# **GREEN AUDIT REPORT** (2019-2020)

# DAKSHIN KAMRUP COLLEGE, MIRZA

INTERNAL QUALITY ASSURANCE CELL DAKSHIN KAMRUP COLLEGE, MIRZA

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# CERTIFICATE

The present report is a Green Audit of D.K College Mirza conducted internally by the Green Audit Assessment team for the session 2019-20 under the aegis of IQAC, Dakshin Kamrup College, Mirza.

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#### PROLOGUE

Dakshin Kamrup College, Mirza, Assam is located amidst the green environs of the southern part of the mighty Brahmaputra River. The lush greenery contributed by the attractive plantations of Sal, Sissoo (Indian rosewood), Teak, Som and Nahor make the region attractive.

Established in 1961, the college has come a long way in the sphere of academics and infrastructure. Although the modern construction of the college includes Departments housed in various 3-4 storeyed buildings, the greenery of the campus captures the soul of the college.

In its commitment towards maintaining a safe and healthy environment in the campus and abiding by the regulations of NAAC, the Internal Quality Assurance Cell of Dakshin Kamrup College, Mirza has initiated the process of self assessment of the environmental quality of the campus.

Green audit follows the basic philosophy and approach summarized by the definition adopted by the International Chambers of Commerce (ICC) in its publication of Environmental Auditing (1989). The ICC defines Environmental Auditing as a management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environment and natural resources in its operations.

The Government of India declared the National Environment Policy 2006 and made green audit mandatory to each industry. According to the policy it is a response to India's national commitment to a clean environment, mandated in the Constitution in Articles 48 A and 51 A (g) and strengthened by judicial interpretation of Article 21. It is recognized that the maintenance of healthy environment is the responsibility of every citizen and thus a spirit of partnership is to be realized through the environment management of the country. By realizing the need of responsibility towards environment, NAAC, under the aegis of the UGC has added the concept of environmental audit in accreditation methodologies of universities and colleges.

The Green Audit Report (2019-20) of Daksin Kamrup College, Mirza is a preliminary attempt to analyse the present status of environmental quality within the campus. The present report is a rapid assessment done internally by specified Departments of the college. The data acquired may not be adequate for an accurate report due to constraints of time and resources. In spite of limitations, this compilation indicates the overall environment in the college campus and serves as a pointer to the steps that should be undertaken for further minimizing the carbon footprint and ensuring a cleaner environment.

# CONTENTS

Торіс	Page No.
Introduction	1
Objectives	2
Campus Map	3
Satellite Map	4
Physical Profile	5
Land Use	6
Floral Diversity in the Campus	8
Faunal Diversity in the Campus	10
Weather and air quality in the campus	12
Electrical Consumption in the campus	14
Noise Level in the Campus	15
Status of Water Quality	17
Waste Management Audit	18
Mushroom Cultivation	20
Environmental Consciousness	21
Concluding Remarks	22
Suggestions and Recommendations	23
Photo Gallery	24

# LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
1.	LAND USE DATA OF D.K. COLLEGE, MIRZA, ASSAM	6
2.	LAND USE (BUILT UP AREA) ANALYSIS	7
3.	LIST OF FLORAL SP. PRESENT IN THE COLLEGE CAMPUS	8
3 (a)	ORCHIDS CONSERVED IN THE DBT SPONSORED ORCHID HOUSE (UNDER BIOTECH HUB SCHEME)	9
4.	LIST OF FAUNAL SP. PRESENT IN THE COLLEGE CAMPUS	10
5.	MONTHLY AVERAGE OF TEMPERATURE, RAINFALL AND HUMIDITY FROM JAN 2019-MARCH 2020	12
6.	AVERAGE DATA OF AIR QUALITY FROM 1 <sup>ST</sup> JANUARY, 2019 TO 17 <sup>TH</sup> MARCH, 2020.	13
7.	STANDARD NOISE LEVEL	15
8	INTENSITY OF NOISE AT DIFFERENT LOCATIONS OF D.K COLLEGE, MIRZA DURING WORKING HOURS	16
9.	WATER ANALYSIS REPORT OF D.K. COLLEGE, MIRZA	17
10.	YIELD OF <i>Pleurotus sp.</i> USING DIFFERENT SUBSTRATES IN LABORATORY CONDITIONS	20

#### **INTRODUCTION**

Green audit is the tool of management system used methodologically for protection and conservation of the environment. It is also used for the sustenance of the environment. It includes the process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments.

Educational institutions have a vital role to play in societal and environmental reform. In the current deteriorating environmental scenario, it is crucial that these institutions lead by example and pave the way for future generations by harbouring and implementing environmentally friendly initiatives and technologies within their campus. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more relevant. The Green Audit recognizes the initiatives taken by the institute to nurture environmental friendly practices like reduction of energy consumption, proper waste management, conservation of water and monitoring of its quality, and proper utilization of natural resources. It records the floral and faunal diversity within the campus which is essential for monitoring the ecological balance. It also identifies the measures to be taken for sustaining a green campus for the welfare of the community within the campus and outside.

