ENVIRONMENT AUDIT REPORT

(2018-2019)

U. N. (AUTO.) COLLEGE OF SCIENCE AND TECHNOLOGY

PRACHI JNANAPITHA, ADASPUR, CUTTACK-754011

GREEN AUDIT REPORT UNC 2018-19

CONTENTS

ACKNOWLEDGEMENT

Udayanath Autonomous College of Science & Technology (hereinafter called UNC) has been working at the forefront since its inception by conducting environmental campaigns, workshops and other extension activities to bring about social change for national and international development. In its pursuit of excellence, UNC has recognized itself to improve the environmental quality and maintain its unique pristine ecosystem for the future generation of students and all the inhabitants of the campus. Although we have been taking a number of steps to conserve and protect our environment but this report is the first formal effort to document the results of our investigation and interpret the information of all the required parameters of the Environment audit process. UNC aims to take up the policy and efforts at every level to avert ecological catastrophe on a global scale by supporting the climate neutrality goals committed by the Government of India. As a part of this, efforts are taken to continuously monitor the sustainability of the academic process by constituting this Environment Audit Committee consisting of faculty members working in this arena to collect basic data of the environmental parameters within the campus so that the environmental issues are resolved within the campus. The Environment Audit Committee has tried to identify the current / emerging environmental issues so as to monitor the environmental management practices adopted in the campus along with subsequent impact of these on its environment. This report is an outcome of efforts of each and every member of the Environment Audit Committee who undertook this audit to gather information on every parameter of the environment, compiled and analyzed the data to recognize the immediate and serious threats within the campus so that opportunities can be explored to bring about continuous improvement in our environmental performance and standards by our suggestions and recommendations put forth. It is hoped that this report will receive adequate attention of all the stake holders for pursuing a bottom-up approach in which we stand to face the challenges in future.

The sincere encouragement and administrative support of Prof. Daityari Singh, Principal of U. N. (Auto.) College of Science and Technology during the conduct of the study has been a guiding force and we, the Environment Audit Committee express our heartfelt gratitude to him for his kind gesture.

Special thanks are due to Prof. Daityari Singh for providing primary data on Environmental Audit; Prof. Krupasindhu Pradhan, Coordinator, IQAC for providing support to conduct the various assessments.

We are indebted to all the HODs, Teachers, officers, all staff members and all the campus dwellers of this Institute for their kind support in collecting data for the report.

We sincerely hope and believe that the untiring efforts in compiling the reports by the present Environment Audit Committee will be helpful for this Institute and it becomes a responsibility of all the stakeholders of this campus to follow the proposed management plan suggested in the report to reduce its impact on our environment.

Environmental Audit Team

Committee for green audit in the UNC campus

Prof. Daityari Singh

Prof. Kalyani Pattanaik

Prof. Arun Kumar Nayak

Dr. Krupasindhu Pradhan

External member

Prof. Santilata Sahoo

EXECUTIVE SUMMARY

An Environmental audit is a snapshot in time, in which one assesses campus performance in complying with applicable environmental laws and regulations. Though a helpful benchmark, the audit almost immediately becomes outdated unless there is some mechanism in place to continue the effort of monitoring environmental compliance.

This audit report contains observations and recommendations for improvement of environmental consciousness.

Udayanath Autonomous College of Science & Technology, Adaspur, a premium educational institution of Odisha, started as a college exclusively dealing with various fields of the Arts stream in its own building at Prachi Jnanapitha on 1991. Soon after that, to manifest the cherished dreams of all the people working hard for the noble cause of providing higher education and entrusting their hopes and faith on the institute, UNC managed to introduce the other two streams of science (1992) & Commerce (1993), making the institute a full-fledged hub of knowledge and learning. Honours teaching facilities were introduced in Economics, Political Science, History, Odia, Physics, Chemistry, Mathematics, Botany and Zoology in 1996; Accounting and Management in 2002; English and Education in 2003; Psychology and Sanskrit in 2004; Philosophy in 2005; Library Science and Computer Science in 2007. UNC flaunts itself as the only college in the entire state to have a teaching department in the field of Women Studies since 2010, which makes it have a grand total of 26 honours subjects (Arts-14, Science- 8 and Commerce). To Commensurate with this vertical academic growth, the college was accorded Autonomous status in 2009 and was accredited by NAAC with B+ Grade. The college made tremendous strides with the opening of P.G classes in the subject of Mathematics, Political Science, Economic and Clinical Psychology from the session 2017-18. In its long journey of 32 years the college has left indelible marks on the stand of time by producing brilliant luminaries in different fields like science, technology, sports, social service, administration and politics.

CHAPTER 1

INTRODUCTION

1.1 BRIEF HISTORY OF THE COLLEGE

Nestled in the lap of Eastern Odisha, the Udayanath Autonomous College of Science & Technology, at- Prachi Jnanapitha, Po- Adaspur, Dist.- Cuttack has taken long strides to reach its destination- a holistic approach to life through meaningful education. The crest of the college truly symbolizes the mission & goals of the institution. The logo of the college is a magnificent blend of the heritage magnified by modernity & technological progress. The charming college emblem comprises five distinct symbols such as: sacred flame, the open book, the river, the greenery & the installed factory. The sacred flame symbolizes the light of knowledge or Jnanaloka fostered by the institution. The open book symbolizes dissemination of knowledge. The holy Prachi river stands for gravity, transparency, solidarity & sanskruti or culture. Also suggests unending flow of knowledge. The greenery symbolizes the agricultural development which is essential for overall development of the country. The installed factory suggests advanced technology & scientific development leading to industrial promotion & generation of employment.

Lastly the sacred line in Devanagari Script "तमसो मा ज्योतिर्गमय" appearing in the box at the base of the crest reveals the Motto of the institution, "Lead Me from Darkness to Light" & glorifies the Jnanapitha. The architectural design & the artistic revelations on the box add beauty carrying the impression of a holistic approach towards education. Under the dynamic leadership of Sj. Trilochan Kanungo, former Member of Parliament (LS), educationist & social thinker & the generous, Nobel financial contribution made by the Late Udayanath Sahoo of the locality, the college managed to weather the difficulties. Named after the patron as Udayanath College of Science & Technology, the college was transferred to its own building at Prachi Jnanapitha on 3 December 1986. The other two streams of science & commerce at the H.S. level were introduced

& all the three streams were accorded official recognition & affiliation together in 1987. The college stands on the holy river Prachi; close to Kenduli, the birth place of the renowned classical poet Jayadev. The establishment of U.N. College of Sc. & Tech. at Adaspur has not only added a new dimension to the aspirations of the people of the region but it has also facilitated the spread of education to every corner of the state. To fulfill the cherished dream of the people for higher education, undergraduate classes were opened in Arts in 1991; Science in 1992 & Commerce in 1993. The college has had 2 NCC units- one for boys & another for girls, 4NSS units, 1Rover unit, 1Ranger unit & 2YRC units engaged in welfare schemes.

1.2 VISION, MISSION & GOALS OF THE INSTITUTE

VISION

- *Knowledge is power.*

MISSION

- To spread the light of knowledge through academic skills, social skills, co-curricular activities and an aesthetic sense in the student.

GOALS

- To arrange periodic assessment of students.
- To uphold and preserve cultural heritage.
- To stimulate academic environment of the institution.
- To provide a free and fair examination system.
- To promote personality development through a holistic approach.
- To inoculate a sense of ethical values through curriculum.
- To uphold a sense of civic responsibility and social commitment.
- To promote creativity. Sportsmanship and leadership quality.

