Green Audit Report –2022

SJB Institute of Technology, Bengaluru

vanalok
enabling sustainability

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1st September 2022

CERTIFICATE

This is to certify that SJB Institute of Technology Bangalore has conducted detailed Environmental Green Audit of their campus and has submitted necessary data and credentials for scrutiny. The activities and measures carried out by the college have been verified based on the report submitted and was found to be satisfactory. The efforts taken by the faculty and students towards environment and sustainability is highly appreciated and commendable.

Director

VANALOK PVT. LTD. BENGALURU

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Green Audit conducted By

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Acknowledgement:

We would like to acknowledge and give our warmest thanks to the committee members of SJB Institute of Technology for their support and for providing us necessary facilities and co-operation during the audit process. This helped us in making the audit a success.

We hope this report would help SJB Institute of Technology with their future endeavors and help them achieve all their environmental aspirations and vision.

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Executive Summary:

Nature encompasses fascinating inhabitants like microorganisms, plants, animals, insects, etc., who have as much right to live as we do. People all over the world see nature differently. With the climatic conditions going haywire all over the world, there is a need for resilient infrastructure, actions and a strong mindset for driving lifestyle change. Students being future citizens of the world can drive change and strive for a better existence and this would be possible only if educational institutions impart values and space for them to grow. They also have the ability to influence their families and the general public more effectively than even a learned motivator. Teachers play an undeniable role in imparting knowledge to the students. Hence, teachers are in a position to facilitate knowledge and promote the learners to achieve better awareness about what is happening in and around them. Teachers as professionals and influential individuals, supported by the management of institutions, can play an important role in moulding students' attitudes through training and encouraging them to be the role models in their communities. An educational institution thus can offer an ideal service in forging the young minds in their impressionable age, towards promoting the health of nature, understanding the underlying causes of climate change and its impacts, and the conditions required to be maintained for sustaining life on earth.

Green Audit is, therefore to make the entire college and the society understand through trained students, how heavy their carbon footprint is, and help in the remediation process while making their campuses and living surroundings 'as green as one can make it'. It is also a search of futuristic ways to climb up the ladder through continuous effort and sustainable ways of sustenance.

The result of such an exercise would help parents and other visitors to the campus appreciate responsible behaviour and admire the novel ways in which the campus team has strived to achieve their "shade of green". A green audit can also be a useful tool for a college to know how and where they are using the most energy, water or other resources. The college can thus plan for the necessary changes and ensure savings. It can also be used to improvise their waste minimization strategy. Green auditing and the implementation of mitigation measures will be a win-win situation for the college, the learners and the planet. It can also create health consciousness and promote awareness of the environment, ethics and values.

Eco-campus is a concept often used by educational institutions around the world to make campuses more sustainable by reducing wastages and enabling their safe disposal into the environment. Waste minimization plans for academic institutions are now mandatory to ensure that the campus is cleaned regularly. As an eco-campus, performing a green audit of the institution is critical. The green auditing of SJB Institute of Technology in Bengaluru allows the assessment of lifestyle, actions, and their impact on the environment. The audit was primarily focused on greening factors such as energy consumption in terms of electricity, water management, waste management, and green spaces management. A series of methods were used to obtain information about the green practices of the college. A set of questions were formulated, reports and documents were verified and a series of interviews were conducted with people in charge of each criterion was done to ensure the accuracy of information. The information gathered was organized, tallied, and analyzed. Finally, a report on environmental observations and recommendations for improvement were listed out for the perusal of the management.

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1. Introduction:

Green audits help analyse local environmental practices both inside and outside the university premises which influences the atmosphere of the campus. Therefore, 'Green Audits' can be defined as a systematic, identification, quantification, recording, reporting and analysis of components that constitute a university environment. Through such audits, the current status, scope for improvement, and recommendations for improvement can be made available which would further improve the structure of the environment and enhance the efficiency and atmosphere of the campus.

A green audit also serves as a means to identify opportunities for sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities and save money and achieve values of virtue.

