SHRI RAM COLLEGE

GREEN AUDIT REPORT

Academic Year

2018-19

PREPARED BY

GREEN ASSESSMENT TEAM
SHRI RAM COLLEGE
MUZAFFARNAGAR
UTTAR PRADESH – 251001

Shri Ram College, Muzaffarnagar

Green Audit Committee

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Principal
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1. Executive Summary

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institute which will lead for sustainable development. Shri Ram College is deeply concerned and unconditionally believes that there is an urgent need to address these fundamental problems and reverse the trends. Being a premier institution of higher learning, the college has started 'Green Campus Inititative' which promoted various environmental friendly practices in combination with curricular education for sustainable and eco-friendly aura in the campus.

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The methodology include: preparation and filling up of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. It works on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, Alternative Energy and Mapping of Biodiversity. With this in mind, the specific objectives of the audit are to evaluate the adequacy of the management control framework of environment sustainability as well as the degree to which the Departments are in compliance with the applicable regulations, policies and standards. It can make a tremendous impact on student health and learning college operational costs and the environment. The criteria, methods and recommendations used in the audit were based on the identified risks. The area of the college premises is 25 acres out of which 'Green Cover' is approx. 19 acre. The tree census was carried out by NSS volunteers alongwith Green Assessment Committee.

In the present audit report, most of the aspects are covered such as tree plantation, awareness about environment programme evaluated by experts. Green campus is the motto of our college and the college has already taken some steps to protect the environment with help of college staff and students under the guidance of Principal Dr. R.S Chauhan, Shri Ram College.

2. Introduction

Green Audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of environmental diversity. The 'Green Audit' aims to analyze environmental practices within and outside the college campus, which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit.

Green audit is assigned to the criteria 7 of NAAC, National Assessment and Accreditation Council which is a self governing organization of India which declares the institutions as Grade A, B or C according to the scores assigned during the accreditation.

2.1 About the College

Shri Ram College, Muzaffarnagar, Uttar Pradesh is a NAAC (A) Grade, 18 years young college having 12 faculties of various streams. The college is located on a beautiful campus of 25 acres. The college main building is as norms of government policies to build it. There are separate laboratory of Chemistry, Botany, Zoology, Biotechnology, Computer Science, Physics, Electronics, Agriculture, Microbiology, Fine Arts, News studio etc.

The college has also adopted the 'Green Campus Inititative' for environmental conservation and sustainability. There are main three pillars i.e. zero environmental foot print, positive impact on occupant health and performance and 100% graduates demonstrating environmental literacy. The goal is to reduce CO_2 emission, energy and water use, while creating an atmosphere where students can learn and be healthy. The 'Green Campus Inititative' has been active since last few years both as an assembly group of sub committees that actively promote the various projects. The college administration works on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, Alternative Energy and Mapping of Biodiversity.

3. Objectives of the Study

The main objective of the green audit is to promote the Environment Management and Conservation in the College Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Audit are:

- To introduce and aware students to real concerns of environment and its sustainability
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus.
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.
- To bring out a status report on environmental compliance

4. Adapted Methodology

In order to perform green audit report of the campus , the team has adopted the following methodology included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation data analysis, Discussion with the staff members interviewing key persons and data analysis, measurements and recommendations. The study covered the following areas to summaries the present status of environment management in the campus:

- Water management
- Energy Conservation
- Waste management
- E-waste management
- Green area management
- Liquid waste management

Spot Visit – Shri Ram College is an integrated campus with different colleges such as Shri Ram College of Law, Shri Ram College of Pharmacy, Shri Ram College of Technology and Shri Ram college of Architecture. Three 'Green Zones' and two 'Agri Zones' were established as shown in map.

Fig: Google Earth view of Shri Ram Group of College (integrated campus). Green Zones and Agri Zones are tagged in Green; Solar Panel (Energy management) in Yellow; Vermicopost and Gaushala (Waste Management) in Red and Bio-Toilets in Purple.

As the physical inspection of the college, the green audit green assessment team started the audit during the period of May-June 2018 by taking the census of plants in the college campus ,vehicle ,counting the electricity consuming elements ,lightening elements, resources of water ,water harvesting mechanism implemented in college campus with support of NSS volunteers etc.