1.3. ACADEMIC PROGRAM

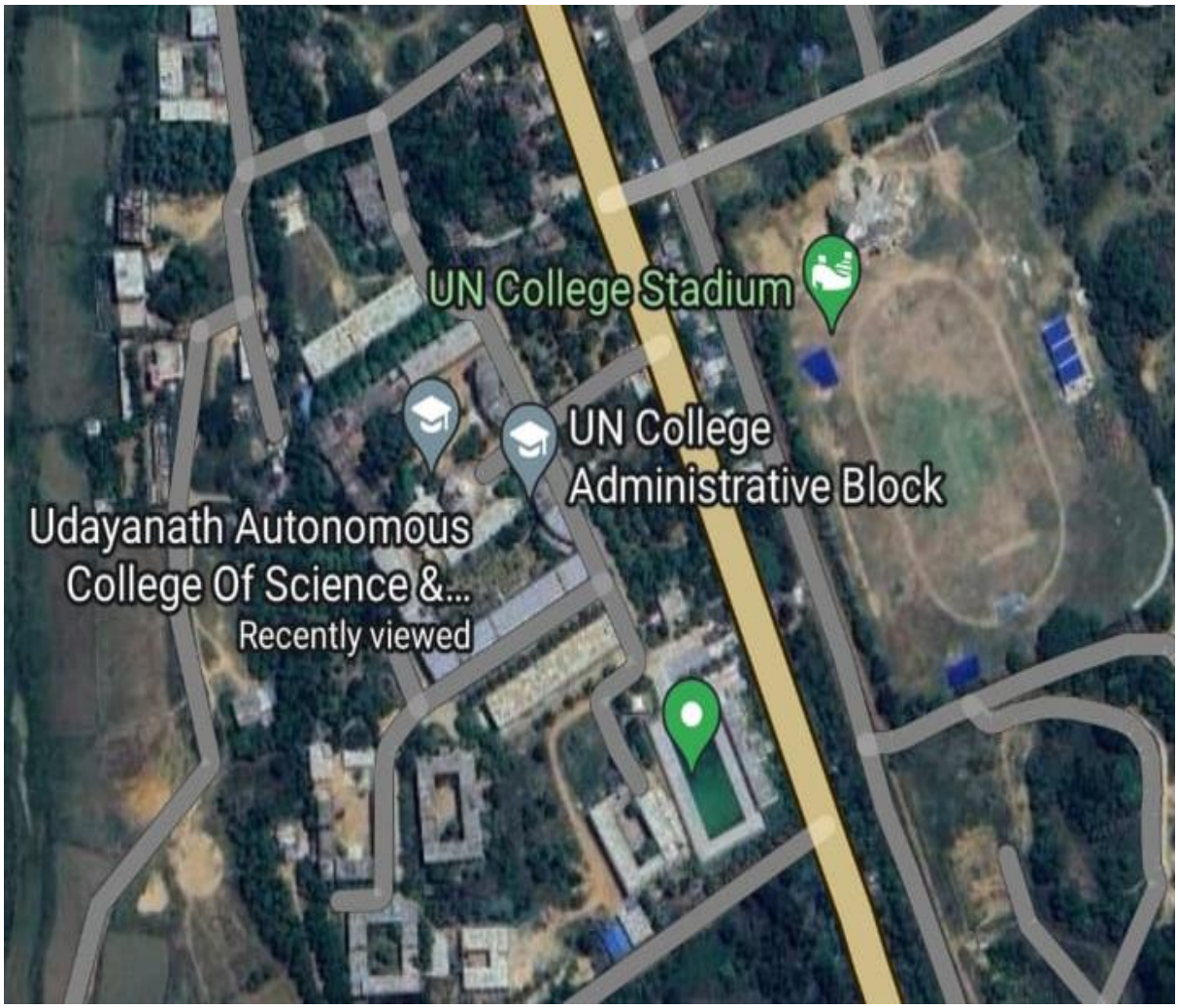
TABLE 1: DETAILS OF ACDEMIC PROGRAMS

ACADEMIC YEAR 2018-19

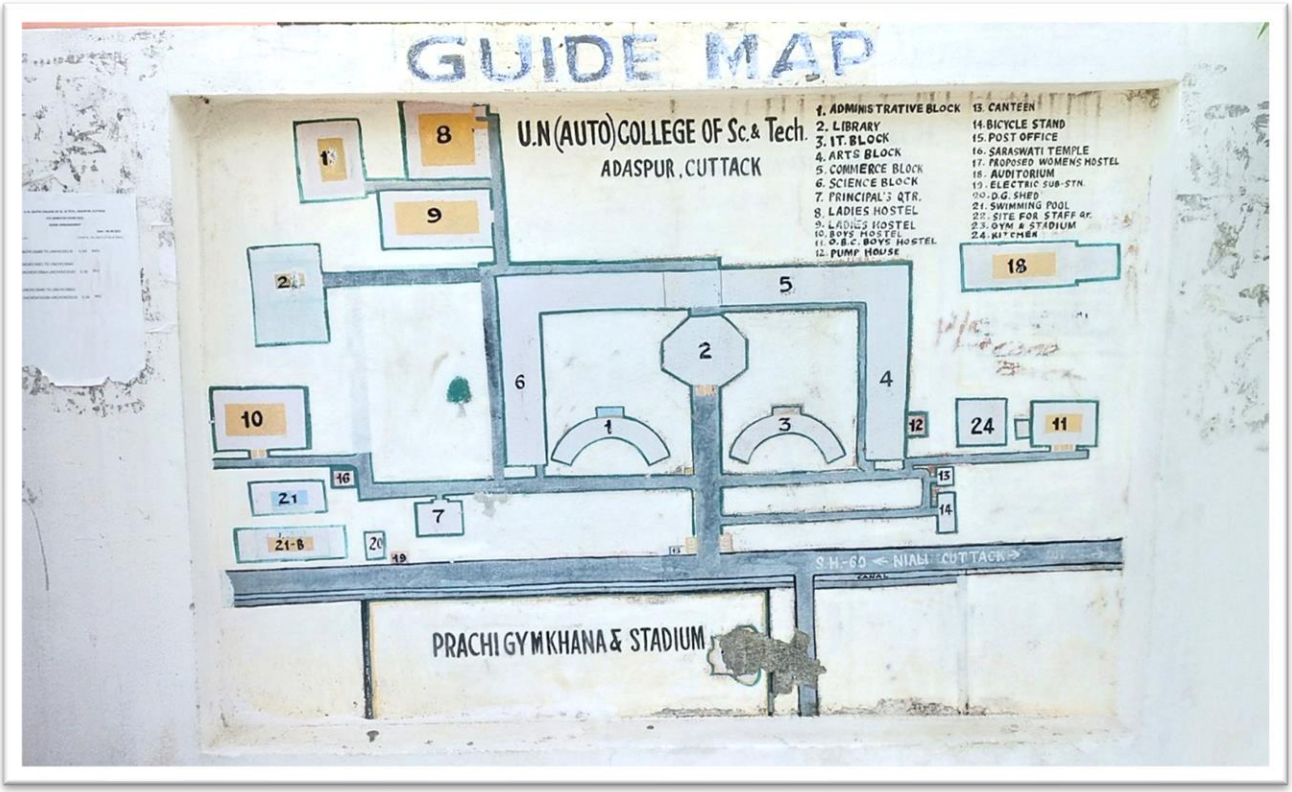
NAME OF THE PROGRAMME	NUMBER OF SANCTIONED SEATS
UG PROGRAM	
Bachelor in Arts	416
Bachelor in Commerce	256
Bachelor in Science& Comp Sc.	PCM-394 +64 CBZ-224
BBA	30
BCA	30
B.SC. ITM	30
B.Lib (1 year)	64
PG PROGRAM	
Botany	32
Chemistry	32
Commerce	32
Computer Science	32
Analytical and Applied Economics	32
Education	32
English	32
Hindi	32
History	32
Mathematics	32
MFC	30
MSW	30
Odia	64
Philosophy and Critical thinking	32
Physics	32
Pol. Science	32
Clinical Psychology	32
Sanskrit	32
Sociology	32
Zoology	32

1.4 LAYOUT OF THE CAMPUS

The college covers an area of 30acres of land seated at Prachi Jnanapitha of Adaspur village by the side of SH-60 near the bank of holy river Prachi under Kantapada block in the district of Cuttack. It lies at North latitude 20.213059º & East longitude 86.014549º. The institute is surrounded by local village, the holy river Prachi & some other educational centers like coaching centers, computer training centers. The college is situated in between the center of the Twin-city (Cuttack & Bhubaneswar). It's equally far from Bhubaneswar and Cuttack (35 K.M.).



Geographical Location Map (Source: Google Map)



Guide Map of UNC Campus

UNC Main Gate

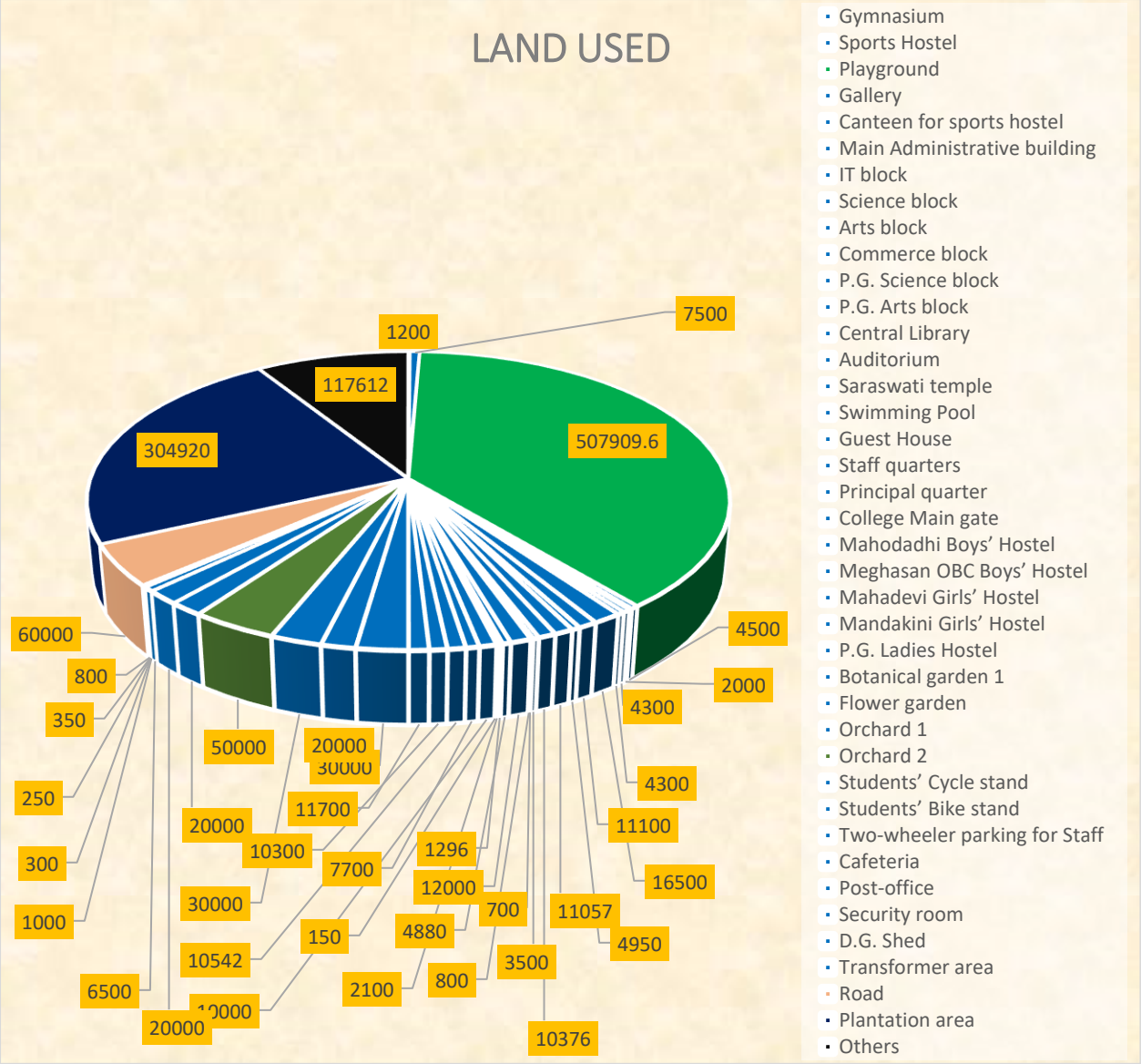
1.5 LAND USED DATA

The college covers an area of 30 acres of land. The maximum coverage of land is occupied by the Plantation area. The construction area comes next with a little bit more land than the half of the land coverage following the plantation area. The playground area covers the minimum area in comparison to plantation and construction area coverage. The whole college area has been divided into two main parts, Stadium site & Main Academic- Administration site. The stadium site constitutes a Gymnasium, Sports Hostel, Playground, Gallery and Canteen for sports hostel. The Academic- Administration site constitutes the Main Administrative building, IT block, Science block, Arts block, Commerce block, P.G. Science block, P.G. Arts block, Central Library, Auditorium, Saraswati temple, Swimming Pool, Guest House, Staff quarters, Principal quarter, College Main gate, Boys Hostels(02), Girls Hostel (03), Botanical Gardens (01), Flower garden (01), Orchards (02), Students 'Cycle & Bike stand, Staff two wheelers parking, Cafeteria, Post-office, Security room, D.G. Shed & transformer area.

TABLE 2: LAND USED DATA

SERIAL NO.	NAME OF THE SITE	AREA COVERED (in sqft.)
STADIUM SITE		
1.	Gymnasium	1200 sqft.
2.	Sports Hostel	7500 sqft.
3.	Playground	507909.6 sqft.
4.	Gallery	4500 sqft.
5.	Canteen for sports hostel	2000 sqft.
	TOTAL	523109.6 sqft. (12.00 acre)
ACADEMIC- ADMINISTRATION SITE		
1.	Main Administrative building	4300 sqft.
2.	IT block	4300 sqft.
3.	Science block	16500 sqft.
4.	Arts block	11100 sqft
5.	Commerce block	4950 sqft
6.	P.G. Science block	11057 sqft
7.	P.G. Arts block	10376 sqft
8.	Central Library	3500 sqft
9.	Auditorium	700 sqft
10.	Saraswati temple	800 sqft
11.	Swimming Pool	12000 sqft
12.	Guest House	4880 sqft
13.	Staff quarters	1296 sqft

14.	Principal quarter	2100 sqft
15.	College Main gate	150 sqft
16.	Mahodadhi Boys' Hostel	10000 sqft
17.	Meghasan OBC Boys' Hostel	7700 sqft
18.	Mahadevi Girls' Hostel	10542 sqft
19.	Mandakini Girls' Hostel	10300 sqft
20.	P.G. Ladies Hostel	11700 sqft
21.	Botanical garden 1	30000 sqft
22.	Flower garden	20000 sqft
23.	Orchard 1	30000 sqft
24.	Orchard 2	50000 sqft
25.	Students' Cycle stand	20000 sqft
26.	Students' Bike stand	20000 sqft
27.	Two-wheeler parking for Staff	6500 sqft
28.	Cafeteria	1000 sqft
29.	Post-office	300 sqft
30.	Security room	250sqft
31.	D.G. Shed	350 sqft
32.	Transformer area	800 sqft
33.	Road	60000 sqft
34.	Plantation area	7 acres
35.	Others	2.7acres
	TOTAL	799983 sqft. (18.36 acres)



Graphical Representation of The Land Area Used

SPORTS HOSTEL

GYMNASIUM

PLAYGROUND

ADMINISTRATIVE BUILDING

IT BLOCK

CENTRAL LIBRARY

COLLEGE CAFETERIA

ACADEMIC BLOCK

FLOWER GARDEN

FLOWER GARDEN

BOTANICAL GARDEN

PARKING

CENTRAL LIBRARY

CHAPTER 2

ENVIRONMENT AUDIT

The Environment audit aims to analyzes environmental practices within and outside the College campus, which will have an impact on the eco-friendly atmosphere. Environment audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of college environment. It was initiated with the motive of inspecting the effort within the institutions whose exercises can cause threat to the health of inhabitants and the environment. Through the environment audit, a direction as how to improve the structure of environment and there are include several factors that have determined the growth of carried out the environment audit.

