

# **ENVIRONMENT AUDIT**

**(2020-2021)**



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

**ADASPUR, CUTTACK**

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## **ACKNOWLEDGEMENT**

Udaynath Autonomous College (hereinafter called UNC) since its inception has been conducting environmental campaigns, workshops and other extension activities to bring about social change for national and international development. It is well aware about the needs of the green audit for the maintenance and future development of the campus. 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 Green 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 Green 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 Green Audit Committee who undertook this green audit to gather information on every parameters 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. Arun Kumar Swain, Principal of U. N. (Auto.) College of Science and Technology during the conduct of the study has been a

guiding force and we, the Green Audit Committee, express our heartfelt gratitude to him for his kind gesture.

Special thanks to Prof. Krupasindhu Pradhan, Coordinator, IQAC for providing support to conduct the various assessment; Prof. Santilata Sahoo for her tremendous support in Floral Diversity; our former principal, Prof. Lingaraj Mishra for his support; 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 Green Audit Committee will be helpful for this Institute and 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**

## **EXECUTIVE SUMMARY**

Udaynath Autonomous College, 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 PrachiJnanapitha 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 26honours 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. Now, the college holds its head high as one of the highest ranking

institutions of Odisha offering P.G. courses in 20 subjects. 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 polit

## Chapter -1

### INTRODUCTION

#### 1.1. Overview of the Institute

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 तमसो मा ज्योतिर्गमय 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 “ ” 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 S.J. 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 2NCC units- one for boys & another for girls, 4NSS units, 1Rover unit, 1Ranger unit & 2YRC units engaged in welfare schemes.



## **MISSION AND VISION OF INSTITUTE**

### **MISSION**

- Situated in a rural place , the institute aims to provide sound knowledge to the rural students to help them prosper and accomplish a great career.
- To develop Scientific Temper and Critical Thinking with the inculcation of values of discipline, hard work, and team spirit.
- Imparting skill enhancing courses to develop professionalism, humanism and social responsibility.
- To develop Scientific and Intellectual thinking by creating an environment of discipline , hardwork, team spirit.
- To strive for quality education in keeping with the motto of the Institution **“EXCELLENCE IN EDUCATION”** and prepare young minds more particularly of rural youth for imbibing knowledge, skills, and sensitivity as higher education is not just for gaining knowledge but nurturing the talent and lead students in exploring new vistas of creativity with zeal.

### **VISION**

- To stand out as a premier institute of knowledge, established specifically for rural people and others in general.

- To foster academic and career success through instilling critical thinking, effective communication, creativity, and cultural awareness among students.
- To adapt to global changes and emerge as an enterprise that blends quality from the very beginning in the whole system.
- To integrate education with technology for enhanced knowledge impartation.

### 1.3 Departments and Academic Programs

The institute provides UG courses in 26 subjects and PG courses in 20 subjects with a total strength of about 7000 students. The institute is well known for its academic excellence by inculcating a unique sense of discipline, punctuality, unity, honesty, accountability and best practices. The academic program offered by UNC is as follows:

Name of the Programme	Year 2020-21	Number of sanctioned seats
<b>UG</b>		
Bachelor in Arts		416
Bachelor in Commerce		256
Bachelor in Science		PCM-416
		CBZ-224
BBA		30
BCA		30
B.SC. ITM		30
Computer Science		64
B.Lib		64
<b>PG</b>		
Odia		64
History		32
English		32
Philosophy		32
Economics		32
Pol. Science		32
Psychology		32
Hindi		32

Sociology		32
Education		32
Sanskrit		32
Commerce		32
Physics		32
Chemistry		32
Mathematics		32
Computer Science		32
Botany		32
Zoology		32
MFC		30
MSW		30

#### **1.4 Layout of the Campus**

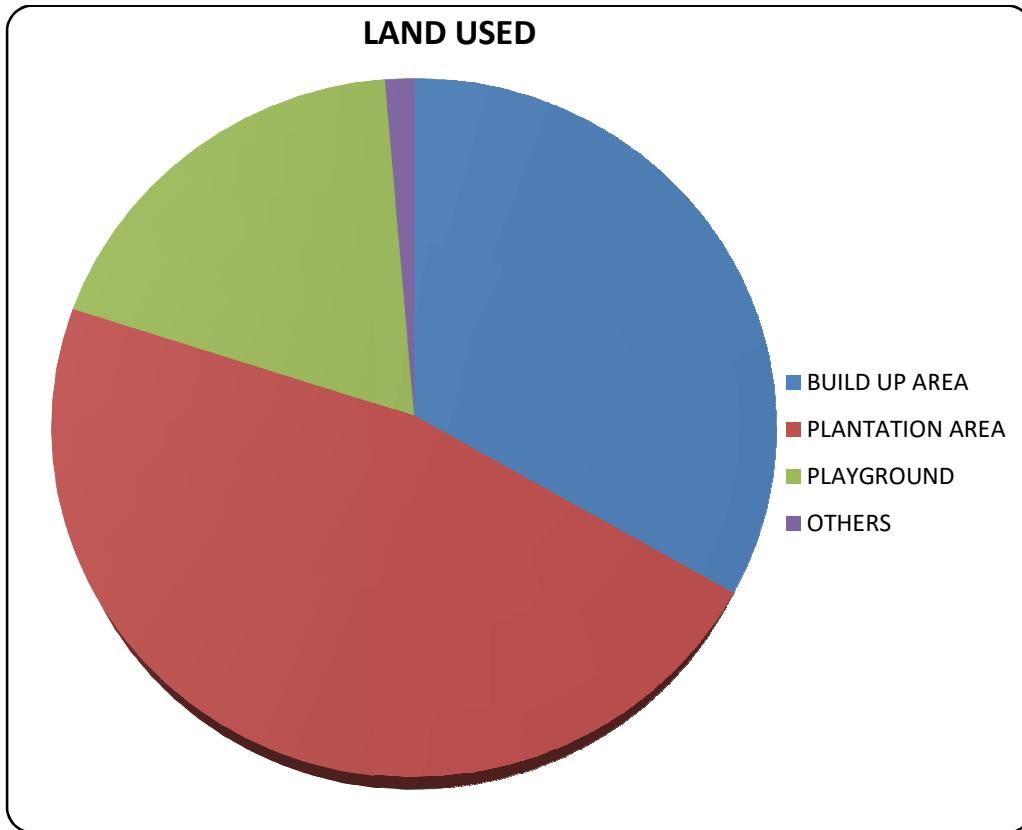
The college covers an area of 30 acres of land seated near Adaspur market at Prachijnanapitha of Adaspur village. It is near the bank of holy river Prachi, which comes under Kantapada block in the district of Cuttack. This college is well connected with cities like Bhubaneswar, Cuttack, Konark, Puri and Kakatpur by State Highway 60. It is in a rural town setting with a calm and serene atmosphere for studying.





### **1.5 Land Use Data**

The college covers an area of 30 acres of land. The plantation area has taken the peak coverage of land. The construction area comes next with a little bit more land than the half of the land coverage remain after the plantation area. The playground area covers a little less than the left half land after plantation and construction area coverage.



## **Chapter 2**

### **ENVIRONMENT AUDIT**

The advent of Modernization and industrialization, has marked the emergence of a revolutionized life towards luxury and comfortability. But subsequently they were responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive

solid waste, polluting the scarce and sacred water resources, and finally making our mother Earth ugly and inhospitable. Today, global issues like global warming, greenhouse effect, ozone depletion, climate change, etc is a major concern for the world . We are accelerating from the state of global warming to global boiling . Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for a sustainable environment.

Environment audit refers to a system that has been devised to monitor the environmental performances of higher education institutions. Many institutions and organizations have started adopting compatible environmental management systems either voluntarily or by external certification. The environmental management and monitoring system not only helps the institution to set an example for the community pertaining to protection of the environment but also educates young student-teachers of the institutions to carry out best practices of the system for sustainable development of the institution.

The process of environmental audit was first mentioned under the Environmental Protection Act (1986) by the Ministry of Forest, government of India on 13 March 1992. Later, various higher education institutes took responsibilities and opportunities to foster environmental sustainability and create their individual institutional policies based on national and international declarations for protection of the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all higher education institutes must submit an annual environment audit report since 2016-17.

In view of NAAC circular regarding environment audit, Udayanath Autonomous Colleg of Sc. & Tech. has taken upon itself the task of conducting an environment audit and has evaluated it profoundly by a team of dedicated and hard working members. The team focuses on greenery of the campus, air pollution, noise pollution, waste management, energy management and carbon footprint being implemented by the institute. It examines the degree to which environmental policies and environmental management system are implemented in the institute and how effectively they are being performed to attain a sustainable environment. Environment audit is very critical for an institute that intends to measure the outcomes of the policies it has executed.

## **2.1 Objectives of the Environment Audit**

- To analyze the current practices that can impact the environment such as effective resource utilization, waste management, etc.
- To prepare an Environmental Statement Report on green practices followed by different departments, support services, and administration building.
- To set goals, vision, and mission for Green practices on the campus
- To improve environmental performance
- To establish and implement Environmental Management Control system in various departments
- To assess for better performance in green practices and increase environmental awareness.

## **Goals of Environment Audit**

UNC has conducted a green audit with specific goals such as:

- Assess facility of different types of waste management
- Increase environmental awareness throughout campus
- Identification and documentation of green practices followed by university
- Identify strengths and weaknesses in green practices
- Conduct a survey to know the ground reality about green practices
- Analyze and suggest solutions for problems identified from the survey
- Identify and assess environmental risk
- The long-term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issues



- To motivate staff for optimized sustainable use of available resources

## **2.2 Benefits of Environment Evaluation**

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 a good image of the institution through its clean and green campus.
- More efficient resource management
- To create a green campus
- To enable waste management through reduction of waste generation
- To create plastic-free campus and evolve health consciousness among the stakeholder
- Recognize the cost-saving methods through waste minimizing and managing
- Authenticate conformity with the implemented laws
- Empower the organizations to frame a better environmental performance
- Enhance the alertness for environmental guidelines and duties
- Impart environmental education through systematic environmental management
- Impart environmental education through systematic environmental management approach and improving environmental standards
- Benchmarking for environmental protection initiatives

- Financial savings through a reduction in resource use
- Development of ownership, personal and social responsibility for the University and its environment
- Invoking a sense of urgency to understand environmental ethics and value systems among youngsters
- Green auditing should become a valuable tool in the management and monitoring of environment and sustainable development programs of the university.

### **2.3. Performance Indicators for Environment Audit**

**1. Energy Consumption:** This performance indicator effectively measures the amount of energy used by the campus. It examines the energy consumption patterns, identifies the 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.

## **2.4. Methodology Followed for Conducting Environment Audit**

The management of the Institution has shown a commitment towards green auditing during the pre-audit meeting. They embraced the concept of promoting greenery by performing the activities that are environment friendly, such as awareness programs on the environment, campus farming, planting more trees in the campus, etc. In order to execute the 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 status of environmental management was monitored by a thorough analysis of the data gathered from the following areas of study:

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

## **METHODOLOGY**

The step by step methodology followed by the management is as follows:

- The data regarding the areas of study were collected and secondary data was derived from the primary data.
- A reference work was carried out to establish a firm idea about the editing process.
- To accomplish the idea , various case studies were analysed and the appropriate approach for the auditing process was selected.

In the present study, online visits to the concerned areas, deducing remarkable observations, and examining them thoroughly was some basic approach adopted to execute the project. Along with it a set of questionnaires were set depending on the collected data. It was filled up by the departments of the college. The responses obtained from the questionnaires further helped to analysis and conclude a group of data.

From the outcome of the overall study, a final report is prepared.

