Govt. Pt. Shyamacharan Shukla College Dharsiwa, Raipur (C.G.)

GREEN, ENVIRONMENT, ENERGY, AUDIT REPORT 2019-23

Audit team

1. Dr. Kavita Sharma, Head, Dept. of Botany, GGC, Devendra Nagar, Raipur
2. Shri Kaushal Kishor, Head, Dept. of Botany, GPSSC, Dharsiwa
3. Shri Hemant Deshmukh, Head, Dept. of Chemistry, GPSSC, Dharsiwa
4. Dr. G Nag Bhargavi, Head, Dept. of Physics & Co-Ordinator IQAC, GPSSC, Dharsiwa
5. PG students of M. Sc. (Physics/Botany) IV Sem

Table of contents

Sl No	Topics	Page number
1	Executive summary	3
2	Introduction /About the College	4
3	Objectives of green audit	5
4	Target Areas of Green Auditing	6 - 7
5	Methodology adopted	7
6	Green Audit Report	8 -18
7	Suggestions and Recommendations	19

Executive Summary

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment. Waste minimization plans for the educational institute are now mandatory to maintain the cleanliness of the campus. To find out the environmental performance of the educational institutions and to analyze the possible solutions for converting the educational campus as eco-campus the conduction of Green Auditing of institution is essential. The green auditing of Govt. Pt. Shyamacharan Shukla College enables to assess the life style, action and its impact on the environment. This is the first attempt to conduct green auditing of this college campus. This audit was mainly focused on greening indicators like consumption of energy in terms of electricity and fossil fuel, quality of soil and water, vegetation, waste management practices and carbon foot print of the campus etc. Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analyzed for its parameters. Collected data was grouped, tabulated and analyzed. Finally, a report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of campus are documented.

About The College

The is affiliated by Pt. Ravishankar Shukla University Raipur (C.G.) and recognized under the section of 12(B) and 2(F) with UGC. The college is established in 14th August 1989 with faculty of Humanities and Science faculty. College was started in Shankar Nagar Raipur, then shifted to Dharsiwa and conducted temporarily in community hall. In the year 2015 it was shifted to its own building at Dharsiwa. Now college has Humanities, Science, Commerce and PGDCA faculty. College has three floored building facilitated by a Library, equipped labs, Mini seminar hall, Gym, Hostel, Garden around college building with ICT facility. In the college there are around 1450 students enrolled in different programs. The college practices co-education but the number of girls is more.

The encourages the students to aim at excellence not only in academic pursuits, but also in every aspect of human endeavor to achieve perfection. The students are prompted to strive for academic excellence so that in course of time they may take up suitable careers for the betterment of their lives and also of their families and society at large. The various co-curricular activities of the college especially the extension programs done by NSS, NCC, YRC, Science Club, Eco club provide them with a rare social consciousness that motivates them to reach out to their needs.

The student and faculty strength of the college is listed below:

No of students	1449
No of teachers	19
No of Non-teaching staffs	08
Boys	486
Girls	963
Total	1476

Physical Structure

The college is located in about 9.5 acres of land. The built-up area of the college is 7.9 acres.

Departments	12 (PGDCA course is running under the supervision of Dept. of Mathematics)
Laboratories	05 (Physics, Chemistry, Botany, Zoology, Computer)
Conference halls	01
Libraries	1 main library+ department libraries
Auditorium	00
Canteens	01(temporary)
Mini stadium	01
Girls hostel	01
Class rooms	19

Objectives Of Green Audit

The main aim objectives of this green audit is to access the environmental quality and the management strategies being implemented in Govt Pt. Shyamacharan Shukla College Dharsiwa. The specific objectives are:

1. To assess the quality of the water, and soil in the Dharsiwa college campus
2. To monitor the energy consumption pattern of the college
3. To quantify the liquid and solid waste generation and management plans in the campus.
4. To assess the carbon foot print of the college
5. To assess whether the measures implemented by Dharsiwa College have helped to reduce the Carbon Footprint.
6. To impart environment management plans to the college
7. Providing a database for corrective actions and future plans.
8. To access whether extracurricular activities of the Institution support the collection, recovery, reuse and recycling of solid wastes.
9. To identify the gap areas and suggest recommendations to improve the Green Campus status of the Dharsiwa College.

