# GREEN AND ENVIRONMENTAL AUDIT REPORT (2022-2023)

## SEVA BHARATI MAHAVIDYALAYA KAPGARI-JHARGRAM,WB

CONSULTRAIN MANAGEMENT SERVICE
LAKE ROAD, KOLKATA, WB

TROPICAL INSTITUTE OF EARTH AND ENVIRONMENTAL RESEARCH (TIEER), MIDNAPUR, WB

**CONSULTRAIN MANAGEMENT SERVICE**
**Lake Road, Kolkata, West Bengal, India**

**TROPICAL INSTITUTE OF EARTH AND ENVIRONMENTAL RESEARCH (TIEER)**
Reg. No. S/1L/42578 of 2006-07
Office address: M-10, Bidhannagar, Medinipur-721101, W.B., India

# GREEN AUDIT CERTIFICATE

## Academic Year: 2022-2023

This is to certify that Seva Bharati Mahavidyalaya, Kapgari, Jhargram, West Bengal has good and healthy eco-friendly environment created for saving Earth and Nature. Tropical Institute of Earth and Environmental Research associated with Consultrain Management Service are satisfied after Green Audit with moral support of Honorable Principal, IQAC Team, Staff and Students for academic year 2022-2023. This efforts taken by Faculties and Students towards environment and sustainable are highly appreciable and commendable.

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President, TIEER

(Mrs. Sanchita Bhattachariya)
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Aerial View of the College premises and surrounding area

# ACKNOWLEDGEMENT

We, The Environment Audit Team thank the management of Sava Bharati Mahavidyalaya at Jhargram for assigning us such an important work on Green & Environmental audit. We appreciate the cooperation to our team for the assigned study, giving us necessary inputs to carry out audit activities.

Our special thanks to:

- ❖ Principal of the College
- ❖ IQAC Members
- ❖ Teaching & supporting staff

# AUDIT EXPERT MEMBERS

The Committee members are listed below:

| SL. No. | NAME | DESIGNATION | AREA IN INTEREST |
|---|---|---|---|
| 1. | Dr. Binoy Kr. Chanda | President, TIEER & Former IC, VU | Environment Science & Climatology |
| 2. | Dr. Kanchan Bhowmik | Organic Scientist and National Expert | Green Technology & Bio Waste Management |
| 3. | Mrs. Sanchita Bhattachariya | Consultant, Consultrain Management services, Kolkata, & Member, TIEER, ISO-9001,14001& 50001Cerfied Auditor. | Environment Management |
| 4. | Dr. Pijush Kanti Tripathi | Associate Professor, Dept. of Geography, Haldia Govt. College | Ecology and Environment management |
| 5. | Dr. Sudipta Maiti | Faulty, Dept. of Botany, Raja N.L. Khan Womens' College, Midnapore | Plants Diversity & Carbon stocking, Green Management |
| 6. | Dr. Mrinmoy Ghorai | Assistant Professor in Zoology, Panskura Banomali college. | Fauna & Aqua animals and Biodiversity conservation |
| 7. | Sri Narasingha Das | Asst. Teacher & expert | Ecology and Biodiversity management |
| 8. | Sri Ananda Das | Asst. Teacher & expert | Electro physics |
| 9. | Dr. Sumita Swar | Faulty, Dept. of Environment, New Alipure College | Water and Waste Management |
| 10. | Sri Sarat Chatterjee | Surveyor & Assistant Researcher | Water and Air Quality Measurement |
| 11. | Sri Sanjib Mahata | Surveyor & Expert in RS &GIS | Model and Planning design on Green management & Map design |

# CONTENTS

# 1.0 INTRODUCTION:

The term 'Green' stands for Resource balance, Quality environment, Recycled products and Ecofriendly environment. Green and environmental Audit is a process of systematic, documented, periodic and objective evaluation of components of environmental diversity with the aim of ensuring readiness in eco-friendly environment and conservation of natural resources in its operations. The process starts with systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of the college. Green auditing is a means of assessing environmental performance. Green audit is a valuable means for a College to determine how and where they are using the most energy or water or other resources; the College can then consider how to implement changes and make savings. It can create healthy consciousness and promotes environmental awareness, values and ethics.


College Campus

## 1.1 Goals & Objectives:

It aims to analysis environments within and outside of the concerned area, which will have an impact on the eco-friendly atmosphere. It provides staff and students better understanding of Resource management on their area of work.


Entrance of the College

### The Main Objectives of Carrying out of Green and Environment Audit:

- To ensure the performance of the Institution with respect to environmental activities they are involved in, in compliance with existing laws and regulations
- To locate the Green area and the Geographical location of the College – aerial view
- To document the floral and faunal diversity of the College
- To develop and follow the waste management system
- To reduce the energy consumption of the Institution
- To report the expenditure on green initiatives, carbon foot print
- To record the air, water quality of the Institution
- To conserve the natural resources

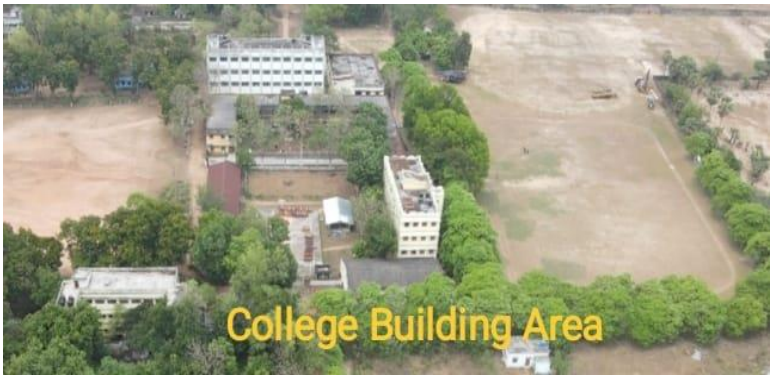
## Areas of Concern:

- WATER MANAGEMENT
- ENERGY MANAGEMENT
- AIR QUALITY AND CARBON FOOTPRINT
- WASTE MANAGEMENT
- E-WASTE MANAGEMENT
- BIODIVERSITY

This Audit has been conducted by a Committee constituted by the Experts & Scientists from different reputed Institutes. The Committee developed a questionnaire for audit based on the regulatory and statutory requirements of Centre as well State. The basic data was gathered and compiled, which the committee analyzed. By and large, the audit reveals a healthy environment inside of the Seva Bharati Mahavidyalaya at Jhargram campus. The committee has suggested short term as well as long-term suggestions for improved environmental conditions to a higher level and authorities and all stakeholders of the College conform that they will give due attention and utilize opportunities for identified improvements.

## 1.2 About the College :

At the dawn of Independence in November 1947, a renowned Agricultural Scientist, working in a high position under the then Bihar Govt., Professor Pabitra Kumar Sen (1906-1997) established Seva Bharati by taking 100 acres of undulated barren land situated in Kapgari and Bagda Mouza from the then Zamindar Jagadish Chandra Deo Dhabaldeb. Education was unknown in the area. The area was highly drought-prone. The land was undulated, the soil lateritic, and rainfall was normally low; less than 1% of the land was irrigated. Market, road and other infrastructural facilities were absent. The villages were predominantly inhabited by poor people belonging to Scheduled Tribe, Scheduled Castes and other backward communities. Poverty was so widespread that the people lived much below the 'poverty line'.




Campus Area 11.4 Acres, Total Constructed Area 2.40 Acres (9712.46sqm.) Playground/ & Vacant Land 6. 0 Acres, Green & vegetated area 2.80 acre, Surface Water Bodies 0.20 Acres, Latitude and Longitude 22.52 N & 86.87 E. Seva Bharati Mahavidyalaya, a dream-project of Prof. P.K.Sen, is dedicated to the service of the nation through dissemination of higher education for more than fifty years. I feel honoured to join of Seva Bharati Mahavidyalaya and shall strive hard to uphold the praise-worthy traditions here. The wonderful atmosphere created by the lush greenery, pollution-free environs, excellent infrastructural facilities, well-qualified and dedicated faculty, and surely, the efficient and liberal administration, have together acted as vital ingredients in the making this Mahavidyalaya par excellence.

