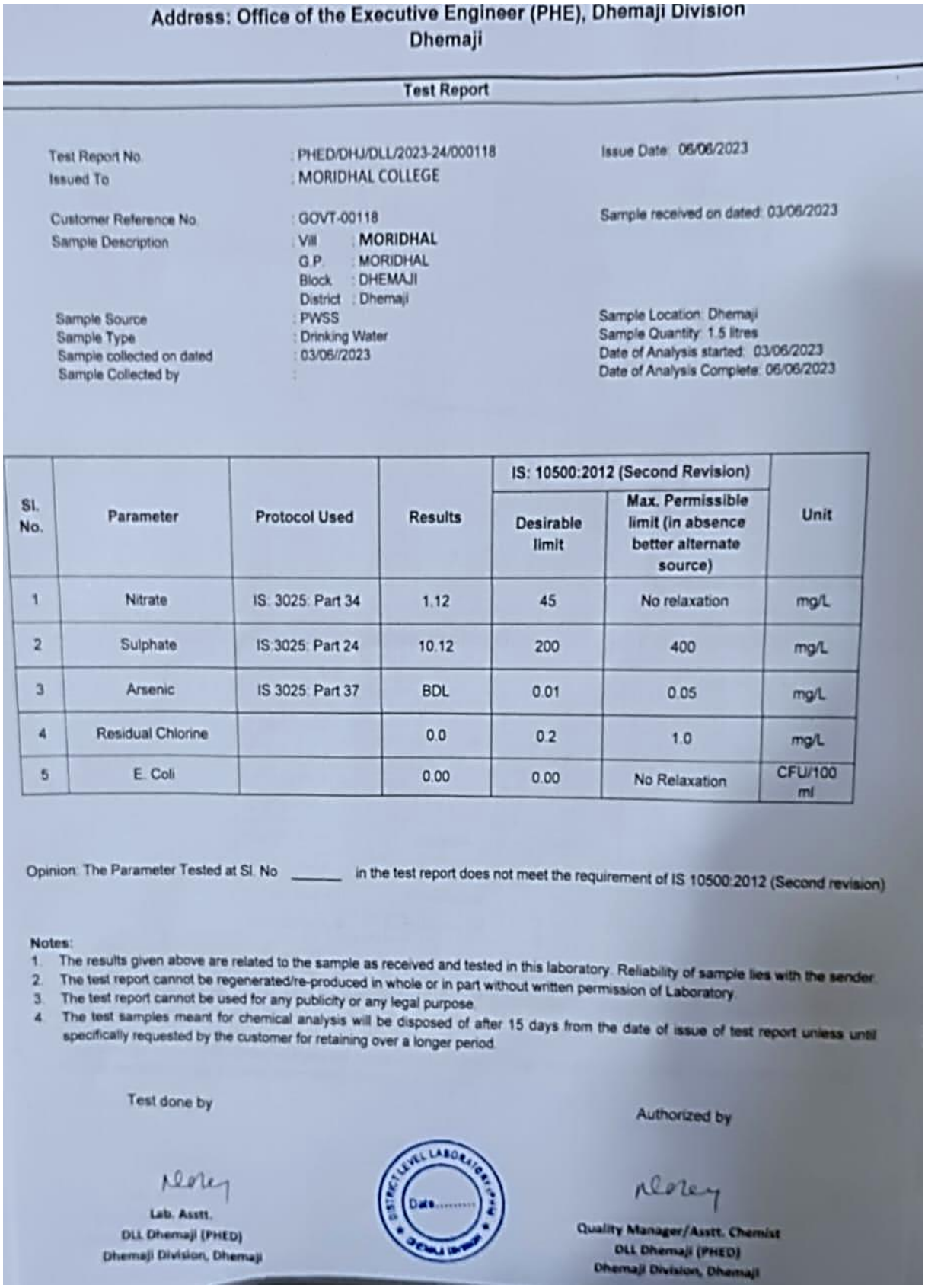
DISTRICT LEVEL LABORATORY Dhemaji

Authorized by

Quality Manager/Asstt. Chemist
DLL Dhemaji (PHED)
Dhemaji Division, Dhemaji

END OF TEST REPORT

Fig. 3(a) Water quality test report of Moridhal College



Address: Office of the Executive Engineer (PHE), Dhemaji Division
Dhemaji

Test Report

Test Report No. : PHED/DHJ/DLL/2023-24/000118 Issue Date: 06/06/2023
Issued To : MORIDHAL COLLEGE

Customer Reference No. : GOVT-00118 Sample received on dated: 03/06/2023
Sample Description : Vill : MORIDHAL
G.P. : MORIDHAL
Block : DHEMAJI
District : Dhemaji
Sample Source : PWSS Sample Location: Dhemaji
Sample Type : Drinking Water Sample Quantity: 1.5 litres
Sample collected on dated : 03/06/2023 Date of Analysis started: 03/06/2023
Sample Collected by : Date of Analysis Complete: 06/06/2023

Sl. No.	Parameter	Protocol Used	Results	IS: 10500:2012 (Second Revision)		Unit
				Desirable limit	Max. Permissible limit (in absence better alternate source)	
1	Nitrate	IS: 3025: Part 34	1.12	45	No relaxation	mg/L
2	Sulphate	IS:3025: Part 24	10.12	200	400	mg/L
3	Arsenic	IS 3025: Part 37	BDL	0.01	0.05	mg/L
4	Residual Chlorine		0.0	0.2	1.0	mg/L
5	E. Coli		0.00	0.00	No Relaxation	CFU/100 ml

Opinion: The Parameter Tested at Sl. No _____ in the test report does not meet the requirement of IS 10500:2012 (Second revision)

Notes:
1. The results given above are related to the sample as received and tested in this laboratory. Reliability of sample lies with the sender.
2. The test report cannot be regenerated/re-produced in whole or in part without written permission of Laboratory.
3. The test report cannot be used for any publicity or any legal purpose.