TARGET AREAS OF GREEN AUDITING

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water; minimize waste generation or pollution and also economic efficiency.

All these indicators are assessed in the process of "Green Auditing of this educational institute". Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint.

Auditing for Water Management

Water is a natural resource; all living organisms depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. Groundwater depletion and water contamination are taking place at an alarming rate. Hence it is essential to examine the quality and usage of water in the college. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water.

Auditing for Energy Management

Energy conservation is an important aspect of campus sustainability which is also linked with carbon foot print of the campus. It is therefore essential that the institute must examine its energy usage.

Auditing for Waste Management

Human activities create waste, handling, storing, collecting and disposing of waste, which can pose risks to the environment and to public health is essentially monitored. Thus, the minimization of solid waste is essential for sustainable development. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Auditing for Green Campus Management

Trees play an important ecological role in green landscape development within the urban environment. They also support improved public health by providing quality oxygen to boost our capabilities. So, more and more saplings must be planted in the college.

Auditing for Carbon Footprint

Burning of fossil fuels (such as petrol, diesel) has an impact on the environment through the emission of greenhouse gases into the atmosphere. The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Vehicular emission is the main source of carbon emission in the campus, hence to assess the method of transportation that is practiced in the college is important.

Methodology Adopted

The methodology adopted to conduct the Green Audit of the Institution had the following components.

Onsite Visit

A day field visit was conducted by the Green Audit Team. The main focus of the visit was on assessing the status of the green cover of the Institution, their waste management practices and energy conservation strategies etc. The sample collection (water, soil) was carried out during the visits. The water samples from two open wells and two tap water sources were taken and soil samples from three different places of the campus was collected. The sample collection, preservation, and analysis were done by external agencies.

Group Discussion

The Focus Group discussions were held with the Science Club members, staff members and the management focusing various aspects of Green Audit. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

Energy, waste management and Carbon foot print analysis Survey

With the help of students M. Sc. (Physics and Botany) the audit team has assessed the energy consumption pattern and waste generation and carbon footprints.

Green auditing in the college began with the assessment of the status of the green cover of the Institution followed by waste management practices and energy conservation strategies etc. The team monitored different facilities at the college, determined different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring the usage per item and identifying the relevant consumption patterns (such as how often an appliance is used).

Data collection was done in the sectors such as Energy, Waste, Greening, Carbon footprint and Water use.

Water Quality assessment

Water samples is analyzed for its quality parameters. The samples were collected, preserved and transported to school of Environmental Sciences and analyzed for various physio-chemical parameters. The major parameters analyzed include dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity. The results are presented in the Table 1 The results are comparable with the values of drinking water standards prescribed by different agencies.

Table 1. Results of water quality

Parameters	Well water	RO Tap water	Standard value (BIS)
Dissolved Oxygen (mg/l)	4.1	4.6	4-8
Acidity (mg/l)	5.0	--	200
Alkalinity ($CaCO_3$ mg/l)	280	40	200
Chloride (mg/l)	13.99	7.99	250
Hardness (Total)	248	30	200
Conductivity (µs)	143.3	179	
pH	7.37	9.29	6.5-8.5
Total Dissolved Solids (ppm)	341.43	48.91	500
Salinity (psu)	0.34	0.049	
Total coliform	24	Absent	0
Fecal coliform	110	Absent	0

Water Management

The source of water used in the College are two wells present in the campus. These wells are recharging with rainwater from the roof. A total of 18000L of water is pumped out from the well every day (Table 2). Wastage of water from the lab is reduced by adopting microscale analysis. An average of 3,60,000 L of water is used by the College per month.

Table 2.