**Table 1 Area Coverage of the College Campus**

| Sl. No. | Use of Area | Area in Percentage | Area in Acres |
|---|---|---|---|
| **1** | Building & Construction | 21 | 2.40 |
| **2** | Play Ground & Vacant Land | 53 | 6.00 |
| **3** | Green Coverage Area | 25 | 2.80 |
| **4** | Surface Water Bodies | 2 | 0.20 |

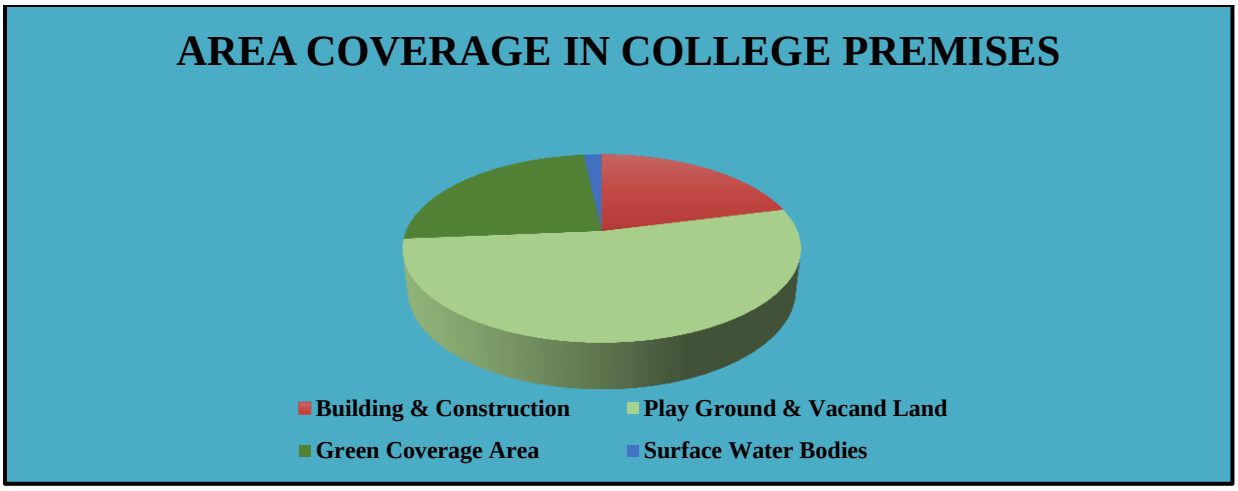



**Fig. 1** Area Coverage of College Premises

## General Information:

| Sl.No | Subject / Parameter of Quantity & Quality | Quantity & Quality |
|---|---|---|
| 1. | College name | SEVA BHARATI MAHAVIDYALAYA |
| 2. | Total area Coverage (acre) | About 11.4 acre |
| 3. | Building / Construction area | 2.40 acre |
| 4. | Playground / vacant land | 6.00 acre |
| 5. | Green & vegetated area | 2.80 acre |
| 6. | Surface water bodies(ponds) | 0.20 acre |
| 7. | Total Students | 1760 |
| 8. | Total Teaching faculties | 70 |
| 9. | Total non-teaching staff | 29 |
| 10. | Other stake holders | 25 |
| 11. | Departments (PG&UG)) | 19 (UG-17,PG-NSOU, BPED-1) |
| 12. | Laboratories | 06 |
| 13. | Classrooms | 20 |
| 14. | Auditorium/seminar hall | 02 |
| 15. | Digital classrooms/smart classroom | 02 |
| 16. | Playground | 05 |
| 17. | Gymnasium hall | 01 |
| 18. | Water bodies/ponds | 01(0.20acre) |
| 19. | Hostels | 04 |
| 20. | Staff Quarters | 01 |
| 21. | Hostel Students | 220 ( capacity-320) |
| 22. | No. of Staff Stay in Quarters | 04 |
| 23. | Source of water | Underground |
| 24. | Capacity of Water Tanks | 20,000 litre |

| | | |
|---|---|---|
| 25. | Lifting Amount of Water (day) | 55,000 litre |
| 26. | Source of energy | Electricity & solar |
| 27. | Solar Power Unit | 05( street light) |
| 28. | Total Unit of Electric Power(Year) | 43,000unit |
| 29. | Total cost of electricity (year) | Rs.301000 |
| 30. | Total No. of fans, lights, AC, | Fans:320, Light-420, AC-NIL |
| 31. | Refrigerator, Xerox, Printer, | 02 +02+06 |
| 32. | computers | 15 |
| 33. | Street light/ Halogen | 12 |
| 34. | Printer- , Water Cooler- . | 06 +01 |
| 35. | No. of Green Generators | 01 |
| 36. | No. of Water Pumps | 06 |
| 37. | No. of Canteen. | 01 |
| 38. | No. of Rain Water Harvesting | 01 (ongoing project) |
| 39. | No. of water quality observation unit | 01(ongoing project) |
| 40. | No of Water Reuse unit | 02 |
| 41. | No. of Medicinal Plants Garden | 01 |
| 42. | No of Private car /Bike ( Day) | 08/35 |
| 43. | No. of Bio fertilizer Unit | 04 |
| 44. | No. of Using of Gas cylinder/year | 10 |
| 45. | Use of wooden fuel/Months | 110 Quintal |

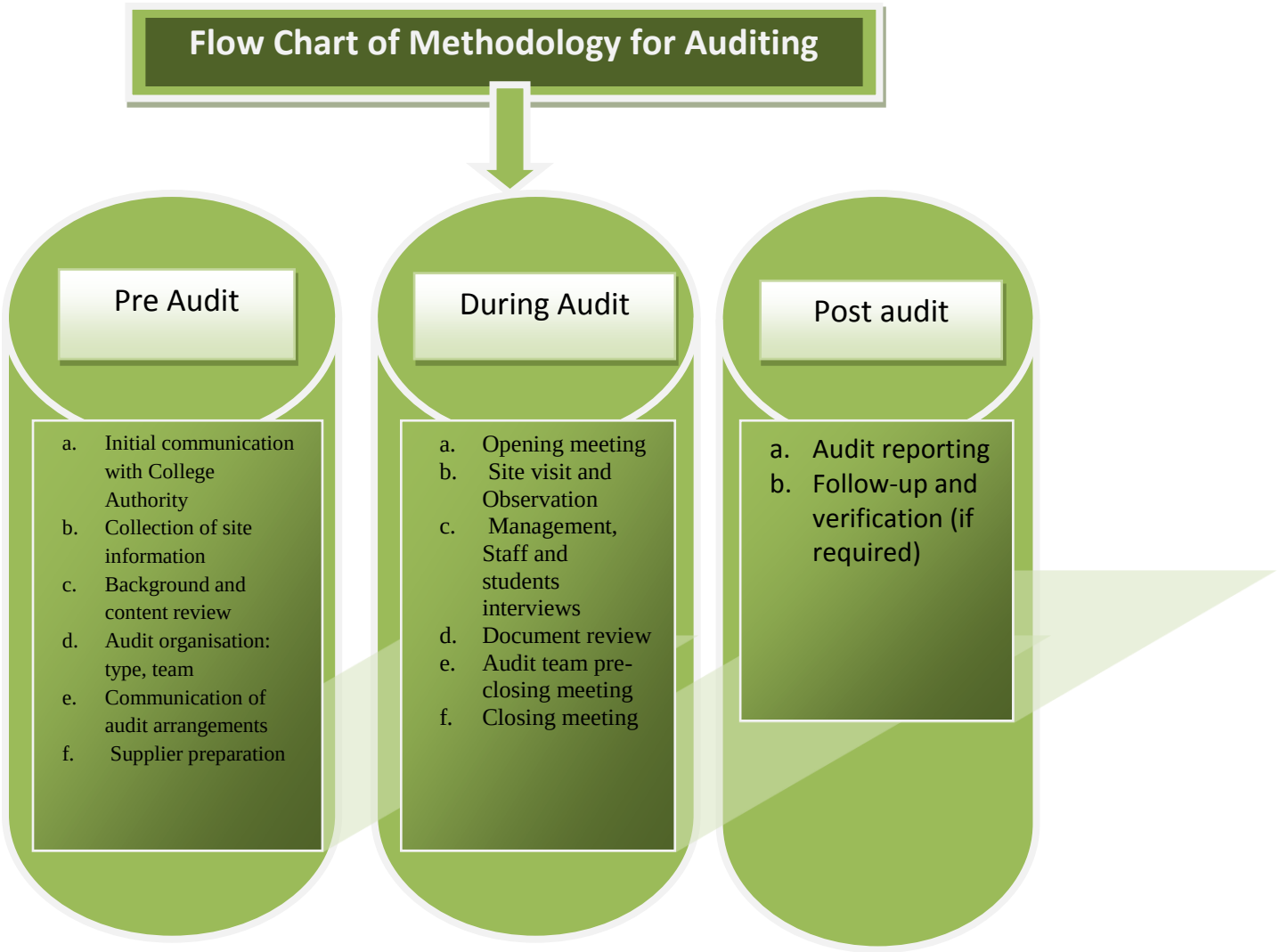
## 1.3 Purpose of Green and Environmental Auditing:

- To develop to more efficient resource management
- To provide basis for improved sustainability
- To create a green campus
- To enable waste management through reduction of waste generation, solid- waste and water recycling
- To promote plastic free campus and evolve health consciousness among the stakeholders
- To recognize the cost saving methods through waste minimizing and managing
- To empower the organizations to frame a better environmental performance
- To develop an environmental ethics and values systems in youngsters.
- To establish valuable tools and methods for managing and monitoring of environmental and sustainable development programs.