Dakshin Kamrup College, a premier educational institute in the Kamrup (R) district of Assam, has been diligently fulfilling its responsibility of commitment towards a healthy environment. The concept of environmental consciousness is ingrained in its functions and policies. The green audit report is a transparent and honest attempt of self assessment of the quality of environment within the campus. The report also brings to light the initiatives that should be included in the institutional policies for a better and greener campus life.

#### **OBJECTIVES**

The main objectives of carrying the Green Audit are -

- 1. To document the physical profile of the college.
- 2. To record the meteorological parameters of the region where the college is located.
- 3. To document the floral and faunal diversity of the college.
- 4. To estimate the energy consumption of the college.
- 5. To estimate and document the noise level in the campus.
- 6. To estimate and document the water quality available in the campus.
- 7. To document the waste disposal system.
- 8. To make students realize the core of environmental consciousness for a sustainable future.

# GEOGRAPHICAL LOCATION OF DAKSHIN KAMRUP COLLEGE CAMPUS, MIRZA



Source: Data given by Department of Geography



#### SATELLITE IMAGE DATA OF DAKSHIN KAMRUP COLLEGE MIRZA

#### PHYSICAL PROFILE

The physical layout of the college campus can encourage positive thinking within the students and the faculty. Green spaces develop an environment which nurtures a connection with nature.

Surrounded by scattered hillocks which are extended parts of the Shillong Plateau as well as the Malaita Hills and located amidst the bustling market area of Mirza Chowk, D.K College is on the overlap between natural and manmade ecosystems.

Providing a learning environment to over 3000 students and a spacious work environment for teaching and non-teaching staff, it has a robust and well planned infrastructure. The college campus occupies a total land area of 383.47 SQ. M. The built up area is 237.67 SQ. M, accounting for 62 % of the land area. The vegetation cover accounts for 32.34% of the total area of the campus. In addition around 6% of the campus is an open area. An orchid house covering 0.68 sqm has a collection of variety of orchids. The green cover is present in patches all around the campus, along the paths, in front of the Administrative buildings and Academic Departments. Around 23.74 sqM of the campus is allocated to games and sports and accounts for the Sports complex and the Basketball court of the college. Five separate blocks houses various Academic Departments, Administrative Office, Conference halls and Library. The Administrative Building houses the Administrative Office, the Krishna Kanta Handique Conference Hall, Digital Conference Hall, the Principal's chamber, two academic departments and occupies 3.2% of the total land area. The Library and Department of Computer Science occupies one of these blocks. Five Academic departments, Institutional Biotech Hub and two common classrooms are housed in one block which occupies 7.4 sq.m. The remaining two blocks housing Academic Departments and common classrooms occupy 7.3% of the land area. The Auditorium accounts for 23.98 sq.m. There is an Examination branch covering 3.2 sq.m. for conducting University examinations as well as Internal Examinations. There is also a parking area of 3.49 sq.m. ATMs, Canteen, Girls' Hostel and Girls' Common room make the campus infrastructure self sufficient and covers 2.36% of the total land area.

A detailed documentation of the physical profile of the college is done through land use mapping given as follows:

#### LAND USE

Land use refers to man's activities and the various uses which are carried on and derived from land. In situations of rapid changes in land use, observations of the Earth from space give the information of human activities and utilization of the landscape (Howarth 1981). Remote sensing and GIS techniques provide new tools for advanced land use mapping and planning. Satellite imagery particularly is a valuable tool for generating land use map.

#### Methodology adopted for Land use Mapping

Arc-GIS 10.2 software was used for land use/ land cover analysis with data obtained from GPS points and field survey. Google Earth was used for obtaining satellite image of the college campus.

#### Observation

TADLE I. LAND USE DATA OF D.K. COLLEGE, MIKZA, ASSAM							
Categories of Land Use	Area in Sq. Metres	Area in Hectares					
Vegetation Cover/ Plantation	124.022	12.4					
Open Space	21.784	2.1784					
Garden (Orchid House)	0.68	0.068					
Built up Area	237.67	23.77					
Total Area	383.47	38.35					

|--|

Source: Data gathered by Department of Geography

#### LAND USE ANALYSIS (AREA IN SQ. METRES)

#### D.K COLLEGE, MIRZA, KAMRUP, ASSAM





The total area of D.K College is 383.47 SQ. M out of which the built up area is 61.9% (i.e 237.67 SQ. M) and open space and plantation area including orchid house is 38.1% (i.e 146.48 sq metres).

The different categories of built up area are given below in Table 2.

