SREYAS Institute of Engineering & Technology

(Approved by AICTE, New Delhi | Affiliated to JNTUH, Hyderabad | Accredited by NAAC)
Hyderabad | PIN: 500068

GREEN AUDIT REPORT

PRINCIPAL
PRINCIPAL
SREYAS INST. OF ENGG. & TECH
BESIDE INDU ARANYA, NAGOLE,
HYDERABAD-500 068.

Prepared by

LEE SHREYU'S FOUNDATION

Acknowledgement

We would like to express a deep sense of gratitude to the authorities of Sreyas Institute of Engineering & Technology for giving us opportunity to carry out the Green Audit of the college campus. We also acknowledge with much appreciation the crucial role of faculty members and students of NSS and NGC who helped us in collecting the data to prepare the report.

Our special thanks to Dr Suresh Akella, Principal, Sreyas Institute of Engineering & Technology (SIET) for his valuable support rendered during the preparation of audit report.

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Summary

Eco Campus is an important concept executed in different educational Institutions of India. Waste minimization plans are implemented to maintain the cleanliness of environment. At the first stage of conducting Green Auditing at Sreyas Institute of Engineering and Technology, we carried out detailed survey of the current status of floral and faunal diversity which includes insects, butterflies, reptiles, birds, etc. in the college campus. Efforts were also taken to assess green covered area and the details have been presented in the report.

This audit mainly focused on green indicators such as vegetation, quality of soil and water, consumption of energy waste management practices etc. The auditing work has also been undertaken by checking documents, photographs, news coverage, biodiversity protection and conservation. Collected data is grouped, tabulated and analyzed. Finally a report pertaining environmental management plan of the campus with strength, weakness and suggestion is documented.

The faculty members and students of SIET have coordinated in preparing the report.

Overview

India is mega-biodiversity region in the world with tremendous diversity of plants and animals. Such biotic forms are endemic to the different bio-geographic habitats in the country. Biodiversity is defined as genetic, species and ecosystem diversity, which offers variability and therefore added values to bio-resources. The most solemn and rapidly accelerating issue of the global environmental problems is the loss of biodiversity through deforestation and biodiversity cover depletion. Over the past 300 years, many species such as mammals, birds, butterflies and plants, have lost their lives due to many anthropogenic activities. In addition to this, habitats vanish very rapidly due to human interference in environment cycle. More than 11,000 species of animals and plants are known to be threatened with extinction. Harvard Biologist Edward O. Wilson in his book The Future of Life explains that unless we change our ways, half of all species would disappear by the end of this century.

In this regard, efforts should be taken to protect and conserve environment, biological diversity, and habitat conservation at regional level. There is a blow on biodiversity of India due to increase in population and usage of natural resources. The introduction and widespread application of high-external input and modern agriculture have biggest impact.

Overall distribution of species principally depends on the climatic conditions and presence of specific ecological parameters along with typical land-form and land-type. In the distribution of flora, the topography, rainfall, soil type etc. play crucial roles for their distribution.

In this regard, Sreyas Institute of Engineering and technology have initiated ‘Green Audit’ in its campus. In the present survey, the focus is mainly on assessment of present status of diversity in form of plants, insects and birds of college campus and efforts made by the college authorities for nature conservation. The data related to protection and conservation of nature, plantation activities, awareness, eco-friendly development, etc. by the institution since last three years have been assessed.

The report provides a baseline review of various activities carried out by institution to inculcate environmental consciousness amongst college students and for general people at large.

The review is the first stage in the development of a Green Action Plan at SIET contributes towards the implementation of “The strategy for the conservation and enhancement of biodiversity and Green initiatives”.
The scope includes (from genetics to species to ecosystems), the threats (from habitat loss to pollution to urbanization), and the responses of institution (in conservation of biodiversity). The assessment includes understanding present vegetation composition that includes trees, shrubs, climbers and herbaceous elements in and around campus. The inventories of faunal components including insects and birds have been done by random sampling method and visual observations in the campus. The standard for the work is followed through the identification of plants (by regional floras) and faunal components during the visit period in the campus. The focus is also on the pollution control methodology, best practice of environment conservation, etc.

Primary survey of college campus was undertaken for assessment of floral and faunal diversity. The list of plants which includes trees, shrubs, climbers, herbs have been prepared and documented for its further ecological importance. The assessment period for documentary evidences of environmental issues, various activities by the institution is during academic year, 2018-19. The reconnaissance survey have been undertaken to understand the boundaries of the campus, vegetation pattern, existing floral and faunal components, various activities carried out within the campus, etc. By visual primary observations on insects and birds diversity, a checklist has been prepared.

During the assessment of biodiversity, we tried to understand the previous contribution of the institution in biodiversity conservation with the involvement of students and staff members. Efforts were made to understand the changes in vegetation pattern, avifaunal (birds) migration (if any) and other faunal components. The flowering pattern of trees, shrubs and climbers were observed to understand the

pollinators and dispersal agents. The observation on faunal components including insects and birds has also been done by random sampling method and visual observations in the campus.

Objective

The aim of the Green Audit of Sreyas Institute of Engineering and Technology is to survey the existing vegetation and assess the significance of the features found in order to facilitate the development of Environment Action Plan (EAP) with clear, long-term objectives and the program for implementation.

1. To analyze current status of floristic composition of SIET campus.
2. To demarcate areas within the institute campus which have potential for restoration of biodiversity.
3. To suggest measures to make the institute campus biodiversity rich.
4. To deal with any other relevant environmental and ecological issues to the surrounding area in general.
5. To make recommendations for the conservation, protection and rejuvenation of the natural vegetation and animal life by involving students and faculty members.