4. The test samples meant for chemical analysis will be disposed of after 15 days from the date of issue of test report unless until specifically requested by the customer for retaining over a longer period.

Test done by

Lab. Asstt.
DLL Dhemaji (PHED)
Dhemaji Division, Dhemaji

DISTRICT LEVEL LABORATORY Dhemaji Date.....

Authorized by

Quality Manager/Asstt. Chemist
DLL Dhemaji (PHED)
Dhemaji Division, Dhemaji

Fig. 3(b) Water quality test report of Moridhal College

9. NOISE LEVEL IN THE CAMPUS

Under the Air (Prevention and Control of Pollution) Act, 1981, noise is considered as a pollutant. Noise mostly occurs in two major situations: community noise and industrial noise. Community noise is also called environmental noise and is defined as the noise emitted from all the sources except the noise from the industrial sources. As per WHO noise quality guidelines, noise level values are summarized with regard to specific environments and effects. For each environment and situation, the guideline values take into consideration the identified health effects and are set, based on the lowest levels of noise that affect health (critical health effect). As far as community noise is concerned, the WHO guidelines recommend less than 35 dB(A) in classrooms which is important for good teaching and learning conditions. The noise level monitoring was carried out to assess the equivalent noise level (L_{eq}) in the Moridhal College campus. The test was carried out for 60 sec in each location and the maximum, minimum and the average noise level readings were recorded. The noise monitoring was carried out at different buildings in different locations within the campus. Table 3 shows the average measured noise level in the campus.