College building and office building survey –

After the surveying of college building, offices ,laboratories the data was collected such as ,light bills ,power consuming elements in the office ,laboratories ,labs ,also the renewable energy sources such as solar cell

Carbon Footprint:

College arranges group discussion programs with the NSS volunteers, staff members and discussion was held on the initiative taken by the college towards the environmental issues such as protection of environment, regarding plantation of trees, arranging rally's and awareness programs about the environment at the college level and society level

Focusing on following issues

- Plantation and conservation of plants
- Water conservation
- Use of renewable energy sources
- Solid waste management
- Plastic free campus

5. Observations and Recommendations

Water Use

This indicator addresses water consumption, water sources, irrigation, storm water, appliances and fixtures. A water audit is an on-site survey and assessment to determine the water use and hence improving the efficiency of its use.

a) Observations

The study observed that boar Well **(Total 7 pumps)** are the major sources of water. Water is used for drinking purpose, toilets, laboratory and gardening. During the survey, no loss of water is observed, neither by any leakages, nor by over flow of water from overhead tanks. The data collected from all the departments is examined and verified. On an average the total use of water in the college is approx. 1,51,000 L/day, which include 17,500 L/day for domestic purposes, 13,27,560 L/day for gardening and 2400 L/day for different laboratories.

Two rain water harvesting units (cemented tanks of 20,000 litre capacity each) and 30 water storing tanks (78,000 litre capacity) are also functional for storing and reuse, Gardens, domestic purposes, laboratory works by using system to save water. This is one of the unique steps towards greening practices.

b) Recommendations

- Need of monitoring, controlling overflow is essential and periodically supervision drills should be arranged. In campus small scale reuse and recycle of water system is necessary.
- Minimize wastage of water and use of electricity during water filtration process, if used, such as RO filtration process and ensure that the equipment's used for such usage are regularly serviced and the wastage of water is not below the industry average for such equipment's used in similar capacity.
- Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment, i.e. are biodegradable and non-toxic, even where this exceeds the Control of Substances Hazardous to Health (COSHH) regulations

Digital Water Level Recorder

Submersible Pumps

Energy Use and Conservation

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

Solar Panel installed in Campus

a) Observations

Energy source utilized by all the departments and common facility centre is electricity only. Total energy consumption is determined per day 200 KW and annually 2400 KW in 1 year by major energy consuming equipments.

Understanding the importance of energy conservation Shri Ram College, in the year 2017, took an initiative and installed Rooftop Solar Panels in the campus producing 160 Kilo Watt of electricity. The reason behind this is to take a bigger step towards environmental protection. We have taken lot of energy initiatives and our managing committee approved a 160 KW Rooftop Solar Panel System worth Rs. 1.05 crore. The area covered by this solar panel system is 3562.37 square meter which results in 22.26 square meter/ KW. The average production of electricity by this system is 960 KW per day and 350400 KW per year. The configuration of this solar Rooftop system depicts >300 Wp PV modules and string inverter of 160 KWP. They operate with a free resource and do not produce greenhouse gas emissions when converting sunshine to electric power.

All the departments and common facility centers are equipped with LED tubes (700), Lamps (50), Fans (750), coolers (72) and AC (26), Central AC (1). Equipments like Computers are used with power saving mode. Also, campus administration runs switch – off drill on regular basis. In science department like Physics, Chemistry, Biotechnology, Electronics, Computer Science,Botany and Zoology electricity was shut downed after occupancy time is one of green practices for energy conservation.

b) Recommendations

To rise maximum LED lights and power saver instruments.

Waste Generation

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, biodegradable, construction, glass, dust etc and recycling. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone. The survey focused on volume, type and current management practice of solid waste generated in the campus. The different solid wastes collected as mentioned above.

a) Observations

The total solid waste collected in the campus is 100 Kg/day. Waste generation from tree droppings and kitchen waste from canteen/ Hostel mess are the major solid waste generated in the campus. The waste is segregated at source by providing separate dustbins for different colors and it separates dry and wet solid and also separate Bio-degradable and Plastic waste. Segregation of chemical and biological waste generated in Biotechnology/Microbiology/Science laboratories is also practiced. Single sided used papers reused for writing and printing in all departments. Very less plastic waste (0.1Kg/day) is generated by some departments, office, garden etc but it is neither categorized at point source nor sent for recycling. Metal waste and wooden waste is stored and given to authorized scrap agents for further processing. Few glass bottles are reused in the laboratories. The food waste is used or sent for vermicomposting.