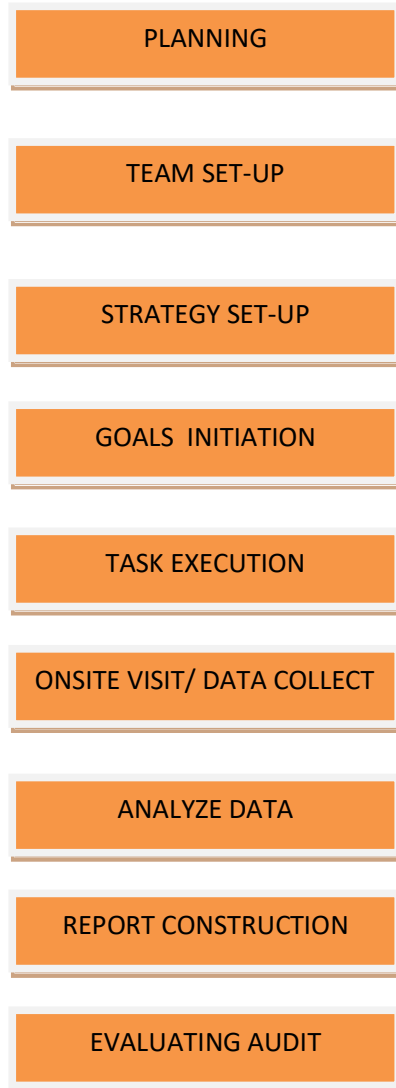
Step 1: Collection of primary data through observation, surveys, interaction and discussions

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

## **AUDIT PROCESS**



### **DATA COLLECTION**

The data was collected from different sites of the college. The college comprises of different departments of ARTS, SCIENCE, COMMERCE, I.T. which could be grouped into academic buildings. Similarly administrative buildings, gymnasium, swimming pool, and hostel building was also taken into consideration. The exact condition of the site was analyzed by evaluating the responses of the given questionnaires. Finally the primary data was constructed and secondary data was derived from it. The data obtained was saved in form of graphs. Depending upon the observations and data collected, interpretations were made. The lacunas and good practices were documented. The Environmental

Management Plan (EMP) was prepared for the next academic year in order to have better environmental sensitization. Finally, all the information was compiled in the form of the Green Audit Report.

### **DATA ANALYSIS AND INTERPRETATION**

The correct analysis of data is a pre-requisite factor in case of presentation of data. The primary as well as secondary data derived from it, their interpretations and interlinks along with the responses obtained were evaluated. In the case of a green audit, the filled questionnaires of the survey from each group were tabulated as per their modules, in Excel spreadsheets. The percentage of the tabulated values were calculated. A graphical representation of these results was made to give a quick idea of the status. Final report preparation was done using this interpretation.

### **Questionnaires for Audit**

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. The guidelines, rules, acts, format along with the modifications were applied to prepare the questionnaires in the following areas of study: energy management, water management, types of waste management. The questionnaires were prepared as modules: each module contains a group of questions. The first module consisted of the Name of the department, month and year, Number of students of the department, Faculty members of the department, number of visitors of the department, and the second module consisted of the questions regarding the energy consumption of the departments. The audit team emphasizes on the ethical use of the energy consumption. The next module was related to the present consumption of resources like water and energy, or the handling of solid and hazardous waste. Maintaining records of the handling of solid and hazardous waste is much important in environment audits. Another module was related to maintaining records, like records of disposal of solid waste, records of solid waste recovery, etc. For better convenience of the surveyor, some

statistics like basic energy consumption characteristics for electrical equipment, etc. were provided with the questionnaires.

- a. The general questionnaires were prepared regarding the location of the institution, area covered by the campus, strength of the institute, and the availability of various places such as playground, library, laboratory, toilet, garden pea canteen, hostel, staff quarters, garbage or waste store yard. Information regarding other facilities such as bus stop for communication purposes, Dispensary, Municipal dump yard, Open drainage, Industry, Sewer Line, Railway station.
- b. The questionnaires also consisted of information demand of the energy consumption such as on water storage, consumption, and conservation. The water source to the institute, consumption of water by various departments, Water storage facility, availability of water recycling system, rainwater system, number of water purifiers in the campus, and the various techniques employed to save the water in the institute. The safe disposal of the discharged laboratory water is the most important information for the audit team.
- c. The questionnaires regarding energy consumption and conservation included, the number of CFL/LED bulbs used, source of energy consumed by the institute, form of electricity used by the institute, form of energy used by the institution, availability of power saving strategy, duration of the electronic devices such as AC, PC being run on the power saving mode.
- d. The questionnaires on solid waste management and its consumption included sources and types of waste generated in the institute, quantity of waste generated per day in the campus of the institute, adoption of waste treatment management system which includes converting domestic and agricultural waste conversion into compost and developing strategies regarding the achievement of zero garbage state.
- e. The questionnaires regarding the campus included the availability of the number of gardens in the campus and the area covered by the gardens, number of different plants present in the gardens, and specifically the categorization of the



plants available was considered such as , number of medicinal plants, number of RET plants etc.

- f. The questionnaires regarding the air quality included the size of the campus, the number of windows available for ventilation, number of doors present, number of vehicles owned by the staff and the students with number of proper documents, any student suffering from respiratory ailments

The questionnaires regarding the biodiversity of the institution included record maintenance of the plant diversity in the campus, any biodiversity awareness program conducted by the institute.

- g. The questionnaires regarding the environment legislative compliance consist of the regular monitoring of the quality of water available in the campus, any hazardous water released by the institute, proper propagation of necessary pre-required knowledge of environmental laws and innovative methods of managing waste produced among the students, steps taken by the management /governing body against people who pollute the environment or violate environmental laws of the institute etc.

## **Answers to questionnaires and the campus environment**

**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 20.213059° & east longitude 86.014549°. The institute is surrounded by local village, the holy river Prachi and some other educational centres like coaching centres, computer training centres etc. The college is situated between the twin-cities, Cuttack and Bhubaneswar.

**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 7000 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.

**WHAT IS THE TOTAL AREA OF THE CAMPUS ?**

The college covers an area of 30 acres 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.

**DOES THE INSTITUTE HAVE THE FOLLOWING ?**

SERIAL NO.	AREA	AVAILABLE	DETAILS
1.	Playground	Available	<ul style="list-style-type: none"> <li>❖ Gymnasium</li> <li>❖ Badminton court</li> <li>❖ Volleyball court</li> <li>❖ Kho – kho court</li> <li>❖ Football ground</li> <li>❖ Cricket ground</li> </ul>
2.	Library	Available	<ul style="list-style-type: none"> <li>❖ Central library</li> <li>❖ E-library</li> </ul>

			❖ Reading room
3.	Laboratory	Available	<ul style="list-style-type: none"> <li>❖ Botany</li> <li>❖ Chemistry</li> <li>❖ C.Sc.</li> <li>❖ Clinical Psychology</li> <li>❖ Geology</li> <li>❖ Geography</li> <li>❖ Mathematics</li> <li>❖ Physics</li> <li>❖ Zoology</li> </ul>
4.	Garden area	Available	<ul style="list-style-type: none"> <li>❖ Flower garden</li> <li>❖ Orchard 1</li> <li>❖ Botanical garden 1</li> <li>❖ Orchard 2</li> <li>❖ Botanical garden 2</li> </ul>
5.	Toilet	Available	<ul style="list-style-type: none"> <li>❖ Separate toilets for male &amp; female in academic, administrative, hostel, guest house buildings.</li> <li>❖ Separate toilets are also available for physically challenged.</li> </ul>
6.	Canteen	Available	❖ An open well furnished, hygienic canteen is present.
7.	Hostel	Available	<ul style="list-style-type: none"> <li>❖ Mahodadhi Boys' Hostel</li> <li>❖ Meghasan OBC Boys' Hostel</li> <li>❖ MahaDevi Girls' Hostel</li> <li>❖ Mandakini Girls' Hostel</li> <li>❖ P.G. Women's' Hostel</li> </ul>
8.	Staff quarters	Available	
9.	Garbage or waste store yard	Available	❖ Portable dustbins are placed for waste deposition.

SERIAL NO.	AREAS	REMARKS
1.	Dispensary	❖ Adaspur PHC is available at a distance of 1.3 K.M.
DOES THE INSTITUTE HAVE THE FOLLOWING NEARBY?		ble
		ble
		ble
5.	Sewer line	❖ Not available
6.	Public convenience	❖ Available
7.	Bus Stop	❖ Mo 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.

#### DOES THE INSTITUTE CONDUCT ENVIRONMENT AUDIT ON CAMPUS

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

#### CLIMATE AND 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 (2<sup>nd</sup> week of June) and prevails up to the end of September or 1<sup>st</sup> 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 30-35°C. 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- 12°C. During the end of December the average minimum temperature gets down up to the 10° c.

### 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 comes under the Gondwana landmass, one of the oldest and stable landmass 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.

### SOIL QUALITY ASSESSMENT 2020-2021

1	PH	.....	6.88
2	EC	µS/cm	274.9
3	COLOUR	.....	GREY
4	SAND	%	50.2
5	SILT	%	14
6	CLAY	%	34.2
7	TEXTURE	%	SANDY CLAY LOAM
8	SPECIFIC GRAVITY	.....	1.18

9	MOISTURE	%	3.9
10	ORGANIC MATTER	%	1.34
11	NITROGEN	Kg/Ha	218
12	POTASSIUM	Kg/Ha	180
13	SODIUM	Kg/Ha	208
14	PHOSPHOROUS	Kg/Ha	28.8
15	CALCIUM	Mg/kg	68.42
16	MAGNESIUM	Mg/Kg	70.6

The above results indicated that pH and EC recorded values were 6.88 and 274.9 $\mu$ S/cm respectively. The soil macro-elements like the amount of total Organic Nitrogen, Phosphorous and Potassium were found to be 218Kg/Ha, 28.8Kg/Ha and 180Kg/Ha respectively. The micro-elements like Sodium, Calcium, Magnesium recorded were 208Kg/Ha, 68.42Kg/Ha, 70.6Kg/Ha. So, from the soil sample analysis report it was revealed that all the values are within the optimal range for overall indicator of soil fertility.



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

Report No. - CEMC/UNAC/09062021

Issued Date-09.06.2021

**SOIL QUALITY TEST REPORT**

Name & Address of the Client	: M/s U.N. AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY
Date of Sampling	: 02.06.2021
Sampling by	: Mr. B.K. Samantray
Date of Sample Received	: 02.06.2021
Sample Description	: Soil
Sample Quantity	: 1 kg
Sample Location	: College Garden
Date of Analysis	: 02.06.2021 to 08.06.2021
Reference No.	: CEMC-09062021S1

**ANALYSIS RESULT**

1	pH	---	6.88
2	EC	μS/cm	274.9
3	Colour	---	Grey
4	Sand	%	50.2
5	Silt	%	14
6	Clay	%	34.2
7	Texture	%	Sandy clay loam
8	Specific Gravity	---	1.18
9	moisture	%	3.9
10	Organic matter	%	1.34
11	Nitrogen	Kg/Ha	218
12	Potassium	Kg/Ha	180
13	sodium	Kg/Ha	208
14	phosphorous	Kg/Ha	28.8
15	Calcium	Mg/kg	68.42
16	Magnesium	Mg/kg	70.6

*[Signature]*  
Authorized Signatory



*Notes:*  
 - The result given above related to the tested sample, as received. The standard should be the above one only.  
 - This Test Report shall not be reproduced wholly or in part without prior written consent of the Laboratory.  
 - The sample received shall be destroyed after two weeks from the date of issue of the Test Report, unless specified otherwise.

Environmental Studies (EIA & EMP), Monitoring, Forest Operation Planning, DPR, BWWF Management Plan, Hazardous & Safety Studies, RSE

**QUESTIONNAIRES ON WATER STORAGE . CONSUMPTION AND CONSERVATION**

**WHAT ARE THE WATER SOURCES TO THE INSTITUTE ?**

There 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.

**WHAT IS THE WATER STORAGE SYSTEM IN THE SYSTEM ?**

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.

