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A Green audit of the institution: An environmental performance indicator of sustainable development and holistic approach for Green campus.

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Abstract: Green audit of the institution is important in consonance to assess the environmental performance of educational institutions and to consider potential options for turning the educational campus into an eco-campus. The MGS varsity campus, Bikaner Rajasthan, has undergone a green audit to evaluate its environmental impact. The main focus of this green audit is on the consumption of energy in terms of electricity, soil and water quality, vegetation, waste management procedures, and the campus carbon footprin Arora,P.(2017).To learn more about the resources on campus and their consumption, a questionnaire survey was first carried out.. The collection of various information from different unit of varsity was sorted, tallied, and examined to give a report on the environment with recommendations (IGBC 2021).

Keywords: Green Audit, Carbon Footprint, environmental conservation and sustainability

INTRODUCTION

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments (Mehta, R.M. and Sharma, V.K. (1997).It aims to analyze environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Green audit can be a useful tool for university to determine how and where they are using the most energy or water or resources; the university can then consider how to implement changes and make savings (Gnanamangai, B.M. Muruganath, B.M. and Rajalakshmi, S. 2021). It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus (Marrone, P., Federico, O., Asdrubali, F. and Guattri, C. 2018). If self enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self enquiry is a natural and necessary outgrowth of a quality educational institution (Wang, Y., Shi, H., Sun, M. and Huisingh, D. 2013). Thus it is imperative that the university evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent. The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises.(Singh, S., & Singh, A. 2018). On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric carbon-di-oxide from the environment.(Pradhan, R. K., Sahu, S. K., & Pandey, P. C. SS2019) The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

OBJECTIVES

In recent time, the Green Audit of an institution has been becoming a paramount important for self assessment of the institution which reflects the role of the institution in mitigating the present environmental problems. The university has been putting efforts to keep our environment clean since its inception. But the auditing of this non-scholastic effort of the university has not been documented. Therefore, the purpose of the present green 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:

1. To map the Geographical Location of the varsity
2. To document the floral and faunal diversity of the varsity

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3. To record the meteorological parameter of Bikaner where varsity is situated.
4. To estimate the Energy requirements of the university Green Audit Report of varsity
5. To document the Waste disposal system
6. To document the ambient environmental condition of air, water and noise of the varsity
7. To introduce and aware students to real concerns of environment and its sustainability

METHODOLOGY

The purpose of the green audit of Maharaja Ganga Singh University is 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. Some data have also been taken from the students' research works carried out by the environmental science department of the university.

GREEN AUDITING

The university has adopted the 'Green Campus' system 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 CO2 emission, energy and water use, while creating atmosphere where students can learn and be healthy.
For audit purpose and suitability of analysis of data the study area i.e. campus is divided into eight sections and detailed description of areas included shown in following table:

S. No.	Section	Units
1	Vice Chancellor Secretariat	Ground Floor : Vice Chancellor Cabin, PS/PA Office, Pantry, Proctorial board office, IQAC office, Meeting hall for Board of Management/ Academic council and Board of Studies, Building Store Room, Gent' s and Ladies toilets for Staff, Water Cooler.
2	Administrative block	Registrar office, Comptroller of Finance office, Director research office, Central store/GAD and Establishment section, Academic section and accounts office, Pantry, Gent' s and Ladies toilets for Staff, Water Cooler.
3	Examination Block	Office to COE, Secrecy, Enrollment, Student help desk, Underground warehouse for examination related material, Gent' s and Ladies toilets for Staff, Water Cooler.
4	University Guest House	Guest house manager office, Waiting lounge, Mess and Kitchen, dormitory, ten furnished rooms, three store rooms, Gent' s and Ladies toilets for Staff, Water Cooler.
5	Canteen	Pantry, refreshment zone and sitting area, Gent' s and Ladies toilets for Staff, Water Cooler.
6	Academic Block-1	Department of Environmental Science, Microbiology and Computer Science, Central Laboratory, six laboratories (two for each department), server room, classrooms, auditorium, Museum, faculty chambers, Gent' s and Ladies toilets for Staff, Water Cooler.
7	Academic block-2	Department of English, History and School of Law, classrooms, auditorium, Examination control room, faculty chambers, Gent' s and Ladies toilets for Staff, Water Cooler.
8	Central Library	Office to librarian, Reference section, Faculty reading room, Computer room, Reprographic section, Circulation section, Research section, Thesis depository section, Gent' s and Ladies toilets for Staff, Water Cooler.