Green audits are assigned to criteria 7 of the National Assessment and Accreditation Council, which is a self-governing organization that provides various institutions with grades based on their criteria for accreditation. This accreditation provides a college with an opportunity to present itself as an esteemed institution without impeccable values, infrastructural advantage and endless opportunities it could provide its students.

1.1.1. Need for Green Audits:

Green audits help analyse and determine good institutional practices; whether they are eco-friendly or sustainable. With the world constantly changing, development, unfortunately results in large-scale utilization of natural resources. Now natural resources are not just used for the production and consumption of commodities. Energy, water are all basic elements that are used generously by all. With the threat of depleting resources looming over our heads, it is imperative to determine how much we use and where we waste resources to ensure efficient usage. Green audits provide opportunities to determine the same and help the organization to reflect, improve and expand their processes and shift to clean green resource utilization. Apart from this, it helps instil consciousness among people as part of the institution towards the environment and sustainable resource utilization.

1.1.2. Goals of Green Auditing:

a) Identification of strengths and weaknesses in green practices.

b) Analyse and suggest solutions for problems identified.

c) Identify and assess environmental risk.

d) Motivate staff for optimal sustainable use of available resources.

e) Increase environmental awareness throughout the campus.

f) Collect baseline data of environmental parameters and prepare plans for issues before they become problems.

1.1.3. Objectives of Green Audit:

a) Analyse current practices and determine their impact on the environment.

b) Identify and analyse significant environmental issues.

c) Continuous assessment for better environmental performance.

d) Establish and implement a green culture on the campus and sensitize the faculty and students.

1.1.4. Benefits to Educational Institutions:

a) Improve the environment within and outside the campus premises.

b) Help recognize cost-effective green strategies like waste minimization, energy conservation, water replenishment etc.

c) Empower people linked to the organization to move towards conscious environmental thinking and practice.

d) It helps improve the image and builds a positive impression of the institution for its green and clean approach.

2. Scope of Green Audits:

The benefits of green auditing practices are the following:

a) Environmental education through systems thinking and environmental management system approach.

b) Benchmarking for environmental protection initiatives.

c) Financial savings through efficient resource use.

d) Enrichment of curriculum through hands-on experiences.

e) Enhancement of college profile and improving environmental standards.

f) Strengthening the environmental ethics and value systems in young people.

g) Developments of ownership, social and personal responsibility for the campus and its surrounding environment.

3. About the College:

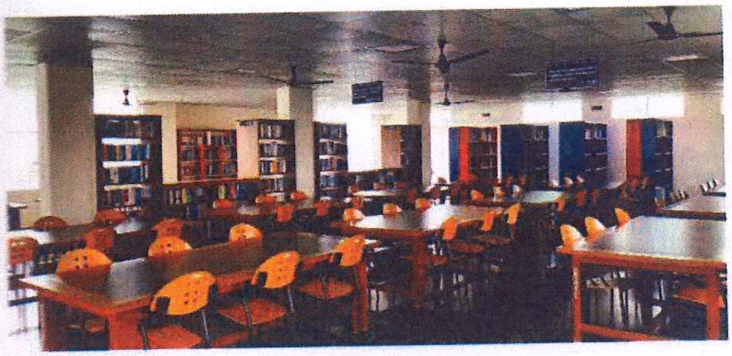
Sri Jagadguru Balagangadharanatha Swamiji Institute of Technology is a private engineering college in Bengaluru established in the year 2001. The College is affiliated to the Visvesvaraya Technological University (Belagavi), approved by AICTE (New Delhi) and recognized by the UGC, New Delhi with 2(f) and 12(B).

SJBIT is spread across an area of 13 acres of land with a built-up area of 58967.43 sqm. With a strong vision that strives to be a recognized technical education centre with global perspective and a mission to provide learning opportunities thatfoster students' ethical values, intelligent development in science and technology and social responsibility so that they become sensible and contributing members of the society.