#### TABLE 2: LAND USE (BUILT UP AREA) ANALYSIS

Sl. No.	CATEGORIES OF BUILT UP AREA	Area in m <sup>2</sup>
1.	BOUNDARY	383.48
2.	COLLEGE PATH	48.45
3.	LABORATORIES OF DEPARTMENTS OF PHYSICS AND CHEMISTRY	5.20
4.	SPORT COMPLEX	11.35
5.	BASKETBALL COURT	12.40
6.	CANTEEN	3.05
7.	ROOM 21	2.67
8.	SAHID SMRITI FOLI	0.90
9.	PARKING AREA	3.49
10.	MANDIR	0.33
11.	GIRL'S HOSTEL	9.30
12.	ATMS	1.83
13.	K.K. HANDIQUE OFFICE	3.03
14.	GIRL'S HOSTEL COMMON ROOM	2.31
15.	BLOCK CONTAINING DEPARTMENTS OF BOTANY, ZOOLOGY, MATHS,	7.40
	EDUCATION, INSTITUTIONAL BIOTECH HUB, ROOM NO. 23, 24.	7.40
16.	BLOCK CONTAINING DEPARTMENTS OF PHYSICS AND CHEMISTRY	13.66
17.	PRIMARY HEALTH CENTRE	0.81
18.	BLOCK CONTAINING LIBRARY AND DEPARTMENT OF COMPUTER	8 85
	SCIENCE	0.05
19.	GIRL'S COMMON ROOM	1.88
20.	EXAM CONTROLLER'S ROOM	3.23
21.	ROOMS 1 TO 14	48.16
22.	BLOCK CONTAINING DEPARTMENTS OF B. VOC, COMMERCE,	0.45
	ECONOMICS AND ENGLISH, ROOM NO.S 201,202,203	2.43
23.	ADMINISTRATIVE_BUILDING	12.43
24.	AUDITORIUM	23.99

Source: Data gathered by Department of Geography



Figure 2: Space occupied (in sq. metres) by different categories of built up area

#### Comment

D.K College Mirza, established in 1962 has an infrastructure that has an eco friendly character. It has always adhered to healthy environmental practices including periodic plantation, their preservation and maintenance. The land use mapping has indicated that 38.1% of its area is open and has green cover that supports a sustainable and healthy campus environment.

#### FLORAL DIVERSITY IN THE CAMPUS

The college campus has a spread out botanical garden housing a variety of plant species from a wide spectrum of plant families. These have medicinal, economic and ornamental significance in the college campus and impart greenery and fresh air in the campus.

The culture of conserving and propagating the diversity of the plant species is also instilled in the stakeholders. The college has a proud heritage of taking plantation drives within the campus and in the adjoining areas as well.

The plant species present in the campus is listed in Table 3.

Sl. No.	Name of the plant species	Family	Common name
1.	Tectona grandis L. f	Verbenaceae	Segun
2.	Duranta repens	Verbenaceae	Duranta
3.	Terminalia cuneata Roth (=T. arjuna Roxb.)	Combretaceae	Arjun
4.	Terminalia chebula Retz.	Combretaceae	Xilikha
5.	Azadirachta indica indica A. Juss.	Meliaceae	Mahaneem
6.	Melia azedarach L.	Meliaceae	Ghoraneem
7.	Albizia lucidior (Steud.) Nielson ex Hara	Mimosaceae	Мој
8.	Samanea saman (Jacq.) Merr.	Mimosaceae	Siris
9.	Syzygium cumini (L.) Skeels	Myrtaceae	Jaam
10.	Psidium guajava L.	Myrtaceae	Madhuriaam
11.	Delonix regia (Bojer.) Raf.	Caesalpiniaceae	Krishnasura
12.	Cocos nucifera L.	Arecaceae	Narikol
13.	Dypsis lutescens (H. Wendl)	Arecaceae	Momai Tamol
14.	Michelia champaca L.	Magnoliaceae	Titasopa
15.	Dalbergia sissoo Roxb. Ex. DC.	Fabaceae	Sisoo
16.	Butea monosperma (Lamk) Taub.	Fabaceae	Palas
17.	Aegle marmelos (L.) Corr.	Rutaceae	Bael
18.	Polyalthia longifolia (Sonner.) Thw.var.	Annonaceae	Devadaru
	Longifolia		
19.	Polyalthia longifolia (Sonner.) Thw.var.	Annonaceae	Devadaru
	pendula (Sonner.) Thw		
20.	Pinus kesiya Royle. Ex Gordon.	Pinaceae	Saralgos
21.	Magnolia hodgsonii (Hookf & Th.) Keng	Magnoliaceae	
22.	Mimusops elengi Roxb.	Sapotaceae	Bokul
23.	Aquilaria malaccensis Lam.	Thymelaeaceae	
24.	Platycladus orientalis (L.) Franco (=Thuja orientalis L.)	Cupressaceae	Thuja
25.	Murraya paniculata (L.) Jack	Rutaceae	Kaminikanchan
26.	Murraya koenigii (L.) Spreng	Rutaceae	Norosingho
27.	Mesua ferrea L.	Clusiaceae	Nahor
28.	Mussaenda sp.	Rubiaceae	Masunda
29.	Ixora coccinea L.	Rubiaceae	Rongial
30.	Alternanthera brasiliana (L.) Kuntze	Amaranthaceae	Bishalya Karani
31.	Tradescantia spathacea Sw.	Commelinaceae	Boat Lily
32.	Zephyranthes candida (Lindl.) Herb	Amaryllidaceae	Lily
33.	Nyctanthes arbor-tristis L.	Oleaceae	Sewali
34.	Euphorbia ligularia Roxb.	Euphorbiaceae	Siju
35.	Costus speciosus (Koen.ex Retz.) Sm.	Costaceae	Jomlakhuti
36.	Kalanchoe pinnata (Roxb.) Pers.	Crassulaceae	Duportenga
37.	Bryophyllum pinnatum Roxb.	Crassulaceae	Pategoja
38.	Canna sp.	Cannaceae	Parijat
39.	Rauvolfia tetraphylla L.	Apocynaceae	Sarpogondha