2.1. NEED FOR ENVIRONMENT AUDITING

Environment auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, are become habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes are consuming more than required resources. Whether we are handling resources carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

2.2. GOALS OF ENVIRONMENT AUDIT

College has conducted an environment audit with specific goals as:

- Identification and documentation of green practices followed by college.
- Identify strength and weakness in green practices.
- Analyze and suggest solution for problems identified.
- Assess facility of different types of waste management.
- Increase environmental awareness throughout campus
- Identify and assess environmental risk.
- Motivates staff for optimized sustainable use of available resources.

- The long-term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

2.3. OBJECTIVES OF ENVIRONMENT AUDIT

- To examine the current practices, which can impact on environment such as of resource utilization, waste management etc.
- To identify and analyze significant environmental issues.
- Setup goal, vision, and mission for Green practices in campus.
- Establish and implement Environment Management in various departments.
- Continuous assessment for betterment in performance in green

2.4. BENEFITS OF ENVIRONMENT AUDIT TO EDUCATIONAL INSTITUTIONS

There are many advantages of Environment audit to an Educational Institute:

- It would help to protect the environment in and around the campus.
- Recognize the cost saving methods through waste minimization and energy conservation.
- Empower the organization to frame a better environmental performance.
- It portrays good image of institution through its clean and green campus.
- Finally, it will help to build positive impression for through green initiatives the upcoming NAAC visit.

2.5 PERFORMANCE INDICATORS FOR ENVIRONMENT AUDIT

1**. Energy Consumption**: This performance indicator measures the amount of energy consumed by the campus. It examines the energy consumption patterns, identifies areas of high energy usage, and recommends strategies for energy efficiency and conservation.

2. Waste Management: This indicator assesses how effectively the college manages its waste, including measures taken to reduce, reuse, and recycle waste materials. It evaluates waste management processes, analyzes the waste disposal methods, and suggests improvements to minimize environmental impact.

3. Water Usage: Water usage is another essential performance indicator. It tracks the college's water consumption, identifies water-intensive areas, and suggests measures to reduce water usage and promote water conservation practices.

4. Environmental Compliance: This indicator evaluates the college's adherence to environmental regulations, permits, and licenses. It examines whether the college is complying with local and national environmental regulations and recommends actions to address any non-compliance issues.

5. Greenhouse Gas Emissions: This performance indicator focuses on quantifying the college's greenhouse gas emissions. It measures the carbon footprint of the college, identifies sources of emissions, and suggests strategies to reduce emissions and combat climate change.

6. Biodiversity Conservation: This indicator assesses the college's efforts in preserving and promoting biodiversity on its campus. It evaluates measures taken to protect local flora and fauna, enhance green spaces, and introduce native species. It also recommends initiatives to raise awareness about biodiversity conservation among students and staff.

7. Transportation Management: This performance indicator examines the college's transportation practices and policies. It assesses the college's efforts to promote eco-friendly modes of transport, such as carpooling, public transportation, and cycling. It also evaluates the availability of parking spaces for electric vehicles and suggests measures to reduce reliance on fossil fuel-based transportation.

8. Education and Awareness: This indicator evaluates the college's initiatives to educate and raise awareness about environmental issues among students, staff, and the wider community. It assesses the effectiveness of environmental education programs, awareness campaigns, and sustainability-focused events organized by the college.

9. Green Building Practices: This performance indicator focuses on the college's infrastructure and building practices. It assesses whether the college follows green building principles, such as energy-efficient design, use of sustainable materials, and integration of renewable energy sources. It also suggests ways to improve the sustainability and environmental performance of existing buildings.

10. Stakeholder Engagement: This indicator evaluates the college's engagement with various stakeholders, including students, faculty, staff, local community, and government agencies. It assesses the level of collaboration, consultation, and involvement of these stakeholders in the college's environmental initiatives. It also recommends ways to enhance stakeholder engagement and facilitate partnerships for sustainable development.

2.6 METHODOLOGY FOLLOWED FOR CONDUCTING ENVIRONMENT AUDIT

The management of the Institution has shown a commitment towards environment auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees in the campus, etc. In order to perform environment audit, the methodology included different tools such as preparation of questionnaires, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following areas to summarize the present status of environmental management in the campus:

- Energy Management
- Water Management
- Waste Management
- Environment Management

The audit process was carried out in three phases. At first, all the primary and secondary data required for the study was collected from various sources by concerned departments. A broad reference work was carried out to clear the idea of environment auditing. Different case studies and methodologies were taken into consideration and the following methodology was adopted for the present audit. The methodology of the present study is based on onsite visits, personal observations, door to door visit and questionnaires. Initially, based on data requirements, various sets of questionnaires were prepared. The surveyors then visited all the departments of the UNC and the questionnaires were filled. The generated data is subsequently gathered and used for further analysis. From the outcome of the overall study, a final report is prepared.

Step 1: Collection of primary data through observation, surveys, interaction and discussions

Step 2: Collection of secondary data through observation, surveys, interaction and discussions

Step 3: Conduction of comprehensive Environment Audit

Step 4: Reporting the Environment Audit

CHAPTER 3

PRE-AUDIT QUESTIONNAIRES & CAMPUS ENVIRONMENT

PRE-AUDIT QUESTIONNAIRES

Questionnaires were prepared to conduct the green audit in our campus based on the guidelines, rules, acts, and formats prepared by the Ministry of Environment, Forest and Climate Change (New Delhi), Central Pollution Control Board, and other statutory organizations. Most of the guidelines and formats are based on broad aspects and some of their issues and formats were not applicable for our campus. Therefore, using these guidelines and formats, combinations, modifications, and restructuring were done and sets of questionnaires were prepared for solid waste management, energy management, water management, hazardous waste and e-waste management data.

Questionnaires and the campus environment

1. Where is the institute located?

The college covers an area of 30 acres of land. It is seated at Prachijnanapitha of Adaspur village, by the side of SH-60 and near the bank of holy river Prachi under Kantapada block in the district of Cuttack. It is located precisely at north latitude 20.213059º & east longitude 86.014549º. The institute is surrounded by local village, the holy river Prachi and some other educational centers like coaching centers, computer training centers etc. The college is situated between the twin-cities, Cuttack and Bhubaneswar.

2. What is the strength of the institute?

The institute provides UG courses in 26 subjects and PG courses in 20 subjects with a total strength of about 5000 students. The institute is well known for pursuing academic excellence by inculcating a progressive sense of discipline, punctuality, unity, honesty, accountability and overall constructive practices.

3. What is the total area of the campus?

The college covers an area of 30acres of land. The whole college area has been divided into two main parts, stadium site & main academic- administration site. The stadium site covers an area of 12 acres & main academic-administration site stretches over an area of 18 acres.

4. Does the institute have the following?

TABLE 3: AVAILABILITY OF THE FACILITIES IN THE INSTITUTE

SERIAL NO.	AREA	AVAILABLE	DETAILS
1.	Playground	Available	❖ Gymnasium ❖ Volleyball court ❖ Kho – Kho court ❖ Football ground ❖ Cricket ground
2.	Library	Available	❖ Central library ❖ Reading room
3.	Laboratory	Available	❖ Botany ❖ Chemistry ❖ Comp.Sc. ❖ Geology ❖ Geography ❖ Physics ❖ Zoology
4.	Garden area	Available	❖ Flower garden ❖ Orchard 1 ❖ Botanical garden 1 ❖ Orchard 2
5.	Toilet	Available	❖ Separate toilets for male & female in academic, administrative, hostel, guest house buildings. ❖ Separate toilets are also available for physically challenged.
6.	Canteen	Available	❖ An open well furnished, hygienic canteen is present.
7.	Hostel	Available	❖ Mahodadhi Boys' Hostel ❖ Meghasan OBC Boys' Hostel ❖ Maha Devi Girls' Hostel ❖ Mandakini Girls' Hostel ❖ P.G. Women's' Hostel
8.	Staff quarters	Available	
9.	Garbage or waste store yard	Available	❖ Portable dustbins are placed for waste deposition.

5. Does the institute have the following nearby?

TABLE 4: AVAILABILITY OF NEARBY PUBLIC FACILITIES

SERIAL NO.	AREAS	REMARKS
1.	Dispensary	❖ Adaspur PHC is available at a distance of 1.3 K.M.
2.	Municipal Dump Yard	❖ Not available
3.	Open drainage	❖ Not available
4.	Industry	❖ Not available
5.	Sewer line	❖ Not available
6.	Public convenience	❖ Available
7.	Bus Stop	❖ Private bus stops are very close to the campus.
8.	Railway station	❖ Both the twin- city railway stations are available at a distance of 30 K.M.
9.	Airport	❖ Biju Pattnaik International Airport is available at a distance of 27 K.M.

6. Does the institute conduct an environment audit of the campus?

Yes, the institute conducts annual environment audit report every year.

7. Climate & topography of the institute

Climate & Meteorology

UNC is located in the coastal region of Odisha, about 50 km west from the Bay of Bengal. Due to its location, the climatic conditions remain tropically humid. The campus experiences all six seasons but generally, only three seasons are noticeably appreciated. The monsoon season generally starts here in the months between June and October. Winter starts from mid-November to February, followed by a hot & humid summer from mid- March to mid- June.

Rainfall

Due to such tropical, humid climate, UNC receives an amount of about 100-115 cm of rainfall during the South-West Monsoon (Mid-June to September), which contributes about 80% of annual rainfall. South- west Monsoon generally reaches Cuttack by mid- June (2nd week of

June) and prevails up to the end of September or 1st week of October. During this period, the place experiences more than 50% of the rainy days from the total monsoon period. Another factor of rainfall is the Nor 'wester, which takes place during the hot-humid summer (March-June). It comes with a heavy thunderstorm along with heavy, localized rainfall which makes 5 % of the annual irregular rainfall.

Wind

During winter season (December- February) surface winds in the Campus are light and variable. However, during March to August strong (8 to 30 km/h) South Western wind prevails (Nor 'wester). During September to November winds are relatively light & variable.

Temperature

Hot weather prevails over the campus during March to May. May is the hottest month with average maximum temperature around 30-35ºC. Long term analysis of average maximum temperature during the summer shows marginal rising of temperature. The greenery of the campus protects and controls the rising temperature during the heavy heat wave. The temperature of the campus remains in a control condition during summer in comparison to the heavy temperature of the Twin-city. Relatively winter is not that severe due to proximity to the sea. Due to the greenery the temperature remains slightly cool than the twin-city. During December to February the average minimum temperature varies in between 10- 12ºC. During the end of December, the average minimum temperature gets down up to the 10ºC.

Topography

Topographically UNC campus belongs to the East & south-eastern coastal plain Agro-climatic zone. The soil type is deltaic alluvial & laterite. The altitude of this place is nearly 17 meters (55.77 ft) above the sea level.

Geology

Geologically, Cuttack & its adjacent areas come under the Gondwana landmass, one of the oldest and stable landmasses in the world. The campus is situated as a deltaic zone lying in between the Devi & Prachi River. The deltaic zone comprises of a very good quality of agricultural soil.

Vegetation

The Flora of UNC &its surroundings are broadly classified as Northern Tropical Moist Deciduous (mixed) type.