Table 3 Noise level test in different locations

Sl. No.	Building/Block	Average noise level (dB)
1	RCC Building (RUSA)	40.2
2	Canteen, Alumni Office & Guest House	50.8
3	Library	35.3
4	ICT Laboratory	38.7
5	Computer Science Department	36.1
6	Education Department and laboratory	32.8
7	State Govt Building (First Floor)	53.7
8	State Govt Building (Ground Floor)	49
9	State Govt Building (Second Floor)	51.5
10	Indoor & Gym	22
11	Assam Type General Class Room	43
12	Department of Geography/Hindi/Zoology/Botany/Chemistry	55
13	RCC Science Building	47.4
14	Boy's Hostel	34
15	Girl's Hostels +Superintendent quarter	48.6
16	Auditorium	23
17	Academic Incharge Room+Distance Education Room+Teachers common room+Exam branch)	34

From the measured data as summarized in Table 3, it is observed that the ambient noise levels in certain locations is beyond the prescribed standard limit of 35 dB for classrooms as per WHO guidelines. The exceeding of maximum permissible limits in these areas can be attributed to the fact that these rooms are kept open to the surroundings through open windows and doors. Along with this, the noise emerging from vehicular movements through nearby roads lead to higher noise levels in the classrooms. Also, due to gathering of a large number of stakeholders for official works, the noise level in the administrative building is on the higher side. For maintenance of WHO recommended noise levels in the classrooms following steps may be taken.

- Closing of windows and doors during classes
- Installation of sound and echo insulation in rooms
- Replacing existing fans with silent fans/ air conditioners

10. AIR QUALITY ASSESSMENT

For air quality monitoring three parameters namely Particulate Matter (PM 2.5 and 10), Carbon dioxide (CO_2), and Formaldehyde (HCHO) were considered for measurement in the College campus. PM stands for particulate matter, often known as particle pollution, which is the word used to describe an airborne mixture of solid and liquid droplets. Dust, dirt, soot, and smoke are examples of particles that are large enough or dark enough to be visible to the unaided eye. Others can only be seen with an electron microscope because they are extremely small.

Inhalable particles with diameters of 10 micrometers or less are referred to as PM10, while fine inhalable particles with diameters of 2.5 micrometers or less are referred to as PM2.5. Particulate matter is made up of microscopic solid or liquid droplets that are so minute that breathing it in can have significant adverse impacts on a person's health. PM10 have the potential to travel deep into the lungs and potentially into the bloodstream. The greatest threat to health comes from fine particles, also known as PM2.5.

Carbon dioxide is not considered as a pollutant as it occurs naturally in the air. However, increased levels of CO_2 have various detrimental effects. Simply put, as the amount of carbon dioxide in a tight space increases, it substitutes for the oxygen the body needs to survive. The body slows down and performs poorly when it cannot acquire enough

oxygen. Carbon dioxide primarily impacts the brain since it is an asphyxiant. Exposure to CO_2 can produce a variety of health effects. These may include headaches, dizziness, restlessness, a tingling or pins or needles feeling, difficulty breathing, sweating, tiredness, increased heart rate, elevated blood pressure, coma, asphyxia, and convulsions.

Volatile organic compunds like formaldehyde, or HCHO, can contaminate the indoor air in a closed space. Total volatile organic compounds (TVOC) are made up of a variety of chemicals, including formaldehyde. Formaldehyde is produced naturally and expelled during metabolism. This volatile organic chemical is one among the most hazardous ones that can be discovered in the air. Formaldehyde exposure on a regular basis or for an extended amount of time can result in adverse effects on health. Nasal irritation, headaches, eye discomfort, and respiratory tract irritation are a few of the health problems that can result from exposure to formaldehyde. High quantities could possibly cause serious, lifelong health problems. In addition, it's important to be aware that formaldehyde is a toxin that might cause leukaemia, tracheal cancer, and nasal cancer.

The air quality monitoring test was conducted with the help of air quality meter Temtop-M 2000. This instrument is sensitive to the size of particles of aerodynamic diameter of 2.5 µm and 10 µm. All the pollutant concentrations were recorded for 60 seconds in the memory of the instrument, which were further downloaded and analyzed. 5 major locations (RUSA Building, State Govt. Building, Library, Assam Type General Class Room and Boys Hostel) within the campus were selected and the readings of PM2.5, PM10, CO_2 and HCHO were recorded.