 Table 3: List of Floral species present in the college campus

40.	Asparagus racemosus Willd.	Liliaceae	Sotmul
41.	Catharanthus roseus (L.) G. Don.	Apocynaceae	Nayantara
42.	Machilus bombycina King. Ex. Hook.f	Lauraceae	Som
43.	Ficus religiosa Linn.	Moraceae	Aahot
Source	· Data given by Department of Rotany		

Source: Data given by Department of Botany

The maintenance and nomenclature of the variety of species in the spread out Botanical Garden is done by the Department of Botany D.K College, Mirza. The greenery presented by the variety of species in the campus instils a spirit of plant nurturing and conservation among the different stakeholders of the college. It provides a congenial environment to learning as well as relaxation and maintains a healthy ecosystem.

#### **ORCHID HOUSE**

An orchid house is also maintained by Advanced level Institutional Biotech Hub, D.K. College, Mirza. The main objective of this orchid house is the collection and conservation of local orchid species of the region.

# Table 3(a) ORCHIDS CONSERVED IN THE DBT SPONSORED ORCHID HOUSE (UNDER BIOTECH HUB SCHEME)

SL. No.	Name
1	Papilionanthe teres
2	Dendrobium aphyllum
3	Ryncostylis retusa
4	Arundina graminifolia
5	Vanilla planifolia
6	Dendrobium sp. (hybrid varieties)
7	<i>Cymbidium</i> sp
8	Bulbophyllum sp.
9	Aerides multiflora
10	Phaius sp

#### Comment on the Segun (*Tectona grandis*) vegetation of the adjoining areas of the College:

The greater Palasbari area in Kamrup district where the college is located is traditionally famous for its Segun (*Tectona grandis*) trees that form the Tropical moist deciduous forest. Climatic conditions of Kamrup region have also preferred Segun and its associates. It is one of the most important timber yielding plants and has known medicinal properties. The leaves of these trees also act as source of non timber forest product.

Effective conservation and management initiative are most important for Segun and its associated plant species to sustain in their natural habitat. Students are sensitized in this regard to protect the green heritage that this region is bestowed with.

#### FAUNAL DIVERSITY IN THE COLLEGE CAMPUS

The documentation of the variety of faunal species present in the College campus was done by the Department of Zoology. A variety of invertebrate and vertebrate species have been found in the campus exhibiting a healthy coexistence. The status of its present existence regarding frequency of spotting in the campus as common, uncommon or rare was also recorded.

INVERTEBRATES PRESENT IN THE CAMPUS						
Sl. No.	English Name	Scientific Name	Family	<b>Present Status</b>		
Phylum	Phylum: Annelida					
1.	Earthworm	Pheretima posthuma	Megascolecidae	С		
2.	Nereis	Nereis pelagic	Nereididae	R		
3.	Leech	Hirudinaria granulose	Hirudinidae	UC		
Phylum	: Mollusca					
4.	Pila	Pila globosa	Pilidae	С		
Phylum	: Arthropoda					
5.	Scolopendra	Scolopendra abnormis	Scolopendridae	UC		
6.	Mosquitoes	Culex pipiens	Culicidae	С		
7.	Ants	Iridomyrmex purpureus	Formicidae	С		
8.	Dragon fly	Anax junius	Aeshnidae	UC		
9.	Cricket	Acheta domesticus.	Gryllidae	С		
10.	Stick and Leaf Insects	Gryllus campestris	Gryllidae	UC		
11.	Silver Fish	Lepisma saccharina	Lapismatidae	UC		
12.	Dragonflies	Sympetrum flaveolum	Aeshnidae	UC		
13.	Millipedes	Millipede	Eurymerodesmidae	R		
14.	Termite	Termite	Termitidae	С		
15.	Cockroach	Periplanata americana	Blattidae	С		
16.	Wasp	Vespula vulgaris	Vespidae	UC		
17.	Honey bees	Apis dorsata	Apidae	UC		
18.	Praying mentis	Mantis religiosa	Mantidae	UC		
Butterf	lies					
19.	Great Mormon	Papilio Memnon	Papilionidae	С		
20.	Red Helen	Papilio helenus	Papilionidae	С		
21.	Yellow Helen	Papilio nephelus	Papilionidae	С		
22.	Three spot Grass yellow	Eurema blanda	Pieridae	С		
23.	Mottled Emigrant	Catopsilia pyranthe	Pieridae	С		
24.	Broad-bordered grass yellow	Eurema brigitta	Pieridae	С		
25.	Painted Jezebel	Delias hyperate indica	Pieridae	С		
26.	Lemon pansy	Junonia lemonias	Nymphalidae	С		
27.	Grey pansy	Junonia atlites	Nymphalidae	С		
28.	Common crow	Euploea core	Nymphalidae	С		
29.	Glassy Tiger	Parantica aglea	Nymphalidae	С		
30.	Lesser Grass Blue	Zizina otis	Lyceanidae	С		
31.	Common snow flat	Tagiades japetus	Hesperidae	С		
32.	Dark Palm Dart	Telicota ancilla	Hesperidae	С		
VERTEBRATES PRESENT IN THE CAMPUS						
Sl. No	English Name	Scientific name	Family	Present Status		
Class: A	Amphibia			1		
1.	Hyla	Hylarana leptoglossa	Ranidae	С		
2.	Asian common toad	Duttaphrynus melanostictus	Bufonidae	R		
3.	Common tree frog	Polypedates leucomystax	Rhacophoridae	UC		