Other buildings including the library building and principal quarter are supplied with water through various PVC Syntax tanks having a capacity of 1000L. And finally, the stadium building is equipped with a 2HP 3 Phase Submersible Motor.

**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 judiciously carried out.

**IS THERE ANY WATER RECYCLING SYSTEM IN THE CAMPUS ?**

There is no water recycling system in the campus. The college is planning for the installation of STP and rain water harvesting system in the campus and at present is working on it.

**HOW MANY WATER PURIFIERS ARE USED IN THE CAMPUS ?**

There are 20 water purifiers used in the campus, which were set up under ‘MO COLLEGE AVIJANA’, a program initiated by the State Government.

**WHAT ARE THE NUMBER OF BATHROOMS IN ACADEMIC, ADMINISTRATIVE AND HOSTEL BUILDINGS ?**

There are a total number of 429 bathrooms (with toilets) present in the academic, administrative & hostel buildings.

**DOES THE INSTITUTE HAS A RAINWATER HARVESTING SYSTEM?**

At present there is no rain water harvesting system but the college is already planning to set up multiple units of rain water harvesting units. Setting and installing them will lead to another step towards water conservation and management.

**DOES THE INSTITUTE FOLLOW ANY SPECIAL MODE 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.

#### **WHAT ARE TECHNIQUES USED TO SAVE WATER IN THE INSTITUTE?**

There are several ways adopted to save water. Pipes, overhead tanks, and plumbing systems are maintained properly to reduce leakages and unnecessary wastages of water. The college is also planning to build a common distillation plant for all the laboratories to reduce loss of water.

#### **QUESTIONNAIRES ON ENERGY CONSUMPTION AND CONSERVATION**

#### **QUESTIONNAIRES ON SOLID WASTE GENERATED AND ITS MANAGEMENT**

#### **WHAT ARE THE SOURCES AND TYPE OF WASTE GENERATED IN THE INSTITUTE?**

Different types of waste are generated such as paper waste, plastic waste, construction waste, glass ware are released from various buildings from the college. They are directly handed over to the Municipality bin for further segregation and recycling.

#### **HOW MUCH WASTE IS GENERATED PER DAY IN THE CAMPUS?**

Approximately 110 kg of waste is generated every day. The rate of waste generated has been less due to the absence of students in hostel during pandemic. An estimated amount of about 2 tonnes per month during peak academic sessions and the minimum amount during the lean period is about 3 tonnes per month, is generated.

#### **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.

#### **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 and vermi-composting. The institute has banned single-use of plastic for any administrative as well as academic purposes.

#### **IS ANY WASTE RECYCLING METHOD ADOPTED?**

Glass waste is generated from laboratories mainly in the form of bottles, and many times bottles are reused for storing other chemicals. The e-waste generated, is sent for recycling and made ready for reuse.

#### **ARE THE AGRICULTURAL AND DOMESTIC WASTE CONVERTED TO COMPOST?**

A vermin-composting unit was established in January 2018 in the campus under the supervision of the green audit team. UNC has taken initiatives for the management of biodegradable waste by processes like dry & wet waste management and vermin-composting technology, which relies upon the conjoint action of earthworms and microorganisms to rapidly transform various types of solid wastes.

#### **HOW CAN THE INSTITUTE ACHIEVE A STATE OF ZERO WASTE?**

The college has planned for the provision of installing a garbage unit where segregation of various wastes such as paper, construction, glass, metal scrap and food waste should be done. various waste recycling plans for different types of waste should be introduced.

## **QUESTIONNAIRES ON GREENERY OF THE CAMPUS**

### **DOES THE CAMPUS HAS A GARDEN?**

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

### **WHAT IS THE TOTAL NUMBER OF HERB, SHRUB , TREE IN THE CAMPUS?**

The total numbers of tree, herb & shrub species in the campus is about 1500 with around 212 species.

### **NAME THE DIFFERENT TYPES OF PLANTS IN THE INSTITUTE?**

### **IS THERE ANY ACTIVE INVOLVMENT OF STUDENTS IN THE MANAGEMENT OF THE GARDEN?**

Yes, the students take active participation in the garden management work but due to the pandemic situation there were no students in the campus. Usually throughout the year the students take interest in the garden work like planting purposes, cleaning the cargrn and watering the plants.

### **DOES THE GARDEN HAVE ANY RET PLANT?**

No, there is no RET plant present in the garden.

## **QUESTIONNAIRES ON AIR QUALITY OF THE CAMPUS**

### **WHAT IS THE APPROXIMATE SIZE OF THE CLASSROOM AND HOW MANY WINDOWS ARE PRESENT IN EAH CLASSROOM?**

The approximate sizes of the classrooms are 35'\* 25'ft. . In average, there are 6 windows per classroom.

**WHAT IS THE APPROXIMATE NUMBER OF VEHICLE OWNED BY STAFF AND STUDENT?**

Due to pandemic time, the college was closed and there were no staff and student due to lockdown.

**IS PROPER VENTILATION OF EVERY FLOOR IS 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.

**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.

**WHAT ARE THE STEPS TAKEN TO IMPROVE OVERALL AIR QUALITY OF THE CAMPUS?**

To improve the air quality, plantation purposes are adopted. In the last two years the number of plants planted by the members of the UNC family increased. The main motto of the plantation program is to improve the overall air quality and make the environment ambient.

**QUESTIONNAIRES ON BIODIVERSITY OF THE INSTITUTE**

**HAS THE INSTITUTION ACCURATELY RECORDED ACCOUNTS OF EVERY PLANT SPECIES FOUND IN THE CAMPUS?**

Yes, the institute has accurately recorded every plant species found in the campus. The recorded data is interpreted as the total floristic record of UNC.

**DOES THE INSTITUTE CONDUCT ANY KIND OF BIODIVERSITY AWARENESS PROGRAM?**

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. But due to the covid-19 pandemic there was no awareness program conducted this year.

## **QUESTIONNAIRES ON ENVIRONMENT LEGISLATIVE**

**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 or swimming. As the college was closed due to pandemic the monitoring purposes was not required.

**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.

**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.

**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 etc are strictly checked by the authority and warned if anyone is found guilty

## CHAPTER 3

### WATER CONSUMPTION AND MANAGEMENT

Water is at the core of sustainable development and is critical for socio-economic development, energy and food production, healthy ecosystems and for human survival itself. Water is also at the heart of adaptation to climate change, serving as the crucial link between society and the environment. Water touches every aspect of development and it links with nearly every Sustainable Development Goal (SDG). It drives economic growth, supports healthy ecosystems, and is essential and fundamental for life itself.

Approximately [2 billion people](#) around the world do not have safely managed drinking water services, 3.6 billion people do not have safely managed sanitation services, and 2.3 billion lack basic handwashing facilities. Gaps in access to water supply and sanitation, growing populations, more water-intensive patterns of growth, increasing rainfall variability, and pollution are combining in many places to make water one of the greatest risks to economic progress, poverty eradication and sustainable development.

The consequences of such stress are local, national, transboundary, regional, and global in today's interconnected and rapidly changing world. Consequences will be disproportionately felt by the poorest and most vulnerable. The unabated discharge of industrial effluents into near by freshwater bodies is reducing the quality of these precious sources of water continuously. Hence, the national mission on water conservation, 'Jal Shakti Abhiyan' was declared by the Honorable Prime Minister, Narendra Modi as an appeal to all citizens requesting cooperation in collectively addressing the problem of water shortage by conserving every drop of water and conducting water audits for all sectors of establishment. A water audit is a technique or method which makes it possible to identify ways of conserving water by determining any inefficiency in the

system of water distribution. The measurement of water losses due to differences in usage and utility is essential for implementing water conservation measures in such an establishment.

### 3.2. Sources of 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 in the campus with RCC 2HP Single Phase Submersible Motor and 2HP 3 Phase Submersible Motor, which operate to fill the various tanks.



**Table depicting the source of water to the Institute:**

<b>Sl. No.</b>	<b>Description</b>	<b>Location in the campus</b>
<b>1</b>	<b>Borewell-1</b>	<b>Near commerce block</b>
<b>2</b>	<b>Borewell-2</b>	<b>Garden</b>
<b>3</b>	<b>Borewell-3</b>	<b>Administrative block</b>



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. Womens Hostel
10	Borewell-10	Guest House
11	Borewell-11	Stadium
12	Borewell-12	Stadium
13	Borewell-13	Near Vermicompost Unit

### 3.3. Water storage capacity in the campus

A number of main buildings of the campus, like hostels, and 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.

Other buildings including the library building and principal quarter are supplied with water



through various PVC Sintex tanks, having a capacity of 1000L. And finally, the stadium building is equipped with a 2HP 3 Phase Submersible Motor.

**Status of Water Storage Capacity in UNC:**

Sl. No.	Description	Capacity	Type
1	Mahodadhi Boys Hostel	20763L	RCC 2HP Single Phase Submersible Motor
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 (2)	2000L	PVC Sintex
9	Auditorium	1000L	
10	Silver Jubilee Building	1000L	
11	Library Building	1000L	
12	Administrative and IT block (2)	2000L	
13	Principal Quarter	1000L	
14	Cycle Stand	1000L	
15	Stadium Building	2000L	2HP 3 Phase Submersible Motor
16	Stadium	300L	RCC WELL

**3.4. 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 consumption of the campus is approx. **100 Kilo Litres per day** by operating discharge pumps with a total discharge capacity of 140 Kilo Litres 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 2,000 (Including office staff, strength and residential buildings) of the UNC campus. Hence total approx.

**109.4** Litres 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 Calander.



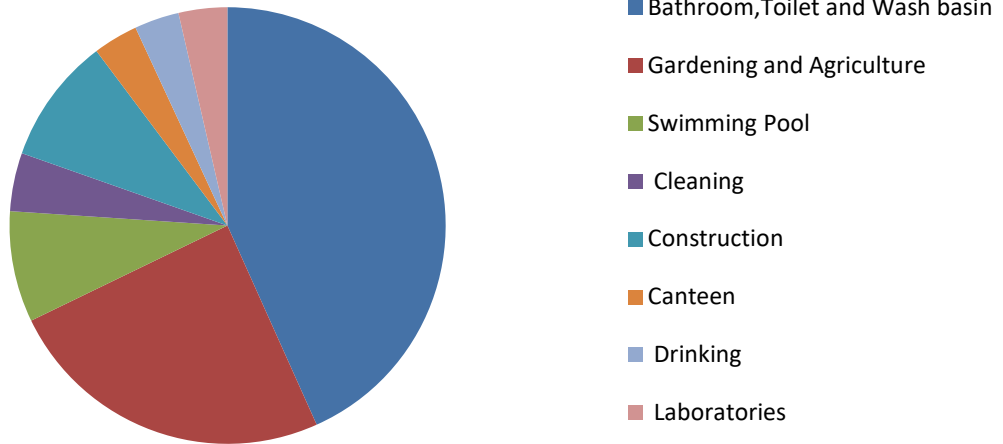
From the data collected for water audit of UNC, the water distribution and water consumption pattern is noticed as follows:

### **Status of Water Consumption in UNC**

<b>Sr. No.</b>	<b>Sector</b>	<b>Total Daily Use (kL)</b>	<b>Total Monthly use (kL)</b>	<b>Total yearly use (kL)</b>	<b>Percentage %</b>
1.	Gardening and Agriculture	170	5130	62627	24.77%
2.	Bathroom, Toilet and Wash basin	300	9200	108100	42.75%
3.	Laboratories	25	780	9670	3.82%
4.	Canteen	23	710	8550	3.38%
5.	Construction	65	2010	25131	09.93%
6.	Drinking	23	700	4000	1.58%
7.	Swimming Pool	57	1720	22450	8.87%
8.	Cleaning	30	1200	12300	4.86%
	<b>Total</b>	<b>693</b>	<b>21450</b>	<b>252828</b>	<b>99.96</b>

\*The above data is obtained on the basis of maximal usage of water during peak academic period

## Total Daily Use





### **Swimming pool**

The maintenance of swimming pool involves a number of things such as cleaning the pool, keeping the pool safe and in good condition for use. Some measures adopted for maintenance:

- **Regular cleaning:** The pool is regularly cleaned to remove debris, leaves, and other floating materials, skim the surface and vacuum the pool floor to maintain cleanliness. The pool walls are scrubbed to prevent algal growth.
- **Water balance and chemistry:** The chemical balance of the pool water is crucial to ensure it is safe and sanitary. Regularly the water for pH levels, chlorine/bromine levels, alkalinity, and calcium hardness is tested. Chemicals such as TCCA, Alum, and Soda etc are added to maintain proper balance.
- **Filter maintenance:** The pool's filtration system is responsible for removing impurities from the water. The filters are cleaned or backwashed regularly to ensure their proper functioning and effectively removing contaminants.
- **Equipment inspection:** Regularly the pool's equipments are inspected, including pumps, motors, and heaters, to ensure that they are in good working condition. Faulty components are replaced promptly to prevent further damage and to ensure uninterrupted pool operation.
- **Safety measures:** A regular inspection of safety equipment like ladders, diving boards, and lifeguard chairs is conducted.
- **Regular testing and maintenance:** The pool water is tested for bacteria regularly to ensure that it meets health and safety standards. Additionally routine maintenance tasks such as checking and cleaning drains, checking pool lights, and monitoring water level is performed. **Staff training:** Staffs handling the pool are trained in proper maintenance techniques, water chemistry, and safety protocols. This will help them efficiently manage the pool's maintenance needs.