RESULT AND DISCUSSION

1. Solid Waste and management:

This indicator of auditing is deals with, waste production and its disposal: paper waste, food waste, plastic waste, biodegradable waste, construction waste, glass waste, dust etc and recycling.The solid waste audit focused on volume, type of solid waste generated in university campus. The solid waste collected was paper waste, plastic waste,

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biodegradable waste, construction waste, glass waste and other waste. The total solid waste collected in the campus is 150 tonnes/Year. Paper waste is a major, also single sided used papers reused for writing and printing in office and in other departments. Important and confidential reports/ papers are stored in office store, can't send for recycling after completion of their preservation period. Very less plastic waste is generated in university campus but it is neither categorized at point source nor sent for recycling. Metal waste and wooden waste is neither segregated not given to authorized Scrap agents. Few glass bottles are reused in the laboratories and small glass waste is thrown on site. Small paper piece waste, classroom waste, biodegradable waste is used for composting but some biodegradable, office and classroom waste burn on site near academic block-1 building. Food waste, dinning waste etc. of common canteen is thrown on site.

2. Electricity and energy audit:

This indicator addresses energy consumption, energy sources, energy monitoring, and electricity consumption on lighting appliances / instruments and natural gas. Energy sources utilized by all wings and common facility centers include electricity and LPG. Major use of energy is in Science building, office, canteen and laboratories for lighting, cooking and laboratory work. Energy consumption by major energy consuming Equipments is 200 units / day, Energy consumption by less energy consuming Equipments is 150 units / day and Energy consumption by Lightning Equipments is 100 units / day . Thus total Electric energy consumption in university campus is 13500 units / Month. In large extent use of CFL and LED lamps decreases the consumption of electricity while use of incandescent lamp is observed at some places which increasing consumption. The use of 200 solar lamps and 100KW solar energy plant installed in year 2017-18 for lighting the campus at night is one the green practices deployed by university. The surplus units generated by 100KW solar plant are transferred to national grid, which reduces the net electricity bill of the campus. The adequate ventilation and natural light survey of whole infrastructure is essential to less the more consumption of electricity on air and light appliances. In science laboratory at some places exhausts fans are not used at proper locations. It is essential to be monitoring the use of windows in science Laboratory. Also high consumption of electricity is observed at office in duration of admission and examination. Major electricity is required for water fetching, drip irrigation for watering the gardens, lawns, Plants, trees and new plantations in campus. Auditing shows that teaching as well as non-teaching staff has residence out off the campus and mass numbers of students are come from nearby villages and the city. As our university is situated in outskirt of the city so the large number of students are using university transportation vehicles, while some of the students make use of private transportation like bikes, scooters and cars. Staff members who lived out campus are using the vehicles in sharing for daily transportation. Also private transportation vehicles are restricted in university from gate. Study tours, collection tours, visits, treks, save environment and clean environment and no vehicle day etc abhiyan are followed by university which gives the message of importance of walking. Consumption of LPG for education or practical purpose as well as the LPG consumption at canteen is observed to be much less. The LPG connection in name of the university and LPG is handled by departments of environmental Science and Microbiology etc for heating purpose at the time of practical, no leakages and off mode regulators are seen at time of verification.

3. Water and waste water audit:

This auditing indicator addresses water consumption, water sources, appliances and fixtures. In survey water used at bathrooms, toilets, laboratory, canteen, garden, shower and as well as leakages and over flow of water from overhead tanks is also been evaluated. The data collected from all the sections is examined and verified. For monitoring of water use, number of times of filling of tanks per day, time for overflowing, rate of flow, water wasted in liters per day due to overflowing is periodically supervised. Data submitted by the sections it examined according to leakages, rate of flow of leakages, use for washing, use of water for cleaning etc by expert committee. On an average the total use of water in the university is 15-18 Kiloliters/day, 2000Liter/day water is loosed through overflow of tanks and it is observed that about 100 Liters /day water losses due to leakages in different sites of water use. The major use of water is in office administrative building, science building and at exteriors. Roof top rain water harvesting is also been practiced in some extent. There are six rainwater harvesting tanks with having capacity of storage 600000 liters and the total storage capacity through all modes is 1050000 liters are available in the campus. Less numbers of leakages are observed while conduction of verification and site inspection of infrastructure still plumbing survey of water supply line is necessary to stop water supply after occupancy time and to use pressure valves / sensor valves to make control on overflow. Need of monitoring, controlling overflow is essential and periodically supervision drills should be arranged by authority. No water recycling plant in campus, small scale / medium scale reuse and recycle of water system is necessary.