Campus Landscape with Trees and Plants

- SIET is very particular about maintaining the rich flora of the campus by planting a variety of saplings in the college premises.
- NSS team initiated “Harithaharam” plantation around the campus with the coordination of faculty members, students and Management.
- Green Peace Eco Club conducted various activities to grow plants in the campus as well as nearby villages.
- All the lawns of the college are equipped with a sprinkler system and drip method for watering the plants to reduce the usage of potable water.

Vegetable & Fruit Plants

SNo	Local Name	Scientific Names
1	Mulaga kada	*Moringa oleifera*
2	Uttareni	*Achyranthes aspera*
3	Pedda Cukudu	*Faba vulgaris*
4	Chamanti	*Chrysanthemum indicum* L.
5	Mamidi	*Manifera indica* L.
6	Areti chettu	*Musa paradisiaca*
7	Karevepaku	*Murraya koenigii L.*
8	Kothhimeera	*Coriandrum sativum* L.
9	Nimma chettu	*Citrus aurantifolia* L.
10	Jama	*Psidium guajava* L.
11	Seetapalam	*Annona reticulate* L.
12	Chinthapandu	*Tamarindus indica* L.
13	Regi	*Ziziphus oenoplia* L.
14	Cobbari chettu	*Cocos nucifera* L.
15	Danimma	*Punica granatum* L.
16	Boppaye	*Carica papaya* L.
17	Neredu	*Syzygium cumini* L.
18	Sapota	*Manilkara zapota* L.
19	Usiri	*Ribes uva-crispa* L.
20	Badam	*Prunus amygdalus*

Weed Plants

SNo	Local Name	Scientific Name
1	Thunga Gaddi	*Sida rhombifolia*
2	Busara gaddi	*Abutilon indicum*
3	Bunkonti chettu	*Lantana camara*
4	Gaddi chamanti	*Tridax procumbens* L.
5	Kakki Donda	*Coccinia grandis*
6	Thunga Gaddi	*Agrostis tenacissima* L.

Medicinal Plants

SNo	Local Name	Scientific Name
1	ThippaTheega	*Tenospora cordifolia* (willd) mieres
2	Nelausiri	*Phyllanthus amaras* L.
3	Kalamanda	*Aloe vera* (L.) Burm.f.
4	Thulasi	*Ocimum tenuifloram* L
5	Tangedu	*Senna auriculata (*L.) Roxb.
6	Kanuga	*Pongamia pinnata* L
7	Jiledu	*Calotropis gigantia* .
8	Galivana chettu	*Croton banplandianus*
9	Vepa	*Azadirachta indica* L.
10	Teku	*Tectona grandis* L.
11	Nalla Reni	*Albizia amara* L.
12	Tumma	*Prosopis juliflora* L.
13	Veduru	*Bambusa vulgaris* L.
14	Kanuga chettu	*Millettia pinnata* L.

Ornamental Plants

SNo	Local Name	***Scientific Name***
1	Chamanthi	*Chrysanthemum indicum* L.
2	Banthi	*Calendula officinalis* L.
3	Malli	*Jasminum officinale* L.
4	Nuruvarahalu	*Ixora coccinea* L.
5	Sampenga	*Magnolia champaca* L.
6	Gulabi	*Rosa damascene* L.
7	Mandhara	*Hibiscus rosa-sinensis* L.
8	Sanna Jaaji	*Jasminum sambac* L.
9	Gorintaaku	*Lawsonia inermis* L.
10	Ganneru	*Nerium odorata* L.
11	Mulla gorinta	*Barleria cristata* L.

Domestic Animals

SNo	Local Name	Scientific Name
1	Mekalu	*Capra aegagrus hircus*
2	Aavulu	*Bos taurus*
3	Barre	*Bubalus bubalis*
4	Oxen	*Bos primigenuis indicus*
5	Kukka	*Canis lupus familiaris*
6	Kodi	*Gallus gallus domesticus*
7	Pilli	*Felis catus*

Insects, Birds & Mammals

SNo	Type	Local Name	*Scientific Name*
1	Amphibians	Indian Toad	*Bufo melanostictus*
2	Amphibians	Indian Bull Frog	*Hoplobatrachus tigerinus*
3	Annelids	Earthworm	*Lumbricus terrestris*
4	Mollusk	Snail	*Cornu aspersum*

Amphibians

Birds

SNo	Type	Local Name	*Scientific Name*
1	Bird	Rock dove	*Columba livia*
2	Bird	Coucal	*Centropus sinensis*
3	Bird	Indian Black koel	*Eudynamys orientalis*
4	Bird	Coppersmith Barbet	*Megalaimahaemacephala*
5	Bird	Myna	*Acridotheres tristis*
6	Bird	Cattle Egret	*Bubulcus ibis*
7	Bird	Pond Heron	*Ardeola grayii*
8	Bird	White breasted water hen	*Amaurornis phoenicurus*
9	Bird	Black winged Kite	*Elanus caeruleus*
10	Bird	Lesser Golden backed Woodpecker	*Chrysocolaptes guttacristatus*
11	Bird	Indian Roller	*Coracias benghalensis*
12	Bird	Little Cormorant	*Microcarbo niger*
13	Bird	Grey Heron	*Ardea cinerea*
14	Bird	Crow	*Corvus splendens*
15	Bird	White Heron	*Amaurornis phoenicurus* L.
16	Bird	Dove	*Columba livia* L.
17	Bird	Sparrow	*Passeridae*
18	Bird	Red-winged Parrot	*Aprosmictus erythropterus*
19	Bird	House swift	*Apus nipalensis*
20	Bird	Indian Peacock	*Pavo cristatus*