- Record-keeping: Detailed records of all maintenance activities, pool chemistry testing results, and repairs are maintained. This documentation will help track the pool's overall condition, identify recurring issues, and ensure regulatory compliance.

By implementing a comprehensive maintenance plan, regular supervision, and efficient record-keeping, swimming pools in UNCis well-maintained, clean, and safe for everyone to enjoy.

### **RECOMMENDATIONS**

- There should be proper monitoring of overflow of water tank
- A Large amount of water is wasted during the practical process in Science laboratories. Designs of small water recycling systems help to reuse of water.
- To produce 1 liter of distilled water required more than 33 liters of water. To avoid more wastage institute should design a common distillation plant for Science Department.
- Adopting the principles of green chemistry to avoid wastage.
- Pipes, overhead tanks, and plumbing systems should be maintained properly to reduce leakages and wastages of water.
- UNC should install its own Sewage Treatment Plant (STP). By doing so there will be a great reduction in water usage, as the water after treatment can be used for various purposes in the campus.

UNC is in the path of setting up multiple units of rainwater harvesting units.

### **3.5. Water test and analysis report**

Water quality testing is important because it identifies contaminants and prevents waterborne diseases. The following indicators are often measured for drinking water like Alkalinity, pH of water, colour of water, taste and odor, Dissolved metals and salts, Dissolved metals and metalloids , microorganisms, total suspended solids.



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 <sup>+</sup> B	6.78
6	TOTAL HARDNESS	mg/l	200	APHA 2340 C	102
7	IRON	mg/l	0.3	APHA 3500Fe, B	0.16
8	CHLORIDE	mg/l	250	APHA 4500Cl <sup>-</sup> B	35.9
9	RESIDUAL, FREE CHLORINE	mg/l	0.2	APHA 4500 Cl B	ND
10	TOTAL DISSOLVED SOLIDS	mg/l	500	APHA 2540 C	272
11	CALCIUM	mg/l	75	APHA 3500 Ca B	20.4
12	MAGNESIUM	mg/l	30	APHA 3500 MgB	10.4
13	COPPER	mg/l	0.05	APHA 3111 B,C	<0.03
14	MANGANESE	mg/l	0.1	APHA 3500 Mn B	<0.05
15	SULPHATE	mg/l	200	APHA 4500 SO <sub>4</sub> <sup>2-</sup> E	20.6
16	NITRATE	mg/l	45	APHA 4500NO <sub>3</sub> <sup>-</sup> E	26.8
17	FLUORIDE	mg/l	1.0	APHA 4500 F <sup>-</sup> C	0.08
18	PHENOLIC COMPOUNDS	mg/l	0.001	APHA 5530 B,D	<0.001
19	MERCURY	mg/l	0.001	APHA 3500 Hg	<0.001
20	CADMIUM	mg/l	0.003	APHA 3111 B,C	<0.003
21	SELENIUM	mg/l	0.01	APHA 3114 B	<0.001
22	ARSENIC	mg/l	0.01	APHA 3114 B	<0.001
23	CYANIDE	mg/l	0.05	APHA 4500CN <sup>-</sup> C,D	ND
24	LEAD	mg/l	0.01	APHA 3111 B,C	<0.01
25	ZINC	mg/l	5	APHA 3111 B,C	<0.05
26	TOTAL CHROMIUM	mg/l	0.05	APHA 3500Cr B	<0.05
27	MINERAL OIL	mg/l	0.01	APHA 5220 B	<0.01
28	ALKALINITY	mg/l	200	APHA 2320 B	72
29	ALUMINIUM	mg/l	0.03	APHA 3500Al, B	<0.01
30	BORON	mg/l	0.5	APHA 4500 B, B	<0.2
31	TOTAL COLIFORM	-	Absent	IS 15185	Absent
32	E.COLI	-	Absent	IS 15185	Absent



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Report No. - CEMC/UNAC/090621/W1

Issued Date-09.06.2021

## WATER QUALITY TEST REPORT

**Name & Address of the Client** : M/s U.N AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY  
**Date of Sampling** : 02.06.2021  
**Sampling by** : Mr. B.k Samantray  
**Date of Sample Received** : 02.06.2021  
**Sample Description** : Drinking water  
**Sample Quantity** : 1.0 Ltr  
**Sample Location** : College Borewell  
**Date of Analysis** : 02.06.2021 to 08.06.2021  
**Reference No.** : CEMC-09062021W1

## 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 <sup>+</sup> B	6.78
6	Total Hardness (as CaCO <sub>3</sub> )	mg/l	200	APHA 2340 C	102
7	Iron (as Fe)	mg/l	0.3	APHA 1500Fe <sub>2</sub> B	0.16
8	Chloride (as Cl)	mg/l	250	APHA 4500Cl <sup>-</sup> B	35.9
9	Residual, free Chlorine	mg/l	0.2	APHA 4500Cl <sup>-</sup> B	ND
10	Total Dissolved Solids	mg/l	500	APHA 2540 C	272
11	Calcium (as Ca)	mg/l	75	APHA 1500Ca <sup>2+</sup> B	20.4
12	Magnesium (as Mg)	mg/l	30	APHA 1500Mg <sup>2+</sup> B	10.4
13	Copper (as Cu)	mg/l	0.05	APHA 3111 B,C	<0.03
14	Manganese (as Mn)	mg/l	0.1	APHA 1500Mn <sup>2+</sup> B	<0.05
15	Sulphate (as SO <sub>4</sub> )	mg/l	200	APHA 4500 SO <sub>4</sub> <sup>2-</sup> E	20.6
16	Nitrate (as NO <sub>3</sub> )	mg/l	45	APHA 4500NO <sub>3</sub> <sup>-</sup> E	26.8
17	Fluoride (as F)	mg/l	1.0	APHA 4500F <sup>-</sup> C	0.08
18	Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	0.001	APHA 5530 B,D	<0.001
19	Mercury (as Hg)	mg/l	0.001	APHA 1500Hg	<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 <sup>-</sup> 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 1500Cr <sup>6+</sup> B	<0.05
27	Mineral Oil	mg/l	0.01	APHA 5220 B	<0.01
28	Alkalinity (as CaCO <sub>3</sub> )	mg/l	200	APHA 2320 B	72
29	Aluminium (as Al)	mg/l	0.03	APHA 1500Al <sup>3+</sup> B	<0.01
30	Boron (as B)	mg/l	0.5	APHA 4500B <sup>-</sup> 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



### Notes:

- The result given above related to the tested sample, as received. The customer is responsible 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 the Test Report unless specified otherwise

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

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E-mail- cemc\_consultancy@yahoo.co.in, cemc122@gmail.com, website: www.cemc.in.

Laboratory At: Plot No. 800/1274, Johal, Pahal, Bhubaneswar-752101, Odisha, India, Mobile: 7752014  
E-mail: cemclab@yahoo.in

### **3.6. Rain Water Harvesting and Sewage Treatment Plant**

**Rain Water Harvesting** is a simple process or technology used to conserve rainwater by collecting, storing, conveying and purifying of rainwater. It is an effective method of conserving water and reducing the dependency on other sources of water. There are various ways to harvest rainwater, including the use of rain barrels, cisterns, and underground tanks. The collected rainwater can be used for non-potable purposes such as watering plants, washing cars, flushing toilets, or even for groundwater recharge.

**Sewage Treatment Plant** is a facility that treats wastewater to remove contaminants and pollutants before discharging it into the environment or reusing it for various purposes. STPs use various treatment processes such as physical, chemical, and biological processes to treat wastewater. STPs are an essential part of maintaining a clean and sustainable environment. They help prevent water pollution by removing harmful substances and pathogens from wastewater before it is released back into rivers, lakes, or oceans. The treated water can also be used for irrigation, industrial processes, or even for non-potable purposes in areas where water scarcity is a significant concern.

**Rainwater harvesting and STPs** complement each other in terms of water conservation and environmental sustainability. While rainwater harvesting reduces the demand for freshwater sources, STPs treat wastewater to make it safe for reuse or discharge. Together, these methods contribute to water conservation, reduce the strain on freshwater sources, and help in the overall management of water resources. To recharge the ground water table, the Institute is planning to construct Rain Water Harvesting system and construction work has already been started. The layout plan is as follows:

STP treats the water by removing the impurities and contaminants from it. To get recycled water that can be used for irrigation and flushing purpose, the Institution has also taken steps to construct STP in the proposed plan:

## Chapter-4

### Solid Waste Management

#### 1.1.Solid waste

The unwanted or useless solid material generated from human activities in a residential, industrial, or commercial area is called a solid waste. The strategy of solid waste management reduces or eliminates the adverse impact on the environment and human health. It is necessary to manage the solid waste properly to reduce the load on the waste management system. We lack an adequate technology to manage the generated waste and thus can lead to public health hazards 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.

#### 1.2.Source of Solid wastes

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. Due to the pandemic period the rate of generated waste has been less. However biodegradable waste is recycled through the organic and vermin composting processes. The daily rate of waste generation is less reaching up to an estimated amount of about 2-3tonnes per month. The wastes generated in the campus include

- (i) Kitchen wastes
- (ii) Liquid waste (residential and eateries),
- (iii) Sewage and sludge,
- (v) Biomedical waste,
- (vii) Plastic wastes,
- (viii) Cans and bottles,

(ix) Unused tools and machinery including battery,

(x) Papers including packaging materials

(xii) Electronics waste

(xiv) Sweeping litters, etc.

The total solid waste generated in the annual year is **18,648 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 roads.



### Status of Solid Waste generation in the campus

Serial no.	Month	Solid waste generated in Kg
1	Jan 2020	1100
2	Feb 2020	1000
3	Mar 2020	1870
4	Apr 2020	1230
5	May 2020	1650
6	June 2020	1780
7	July 2020	1690
8	Aug 2020	1908
9	Sep 2020	1340
10	Oct 2020	1200
11	Nov 2020	2340
12	Dec 2020	1540
	Total	18,648 kg

- **Non biodegradable Waste Management**

The three steps that can be followed for management of non biodegradable waste are Recycle, Reuse, and Reduce which can save energy and other resources as well. This Institute adopts one of the safest way of disposal i.e., Land filling. The non biodegradable substances are segregated and dumped in a low lying region nearby the campus and covered with soil.