 Table 4: List of Faunal species present in the college campus.

4.	Indian bullfrog	Hoplobatrachus tigerinus	Dicroglossidae	R
Class: Reptilia				
5.	Calotes	Calotes versicolor	Agamidae	С
6.	Hemidactylus	Hemidactylus turcicus	Gekkonidae	С
7.	Skink	Eutropis multifasciata	Scincidae	UC
8.	Forest skink	Sphenomorphus maculates	Scincidae	UC
9.	Brahminy blind snake	Indotyphlops braminus	Typhlopidae	UC
Class: I	Birds			
10.	House crow	Corvus brachyrhynchos	Corvidae	С
11.	Common Myna	Acridotheres tristis	Sturnidae	С
12.	Asian pied starling	Gracupica contra	Sturnidae	UC
13.	Rose-ringed parakeets	Psittacula krameri	Psittaculidae	UC
14.	Little cormorants	Microcarbo niger	Phalacrocoracidae	С
15.	Common pigeon	Columba livia	Columbidae	С

Note: C=Common;UC=Uncommon; R=Rare

Data source: Department of Zoology

#### Comment

The green space in the campus supports diverse vertebrate and invertebrate species. It gives opportunity for humans in the campus to connect with the wildlife in their natural habitat and survive in peaceful coexistence.

#### WEATHER AND AIR QUALITY IN THE CAMPUS

#### Methodolgy for acquiring data

The data acquired is mainly from the websites

(a) Airquality.com

(https://airquality.com/place/india/kamrup/7e374e8e?lang=en&standard=aqi\_us)

(b) Accuweather.com

(https://www.accuweather.com/en/in/guwahati/186893/march weather/186893?year=2019

#### **Observation:**

#### Weather Report

The monthly average data of maximum and minimum temperatures, rainfall and humidity were collected for the period January 2019- March 2020 and presented in Table 5.

	<b>X</b> 7		Average Temp	erature (in °C)	Average Rainfall	Average Humidity
SI. NO.	Year	Months	Maximum	Minimum	(in mm.)	(in %)
1		January	23.6	10.5	8	79
2		February	26.0	11.9	21	65
3		March	29.9	15.7	47	57
4		April	30.7	19.9	181	68
5		May	31.0	22.4	226	75
6	2010	June	31.9	24.8	309	81
7	2019	July	31.7	25.3	377	83
8		August	32.1	25.4	227	82
9		September	31.4	24.4	199	83
10		October	30.2	21.9	92	82
11		November	27.5	16.8	25	82
12		December	24.4	11.8	10	82
13		January	24.1	11.2	10	76
14	2020	February	24.8	12.1	22	66
15	]	March	30.0	15.8	51	59

 Table 5: Monthly average of Temperature, Rainfall and Humidity in the College from Jan 2019-March 2020

Data gathered by Department of Geography

#### Comment

The weather pattern was normal and according to the usual pattern in the region. The warmest month was August 2019, with the highest average minimum temperature of 25.4°C and highest average maximum of 32.1°C. The coldest month with the lowest average minimum temperature was January 2019 (10.5°C). Months with the highest relative humidity were July 2019 and September 2019 (83%). The month with the lowest relative humidity was March 2019 (57%). Monsoon started in April 2019 and highest rainfall was recorded in July 2019 (377 mm). The month with the lowest rainfall was January 2019 (877).

#### AIR QUALITY IN KAMRUP: D.K. COLLEGE, MIRZA

Air quality monitoring is utmost necessary for sound health of staff and students and learning environment of the educational institution.