# 2.0 PRE-AUDIT STAGE:

## 2.1 Methodology and Survey Schedules:

The methodology is adopted for this assessment by collecting the information by onsite visit, group discussion, campus survey, enquiry, observation. Perception study and opinion survey are also included in the Auditing Report.



## 2.2 Site Visit:

1. College and its premises were visited and analyzed by the audit-teams several times to gather information.
2. Campus trees were counted and identified.
3. Medicinal garden, play grounds, canteen, library, All Department, office rooms, Hostels, Staff Quarter and parking grounds were also visited to collect data.
4. Number and type of vehicles used by the stakeholders were counted and fuel consumption for each vehicle was verified with the user.
5. Number of LPG cylinders used in labs, canteen and hostel kitchen were also counted.
6. Water taps were checked. Leakage of a few water taps and over-flow tanks were noticed during the site inspection.


**Ecofriendly College premises**

**Following steps were taken for data collection:**

- Survey to each department, Laboratories, Library, canteen and Hostels etc.
- Data collected by observation and interview.
- Assessment of the environmental condition through measurement

## 2.3 Survey & Data Collection:

- A Questionnaire was developed covering all aspects of Green and Environment aspects for collection of data.
- Arrangement of Drone survey was made available to cover every corner of the college and its neighborhood areas.
- Data Analysis - Calculation of energy consumption, analysis of water reused waste generation & disposal arrangements.

- Recommendation — On the basis of results of data analysis and observations, some steps for reducing power consumption, water consumption, waste management etc. were recommended.

We have discussed and interacted with different groups like teachers, students and staff to identify the attitudes and awareness towards environmental issues at the institutional, district, national and global level. Data and information were also collected form utility bills, reuse of water, waste management, use of energy-saving devices and e-waste. This information was added to the carbon footprint data, generating a fairly clearer picture of the emissions and impact of the reduction measures undertaken.


Observation of medicinal plants garden

## 3.0 AUDIT STAGE :

### 3.1 Campus Survey and Enquiry:

Green and Environmental audit forms part of a resource management process. Total area including neighborhoods was surveyed using Drone and the data derived from this survey was detailed in our report.

Eco-campus concept mainly focuses on the reduction of contribution to emissions, on the efficient use of energy and water; Minimize waste generation or pollution and also economic efficiency. All these indicators are assessed in process of "Green Auditing of educational institute". Covered areas included in this green auditing are water, energy, air quality & carbon footprint, waste, biodiversity campus.


Visiting the Chemistry Department

The Audit covered the following major areas:

1. Water Efficiency and Water Management
2. Energy Efficiency and Energy Management
3. Air Quality and Carbon foot print and Management
4. Waste Produce and Waste Management
5. Biodiversity and Green Zone management

**Table-2 Total Stakeholders of the College**

| | |
|---|---|
| **Students** | 1623 persons |
| **Teaching, Non-teaching and Other Stakeholders** | 124 persons |
| **Total** | 1747 persons |

## 3.2 Water Efficiency and Water Management :

The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water and also proper water management practices along with rooftop rain water harvesting system must be installed in whole campus for recharging ground water and meeting part of the water requirements. It is therefore essential that any environmentally responsible institution examine its water use and Re-use practices.

Micro water bodies

| | | |
|---|---|---|
| **a** | Usage of water | That water is use for Drinking, Washing, Cleaning, Cooking, Bathing and gardening purpose. The maximum water is use for Bathing and washroom in the college. About 26550 Litre water has been supplied for that sector. |
| **b.** | Consumption of water | About 51000 Litre water per day |
| **c.** | Water wastage | The leakage and misuse of water is about 500 Litre in whole campus. Small drip from a leaky tap, sewage water from pan in toilets and over flow can waste significant amount of water per day. |
| **d.** | Surface water Harvesting | A small surface water bodies and two micro water reservoir are available in college campus. |

**Table-3 Use of water for Different Purpose of College Premises**

| Use of water for Different Purpose Per Day | Use in Percentage |
|---|---|
| **Drinking Purpose** | 9 |
| **Bathing & Washroom** | 52 |
| **Cleaning & Cooking** | 23 |
| **Gardening** | 10 |
| **Others** | 5 |
| **Overflow & Leakage** | 1 |

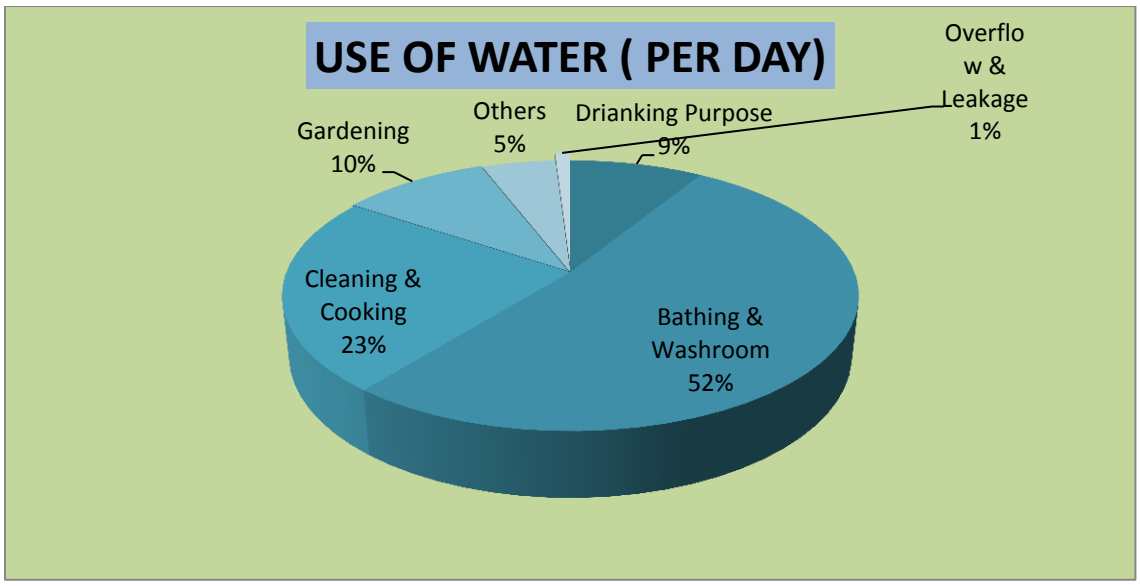



Fig.2 Use of water in Different Purpose Per Day

**Taken Water management policy**

| Sl. No. | Factors | Weightage |
|---|---|---|
| 1 | Quality of Water | H |
| 2 | Re-use of water | M |
| 3 | Water Harvesting & Recharge | M |
| 4 | Use of Surface Water | L |

* H *denote- Taken management policy level above 60%
** M denote- Taken management policy level 40%-60%
*** L denote-Taken management policy level below 40%

**Observation and Recommendation**

Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimising the water footprint of the institute. Sanitary wastewater generated from washrooms is connected to sewerage system.

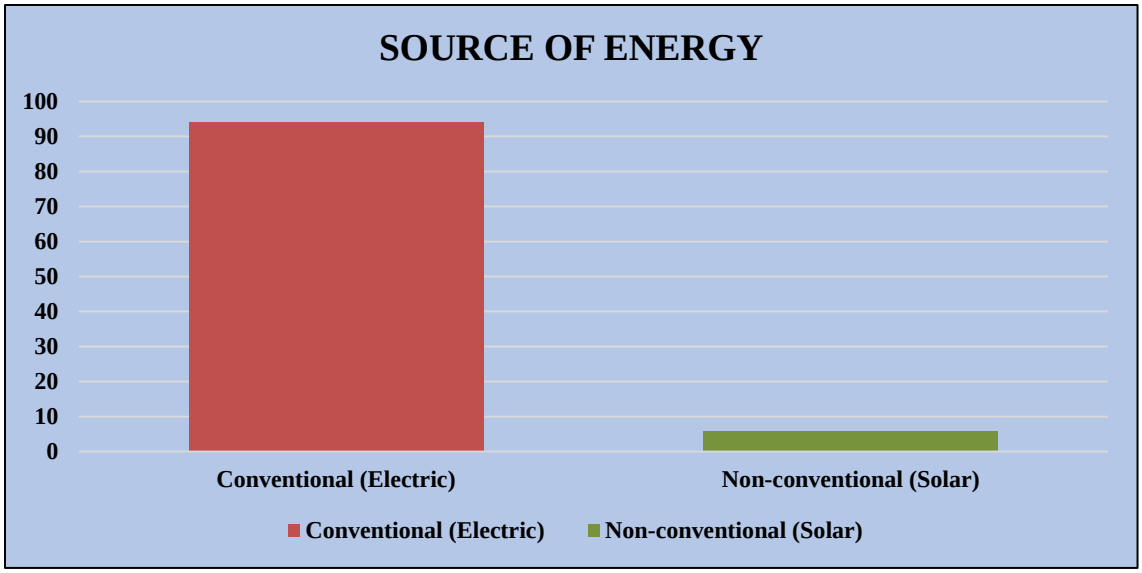
## 3.3 Energy Efficiency and Energy Management:

| | | |
|---|---|---|
| **a** | **Energy sources** | **Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment.**<br>**An old incandescent Tube uses approximately 40W while an energy efficient light emitting diode (LED) uses only less than 24 W.** |
| **b.** | Energy consumption | The useable energy is Conventional energy. The used Electricity energy is 43000 units which costing is Rs.30100/- Per Year.<br>The Maximum energy is consumed for Light & Fan purpose which is 59 % of total consumption. |
| **c.** | Usage of LPG | It has been observed that LPG Ten gas cylinders are used in Canteen, Laboratories, cooking and other purposes. There are Green generators used in the premises. |