8. Soil quality assessment 2018- 2019

The soil samples were collected from the campus, placed in clean, labeled polyethylene bags and then transported to the laboratory for quality analysis after air drying under room temperature. The soil samples were ground using mortar and pestle to reduce the particle size and then sieved through a 2 mm mesh to obtain acceptable and homogeneous samples. The samples were stored at room temperature until the physicochemical analysis was performed. Various soil edaphic parameters like soil pH, electrical conductivity (EC), total organic matter (OM) as carbon content, available nitrogen, available phosphorous, potassium, calcium, magnesium and sodium were estimated.

The fundamental characteristics of soil samples are very important because soil health determines the various types of plant and microbial diversities in terms of the number of Genera and species diversity and richness. Besides, the population density as well as diversity determines the human population intervention, anthropogenic sources, municipal sewage disposal, solid / garbage waste disposal, industries activities and use of large number of vehicles and agrochemicals which will pollute the soil health. The availability of macro and micro-elements of soil determines the number of beneficial microorganisms such as nitrogen fixing, potassium solubilizing and phosphorous mobilizing microorganisms for example bacteria, fungi and actinomycetes. The soil nutrients are being considered as essential elements for enhancing the profuse growth of various plant species and microbial organisms.

Soil physic-chemical properties influence the behavior of soil and hence, knowledge of soil property is important. Soil testing is the only way to determine the available nutrient status in soil and the only way we can develop specific fertilizer recommendations. Soil properties that are sensitive to changes can be used as indicators to improve soil quality.

The fertility of the soil depends on the concentration of N, P, K, organic and inorganic materials, conductivity. The physicochemical properties such as moisture content, nitrogen, phosphorus and organic matter required for the growth of plant. Potassium is used for flowering purpose, for building of protein, photosynthesis, fruit quality and reduction of diseases and phosphate is used for growth of roots in plants. The soil profile and soil edaphic parameters of the campus observed to be low in the essential nutrients which are needed for the plant growth.

The soil fertility has to be enhanced by adapting vermi-composting and proper irrigation facility which is now well implemented in the campus.

CENTRE FOR ENVOTECH AND MANAGEMENT CONSULTANCY PVT. LTD.
An ISO 9001-2008 & OHSAS 18001:2007 Certified Company, Empanelled with OCCL, ORSAC and SPCB of Govt. of Odisha
Accredited by NABET, QCI for EIA Studies as 'A' Category Consultant Organization. Empanelled with PCCF(Wildlife) & CWLW,Odisha
Enlisted in Construction Industry Development Council (CIDC) established by the Planning Commission (Govt. of India)
MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.

Report No. - CEMC/UNAC/080619/S1 **Issued Date-08.06.2019**

SOIL QUALITY TEST REPORT

Name & Address of the Client : **M/s U.N AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY**
Date of Sampling : 01.06.2019
Sampling by : Mr. B.k Samantray
Date of Sample Received : 01.06.2019
Sample Description : Soil
Sample Quantity : 1 kg
Sample Location : **College Garden**
Date of Analysis : 01.06.2019 to 07.06.2019
Reference No. : CEMC-08062019S1

ANALYSIS RESULT

1	pH	------	6.92
2	EC	µS/cm	298
3	Colour	-----	Grey
4	Sand	%	45.2
5	Slit	%	16.4
6	Clay	%	37.2
7	Texture	%	Sandy clay
8	Specific Gravity	------	1.18
9	moisture	%	4.8
10	Organic matter	%	1.16
11	Nitrogen	Kg/Ha	218
12	Potassium	Kg/Ha	206
13	sodium	Kg/Ha	326
14	phosphorous	Kg/Ha	16.8
15	Calcium	Mg/kg	78.92
16	Magnesium	Mg/kg	80.2

Authorized Signatory **Seal of Laboratory**

Notes:
- The result given above related to the tested sample, as received. The customer asked for the above test only.
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Environmental Studies (EIA & EMP), Monitoring, Forest Diversion Planning, DPR, Wildlife Management Plan, Hazardous & Safety Studies, RS & GIS, Baseline Survey, Hydrological & Geological Studies, Socio-economic Studies, DGPS & ETS Survey.
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Questionnaires on water storage, consumption and conservation:

1. What are the water sources to the institute?

The major source of water in UNC is a self-reliant water boring system installed in the campus. There are Ground Water Tube wells installed in the campus with a RCC 2HP Single Phase

Submersible Motor and a 2HP 3 Phase Submersible Motor, which operate to fill the various tanks.

2. What is the water storage system in the institute?

A number of main buildings of the campus, like hostels, commerce, arts and science blocks are equipped with many RCC tanks of varying capacities to meet the specific demands of the said establishments. These tanks are enabled with fast and efficient RCC 2HP Single Phase Submersible Motors for further convenience.

3. What are the ways in which water is consumed in the institute?

Water is a crucial amenity and its usage in all hostels, cafeterias, academic buildings, on-campus, on-gardens, at construction sites, laboratories etc. is judicially carried out.

4. What are the number of bathrooms in academic, administrative and hostel buildings?

There are a total number of 300 bathrooms (with toilets) present in the academic, administrative & hostel buildings.

5. Does the institute have any rainwater harvesting system?

UNC is already planning to set up multiple units of rain water harvesting units and has started working on it. Setting and installing them will lead to another step towards water conservation and management.

6. Does the institute follow any special method for safe disposal of water released from the laboratory?

The various kinds of wastewater released from the campus include sewerage, residence (water used in cooking, showering and washing clothes) as well as chemical and biological laboratories, which ultimately go down in the sink or drainage system.

7. What are the techniques used to save water by the institute?

Several practices have been adopted to save water. Pipes, overhead tanks, and plumbing systems are maintained properly to reduce leakages and unnecessary wastages of water.

Questionnaire on energy consumption and conservation:

1. How many CFL/LED bulbs are used in the institute?

There is a total of 218 nos. of CFL & 396 nos. of tube lights are used in the institute. A total no. of 20 LED Street lights are also placed in the campus.

2. What is the source of energy in the institute?

The energy source of the institute is the electricity provided by the TATA Power Central Odisha Distribution Limited (Electricity through transformer).

3. Does the institute follow any energy saving techniques?

Yes, College adopts practices like turning off lights when not in use, using energy-efficient appliances, and optimizing computer usage by enabling power-saving settings.

4. What are the various forms in which energy is used in the institute (firewood, electricity, fuel, etc.)?

The institute mainly depends on the electrical energy provided by the govt. for use. The firewood as energy source by the institute is negligible. The canteen, hostel mess uses the LPG as fuel for preparation of food.

5. How many air conditioners are installed in the institute?

There are 15 air conditioners that have been installed in the institute. This includes the principal's office, auditorium, IT block, etc.

6. Does the institute run on DG as an alternative to electricity?

Yes, the institute runs on DG as an alternative source of electricity. It operates on automated programming. This remains on during power disruption only. There are 2 DG sets, installed for the academic, administrative & hostel purposes. The capacities of the DGs are 125kV& 250kV respectively.

7. Do people of the institute ensure to completely turn off electronic devices such as PCs and ACs?

The employees of the institution have been instructed to turn off all the electrical devices during leisure hours. A number of peons are appointed to monitor the usage of electrical equipment on a daily basis.

8. Are electronic devices such as PCs and ACs run on power saving mode?

Yes, all the lab equipments, PCs &ACs run on power saving mode.

Questionnaires on solid waste generated and its management

1. What are the sources and types of waste generated in the institute?

Different types of wastes, such as paper waste, plastic waste, construction waste, glass waste, etc. are released from various buildings of UNC and the same is directly handed over to the Municipalities' Bin for further segregation and recycling purposes.

2. How much waste per day is generated in the campus approximately?

Approximately, a net weight of kg of waste is generated every day.
The rate of waste generated has been increasing in the recent times, reaching up to an estimated amount of about 3.5 tons per month during peak academic sessions and the minimum amount generated during the lean period is about 2 tons per month.

3. Is there any adoption of waste treatment system?

The institute is committed to ensure that all forms of wastes generated are handled based on the RRRR (Reduce, Reuse, Recycle, Recover) principles, following appropriate source segregation protocols, including safe disposal of bio, medical and hazardous E-wastes.

4. How the waste generated is managed?

Hazardous waste generated in solid and liquid states during experiments in the laboratory is properly disposed off after decontamination. Biodegradable waste is one of the major kinds of solid waste generated in the campus, which is further treated through organic composting. The institute has banned single-use of plastic for any administrative as well as academic purposes.

Questionnaire on greenery of the campus:

1. Does the campus have a garden?

Yes, the institute has one botanical garden, one flower garden along with two Orchards.
The total plantation area & garden occupy half of the total land area covered by the institute

2. Name the different type of plants in the institute

Some of the most noticeable plants found inside the campus are *Terminalia catappa*, *Cocos nucifera*, *Dypsis leutescens*, *Polyalthia longifolia*, *Mimusops elengi*, *Pongamia pinnata*, *Mangifera indica*, *Carica papaya* and *Azadiracta indica.*

3. Is there an active involvement of students in the management of the garden?

Yes, the students take active role during plantation programs. They also used to adopt at least one plant and nurture it till the completion of their course. They are also instructed to take precautionary measures and follow proper protocols for the overall development of plants.

Questionnaire on air quality of the campus:

1. What is the approximate size of a classroom and how many windows are present in each classroom?

The approximate sizes of the classrooms are 30'* 20'ft. In average, there are 6 windows per classroom.

2. What is the approximate number of vehicles owned by
    a. Staffs
    b. Students

a. Staffs

Not all the staffs use their own vehicles. They rather opt for public transport services. About 60% of the total staffs have their own vehicles, and many of them prefer carpooling.

b. Students

Most of the students use public transport. Approximately 40% of the students come to the institute via personal transit system & the remaining 60% use public transit systems.

3. Is proper ventilation of every floor ensured by the institute?

Yes, proper ventilation has been ensured by the institute at every floor. All the classrooms are well ventilated by natural air, as there are open windows built into every classroom.

4. Are there any cases of respiratory ailments among students of the institute?

No. Yet, there have been no cases reported regarding any respiratory ailment among students of the institute.

5. What are the steps taken by the institute to improve overall air quality of the campus?

The institute has taken all the measures to provide the best greenery to the campus environment.

Questionnaire on biodiversity of the institute:

Does the institute conduct any kind of biodiversity awareness programs?

Yes, the institute conducts many biodiversity-related awareness programs for educational purposes and spreading awareness about the value and importance of public involvement in the conservation of biodiversity. The plantation programs, in particular are managed by the NSS & YRC unit of the institute. They choose any barren land or field & do avenue plantations inside & outside of the campus.

Questionnaire on environment legislative compliance

1. Does the institute regularly monitor the quality of water supplied to the campus?

The institute monitors the quality of water supplied to the campus on an annual basis as contaminants in our water can lead to serious health issues. The water quality is monitored with respect to its suitability for various purposes such as drinking.

2. Does the institute release any kind of hazardous waste? If yes, what are their plans for safe disposal/ treatment of such waste produced?

The institute does not produce any kind of hazardous waste. The waste produced by the institute follows the 3R rule. The non-biodegradable wastes are disposed by land filling, e-wastes are sent for recycling and biodegradable wastes are converted to compost & that can be used as fertilizer.

3. Is there proper propagation of necessary pre-required knowledge of environmental laws and innovative methods of managing waste produced among the students?

The institute has prepared guidelines for staffs & students regarding the waste management produced from different sources.

4. What are the steps taken by the management /governing body against people who pollute the environment or violate environmental laws of the institute?

Although the institute is placed in a rural area but the local people have knowledge & respect towards the institute which protects the institute from external pollution. Common violation such as dumping hazardous wastes or improper handling of wastes, littering, destruction of wetland, burning of fossil fuels are strictly checked by the authority and warned if anyone is found guilty.

