Environment Audit Report

A step towards protecting the environment

2021-22

TRIMURTI SHIKSHAN SANSTHA'S

SMT. VIMALBAI UTTAMRAO PATIL ARTS AND LATE DR. BHASKAR SADASHIV DESALE SCIENCE COLLEGE, SAKRI

Dist. Dhule, Maharashtra, India

Environment Audit

Green Audit

Energy Audit

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- Principal of the college
- IQAC Members
- Environment Audit coordinator
- Teaching & Supporting Staff of College

For giving us the necessary inputs to carry out this very vital exercise of Environment Audit. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

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INTRODUCTION

TRIMURTI SHIKSHAN SANSTHA'S SMT. VIMALBAI UTTAMRAO PATIL ARTS AND LATE DR. BHASKAR SADASHIV DESALE SCIENCE COLLEGE, SAKRI aim at creating awareness about environmental awareness. The college takes lead in organizing different events on green practices to know the knowledge among students, teachers, and non-teaching staff. This green message in the form of an environmental audit report being transferred along with its practical dimensions among the families, societies and thereby to the stakeholders, forms a chain and network to spread the message at large. College is additionally geared toward giving resolution to the various burning topics associated with the environment, its awareness still as its protection. As the government is taking initiative to inform about environmental protection, newer concepts are being introduced to make colleges eco-friendly. To create and conserve the environment within the TRIMURTI SHIKSHAN SANSTHA'S SMT. VIMALBAI UTTAMRAO PATIL ARTS AND LATE DR. BHASKAR SADASHIV DESALE SCIENCE COLLEGE, SAKRI campus and to solve the environmental problems such as raising the energy savings and conservation, water reduction, water harvesting, solid waste management, improvement in the air quality of the campus, control noise pollution, and minimizing the use of Plastic, etc. is one of the prime objectives of the college.

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. An Environment audit provides an assessment of the environmental performance of a business or organization. The environment audit report is one such initiative that has been introduced to create a college environmentally sustainable and active in spreading education concerning constant. it's a tool to assess general practices enforced by the organization in terms of the impact on the environment. The report additionally aims to unfold awareness of the adverse practices that are accountable for the degradation of the environment and the way powerfully the institute is concerned in curtailing those practices. It helps in recognizing the necessity for colleges to figure around the academic year **2021-22** for environmental sustainability. Thus, the Environment audit forms the baseline survey to decide on the **Green policy**.

ENVIRONMENT AUDIT: A STEP TOWARDS PROTECTING THE ENVIRONMENT

The rapid urbanization with economic development at the local, regional and global levels has led to numerous environmental and ecological catastrophes. Environment auditing is the process of documentation and determination of the institution's practices in creating awareness and practising environment-friendly measures. Over the period overexploitation of natural resources like energy, water, soil, vegetation, etc. has resulted in environmental degradation which will be a crisis in future. It is necessary to check whether our way of living and handling resources is not going to cause detrimental effects on our surroundings.

In this context it becomes essential to adopt the system of the Green Campus for the college which will lead to sustainable development and at the same time decrease a sizable amount of atmospheric pollution from the environment, conserve water and many more. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it compulsory that all Higher Educational Institutions should submit an annual Green Audit/ Environment Audit Report. Moreover, it is part of the Corporate Social Responsibility of Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures. The environment audit Report aims at summarising the college's contribution and its activeness in creating awareness and consciousness in practically applying environmentally friendly measures towards an institute in A.Y. 2021-22.

ENVIRONMENTAL SETTING OF THE COLLEGE

The college has a sprawling pollution-free campus on the west side of Sakri town. Sakri is a town and taluka in the Dhule district of Nashik Division, Maharashtra, and It is located on National Highway No. 6 which is now Asian Highway AH 46. This highway connects it with the larger Delhi-Mumbai Industrial Corridor (DMIC) which once completed will be game-changing for industrial investments and growth. The Panzara river flows through the city. Sakri is a developing town in North Maharashtra.

In Sakri, the wet season is hot, oppressive, and mostly cloudy and the dry season is sweltering and mostly clear. Over the year, the temperature typically varies from 12°C to 38°C and is rarely below 11°C or above 42°C while the average annual rainfall is 700 mm.

The college campus is spread over 2.10 acres which include about 0.32-acre sports ground and a 0.58-acre green area situated at the 405 m (1,329 ft) MSL. College is easily accessible by road for the rural area which is 20 km away. Although the campus is located in a residential area, the presence of a green belt including dense tree cover has considerably reduced noise pollution and provided fresh air on the campus. The College campus area has an academic building, a sports auditorium and a canteen.

OVERVIEW OF INSTITUTE

Established in 1998, we are one of the proud and resource-rich establishments of 'Trimurti Shikshan Sanstha, Sakri, Dist. Dhule'. Our college is gifted with the most experienced teachers, a rich books library, best infrastructure resource. We are one of the prominent educational institutions established by 'Trimurti Shikshan Sanstha, Sakri' With the visionary approach of the honourable Late Dr. Bhaskar Sadashiv Desale. We are committed and fully devoted to social reforms through mass education and are located in the hilly and rural region of Dhule district and affiliated with North Maharashtra University, Jalgaon. We offer Undergraduate Degree Courses in Arts and Science Faculty in various special subjects along with Post Graduation Degree Master in Arts courses. Do take a moment to navigate through our Courses and Facilities offered and keep visiting for the latest updates and announcements.

VISION

To contribute nation building through quality higher education in rural, tribal and hilly areas and creating highly educated, righteous, conscious and self-reliant students.

MISSION

To provide quality higher education to students from Adivasi, backward, rural and economically weaker sections including women in order to holistic development of them.

CORE VALUES

- Academic Excellence
- Social Commitment
- Skill Development
- Value Orientation
- Nation Building

OBJECTIVES

1. To inculcate the moral and ethical values among the rural students.
2. To provide facilities to the students by given them opportunities to face all.
3. To introduce courses which are currently relevant to need of the national and self-employment.
4. To promote the faculty for research, and participation in state, national, international seminars, workshops and conferences.
5. To impart qualitative higher education to the students.
6. To aim overall personality development of the students through extra-curricular activities in association with various social and cultural organizations.
7. To shoulder the responsibilities of generating & promoting awareness and devote time for society.
8. To create a positive attitude and approach, motivating and providing support, organize co-curricular or extra-curricular activities, promoting research culture, encourage teachers to organize seminars, workshops for motivating students to learn beyond the curricular accepts.

COLLEGE PROFILE

- Affiliating University –North Maharashtra University, Jalgaon
- Year of Establishment –1998
- Year of Affiliating: Permanent Affiliation No. NMU/5/T.No.06/Permanent 2010-2011/647/2010
- Year of Recognition (UGC) – U/S 2(F) – F.No.8 220/2009 (CPP-I) 2 Sep. 2009
  – U/S 12(B)- of UGC Act 1956. Applied

AIMS AND OBJECTIVE

TRIMURTI SHIKSHAN SANSTHA'S SMT. VIMALBAI UTTAMRAO PATIL ARTS AND LATE DR. BHASKAR SADASHIV DESALE SCIENCE COLLEGE, SAKRI conducted an Environment auditing survey for the year 2021-2022. The primary aim of this report is to analyse the environmental profile of the college for Green Audit, Energy Audit and Environmental Audit. The following were the objectives:

- A baseline survey to recognize the real status of green practices.
- Identification of the problems faced while practising green practices on the college campus.
- Inspection of the current practices that have an impact on the environment such as natural resource utilization, waste management, energy conservation etc.
- Analysis and suggestion for the plausible solutions for problems identified from the Audit Report.
- Increasing and spreading the awareness for environmental awareness and sustainable use of resources amongst the students, teaching and non-teaching staff members.
- Identification and assessment of any environmental risk if any inside the college campus.
- Enhancement of College profile.
- Improving environmental standards of the institute.
- Financial savings through a reduction in resource use.
- Giving direction and guidance working on local environmental issues.