The college management has slowly made conscious steps towards bringing an overall positive and environment friendly campus for the benefit of both the students as well as long term benefits for the institution. The institution has mindfully provided sufficient space for all the essential requirements of the students, such as parking areas, proper roads, sitting areas, well-maintained washrooms, clean filtered drinking water, good playgrounds, well-managed green space and most importantly fully functional waste water management units. The corridors are clean and provisions for dustbins and lights wherever necessary are present.

SJBIT is a well-recognized technical institution fostering quality education in the last 21 years. They provide placement training, technical skill enrichment programs, soft skill trainings that enable students to get placed in multinational companies with a top-notch reputation. The College features a huge library with a good collection of books and an exclusive digital library facility, an indoor

auditorium, a hi-tech gym facility on campus. The college features separate hostels for girls and boys with all facilities and a dedicated staff. The institute encourages sports and provides facilities for outdoor games like Cricket, Volleyball, Football and Basket-ball court along with a centralized AC Indoor Sports Complex. The college campus consists of Bank, Medical facility, ATM and cafeteria for both students and faculty.



4. Observations and Recommendations:

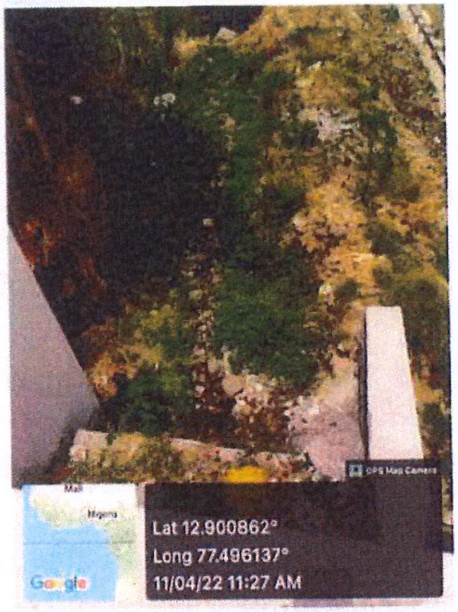
4.1 Water Management:

Water is an important resource that is depleting at a rate faster than what can be recovered. All beings depend on water for their survival. Although the earth is covered by water majorly, freshwater that is used for drinking purposes is very limited. Hence, it is very important to use water judiciously and make arrangements to collect and preserve water whenever possible for replenishment of the water table. This indicator addresses water consumption, water sources, irrigation, stormwater, appliances and fixtures. A water audit is an on-site assessment and surveys to determine the practices and efficiency of usage.

- **Observations**:

  The major source of water supply are campus borewells, tanker services and the layout water supply in the college premises. Everyday 11 (6 in college + 0 in Girls Hostel + 5 in Boys Hostel) are operated to fill the overhead tanks with a total capacity of 1,30,000 ltrs. The tanks have a system of automatic water level controllers to ensure limited wastages. Water is majorly used in washrooms, canteen, administrative areas, academic areas, hostels and gardening purposes. On an average, the total annual consumption of water in the college is 54.75 MLD. The management has made available provisions for purified drinking water on campus for the students and other staff. Wherever applicable the washrooms have fittings such low flow faucets, low flow shower heads, low flow toilets and urinals to ensure minimum wastages.

  During the survey, no wastages were observed. The open grounds provide means for water percolation as they are not barren due to ample greenery on campus. A proposal for a functional rain water harvesting unit has been initiated in the campus premises. All the waste water from the campus is treated by a fully functional Sewage Treatment Plant and is reused in the college premises.



Rainwater outflow point at SJB Institute of Technology

SJB Institute of Technology Campus Layout

Recommendations:

1. Push Button taps can be implemented phase wise in wash rooms to prevent water wastage.
2. Rain water harvesting units can be improved in the premises to conserve rainwater run-off and recharge pits can be employed close to the borewells or wells to help recharge the groundwater table.
3. Need for systems to control overflow of water while filling up overhead tanks.
4. Minimizing wastages by reducing, reusing and recycling wherever possible.
5. Installation of aerators in all taps to reduce wastage and consumption. Automated taps could also help reduce usage.
6. Fix leaky faucets and flushes regularly.
7. Ensure all disinfectant products used are eco-friendly and do not cause major harm to the environment.