CHAPTER 4

WATER CONSUMPTION& MANAGEMENT

4.1 WATER

Water is a precious natural resource available with a fixed quantum. The availability of water is decreasing due to the increasing population of the nation, as per capita availability of utilized water is going down. Due to the ever-rising standard of living of people and advancements in industrialization and urbanization, demands for freshwater is increasing day by day. The unabated discharge of industrial effluents into nearby freshwater bodies is reducing the quality of these precious sources of water continuously. Water audit can be defined as a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing, and recycling water. Water Audit is nothing but an effective measure for minimizing losses and optimizing various uses of water and thus, enabling effective management of water in the irrigation, domestic, power, and industrial sectors.

4.2 SOURCES OF FRESH WATER

The major source of water in UNC is a self-reliant water boring system installed in the campus. There are Ground Water Tube wells installed on the campus with RCC 2HP- Single Phase Submersible Motor and 2HP -3 Phase Submersible Motor, which operate to fill the various tanks.

TABLE 5: DETAILS OF FRESH WATER SOURCE

SL. NO.	DESCRIPTION	LOCATION IN THE CAMPUS
1.	Borewell-1	Near commerce block
2.	Borewell-2	Garden
3.	Borewell-3	Administrative block
4.	Borewell-4	Arts block
5.	Borewell-5	Meghasan OBC Boys Hostel
6.	Borewell-6	Mahodadhi Boys Hostel
7.	Borewell-7	Mandakini Girls Hostel
8.	Borewell-8	Mahadevi Girls Hostel
9.	Borewell-9	P.G. Women's Hostel
10.	Borewell-10	Guest House
11.	Borewell-11	Stadium
12.	Borewell-12	Stadium
13.	Borewell-13	Near Vermicompost Unit
14.	Borewell-14	Swimming pool

BOREWELL

4.3 WATER STORAGE CAPACITY IN THE CAMPUS

A number of main buildings of the campus, like hostels, and art and science blocks are equipped with many RCC tanks of varying capacities to meet the specific demands of the said establishments. These tanks are enabled with fast and efficient RCC 2HP Single Phase Submersible Motors for further convenience.

TABLE 6: DETAILS OF WATER STORAGE CAPACITY IN UNC CAMPUS

SL. NO.	DESCRIPTION	CAPACITY	TYPE
1.	Mahodadhi Boys Hostel	20763L	RCC
2.	Meghasan Boys Hostel	12506L	
3.	Mahadevi Ladies Hostel	21432L	
4.	Mandakini Ladies Hostel	21232L	
5.	Swimming Pool	13875L	
6.	Science Block	21057L	
7.	Arts Block	14877L	
8.	PG Ladies Hostel (02)	2000L	PVC SINTEX
9.	Auditorium	1000L	
10.	Silver Jubilee Building	1000L	
11.	Stadium Building	2000L 3000L	RCC WELL
12.	Library building	1000L	PVC SINTEX
13.	Administrative & IT Block (02)	2000L	
14.	Principal Quarter	1000L	
15.	Cycle stand	1000L	

4.4 WATER CONSUMPTION IN THE CAMPUS

Water usage can be defined as water used for all activities which are carried out on campus from different water sources. This includes usage in all hostels, academic buildings, on-campus, on-grounds, laboratories etc.

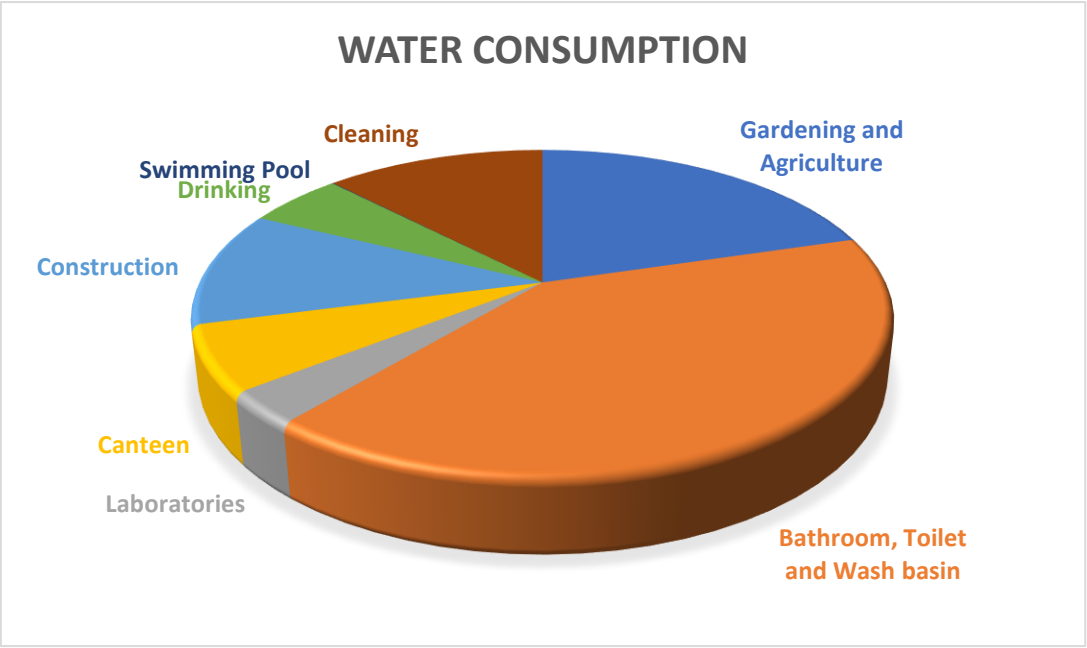
Total water consumption of the campus is approx. 678 Kilo Liters per day by operating discharge pumps with a total discharge capacity of 120 Kilo Liters for 8 hours per day. The

water is used to cover the total daily consumption in the UNC Campus including Drinking, Bathroom, Toilet, Garden, Urinals, Wash Basin, Laboratory etc. in the total population of 7,000 (Including office staff, strength and residential buildings) of the UNC campus. Hence total approx. 96L per day per head is used for Bathroom, Toilet, Garden, Urinals, Shower, Drinking, and Laboratories etc. However, the above data varies as per the requirement on the basis of academic Calendar.

TABLE 7: STATUS OF WATER CONSUMPTION IN UNC

Sl. No.	**Sector**	**Total Daily Use (KL)**	**Total Monthly Use (KL)**	**Total Yearly Use (KL)**	**Percentage**
1.	Gardening and Agriculture	125	3750	45,000	20.37
2.	Bathroom, Toilet and Wash basin	250	7500	90000	40.75
3.	Laboratories	20	600	7200	3.26
4.	Canteen	40	1200	14400	6.52
5.	Construction	70	2100	25200	11.41
6.	Drinking	33	990	11880	5.38
7.	Swimming Pool	65	65	130	0.05
8.	Cleaning	75	2250	27000	12.26
	Total	**678**	**18,455**	**2,20,810**	**100**

N.B.: The above data is obtained on the basis of maximal usage of water during peak academic period



DAILY WATER CONSUMPTION ANALYSIS

4.5 WATER TEST AND ANALYSIS REPORT

Water quality testing is important because it identifies contaminants and prevents waterborne diseases. Drinking or using contaminated water can result in severe illness or death. That is why it is important to ensure that drinking water is safe, clean and free from bacteria and disease. The parameters for water quality are determined by the intended use. Work in the area of water quality tends to be focused on water that is treated for human consumption, or in the environment.

The following indicators are often measured for drinking water like Alkalinity, Color of water, pH value, Taste and odor, Dissolved metals and salts (chloride, manganese, magnesium etc.), Dissolved metals and metalloids (lead, mercury, arsenic, etc.), Microorganisms such as fecal coli form bacteria (*Escherichia coli*) etc. The major parameters analyzed include dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity.

CENTRE FOR ENVOTECH AND MANAGEMENT CONSULTANCY PVT. LTD.

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Enlisted in Construction Industry Development Council (CIDC) established by the Planning Commission (Govt. of India)
MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.

Report No. - CEMC/UNAC/080619/W1 **Issued Date-08.06.2019**

WATER QUALITY TEST REPORT

Name & Address of the Client : **M/s U.N AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY**
Date of Sampling : 01.06.2019
Sampling by : Mr. R.N Das
Date of Sample Received : 01.06.2019
Sample Description : Drinking water
Sample Quantity : 1.0 Ltr
Sample Location : **College Borewell**
Date of Analysis : 01.06.2019 to 07.06.2019
Reference No. : CEMC-08062019W1

ANALYSIS RESULT

Sl. No	Parameter	Unit	Standard as per IS: 10500	Testing Method	Result
1	Colour	Hazen	5	APHA 2120 B,C	<5
2	Odour	-	AL	APHA 2150 B	AL
3	Taste	-	AL	APHA 2160 C	AL
4	Turbidity	NTU	1	APHA 2130 B	<1
5	pH Value	-	6.5-8.5	APHA 4500H^+ B	7.11
6	Total Hardness (as $CaCO_3$)	mg/l	200	APHA 2340 C	110
7	Iron (as Fe)	mg/l	0.3	APHA 3500Fe, B	0.16
8	Chloride (as Cl)	mg/l	250	APHA 4500Cl^- B	31.9
9	Residual, free Chlorine	mg/l	0.2	APHA 4500Cl, B	ND
10	Total Dissolved Solids	mg/l	500	APHA 2540 C	244
11	Calcium (as Ca)	mg/l	75	APHA 3500Ca B	26.4
12	Magnesium (as Mg)	mg/l	30	APHA 3500Mg B	15.6
13	Copper (as Cu)	mg/l	0.05	APHA 3111 B,C	<0.03
14	Manganese (as Mn)	mg/l	0.1	APHA 3500Mn B	<0.05
15	Sulphate (as SO_4)	mg/l	200	APHA 4500 SO_4^{2-} E	20.2
16	Nitrate (as NO_3)	mg/l	45	APHA 4500NO_3^- E	26.6
17	Fluoride (as F)	mg/l	1.0	APHA 4500F^- C	0.07
18	Phenolic Compounds (as C_6H_5OH)	mg/l	0.001	APHA 5530 B,D	<0.001
19	Mercury (as Hg)	mg/l	0.001	APHA 3500Hg	<0.001
20	Cadmium (as Cd)	mg/l	0.003	APHA 3111 B,C	<0.003
21	Selenium (as Se)	mg/l	0.01	APHA 3114 B	<0.001
22	Arsenic (as As)	mg/l	0.01	APHA 3114 B	<0.001
23	Cyanide (as CN)	mg/l	0.05	APHA 4500CN^- C,D	ND
24	Lead (as Pb)	mg/l	0.01	APHA 3111 B,C	<0.01
25	Zinc (as Zn)	mg/l	5	APHA 3111 B,C	<0.05
26	Total Chromium (as Cr)	mg/l	0.05	APHA 3500Cr B	<0.05
27	Mineral Oil	mg/l	0.01	APHA 5220 B	<0.01
28	Alkalinity (as $CaCO_3$)	mg/l	200	APHA 2320 B	76
29	Aluminium (as Al)	mg/l	0.03	APHA 3500Al B	<0.01
30	Boron (as B)	mg/l	0.5	APHA 4500B, B	<0.2
31	Total Coliform	--	Absent	IS 15185	Absent
32	E. Coli	--	Absent	IS 15185	Absent

NB: AL- Agreeable, ND-Not Detected

*** As per the result mentioned above parameters, these are within the drinking water standard/norms.**

Authorized Signatory **Seal of Laboratory**

Notes:

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E-mail: cemclab@yahoo.in, Mobile: 9937631956, 8895177314

WATER ANALYSIS REPORT

4.6 MANAGEMENT OF WASTE WATER

The waste water generation in the UNC campus is very less. The main source of waste water is the Canteen & Hostel wastes in comparison to the laboratory's wastes. The waste water is collected in an old non-functional pond. The pond water is further treated with chemicals like lime water & cow dung to make it contamination free. The waste water after treatment is used in gardens for watering purpose in the campus. The excess rain water is irrigated via roof top pipes into the ground to recharge the ground water.