Source of Conventional Energy

| SOURCE OF ENERGY | |
|---|---|
| **Source of Energy** | Energy of Percentage (%) |
| **Conventional (Electric)** | 94 |
| **Non-conventional (Solar)** | 6 |



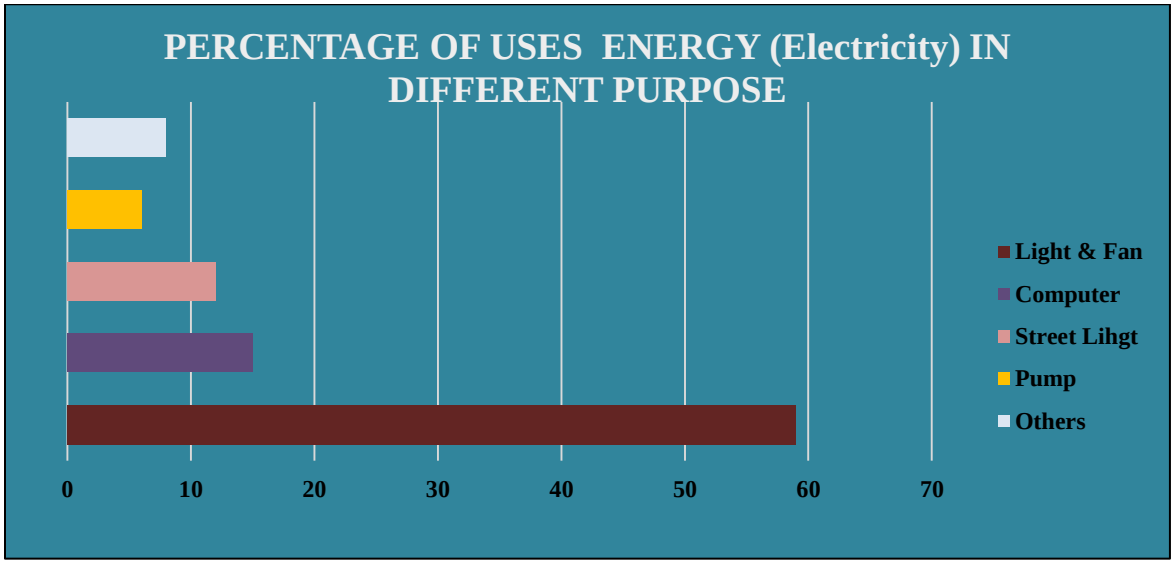
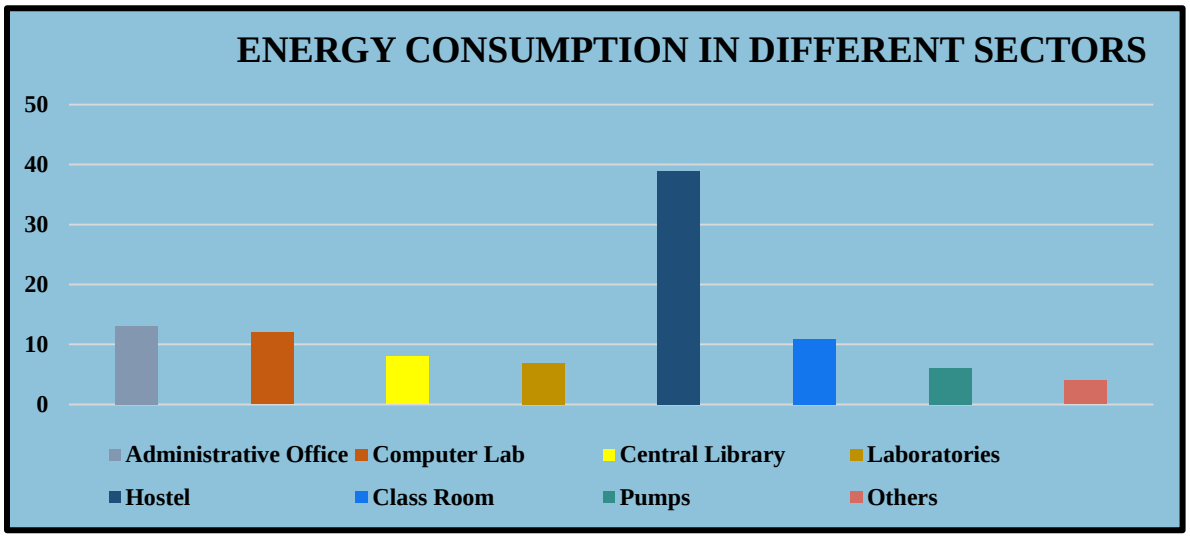




Fig. 4 Percentage of Energy Consumption in different Purpose

## Observation and Recommendations:

a) Every classroom and lab with central switch board should have a diagram linking place of tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.

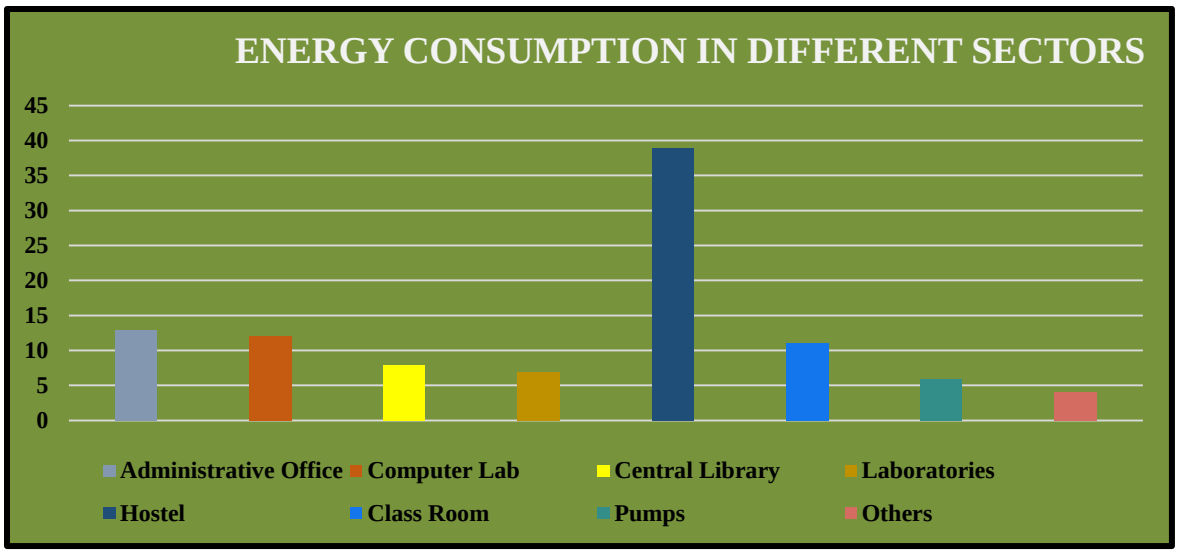
b) Installation of automatic lights with sensors can be considered.




c) Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing wherein equipment's with star rating; those using eco-friendly materials; those with safe disposal policy or return to supplier after unused, can be considered.

d) For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.
e) Usage of light reflectors is recommended as the reflectors can spread light to relatively large areas.
f) Notices/ signage can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all Departments & Sectors when not in use.
g) Use of large percentage renewable energy should be considered.

| ENERGY CONSUMPTION IN DIFFERENT SECTORS | |
|---|---|
| **Use of Sectors** | Energy Consumption in Percentage (%) |
| **Administrative Office** | 13 |
| **Computer Lab** | 12 |
| **Central Library** | 8 |
| **Laboratories** | 7 |
| **Hostel** | 39 |
| **Class Room** | 11 |
| **Pumps** | 6 |
| **Others** | 4 |




## 3.4 Air Quality and Carbon Footprints :

Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere consequent to burning of fossil fuels (such as petrol, Diesel, LPG Gas). The most common greenhouse gases are carbon dioxide, CFC, water vapor, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most leading greenhouse



Measurement of Indoor Air Quality

gas, comprising about 214ppm (2022) to the Earth's atmosphere. It undertakes the measure of bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is observed that the Outdoor air quality is Fresh and comfortable for breathing to human life.