DATABASE AND METHODOLOGY

The present study is based on visits to the college, personal observations, and a primary database that was collected using sets of questionnaires and other survey tools. The audit report was divided into different areas viz, Carbon footprint, Electricity and Energy audit, water and water management audit, waste management audit, etc. For a proper survey whole campus was divided into different sections, based on data requirements, sets of questionnaires about electricity consumption, water consumption, fuel waste, solid waste collection etc. The WorldView-3's satellite 31cm resolution multi-spectral data is used for supervised classification for preparing a Land use map. The software ERDAS-2022 and ArcGIS Pro 3.0.2 is used for data processing. Calculating carbon footprint using the following formulas,

Electricity: use (kWh/yr) * EF (kg CO_2e/kWh) = emissions (kg CO_2e/yr)
Fuel Oil: use (litres/yr) * EF (kg CO_2e/litre) = emissions (kg CO_2e/yr)
Where EF = emissions factor

Electrical vehicles' CO_2 emissions have been calculated by their consumption of electrical energy. Consumed energy emission is calculated by its generation of energy emission. A noise measuring app, Noise test pro, was used to measure the noise level. Noise test pro detects any noise, music or sound in your surroundings. It will show maximum, minimum and average decibels. Light intensity was measured using the Lux Meter app.

ANALYSIS OF THE DATABASE

The database has been prepared for statistical analysis for the Environment audit using Minitab and IBM SPSS statistical software. The surveys from each group were tabulated in Excel spreadsheets. The tabulated data were further analyzed through statistical analysis and computing. For a better understanding of the results and to avoid complications, averages and percentages of the tables were taken. A graphical representation of these results was made to give a summarized picture of the status. The outcome was interpreted with the overall consequences, conclusion and plausible solutions or steps for them.

Environment Audit Analysis

CARBON FOOTPRINT

A carbon footprint is the total greenhouse gas emissions caused directly and indirectly by an individual, organization, event or product. A carbon footprint is the total amount of greenhouse gases including carbon dioxide and methane that are generated by our actions. carbon footprint, the amount of carbon dioxide (CO_2) emissions associated with all the activities of a person or other entity e.g., building, corporation, country, etc. It includes direct emissions, such as those that result from fossil fuel combustion in manufacturing, heating, and transportation, as well as emissions required to produce the electricity associated with goods and services consumed. It is calculated by summing the emissions resulting from every stage of a product or service's lifetime. The calculations for CO_2 emission were done using the method reported in the methodology. CO_2 emission has been calculated annually by vehicle category of college staff and students.

The highest CO_2 emissions (9247.50 kg) has been reported by Public Transport use by Students, after that Two-wheelers used by Students reported 4591.485 kg of CO_2 emissions while the lowest CO_2 emissions (592.43 kg) has been reported by Four-Wheeler used by college teaching and non-teaching Staff. Total CO_2 emission for the year 2021-22 of all the vehicles have been 20248.04 kg by the college into the atmosphere. The campus does not have a diesel generator. Electrical vehicles used by Student's CO_2 emissions are low i.e., 654.80 kg. The college contributes **25.84 kg per day of CO_2 emission** to the atmosphere by using electrical energy, in this way in A.Y. 2021-21 total CO_2 emission to the atmosphere by using electrical energy was 5814 kg. Overall CO_2 emission to the atmosphere in A.Y. 2021-21 by all activity was **26062.04 kg**.

Table 1 Aggregate CO_2 emission for the year 2021-22 of all the vehicles

Type of Vehicles	No of vehicles	CO_2 emission (kg)
Four-Wheeler (Staff)	6	592.434
Four-Wheeler (Students)	0	0
Two-Wheeler (Staff)	26	2387.5722
Two-Wheeler (Students)	50	4591.485
Electrical vehicles (Staff)	0	0
Electrical vehicles (Students)	20	654.804
Bicycles (Staff)	13	0
Bicycles (Students)	150	0
Public Transport (Staff)	2	2774.25
Public Transport (Students)	5	9247.5

(Source: CO_2 emissions were calculated by using counting of vehicles)