CHAPTER 5

SOLID WASTE GENERATED & MANAGEMENT PRACTICES

5.1 SOURCES OF SOLID WASTES IN THE CAMPUS

Solid waste is the unwanted or useless solid material generated from human activities in a residential, industrial, or commercial area. Solid waste management reduces or eliminates the adverse impact on the environment and human health. A number of processes are involved inefficiently managing waste for an organization. It is necessary to manage the solid waste properly to reduce the load on the waste management system. Solid waste generation and its management is a burning issue in current days. The rate of generation of solid waste is very high and yet we do not have adequate technology to manage the generated waste. Unscientific handling of solid waste can create threats to public health and environmental safety issues. Thus, it is necessary to manage solid waste properly to reduce the load on the waste management system. The purpose of this audit is to find out the quantity, volume, type, and current management practice of solid waste generation in the UNC campus. This report will help for further solid waste management and to go for green campus development.

Solid waste from UNC campus is collected from all the building areas and the same is directly handed over to the Municipalities' Bin for further segregation and recycling purpose. There are different types of waste are recorded such as paper waste, plastic waste, construction waste, glass waste, etc. However biodegradable waste is recycled through the organic and vermicomposting processes. The daily rate of waste generation has been increasing in the recent time reaching up to an estimated amount of about 3.5 tons per month during peak academic sessions and the minimum amount generated during the lean period is about 2 tons per month. The wastes generated in the campus include;

- Kitchen wastes
- Wastes from construction sites
- Liquid waste (residential and eateries)
- Sewage and sludge

- Biomedical waste
- Chemical wastes
- Plastic wastes
- Cans and bottles
- Damaged or spoiled laboratory glassware
- Unused tools and machinery including battery
- Papers including packaging materials
- Electronics waste
- Garden waste and sweeping litters etc.

The total solid waste generated in the annual year is **30,520 Kg**.

The campus is committed by ensuring that all forms of wastes generated are handled based on the RRRR (Reduce, Reuse, Recycle, Recover) principles following appropriate source segregation protocols including safe disposal of bio, medical and hazardous wastes. There are studies from time to time to estimate the amount and nature of wastes, particularly solid waste which indicates the increasing trend of the volume. A preliminary survey reveals the domination of biodegradable components (volume basis) over the non-biodegradable counterparts in the campus. The students' hostels share the highest amount of solid waste mostly dominated by food/kitchen wastes (a substantial amount of papers, plastics, metals are also seen with waste also generated in hostels) followed by residential areas, eateries and offices including academic buildings, construction sites (occasionally), open areas including gardens and road.

5.2 DETAILS OF SOLID WASTE GENERATED IN THE CAMPUS

TABLE-8 SHOWING THE DETAILS OF SOLID WASTE GENERATED IN THE CAMPUS DURING THE ACADEMIC SESSION 2018-19

SERIAL NO.	MONTH	SOLID WASTE GENERATED IN KG
1.	June 2018	1465
2.	July 2018	2100
3.	August 2018	2275
4.	September 2018	3080
5.	October 2018	3175
6.	November 2018	3280
7.	December 2018	3085
8.	January 2019	3090
9.	February 2019	2590
10.	March 2019	2470
11.	April 2019	2320
12.	May 2019	1590
	TOTAL	**30, 520**

5.3 INITIATIVES TAKEN BY THE INSTITUTE FOR WASTE MANAGEMENT

- Glass waste is generated from the laboratory mainly in the form of bottles; Many times, bottles are reused for storing other chemicals.
- The e-waste generated at is sent for recycling and reuse.
- Hazardous waste generated in a solid and liquid state during experiments in the laboratory is disposed of properly.
- Biodegradable waste is a major solid waste generated on campus which is further treated by organic waste and vermicompost technology.
- UNC has banned single-use of plastic for any administrative as well as other purposes.
- The kitchen waste & hostel wastes were transported the municipal dump yard.

CHAPTER 6

ENERGY CONSUMPTION AND MANAGEMENT

Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also, it can be said as "the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs producing the output from these systems". The energy audit is key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use and serves to identify all the energy streams in a facility. Energy resources utilized by all the departments, support services, and the administrative buildings of the Institute, include Electricity and Diesel Generators installed on the campus.

Objectives of Energy Audit

Primary:

- The first objective is to acquire and analyze data and find the necessary consumption pattern of these facilities.
- The second objective will be to calculate the wastage pattern based on the results of the first objective.

Secondary:

- This would be our first exposure to this field hence experience gain would be vital.
- This project will precede many follow up projects and hence helps to gain technical and management exposure required for future energy projects.
- It is sure to help create a repertoire of vital contacts hence will develop interaction with alumni, faculty and students.

Source of Energy

UNC draws Energy from the Followings:

- Electricity from TPCODL

The Following are the Major consumers of electricity in the facility

- Lighting
- Air Conditioner
- Fans
- Computers
- Other Lab Equipment

Indirect Benefits of Energy Audit

Every time the Energy Audit is carried out it rekindles the interest in Energy Conservation as an important function. Energy Auditors sharing their experience and knowledge with the Plant Personnel helps in fueling the innovative ideas for further action of reduction in Specific Power consumption (SPC). Any loose connections or heating of cables come to timely vision. For an external agency due to unbiased vision, a few points for Energy Conservation may be visible each time they perform the audit and this would help in achieving further saving. Inform any irregularities in Energy meter HT connections for rectification.

6.1. Energy consumption in the Campus

In conducting an environmental audit of an autonomous college, it is essential to examine the energy consumption and utilization on campus. Energy plays a crucial role in every aspect of campus life, including classrooms, residential halls, laboratories, and administrative buildings. Thus, understanding how energy is consumed and utilized is vital in identifying opportunities for efficiency and sustainability.

One significant aspect to consider is the source of energy in the campus. Analyzing whether the energy predominantly comes from non-renewable sources such as coal or oil, or from renewable sources like solar or wind power, is crucial. Transitioning towards renewable energy sources can greatly reduce the college's carbon footprint and contribute to environmental sustainability.

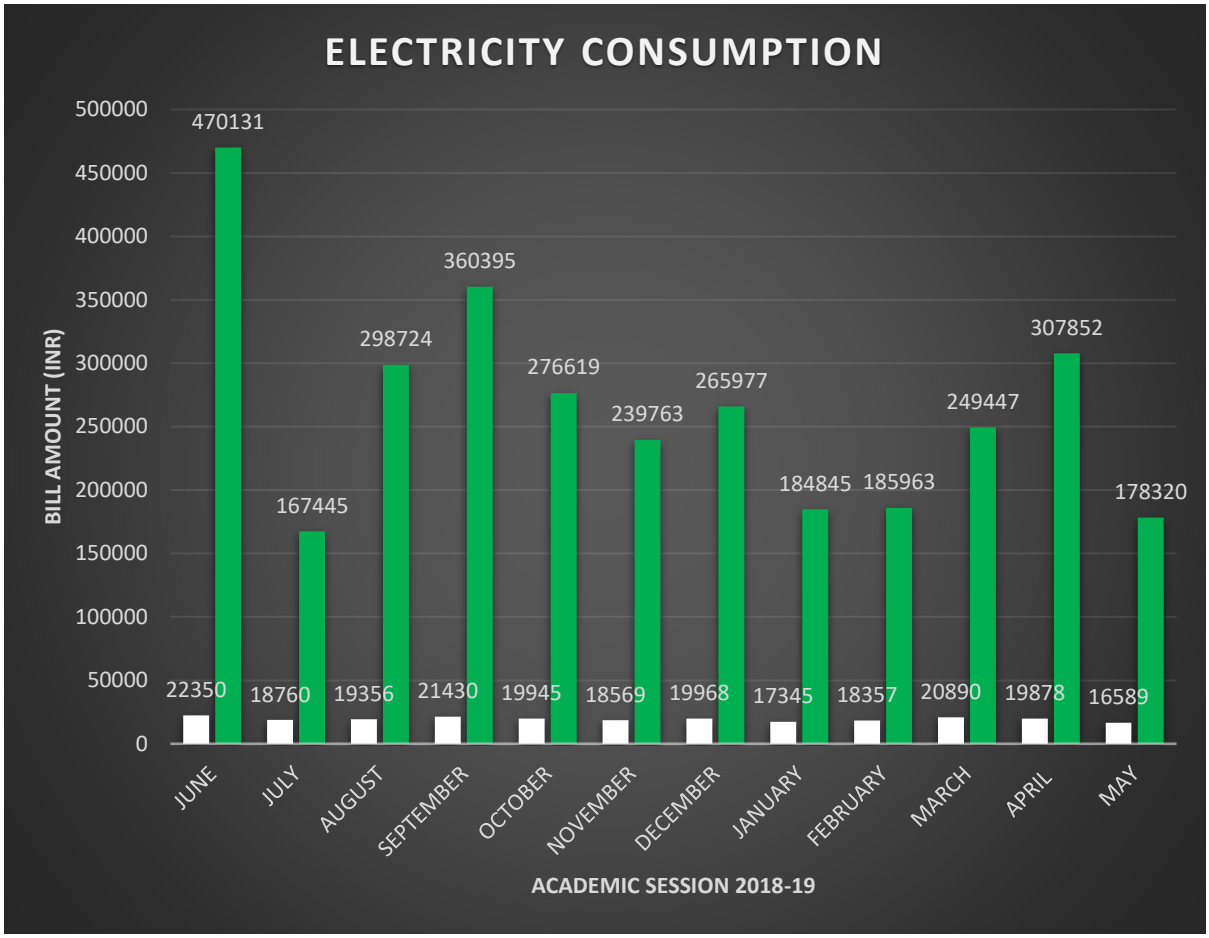
The next aspect to assess is the energy consumption patterns within different areas of the campus. Conducting a comprehensive survey of energy consumption in classrooms, laboratories, and residential halls can provide insights into areas where energy efficiency measures can be implemented. For instance, retrofitting buildings with energy-efficient lighting, optimizing heating and cooling systems, and promoting responsible energy usage can result in significant energy savings.

Furthermore, it is crucial to promote and educate the campus community about energy conservation and sustainable practices. Raising awareness through workshops, campaigns, and informational sessions can encourage students, faculty, and staff to adopt energy-saving habits. Additionally, providing incentives for energy-efficient behaviours, such as organizing competitions or offering rewards, can further motivate individuals to actively participate in reducing energy consumption on campus.

In conclusion, assessing energy consumption and utilization in the campus environment audit of U.N. autonomous college is vital for promoting sustainability and reducing the institution's environmental impact. By analyzing energy sources, patterns of consumption, and implementing energy-saving measures, it is possible to create a more sustainable and efficient campus. Furthermore, fostering awareness and behavior change among the campus community can lead to long-lasting energy conservation practices that benefit not only the college but also the larger environment.