Butterflies

SNo	Type	Local Name	*Scientific Name*
1	Butterfly	Crimson Rose	*Pachliopta hector Linnaeus*
2	Butterfly	Common Mormon	*Papilio polytes Linnaeus*
3	Butterfly	Common Emigrant	*Catopsilia pomona Fabricius*
4	Butterfly	Common Grass Yellow	*Eurema hecabe Linnaeus*
5	Butterfly	Common Wanderer	*Pareronia valeria*
6	Butterfly	Common Fivering	*Ypthima baldus*

Insects

SNo	Type	Local Name	***Scientific Name***
1	Insects	Centipede	*Theatops californiensis*
2	Insects	Daddy Long Legs	*Pholcus phalangioides*
3	Insects	Honey Bee	*Apis mellifera*
4	Insects	Fire Ant	*Solenopsis invicta*
5	Insects	Miduthalu	*Caelifera*(Grass hopper)
6	Insects	Thene teega	*Apis mellifera* (honey bee)
7	Insects	Resham purugu	*Bombyx mori* (Silk worm)
8	Insects	Teelu	*Hottentotta tamulus*
9	Insects	Paper Wasp	*Polistes exclamens*
10	Insects	Dragonfly	*Sympetrum flaveolum*
11	Insects	Grasshopper	*Caelifera*
12	Insects	Cricket	*Gryllus pennsylvanicus*
13	Insects	Praying Mantis	*Mantis religiosa*
14	Insects	Dry wood Termite	*Cryptotermes cavifrons*
15	Insects	Dung Beetle	*Phanaeus vindex maclachlan*

Mammals

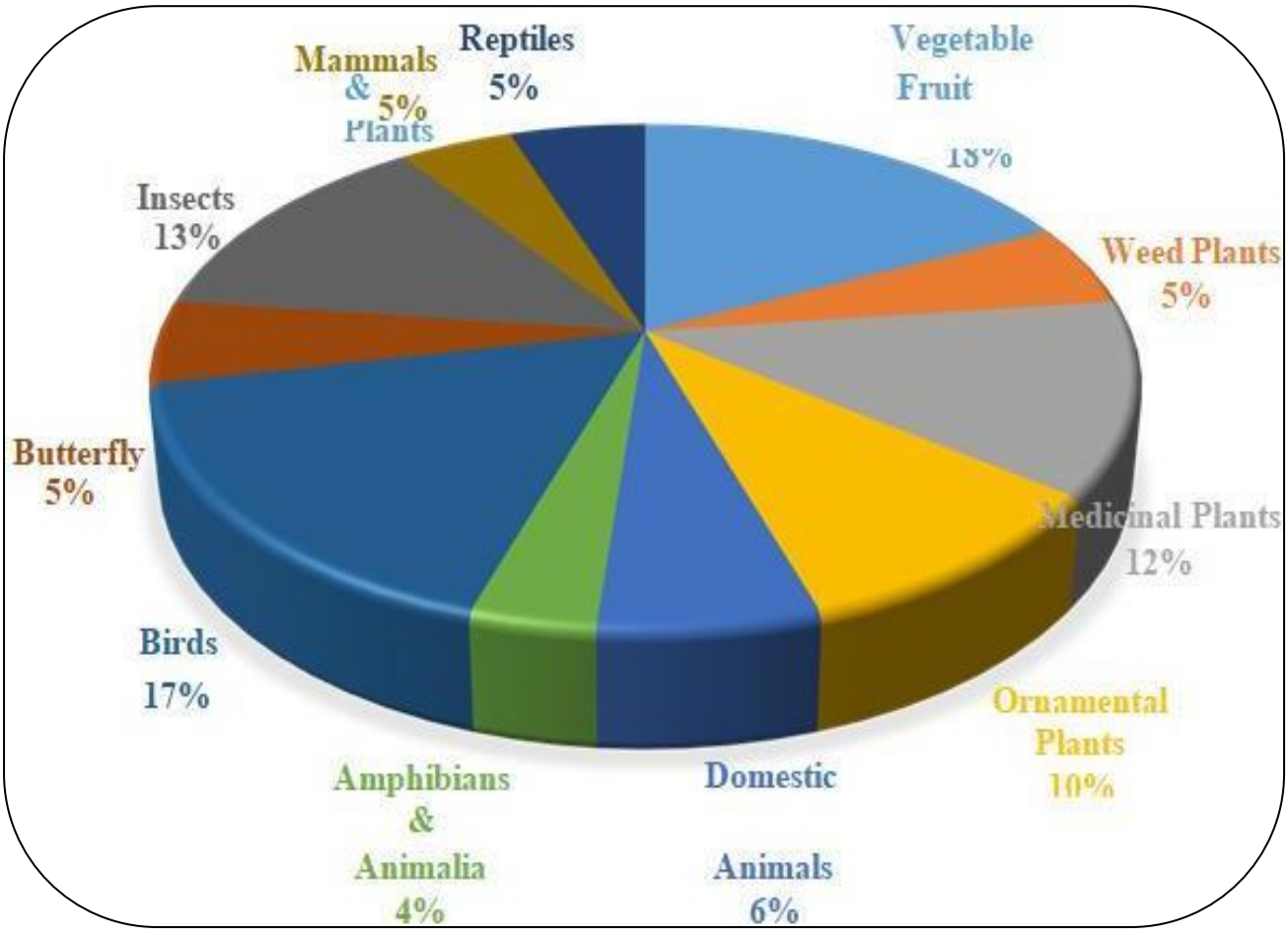
SNo	Type	Local Name	***Scientific Name***
1	Mammal	Ruddy Mongoose	*Herpestes smithii*
2	Mammal	Indian Hare	*Lepus nigricollis*
3	Mammal	Indian Gerbil	*Tatera indica*
4	Mammal	Indian Bush Rat	*Golunda ellioti*
5	Mammal	Monkey	*Cercopithecidae*