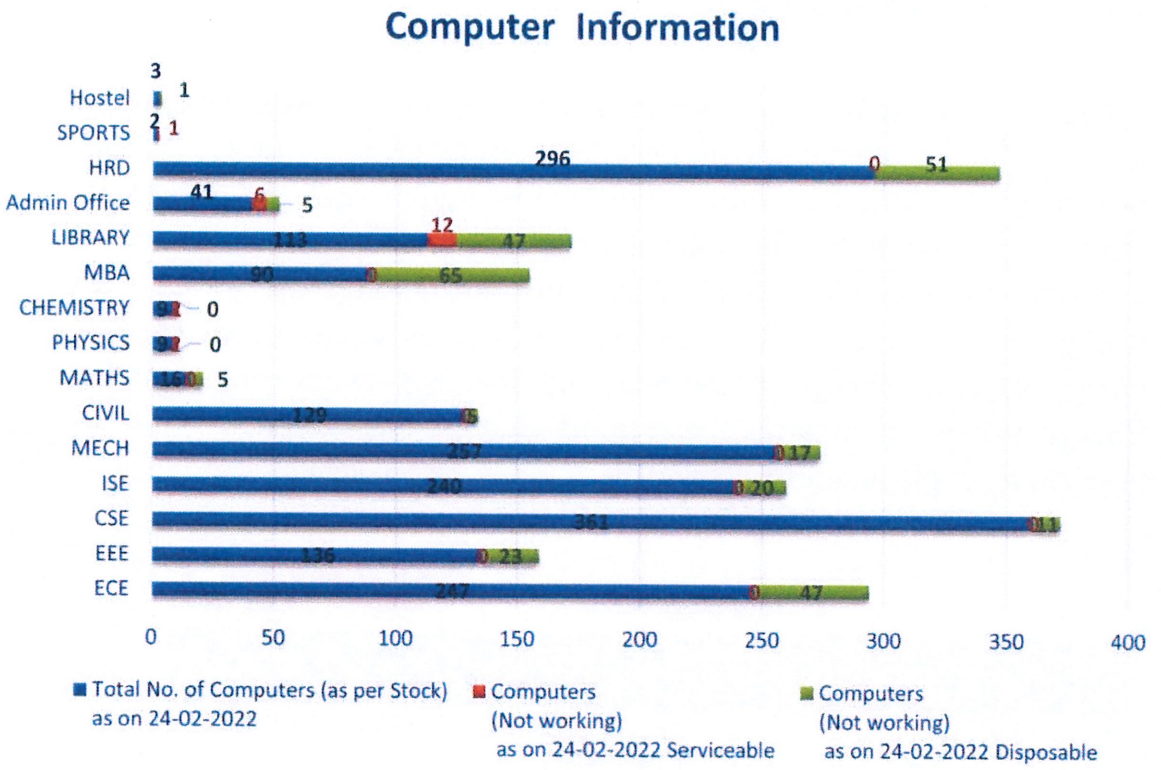
4.2 Energy Management:

Energy conservation is an important component of campus sustainability, as it is linked to the institution's carbon footprint. Energy auditing primarily is associated with energy conservation and techniques for reducing consumption that contributes to environmental degradation. As a result, any environmentally conscious institution must evaluate its energy usage policies. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment.