Table-6 Amount of CO2 (ppm) in different location of the College Campus

| LEVEL OF $CO_2$ IN DIFFERENT PLACES | |
|---|---|
| **Places** | Dimension (ppm) |
| **Principal Chamber** | 440 |
| **Office** | 430 |
| **Physics Lab** | 410 |
| **Botany Lab** | 415 |
| **Geography Lab** | 410 |
| **Computer Lab** | 430 |
| **Central Library** | 420 |
| **Seminar Hall** | 410 |
| **Boy's Hostel** | 420 |
| **Girls Hostel** | 430 |
| **Tribal Hostel** | 420 |
| **B.P.Ed Hostel** | 420 |
| **Cycle Stand** | 410 |
| **Canteen** | 420 |
| **Gymnasium** | 430 |
| **Staff Room** | 420 |

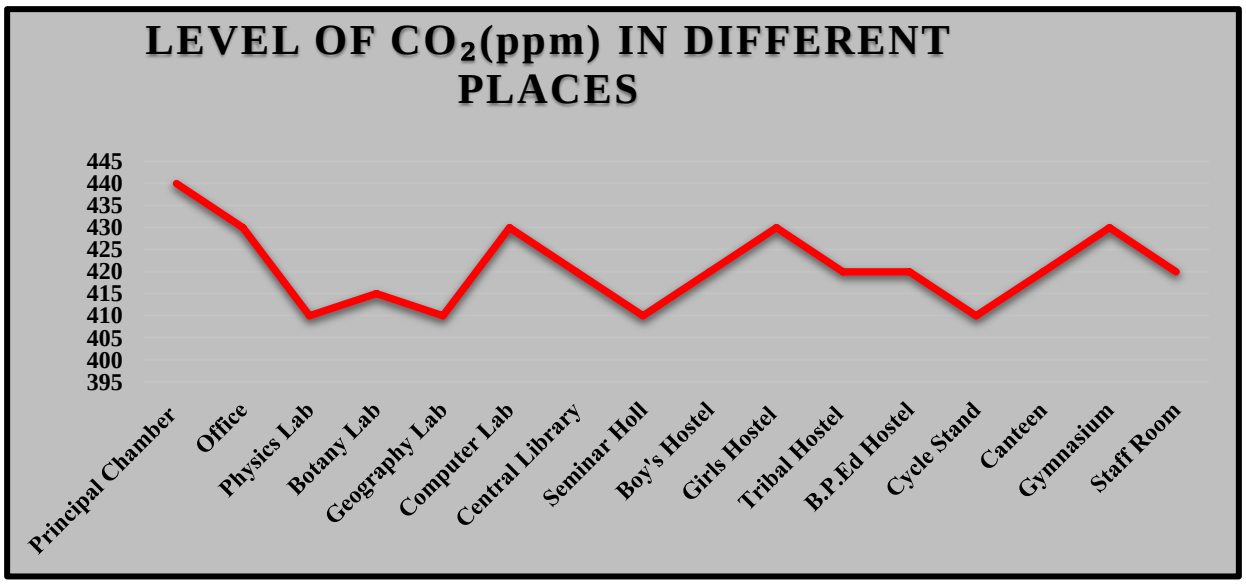



Fig. 5 Amount of CO2 (ppm) in Different Location of the College Premises

Table-7 Amount of $CO_2$ ( ppm) in the air in different location,( College Campus) session 2022-2023

| LEVEL OF $CO_2$ IN DIFFERENT LOCATION (ppm) | |
|---|---|
| **Location** | Amount of $CO_2$ (ppm) |
| **Out Door (Play Ground)** | 380 |
| **Indoor (Classroom)** | 400 |
| **Laboratories** | 420 |

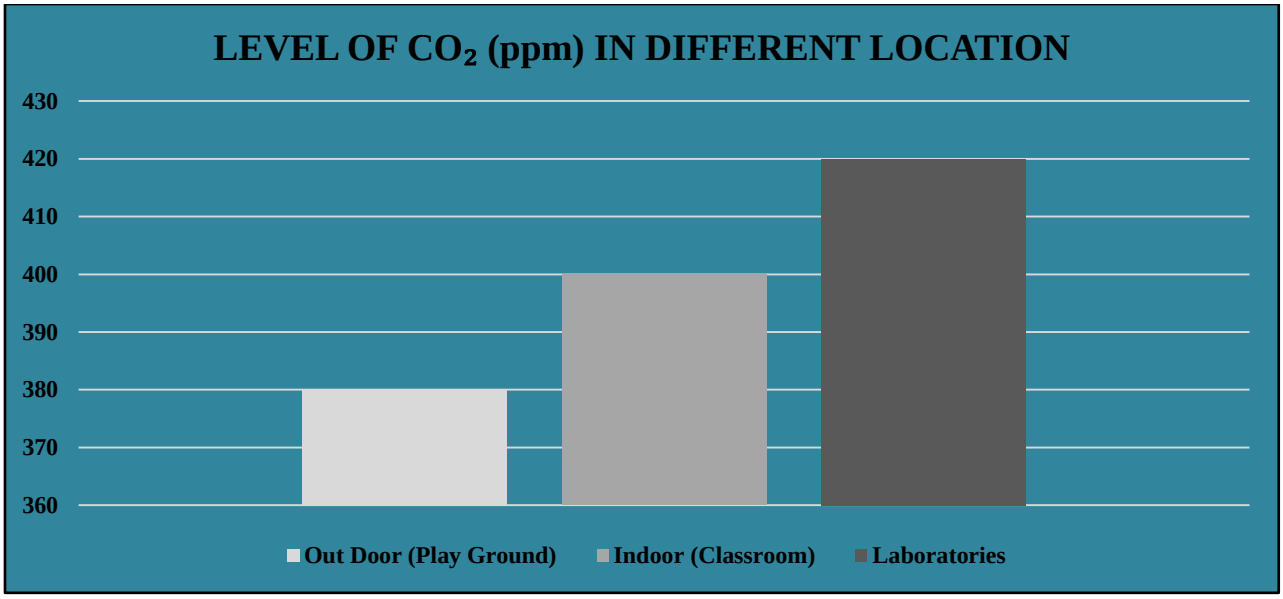



Fig. 6 Amount of $Co_2$(ppm) of the Air in Different location of the College Premises

**Observation and Recommendation:**

a) Ventilation is achieved by fans in the institute and air conditioners in Official and Lab. places.
b) Heating Ventilation and Air Conditioning (HVAC) system is not installed.
c) No Exhaust fans in washrooms and laboratories .

d) No indoor plants were observed in the staff rooms and laboratories . Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits.

## 3.5 Generation of Waste and Waste Management:

Waste (or wastes) is useless or unusable materials or components which are discarded after principal use. Sometimes, it is a defective article and of no use. In modern outlook waste may be a valuable substance subject to an appropriate operation or action on the waste. With the context of waste management RRR (Reduce, Reuse and Recycle) model may be followed in appropriate fashion.

The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. It is therefore essential that any environmentally responsible institution examine its waste processing practices. Keeping the objective of the audit the following study will be limited to the waste generated in an academic campus and surroundings.

Visiting the Seminar Hall

# Table-8 Types of wastes :

| | |
|---|---|
| **Degradable** | **96** |
| **Non-degradable** | 8 |

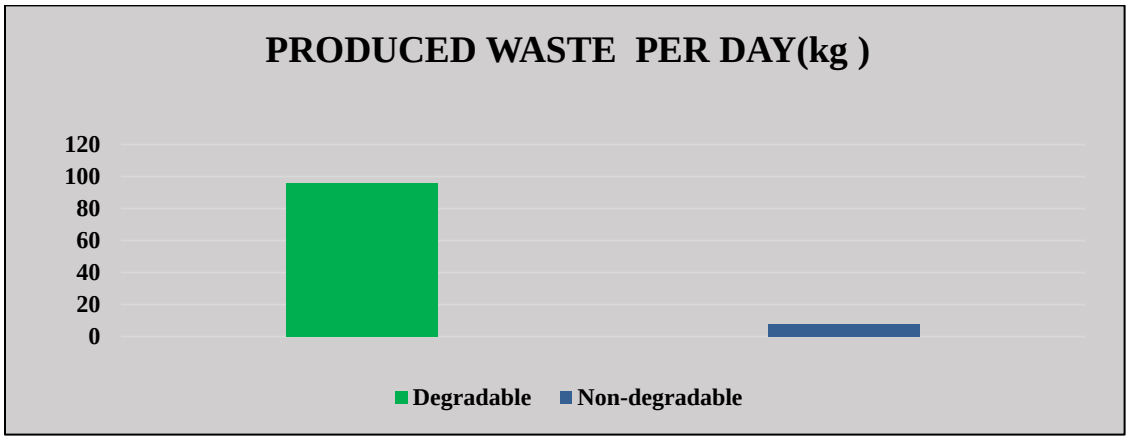



Fig. 7 Type and Amount of Waste

The following categories of wastes are generated in the College campus:
a) Solid waste - Waste generated through paper, plastic packaging causes nuisance. Some wastes are generated after various experiments, primarily, chemistry laboratory; broken test tube, glassware are the example.

b) Liquid waste - There are bio-chemical wastes generated through various chemical reactions and biological processes. Generally, these are being drained to nearby Surface water bodies contaminating water and soil. Appropriate means is suggested to adopt scientific liquid waste management practices. These are neutralization, bacterial control, and natural control through plantation.