SL NO	PARAMETERS	Response	Remarks
1	Source of water	Underground	
2	No of Wells	1	
3	No of motors used	1	
4	Horse power – Motor	3HP	
5	Depth of well –Total	210 feet	
6	Water level	140	
7	Number of water tanks	3	
8	Capacity of tank	2000 L	
9	Quantity of water pumped every day	4000L	
10	Any water wastage/why?	nil	
11	Water usage for gardening	1000L/day	
12	Waste water sources	Lab washings	
13	Use of waste water	Ground water reharge	
14	Fate of wastewater from labs	To soakpit	
15	Any wastewater treatment for lab water	No	
16	Whether any green chemistry method practiced in labs	no	
17	Rain water harvest available?	yes	
18	No of units and amount of water harvested	01	
19	Any leaky taps	Nil	
20	Amount of water lost per day	Nil	
21	Any water management plan used?	nil	
22	Any water saving techniques followed?	Nil	
23	Are there any signs reminding peoples to turn off the water?	Yes	

Soil Quality assessment

Soil samples were collected from four locations of the campus and analyzed for the basic parameters. The results are tabulated and presented in the table 3.

Table 3

Parameter	Location garden area
pH	8.36
Total Kjeldhal Nitrogen (kg/ha)	156.9
Total organic carbon (%)	0.15
Phosphate (mg/kg)	21.5
Cation exchange capacity (meq/100g)	6.32
Base saturation (%)	39
Sand (%)	34.6
Clay (%)	22.3
Available Water Capacity (%)	22.8
Slit (%)	43

Energy Audit Report:-

Table 4 shows the energy consumption pattern of the college for a month.

S.8i9 No.	Electrical appliances/instruments	Number	Power (W)/unit	No of days in Month (Average)	Total consumption per month
1	LED bulb	43	12Waat	22	68.112
2	LED TUBE Light	210	20 waat	22	23.1
3	PROJECTOR	04	280	22	2.464
4	FAN	167	60	22	881
5	COMPUTER	47	250	22	1034
6	LAPTOPS	03	50	15	12
7	PRINTERS	5	60	15	6.3

08	PHOTOSTAT MACHINE	3	650	15	117
09	INDUCTION	1	2000	15	7.5
10	A/C	1	7000	15	210
11	REFRIGERATOR	2	150	30	756
12	OVEN	1	1500	10	90
13	CENTRIFUGE	1	850	8	3.4
14	EXHAUST FAN	11	32	25	3.2

Waste management

Waste management is important for an ecofriendly campus. In a college different types of wastes are generated, its collection and management are very challenging. The following data provide the details of the waste generated and the disposal method adopted by the college.

Total number of building (Class rooms, canteen, office, auditorium, library etc): 36

Table 5. Different types of waste generated in the college and their disposal

S.N.	Electrical appliances/instruments	Number	Power (W)/unit	Tot al pow er (W)	kW	Operation /day (Average)	kW-h	No of days in month	Total consumption per month
1	LED bulb	43	18	774	0.774	1	0.774	22	17.028
2	LED TUBE Light	210	20	4200	4.2	1	4.2	22	92.4
3	PROJECTOR	04	280	112	0.112	1	0.112	22	2.464
4	FAN	167	60	10020	10.020	5	50.1	22	1102.2
5	COMPUTER	47	250	11750	11.750	4	47	22	1034
6	LAPTOPS	04	50	200	0.2	3	0.6	15	9.0
7	PRINTERS	7	60	420	0.42	1	0.42	15	6.3
08	PHOTOSTAT MACHINE	3	650	1950	1.95	2	3.9	15	58.5
09	INDUCTION	1	2000	200 0	2	0.25	0.5	15	7.5

10	A/C	1	7000	7000	7	4	28	22	616
11	REFRIGERATOR	2	525	1050	1.05	24	31.5	30	756
12	OVEN	1	1500	1500	4.5	2	9	10	90
13	CENTRIFUGE	2	850	1700	1.7	0.25	0.425	8	3.4
14	EXHAUST FAN	11	32	352	0.032	4	0.128	22	2.816

Waste management Practices adopted by the college

The food waste generated by the students and staffs are taken by them to their own home, so that, minimum waste is generated inside the campus. Vegetable waste and other leaf litters were used to fed in the compost pit and the resulting cast is used as manure in the garden. The chemicals from the laboratories are disposed in a sealed tank along with water, so that the chemicals undergo neutralization with the water.