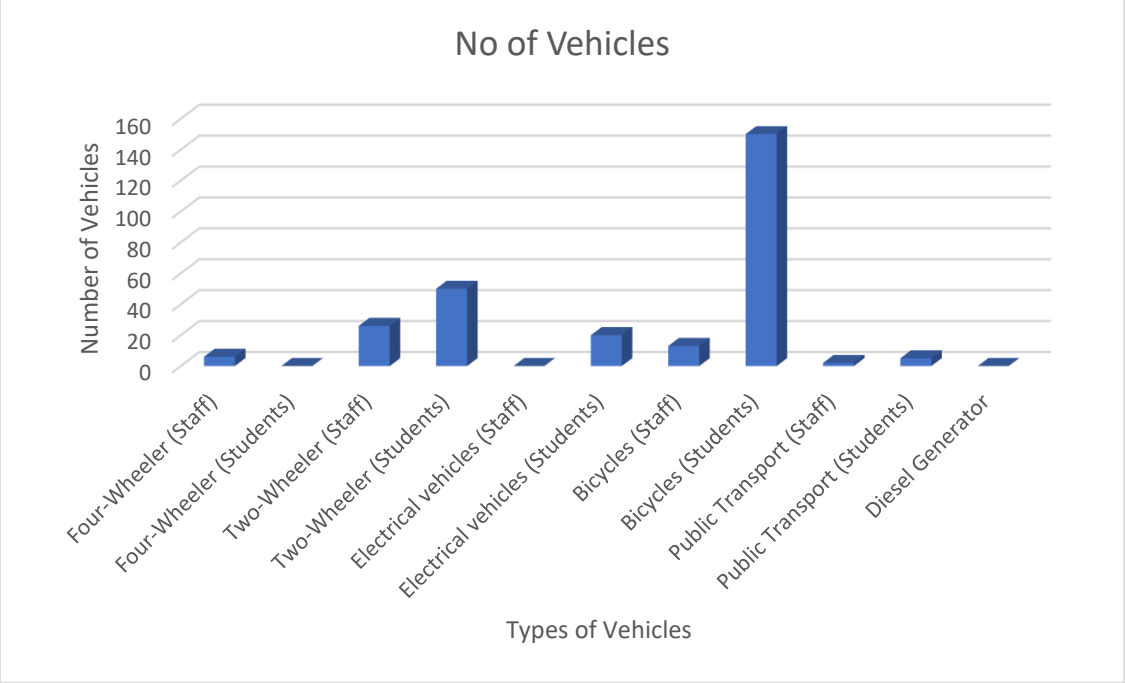

Figure 1 Types of Vehicles

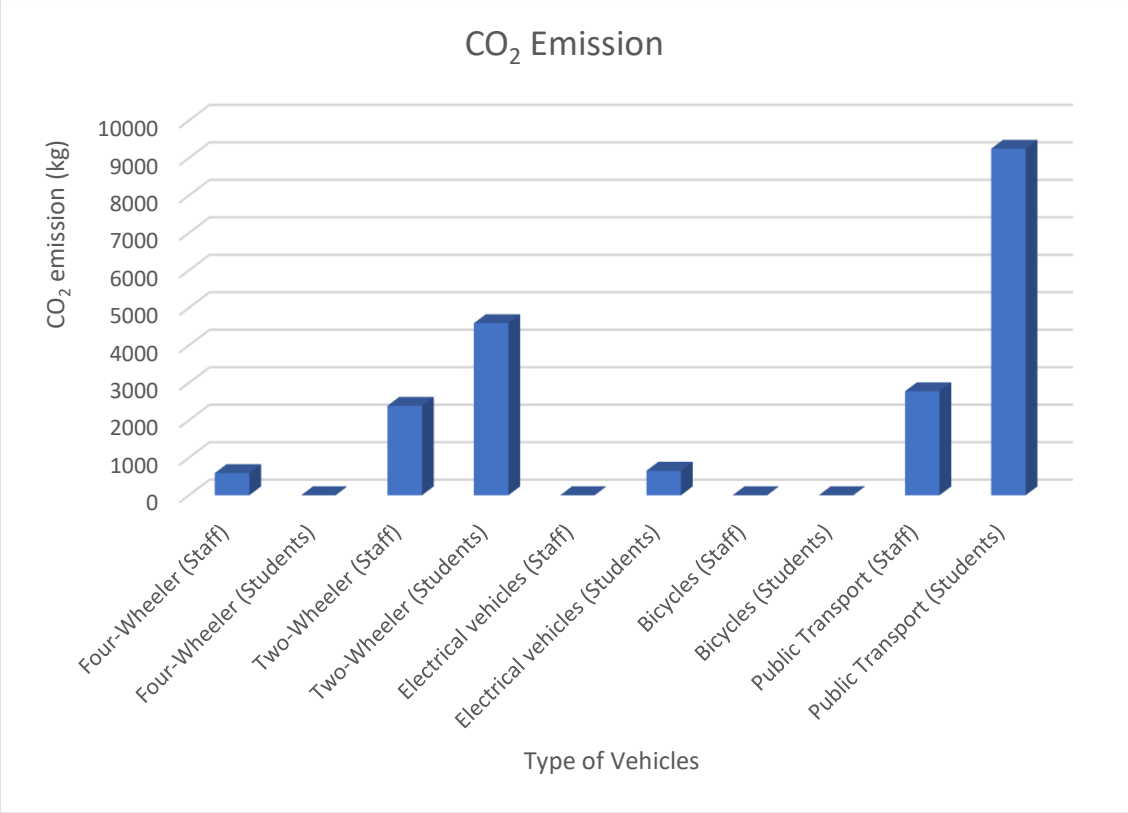

Figure 2 Total CO_2 Emission by Vehicles in A.Y. 2021-22

GREEN AUDIT

The campus area 8470 m^2 (2.10 Acre) consists of the following regions as stated below for land consumption in the built-up area of the college: The central region is densely built-up having Main Administrative Block, departments, lecture rooms and an auditorium. The central region comprises Sports grounds. The western region has various trees. The southern region has an entrance gate and dense tree cover. The eastern boundary of the campus has various types of trees observed. Approximately **27.99 % i.e., 2371 sq. m** of the region is occupied by **trees and forms the part of green cover of the campus**.

Table 2 Land-Use of the College campus

Land Use	*Area (sq. m)*	*Area (Acre)*	*Area (%)*
Built-up	2394	0.61	28.26
Vegetation	2371	0.58	27.99
Bare land	3705	0.91	43.74

(Source: WorldView-3 Satellite Imagery, Oct-2021)

Table 3 Area of the various Built-up lands

Land Use	*Area (sq. m)*	*Area (Acre)*	*Area (%)*
Administrative Blocks & College Building	1034	0.255	12.21
Canteens	40	0.009	0.47
Sports Auditorium	712	0.175	8.41
Sports Play Ground	600	0.148	7.08

(Source: WorldView-3 Satellite Imagery, Oct-2021)

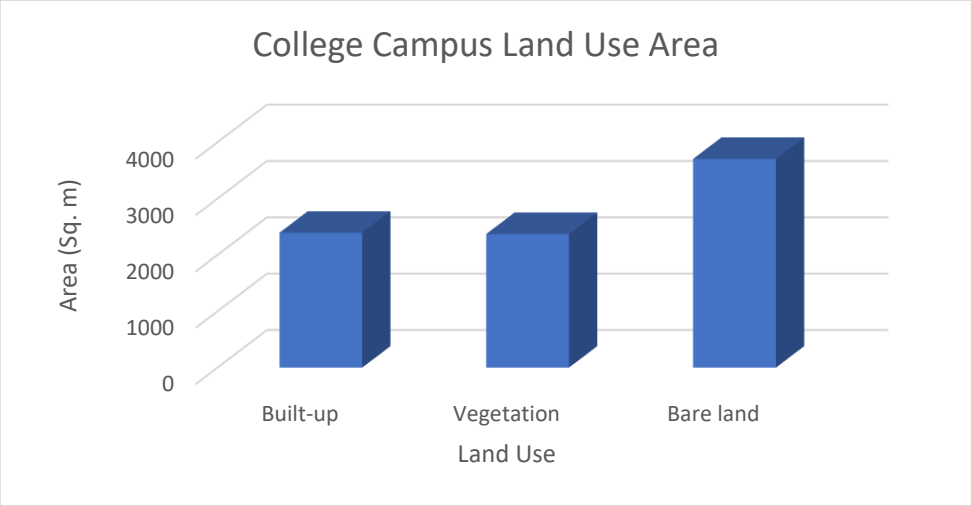

Figure 3 College Campus Land Use area

The College campus geo-position is at 21° 59' 42.65" N latitude and 74° 18' 18.93" E longitude in Sakri, Maharashtra, India. It encompasses an area of about 2.10 Acres. The area is enormously diverse with a variety of tree species performing a variety of functions. Most of these tree species are planted in different periods through various plantation programmes organised by the college and have become an integral part of the college. The trees of the college have increased the quality of life, not only for the college society but also for the people around the college in terms of contributing to our environment by providing oxygen, improving air quality, climate improvement, conservation of water, preserving of soil, and supporting wildlife, controlling climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in the summer months. Many species of birds are dependent on these trees mainly for food and shelter. The fluid of flowers and plants is a favourite of birds and many insects. Leaf-covered branches keep many animals, such as birds and squirrels, out of reach of predators. Different species show an endless variety of

shapes, forms, textures and vibrant colours. Even individual trees vary their appearance throughout the year as the seasons change. The strength, long lifespan and imperial stature of trees give them a monument–like quality. They also remind us of the glorious history of our institution in particular. We often make an emotional connection with these trees and sometimes become personally attached to the ones that we see every day. A thick belt of large shady trees in the periphery of the college is bringing down the noise and cutting down dust and storms. Thus, the college has been playing a significant role in maintaining the environment of Sakri town in its surrounding areas. Various types of Fauna were observed at the college campus, Tables 4,5 & 6 show Fauna at the college campus.

Table 4 Birds observed at the college campus

Sr. no	*Common name*	*Scientific name*
1	Parrot	Psittacula krameri
2	Sparrow	Passer domesticus
3	Crow	Corvus splendens
4	Pigeon	Columba livia
5	Koel	Eudynamys scolopaceus
6	King fisher	Halcyon smyrnensis
7	Owl	Bubo bengalensis
8	Hawk	Nisaetus cirrhatus
9	Nilpankh (Indian roller)	Coracias benghalensis
10	Lavri (Indian teetar)	Ortygornis pondicerianus
11	Titodi (Red wattle lapwing)	Vanellus indicus
12	Indian white Egret	Egretta Ardea alba
13	Bulbul	Pycnonotus barbatus
14	Jungle babbler	Turdoides striata

(Source: Field visit and Survey, Oct-2021)

Table 5 Reptiles observed at the college campus

Sr. no	*Common name*	*Scientific name*
1	Garden lizard	Calotes versicolor
2	Wall lizard (Gecko)	Hemidactylus frenatus
3	Varanus Indian monitor	Varanus bengalensis

(Source: Field visit and Survey, Oct-2021)

Table 6 Arthropods observed at the college campus

Sr. no	*Common name*	*Scientific name*
1	Butterfly	Papilla machaon
2	Cockroach	Periplaneta americana
3	Lady bugs (ladybirds beetles)	Harmonia axyridis
4	Moths (brown house moth)	Hofmannophila pseudospretella
5	Termite	Isoptera brulle
6	Ants (black carpenter ants)	Camponotus pennsylvanicus
7	Honey bee	Apis dorsata, Apis indica
8	Dragon fly	Pantala flavescens, Anax imperator

(Source: Field visit and Survey, Oct-2021)