#### **Observation:**

# TABLE 6: AVERAGE DATA OF AIR QUALITY FROM 1<sup>ST</sup> JANUARY, 2019 TO 17<sup>TH</sup>MARCH, 2020.

Sl.	PARAMETERS	Average reading/data	AQI	REMARKS				
No.			(Air Quality Index )					
1	Humidity	68.0 %	NA					
2	Air Temperature (°C)	18	NA					
2	Wind Speed (m/s)	5.82	NA					
3	Wind Direction (Degree)	190.0	NA					
4	Barometric Pressure	1013.0 hPa	NA					
5	NO <sub>2</sub>	65.36 μg/m <sup>3</sup>	AQI = 81	Moderate				
6	O <sub>3</sub>	18.3 μg/m <sup>3</sup>	AQI = 18	Good				
7	CO	1140.0 µg/m <sup>3</sup>	AQI = 57	Severe				
8	$SO_2$	13.98 μg/m <sup>3</sup>	AQI = 13	Good				
9	$P PM_{10}$ 146.0 µg/m <sup>3</sup> AQI = 100 Satisfactory							
Note	Note: NA-Not Applicable							
	* Air Quality Index							
	* PM <sub>10</sub> is particulate mat	ter 10 micrometres or les	s in diameter					
	* NO <sub>2</sub> = Nitrogen Dioxid	e						
$* O_3 =$ Ground-level ozone								
* CO = <u>Carbon Monoxide</u>								
* $SO_2 = Sulphur Dioxide$								
	* $\mu g/m^3$ = Micrograms per Cubic Meter of Air							
	* hPa = Hectopascal ( $100 \times 1$ Pascal) Pressure Units							
Data	aathered by Department	of Geography						

Data gathered by Department of Geography

#### Comment

The overall air quality index can be mentioned as **Satisfactory** (AQI 100 for  $PM_{10}$ ). The ambient air quality may be maintained by the plantation within and around the campus.

D.K. College being located adjacent to the main market area of Mirza, Kamrup, there is considerable movement of commercial vehicular traffic around it. The use of DG sets during electricity failure, dust from construction activities and emission from vehicular traffic are also the sources of air pollution and may have resulted in higher CO content in the air as observed in the table.

A holistic approach is required to reduce the emissions around the campus and ensure pure air quality.

#### **ELECTRICAL POWER CONSUMPTION IN THE CAMPUS**

This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliance, natural gas and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment.

Dakshin Kamrup College is one of the largest colleges in this area. The energy source utilized by all the Departments and common facility centre is electricity only.

Total energy consumption is determined as 200000 KWH/year by major energyconsuming equipment. (*Data source: Department of Physics*)

Equipment like computers is used with power-saving mode. Also, campus administration runs switch -off drill on a regular basis.

In the department of Science faculties like Physics, Chemistry, Mathematics, Botany, and Zoology electricity was shut down after occupancy time, which is one of the green practices for the energy conservation.

The authority keeps on replacing the old filament bulbs, CFL bulbs and tube lights by low energy consuming LED bulbs and bulky high power-consuming fans by energy-efficient fans in order to keep the electricity consumption of the college as low as possible. Approximately 10% of LED bulbs in the institution have been replaced and further replacement will be done in the upcoming days. All the new constructions are lighted with LED bulbs with a view to save energy consumption.

The institution has also planned to install solar light in the coming days in order to reduce energy consumption.

#### NOISE LEVEL IN THE CAMPUS

All of us are constantly exposed to sound. Those like the twittering of birds, the rustling of leaves, and gentle lapping of waves are natural sounds that would strike a responsive chord in most of us. But when even pleasant sounds became too loud, they become unwanted noise. Sound levels are measured in decibels (dB). It is a unit for expressing the relative intensity of sound on scale from zero (for average least perception sound) to about 130 dB for the average pain level. Exposure to high level of noise cause severe stress on the auditory and nervous system. The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as **Pollutant** as it harms hearing system.

A sound meter uses a display with a decibel range and resolution to approximate the ear's dynamic range, usually the upper range rather than the quiet part. Table 7 gives the standard noise level of different places and concurrences.

Cause	Level of Noise
Leaves Fall	20 db
Quiet Whisper	30 dB
Quiet Park	40 dB
Quiet Library	50 dB
Conversation	60 dB
Busy traffic	70 dB
Busy Street	80 dB
Factory	90 dB
Subway train	100 dB
Rock Music	110 dB
Thunder	120 dB

Table 7: Standard Noise level

#### Methodology:

The noise level in different locations within college campus has been recorded with the sound meter app. This app uses the microphone of our mobile phone to measure noise level in decibels (dB) by displaying the reading in three different values such as minimum/average/maximum. This app standardizes the noise level in decibels (dB) according to American Academy of Audiology, ranging from 0 dB to 120 dB, where 60 dB is considered as "normal conversation". The app information is provided below.

App Info: Name: Sound meter (by Tools dev), Version 2.1.7, updated on 26 Feb, 2020.

The measurement of noise level has been carried out using the above mentioned application at different locations within the college campus in working hours. The time taken for each measurement is 60 seconds. The collected data are presented in the Table 8.

Sl. No.	Place	Measurement Time (Sec.)	Minimum Value (dB)	Maximum Value (dB)	Average Value (dB)
1.	Physics department	60	41	70	62
2.	Chemistry department	60	56	72	61
3.	Zoology department	60	56	68	61
4.	Assamese department	60	59	75	66
5.	Political science department	60	62	77	68
6.	History department	60	58	70	65
7.	English department	60	60	73	65
8.	Library	60	51	66	60
9.	College front gate	60	62	87	78
10.	College back gate	60	57	81	70
11.	College Canteen	60	50	71	61
12.	Boys common room	60	48	62	63

Table 8: Intensity of noise at different locations of D. K. College, Mirza during working hours

Data Source: Data gathered by Department of Physics

#### Conclusion

It is found that the average value of noise level at maximum locations within the college campus is around 60 dB which is the range of normal conversation.