Reptiles

SNo	Type	Local Name	***Scientific Name***
1	Reptile	Common house gecko	*Hemidactylus frenatus*
2	Reptiles	Common Garden Lizard	*Calotes versicolor*
3	Reptiles	Fan-throated Lizard	*Sitana ponticeriana*
4	Reptiles	Common smooth-scaled water Snake	*Enhydris enhydris*
5	Reptiles	Buff striped keel back	*Amphiesma stolata*
6	Reptiles	Indian cobra	*Naja naja*
7	Reptiles	Monitor lizard	*Varanus*

Species Analysis

Type	Number of species
Vegetable & Fruit Plants	20
Weed Plants	6
Medicinal Plants	14
Ornamental Plants	11
Domestic Animals	7
Amphibians & Animalia	4
Birds	20
Butterfly	6
Insects	15
Mammals	5
Reptiles	7



Recommendations:

1) Avoid burning of dry leaves and litter in the campus.
2) Prevent the use of chemical fertilizers and pesticides.
3) Restriction or marked use of vehicles in campus area.
4) If possible there should be an arrangement of artificial ponds as a source of potable water especially in summer season
5) Plantation of seed bearing and flowering plants.
6) Periodical observations of animals (through the projects of EVS) in campus area to update the data.
7) The wild vegetation needs to be identified and conserved. Signboards should be placed for displaying “Conservation area”.
8) The microhabitats of insects need to be identified and protected. These include trees, grass- stands, small ponds, anthills, etc.
9) The fire to grass should be controlled
10) Plantation of exotic species has to be avoided
11) Patches of wild-flower habitats have to be fenced and protected from reclamation.
12) No chemical pesticides should be used within the campus.
13) Invasive weeds need to be eliminated /controlled.
14) All the insect species need to be catalogued, seasonally and preserved to create a museum display for environmental education.
15) Economically useful insect species need to be given special protection.
e.g. honeybees.
16) Literature on insect fauna of the campus needs to be published.
17) Development of College Nursery, Orchidium, Nakshtra Udyan, etc.
18) Development of Butterfly Park, Bee Park, etc. as college is located in biodiversity rich Western Ghats.
19) Plant indigenous flowering plants which flower for whole year and readily available for insects and birds.
20) Plantation of exotic species has to be avoided in the future plantation program.
21) No chemical pesticides should be used within the campus.
22) Workshop on ‘Biodiversity’ should be organize

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ENVIRONMENTALAUDIT REPORT

2018-20

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PREFACE

A healthy environment serves effective learning and provides a conducive learning environment. There are various efforts to address environmental education issues. The environmental monitoring system helps all the institution to set environmental examples for the community and to educate young learners to protect, manage and minimize the damage to environment, environmental education is necessary. It develops the required skills and expertise to handle the associated challenges. Such environment education to students is to impart knowledge, create awareness and provide skill to handle the environmental challenges.

SREYAS Institute of Engineering & Technology is determined to inculcate the emerging innovative generation and make them "Nurturing Future Leaders" with the continuous rise in expectation of essential leadership standards. The college has always strived to build such attitude towards environment amongst the students.

In view of the above, SREYAS Institute of Engineering & Technology has intended to conduct the environment report of their campus to understand the present practices of sustainability with regard to various components of environment.

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Chapter – 1

Introduction

SREYAS Institute of Engineering & Technology is sponsored by the Sreyas Educational Society, which was established in 2011. The college is situated 5 Km away from Naloge X Road, Telangana, India. It is located in 10.02 acres of serene, lush green and pollution free area. The Management is committed in assuring quality service to all its stake holders such as parents, students, alumni, employees and the community. Commitment and dedication is executed into our policy of continual quality improvement by establishing and implementing mechanisms and modalities, ensuring accountability at all levels, transparency in procedures and access to information and services.

SIET has adopted the best possible steps for managing the degradable and non- degradable waste. Management of degradable and non-degradable waste refers to collection, proper treatment and safe disposal. Risk and threats associated with waste disposals can be easily evaded by the knowledge on forms of wastes.

SIET has taken initiatives to segregate the waste at its source level which is the first and most important step in waste management. Waste generated in the campus is recycled and reused to the maximum extent. For this, all the housekeeping staff members are properly trained to segregate waste at its source level before the waste is dumped for proper disposal. The various forms of waste generated in the college campus are kitchen waste (organic), food waste, paper waste, E-waste, dry waste (leaves) and liquid waste, sewage, biomedical waste such as sanitary napkins, and few less hazardous chemicals from chemistry laboratory etc.

SIET practices the composting technique for organic waste. The waste that is generated from the canteen i.e., vegetable peels are mostly sent out to composting unit. Huge amount of garden waste is being generated in the campus, mostly in the form of leaves, which is deposited in separate chamber and composted to form manure and used for organic farming. Color coded waste collection bins are placed in the college premises to collect solid waste. All the dry waste such as paper waste, old record etc and E-Waste like key boards, mother boards, printers, etc generated in the college will be collected by Green Waves Environmental Solutions and undertake necessary measures for dispatch of the sorted recyclables for recycling as part of Swatch initiative.