VERMICOMPOST UNIT

GAUSHALA (DAIRY FARM)

Waste management

Dustbins

The institute has adopted vermiculture composting in culture house on 600 sqft. land. The main purpose of this is to reduce disposable waste in the college campus. After complete process of vermicomposting, it is used as manure in the green zones. Awareness program among farmers is also conducted in the village nearby. Similarly, plant waste is used as fooder for cows in Gaushala (500 sqft.) in which 11 cattles are inhabited.

b) Recommendations

- Reduce the absolute amount of waste that it produces from college staff offices.
- Make full use of all recycling facilities provided by City Municipality and private suppliers, including glass, cans, white, colored and brown paper, plastic bottles, batteries, print cartridges, cardboard and furniture.
- Provide sufficient, accessible and well-publicized collection points for recyclable waste, with responsibility for recycling clearly allocated.
- Single sided papers to be used for writing and photocopy

E-Waste Generation

E-waste can be described as consumer and business electronic equipment that is near or at the end of its useful life. This makes up about 5% of all municipal solid waste worldwide but is much more hazardous than other waste because electronic components contain cadmium, lead, mercury, and Polychlorinated biphenyls (PCBs) that can damage human health and the environment.

a) Observations

E-waste generated in the campus is very less in quantity. The cartridges of laser printers are refilled outside the college campus. Administration conducts the awareness programmes regarding E-waste Management with the help of various departments. The

E- waste and defective item from computer laboratory is being stored properly. The institution has decided to contact approved E-waste management and disposal facility in order to dispose E-waste in scientific manner.

b) Recommendations

- Recycle or safely dispose of white goods, computers and electrical appliances.
- Use reusable resources and containers and avoid unnecessary packaging where possible.
- Always purchase recycled resources where these are both suitable and available.

6. Green spots in campus

This includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards. This also helps in ensuring that the Environmental Policy is enacted, enforced and reviewed using various environmental awareness programmes.

a) Observations:

The college campus is covered with the various species of the plants and maintained by the gardener all time. The varieties includes Melia azedarach, Populus, Neolamarckia kadamba, Delonix Regia, Tectona grandis, Toona ciliata, Pine, Cycas, Maulsari, Ficus, Eucylyptus, Jade Plant, Casaurina, Pistol Palm, Areca palm, Platycladus orientalis, Rudraksh, Silver Oak, Bismarckia Palm, Raphis Palm, Sapodilla, Mango, Monkey Jack, Litchi, Guava, Java Plum, Sideroxylon inerme, Murraya Paniculata, Crepe jasmine, Peace Lily, Hibiscus, Rose, Bamboo etc. and many other medicinally important plant such as Shatavari, Bakayan, Harsingar, Aak, Patthar chatta, Karipatta, Lemongrass, Doob ghaas, Calendula and Sadabahar etc. Campus also have several indoor plants including Ficus removes (formaldehyde, & benzene), Spider plants (carbon mono oxide, benzene & trichloroethylene), Snake plants, Bamboo palm, Rubber plant, chrysanthemum, Peace lily, & Gerbera etc. In point of view of importance of the assessement, zones were divided as:

Green Zone '1' : (Includes Block 'A', Main Entrance, Pavement from entrance to Block 'B', Parking Area)
No. of trees: 49
No. of Plants: 500
Grass Lawn Area: 6200 sq. m.
Haze Area: 2575 sq. m.

Green Zone '2' : (Includes College of Technology, College of Architecture, Boys Hostel)
No. of trees: 380
No. of Plants: 1121
Grass Lawn Area: 2405 sq. m.
Haze Area: 3652 sq.m.

Green Zone '3': (Includes Block 'B', 'C', 'D' , Playground and Shri Ram College of Pharmacy)
No. of trees: 61
No. of Plants: 872
Grass Lawn Area: 24,585 sq.m.
Haze Area: 654 sq.m.

Agriculture Zone '1': (In front of Block 'B', 'C')
Crops Grown: Rice, Wheat
Area: 1.5 Acre

Agriculture Zone '2': (Behind Block 'B', 'C' and Shri Ram College of Pharmacy)
Crops Grown: Sugarcane
Area: 3 Acre

b) Recommendations

- Reviews periodically the list of trees planted in the garden, allot numbers to the trees and keep records. Give scientific names to the trees.
- Promote environmental awareness as a part of course work in various curricular areas, independent research projects, and community service.
- Create awareness of environmental sustainability and takes actions to ensure environmental sustainability.
- Establish a College Environmental Committee that will hold responsibility for the enactment, enforcement and review of the Environmental Policy. The Environmental Committee shall be the source of advice and guidance to staff and students on how to implement this Policy.
- Ensure that an audit is conducted annually and action is taken on the basis of audit report, recommendation and findings.
- Celebrate every year 5th June as 'Environment Day' and plant trees on this day to make the campus more Green.
- Plant exhibition arranged regularly in college campus.