The average particulate matter PM10 was observed to be 24.37 µg/m^3 and PM2.5 was observed to be 34.25 µg/m^3 which is lower than the permissible limits of CPCB Ambient Air Quality Standards of 100 µg/m^3 and 60 µg/m^3, respectively. The average CO_2 level was 463.4 ppm and HCHO level was 0.1054 mg/m^3 which are within acceptable standard limits. In the college campus, the major source of PM10 and PM2.5 might be the dust from vehicular traffic, construction, and burning.

11. FLORAL DIVERSITY OF THE COLLEGE CAMPUS

The campus is an example of co-existence of human and environment as it is rich in flora and faunal diversity. The campus area is vastly diverse with a variety of tree species having significant environmental role. These tree species are the integral part of the

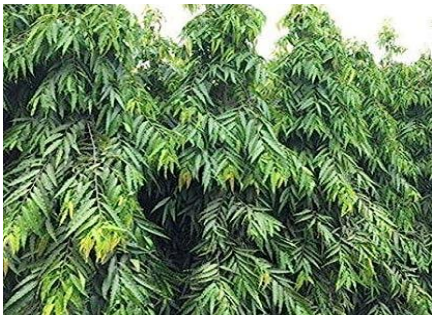
college. Most of these tree species are planted by the college authority through various tree plantation programs conducted in different periods of time. These trees have increased the quality of life by providing oxygen, improving air quality, climate amelioration, conservation of water, preserving soil, and supporting wildlife. The impact of these trees is seen not only within the college site but also on the surroundings of the college. They contribute to the environment by moderating the effects of the sun, rain and wind and by absorbing and filtering the sun's radiant energy and keeping the campus cool in summer. Many spices of birds are dependent on these trees mainly for food and shelter. Thus, the college campus has been playing a significant role in maintaining the environment of entire Moridhal town.

The study reveals that a total 22 numbers of floral species belonging to 17 families are found in the campus (Table 4).

Table 4 Floral Diversity of College Campus

Sl. No.	Details		Photograph
1	Name	Red wood tree (3 nos.)	
	Local Name	Ronga Chandan	
	Scientific Name	*Adenanthera pavonona* Linn.	
	Family	Fabaceae	
2	Name	Paradise flower (12 nos.)	
	Local Name	Krishna Chura	
	Scientific Name	*Caesalpinia pulcherrima* Swartz.	
	Family	Fabaceae	
3	Name	Bottle brush (19 nos.)	
	Local Name	Botol burush gosh	
	Scientific Name	*Callistemon viminalis* R.Br.	
	Family	Myrtaceae	

Sl. No.	Details		Photograph
4	Name	The coconut palm (15 nos.)	
	Local Name	Naricol	
	Scientific Name	*Cocos nucifera* Linn.	
	Family	Palmeae	
5	Name	Indian laburnum (4 nos.)	
	Local Name	Sonaru	
	Scientific Name	*Cassia fistula* Linn.	
	Family	Fabaceae	
6	Name	Black plum (1 no.)	
	Local Name	Kolajamu	
	Scientific Name	*Eugenia jambolana* Lam.	
	Family	Myrtaceae	
7	Name	Pride of India (4 nos.)	
	Local Name	Ajar	
	Scientific Name	*Lagerstroemia flos-reginae* Retz.	
	Family	Lythraceae	
8	Name	The Mango tree (4 nos.)	
	Local Name	Am gosh	
	Scientific Name	*Mangifera indica* Linn.	
	Family	Anacardiaceae	