The range of 60-63 dB has been detected in six locations viz. Departments of Physics, Chemistry and Zoology, Library, College Canteen and Boys' Common Room.

The range of 65-68 dB has been detected in three locations, viz. Departments of History, English, Assamese and Political Science. Thus the College campus has a safe noise level in the range of normal conversation suitable for teaching-learning process. The College Front gate and Back Gate recorded relatively higher noise level (78 dB and 70 dB) due to large assembly of people during entry and exit and also adjoining market area.

#### STATUS OF WATER QUALITY IN THE CAMPUS

Groundwater is the only source of water for all in the campus of D.K College.

Water Quality testing for different parameters was done by standard methods.

Three groundwater samples were collected from three sources as follows.

Sample 1: Groundwater source: Collected from Department of Chemistry situated in the main College campus

Sample 2: Groundwater source: Collected from D.K. College Girls' hostel campus

Sample 3: Groundwater source: Collected from D.K. College Boys' hostel campus

The results of the quality testing of different parameters and methodology used for each are given below in Table 9.

#### **Comment:**

All the parameters are well within the permissible limit for drinking water as prescribed by WHO.

Sl. No.	Parameters	Unit	Methodology	Results			WHO Standards for Drinking water	
				Sample 1	Sample 2	Sample 3	Desirable	Maximum
							Limit	Permissible Limit
1	pН		pH meter	7.2	7.0	7.0	6.5-8.5	No relaxation
2	Conductivity	µs/cm	Conductivity Meter	152	182	164	_	400
3	Turbidity	NTU	Turbidity meter	2	2	2	1	5
4	Alkalinity	mg/l	Titrimetric	196	48	118	200	600
5	Total Hardness	mg/l	Titrimetric	158	40	90	300	600
6	Calcium	mg/l	Titrimetric	110	26	64	75	200
7	Magnesium	mg/l	Titrimetric	48	14	26	30	100
8	Chloride	mg/l	Titrimetric	4	4	4	250	1000
9	Sulphate	mg/l	Spectrophotometric	4.1	1.9	2.2	200	400
10	Nitrate	mg/l	Spectrophotometric	0.1	0.1	0.1	45	No relaxation
11	Phosphate	mg/l	Spectrophotometric	BDL	BDL	BDL	0.05	0.1
12	Fluoride	mg/l	Spectrophotometric	0.4	0.2	0.2	1.0	1.5
13	Iron	mg/l	Spectrophotometric	0.2	0.1	0.1	0.3	No relaxation
14	Arsenic	mg/l	Spectrophotometric	BDL	BDL	BDL	0.01	0.05

Table 9: WATER ANALYSIS REPORT OF D.K. COLLEGE

**BDL= Below Detection Limit** 

Data Source: Department of Chemistry

#### WASTE MANAGEMENT AUDIT

Solid Waste audit covers the generation of solid waste, its collection and disposal.

The audit focuses on the volume of wastes accumulated in the campus and assesses whether the way in which it is treated or disposed-off is environmentally sensitive.

Composting solid waste is more sustainable than landfilling. Solid-waste sent to landfills undergoes anaerobic decomposition and produce landfill methane gas emissions, which is 72% stronger than CO<sub>2</sub>. Composting, however, involves aerobic decomposition and produces CO<sub>2</sub>, reduces methane gas emissions and also leads to carbon sequestration. Besides landfilling and composting, recycling is another way in which solid wastes are treated. It pertains to the recovery and reuse of plastic wastes, metal waste, etc. Recycling practice serves as a way to keep large amounts of solid waste out of landfills, conserve resources and save energy.

Hazardous waste is a label assigned to specific class of refuge which in some way is potentially dangerous to living beings and environment. These include electronic waste such as cadmium, lead and PVC on cables, bleach, paints, zinc and titanium oxide in cosmetics, asbestos, chemical laboratory waste, etc. Chemical laboratories have the potential to generate a wide range of hazardous waste: aqueous waste (cyanide, chromium VI, sulfifide); organic liquids (solvents, oils); and solids (glass, sharps, resins, alloys). Efficient management of hazardous waste involves an organized system of identification, storage upon generation or containerization, collection and transportation and final treatment to disposal which depends on the physical form of wastes. Disposal of hazardous wastes includes land disposals, incineration, dumping in the sea, deep well injection, etc.

#### Waste generation and management in the campus:

Sizeable amount of Solid wastes are generated from the College canteen, the Academic Departments and the Laboratories per day.

The wastes are segregated and the reusable solid waste are used for

- a) Vermicomposting for organic farming
- b) Mushroom Cultivation

The rest of the solid wastes are disposed off to the Community bin of Mirza area.