BIO (GREEN) TOILETS

COLLEGE ENTRANCE

PAVEMENT

LAWN AT CAMPUS ENTRANCE

CAMPUS (MAIN GATE BLOCK 'B')

BLOCK 'A'

BLOCK 'C' & 'D'

CANTEEN

ENGINEERING BLOCK

SRGC PLAYGROUND

AGRICULTURE ZONE

7. Tree plantation in the campus

Tree plantation is the major tools to control the air pollution and maintain the environmental balance. It is found that one fully grown trees absorbs 6.8 kg carbon dioxide CO_2 at the same time it gives oxygen gas more than 6.8 kg. It shows the importance of plantation and conservation of trees.

Every year planted trees growing responsibility and conservation of that plant is given to each volunteer of the NSS. After plantation each volunteer take the responsibility of one plant of its care. NSS unit organized environmental awareness programmes time to time. During the festival season the volunteer creates the awareness among the people to stop or reduce the water pollution, noise and air pollution. During the ganpati festival volunteer collected ganpati statues which help to reduce the water pollution.

8. Vehicle survey and carbon foot print

The main source of the air pollution is vehicle. The element which are responsible for the air pollution, emitted from the vehicles which are carbon dioxide, carbon monoxide, nitrogen oxide, hydrogen, ammonia, sulphur dioxide, these are the poisonous for the human health this element effect bad on the human health and other living animals and also damage the ecosystem. As the vehicles on the roads are increasing day by day, on other hand population of the world and our nation is increasing, this leads into the increase of air pollution. Use of vehicle introduce several products which are waste and harmful for the ecosystem imitates in the environment and this causes the environmental pollution. So that the air pollution is the biggest problem issue in the world.

Staff members and students uses the number of vehicles for the transportation.These leads to the air pollution. But to overcome this big problem of pollution college has adopted the systematic policy of transportation. The most of students are from outside of the town and they use the public transport for the transportation. Student from the town preferred the use of bicycle mostly the girl student's used bicycles. As the college is near to the bus stand student used to walk to college. Staff members of the college and visitors uses the cars or bikes or auto rickshaw and some staff member uses bicycles.

To manage the transportation system the college has adopted some policies such as the college staff member uses the sharing transport system. Most of student used bicycles colleges taken one another step toward the reduction of carbon foot print that, college celebrates the vehicle free day on this day students and staff member uses the state transport system.

a) Absorption of Carbon

According to the report of NGO DELHI GREENS, the economic value of full grown tree with aspect of oxygen producing capacity is nearly equal to Rs 23.72 Lakh per year. According to the reports given by the NGO "economic valuation of oxygen supplying ecosystem service of healthy tree", their claim is based on facts that an average adult at rest inhales nearly 7-8 liters of air per minute, which means about 11,000 liters per day, of which about 20% is oxygen and nearly 15% is exhaled. For human consumes about 550 liters of pure oxygen per day. Based on the market survey, it is found that the average cost of 2.75 portable oxygen cylinders is of Rs. 6500, at this rate human consumes oxygen worth about rupees 13 lakh per day.

By taking some consideration the following numbers cones out,

- Number of full-grown Trees in campus=500.
- Carbon absorption capacity of 500 trees=carbon emission during run of 25,000 miles.

  25,000 miles = 40223.6 km
- Petrol / Diesel consumes by a Vehicle for 40233.6 km= 2011.68 ltr.
- The carbon emitted by a Vehicle by consumption of 01 ltr of diesel is 2.68 kg.
- Thus carbon emitted by 2011.68 ltr is 5391.30 kg (2011.68 lts x 2.68 kg)

Amount of carbon absorbed by the one full grown tree is 5391.30 kg/500= 10.7826 kg.

Absorption of carbon dioxide:

As the college campus having number of plants, trees. The huge amount of carbon dioxide is absorbed and converted in oxygen.