- **Biodegradable Waste Management**

- (i) **Vermicomposting**

UNC has taken initiatives for Biodegradable Waste Management by processes like Dry & Wet Waste Management. Vermi composting technology relies upon the conjoint action of

earthworms and microorganisms to rapidly transform varied types of solid wastes. It is far superior to traditional composting technique. Considering the simplicity and flexibility of the technology, a vermin composting unit was established in January 2018 in the campus under the supervision of the Green audit team. The prime objectives are to recycle a fraction of biodegradable waste in a sustainable manner and curtail the cost of purchasing organic manure from the market for landscaping ventures. Presently, the unit is running successfully to fulfill the need for organic manure for plantation/gardening works of the campus. So far, the ready-to-use vermicompost is produced entirely from garden waste (grass) and leaf litter of the campus.

The vermin composting unit has a waste accommodating capacity of about 16.5 m<sup>3</sup>, i.e., about 10 quintals (on a fresh weight basis) at a given time. On average, one vermicomposting period (or one batch) takes about 60-90 days depending on the nature of the feedstock. Epigeic earthworm species (*Eiseniafetida*, *Eudriluseugeniae*, and *Perionyxexcavatus*) are applied at a rate of 10 worms/kg (approximately) feedstock to carry out the composting process. Approximately 93.52 quintal vermicompost has been produced in the last three years (i.e. April 2020 to March 2023). The produced vermicompost is used for all sorts of plantation and landscaping activities at the campus. The unit is ready for expansion to accommodate various other kinds of biodegradable solid wastes generated in the campus. Apart from utilizing the required amount of vermicompost for landscaping work, Institute is selling certain quantities to the campus dwellers.



## **(ii) Organic Composting**

Standing strong by its vision for transforming UNC into an institute which truly realizes the value of adhering to various laws and standards of environmental compliance, we always strive to arrive at possibilities for reducing and managing waste. Kitchen-waste composting is thus, an effective practice that extends its efforts towards putting every bit of waste produced. For converting organic waste into compost, an automated machine was installed in the campus with a capacity of 250 kg.



e-Way Bill



E-Way Bill No: 2212 7903 0723  
E-Way Bill Date: 10/03/2021 04:12 PM  
Generated By: 27AAB CN869 2H1Z0 - NETEL INDIA LIMITED  
Valid From: 10/03/2021 04:12 PM [1634Kms]  
Valid Until: 20/03/2021

Part - A

GSTIN of Supplier: 27AABCN8692H1Z0,NETEL INDIA LIMITED  
Place of Dispatch: RABALE MIDC,MAHARASHTRA-400701  
GSTIN of Recipient: URP ,UDAYANATH AUTONOMOUS COLLEGE OF SCIENCE  
Place of Delivery: ADASPUR,ODISHA-754011  
Document No.: 20160030RI  
Document Date: 10/03/2021  
Transaction Type: Regular  
Value of Goods: ₹ 884800  
HSN Code: 8479 - AUTOMATIC ORGANIC WASTE CONVERTER MACHINE 250KG.  
Reason for Transportation: Outward - Supply  
Transporter: 27BQFPM7108H1ZR & SHAURBH FREIGHT CARRIERS

Part - B

Mode	Vehicle / Trans Doc No & Dt.	From	Entered Date	Entered By	CEWB No. (If any)	Multi Veh.Info (If any)
Road	MH05EL1199 & 231 & 10/03/2021	RABALE MIDC	10/03/2021 04:12 PM	27AABCN8692H1Z0	-	-



221279030723

2023.12.21 14:24



### PRODUCTION RECORD OF COMPOST UNITS AND REVENUE

Financial Year	Total Production (Quintals)
April 2020 - March 2021	17.47
April 2021 -March 2022	34.68
TOTAL	52.15

Financial Year	Revenue Earning (INR)
April 2020 - March 2021	5000
April 2021 - March 2022	9700
TOTAL	14700

### Initiatives taken by the Institute for Waste Management

- Reuse of the glasswares generated during
- The e-waste generated 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.

### **Recommendations**

- Provision of installation of garbage unit should be introduced where the multilevel segregation of various wastes such as paper, construction, glass, metal scrap and food waste should be done. Further various waste recycling plans for different types of waste should be introduced.
- Provision for E-waste management should be introduced in the Campus.
- Paper waste like answer sheets, old bills, and confidential reports should be sent for shredding, pulping, and recycling after completion of their preservation period.
- Recycling facilities should be introduced and should be supported by City Municipality and private suppliers, including glass, cans, white, colored, and brown paper, plastic bottles, batteries, print cartridges, cardboard, and furnitures.

## Chapter – 5

### ENERGY CONSUMPTION AND MANAGEMENT

Energy is one of the major inputs for driving the economic development of any country. The strategy 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 the 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, Solar Roof Top Systems, and Diesel Generators installed on the campus.

#### Objectives of Energy Audit

##### Primary:

- To acquire and analyze data, regarding the necessary consumption pattern of these facilities.
- To identify the quality and cost of various energy input.
- The final objective is to find and implement feasible and acceptable solutions regarding the optimizing energy consumption .

#### Source of Energy

UNC draws Energy from the Followings:

- ❖ Electricity from TPCODL
- ❖ Solar Energy

The Following are the Major consumers of Electricity in the facility

- Lightning
- 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). The main aim is to identify the quality and cost of various energy input. Any loose connections or heating of cables should 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. Any irregularities in Energy meter HT connections is informed for rectification.

#### **5.1. Energy consumption in the Campus**

In conducting an environmental audit of an autonomous college, it is essential to examine the energy consumption and utilization pattern on campus . This would throw a light on the effective management of energy and futher help in mitigating the unnecessary use of it. 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.

It includes energy sources, it's consumption and monitoring, lighting, appliances and vehicles. Energy sources utilized by all the departments and services of college include electricity, liquid petroleum and LPG. Data for electricity consumption of the college from various buildings were collected and listed as below:

Sl.no	Name of Appliance	Wattage	Quantity	Wattage
1	Tube light (LED)	20	520	10,400
2	CFL(LED)	09	310	2,790
3	Fan	80	670	53,600

4	Water Cooler	1500	05	7,500
5	Exhaust Fan	150	20	300
6	Aquaguard	500	20	1,000
7	Computer	200	180	36,000
8	Projector	750	10	7,500
9	Printer	500	20	10,000
10	Smart Board	500	03	15,000
11	TV(LED)	150	01	150
12	Motor(water pump)	1000	05	5,000
13	AC	2000	20	40,000
14	Submersible Pump			

### **Lighting system**

Lighting is an essential service for all industries, institutions, hospitals, malls, etc. Innovation and continuous improvement in the field of lighting, have given rise to tremendous energy-saving opportunities in this area. Lighting is an area, which provides a major scope to achieve energy efficiency at the design stage, by incorporation of modern energy-efficient lamps, luminaries, and gears, apart from good operational practices.

### **Ceiling Fans**

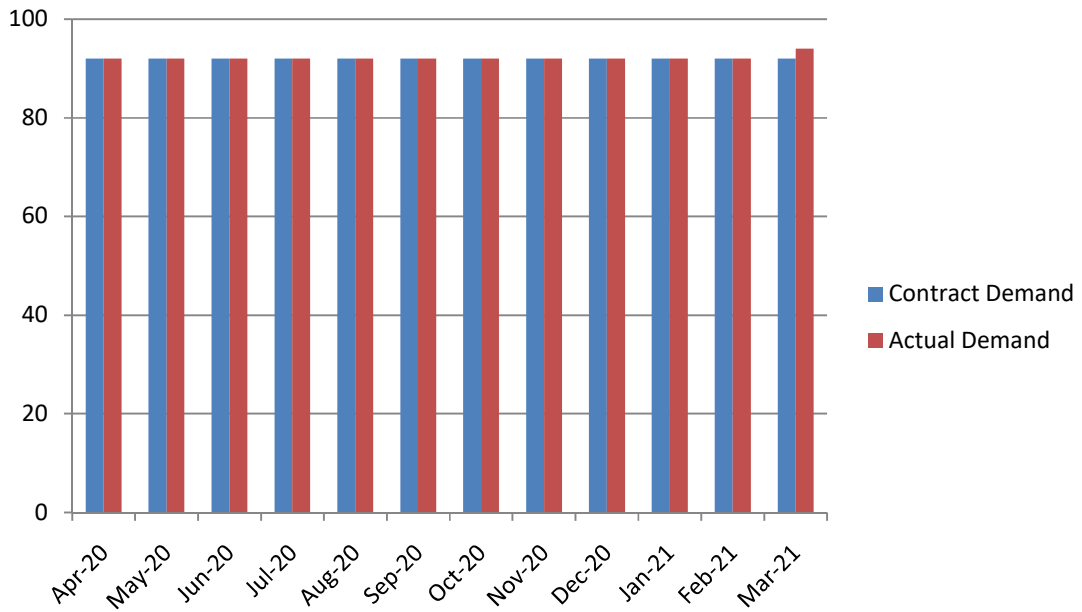
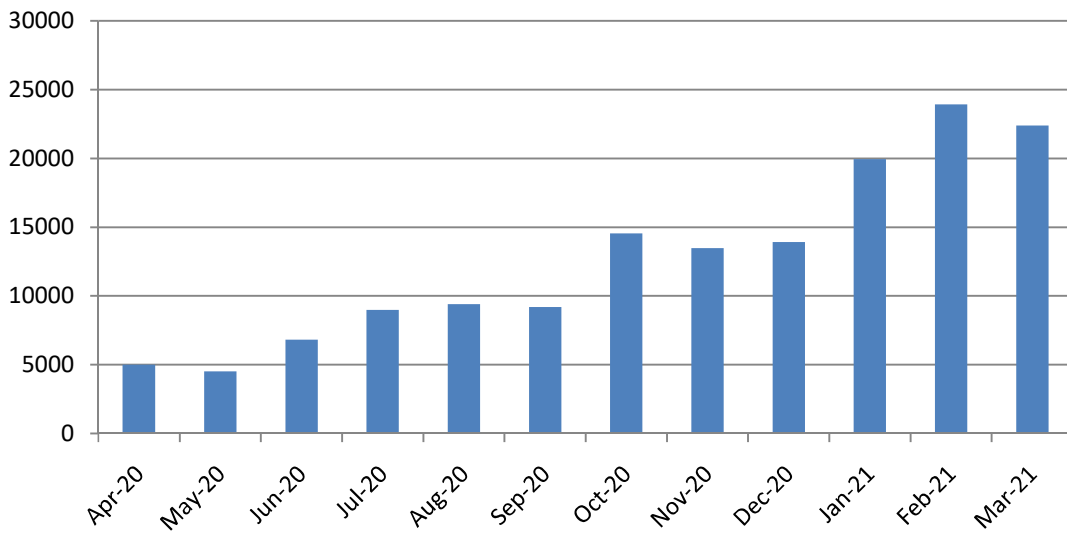
Ceiling Fans constitute a major part of the total energy expended by the institute. However, in places like India, with its hot, tropical climate, it is very common to find ceiling fans in households, institutes, offices, and almost every other building or establishment. Hence, innovations and continuous improvement in the field of fans, have given rise to tremendous energy-saving opportunities in this area. The fan is an area, which provides a major scope to achieve energy efficiency at the design stage, by incorporation of modern energy-efficient Fans, BLDC Fans, smart Fans, apart from good operational practices.