All the liquid waste generated in the college premises is safely collected through underground sewer lines and sent to sewage treatment plant located near to the college. The treated sewage

is again reused for the gardening, flushing purpose. The liquid waste generated by drinking water RO plant is used for gardening. The standard operating procedures are being adopted by chemistry department for safe disposal of few less hazardous chemicals which are collected from chemistry laboratory and other allied departments. Drip irrigation system is adopted to supply the water to the plants in the campus to avoid wastage of water rain harvesting pits with dry bore wells are available for proper absorption of water in to the ground. Sprinklers are placed in the greenery lawns to sprinkle the water evenly and effectively.

The adopted methods of waste management help the college in attaining a high level of performance with respect to the environmental safety. The practices used in the waste-management are eco-friendly, economically viable and as per legal & regulatory norms.

1.1. College Mapping

Total area of the campus – 10.02 acres

Total built in area of the campus – 6 acres

1.2. Introduction to Environmental Audit

Environmental audit is a systematic, documented, periodic and objective review by regular entities of facility operations and practices related to meeting environmental requirements. In other words, it is a management tool comprising systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with company policies, which would include regulatory requirements and standards applicable.

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organization of all kinds recognizes the importance of environmental matters. The environmental performance will be scrutinized by a wide range of interested parties. Thus it

helps to improve the existing human activities, with the aim of reducing the adverse effects of these activities on the environment. An environmental auditor will study an organizations environmental effect in a systematic and documented manner and will produce an environmental report.

Objectives

- To introduce and give awareness to the 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 present status report on environmental compliance.

Methodology

This includes different techniques such as physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. These studies cover various aspects of environment as mentioned in the report.

1.3. Synopsis

Water Management – Judicial usage of water is being maintained by the college administration and instructions were also given to the students. Rain water harvesting pits are dug in the campus for ground water recharge. RO plant service the drinking water requirement and bore water is used for other uses. Management has set up Sewage Treatment Plant (STP) for effective treatment and future utilization of waste water.

Waste Management – Waste segregation at the source being practices by every department in the campus. Dry waste is sent to recycling units with the support of ITC. Though the wet waste segregation is being done and sent to compost units, it need to be streamlines for effective usage. The bins are placed as per the requirement.

Transportation – Majority of the students use public transport creating less carbon footprint. College also provides bus facility for the students and faculty members.

Students Awareness Campaigns – Various campaign activities are being initiated by college and run by the students. Activities based on water and energy conservation are being done in the college premises which is evident by the display stickers on good practices in the required places of every building. NSS students prepare their activities and conduct for mass awareness in and around the campus.

Infrastructure - Apart of the building and other facilities college administration has taken up eco-friendly initiative like

- RO Plant for safe drinking water
- Rainwater harvesting pits for ground water recharge
- Compost unit for wet waste management
- Recycling unit tie up for safe disposal of dry waste

1.4. Recommendations

- Overall Environmental plan for strategic implementation of eco-friendly practices is to be framed every year. This help to streamline the existing good practices that are already being implemented. This also gives increase the scope of environmental activities for students. Strict implementation of the plan also brings behavior change amongst the students' fraternity.

- Environment auditing is to be carried out every year to evaluate the outcomes of the environmental activities. This helps the college to implement activities like cost efficiency and conservation of the available natural resources.

- Continuous check of the LED bulbs usage with the help of student team and proper maintenance of the solar power plant also increase the energy efficiency of the system. Proper maintenance and judicial use of electricity will reduce the energy consumption of the college.

- The old machinery like computers, printers, fans and other electronic appliances are to be repaired, maintained or changed regularly to reduce overall energy consumption.

- Rain water harvesting structures are to be built with proper scientific method for all buildings for water conservation within the campus. And students should take part in the conservation of water of the entire campus so that they also learn the system and good practices.

- Waste water from laboratories and canteens are to be controlled and used for garden only after proper treatment.

- Repair leaking taps and pipes at regular intervals to conserve water.

- Specific Waste Management Plan should be developed and adopted to manage solid waste within the campus. Swachh Survekshan of Swachh Bharat

Mission is also now giving scope for the involvement of the college and general public in large. So college can take part in their programmes.

- Management has to make the campus plastic free zone. Usage of single use plastic is to be banned completely from the campus especially in the plastic bags, glasses, cups / plates. The manure of compost can be used for plants avoid using pesticides. There should be a system for better management of hazardous waste management.

- Bio toilets can be installed for better management of fecal sludge.
- Vehicle pooling can be promoted for both students and faculty. Initially this can be declared by the management or through student groups on particular days.

- Environmental education should be part of curriculum and activities irrespective of the subjects. Students should be made part of environmental activities being organized in the campus.

- More display board should be set up on various conservation aspects.
- Students and faculty should be trained on carbon footprint calculation and reduce carbon emissions.

- Students are encouraged to do innovative activities at this level so that they feel motivated and think on eco-friendly solutions.

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Chapter 2

ENERGY

Energy audit would give a positive orientation to the energy cost reduction, preventive maintenance and quality control programmes which are vital production and utility activities. It will help to understand more about the ways energy utilized and help in identifying the areas where waste can occur and where scope for improvement exists.

Energy audit helps in energy cost optimization, pollution control, safety aspects and suggests the methods to improve the operating and maintenance practices of a campus. It is instrumental in coping with the situation of variation in energy cost availability, reliability of energy supply decision on appropriate energy mix, decision on using improved energy conservation equipment, instrumentations and technology. It is proven that energy saving about 15 to 30% is possible by optimizing use of energy efficient equipment at the time of replacements.