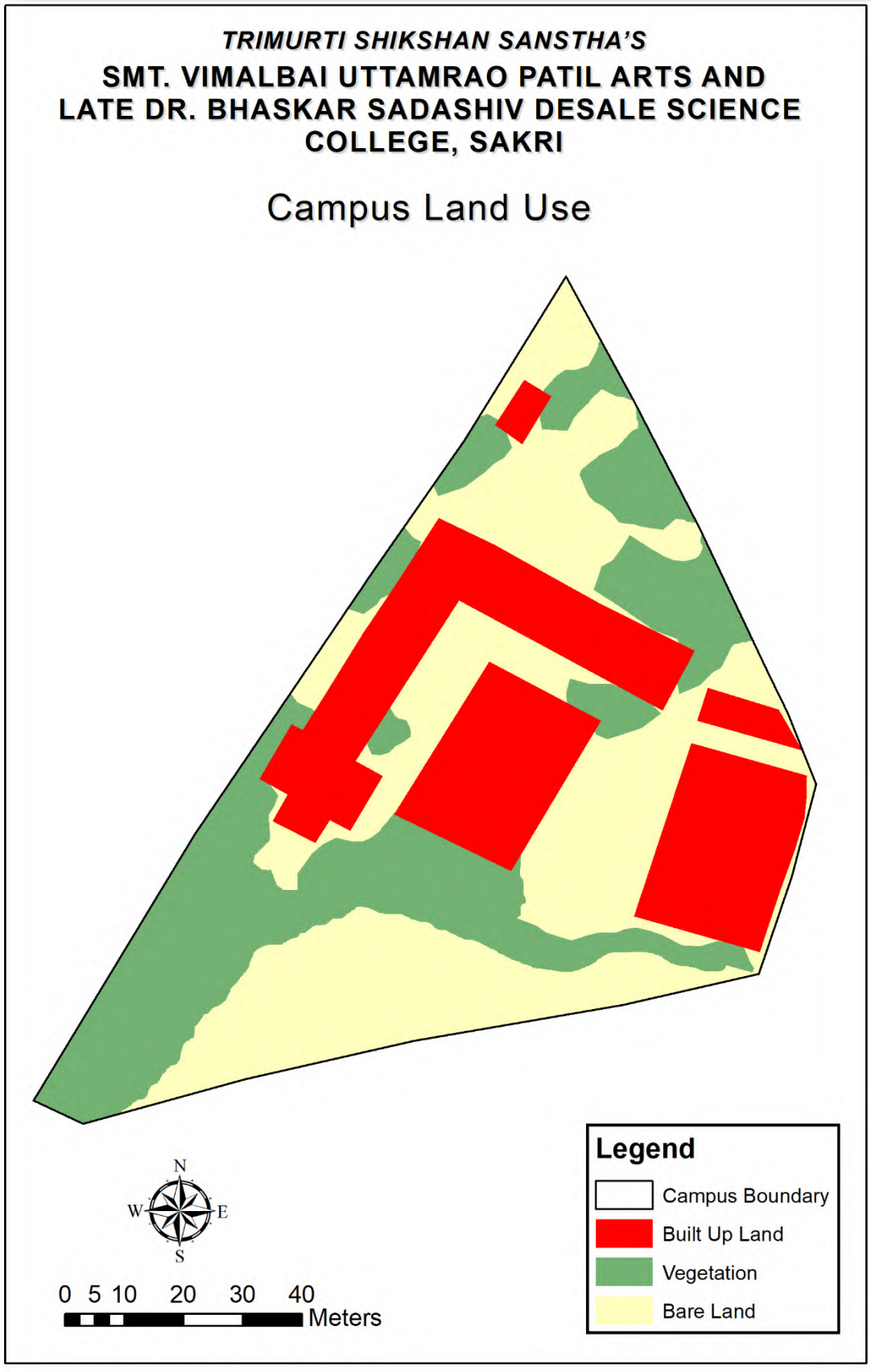

Figure 4 College Campus Land Use Map

ENERGY AUDIT

As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of the use of energy as well as submission of technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption". Effective management of energy-consuming systems can lead to significant cost and energy savings as well as increased comfort, lower maintenance costs, and extended equipment life. A successful energy management program begins with a thorough energy audit. The energy audit evaluates the efficiency of all building and process systems that use energy.

Energy use is an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. An old incandescent bulb uses approximately 60W to 100W while an energy-efficient light emitting diode (LED) uses only less than 10 W. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

Two electricity meter is provided for the entire campus. There is **total energy consumption** for the college is **32.83 KWh per day**. The major difference in Energy consumption of various departments is due to the usage of various electronic and electrical equipment. Data are shown in Tables 7 & 8 below for a comparison of no. of electrical appliances and energy consumption (kwh) per day in each Department. The difference in no. of electrical appliances and energy consumption (kwh) used is reflected in their respective energy consumption. The emissions per unit of electricity in India are estimated to be in the range of 0.91 to 0.95 kg/kWh, in this way **college contribute 25.84 kg per day of CO_2 emission** to the atmosphere by using electrical energy.

The graphs (Fig. 8 & 9) are showing a comparative study of electricity bills and consumption of college month-wise. The major difference is due to the usage of air conditioners and coolers. The peaks can be seen in the summer season in March, April and May, while another peak can be observed in October due to extensive heat. For June and most of July, teaching is suspended and that is reflected in electricity bills and consumption. IT and computer departments consume the highest electricity than others, due to the continuous use of computers.

Table 7 Department-wise number of electrical appliances

Department	History	Geography	Chemistry	English	Marathi	Hindi	Microbiology	Information Technology	Computer Science	Overall, College Campus
Tubes light	1	1	5	1	0	0	0	2	2	26
Bulbs	5	0	0	0	0	0	3	0	0	5
CFL or LED	0	1	2	0	3	1	0	0	0	10
Focus	0	0	0	0	0	0	0	0	0	4
Ceiling fans	1	1	2	1	1	1	1	2	2	14
Exhaust Fan	0	0	2	0	0	0	0	0	0	10
Computers	0	1	0	0	0	0	1	35	35	42
Printers	0	1	0	0	0	0	0	1	1	4
Projectors	0	1	0	0	0	0	0	1	1	2
Scanners	0	0	0	0	0	0	0	0	0	3
Sound System	0	0	0	0	0	0	0	0	0	1

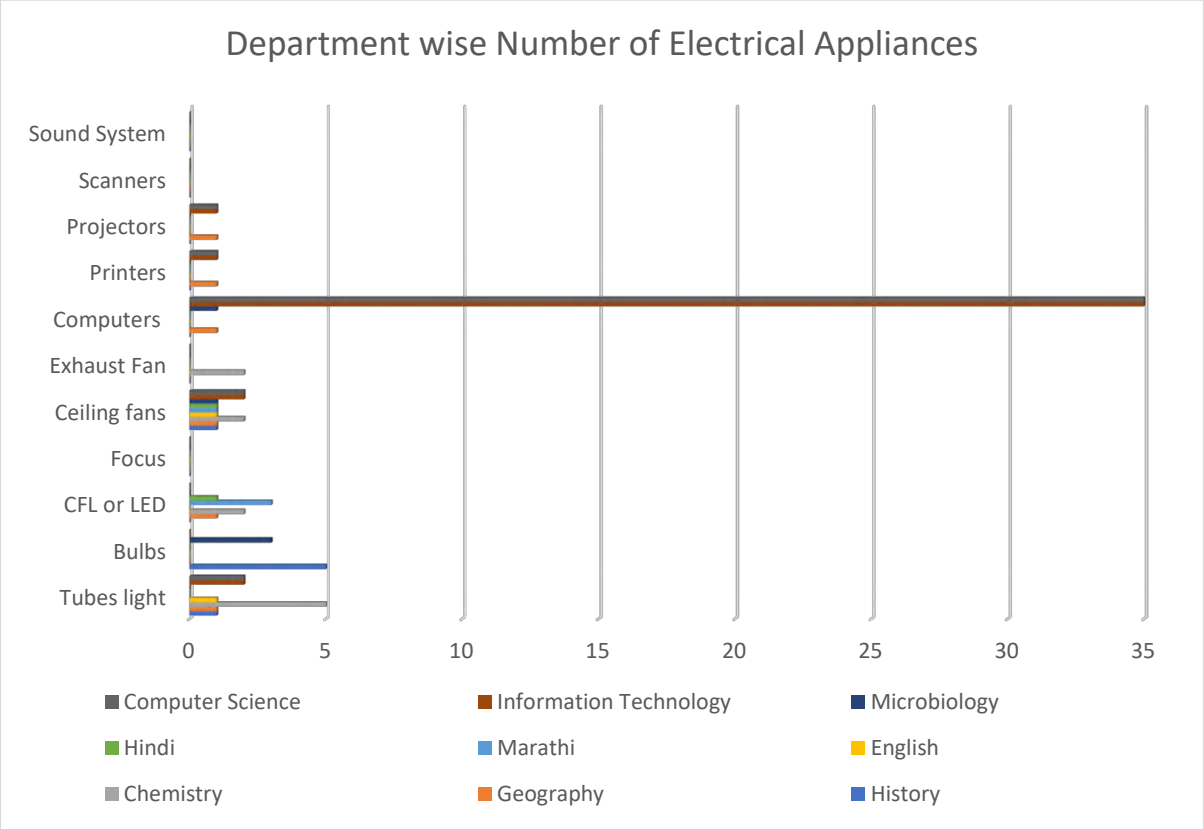

Figure 5 Department-wise Number of Electrical Appliances

Table 8 Department-wise Energy Consumption per day (kwh)