### **Electricity bills**

<b>Bill Month</b>	<b>Consumption Unit</b>	<b>Contract Demand</b>	<b>Actual Demand</b>	<b>Bill amount</b>	<b>Power Factor</b>
2020- April	4994	92.0	92.0	106297*	90.00
2020- May	4538	92.0	92.0	126257	92.00
2020- June	6826	92.0	92.0	154983	90.00
2020- July	8996	92.0	92.0	148658	90.00
2020-Aug	9396	92.0	92.0	142876	97.00
2020- Sep	9196	92.0	92.0	81276	92.00
2020- Oct	14562	92.0	92.0	184469	92.59
2020- Nov	13467	92.0	92.0	105721	93.00
2020- Dec	13916	92.0	92.0	108422	93.00
2021- Jan	19946	92.0	92.0	138964	100.00
2021- Feb	23942	92.0	92.0	166759	100.00
2021- Mar	22387	92.0	94.0	297705	97.00
		<b>Contract Demand (KVA)</b>	<b>Actual Demand (KVA)</b>		
2021- April	21649	92.0	94.0	150952	97.00
2021- May	6529	92.0	97.0	66530	99.00
2021- June	7125	92.0	97.0	63239	99.90
2021- July	20851	92.0	97.0	146253	99.97
2021-Aug	23590	92.0	97.0	173550	100
2021- Sep	17990	92.0	97.0	140370	100
2021- Oct	28746	92.0	97.0	180370	100
2021- Nov	30715	92.0	114.0	205751*	100
2021- Dec	29764	92.0	114.0	220084*	100



### Consumption Units (2020-21)



## **5.2. Consumption and utilization of fuel**

Fuel is a significant component for various aspects of campus operations, including transportation, powering equipment, and maintaining infrastructure. Understanding the sources of fuel used on campus, such as gasoline, diesel, or propane, helps to assess the college's carbon emissions and environmental impact. By analyzing the consumption patterns of fuel by different departments, opportunities and facilities could be established to rely less on fossil fuels.

Implementing measures like promotion of carpooling or supporting the use of electric vehicles can contribute to a greener and more sustainable campus, ultimately reducing the college's carbon footprint.

### **Recommendations:**

The institute must conduct energy audits to identify areas where buildings can be retrofitted for better energy efficiency. This may include upgrading insulation, windows, and doors, installing energy-efficient lighting systems, and optimizing heating, ventilation, and air conditioning (HVAC) systems. These measures can reduce energy waste and result in long-term energy and cost savings.

The Institute must implement educational campaigns, workshops, and seminars to increase awareness about the importance of turning off lights when not in use, using energy-efficient appliances, and optimizing computer usage by enabling power-saving settings. To encourage about effective power consumption on individual level recognition or award could be introduced.

The college must utilize smart technology and automation systems to manage energy consumption effectively. Installing motion sensors and timers for lighting, HVAC controls, and smart meters for monitoring energy usage can provide real-time data and insights that can drive energy-saving decisions. Additionally, implementing energy management systems can help identify energy inefficiencies and adjust usage patterns accordingly.

The college must incorporate sustainability and energy conservation topics into the college curriculum. This can include offering courses or workshops on renewable energy, energy management, or sustainable architecture and design. By empowering students with knowledge and skills in sustainable practices, the college can create a generation of environmentally conscious individuals who can contribute to a more sustainable future.

The institute must collaborate with local energy agencies, NGOs, or sustainability initiatives to access resources, funding, and expertise in energy conservation. Partnering with energy service companies (ESCOs) can also provide opportunities for comprehensive energy efficiency projects that can yield substantial savings over time.

Overall, the college should adopt a holistic approach towards energy consumption and utilization, encompassing education, technology, and infrastructure upgrades, to create a more sustainable campus environment. By prioritizing energy efficiency and sustainable practices, the college can actively contribute to mitigating climate change and promoting environmental stewardship.

## **Chapter-6**

### **AIR AND NOISE**

#### **1.1.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 is given in the below table.



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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 & NABL Accredited Laboratory

Report No. - CEMC/UNAC/090621/N1

Issued Date-09.06.2021

### NOISE MONITORING TEST REPORT

Name & Address of the Client : M/s U.N AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY  
Date of Sampling : 02.06.2021  
Sampling by : Mr. B.k Samantray  
Sample Description : NOISE  
Reference No. : CEMC-09062021N1

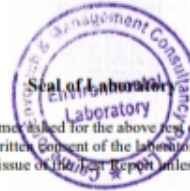
### ANALYSIS RESULT

Sl No.	Location	NL Day Time dB (A)			NL Night Time dB (A)		
		Max	Min.	Avg.	Max.	Min.	Avg.
1	Near Ad. Building	71.2	66.4	68.8	67.0	62.4	64.7

  
Authorized Signatory

Notes:

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- > This Test Report shall not be reproduced wholly or in part without prior written consent of the laboratory.
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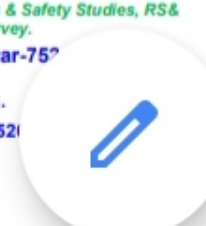


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E-mail- cemc\_consultancy@yahoo.co.in, cemc122@gmail.com, website: www.cemc.in.

Laboratory At: Plot No. 800/1274, Johal, Pahal, Bhubaneswar-752101, Odisha, India, Mobile: 7752101010  
E-mail: cemclab@yahoo.in



## 1.2.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 strategy.

A vehicle information data in the Pre audit stage of the college campus was collected through Google form. It was found that only 12% vehicle owner had pollution checked certificates.

Based upon this, the administration made it mandatory to obtain PUC for all the vehicles inside the campus.

No. of Cycles	No. of Two Wheelers	Pollution Checked Two wheelers	No. of Four Wheelers	Pollution Checked Four Wheelers	No. of e-vehicles
5	25	15	10	07	02

Under NAMP (National Air Quality Monitoring Program), three air pollutants viz., Sulphur dioxide (SO<sub>2</sub>), Nitrogen dioxides (NO<sub>2</sub>), 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. The air sample of the institute near administrative building was collected by professional of CEMC in a air sampler to measure the SPM and gaseous pollutants like SO<sub>2</sub> and NO<sub>2</sub> present in the ambient air. The trees cover on the campus is the leading sources to absorb CO<sub>2</sub> and release enough fresh O<sub>2</sub> 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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Report No. - CEMC/UNAC/090621/A1

Issued Date-09.06.2021

### AMBIENT AIR QUALITY TEST REPORT

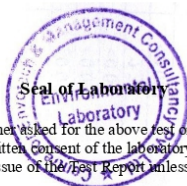
Name & Address of the Client : M/s U.N AUTONOMOUS COLLEGE OF SCIENCE & TECHNOLOGY  
Date of Sampling : 02.06.2021  
Sampling by : Mr. B.k Samantray  
Date of Sample Received : 02.06.2021  
Sample Description : AMBIENT AIR  
Sample Location : Near Admin Building  
Date of Analysis : 02.06.2021 to 08.06.2021  
Reference No. : CEMC-09062021A1

### ANALYSIS RESULT

Parameter	Unit	Result	NAAQ Standard-2009
Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	64.2	100
Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	35.4	60
Sulphur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	12.4	80
Oxides of Nitrogen (NO <sub>x</sub> )	µg/m <sup>3</sup>	16.6	80

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## **Chapter 7**

### **SUSTENANCE OF GREEN COVER IN THE CAMPUS**

Udayanath College covers an area of about 30 acres. The major portion is covered with vegetation and the main goal is to protect and conserve its biodiversity, fresh and clean ambiance through adopting correct approach and strategy. The institute has taken the following green initiatives to protect and conserve nature.

#### **1.1.Greeneries of the campus**

The campus of our rural Autonomous College is endowed with abundant greenery that never fail to mesmerize its students and visitors. As one enters the campus through the towering gates, a sense of tranquility and freshness immediately engulfs the surroundings. Lush green trees, neatly trimmed hedges, and colourful flowers are the main centre of attraction of the college. The college administration has put great efforts into maintaining and developing the natural beauty of the campus, making it a paradise for both academic and leisurely pursuits.

The many gardens and lawns scattered across the campus grounds provide perfect spots for students to immerse themselves in the beauty and simultaneously they get to gain about the scientific knowledge of the plants. The meticulous arrangement of flowering plants and shrubs creates a vibrant tapestry of colours that change with the seasons. It is not uncommon to see students and faculty members sitting under the shade of trees, reading, discussing, or simply enjoying the calmness that is impossible to find elsewhere. Studying amidst such green surroundings is known to enhance concentration levels and mental calmness.

Moreover, the greeneries on our campus are not limited to mere adornment. They play an important role in fostering a sustainable environment. The college has taken significant steps



towards eco-friendliness by promoting green practices such as waste recycling, and energy conservation. The lush greenery not only contributes to carbon sequestration but also acts as a natural shield against air pollution, creating a clean and healthy atmosphere for all.



### **1.1.Plantation Drives**

The college takes pride in its plantation efforts to enhance the green cover on the campus. Various native and non-invasive plant species are carefully selected and planted in designated areas. The plantation activities are carried out with the goal of promoting biodiversity and creating a sustainable ecosystem. The college also actively encourages students and faculty to

participate in plantation drives, instilling a sense of environmental responsibility and fostering a connection with nature. Many plantation drives are taken by the campus. Every year on 5th June i.e. World Environment Day, the college takes Plantation activity.

The trees are watered by students of various Departments. They nurture these trees throughout the year. Students of various departments make the plantation and nurturing program successful. This year due to covid there were no plantation of saplings were done. In the coming year new plantation drives and landscaping/beautification activities, all essential maintenance work (like lawn, hedge, existing plants /shrubs, growing of seasonal flowers) for previously developed flower and other gardens, as well as other locations of the campus, will be done regularly under the supervision of Horticulture Section.

Apart from the maintenance of gardens, all old plantations (like roadside and other plantations) in different locations of the University campus are regularly nurtured by cleaning, fertilization, watering, etc. In addition to that, campus celebrates various events like Special Plantation Drive every year on World Environment Day and other extension activities like the Plantation program. This year due to the pandemic and lockdown, there were no special event organised for the plantation programs.

The various occasions on which plantation is done in the campus are

- World Environment Day
- Van Mahotsav week
- Superannuation day of Employees
- Special visit by Dignitaries
- Alumni day



### **7.6. Campus Involvement**

The college campus is deeply involved in sustaining the green cover and promoting environmental consciousness. The students actively participate in tree plantation drives, creating small forests and groves within the campus. These efforts not only enhance the beauty of the campus but also contribute to carbon sequestration and mitigating climate change. Additionally, the college organizes awareness programs and workshops on sustainable practices like composting, waste reduction, and water conservation. The campus community is encouraged to actively participate in these initiatives, fostering a sense of responsibility towards the environment.

### **7.7. Environmental Conservation Programs of the Institute**

The college has developed a comprehensive environment conservation program that encompasses various initiatives. One of the key aspects of this program is waste management,

which includes proper segregation, recycling, and composting. The college also emphasizes the reduction of plastic usage on campus and advocates for eco-friendly alternatives. Additionally, energy conservation measures such as the use of solar power and energy-efficient lighting systems have been implemented. The college regularly organizes awareness campaigns, workshops, and seminars on environmental conservation to educate and empower its students and faculty in sustainable practices. The efforts of the college in creating a greener and more sustainable campus showcase its commitment towards environmental stewardship.

In addition to new plantation drives and landscaping/beautification activities, all essential maintenance work (like lawn, hedge, existing plants /shrubs, growing of seasonal flowers) for previously developed flower and other gardens, as well as other locations of the University campus, is done regularly under the supervision of Horticulture Section. Apart from the maintenance of gardens, all old plantations (like roadside and other plantations) in different locations of the University campus are regularly nurtured by cleaning, fertilization, watering, etc. In addition to that campus celebrates various events like Special Plantation Drive every year on World Environment Day and other extension activities like the Plantation program

## CHAPTER-8

### FLORAL DIVERSITY OF THE CAMPUS

UNC is within the geo-position between latitude 20.211299°N and longitude 86.015066° 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.