TABLE 9: CONSUMPTION DETAILS OF ELECTRIC APPLIANCES

SL.NO	NAME OF APPLIANCE	WATTAGE	QUANTITY	WATTAGE
1	Tube light (LED)	20	396	22,400
2	CFL(LED)	09	218	2,790
3	Fan	80	556	106,400
4	Water Cooler	1500	08	7,500
5	Exhaust Fan	150	08	3,000
6	Aqua guard	500	12	10,000
7	Computer	200	150	36,000
8	Projector	750	07	7,500
9	Printer	500	16	10,000
11	TV(LED)	150	01	900
12	Motor (water pump)	1000	05	10,000
13	AC	2000	15	40,000
14	Submersible Pump	2 H.P. 1PHASE	04	5968
		2 H.P. 3PHASE	03	4476
		1.5 H.P.1PHASE	05	5595
		5 H.P. 3PHASE	02	7460
		10 H.P.	01	7460
15	Tool pump	1 H.P.	05	3730
16	Street Light	45	20	900



DETAILS OF UNIT CONSUMED & BILL AMOUNT PAID DURING 2018-2019

6.2 MANAGEMENT OF ENERGY

- Consumption of energy helps in understanding the success towards green environment. Lesser the consumption of energy more contribution the environment.
- UNC is also aware of the proper energy utilization by replacing CFL bulbs and tube lights with LED lamps and fluorescent tubes.
- Use of 15” monitor @1024*768 resolution consumes 6 watts less energy than 17”-19” monitor with higher resolution.
- Considering there are 150 computers in the institute made possible to reduce 3000 watt per day.
- Use of laptops over the desktops are also helpful to reduce energy consumption.
- Use of renewable source of energy is widely accepted option now a days.
- The institute is also planning for a better conservation of hydroelectricity by replacing it with solar energy. Hopefully the project will be fruitful by 2020.

CHAPTER 7

AIR & NOISE

7.1 AMBIENT NOISE STATUS

The major source of noise in UNC is from automobiles and construction sites. At the main gate of the Campus, human communication and transportation are producing high sound levels. Ambient noise monitoring was carried out in different areas of UNC campus like at the campus entry, administration building, and construction sites and plantation areas. The sampling was carried out using calibrated Sound Level Meter (AZ 8921) by logarithmic scale in decibels (dB). The noise readings were collected in the campus and calculated. The details of noise status in UNC campus are given in the below table.

TABLE 10: NOISE LEVELS IN UNC CAMPUS

SERIAL NO.	AREA	LEQ (DB) DAY TIME
1	Main Gate	**80**
2	Administration block	**65**
3	Academic blocks	**58**
4	Canteen	**74**
5	Plantation area	**69**
6	Construction site	**72**

- All parameters expressed in dB (A) Leq. and observed under permissible limits.
- Monitoring is carried out during the daytime.

RECOMMENDATIONS

- Campus should follow the Environmental aware laws for different aspects of environmental management.
- Campus should make the rule provide posters and slogans in the campus for protecting the environment.

Noise level near the administrative building of the campus was measured by a **decibel meter** by sound professional of CEMC with great accuracy on dt.08.06.2019. The details of the report are as follows:

CENTRE FOR ENVOTECH AND MANAGEMENT CONSULTANCY PVT. LTD.

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MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.

Report No. - CEMC/UNAC/080619/N1 **Issued Date-08.06.2019**

NOISE MONITORING TEST REPORT

Name & Address of the Client : **M/s U.N AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY**
Date of Sampling : 01.06.2019
Sampling by : Mr. B.k Samantray
Sample Description : NOISE
Reference No. : CEMC-08062019N1

ANALYSIS RESULT

Sl No.	Location	NL Day Time dB (A)			NL Night Time dB (A)		
		Max	Min.	Avg.	Max.	Min.	Avg.
1	Near Ad. Building	70.6	67.6	69.1	68.0	61.4	64.7

Authorized Signatory **Seal of Laboratory**

Notes:

- The result given above related to the tested sample, as received. The customer asked for the above test only.
- This Test Report shall not be reproduced wholly or in part without prior written consent of the laboratory.
- The samples received shall be destroyed after two weeks from the date of issue of this Test Report unless specified otherwise

Environmental Studies (EIA & EMP), Monitoring, Forest Diversion Planning, DPR, Wildlife Management Plan, Hazardous & Safety Studies, RS & GIS, Baseline Survey, Hydrological & Geological Studies, Socio-economic Studies, DGPS & ETS Survey.

Regd. Office: 1st Floor, N-5/305, IRC village, Nayapalli, Bhubaneswar-751015, Odisha, India, Mobile: 9861032826
E-mail- cemc_consultancy@yahoo.co.in, cemc122@gmail.com, website: www.cemc.in, Landline: 0674-2360344.

Laboratory At: Plot No. 800/1274, Johal, Pahal, Bhubaneswar-752101,
E-mail: cemclab@yahoo.in, Mobile: 9937631956, 8895177314

NOISE LEVEL IN UNC CAMPUS

7.2 AMBIENT AIR QUALITY STATUS

- Central Pollution Control Board, New Delhi initiated National Ambient Air Quality Monitoring (NAAQM) program in the year 1984 to get a spatial and temporal variation of ambient air concentrations for a wide range of pollutants that are considered relevant for evolving strategic.
- A vehicle information data in the Pre audit stage of the college campus was collected through Google form. It was found that only 70% vehicle owner had pollution checked certificates. Based upon this, the administration made it mandatory to obtain PUC for all the vehicles inside the campus.

TABLE 11: PRE-AUDIT STAGE

No. of Cycles	No. of Two Wheelers	Pollution Checked Two wheelers	No. of Four Wheelers	Pollution Checked Four Wheelers	No. of e-vehicles
1100	206	145	18	12	02

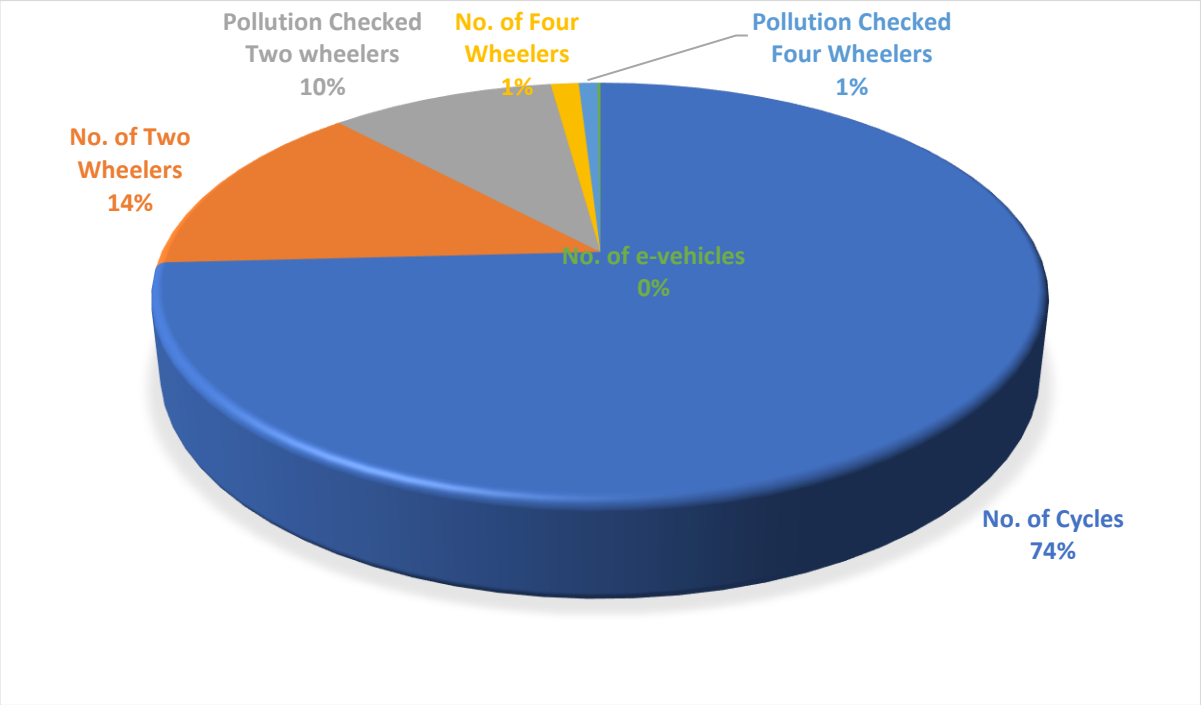
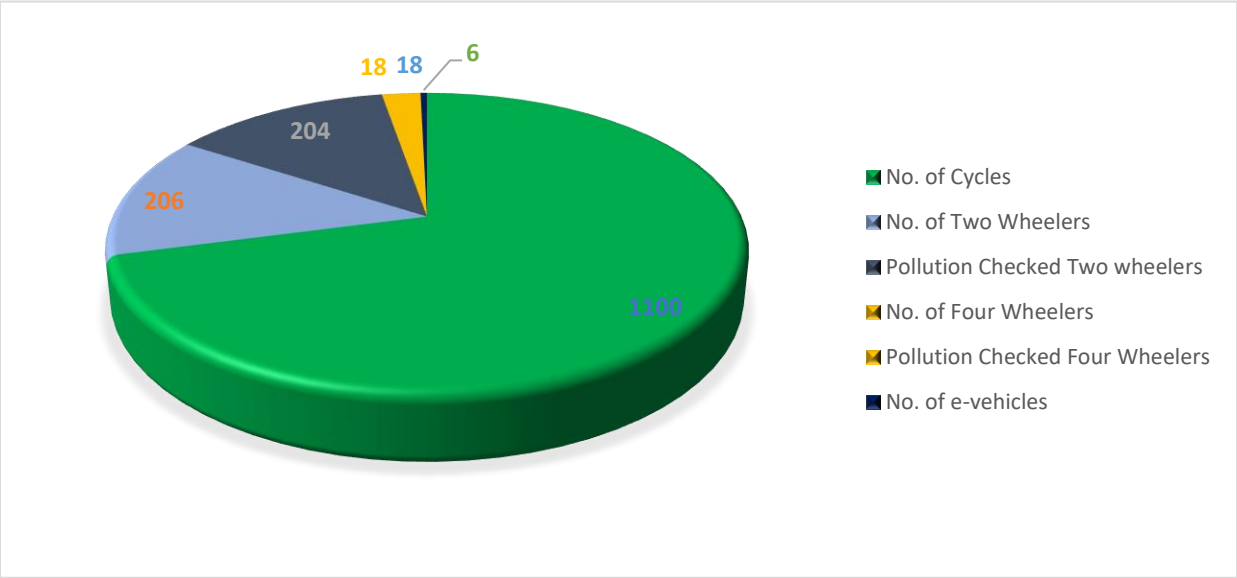


TABLE 12; POST AUDIT STAGE

No. of Cycles	No. of Two Wheelers	Pollution Checked Two wheelers	No. of Four Wheelers	Pollution Checked Four Wheelers	No. of e-vehicles
1100	206	204	18	18	06



Under NAMP (National Air Quality Monitoring Program), three air pollutants viz., Sulphur dioxide (SO_2), Nitrogen dioxides (NO_2), and Respiratory Suspended Particulate Matter (RSPM/PM10) have been identified for regular monitoring at various locations. Monitoring of pollutants has been carried out for 24 hours (4-hourly sampling for gaseous pollutants and 8-hourly sampling for particulate matter) as per CPCB monitoring protocol. One **Respirable Dust Sampler (RDS)** machine is installed at the Main Gate of the Campus which monitored the changes in ambient air quality during 24- hours. The trees cover on the campus is the leading sources to absorb CO_2 and release enough fresh O_2 across the Campus. The result shows that the Campus's air quality status is good as compared to other locations. It is identified that the campus is a green campus. UNC campus observed minimum air pollution as compared to other Ambient Air Pollution Centers located in different parts of the city.

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MoEF&CC, Govt. of India, Recognised Environment Laboratory under Environment (Protection) Act, 1986.