Sl. No.	Details		Photograph
9	Name	Indian rose chestnut (14 nos.)	
	Local Name	Nahor	
	Scientific Name	*Mesua ferrea* L.	
	Family	Calophyllaceae	
10	Name	Indian Madlar (2 nos.)	
	Local Name	Bokul	
	Scientific Name	*Mimusops elengi* Linn.	
	Family	Sapotaceae	
11	Name	Mast tree (44 nos.)	
	Local Name	Debadaru	
	Scientific Name	*Polyalthia longifolia* Benth.	
	Family	Anonaceae	
12	Name	English guava (4 nos.)	
	Local Name	Modhuri aam	
	Scientific Name	*Psidium guajava* L.	
	Family	Myrtaceae	
13	Name	Teak tree (15 nos.)	
	Local Name	Sagoon	
	Scientific Name	*Tectona grandis* Linn. F.	
	Family	Verbenaceae	

Sl. No.	Details		Photograph
14	Name	The Arjun tree (8 nos.)	
	Local Name	Arjun gosh	
	Scientific Name	*Terminalia arjuna* Weight & Arn.	
	Family	Combretaceae	
15	Name	Indian jujube (1 no.)	
	Local Name	Bogori	
	Scientific Name	*Zizyphus jujube* Lamk.	
	Family	Rhamnaceae	
16	Name	Emblicmyrobalans (8 nos.)	
	Local Name	Amlokhi	
	Scientific Name	*Emblica officinales* Geartn.	
	Family	Euphorbiaceae	
17	Name	Chebulic myrabolan (6 nos.)	
	Local Name	Silikha	
	Scientific Name	*Terminalia chebula*	
	Family	Combretaceae	
18	Name	Black Pepper (12 nos.)	
	Local Name	Jaluk	
	Scientific Name	*Piper nigrum L.*	
	Family	Piperaceae	

Sl. No.	Details		Photograph
19	Name	China Rose	
	Local Name	Joba	
	Scientific Name	*Hibiscus rosa-sinensis*	
	Family	Malvaceae	
20	Name	Wild chinchona (2 nos.)	
	Local Name	Kadam	
	Scientific Name	*Neolamarckia cadamba*	
	Family	Rubiaceae	
21	Name	Paradise Flower	
	Local Name	Radhachura	
	Scientific Name	*Caesalpinia pulcherrima (L.)* Swartz	
	Family	Caesalpinaceae	
22	Name	Sacred Fig (1 no.)	
	Local Name	Aahat	
	Scientific Name	*Ficus religiosa*	
	Family	Moraceae	

12. FAUNAL DIVERSITY OF THE CAMPUS

Assam is considered as biodiversity "hot spot" in the country. Favorable climate condition, topography and different other factors result in a diversity of ecological habitats such as forests, grasslands and wetlands.

The college campus is inhabited by various faunal species. Some faunal species found in the campus as listed in Table 5.

Table 5 Faunal Diversity of College Campus

Sl. No.	Details		Photograph
1	Common Name	Earth worm	
	Scientific Name	*Lumbricus terrestris*	
2	Common Name	Red ant	
	Scientific Name	*Solenopsis invicta*	
3	Common Name	Chain Swordtail	
	Scientific Name	*Pathysa aristeus*	
4	Common Name	Common Mime	
	Scientific Name	*Princeps castor polas*	
5	Common Name	Water Frog	
	Scientific Name	*Rana tigrina*	

Sl. No.	Details		Photograph
6	Common Name	Common Mormon	
	Scientific Name	*Princeps polytes*	
7	Common Name	Toad	
	Scientific Name	*Rana tigrina*	
8	Common Name	White Breasted Waterhen	
	Scientific Name	*Amaurornis Phoenisurus*	
9	Common Name	Home Lizard	
	Scientific Name	*Hemidactylus frenatus*	
10	Common Name	Oriental Turtle Dove	
	Scientific Name	*Streptopelia orientalis*	

Sl. No.	Details		Photograph
11	Common Name	Indian Flying Fox	
	Scientific Name	*Pteropus giganteus*	
12	Common Name	Squirrel	
	Scientific Name	*Callosciurus pygerythrus*	
13	Common Name	Dog	
	Scientific Name	*Canis familiaris*	