Scattered Non degradable wastes at Girls Hostel

| TYPE OF DEGRADABLE WASTE | |
|---|---|
| **Type of Waste** | Amount of wastes (kg)/ Day |
| **Organic Waste** | 88 |
| **Paper Waste** | 7 |
| **Others** | 1 |

Use of separate dustbin for wastes management

Table-9 Source of Wastage in Different Sector (per day in Kg)

| Source of Wastage in Different Sector(per day in Kg) | Degradable wastage Amount in Kg. | Non Degradable wastage Amount in Kg. |
|---|---|---|
| **Canteen** | 02 | 0.5 |
| **Hostels & Quarter** | 75 | 3.5 |
| **Classroom** | 01 | 0.5 |
| **Office** | 03 | 02 |
| **Laboratories** | 01 | 01 |
| **Garden** | 12 | 0.25 |
| **Others** | 02 | .25 |

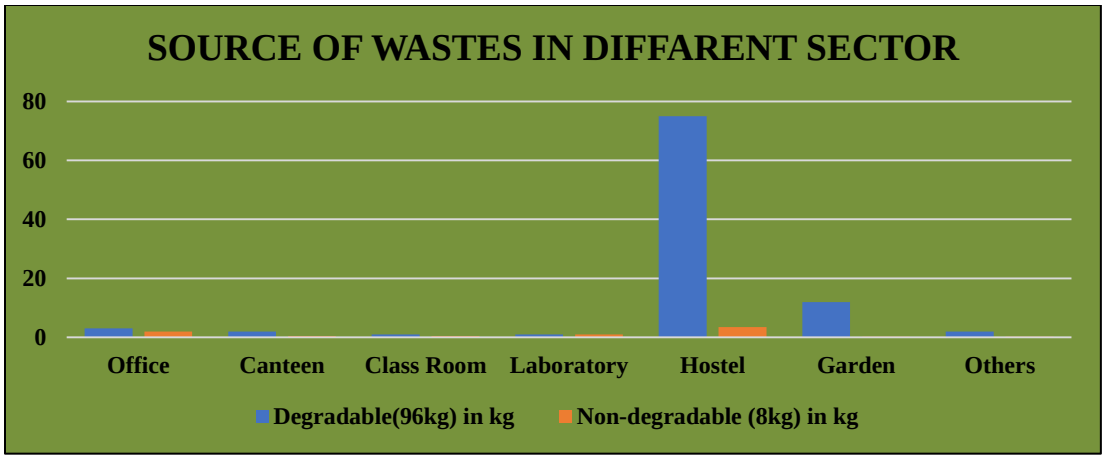
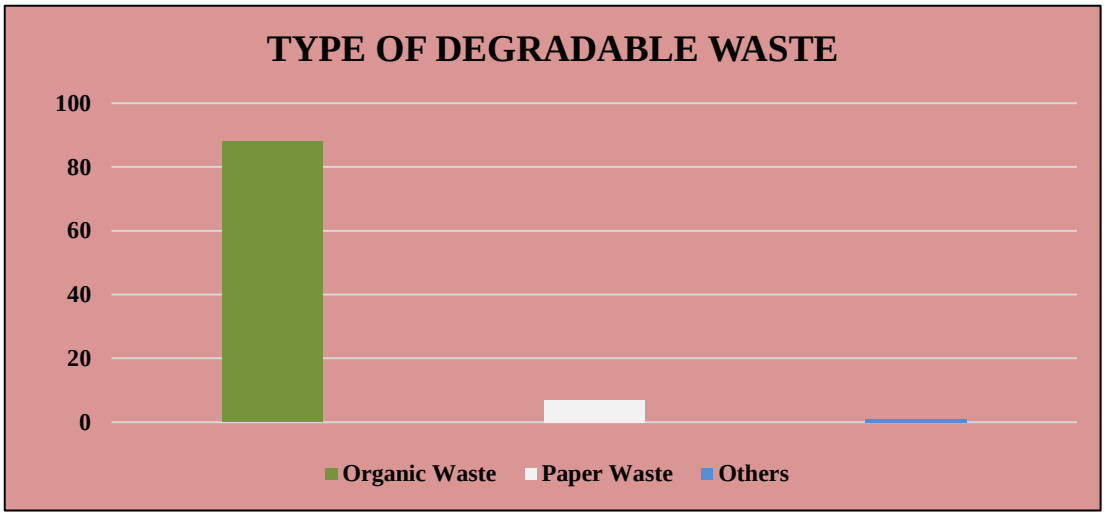



Fig. 8 Source and Amount of Wastage in Different Sector (per day in Kg)




**The following are being emphasized during audit of waste management:**

Earthen bio compost pit

a) Name of the waste
b) Category of waste
c) Quantity of waste
d) Hazardous effect of the waste
e) Institutional action and mechanism for waste management

Compliance audit of waste issues:

At the present stage the institute is capable in managing their waste. They are complying with the essential requirements of waste management although suggestions are given for future improvements.

**Performance Audit of Waste Issues:**

| Implemented wastes management | | |
|---|---|---|
| Sl.no | Factors/Indicators | Weightage |
| 1 | Plastic and Polythene free | M |
| 2 | Re-use of papers | M |
| 3 | Hazardous effect waste management | H |
| 4 | Removal of E-Wastes | H |
| 5 | Organic & food waste | H |
| 6 | Others solid wastes | M |

* H denote- Taken management policy level above 60%
** M denote- Taken management policy level 40%-60%
*** L denote-Taken management policy level below 40%
No critical audit issue is there with respect to the waste management.

## 3.6 Auditing for Biodiversity & Green Campus Management:

Ornaments Plants Garden

Unfortunately, biodiversity is facing serious threats from habitat loss, pollution, over consumption and invasive species. Species are disappearing at an alarming rate and each loss affects nature's delicate balance and our quality of life. In one year, a single mature tree will absorb up to 48 pounds of Carbon dioxide from the atmosphere, and release it as Oxygen. The amount of oxygen that a single tree produces is enough to provide one day's supply of oxygen for people. So while you are busy studying and working on earning those good grades, all the trees on campus are also working hard to make the air cleaner for us. Trees on our campus impact our mental health as well; studies have shown that trees greatly reduce stress, which a huge deal is considering many students are under some amount of stress.

About 25% area is under greenery and biodiversity zone Biodiversity includes the genetic variability and diversity of life forms such as plants, animals, microbes etc. living in a wide range of ecosystems. Flora and fauna of College campus premises is rich.