Sl No.	Load	Numbers
1	Lights	1612 (Tube lights – 1333 + LED 172+ CFL - 107)
2	HV AC system	Fans – 901 AC – 7
3	Motors	Borewell – 4 Lift – 4

Sl No.	Specifications	Power	Qty
1	Kirloskar Diesel Generator Sets	250KAV	1
2	Cummins Diesel Generator Set	320KVA/415V	1

Solar Meter Readings	Total units (Feb 2022)
ECE - EEE Block	27,808
MECH – CIVIL Block	17,648



Observations:

Energy is one resource that is used in every branch of the institution. The primary source of energy is electricity and the total energy consumption for the FY 2021-22 is 730,812.5 Units respectively. Apart from this, there is a provision for a generator for emergencies. The college also uses UPS (36 numbers) on every floor for backup during power outages. All the rooms are well-lit and have enough and more provisions for natural lighting thereby saving a lot of energy in the day times. Apart from this the institution is slowly phasing out their older lighting to CFL's. The authorities have taken extra care to purchase only Energy Star certified equipment to ensure efficient usage of energy. The management has utilized its terrace space and invested in solar energy which is a renewable energy resource and the energy harvested is sent to the electricity department for a waiver in the electric bills. The total capacity of the solar power plant is 423.68 kW. The panels are spread over an area of 90000 sqft of the terrace space.

Recommendations:

1. Existing UPS system needs to be upgraded to smart UPS system which will help the institution to save energy.
2. Foot valves shall be used to automatically switch off the water supply when the tank reaches optimal levels. This could help save both energy as well as water. Automatic bore well management systems with sensors at the overhead tank as well as underground would help pump water only in case of shortages.
3. Using Brushless Direct Current Fans could help reduce the consumption by half. All traditional electric appliances shall be replaced with energy-efficient ones to reduce power consumption and wastages.
4. Lighting in some areas such as the toilets can be controlled by PIR (passive infrared light) sensors.
5. Holding power conservation and awareness events could help keep the college community engaged.
6. Switch on the energy saving modes in computers so that the system would shut down when there is no activity or idle.

4.3 Waste Management:

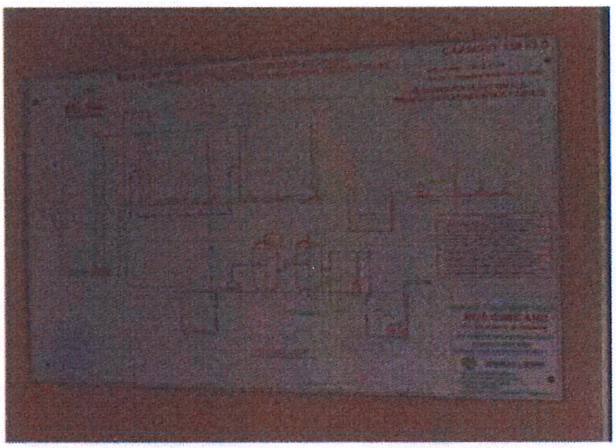
Solid waste can be categorized into three types namely: Biodegradable, Non-Biodegradable and Hazardous Waste. In an institutional setting, the only hazardous waste generated is E-waste and Sanitary Waste. Biodegradable or Wet waste is mainly leftover food components, canteen waste etc., while non-biodegradable includes recyclable waste like plastics, tin, bottles, papers etc. E-waste majorly contains harmful chemicals and metals that could cause harm to the handlers or even cause harmful gas emissions in case it is burnt in landfills. Such waste needs to be collected and given special treatment. Thus, minimization of solid waste is an essential win on the road to sustainability. This indicator addresses the waste collection and disposal mechanisms.

Observations:

The total waste collected on the campus is around 73 tons of wet waste and 7.3 tons of dry waste for the year 2020-21. Waste segregation seems to be taking place at the source itself. There were provisions for dustbins with clear demarcations for wet waste and dry waste in every place possible. All the segregated waste are sent to the respective vendors. Wet waste is sent to piggeries, dry waste to recycling units and E-Waste to the respective authorized vendors who would safely dispose of the waste components after extraction of required materials. The institution encourages extensive usage of E-communication thereby moving towards a paperless mode of communication.