Report No. - CEMC/UNAC/080619/A1 **Issued Date-08.06.2019**

AMBIENT AIR QUALITY TEST REPORT

Name & Address of the Client : **M/s U.N AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY**
Date of Sampling : 01.06.2019
Sampling by : Mr. B.k Samantray
Date of Sample Received : 01.06.2019
Sample Description : AMBIENT AIR
Sample Quantity : 1 kg
Sample Location : **Near Admin Building**
Date of Analysis : 01.06.2019 to 04.06.2019
Reference No. : CEMC-08062019A1

ANALYSIS RESULT

Parameter	Unit	Result	NAAQ Standard
Particulate Matter (PM10)	$\mu g/m^3$	54.6	100
Particulate Matter (PM2.5)	$\mu g/m^3$	32.8	60
Sulphur Dioxide (SO2)	$\mu g/m^3$	9.2	80
Nitrogen Oxides (NOx)	$\mu g/m^3$	14.4	80

Authorized Signatory **Seal of Laboratory**

Notes:

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CHAPTER 8

BIODIVERSITY OF THE CAMPUS

8.1 FLORAL DIVERSITY OF UNC

UNC is within the geo-position between latitude 20.211299^0N and longitude 86.015066^0 E, Prachi Jnanapitha, Adaspur, Cuttack, Odisha, India. It encompasses an area of about 30 acres. The area is immensely diverse with a variety of tree species performing a variety of functions. Most of these tree species are planted in different periods of time through various plantation programmes organized by the college authority & have become an integral part of the college. The trees of the college have increased the quality of life, not only the college fraternity but also the people around the college in terms of contributing to our environment by providing oxygen, improving air quality, climate amelioration, conservation of water, preserving soil, and supporting the faunal species, controlling climate by moderating the effects of the sun, rain & wind. Leaves absorb the radiant energy of the sun, keeping things cool in summer. Many species of birds are dependent on these trees mainly for food & shelter. Nectars of different flowers & plants is a favorable source of food for birds & squirrels. Different species display a seemingly endless variety of shapes, forms, texture & vibrant colors. Even individual trees vary their appearance throughout the course of the year as the seasons change. The strength, long lifespan & regal stature of trees give them a monument like quality. They also remind us the glorious history of our institution in particular. A thick belt of large shady trees in the periphery of the college have found to be bringing down noise & cut down dust & storms. Thus, the college has been playing a significant role in maintaining the environment of the entire Adaspur village.

TABLE 13: FLORISTIC DETAILS OF UNC

SERIAL NO.	NAME OF THE PLANT	FAMILY
1.	*Achyranthes aspera* L.	Amaranthaceae
2.	*Adhatoda vasica*	Acanthaceae
3.	*Aegle marmelos* L.	Rutaceae
4.	*Alternanthera sessilis*	Amaranthaceae
5.	*Amaranthus viridis*	Amaranthaceae
6.	*Bauhinia purpurea*	Caesalpiniaceae
7.	*Bauhinia variegata* (L.) Benth.	Caesalpiniaceae
8.	*Bixa Orellana*	Bixaceae
9.	*Blumea lacera*	Asteraceae
10.	*Boerhavia diffusa*	Nyctaginaceae
11.	*Cephalandra indica or Coccinia grandis*	Cucurbitaceae
12.	*Commelina kurzii or commelina erecta* C.B. Clarke	Commelinaceae
13.	*Commelina longifolia*	Commelinaceae
14.	*Cynodon dactylon*	Poaceae
15.	*Dactyloctenium aegyptium*	Poaceae
16.	*Desmodium gangeticum*	Fabaceae
17.	*Desmodium triflorum or Grona triflora*	Fabaceae
18.	*Echinochloa colona*	Poaceae
19.	*Eclipta alba or Eclipta prostrata*	Asteraceae
20.	*Eichhornia crassipes*	Pontederiaceae
21.	*Elaeocarpus sphaericus* L.	Elaeocarpaceae
22.	*Elettaria cardamomum* L.	Zingiberaceae
23.	*Feronia limonia*	Rutaceae
24.	*Ficus elástica* L.	Moraceae
25.	*Ficus hispida* L.	Moraceae

26.	*Gardenia gummifera*	Rubiaceae
27.	*Gardenia jasminoides*	Rubiaceae
28.	*Gladiolus sp.*	Iridaceae
29.	*Glycomis pentaphylla*	Rutaceae
30.	*Gymnema sylvestre* R. Br.	Apocyanaceae
31.	*Hedychium coronarium*	Zingiberaceae
32.	*Helioconia rostrata*	Musaceae
33.	*Heliotropicum indicum*	Boraginaceae
34.	*Hemidesmus indicus*	Periplocaceae
35.	*Hydrolea zeylanica*	Hydrophyllaceae
36.	*Ipomoea nil*	Convolvulaceae
37.	*Ipomoea pes-tigridis*	Convolvulaceae
38.	*Ixora finlaysoniana*	Rubiaceae
39.	*Jasminm multiflorum*	Oleaceae
40.	*Jasminum sambac*	Oleaceae
41.	*Jatropha podagrica*	Euphorbiaceae
42.	*Juniperus communis*	Cupressaceae
43.	*Justicia gendarussa*	Acanthaceae
44.	*Kalanchoe blossfeldiana*	Crassulaceae
45.	*Kopsia fruticosa*	Apocyanaceae
46.	*Lantana cámara* L.	Verbenaceae
47.	*Leptochloa chinensis*	Poaceae
48.	*Litchi chinensis*	Sapindaceae
49.	*Litsea glutinosa* (Lour.) C.B. Roxb.	Lauraceae
50.	*Michelia champaca*	Magnoliaceae
51.	*Mikania micrantha*	Asteraceae
52.	*Mimosa púdica*	Mimosaceae

53.	*Mimusops elengi* L.	Sapotaceae
54.	*Mollugo pentaphylla*	Molluginaceae
55.	*Nerium oleander*	Apocyanaceae
56.	*Nyctanthes arbor-tristis* L.	Oleaceae
57.	*Oxalis corniculata*	Oxalidaceae
58.	*Plumbago zeylanica*	Plumbaginaceae
59.	*Paederia foetida* L.	Rubiaceae
60.	*Plumeria rubra*	Apocyanaceae
61.	*Punica granatum*	Lythraceae
62.	*Rauvolfia tetraphylla*	Apocyanaceae
63.	*Rothia indica*	Fabaceae
64.	*Saccharum spontaneum*	Poaceae
65.	*Syzygium cumini*	Myrtaceae
66.	*Syzygium jambos*	Myrtaceae
67.	*Terminalia catappa*	Combretaceae
68.	*Terminalia bellirica*	Combretaceae
69.	*Terminalia chebula*	Combretaceae
70.	*Thevetia peruviana or Cascabela thevetia* L.	Apocyanaceae
71.	*Vernonia cinera*	Asteraceae
72.	*Vitex negundo*	Verbenaceae
73.	*Vinca rosea or Catharanthus roseus* L.	Apocyanaceae
74.	*Verbena sp.*	Verbenaceae
75.	*Wrightia antidysenterica*	Apocyanaceae
76.	*Ziziphus jujuba* Mill.	Rhamnaceae
77.	*Zamia pygmaea*	Zamiaceae

Achyranthes aspera L.

Aegle marmelos L.

Bauhinia variegata (L.) Benth.

Commelina erecta C.B. Clarke

Elaeocarpus sphaericus L.

Elettaria cardamomum L.

Ficus hispida L.

Ficus elástica L.

Gymnema sylvestre R. Br.

Lantana cámara L.

Litsea glutinosa (Lour.) C.B. Roxb.

Michelia champaca L.

Mimusops elengi L.

Nyctanthes arbor-tristis L.

Paederia foetida L.

Cascabela thevetia L.

Catharanthus roseus L.

Ziziphus jujube Mill.

8.2 FAUNAL DIVERSITY OF UNC CAMPUS

The well-maintained greenery of the campus attracts many faunal species. A survey was carried out to find out the faunal species involved with the greeneries of the campus. A report has been made to categorize the entire faunal diversity of the campus.

TABLE 14: FAUNAL DIVERSITY

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME
1.	Common kingfisher	*Alcedo atthis*
2.	Bank Myna	*Acridotheres ginginianus*
3.	Common myna	*Acridotheres tristis*
4.	Spotted owl	*Athene brama*
5.	Cattle egret	*Bubu usibis*
6.	Pied kingfisher	*Ceryle rudis*
7.	Greater coucal	*Centropus sinensis*
8.	Blue rock pigeon	*Columba livia*
9.	House crow	*Corvus splendens*
10.	Indian cuckoo	*Cuculus cahorus*
11.	Thick-billed flowercatcher	*Diceum agile*
12.	Black drongo	*Dicrurus macrocerus*
13.	Asian koel	*Eudynamys scolopacea*
14.	Purple sunbird	*Nectarinia asiatica*
15.	House sparrow	*Passer domesticus*
16.	Baya weaver	*Ploceus philippinus*
17.	Red- vented bulbul	*Pycnonotus cafer*
18.	Red- whiskered bulbul	*Pycnonotus jocosus*
19.	Rose ringed parkeet	*Psittacula krameri*

20.	Spotted dove	*Streptopelia chinensis*
21.	Jungle babbler	*Turdoides striata*
22.	Lesser bandicoot rat	*Bandicota bengalensis*
23.	Dog	*Canis lupus familiaris*
24.	Cat	*Felis catus*
25.	Indian palm squirrel	*Funambulus palmarum*
26.	Rhesus monkey	*Macaca mulatta*
27.	House mouse	*Mus musculus*
28.	Common rat	*Rattus rattus*
29.	Mongoose	*Urva edwardsii*
30.	Asian Toad	*Duttaphrynus melanostictus*
31.	Indian Bull Frog	*Hoplobatrachus tigerinus*
32.	Common krait	*Bungarus caeruleus*
33.	Indian Garden Lizard	*Calotes versicolor*
34.	Russell's viper	*Daboia russelii*
35.	Keeled Indian Mabuya	*Eutropis carinata*
36.	Checkered keelback	*Fowlea piscator*
37.	House Gecko	*Hemidactylus brookii*
38.	Indian Cobra	*Naja naja*
39.	Rat snake	*Ptyas mucosus*
40.	Monitor lizard	*Varanus varius*

Acridotheres ginginianus

Centropus sinensis

Columba livia

Corvus splendens

Ploceus philippinus

Eudynamys scolopacea

Passer domesticus

Cuculus cahorus

Funambulus palmarum

Urva edwardsii

Varanus varius

Mus musculus

Bungarus caeruleus

Daboia russelii

Naja naja

Hoplobatrachus tigerinus

CONCLUSION

The environment audit of U. N. Autonomous College highlighted several key findings and recommendations.

Firstly, it was observed that the college has made commendable efforts in implementing sustainable practices such as solar panel and waste segregation. These initiatives have resulted in significant reduction of electricity usage and landfill waste.

However, there were areas requiring immediate attention. The college lacked proper recycling facilities, leading to improper disposal of recyclable waste. It is recommended that the college establish a dedicated recycling center and educate students and staff about the importance of recycling.

Furthermore, it was found that the campus utilizes renewable energy technologies, such as solar panels to reduce the college's carbon footprint and dependence on fossil fuels.

This audit records a number of biodiversity conservation initiatives within the college campus which not only shows their concern towards the environment but also reflects sincere efforts in management and maintenance of the campus.

Additionally, cycling facilities and infrastructure should be improved to encourage sustainable commuting options.

Overall, the environment audit of U.N. Autonomous College of Science & Technology highlights both achievements and areas for improvement. It is crucial for the college management to prioritize sustainability and take immediate actions to mitigate environmental impacts. By implementing the recommended measures, the college can become a role model for other educational institutions in promoting environmental stewardship and fostering a sustainable future.