Green Campus

Total number of plant species identified- 42

Total number of plants in the campus- 377

Table 6. List of plants in the campus

Sl No	Common/local name	Scientific Name	No of trees
1	Giloy	Tinosporacardifolia	5
2	Neem	Azadirachta Indica	36
3	Indian Rosewood (Shishum)	Dalbergia sissoo	14
4	Pongame oiltree (Karan)	Milleltia Pinnata	14
5	Tamarind (Imli)	Tamarindus Indica	1
6	Indian goose berry(Amla)	Phyllanthus emblica	2
7	Custared Apple	Annona Squamasa	2
8	Azuba	Kalanchoe pinnata	6
9	Papaya	Carica Papaya	3

10	Kachnar	Bauhinia Variegato	4
11	Hibiscus	Hibiscas Rasacienasis	7
12	Almond	Prunus Amygdalis	2
13	Amarood (Guava)	Psidium Guajava	1
14	Haly Basil	Ocimum Sanctium	3
15	Bahera	Terminalia Bellirica	3
16	Dumb Cam	Deffenbachia Seguine	4
17	Rose	Rasa Indica	20
18	Shatavari	Asparagusracemose	2
19	Black Turmeric	Curcuma Caesia	15
20	Red Sister	Cardyline Fruticasa	6
21	Croton	Codieum Variegatum	7
22	Areca palm	Dypsis lutescens	10
23	Thorm Christ	Ehphorbia Milli	12
24	Copperlead	Acalypha Wilkesiana	150
25	Jasmine	Tabernaemon Tanadivaricala	3
26	Thyja	Cuoressaceae	15
27	Gurmar	Gymnema Sylvestre	3
28	Sweet flag	Acorus Calamus	1
29	Chinese Chastetree	Vitex negundo	1
30	Elephant Geeper	Argyrcia nervosa	1
31	Piliya (Yellow Elder)	Tecoma Stuns	1
32	Aloevera	Aloebarbadesis Miller	10
33	Vehiel Bean	Mucuma Pruriens	1
34	Bhringraj	Eclilolota Pruriens	1
35	Lebbeck	Albizia Lebbeck	1

36	Veld Grape	Cissus quadrangularie	1
37	Malabar nut	Justica adhatada	1
38	Psiral Flag	Chamaecostus Cuspidatus	1
39	Guggul	Commiphora Wightii	1
40	Putranjiva	Putranjiva rosbughii	1
41	Henna	Lawsonia Inermis	3
42	White Mulbery	Morusalba	2

Carbon Foot Print Analysis

1. Total number of vehicles used by the stakeholders of the college: 10
2. Number of cycles used: 200-300
3. No: of two wheelers used: 40-50

   Average distance travelled: 10 km

   Average quantity of fuel used: 1.5 Ltr
4. No: of cars used: 08

   Average distance travelled: 30 km

   Average quantity of fuel used: 2 Ltr
5. No: of persons using public transportation: 600
6. No: of persons using college conveyance: ---- NIL
7. No: of generators used per day : NIL
8. Amount of fuel used: NIL
9. No: of LPG cylinders used in canteen/ Labs: 3
10. Use of any other fossil fuels in the college: Nill