SIET has come up with energy efficient technologies like installation and usage of LED Bulbs. They also have range of eco-friendly activities involving students of NSS.

2.1. Objectives

The main objectives of conducting energy audit are as follows:

- To study the present pattern of energy consumption
- To identify potential areas for energy optimization
- To recommend energy conservation proposals with cost benefit analysis

Energy Source within the campus

Institute uses energy from:

- Electricity from TSSPDCL

The following are the electrical appliances college use regularly for various purposes:

S.No	Type	Quantity
1	Tube Lights	577
2	CFL Bulbs	452
3	LED Bulbs	1195
4	Fans	720
5	Air conditioners	103
6	Xerox Machines	5
7	Computers	1495
8	Air conditioners	103
9	UPS-6 kVA	12
10	UPS-10 kVA	1
11	UPS-12.5 kVA	7
12	UPS-20 kVA	10
13	Printers	67

2.2. Annual Power saving through LED Bulbs

Total requirements	Coverage (%) through LED Bulbs	Coverage (%) through other sources
60,176 watt	28,056 watt (47%)	32,120 watt (53%)

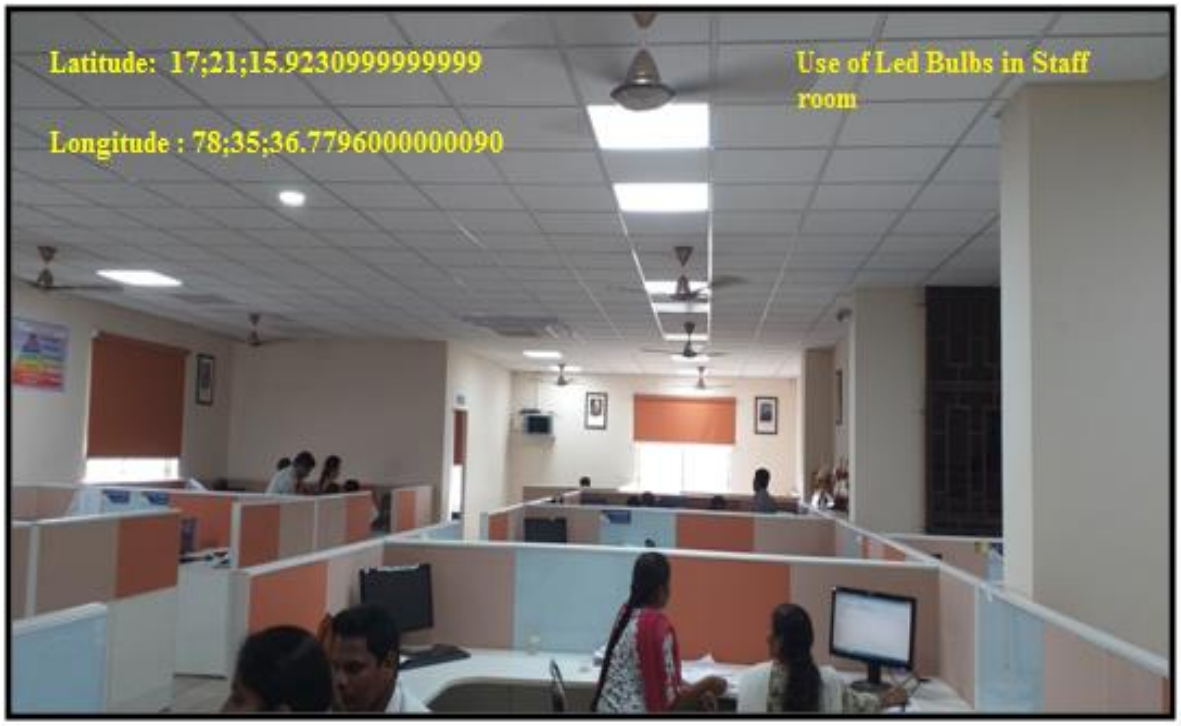
Energy saving through the replacement of LED bulbs was a good option. Apart from this awareness programmes organized by NGC and NSS students has also been instrumental in reduced energy consumption.

- The total lighting requirement = **60,176** watt
- Percentage of lighting through LED bulbs = **47%**
- Percentage of Lighting through other sources = **53%**

- Total number of lights (Tube Lights, CFL Bulbs & LED Bulbs)= **2,224** numbers

Total calculation for illumination:

- Tube lights 577 numbers X 40 watt each = 23,080 watt
- CFL bulbs 452 numbers X 20 watt each = 9,040 watt
- LED bulbs 11 numbers X 100 watt each = 1,100 watt
- LED bulbs 32 numbers X 20 watt each = 640 watt
- LED bulbs 760 numbers X 18 watt each = 13,680 watt
- LED bulbs 74 number X 30 watt each = 2,220 watt
- LED panel bulbs (Rc-EIII sq595) 288 number X 32 watt each =9,216 watt
- LED street lights (EQ-9405) 30 number X 40 watt each =1,200 watt
- Total wattage of lighting through LED bulbs =**28,056** watt
- Total wattage of lighting through other bulbs =**32,120** watt
- Total wattage of all Bulbs = **60,176** watt


Latitude: 17;21;15.9230999999999
Longitude : 78;35;36.7796000000090
Use of Led Bulbs in Staff room


LED Lamps
Latitude: 17;21;17.3499999999985
Longitude: 78;35;37.3900000000138

2.3. Transportation

The college transportation includes wide variety of vehicles including the buses provided by the college. The following are the details:

No. of buses	23
No. of students bus transport	1105
No. of students using public transport	986
No. of faculty using public transport	nil
No. of faculty own vehicles	110
No. of students own vehicles	556
No. of buses having pollution certificate	23
No. of outside vehicles visited in the year	~1500
Fuel consumption in litres/Year	62450 lts

Institute utilizes 23 buses as public transport facility to the students and faculty. This has reduced pressure on the fuel usages for various other vehicles. And also about 37.34 % of the total strength including students & faculty are using public transport. Further about 43.58% students use college bus facility.