13. WASTE DISPOSAL SYSTEM OF THE COLLEGE

Waste management system comprises of various waste disposal activities including waste collection, transportation, treatment and disposal. At present solid wastes in the form of wastepaper and fallen tree leaves are the major waste generated in the college along with minor amounts of laboratory organic and inorganic waste. The bathroom liquid waste is fed to soak pits. The canteen and hostels produce a mix of organic and inorganic waste. A sizeable fraction of the biodegradable solid waste primarily containing the fallen leaves are recycled by composting in the vermicomposting unit of the college (Fig. 4). Compost thus produced is also utilized by the college as organic manure for saplings.

Some of the non-biodegradable wastes are being sold as scrap for recycling. There are various waste collection bins across the entire college campus. The local Municipal Board, collects laboratory waste and waste from the hostels for disposing them properly in regular intervals.

Fig. 4 Vermicomposting units in the campus

It is observed that the college has taken up some initiatives for managing the generated waste. However, there is scope for improvement of the present waste collection and disposal practice. It is recommended that waste segregation practice be followed in the college campus. The standard practice of having different colored bins for different types of wastes may be adopted. It is suggested that Red Dustbins be used for collecting waste that is not biodegradable; Green Dustbin for wet and biodegradable wastes and Blue Dustbin for dry and non-biodegradable wastes. Source segregation of waste will allow for devising a mechanism for safe disposal/recycling of the non-biodegradable fraction of waste. The biodegradable fraction may be used for waste conversion practices like biogas which will help replacing some amount of the LPG used in the Canteen and Hostels along with the production of manure. E-waste (out of order equipment's or obsolete items like laboratory instruments, electronic circuits, computer desktops or different computer components, laptops and accessories, printer and cartridges, charging cables, Wi-fi devices and cables, CCTV components, sound systems, display units, UPS and battery, biometric machine, scientific instruments etc.) disposal should be done through authorized vendors.

14. VEHICULAR MOVEMENTS

It was estimated that on an average around 60-80 four wheelers and 700-800 two wheeler vehicles have a regular movement in the campus every day. Considering this, the college may adopt a 'Walk to the College' initiative on a designated day every week on which all members of the college within the vicinity of the college can come to the college walking and those staying away can use mass transport to reach the college. No vehicles (excluding visitor's) will be allowed in the campus on the designated day of the week thereby contributing towards environmental sustainability.

15. ELECTRICAL POWER CONSUMPTION AND ENERGY CONSERVATION INITIATIVES

The College draws power from the electricity grid of Assam Power Distribution Company Ltd. (APDCL) through a high tension connection with a total connected load of 55 kW. The electrical power consumption of Moridhal College from April, 2022 to March, 2023 is shown in Table 6. This is supported by a power backup system consisting of 3 nos. of Diesel Generators as detailed in Table 7.

Table 6 Energy consumption of Moridhal College

Sl. No.	Bill Duration	Electricity Consumption (KWh)	Bill Amount (₹)
1	1/3/2023-31/2/2023	3094.50	40454.00
2	1/2/2023-28/2/2023	2476.20	33804.00
3	1/1/2023-31/1/2023	2250.87	33218.00
4	1/12/2022-31/12/2022	2432.43	34289.00
5	1/11/2022-30/11/2022		39465.00
6	1/10/2022-31/10/2022	4011.30	46915.00
7	1/9/2022-30/9/2022	5933.70	57770.00
8	1/8/2022-31/8/2022		48092.00
9	1/7/2022-31/72022	4440.00	49555.00
10	1/6/2022-30/6/2022	4586.40	51173.00
11	1/5/2022-31/5/2022	5668.83	59420.00
12	1/4/2022-30/4/2022	3616.77	42678.00