Routine Green Practices

Every year college celebrates World Environment Day, World Water Day and Ozone Day in the campus. The main focus of these program was to provide awareness to the students about the importance of the environment, its conservation and sustainable use of environmental resources. The programs are conducted through seminars, poster presentation, quiz competition debates etc. The volunteers of NSS run clean and green drive in each session. They clean the college campus, plant saplings and maintain the land scape under their regular activities. The NSS volunteers also continue the cleanliness drive in the nearby villages during 7-days NSS camp each year. We also celebrate Ozone day, world environment day, National energy conservation day, world water day under the banner of Science club and Eco club etc. The department of physics has conducted a value-added course on "Renewable energy and Technology" to make students aware of energy crisis in India, the students also visited Solar energy plant and energy park developed by Chhattisgarh Renewable Energy Development Agency. Various competitions like essay, poster making, slogan writing, best out of waste, eco facts posters, models on energy conservation are organized to create awareness among young generation to protect environment and to promote green practices. The local administration also promotes and cooperate in green initiatives. The college administration believes in developing a mutual understanding with local community. The college being situated in the industrial belt of Dharsiwa receives a good cooperation from the nearby industries. Some industries have contributed financial support to develop green landscape. In the session 2020-21 the college received extremum support of nearby industries in Dharsiwa by providing water coolers, RO systems and air coolers (by Rama Steel Udyog), Computers for the newly developed computer lab. A gardener for maintaining developed garden (supported by Nandan Steels Siltara) is financially supported by the local industrial establishments. Green landscape in the front part of college building developed by local industries (Nandan steels, Siltara) they also helped by providing interior plants with pots.

Repairing of Pit for rain water harvesting

7 days NSS camp Kairkhoont

Environment Sensitization to the kinds of village school

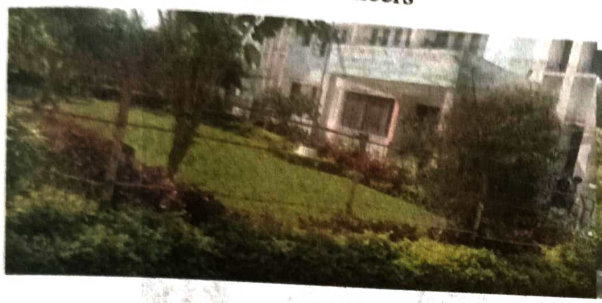
NSS volunteers cleaning village Khairkhoont/ NSS volunteers maintaining the garden