Chapter -3

WATER

Virtually everything we do or use each day involves water. Yet, we do not give it the importance that is due to it. India will soon be a water-stressed country and we all need to work towards our water security. As our populations continue to grow and shift, the availability of quality water resources is in decline. Pollution, climate change and construction of cities in dry regions are some of the factors exacerbating evolving supply/ demand imbalances. To account this, it is essential that man utilize existing water resources in the most careful, efficient manner. Water audits provide a rational, scientific framework that categorizes all water use. It is a tool to overcome drought related problem, shortage, leakage and losses.

Simple actions can be adopted to reduce the wastage of water and use it wisely. Water audit is a qualitative and quantitative analysis of water consumption to identify means of Reducing, Reusing and Recycling of water. Water consumption patterns are to be identified and problems are to be fixed like leaks & overflow, identify the points where water loss is observed, identify the solutions, assign the responsibility for implementation, prepare a monitoring schedule and assign a person for monitoring.

Water auditing is conducted for the evaluation of facilities of raw water intake and determining the activities for water treatment and reuse. The relevant method that can be adopted and implemented to balance the demand and supply of water. It is therefore essential that any environmentally responsible institution examine its water use practices.

3.1. Sources of water

The water source is bore well only. The campus has Overhead tanks for each building along with bore well. For drinking water RO plant is set up.


Over head water tank
Latitude: 17;21:16.190000000002414
Longitude: 78;35:35.92999999993072


Water tank for drip irrigation
Latitude: 17;21;15.129999999997281
Longitude: 78;35;36.13000000004827


R O Water Plant
Latitude: 17;21:16.12999999999997437
Longitude; 78;35;36.26000000000009143

3.2. Water Consumption

S.NO	Location	Length of Tank (L) (m)	Width of Tank (B) (m)	Height of Tank (H) (m)	Volume of Tank (V) (m^3)	Vol. of Tank (Liters)
1	AB Block	7.31	2.43	1.52	27.00021	27000
2	Block-A	7.31	2.43	1.52	27.00021	27000
3	Block-B	7.31	2.43	1.52	27.00021	27000
4	Block-C & D	7.31	2.43	1.52	27.00021	27000
Total Capacity of Water Tanks at SIET						**108,000(Appr)**

S.No	Location	Time Duration (Hrs)	Initial Depth of Water (Hi) (m)	Final Depth of Water (Hf) (m)	Height of water consumed (H=Hi-Hf) (m)	Area of Tank (A)	Volume of Water Consumed (V=A*H) (m3)	Volume of Water Consumed (Liters)	Volume of Water consumed in 8hrs
1	AB Block Tank	9AM-2PM (5hrs)	1.45	0.95	0.50	17.76	8.88	8880	14208
2	Block-A Tank	9AM-2PM (5hrs)	1.48	0.70	0.78	17.76	13.852	13852	22163
3	Block-B Tank	9AM-2PM (5hrs)	1.50	0.80	0.70	17.76	12.432	12432	19891
4	Block-C & D Tank	9AM-2PM (5hrs)	1.48	0.55	0.93	17.76	16.534	16534	26454
Total Volume of Water Consumed per day									**82716**

A total of **82716 litres** is being utilized every day by the people in entire campus.

3.3. BOD, COD & DO levels of water resource

Water Type	BOD	COD	DO
Drinking Water	4.05	0.16	9.5
Canteen Water	3.86	0.18	7.9
Hostel Water	2.7	0.27	5.6
Washroom Water	2.01	0.3	6
Lab Water	2.5	0.2641	8.1
Ground Water	3.5	0.18	7.9

The Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and Dissolved Oxygen (DO) are within the standards. College Management is ensuring the quality of water regularly so that ground water is not contaminated.

3.4. Sewage Treatment Plant

- Waste water or sewage is generated from the college hostels, canteen and other locations of the premises. This liquid waste is safely collected through underground sewer lines and sent to sewage treatment plant located near to the college.

- This sewage Treatment Plant (STP) is installed with the capacity of 125 KL/day using the technology of 'Constructed Wetland System (CWS)' to treat the waste water generated in the campus.
- The treated sewage is again reused for the gardening and in toilets for flushing.
- Sewer lines, water discharge pipes, taps and other discharging devices are checked periodically every month to monitor leakages.
- The liquid waste generated by drinking water RO Plant is used for gardening

3.5 Rain Water Harvesting Structure:

SIET takes the necessary measures to collect and reuses rain water. Surface runoff collected from the roads and open ground is allowed to flow through proper channels and then allowed to infiltrate into the ground to recharge ground water. Rain water is collected from the roofs of building through PVC pipes and then allowed to sell designed rain water structures. Rain water harvesting pits are properly designed and constructed to recharge the aquifers. Each recharge pit has size of 6 ft X 4 ft X 5 ft and depth of each pit from the bottom consists of 1.5 ft gravel/pebbles, 1.5 ft coarse sand and 2 ft left for water collection.