Department	*History*	*Geography*	*Chemistry*	*English*	*Marathi*	*Hindi*	*Microbiology*	*Information Technology*	*Computer Science*	*Overall, College Campus*
Tubes light	0.02	0.02	0.1	0.02	0	0	0	0.04	0.04	0.52
Bulbs	0.1	0	0	0	0	0	0.06	0	0	0.1
CFL or LED	0	0.01	0.02	0	0.03	0.01	0	0	0	0.1
Ceiling fans	0.075	0.075	0.15	0.075	0.075	0.08	0.075	0.15	0.15	1.05
Exhaust Fan	0	0	1.68	0	0	0	0	0	0	8.4
Computers	0	0.2	0	0	0	0	0.2	7	7	8.4
Printers	0	0.3	0	0	0	0	0	0.3	0.3	1.2
Projectors	0	0.8	0	0	0	0	0	0.8	0.8	1.6

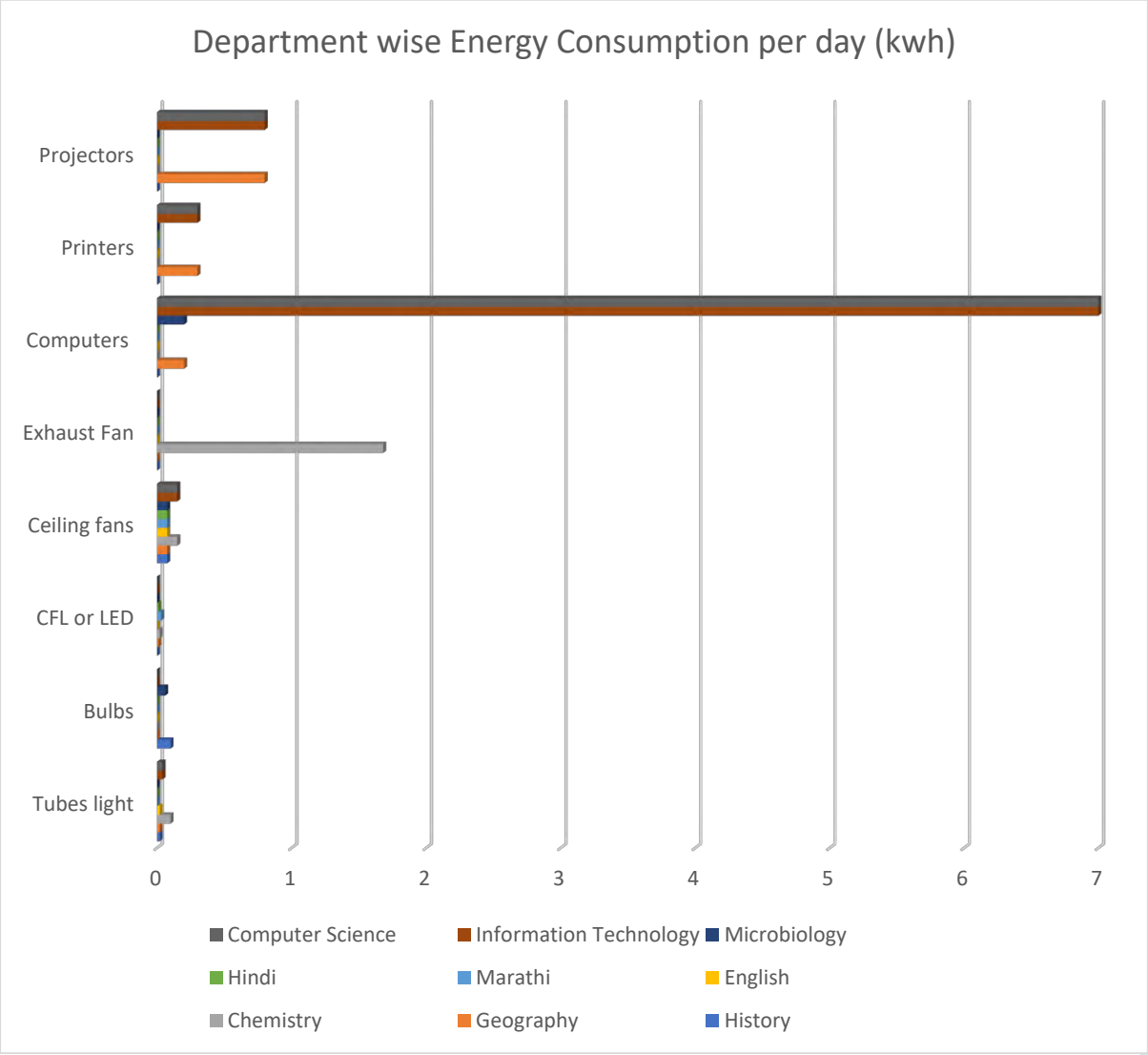

Figure 6 Department-wise Energy Consumption per day (kwh)

Table 9 Energy Consumption by others Electrical Appliances per day (kwh)

Department	Chemistry		Microbiology		Overall, College Campus	
	No. of Appliances	Energy Consumption (kwh)	No. of Appliances	Energy Consumption (kwh)	No. of Appliances	Energy Consumption (kwh)
Scanners	0	0	0	0	3	0.04
Photocopiers (Xerox)	0	0	0	0	3	3.3
Freezer / Chiller	1	0.04169	1	0.0417	3	0.13
RO / Water filters	0	0	1	0.025	1	0.03
Sound System	0	0	0	0	1	0.1
Invertor	0	0	1	0.29	1	0.29
Tubes light inside the college except for the classroom	10	0	8	0	10	0.72
Focus	4	0	0	0	4	0.8
CCTV	1	0.015	1	0.015	16	0.24