4. Hazardous waste audit:

A. Chemical waste:

This is hazardous waste of laboratories, medical waste from health center, colors, dies and chemicals used in campus maintenance. Hazardous materials represent significant risks to human health and ecological integrity. Only in the

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department of Environmental science, Micro-biology the laboratories generate the chemical waste. Survey and data collection shows that chemical waste generated on the campus through Science laboratories is very less and majorly generated by the department of environmental science and micro-biology. At time of site inspection it is observed that in the department of environmental and microbiology hazardous chemicals are handled for practical purpose and these hazardous chemical wastes are drain out with basin water directly to the campus. In some extent it produces an air, soil, water pollution. Hence drainage of chemical laboratory should be collected in air tight cement chamber and frequently the chemical waste from chamber is sent for recycle or for scientifically destroy process. The study data reveals that solid hazardous waste 05 Kg and liquid hazardous waste 20 liters are generated, it

reveals that solid hazardous waste 05 Kg and liquid hazardous waste 20 liters are generated, it drained with making 100 times dilution. Usually there is a practice in the laboratories to store these hazardous chemicals in the containers and cans for safe disposal. The stoppers of all the bottles are regularly checked. The exhaust fans are not provided in some laboratory to expel gaseous waste. No separate dust bins for wet solid waste or for chemical precipitation are seen in laboratory.

B. E-waste:

E-waste can be described as electronic equipment that is near or at the end of its useful life. E-waste 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. E-waste generated in university campus is of schedule III and is generated is very less but not disposed in scientific way. Now institute has some e-waste like chips, bulbs, circuit boards, mother boards, computers, batteries, and switches. The university is not using paperless office work administration due to which in campus there is carbon emission due to printers, filing of cartridge inside the office and in several section Xeroxing and printing facility is observed. The non-working computer spare and other non-working electrical equipments like bulbs, tubes, PCB components, pieces of wires, computer hardware‟ s, and old instrument‟ s are dumped in different sections at several places. Buy back policy is not available. University does conduct the awareness programmes regarding -E-waste Management with the help of Department of environmental science for how to handle and dispose the E-Waste. There is no separate method to dispose the e waste through authorized vendors.

5. Air quality audit:

Air quality in the academic university is very important for producing good educational atmosphere as well as for the health of the students, faculty, staff and other stake holder of the institute. The no air pollution sources other than natural dust are observed in the university campus. The university campus is situated in outskirt of the city of Bikaner district and it is far from major transporting roads. University has green campus of seven acres, efforts have been made on to bring part of land under cultivation of trees, plants through plantation drive by NSS ,communities, students, teaching and nonteaching staff in university. In campus more than 5000 trees through plantation and also having in natural capacity because university campus still has more virgin area with their indigenous species which comprises of herbs , shrubs and grasses with their medicinal and economic value. University campus has a lot of open area and all buildings are discrete hence airy, clean atmosphere is seen. University created a green zone in university campus. The university has planted different types of large number of trees in the campus, this greenery in campus helps to neutralize the carbon products generated.

6. Noise Environment

The noise levels measurements were carried out using precision noise level meter. The noise level survey was carried in classroom, in study area it is averagely 62 dB. No major sources of noise are identified, the study area is quite no major vehicular movement and the transportation activities are seen.

CONCLUSION

Environmental Management Plan: Environmental Management Plan gives the strength, weaknesses and suggestions on the environmental issues of Maharaja Ganga Singh University Bikaner campus. It also suggests about which area is to be given priority. The green audit of Maharaja Ganga Singh University campus reveals that the administration should take care of solid waste, waste water, chemical waste and e-waste management on high priority as the ignorance to these will deteriorate the environment on the campus. The entire exercise of green audit concluded that the university administration is keen on all the environmental issues and starts steps for environmental sustainability. Students, staff, faculty and administration working together will produce the best results in raising awareness and help for environmental friendly campus.

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REFERENCES

[1]. Arora,P.(2017).Environmental audit need of hour International Journal of Adavanced Research in Engineering and Management 3(4),25-27
[2]. Mehta, R.M. and Sharma, V.K. (1997). Environmental audit – An overview. IJEP. 17 : 212-214
[3]. Gnanamangai, B.M. Muruganath, B.M. and Rajalakshmi, S. 2021. A Manual on Environment Management Audits to Educational Institutions and Industrial Sectors. Vol. I. Laser Park Publishing House, Coimbatore, Tamil Nadu, India, p. 127.
[4]. IGBC 2021. Indian Green Building Council. https://igbc.in/igbc/
[5]. Marrone, P., Federico, O., Asdrubali, F. and Guattri, C. 2018. Environmental performance of Universities: Proposal for implementing campus urban morphology as an evaluation parameter in Green Metric. Sustain. Cities Soc.,42: 226-239.
[6]. Wang, Y., Shi, H., Sun, M. and Huisingh, D. 2013. Moving towards an ecologically sound society? Starting from green universities and environmental higher education. J. Clean Prod., 61: 1-5.
[7]. Singh, S., & Singh, A. (2018). Green Audit and Energy Performance of Higher Education Institutions in India: A Case Study Approach. Journal of Cleaner Production, 183, 139-148.
[8]. Pradhan, R. K., Sahu, S. K., & Pandey, P. C. (2019). Green Audit and Sustainability Practices of Higher Education Institutions in India. Journal of Cleaner Production, 213, 50-59.