Chapter - 4

4 : WASTE MANAGEMENT

4.1. About Waste Audit

The purpose of the waste audit is to gain a detailed understanding of the types and weights of material being generated. The recommendations can be used to improve the economic and environmental performance of waste management efforts. For this audit, there is a need to discover the waste being generated and material are recyclables. Further the dispose mechanism adopted for both wet and dry waste has to be considered during audit. An effective waste reduction program must be based on current and accurate information on the quantity and composition of the waste stream. Therefore, there should be systematic procedure to review operations and subsequently, waste generation. Performing this exercise will define the composition of your discards by examining how materials enter and exit your facility.

All operations produce waste and there is nothing wrong by recognizing it. However today concern is over waste generation and increasing costs of collection and disposal are good reasons to find out how to reduce, increase recycling and try to cut costs. An audit alone will not reduce your waste. Rather, it is the starting point that will enable your work to make informed decisions on how to allocate resources for source reduction and recycling programs.

In long run this saves money, reduces waste and disposal costs and creates positive environment campus image. This also helps in devising the ways and methods of reducing wastes at the source.

Hazardous Waste – Institute adopts standard operating procedures for safe disposal of hazardous chemicals collected in the chemistry laboratory and other allied departments. The chemicals like acids utilized for experiments are very negligible hazardous chemicals.

4.2. Waste classification & Quantity

SIET has following solid waste management:

- Waste collection bins are placed in the classrooms, canteen and in the college hostels to collect the solid waste materials like cool drink cans/ bottles, paper etc
- Around 80 Kg/day organic waste is being generated from the canteen. All the organic waste with remix powder is filled in "Aaga Composter" to convert it into bio-manure which is used for the plants in the Garden.
- Huge amount of garden waste is being generated in the campus, mostly in the form of leaves & twigs, which is deposited in separate chamber and composted. This manure is used for organic farming.
- Waste Material from the construction of building, such as cement, brick pieces, gravel, sand etc are collected and reused for land filling and other small constructions in the college.
- College Management has banned the usage of plastic bottles in the campus.

SNo	Source	Types of Waste	Quantity of waste produced per year
1	Canteen	Food	2355 Kgs
		Plastic	730 Kg
2	Labs, Classrooms, administrative office	Books, papers	18 tons
3	Labs	E-Waste	30 Kgs
4	Construction Site	Construction Waste	1000 Kgs
5	Garden	Horticulture	80 Kgs
6	Garden & Campus	Rubbish	3650 Kgs
7	Washrooms	Sanitary	480 Kgs
8	Chemistry Labs	Chemical Waste	10 Kgs

Source	Type of waste	Description
Canteen	Food	Waste obtained as result of preparation, cooking and serving of food, waste produced due to handling market refuse
	Plastic	The plastic waste consists of used water bottles, broken chairs, milkshake tins etc. These are collected every day in the evening and are stored and sent to recycling unit with the support of ITC WOW.
Labs, classrooms, administrative office	Books & Other papers	Books, newspapers, record etc are collected at the end of each semester and sent to recycling unit. Similarly the exam papers, sheets are collected and recycled every year.
Labs	E-Waste	Mainly consists of chips, electronic material etc. These materials are also sent to recycling unit with the support of ITC.
Construction Site	Construction Waste	Consists of the waste produced during construction or repairs of the blocks. It consists of cement, card board, wood, iron material etc
Garden	Horticulture	Consists of twigs, dry leaves, flowers & fruits fallen from the plants etc
Garden & Campus	Rubbish	It includes two types of waste 1. Combustible (primarily organic), paper card boards, cartons, wood, leather, grass, leaves etc 2. Non-combustible (primarily inorganic)- metals, stones and grass etc
Washrooms	Sanitary	It consists of sanitary waste like pads
Chemistry Labs	Chemical Waste	The chemical waste mainly consist of chemicals that are used in laboratory and the chemicals whicht are expired cannot be used further

4.3. Collection & Storage of waste

The Wet waste is being sent to compost unit and resulted manure is used for plants in the campus. And the dry waste is collected separately item wise and sent to recycling unit with the support of ITC. Initially they the stored at safe place within the campus and then collected

by ITC monthly once depending on the quantity of the material. Twin bins are installed at required places and for wet waste two types of compost units are being maintained. The biogas plant has been installed near the canteen which generates the methane gas by using the wet waste generated by the canteen. The biogas can be utilized by the canteen for the purpose of cooking. The exhaust of the biogas plant can be used a manure for the plants.

4.4. E-Waste Management

- Computers and their parts, telephones, printers and other electronic devices become obsolete or do not function properly after some years are considered to be e- waste.
- Proper collection and disposal of e-waste is very important as they are mostly made of hazardous metals like lead, cadmium etc.
- All the E-Waste like key boards, mother boards, printers etc generated in the college premises is stored in a separate room.
- Institute has MoU with Green waves Environmental Solutions an authorized agency of ITC, for the safe disposal of E-Waste.
- Green waves Environmental Solutions collect the E-Waste periodically.
- The printer cartridges are refilled outside the college.

Conclusion

- The overall environment of the college campus is being safe guarded with various activities. The utilization of the renewable resources is being done through Solar Power Plant and less energy consumption through LED Bulbs. Similarly waste water treatment through STP is another eco-friendly initiative of the college management**.**
- Waste Management is also effectively managed through safe disposal systems of wet and dry waste. Especially recycling of e-waste, plastic waste and safe disposal of sanitary napkins etc. Apart from the implementation of the above, the college management has also been very keen on involving students continuously in creating awareness through several activities by NSS Club.