# Biodiversity Study

**Floral diversity** – Seva Bharati Mahavidyalaya has more than 11.4 acre of area and divided by different habitat, like medicinal plant garden, waste land, surrounding the playground, volleyball ground, hostel area, open area, etc. They have planted different types of plant in different habitat since long. It is remarkable that there are two large Mahagini trees (*Swietenia mahageni)* are found with 330cm GBH (girth at breast height) planted in the inception of the college itself. It

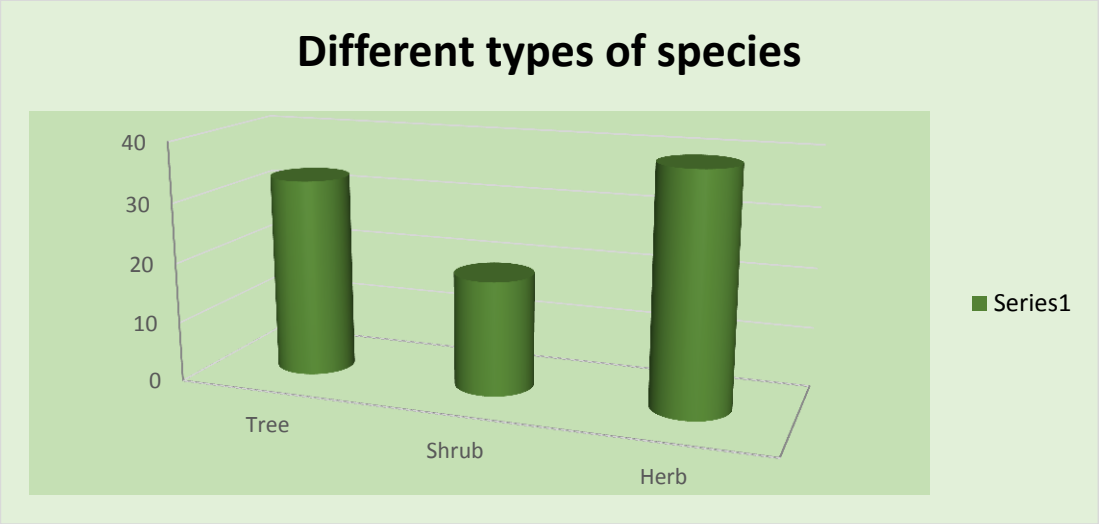



**Fig.-1: Floral inventory of the college campus**

harbours huge faunal specimens. There is a Chhatim (*Asltonia scholaris*) plantation area surrounding the playground, which is very beautiful and giving shade to the area. Another plantation site has been found in front of the boy's hostel. There are Eucalyptus (*Eucalyptus hybrid*) and Teak (*Tectona grandis*) species.

It is found from a rapid ecological study in the campus that there are 33 Tree species, 19 shrub species and 39 herb species (Table – 1 and Fig.-1).

**There are different types of plantation which are as follows-**

**Flower Garden –** A large flower garden is found in front of main building. Rose is the main plants but different seasonal varieties also planted. Gymnosperm like *Cycas* sp. is planted here and also in pots. It seems that garden is fully maintained.

**Volleyball ground** – in front of the ST hostel, there is a volleyball playground. Surrounding the ground there are different plantations like Chhatim (*Alstonia scholaris*), Neem (*Azadirachta indica*), Mango (*Magnifera indica*), Siris (*Albizia lebbeck),* Kaju (*Anacardium occidentale*) and Eucalyptus (*Eucalyptus hybrid*) trees.

**Medicinal Plant Garden –** The College have a small patch (5 decimal approx.) of medicinal plant garden to introduce the valuable plant to the students. There are 18 species till now (Table-2). There are few plots are blank. Very important species are there like *Aloe vera*, Asok, Stevia, , Aswaagandha, Citronella, Bahera, etc.

**Between Playground and main building** – there are more than above 20 no. of Chhatim (*Alstonia scholaris*), Teak (*Tectona gradis*), Mahagini (*Swietenia mahageni)* and Radhachura (*Caesalpinia pulcherima*) plantation found in between the main campus and playground. These plantations are very old. The large trunk of Mahagini trees are seen.

**Basketball Ground** – inside the college building there is a basketball ground with gallery. This ground is shading by different tree like Mahagini (*Swietenia mahageni),* Teak (*Tectona gradis*), Mango (*Magnifera indica*), Bakul (*Mimosops elangi*), Sisso (*Dalbergia sissoo),* Palash (*Butea monosperma*) and Royal plam (*Roystonea regia*).

**Ladies Hostel** – The campus of ladies hostel is very small. There are some important trees also. There are Mango (one) and Randhachura (five) trees seen. The GBH of Radhachura trees are near about 198cm each, which are very large in respect of the area.

**Boy's Hostel** – in front of the boy's hostel, there is a large plantation of Eucalyptus and Teak trees are found. The plantation is not so old but all trees are beautifully developed. Beside these plants there are Neem (*Azadirachta indica* ) , Akor (*Alangium salviifolium* ), Kurchi,

(*Holarrhena antidysenterica* ) Bandarlathi (*Cassia filstula*), Gamar (*Gmelina arborea* ), Mahagini (*Swietenia macrophylla* ) etc. are found.

**Quadrat analysis** - Two quadrats have been laid within the campus (Table-3). It showed that frequencies of trees are quite good (total 8 trees). Diversity of tree species is also remarkable. Timber yielding (*Tectona grandis*, *Swetenia macrophylla),* fruiting bearing (*Mangifera indica*), avenue tree (*Roystonea regia*) etc. have been found.

**Carbon stocking –** We have studied 2 quadrats within the college campus. There are 8 trees are found within the quadrats. Total Carbon sequestration potential is 2394kg. It is assumed that the probability of carbon stocking is per tree is 299.25kg (Table-4). It is also said that there are huge large trees in the campus including Mahagini, but they are out of the quadrats. So their carbon content is not calculated. If that the carbon content will be more.

**Table -1: List of plants in the college campus.**

**Trees**

| Sl. No. | Scientific Name | Local name | Family |
|---|---|---|---|
| 1. | *Acacia auriculiformis* | Sonajhuri | Fabaceae |
| 2 | *Aegle marmelos* | Bel | Rutaceae |
| 3 | *Alangium salviifolium* | Ankor | Cornaceae |
| 4 | *Albizia lebbeck* | Khiris | Fabaceae |
| 5 | *Anacardium occidentale* | Kaju | Anacardeiaceae |

| | | | |
|---|---|---|---|
| **6** | *Asltonia scholaris* | Chhatim | Apocynaceae |
| **7** | *Azadirachta indica* | Neem | Meliaceae |
| **8** | *Borassus flabellifer* | Tal | Arecaceae |
| **9** | *Butea monosperma* | Palas | Fabaceae |
| **10** | *Caesalpinia pulcherrima* | Radhachura | Caesalpiniaceae |
| **11** | *Cassia filstula* | Amaltas | Fabaceae |
| **12** | *Ceiba pentandra.* | Sada simul | Bombacaceae |
| **13** | *Crataeva nurvala* | Barun | Capparidaceae |
| **14** | *Dalbergia sissoo* | Sisso | Fabaceae |
| **15** | *Eucalyptus hybrid* | Euc | Myrtaceae |
| **16** | *Gmelina arborea* | Gamar | Lamiaceae |
| **17** | *Holarrhena antidysenterica* | Kurchi | Apocynaceae |
| **18** | *Holoptelea integrifolia* | Challa | Ulmaceae |
| **19** | *Mangifera indica* L. | Amm | Anacardiaceae |

| | | | |
|---|---|---|---|
| **20** | *Mimusops elangi* | Bakul | Sapotaceae |
| **21** | *Moringa oleifera* | Sajne | Moringaceae |
| **22** | *Nyctanthes arbor-tristis* | Seuli | Oleaceae |
| **23** | *Pithecellobium dulce* | Jilipi | Fabaceae |
| **24** | *Pongamea pinnata* | Karanj | Fabaceae |
| **25** | *Psidium guajava* | Peyara | Myrtaceae |
| **26** | *Roystonea regia* | Cuban royal plam | Arecaceae |
| **27** | *Saraca asoca* | Ashok | Fabaceae |
| **28** | *Siamese cassia* | Sena | Caesalpiniaceae |
| **29** | *Swietenia macrophylla* | Mahogini | Meliaceae |
| **30** | *Swietenia mahageni* | Mahogini | Meliaceae |
| **31** | *Tectona grandis* | Teak | Lamiaceae |
| **32** | *Terminalia belerica* | Bahera | Combretaceae |
| **33** | *Ziziphus jujube* | Kul | Rhamnaceae |

**Shrubs**

| Sl. No. | Scientific Name | Local name | Family |
|---|---|---|---|
| 1 | *Asparagus racemosus* | Satamul | Asparagaceae |
| 2 | *Asperagas racemosus* | Satamuli | Asperagaceae |
| 3 | *Calotropis procera* | Akanda | Asclepiadaceae |
| 4 | *Clerodendron infortunatum* | Bhat | Verbenaceae |
| 5 | *Datura stramonium.* | Dhutra | Solanaceae |
| 6 | *Duranta repens* | Hedge | Verbenaceae |
| 7 | *Eupatorium odoratum* | Assam lata | Asteraceae |
| 8 | *Jatropha multifida* | Gab | Euphorbiaceae |
| 9 | *Justicia adhatoda* | Basak | Acanthaceae |
| 10 | *Kaempferia galanga* | Ekangi | Zingiberaceae |
| 11 | *Nyctanthes arbor-tristis* | Seuli | Oleaceae |
| 12 | *Ocimum sanctum* | Sada tulsi | Labiatae (Lamiaceae) |
| 13 | *Ocimum tenuiflorum* | Krishna tulsi | Labiatae (Lamiaceae) |
| 14 | *Pedillanthus sp.* | Ranchita | Euphorbiaceae |
| 15 | *Solanum xanthocarpon* | | Solanaceae |
| 16 | *Streblus asper* | Saora | Moraceae |
| 17 | *Tephrosia purpurea* | | Fabaceae |
| 18 | *Vanguirea spinosa* | Moyna kanta | Rubiaceae |
| 19 | *Ziziphus oenopolia* | Sia kul | Rhamnaceae |