#### WASTE MANAGEMENT THROUGH VERMICOMPOSTING

The Institutional Biotech Hub supported by DBT, Govt. of India initiated the Vermicompost Unit since 2014 in collaboration with D. K. College Science forum and Krishi Vigyan Kendra, AAU, Kahikuchi. Presently, it is run by **Advanced level Institutional Biotech Hub in association with Department of Biotechnology**. The unit maintains the vermicompost production required for organic farming in D. K. College, Mirza.

The main objective of the unit is the management of the solid biodegradable waste of the campus like daily tree leaves, canteen food waste, papers etc. To carry out this process two species of earthworms *Eisenia foetida* and *Eudrilus euganae* have been used.

The vermincompost produced is mainly used as the manure for the campus garden and orchid house of the Institute. Remaining manure is sold among the faculty members to generate the revenue for the maintenance of the unit.

#### MUSHROOM CULTIVATION

Advanced level Institutional Biotech Hub in association with Department of Biotechnology is also maintaining the Mushroom cultivation unit in the campus as well as spawn production unit. For cultivation of mushrooms, organic lingo cellulosic wastes such as paddy straw, rice husk and saw dust are utilized as substrates.

Mushroom is one of the best alternative sources of food. Its cultivation is not only economically viable by converting wastes into high quality protein food but also provides job opportunities to many in rural areas.

Table 10: Yield of Pleurotus sp. using different substrates in<br/>Laboratory conditionPleurotus speciesSubstrateYield per bag after 1st harvesting

Pleurotus species	Substrate	Yield per bag after 1 <sup>st</sup> harvesting
Pleurotus ostretus	Rice straw	700 gm
Pleurotus ostretus	Rice straw + saw dust	500 gm
Pleurotus ostretus	Rice straw + Husk	750 gm
Pleurotus fabellatus	Rice straw	730 gm
Pleurotus djamor	Rice straw	740 gm
Pleurotus florida	Rice straw	745 gm

#### Disposal of wastes in the Community Bin of Mirza:

The solid wastes generated in the Academic Departments and Laboratories are segregated in garbage bins kept at various points within the Departments and the college campus. These are disposed off to the community garbage disposal bins of Mirza are for recycle and reuse.

#### Issue to be handled

A point of concern is disposal of hazardous wastes arising out of the labs of academic departments and the increasing piles of e-waste. No policy or mechanism is in place at present to deal with these wastes. However, efforts are underway to develop an arrangement for handling such wastes in near future.

#### **ENVIRONMENT CONSCIOUSNESS**

Creating awareness about environmental issues and the conservation of the ecosystem have become increasingly important in the life skill education of students. The student community would assume responsibility for educating others about the need for environmental protection if they are made aware of the need and ways for protecting the environment.

Environmental Education is a compulsory course imparted to all students by the Department of Environmental Science of the College in accordance with the guidelines and curriculum of the affiliating Gauhati University.

#### **CONCLUDING REMARKS**

The Green Audit done on a primary scale has revealed that D.K College, Mirza has adhered to the green practices making the campus ecofriendly, congenial to teaching learning and relaxation in a healthy ambience. In spite of a considerable built up area, it has 38.1% of green and open spaces. The green cover has been a habitat to diversity of flora and fauna. The biodiversity present has acted as a major source of carbon sink, pollution reduction and has enhanced the connection to nature and peaceful coexistence with wildlife. The Air Quality Index has been found to be satisfactory indicating no significant air pollution. The noise levels in and around the Academic Departments were found to be well within normal limits making teaching learning possible in a peaceful environment. The water quality parameters in the campus were also found to be in the normal range as prescribed by WHO regulations. Concrete steps have also been taken for solid waste management. Wastes recycle and reuse is being done through vermicomposting and mushroom cultivation. Environmental consciousness and sensitivity has been imparted to students through the study curriculum as well as practically by encouraging plantation drives and clean campus drives.

#### SUGGETIONS AND RECOMMENDATIONS

There exists vast scope to improve the green campus status of the College through biodiversity promotion and tapping green energy sources. Landscaping of the campus can be done in a planned manner to increase the greenery and enhance the carbon sink. Planting of economically important plant species as well as rare and endangered species would contribute towards biodiversity conservation and promotion.

Energy efficient measures including installation of solar panels and energy efficient bulbs, fans and electrical equipment on a large scale basis would also reduce the carbon footprint in the campus.

Solid waste reuse and recycling measures can also be enhanced taking into consideration installation of biogas plant. E-waste management practices should be initiated in the coming future.

Water use efficiency and conservation can be enhanced by practicing rain water harvesting.

# **PHOTO GALLERY**

# **GLIMPSES OF THE CAMPUS**



Plate 1: Front View from Main Gate



*Plate 2*: View of Administrative Building



Plate 3: View of Girls' Hostel

Dakshin Kamrup College, Mirza



*Plate 4*: Plantations inside the Campus



*Plate 5*: Open Green Spaces and Sitting Area near Classrooms



*Plate 6*: View of Department Buildings

# FLORA AND FAUNA IN THE CAMPUS

























### GREEN HOUSE AND VERMI COMPOST UNIT OF THE COLLEGE

















Dakshin Kamrup College, Mirza

#### MUSHROOM CULTIVATION UNIT