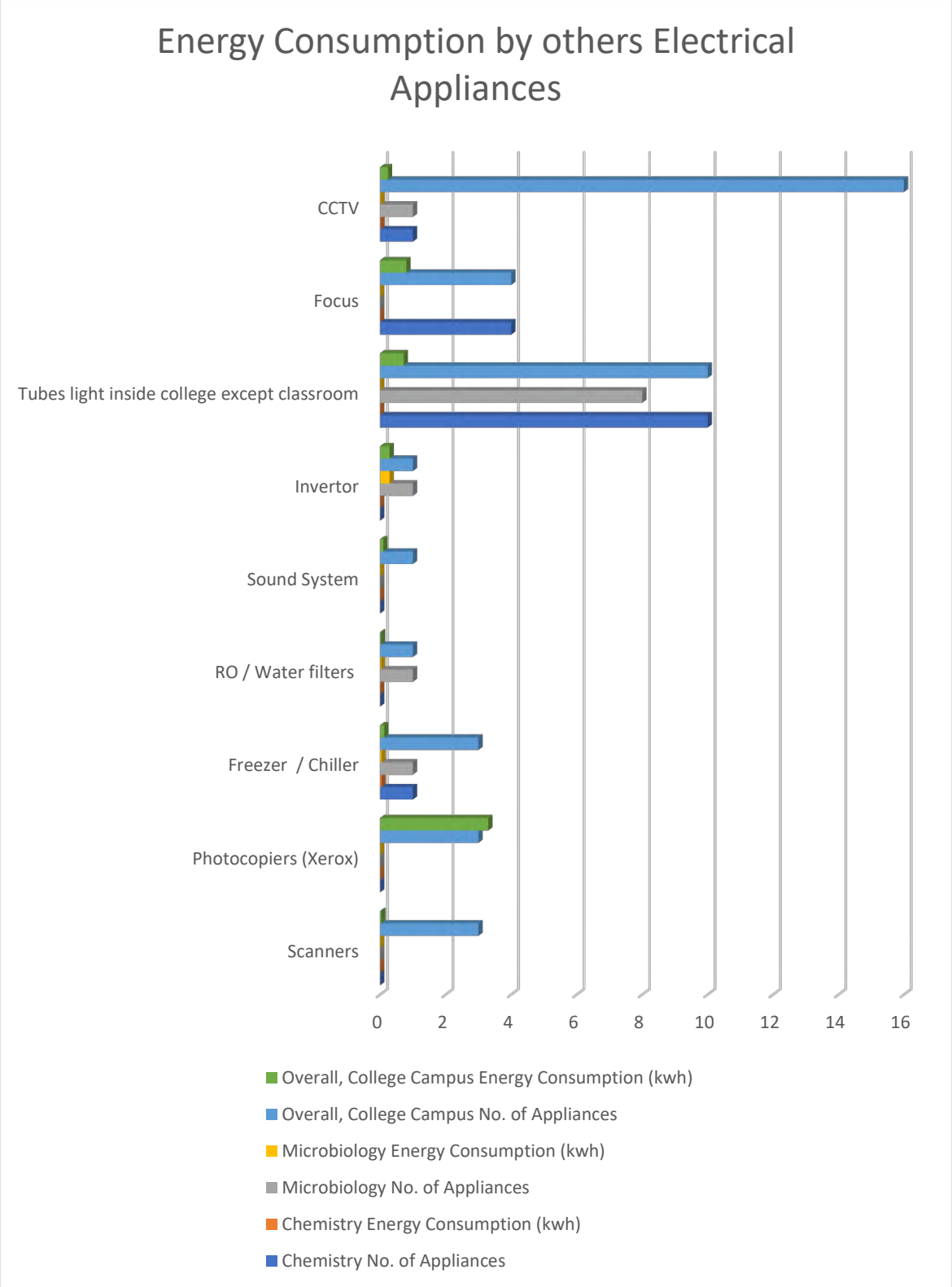

Figure 7 Energy Consumption by other Electrical Appliances

Table 10 Electricity bills & consumption of the college month-wise across the year

Month	Electricity Consumption (Unit)	Bill in Rupees
Jun-21	2394	18640
Jul-21	854	3120
Aug-21	1160	3900
Sep-21	575	0
Oct-21	966	5790
Nov-21	501	2550
Dec-21	658	3630
Jan-22	620	4260
Feb-22	572	7230
Mar-22	592	0
Apr-22	804	10530
May-22	817	4790

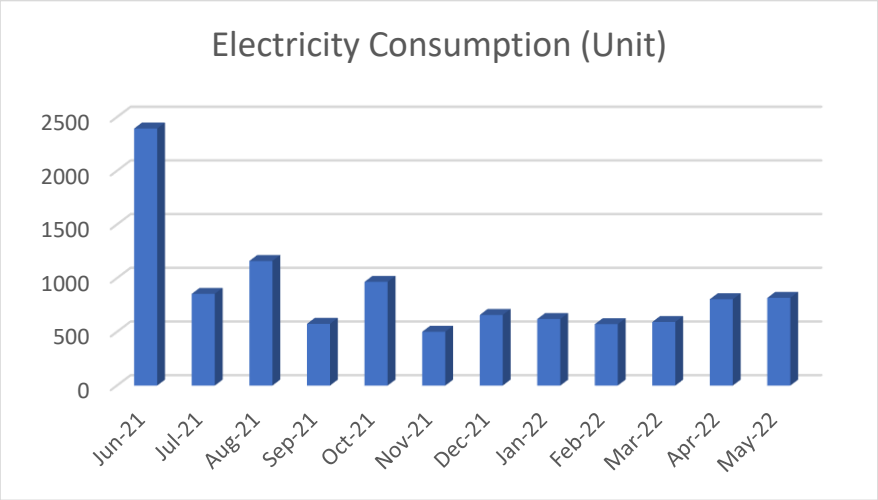

Figure 8 Electricity consumption of the college month-wise across the year

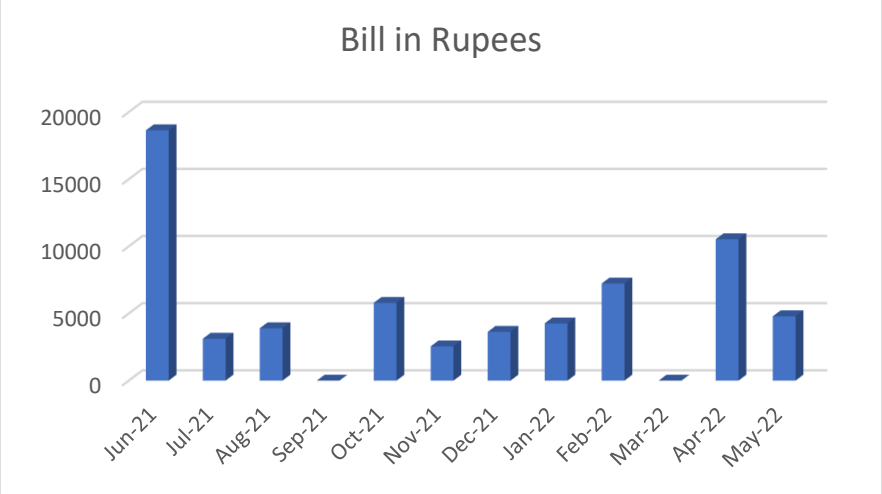

Figure 9 Electricity Bills of the college month-wise across the year

AIR EMISSIONS

Air Emissions is the term used to describe the gases and particles which are put into the air or emitted by various sources. Ambient air quality mentions to the condition or quality of air surrounding us outdoors. Exhausts from the canteen kitchen and chemical vapours in the chemistry department laboratory produce emissions. Four exhaust fans are provided in the chemistry department laboratory. Exhaust fans are not provided in the washroom and canteen kitchen. No vehicle entry is allowed on the College campus except for dignities & differently-abled students. A separate parking area for vehicles is available at the entry of the college campus. **Classrooms on the college Campus are Well Ventilated**, while the Window Floor ratio of the classroom is very good. This fact proves that there is no need for Exhaust fans in classrooms.

INDOOR AIR QUALITY

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Common indoor pollutants are;

- Carbon monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels
- Volatile organic compounds (VOCs) – VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon dioxide – Due to human respiration
- Particulate matter (PM) – Due to construction and maintenance activities, vehicular pollution
- Nitrogen Oxides- Due to vehicular pollution

In the Canteen area, parameters responsible for affecting indoor air quality are,

- Type and quantity of fuel used
- Medium of cooking
- Type of cooking e.g., roasting, frying, steaming etc.
- Duration of cooking, the quantity of food being cooked
- Efficiency of ventilation

Indoor air quality should be monitored at least once a year and results should be compared with The Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE) standards for indoor air quality.

In classrooms, ventilation is a natural draft through windows and is enhanced by fans. In corridors, cross-ventilation is observed. Two exhaust fans are provided in Chemistry laboratories. Ten exhaust fans are provided in college camps for various useful purposes. **Green belts** have been set up in the campus area, plants are present near the College building **which helps in maintaining ambient air quality**. In the Canteen for food processing used LPG fuel, which is less pollutant.

LIGHTS AND ACOUSTICS

The human ear is constantly being beset by man-made sounds from all sides, and there remain few places in crowded areas where relative quiet prevails. There are two basic properties of sound Loudness and Frequency. Loudness is the strength of sensation of sound apparent by the individual. It is measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-100 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 dB. The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as Pollutants as it harms the hearing system. According to WHO, 45 dB is the safe noise level for a city. For international standards, a noise level of up to 65 dB is considered tolerated. Loudness is also expressed in sones. One sone equals the loudness of 40 dB sound pressure at 1000 Hz. Frequency is defined as the number of vibrations per second. It is denoted as Hertz (Hz).

The college campus is located in the Sakri city area; vehicular noise pollution is minimum on the premises probably due to tree cover in the campus. Noise levels are between 50-75 dB on the premises. Light intensity is between 50 - 196 Lux. Light intensity and noise levels were monitored at 13 different locations and the results are presented in Table 11.

As per the Occupational Safety and Health Administration (OSHA) standards, permissible noise exposure for 8 hours/day is 90 dB(A). Colleges, schools, hospitals and courts come under the silent zone. Permissible noise limits in and near the College is 50 dB during day time. Noise levels monitored during the audit are above the permissible limits at all locations. The illumination (Lux) levels were adequate or less in a few areas that are because lights are kept

switched off in rooms, and laboratories which are not occupied and receive natural sunlight. High noise was reported in the canteen premises.