- College campus having 490 full grown trees there it absorbs (490 x 10.7826 kg)= 5285.924 kg CO2 or **5.285 tons**

- College campus having 2493 semi grown plants, flowers and 40,000 sq. m. of Lawn and Bush area (equivalent to 50 semi grown plant), therefore it absorbs one third of full grown trees (2500 x 3.594 kg) = 8985 kg CO2 or **8.98 tons.**

Total Absorption of Carbon dioxide = 5.285 + 8.98 = 14.265 Tons

b) Oxygen emission in the campus

According to the growing air foundation,

- Trees renew our air supply by absorbing carbon dioxide and producing oxygen.
- The amount of oxygen produced by an acre of trees per year equals the amount consumed by 18 people annually. One tree produces nearly 260 pounds or 117.934 kg of oxygen each year.
- One acre of tree removes up to 2.6 tons of carbon dioxide each year.
- Trees lower air temperature by evaporating water in their leaves.

Therefore,

Total oxygen emitted by the 490 full grown trees is

(490 x 117.934)= 57,787.66 kg or 57.787 tons

By the semi grown plants, lawns abd bushes is about

(2500 x 39.311) = 98278.33 kg or 98.27 tons

Total oxygen emitted by the campus greenery = 156.8.505 tons / per annum

9. Activities and Awareness Programme

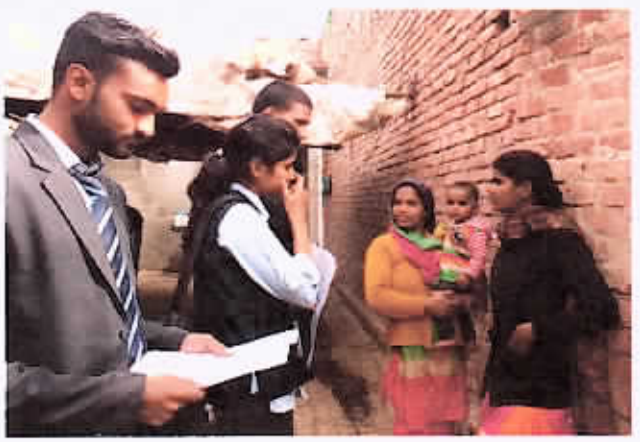
To define environmental awareness we must first understand the environmentalist movement. Environmentalism is an ideology that evokes the necessity and responsibility of humans to respect, protect, and preserve the natural world from its anthropogenic (caused by humans) afflictions. Environmental awareness is an integral part of the movement's success. By teaching our friends and family that the physical environment is fragile and indispensable, we can begin fixing the problems that threaten it.

A good course of action that ensures your continued participation is to pick an environmental issue that strikes you as the most urgent. The amount of environmental issues seems limitless, and while they are all important, it's easy to get overwhelmed. Thus, Shri Ram College time to time arraanged such type of programmes in this session, some of the noteworhty are: -

1. Guest Lecture on "Super Food – Spirulina"
2. "NO POLYTHENE CAMPAIGN" with Muzaffarnagar District Administration
3. Best of WASTE Competition
4. World Environment Day
5. Plantation Programmes with NSS time to time
6. International seminar of "Problem of Waste water" with Japan's TafGuard JICA foundation.
7. Seminar on Waste Management

Unnat Bharat Abhiyan

Smart City Rally



Environmental Awareness

Plantation Program

International Seminar with Japan's JICA foundation

Save Water Seminar By Dr. Rajendra Singh

"NO POLYTHENE" Campaign

10. Conclusions

Considering the fact that the institution is predominantly an undergraduate college, there is significant environmental research both by faculty and students. The environmental awareness initiatives are substantial. The installation of solar panels, paperless work system and vermicomposting practices are noteworthy. Besides, environmental awareness programmes initiated by the administration shows how the campus is going green. Few recommendations are added to curb the menace of waste management using eco friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus & thus sustainable environment and community development.

As part of green audit of campus, we carried out the environmental monitoring of campus includes Illumination, Noise level, Ventilation and Indoor Air quality of the class room. It was observed that Illumination and Ventilation is adequate considering natural light and air velocity present. Noise level in the campus well within the limit i.e. below 50 dB at day time.

College authority forms a committee for the plantation program and environmental awareness, this committee continuously work throughout the year with the help of NSS student. College appointed NSS students for the awareness of tree plantation.

(Convenor)

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Muzaffarnagar

Principal
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