## FLORAL DIVERSITY OF THE INSTITUTE

SERIAL NO.	PLANT TYPE	APPROX. NUMBER
1.	Herbs	25
2.	Shrubs	15
3.	Trees	23
4.	Grasses	07
5.	Climbers	05
6.	Parasites	02
7.	Epiphytes	02
8.	Gymnosperms	03
9.	Pteridophytes	04
10.	Bryophytes	03
11.	Hydrophytes	05
12.	Mangrove & mangrove associates	06
13.	RET species	07
	<b>TOTAL</b>	107

## TOTAL FLORISTIC RECORD OF UNC CAMPUS, ADASPUR, CUTTACK

### HERBS

SL. NO.	SCIENTIFIC NAME	FAMILY
1.	<i>Acalypha indica</i>	Euphorbiaceae
2.	<i>Achyranthes aspera</i>	Amaranthaceae
3.	<i>Adhatodavasic</i>	Acanthaceae
4.	<i>Aervalanata</i>	Amaranthaceae
5.	<i>Althernanthera brasiliana</i>	Amaranthaceae
6.	<i>Alternanthera sessilis</i>	Amaranthaceae
7.	<i>Amaranthus viridis</i>	Amaranthaceae
8.	<i>Antirrhinum majus</i>	Plantaginaceae
9.	<i>Centella asiatica</i>	Apiaceae
10.	<i>Chromolaena odorata</i>	Asteraceae

11.	<i>Chrysanthamumcoronarium</i>	Asteraceae
12.	<i>Cleome gynandra</i>	Capparaceae
13.	<i>Cleome visoca</i>	Capparaceae
14.	<i>Clerodendruminerve</i>	Verbenaceae
15.	<i>Clerodendrum serratum</i>	Verbenaceae
16.	<i>Clerodendrum viscosum</i>	Verbenaceae
17.	<i>Coelusamboinicus</i>	Lamiaceae
18.	<i>Coeluscutellarioides</i>	Lamiaceae
19.	<i>Colocasia esculenta</i>	Araceae
20.	<i>Commelinakurzii</i>	Commelinaceae
21.	<i>Commelinalongifolia</i>	Commelinaceae
22.	<i>Costus speciosus</i>	Zingiberaceae
23.	<i>Crinum asiticum</i>	Amaryllidaceae
24.	<i>Croton bonplandianus</i>	Euphorbiaceae
25.	<i>Desmodium gangeticum</i>	Fabaceae

## SHRUBS

SERIAL NO.	SCIENTIFIIC NAME	COMMON NAME	FAMILY
1.	<i>Acalyphawilkesiana</i>	-	Euphorbiaceae
2.	<i>Allamandablanchetii</i>	-	Apocynaceae
3.	<i>Allamandacathartica</i>	-	Apocynaceae
4.	<i>Annonasquamosa</i>	Aata	Annonaceae
5.	<i>Breyniaretusa</i>	Jajanga	Phyllanthaceae
6.	<i>Carmona retusa</i>	Purnamari	Boraginaceae
7.	<i>Cassia ocedentalis</i>	Banachakunda	Fabaceae
8.	<i>Cestrum nocturnum</i>	Hena	Solanaceae
9.	<i>Dracaena reflexa</i>	-	Asparagaceae
10.	<i>Durantaerecta</i>	Bayakoli	Verbenaceae
11.	<i>Euphorbia tithymaloides</i>	-	Euphorbiaceae
12.	<i>Gardenia jasminoides</i>	Sugandharaj	Rubiaceae
13.	<i>Glycomispentaphylla</i>	Chauladhua	Rutaceae
14.	<i>Indigoferatinctoria</i>	Nilachara	Fabaceae
15.	<i>Ixoracoccinea</i>	Katharangani	Rubiaceae

## TREES

SL. NO.	SCIENTIFIC NAME	LOCAL NAME	FAMILY
1.	<i>Acacia auriculiformis</i>	Acacia	Mimosaceae
2.	<i>Aeglemarmelos</i>	Bela	Rutaceae
3.	<i>Albizialebeck</i>	Sirisa	Fabaceae
4.	<i>Alstoniascholaris</i>	Chatiana	Apocynaceae
5.	<i>Anacardium occidentale</i>	Kaju	Anacardiaceae

6.	<i>Areca catechu</i>	Gua	Areaceae
7.	<i>Artocarpusheterophyllus</i>	Panasa	Moraceae
8.	<i>Artocarpuslacucha</i>	Jeuta	Moraceae
9.	<i>Averrhoacarambola</i>	Karamanga	Oxalidaceae
10.	<i>Bauhineapurpurea</i>	Barada	Fabaceae
11.	<i>Bauhineavariegata</i>	Kanchana	Fabaceae
12.	<i>Bauhinia racemose</i>	Ambralata	Fabaceae
13.	<i>Callophyluminophyllum</i>	Polanga	Clusiaceae
14.	<i>Caricapapya</i>	Amrutabhanda	Caricaceae
15.	<i>Casuarinaeuqisetifolia</i>	Jhaun	Casuarinaceae
16.	<i>Calliandrahaematocephala</i>	-	Fabaceae
17.	<i>Cinnamomumzeylanicum</i>	Tejapatra	Lauraceae
18.	<i>Citrus grandis</i>	Batapi	Rutaceae

### GRASSES

SERIAL NO.	SCIENTIFIC NAME	LOCAL NAME	FAMILY
1.	<i>Bambusaventricosa</i>	-	Poaceae
2.	<i>Chlorisbarbata</i>	-	Poaceae
3.	<i>Cymbopogonflexuosus</i>	Dhanwantari	Poaceae
4.	<i>Cynodondactylon</i>	Dubaghasa	Poaceae
5.	<i>Cyperusrotundus</i>	Mutha	Cyperaceae
6.	<i>Dactylocteniumaegyptium</i>	Kakuria	Poaceae
7.	<i>Digitariaciliaris</i>	-	Poaceae

### CLIMBERS

SERIAL NO.	SCIENTIFIC NAME	LOCAL NAME	FAMILY
1.	<i>Abrusprecatorius</i>	Kaincha	Fabaceae
2.	<i>Aganosmacaryophyllata</i>	Gandhamalati	Apocynaceae
3.	<i>Bougainvillea spectabilis</i>	Kagajaphula	Nyctaginaceae
4.	<i>Cephalandraindica or Cocciniagrandis</i>	Kainchikakudi	Cucurbitaceae
5.	<i>Gymnemasylvestre</i>	Gudamari	Apocyanaceae

### PARASITES

SERIAL NO.	SCIENTIFIC NAME	LOCAL NAME	FAMILY
1.	<i>Cassythafiliformis</i>	Nirmuli	Lauraceae
2.	<i>Cuscutareflexa</i>	Malanga	Cuscutaceae



## EPIPHYTES

SERIAL NO.	SCIENTIFIC NAME	LOCAL NAME	FAMILY
1.	<i>Pterisvittata</i>		Pteridaceae
2.	<i>Vanda tessellate</i>	Rasna	Orchidaceae

## GYMNOSPERMS

SERIAL NO.	SCIENTIFIC NAME	LOCAL NAME	FAMILY
1.	<i>Cycasrevoluta</i>	King sago palm	Cycadaceae
2.	<i>Cycascircinalis</i>	Queen sago	Cycadaceae
3.	<i>Pinusroxburghii</i>	Chir pine	Pinaceae

## PTERIDOPHYTES

SERIAL NO.	SCIENTIFIC NAME	LOCAL NAME	FAMILY
1.	<i>Adiantumpedatum</i>		Pteridiaceae
2.	<i>Azollapinnata</i>		Azollaceae
3.	<i>Christellaparasitica</i>		Thelypteridaceae
4.	<i>Christelladentata</i>		Thelypteridaceae

## BRYOPHYTES

SERIAL NO.	SCIENTIFIC NAME	FAMILY
1.	<i>Funariahygrometrica</i>	Funariaceae
2.	<i>Marchantiapolymorpha</i>	Marchantiaceae
3.	<i>Ricciahuebeneriana</i>	Ricciaceae

## HYDROPHYTES

SERIAL NO.	SCIENTIFIC NAME	FAMILY
1.	<i>Eichhorniacrassipes</i>	Pontederiaceae
2.	<i>Hydrillaverticillata</i>	Hydrocharitaceae
3.	<i>Hydroleazeylanica</i>	Hydroleaceae

4.	<i>Lemnaperpusilla</i>	Lemnaceae
5.	<i>Nymphaeapubescens</i>	Nymphaeaceae

#### MANGROVE & MANGROVE ASSOCIATES

SERIAL NO.	SCIENTIFIC NAME	FAMILY
1.	<i>Acanthus illicifolius</i>	Acanthaceae
2.	<i>Acrostichumaureum</i>	Pteridaceae
3.	<i>Aegicerascorniculatum</i>	Primulaceae
4.	<i>Avicennia alba</i>	Acanthaceae
5.	<i>Avicennia marina</i>	Acanthaceae
6.	<i>Brugieragymnorhiza</i>	Rhizophoraceae

#### RET SPECIES

SERIAL NO.	SCIENTIFIC NAME	FAMILY
1.	<i>Anogeissusacuminata</i>	Combretaceae
2.	<i>Anogeissuslatifolia</i>	Combretaceae
3.	<i>Dimorphocalyxglabellus</i>	Euphorbiaceae
4.	<i>Guatteriasimiarum</i>	Annonaceae
5.	<i>Litseaglutinosa</i>	Lauraceae
6.	<i>Madhucalongifolia</i>	Sapotaceae
7.	<i>Mesuaferrea</i>	Callophyllaceae

#### 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.

#### AVIFAUNAL DIVERSITY

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME
1.	Common kingfisher	<i>Alcedoatthis</i>
2.	Common myna	<i>Acridotherestrictis</i>
3.	Spotted owl	<i>Athenebrama</i>
4.	Pied kingfisher	<i>Cerylerudis</i>
5.	Greater coucal	<i>Centropussinensis</i>
6.	Blue rock pigeon	<i>Columba livia</i>
7.	House crow	<i>Corvussplendens</i>
8.	Indian cuckoo	<i>Cuculuscahorus</i>
9.	Thick-billed flowercatcher	<i>Diceum agile</i>
10.	Black drongo	<i>Dicrurusmacrocerus</i>
11.	Asian koel	<i>Eudynamysscolopacea</i>
12.	Purple sunbird	<i>Nectariniaasiatica</i>
13.	House sparrow	<i>Passer domesticus</i>
14.	Baya weaver	<i>Ploceusphilippinus</i>
15.	Red- vented bulbul	<i>Pycnonotuscafer</i>
16.	Red- whiskered bulbul	<i>Pycnonotusjocosus</i>
17.	Rose ringed parkeet	<i>Psittaculakrameri</i>
18.	Spotted dove	<i>Streptopeliachinensis</i>

#### BUTTERFLIES & INSECTS

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME
1.	Plum judy	<i>Abisaraecheirus</i>
2.	American house spider	<i>Achaearanaepidariorum</i>
3.	Tawny coster	<i>Acraeaviolae</i>
4.	Honey bee	<i>Apismellifera</i>
5.	Common sergent	<i>Athymaperius</i>
6.	Cockroach	<i>Blattodea</i>

#### REPTILES

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME
1.	Striped keelback	<i>Amphiesmastolata</i>
2.	Common krait	<i>Bungaruscaeruleus</i>
3.	Indian Garden Lizard	<i>Calotesversicolor</i>
4.	Russell's viper	<i>Daboiarusselii</i>
5.	Keeled Indian Mabuya	<i>Eutropiscarinata</i>
6.	Checkeredkeelback	<i>Fowleapiscator</i>

7.	House Gecko	<i>Hemidactylusbrookii</i>
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#### MAMMALS

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME
1.	Lesser bandicoot rat	<i>Bandicotabengalensis</i>
2.	Dog	<i>Canis lupus familiaris</i>
3.	Cat	<i>Feliscatus</i>
4.	Indian palm squirrel	<i>Funambuluspalmarum</i>
5.	Rhesus monkey	<i>Macacamulatta</i>

#### AMPHIBIANS

SERIAL NO.	COMMON NAME	SCIENTIFIC NAME
1.	Asian Toad	<i>Duttaphrynusmelanostictus</i>
2.	Indian Bull Frog	<i>Hoplobatrachustigerinus</i>