The college has a fully functional STP (Sewage Treatment Plant) with a capacity of recycling up to 550 KLD in place that takes care of all the grey water recycling. It runs for 18 hours in a day. The water first passes through a collection tank with a bucket screen that screens solid waste initially. Following which the water is moved to an equalizer tank and then to an anaerobic digestor used for treatment of wastewater. After the digestion of waste using microbes, the water is moved to an aeration tank that provides a constant supply of oxygen to allow the microorganisms to digest the organic waste. The water is then moved to a clarifier tank to allow the sludge to settle at the bottom. The recycled water is sent to filtration units to further process the water and then finally sent to the

collection tank. The recycled water is then utilized for gardening purposes. A thorough STP plant is necessary as the lab waste and other sewage needs to be thoroughly treated. The presence of this impeccable recycling option in the campus definitely shows that the opportunities for water utilization is fully explored.



Recommendations:

1. Having proper sanitary waste disposal mechanisms on site like an incinerator for safe disposal are a part of good environmental practices. Having sanitary pad vending machines could also benefit the students on campus.
2. Applying concepts of Reduce, Reuse, Recycle and Refurbish wherever possible could instil a green mentality in the campus.
3. Installing proper composting units in the form of pits to take care of wet waste in the premises itself could be beneficial to the institution. This could be done involving students and the compost could be used as nourishment for the trees and plants on the campus.
4. Training and campaigns in cotton bag making for students and staff will reduce the usage of throw away plastic carry bags.
5. Leaf litter from the campus can be effectively used for aerobic/ vermicomposting so that the composted material can also be used as good manure.

4.4 Green Space Management:

With the rapid increase in urbanization, the availability of green spaces for recreation and relaxation is slowly reducing leading to detrimental repercussions on student growth and health. Students need to grow and learn in environments that promote their physical health as well as their cognitive development to enhance their academic learning. Green spaces boost mental health among adults and can offset traffic emissions. Greenery can help reduce air pollution in several ways like filtering air, restoring water tables, reducing heat island effects and reducing noise levels.

a) Observations:

SJBIT has extensive green cover spanning over their campus space. The college campus consists of various trees as well as plants. The garden maintenance team of SJBIT identifies the areas in the campus where new saplings are to be planted, manage the procurement of saplings from the nursery and is responsible for planting of saplings, watering the plants and other garden maintenance activities. The construction of new block was carefully done without uprooting any trees.

Details of Trees Within Campus: (Height: 4feet and above)

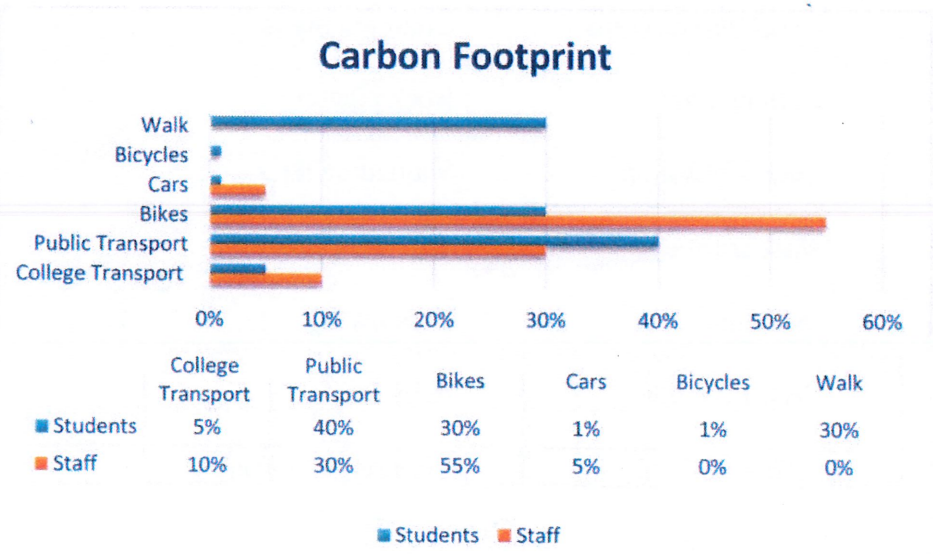
Sl.No.	Botanical Name	Local Name
1.	*Grevillea robusta*	Silver oak
2.	*Tabebuia rosea*	Trumpet Tree
3.	*Calotropis gigantea*	Ekka
4.	*Spathodeacampanulata*	African tulip tree
5.	*Azadirachtra indica*	Neem
6.	*Phyllanthus emblica*	Amla
7.	*Bougainvillea glabra*	Bougainvillea
8.	*Pongamia pinnata*	Indian beech
9.	*Saracaasoca*	Ashoka
10.	*Artocarpus heterophyllus*	Jack fruit
11.	*Plumeria alba*	White frangipani
12.	*Cycus*	Cycad
13.	*Ixora*	West Indian jasmine
14.	*Persea americana*	Butter fruit
15.	*Oxalis*	Wood sorrels
16.	*Albizia julibrissin*	Persian silk tree
17.	*Ficus benghalensis*	Banyan
18.	*Cassia javanica*	Apple blossom tree
19.	*Paulownia tomentosa*	Royal forms
20.	*Tectona grandis*	Teak
21.	*Dypsislutescens*	Areca palm