Table 11 Light intensity and noise levels monitoring results

Department	*Noise level (dB)*	*Light Intensity (Lux)*
Principal Cabin	61	110
Library	55	112
Staff Room	70	98
Office	67	115
Sport	72	161
Canteen	75	196
Geography	70	130
History	68	120
Marathi	68	120
English	55	180
Hindi	54	190
Microbiology	50	90
Information Technology	60	105
Computer Science	60	110
Chemistry	65	50

WATER AND WATER MANAGEMENT

A major water source for the college is a borewell on the campus. Data related to the water audit was collected by circulating a proforma based on water user profiles. The college has 689 students enrolled in different courses, and more than 51 employees. The assessment of water requirements comprises sanitation, laboratory, kitchen, drinking, washing, etc. For assessment of water management, the college has been divided into six blocks: Academic block, Garden, Canteen, Common Toilet, teaching and non-teaching staff room and office.

As can be seen, the consumption of water by the canteen is 12.20 % as compared to 39.02 % for the academic block. The collective consumption of water by departments (comprising Chemistry, Microbiology, History, English, Marathi, Information Technology, Computer

Science and Geography) is 34.15 %. In the academic departments, the major consumers of water are Chemistry Department (24.39%). Highest utilisation of water in the common toilet block and for Trees and Garden. The college utilises approximately 4100 litres per day of water. Water consumption of the College works out to be 4.20 Litre /Person/Day. As per IS 1172 standards for non-residential institutions, water consumption should be a maximum of 45 Litre /Person/Day. Drip irrigation system to water the trees on the college premises. **Thus, water consumption is well under the limit.**

Table 12 Utilizations of water per day in litres.

Particulars	***Utilisation of water (litres / per day)***	***Utilisation of water (%)***
Department/Section		
Chemistry	1000	24.39
Microbiology	100	2.44
History	60	1.46
Geography	100	2.44
English	50	1.22
Marathi	40	0.98
Hindi	50	1.22
Information Technology	0	0.00
Computer Science	0	0.00
Staffroom	100	2.44
Office	100	2.44
Common Toilet block	1000	24.39
Trees and Garden	200	4.88
Canteen	500	12.20
Drinking Water for Students	800	19.51

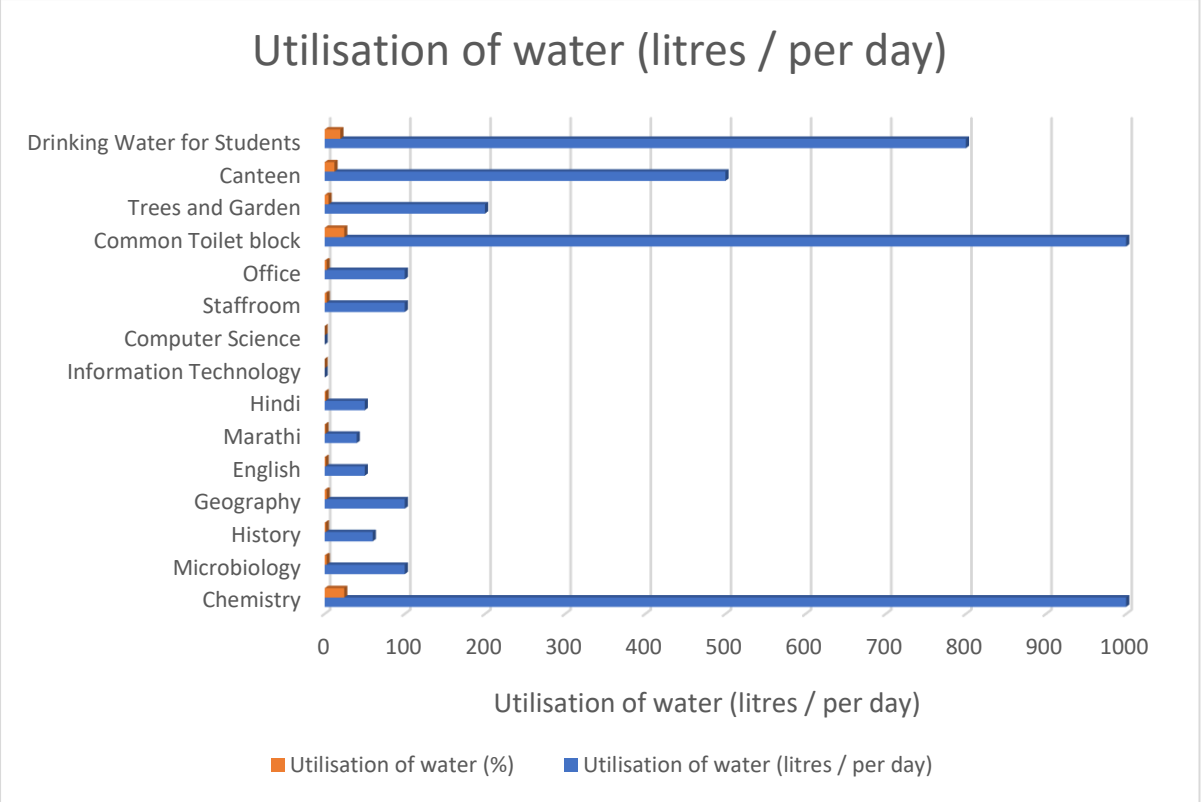

Figure 10 Utilizations of water per day in litres

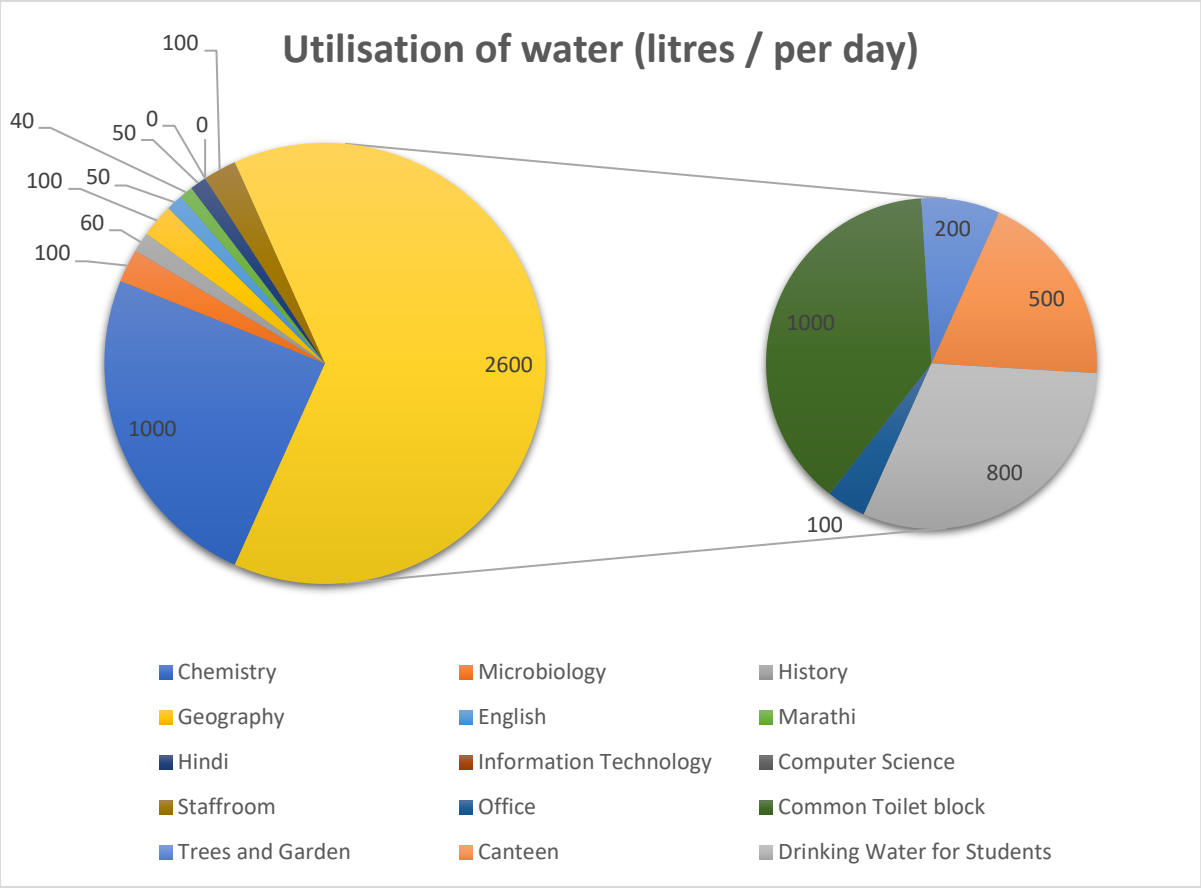

Figure 111 Daily water consumption

- **Flora and fauna conservation**

The college has a lush green campus which provides habitat to various species. Recently conducted Flora and fauna survey reports Parrot, Sparrow, Crow, Pigeon, Koel, Kingfisher, Owl, Hawk, Nilpankh, Indian Teetar, Red wattle lapwing, Indian white Egret, Bulbul, Jungle babbler, Garden lizard, Wall lizard, Varanus Indian monitor, Butterfly, Cockroach, ladybirds beetles, Moths, Termite, black carpenter ants, Honey bee and Dragonfly.