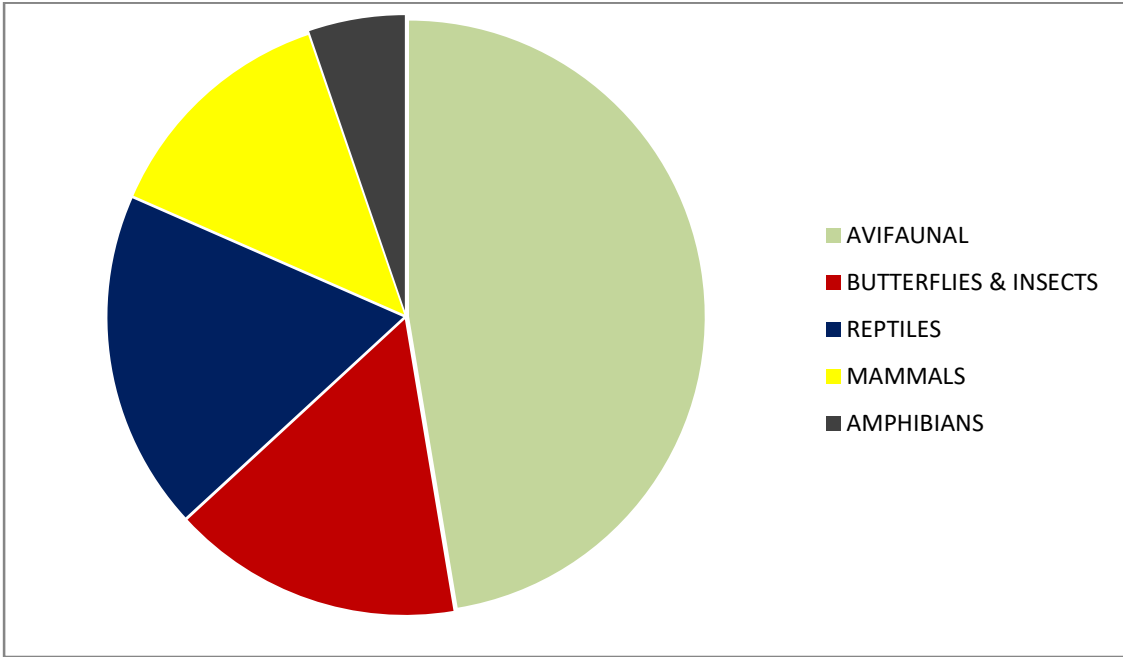


Figure: Faunal diversity of UNC Campus, Adaspur, Cuttack

## Chapter 9

### CARBON FOOTPRINTS FOR HEALTHY ENVIRONMENT

Carbon is an essential element for life on Earth. It is present in all living organisms as a key component of organic compounds. Carbon dioxide (CO<sub>2</sub>), a compound of carbon and oxygen, plays a significant role in maintaining the Earth's temperature through the greenhouse effect. This effect helps the planet retain enough heat to support life. However, human activities such as burning fossil fuels, deforestation, and industrial processes have led to a significant increase in carbon dioxide concentrations in the atmosphere. The excess CO<sub>2</sub> traps more heat, leading to global warming and climate change. This alteration in the climate pattern has severe consequences, including rising sea levels, altered weather patterns, and the loss of biodiversity. Carbon compounds also play a crucial role in various environmental processes. For example, carbon is a fundamental component of organic matter in soil. It is vital for soil fertility, as it provides essential nutrients for plant growth and nourishes the microbial ecosystem. Additionally, carbon compounds are used in water treatment processes and as a basis for various industries, including plastics, textiles, and pharmaceuticals.

#### 9.1. Carbon footprint

Carbon footprints are a measure of the total greenhouse gas emissions produced by an individual, organization, or product. It serves as an indicator of the impact of human activities on climate change. The footprints primarily focus on carbon dioxide (CO<sub>2</sub>) emissions, but also consider other greenhouse gases like methane and nitrous oxide.

Carbon footprints measure the amount of greenhouse gas emissions, mainly carbon dioxide, released into the atmosphere as a result of human activities. These footprints are essential for understanding the impact of our actions on climate change. By calculating and analyzing carbon footprints, organizations and individuals can recognize the areas where they contribute to greenhouse gas emissions and take necessary steps to reduce them. It helps in raising awareness, creating benchmarks, implementing strategies, and promoting sustainable development.

The concept of carbon footprints has gained significant importance in recent years due to the growing concern about climate change. It helps individuals and organizations understand their contribution to greenhouse gas emissions and take necessary actions towards reducing them. By calculating carbon footprints, one can identify the major sources of emissions and implement strategies to mitigate their impact on the environment.

## **9.2. Efforts for Carbon Neutrality**

These days many colleges in India are increasingly recognizing the importance of reducing their carbon footprints and striving for carbon neutrality. With their potential to influence and educate the younger generation, colleges can lead by example and inspire sustainable practices. Several initiatives are being undertaken by UNC to achieve carbon neutrality.

- One of the significant efforts is the installation of renewable energy systems. UNC is investing in solar panels to generate clean and sustainable electricity. By shifting to renewable energy sources, it strives to reduce its reliance on fossil fuels and lower its carbon emissions. This step not only contributes to carbon neutrality but also promotes a clean energy transition.
- Another approach adopted by the college is the implementation of energy-efficient technologies. By replacing traditional lighting systems with energy-saving LED lights, optimizing HVAC systems, and encouraging the use of energy-efficient appliances, colleges can significantly reduce their electricity consumption and, consequently, their carbon footprints.
- UNC also promotes sustainable transportation options. By encouraging students and staff to use public transportation, bicycles, or carpooling, it reduces the emissions associated with commuting. Implementation of electric vehicle charging stations on campus also encourages the use of eco-friendly vehicles.

- Furthermore, it raises awareness and conducts educational programs on climate change and sustainability. By organizing seminars, workshops, and campaigns, UNC educates its students and staff about the significance of carbon neutrality. Such initiatives help foster a culture of sustainability and motivate individuals to adopt environmentally friendly practices.
- It also takes steps to reduce paper waste and promotes digitalization. By adopting online documentation and digital communication systems, UNC minimizes paper consumption and decreases its carbon footprint associated with deforestation and paper production.

In conclusion, the college along with all its staff and students work hard and are sincere with their efforts towards achieving a state of sustainable carbon neutrality. By focusing on renewable energy, energy efficiency, sustainable transportation, and raising awareness it significantly reduces its carbon footprints. These efforts not only contribute to mitigating climate change but also inspire students and communities to adopt sustainable practices in their lives. Achieving carbon neutrality is a collective responsibility, and however small it may be, our college always tries to actively contribute towards this global movement.

### **Electricity Carbon Footprint**

Electricity generation is a significant contributor to carbon footprints. The college has taken notable steps to reduce its electricity carbon footprint. It has installed solar panels on rooftops to harness clean energy and reduce dependency on fossil fuel-based electricity. Additionally, energy audits have been conducted to identify areas of high energy usage and find energy-saving solutions. Efficient lighting systems and motion sensors have been installed to reduce unnecessary energy consumption.

In the campus, electricity is used for various purposes like residential, office use, and laboratories. The total electricity used in the campus liberates mass kg of CO<sub>2</sub> per year. The laboratory equipment consumes the highest electricity which emits a large amount of carbon



CO<sub>2</sub> per year. The solar panels are installed on the roof of various buildings produce electricity from solar panels which further saves ample mass of CO<sub>2</sub> per year.

### **Paper Footprint**

The paper footprint is another aspect that the college considers in its environmental audit. The usage of paper contributes to deforestation, which in turn contributes to increased carbon dioxide levels. To address this issue, the college has adopted measures such as promoting digital documentation, encouraging double-sided printing, and educating staff and students about the importance of reducing paper consumption. Additionally, recycling initiatives have been implemented to ensure that used paper is reused efficiently.

### **Conclusion**

Understanding and addressing carbon footprints are vital for our college's environmental audit. It allows us to assess our impact on climate change and take necessary measures to reduce emissions. By implementing sustainable practices and promoting renewable energy, our college is making significant efforts towards carbon neutrality. However, more can be done to further reduce our carbon footprint and mitigate climate change impacts.

### **Recommendations**

To improve our carbon footprint, the college should consider implementing the following recommendations:

- a) Strengthening renewable energy initiatives by investing in additional solar panels or exploring other alternative energy sources.
- b) Promoting bicycle usage on campus and encouraging carpooling among students and staff to reduce transportation-related emissions.
- c) Increasing awareness and education on climate change and carbon footprints among students and staff through workshops, seminars, and awareness campaigns.

d) Implementing a comprehensive waste management system that includes proper disposal and recycling of waste materials.

e) Collaborating with local communities and organizations to implement reforestation projects and carbon offsetting initiatives.

### **Carbon Sequestration**

Carbon sequestration can play a crucial role in further reducing our carbon footprint. Our college should explore opportunities to establish green areas and plant trees on the campus. Trees act as carbon sinks, absorbing carbon dioxide during photosynthesis and storing it in their biomass. Additionally, the college can explore partnerships with organizations involved in sustainable forestry and carbon offset programs to contribute to sequestration efforts.

In summary, understanding carbon footprints helps in assessing the impact of our activities on climate change. Our rural Autonomous College acknowledges the significance of reducing carbon footprints and has implemented various measures to achieve carbon neutrality. By addressing electricity consumption, paper usage, and promoting sustainable practices, we can continue to make significant progress towards mitigating climate change and creating a more sustainable future.

## 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. Additionally, energy conservation measures like LED lighting and energy-efficient appliances should be implemented to further reduce energy consumption.

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.

Lastly, transportation was found to be a major contributor to the college's carbon emissions. It is recommended that the college encourage the use of public transport and carpooling among students and staff. Additionally, cycling facilities and infrastructure should be improved to encourage sustainable commuting options.

Overall, the environment audit of U.N. Autonomous College 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.

## RECOMMENDATIONS

U. N. Autonomous College takes efforts to dispose of majority of wastes by proper methods.

- Green computing i.e. online payment systems, online circulars, and examination procedures are helpful for reducing the use of papers and ultimately reducing carbon footprint.
- Reducing the use of one-time use plastic bottles, cups, folders, pens, bouquets, decorative items will be useful to solve the problem of plastic pollution to some extent.
- Biodegradable waste is used efficiently for composting and vermicomposting.
- Use of LED lamps and Tube Lights is to be encouraged
- Toilets and bathrooms are consuming more water in the departments. Thereplacement of old taps can be beneficial for solving this issue The use of electric cars on the campus is a good initiative to save fuel.
- The overall ambient air quality on the campus is good while some air quality issues that may arise due to developmental activities on the campus should be addressed.
- The sound levels on the campus are good. Science departments are following the principles of Green Chemistry to reduce chemical waste
- An environmental policy document has to be prepared with all the recommendations and current practices carried by the university. A frequent visit should be conducted to ensure that the generated waste is measured, monitored and recorded regularly and information should be made available to the administration.
- The university should develop internal procedures to ensure its compliance with environmental legislation and responsibility should be fixed to carry out it in practice.
- The solid waste should be reused or recycled at maximum possible places.
- Installation of sensor-based electrification items like fans, lights, etc. can save electricity Installation of solar panels and rainwater harvesting system to every terrace of the building will be useful in conserving the natural resources.
- Regular checkups and maintenance of pipes, overhead tanks, and plumbing systems should be done by the engineering section to reduce overflow, leakages, and corrosions.

Science laboratories large amount of water goes waste during the process of making distilled water; the system should develop to reuse this water for other purposes. The solar distillation unit is installed at the earliest.

- No such processes or activities were observed at institute which can deteriorate the environmental quality.

The college is in continuous efforts to spread the environmental awareness programs among staff and students. It was also observed that the UNC campus is keeping the environmental quality at priority in every developmental stage.