Details of animal biodiversity on campus:

Sl.No.	Scientific Name	Local Name
1.	*Leptocomazeylonica*	Purple rumped sunbird
2.	*Nectarinia asiatica*	Purple sunbird
3.	*Parus cinereus*	Grey tit
4.	*Accipiter badius*	Shikra
5.	*Bubulcus ibis*	Cattle egret
6.	*Saxicoloidesfulicata*	Indian robin
7.	*Dicriris macrocercus*	Black drongo
8.	*Pycnonotusjocosus*	Red whiskered bulbul
9.	*Meropsorientalis*	Green bee eater
10.	*Terpsiphone*	Paradise flycatcher
11.	*Ardeolagrayii*	Pond heron
12.	*Milvus migrans*	Black kite
13.	*Funambulus palmarum*	Squirrel
14.	*Acridotheres tristis*	Common myna
15.	*Columba livia*	Rock pigeon
16.	*Strix occidentalis*	Spotted owlet
17.	*Haliasturindus*	Brahminy kite
18.	*Tyto alba*	Barn owl
19.	*Priniasocialis*	Ashy prinia
20.	*Psittaculakrameri*	Rose ringed parakeet

b) Recommendations:

- Keeping records of the trees and plants on the campus and looking out for opportunities would help increase their number.
- Including environmental sciences as an added subject in the curriculum for at least one module would benefit students in understanding the environment.
- Including opportunities for students to volunteer and be a part of environmental organizations by incentivizing the same for extra credits could help them achieve a number of personal goals that would be beneficial in their careers.
- Including projects that involve environmental concerns and what students can contribute from their respective fields as a part of the curriculum to enhance problem-based thinking capabilities.



5. Summary:

An audit of natural resources is an important tool for ensuring that natural resources are being used in an eco-friendly and sustainable manner. Green auditing is the process of determining whether institutional practices are environmentally friendly and sustainable. It is a continuous process of identification, monitoring and discussion. There is scope for further improvement, particularly concerning waste, energy and water management. The college in recent years consider the environmental impacts of most of its actions and makes a concerted effort to act in an environmentally responsible manner. Even though the college does perform fairly well, the recommendations in this report highlight many ways in which the college can work to improve its actions and become a more sustainable institution.

Figure 1: Good Environmental Practices for Sustainable Development.

6. Corollary:

From the green audit, the following conclusions can be made:

- Water management consists majorly of the rainwater harvesting systems that bring in a good amount of water that could be used during difficult times. More thought could be put into rainwater recharge pits that could replenish the ground water table.
- Food waste or wet waste, in general, can be turned into compost that can be used as enrichment for the green on the campus. This would help them institution lessen its dependence on the local authorities for disposal.
- E-waste is segregated, handled and disposed of properly in an eco-friendly and responsible manner.
- Reduction in the use of one-time-use plastics like bottles, cups, folders, pens and other decorations could help reduce the plastic waste menace on the campus.
- Wear masks signage were seen on the campus.

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