Table 7 Details of diesel generators

Make of the Generator	Rating (kVA)	Annual fuel consumption (2022-2023)		Generator annual maintenance done/not done
		Amount (l)	Cost (Rs.)	
Kirloskar Oil Engines Limited Model: KG1-20WS	20	**600***	**54,000.00***	**Yes**
Kohler Power India Pvt. Ltd. Model: KES 15II	15			**Yes**
Kirloskar Oil Engines Limited Model: KG 10 AS1	10			**Yes**

**Estimated*

Keeping in view of the available rooftop area, it is suggested that the College Authority may install renewable energy generation systems to substitute a sizeable fraction of their electricity requirement, which in turn will be another green and environmentally benign practice of the institute.

16. ROUTINE GREEN PRACTICES

The college has taken up many green practices to augment its contribution towards environmental sustainability. Some salient points highlighting the routine green practices of the college are summarized below.

Fig. 5 Solar Street lights installed in the college campus

1. *Solar Lights:* Solar Street lights are installed in some locations of the college campus (Fig. 5).
2. *Plastic free campus:* The use of plastic is restricted and discouraged in the college campus (Fig. 6). For instance, in the two establishments of the college requiring packaging: the college book shop uses paper for wrapping goods sold and the college canteen uses plastic above 50-micron thickness only when extremely essential. The use of paper in daily functioning of the college office is limited by gradually moving towards a paperless mode.

Fig. 6 Signage discouraging the use of plastic in the campus

3. *Green landscaping with trees and plants:* The College has been taking plantation drives in all major occasions not only in different parts the college but in different locations of the district also. Plantation drives are conducted on major occasions such as World Environment Day, College annual sports, NCC Day, NSS Day etc. (Fig. 7).

Fig. 7 Plantation drives carried out on various occassions

4. *Programmes related to environmental awareness:* Seminars/workshops are regularly organized by the college for various stakeholders to create awareness regarding environmental sustainability. Some highlights of these activities are shown in Fig. 8.

Awareness programme on protection of environment

Environmental Awareness Programme by Eco Club

Fig. 8 Programmes related to environmental awareness

5. *Extension Activities conducted on Environment Awareness:* Various outreach activities relating to environment promotional are carried out by the college. Some highlights of such activities are detailed below (Fig. 9).

Fig. 9 Extension Activities conducted on environment awareness: (A)Weekly Campus Cleaning, *(B)*World Environment Day, (C)*World Water Day*, (D)Swachha Baharat Summer Internship, (E)Plantation Progamme at Moridhal Bor Namghar, (F)Planation at Out Door Sports Complex of the college by 12BN NDRF .

17. RECOMMENDATIONS

Green and Environment Audit of Moridhal College was conducted. The study comprised of data collection and monitoring through personal visits. Overall, it was observed that the college is performing satisfactorily in terms of playing its role in environmental sustainability. As an educational institution of reputation, it is taking several encouraging

initiatives that can make significant contributions towards dealing with current environmental challenges, which is promising. We have made the following recommendations so that the college can have more impact in achieving its sustainability goals and thus can be a major player in practicing environmental sustainability.

- The current waste collection and disposal practices have room for improvement. It is recommended that waste segregation be practiced on college campuses by using specified coloured bins for different types of waste.
- It is suggested that the College Authority install small decentralized renewable energy generation systems in the campus which can supplement to their total electricity needs. The college can install solar energy system and take advantage of the available rooftop space. Further, the segregated biodegradable fraction of waste generated in the campus may be treated in small scale 'biogas digester' for producing 'biogas'. This biogas can be utilized on site as energy source to replace some of the LPG used in the Canteen and Hostels, while also producing manure to be used in the college campus. These would be eco-friendly and environmentally responsible actions taken by the institute.
- E-waste disposal should be done through authorized vendors.
- To maintain the WHO recommended noise levels in the classrooms, college can install sound and echo insulation in rooms and can replace existing fans with silent fans/ air conditioners.