Plantation by Students of science club at Nandan Steels, Siltara

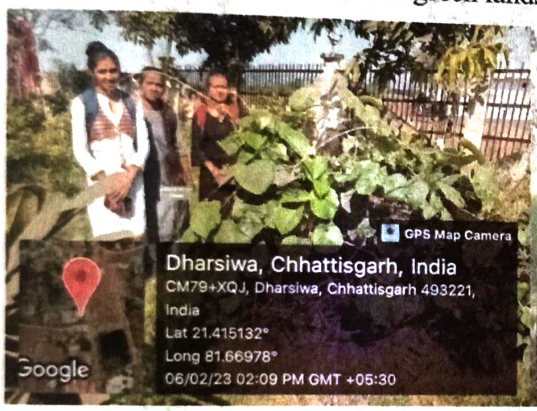
Cleanliness drive by students of NSS

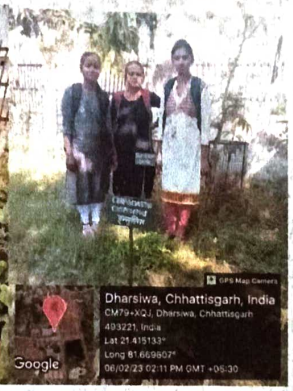
Principal & NSS program officers

The green entrance of the college



The green landscape in the campus



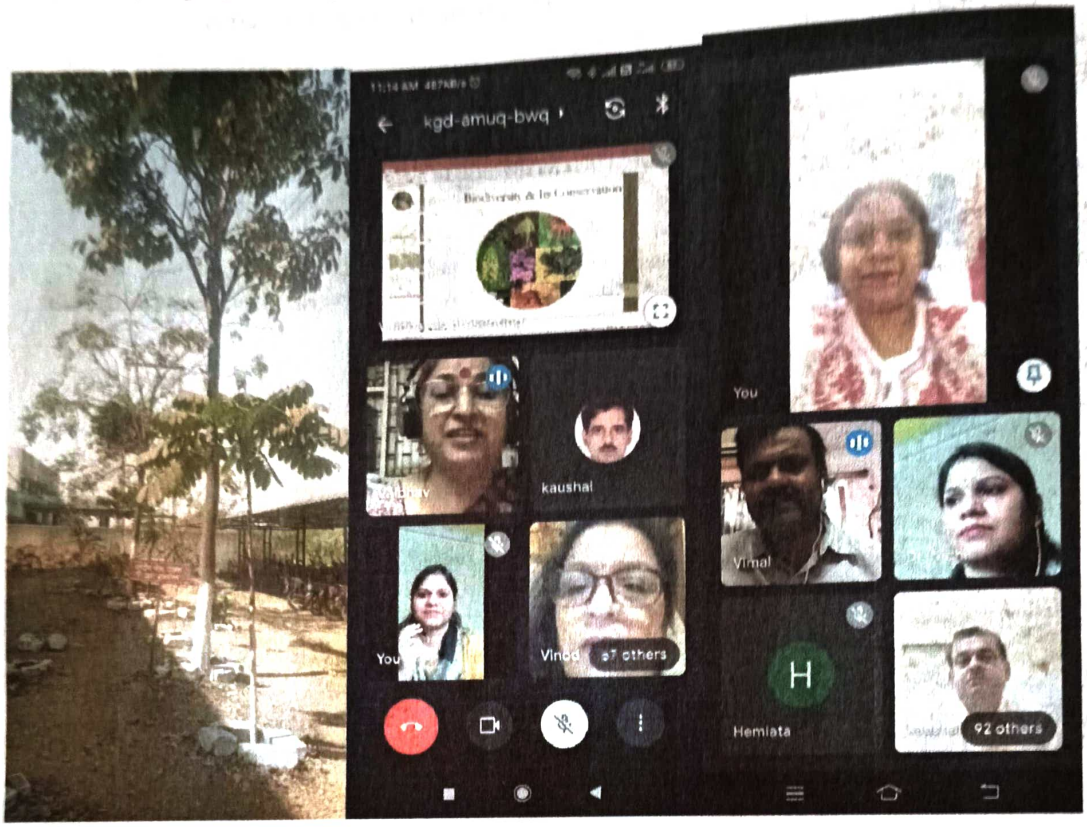


Medicinal plants developed by students of M Sc. Botany

Ozone day activities by Eco club

Students visiting solar energy Plant (CREDA)

Activities (Slogan, ecofact poster, exxtempore speech) during National energy conservation day



Plantation in the college campus done by NSS volunteer/ invited talks during world Environment day

Activities (Plantation and Best out of waste) during World Environment day

SUGGESTIONS AND RECOMMENDATIONS

Water Management

The water sources are found in safer range in terms of contamination. The college must adopt waste water management policy for the water draining out from the laboratories. The rain water from harvesting tank can be used as source water as well as coolant for the distillation unit. The rain water can also be used as source for drinking water.

Energy management

The energy audit recommends to avoid the use of more energy consuming electrical appliances and to replace with more environment friendly and energy efficient appliances in the college. For this the college may go with the installation of solar panels setup for lightening in some areas like parking, terrace and the lawn area. Solar water heater and solar cooker for canteen may be preferred.

Green Campus

In order to increase the carbon credit and greenery of the campus, it is recommended to plant more indigenous and evergreen / fruit trees inside the campus.

Waste Management

The college must adopt policy to reduce the usage of plastic in the campus. The college must encourage the use of biodegradable materials as alternatives. The dry and felt leaves in the campus can be used in the compost to use as manure. Used paper must be recycled.

1. Dr. Kavita Sharma, Head, Dept. of Botany, GGC, Devendra Nagar, Raipur 7/11/23

2. Shri Kaushal Kishor, Head, Dept. of Botany, GPSSC, Dharsiwa

3. Shri Hemant Deshmukh, Head, Dept. of Chemistry, GPSSC, Dharsiwa 7/11/23

4. Dr. G Nag Bhargavi, Head, Dept. of Physics & Co-Ordinator IQAC, GPSSC, Dharsiwa 7/11/23