- **Tree Plantation Drives**

Every Guest is honoured by Tree Plantation on Campus. Periodically the plantation drove by students and staff of the campus. Periodically students and staff of the college **planted trees in the adopted village namely Ramnagar**.

- **Pollution Reduction**

Personal Vehicles of Students are not allowed at the campus. In this way reduction in Air Pollution through vehicular emission.

- **Solid Waste Management**

Lifting of garbage from campus on an alternate day by Municipal Corporation.

- **Environment Awareness**

The National Service Scheme (NSS) of the college undertakes projects for the environment, rural development, education awareness, healthcare etc. Various activities like cleanliness drives, tree plantation, seminars and workshops are organised by NSS to increase awareness and sensitivity among students and faculty. Students participate in field visits to biodiversity parks and other places of ecological importance are also being arranged by college various departments.

CONCLUSION

All the indicators of the Environment audit were properly studied and information about the indicators was collected, analysed and concluded. This Environment, Green and Energy audit involved extensive consultation with the campus team and interactions with key personnel on a wide range of issues related to Environmental aspects. The audit has identified several observations for making the campus premise more environmentally friendly. LPG is handled in the science building section for Chemistry and the canteen area for practical purposes. Per unit, consumption is still less. Electricity consumption is more in some sections that have instruments. Other departments have minimal usage of electricity. There are several trees and plants of different varieties and species that serve the greenery of the college. Students and staff of the college are encouraged on using public or pool sharing to minimize fuel energy consumption for daily work. However, on average most per cent of students travel using buses. Staff travelling long distances also prefer coming by public transportation. Air quality on the campus is good.

The recommendations are also mentioned with observations for the campus team to initiate actions. The audit team opines that the overall site is maintained well from an environmental perspective. There are no major observations but a few things that are important to initiate urgently are waste management records by the monthly inventory of hazardous waste, rainwater harvesting recharge; water balance cycle and periodic inspection of buildings housekeeping and environment policy.

RECOMMENDATIONS

1) The world is in front of problems due to climate change leading to global warming, water scarcity and sustainable resource management. Creating awareness on mitigation of adverse impacts on the environment, sustainable resource management and conservation of the ecosystem, has increased importance in any educational institute. It is necessary to create as much awareness as possible and sensitize students. Awareness sessions help students to understand the effect of their actions & inactions on the environment, build the knowledge and skills necessary to address complex environmental issues and encourage them to keep our environment healthy and sustainable.
2) Consider setting up an environmental advisory committee with students' involvement. The discussions & information sharing among different departments can create ideas and awareness of environmental issues.
3) Adopt an environmentally responsible purchasing policy and work towards creating and implementing a strategy to reduce environmental impact.
4) CFL lamps can be used in all sections and classrooms to minimize the usage of fluorescent tubes.
5) Wastewater management still needs to be practised and designed on campus.
6) Drinking water quality shall be as per IS:10500.
7) Drips and sprinklers can be used for watering the gardens and trees.
8) The rainwater Harvesting System is comprised of rooftop and surface runoff. Through Rainwater Harvesting System, rainwater collected is used for recharging groundwater through recharge bores. Rainwater collected is also stored in recharge pits which are used for gardening. Rooftop rainwater harvesting is necessary for water harvesting on the college campus. Every year such rainwater harvesting pits can be maintained, designed and constructed.
9) Special days like Teachers' Day, Guru Poornima, and Van Mahotsav can be celebrated with plant donations.
10) More composting pits can be prepared for the proper disposal of garden waste and kitchen waste from canteens.
11) E-waste and solid waste segregation, handling and disposal can be deployed at the campus.

12) Records of E-waste generation and disposal are to be maintained properly. College should maintain the inventory mentioning the type and quantity of waste generated e.g., computer monitors, scanners, keyboards, cables, circuit boards, batteries etc.
13) Reduction in use of paperwork by goes digital system.
14) Water meters should be installed at the college for monitoring water consumption for gardening and landscape.
15) As practically feasible avoid the use of personal vehicles inside the campus.
16) Raising awareness is crucial for energy saving. Notices/ signage can be displayed near switches, thus reminding students and staff to switch off all electricals when not in use.
17) Encourage the solar panel electricity generator.
18) It is recommended to measure emissions from every vehicle of staff and students & ambient air quality at least once a year and results should be compared with Indian Ambient Air Quality Standards.

REFERENCES

- The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
- The Petroleum Act: 1934 – The Petroleum Rules: 2002
- The Central Motor Vehicle Act: 1988 (Amended 2011) and The Central Motor Vehicle Rules:1989 (Amended in 2005)
- Energy Conservation Act 2010.
- The Water [Prevention & Control of Pollution] Act – 1974 (Amended 1988) & the Water (Prevention & Control of Pollution) Rules – 1975
- The Air [Prevention & Control Of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982
- The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981
- E-waste management rules 2016
- Electrical Act 2003 (Amended 2001) / Rules 1956 (Amended 2006)
- The Hazardous Waste (Management and Handling and Trans-boundary Movement) Rules, 2008 (Amended 2016)
- The Noise Pollution Regulation & Control rules, 2000 (Amended 2010)
- The Batteries (Management and Handling) Rules, 2001 (Amended 2010)
- Relevant Indian Standard Code practices
- Internal Records of the Campus, (A.Y. 2021-22)

ANNEXURE – PHOTOGRAPHS

Photo 1 College campus main Entrance gate with dense vegetation

Photo 2 College four-wheeler parking within dense vegetation

Photo 3 Main entrance gate with dense tree cover

Photo 4 Yashwantrao Chavan Maharashtra open university department with surrounding dense tree cover

Photo 5 College administrative building main entrance with dense tree cover

Photo 6 Campus Office surrounded by tree cover

Photo 7 Tree plantation on the college campus by Hon. Dr. Manglatai Desle (Secretary)

Photo 8 Tree plantation on the college campus by Hon. Dr. Manglatai Desle (Secretary), Principal and college staff.

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Photo 9 Tree plantation on the college campus by Hon. Dr. Manglatai Desle (Secretary), Principal and college staff with NSS students.

Photo 10 Tree plantation on the college campus by Principal and college staff with NSS students

Photo 11 Tree plantation on the college campus by Principal and college staff.

Photo 12 Tree plantation at adopted village Ramnagar by Principal and college staff with NSS students

Photo 13 Tree plantation on bare land at adopted village Ramnagar by college staff with NSS students

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Chalisgaon

Photo 14 Extensive Tree plantation on bare land at adopted village Ramnagar by college staff with NSS students

Photo 15 Preserved and watering to Tree plantation on bare land at adopted village Ramnagar by college staff with NSS students.

Photo 16 Watering by drip irrigation system in college campus trees to save water

Photo 17 Classrooms of the college Campus are Well Ventilated, with a very good Window Floor ratio.

Photo 18 Classrooms of the college Campus are Well Ventilated, with a very good Window Floor ratio.

Photo 19 Well-Ventilated laboratory to maintain indoor air quality.

Photo 20 Classrooms of the college Campus are Well Ventilated, with a very good Window Floor ratio.

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Photo 21 Regularly campus has been cleaned by students and staff.

Photo 22 Regularly campus has been cleaned by students and staff.