**Herbs**

| Sl. No. | Scientific Name | Family |
|---|---|---|
| **1** | *Acalypha indica* | Euphorbiaceae |
| **2** | *Achyranthuys aspera* | Amaranthaceae |
| **3** | *Aloe vera*. | Liliaceae |
| **4** | *Aloe vera*. | Liliaceae |
| **5** | *Amomum subulatum* | Zinziberaceae |
| **6** | *Andropogon aciculatus* | Poaceae |
| **7** | *Andropogon aciculatus* | Poaceae |
| **8** | *Blumea lacera* | Asteraceae |
| **9** | *Boerhavia diffusa* | Nyctaginaceae |
| **10** | *Bryophyllum pinnatum* | Crassulaceae |
| **11** | *Cleome viscosum* | Capparaceae |
| **12** | *Corchorus sp.* | Tiliaceae |
| **13** | *Cosmos sp.* | Asteraceae |
| **14** | *Cyanodon dactylon* | Poaceae |
| **15** | *Cymbopogon citrates* | Poaceae |
| **16** | *Cyperus kyllinga* | Cyperaceae |
| **17** | *Dahlia pinnata* | Asteraceae |

| | | |
|---|---|---|
| **18** | *Desmodium triflorum* | Fabaceae |
| **19** | *Digitaria sanguinales* | Poaceae |
| **20** | *Eclipta alba* | Asteraceae |
| **21** | *Elettaria cardamomum* | Zinziberaceae |
| **22** | *Eragrostis tenella* | Poaceae |
| **23** | *Eupatorium ayapana* | Asteraceae |
| **24** | *Evolvulus alsenoides* | Convolvulaceae |
| **25** | *Hordeum vulgare* | Poaceae |
| **26** | *Oldanladia corymbosa* | Rubiaceae |
| **27** | *Oxalis corniculata* | Oxalidaceae |
| **28** | *Phyllanthus amaru* | Euphorbiaceae |
| **29** | *Piper nigrum* | Piperaceae |
| **30** | *Rungia pectinata* | Acanthaceae |
| **31** | *Salvia sp.* | Lamiaceae |
| **32** | *Saraca asoca* | Fabaceae |
| **33** | *Sauropus androgynus* | Euphorbiaceae |
| **34** | *Scoparia dulsis* | Plantaginaceae |
| **35** | *Sida cordifolia* | |
| **36** | *Stevia rebaudiana* | Asteraceae |
| **37** | *Strephania harnandifolia* | Menispermaceae |

| | | |
|---|---|---|
| **38** | *Triamphetta rhomboida* | Malvaceae |
| **39** | *Tridax procumbens* | Asteraceae |

**Table- 2: List of Medicinal Plants Present in Medicinal plant Garden**

| Sl. No. | Scientific Name | Local name | Family |
|---|---|---|---|
| **1** | *Aloe vera*. | Ghritakumari | Liliaceae |
| **2** | *Amomum subulatum* | Boro elach | Zinziberaceae |
| **3** | *Asparagus racemosus* | Satamul | Asparagaceae |
| **4** | *Cymbopogon citrates* | Lemon grass | Poaceae |
| **5** | *Datura stramonium.* | Dhutra | Solanaceae |
| **6** | *Elettaria cardamomum* | Chhoto elach | Zinziberaceae |
| **7** | *Eupatorium ayapana* | Ayapana | Asteraceae |
| **8** | *Hordeum vulgare* | Barley | Poaceae |
| **9** | *Jatropha multifida* | Gab | Euphorbiaceae |
| **10** | *Justicia adhatoda* | Basak | Acanthaceae |
| **11** | *Kaempferia galanga* | Ekangi | Zingiberaceae |
| **12** | *Nyctanthes arbor-tristis* | Seuli | Oleaceae |
| **13** | *Ocimum sanctum* | Sada tulsi | Labiatae (Lamiaceae) |
| **14** | *Ocimum tenuiflorum* | Krishna tulsi | Labiatae (Lamiaceae) |
| **15** | *Piper nigrum* | Golmorich | Piperaceae |

| | | | |
|---|---|---|---|
| **16** | *Saraca asoca* | Ashok | Fabaceae |
| **17** | *Sauropus androgynus* | Multivitamin plant | Euphorbiaceae |
| **18** | *Stevia rebaudiana* | Chinipata | Asteraceae |

**Table - 3: List of Quadrats studied within the college campus**

**Quadrat - 1**

It's a corner place, is in between two building and north gate. There are ruined rooms and abundant place with old Kaju plantation. Trees are very old perhaps from the beginning time of the college.

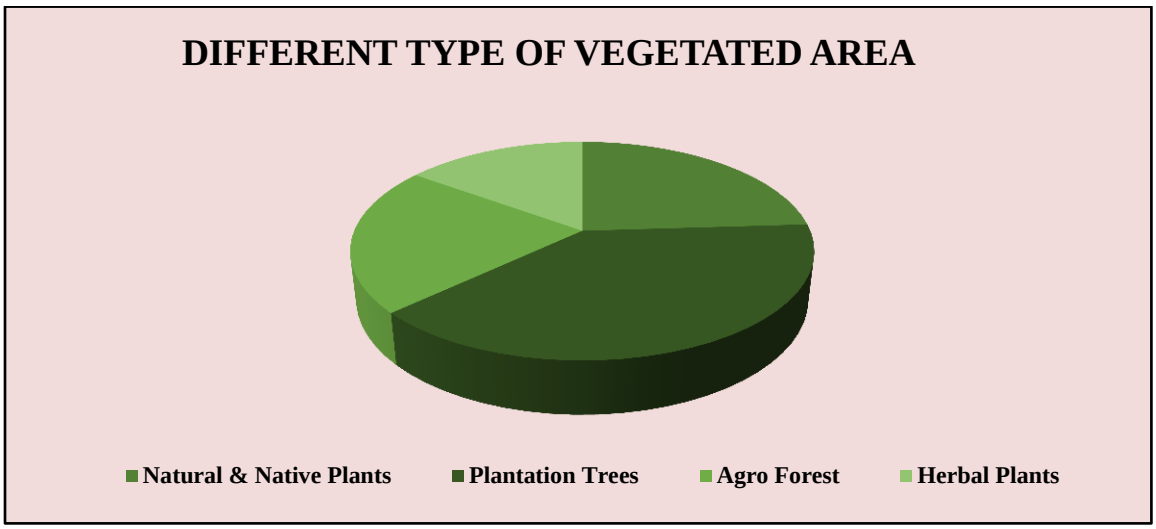
**Tree Quadrat (10m x 10m)**

| Sl. No. | Scientific name | GBH (in cm) | Height (in m) |
|---|---|---|---|
| **1.** | *Alangium salviifolium* | 60 | 7 |
| **2.** | *Alangium salviifolium* | 98 | 8.5 |
| **3** | *Alangium salviifolium* | 67 | 7 |
| **4** | *Alangium salviifolium* | 72 | 7 |
| **5** | *Alangium salviifolium* | 78 | 7.5 |

**Shrub quadrat (5m x 5m)**

| Sl. No. | Scientific name | Number of individuals |
|---|---|---|
| **1** | *Alangium salviifolium* | Huge |
| **2.** | *Clerodendron infortunatum* | 3 |

| | | |
|---|---|---|
| **3** | *Ziziphus oenopolia* | 2 |
| **4** | *Eupatorium odoratum* | 11 |
| **5** | *Streblus asper* | 8 |




**Herb quadrat (1m x 1m)**

| Sl. No. | Scientific name | Number of individuals |
|---|---|---|
| 1 | *Boerhavia diffusa* | 2 |
| 2. | *Acalypha indica* | 2 |
| 3 | *Sida cordifolia* | 1 |
| 4 | *Rungia pectinata* | 6 |
| 5 | *Evolvulus alsenoides* | 5 |
| 6 | *Stephania harnandifolia* | 3 |

## Quadrat - 2

The site is located in front of the boy's hostel. There are old and new hostel side by side. A new plantation of *Eucalyptus* sp. and Teak (*Tectona grandis*) are found. This place is extreme south side of the main campus.

**Tree Quadrat (10m x 10m)**

| Sl. No. | Scientific name | GBH (in cm) | Height (in m) |
|---|---|---|---|
| **1.** | *Eucalyptus hybrid* | 84 | 12 |
| **2.** | *Tectona grnadis* | 32 | 8 |
| **3** | *Tectona grnadis* | 52 | 9 |

**Shrub quadrat (5m x 5m)**

| Sl. No. | Scientific name | Number of individuals |
|---|---|---|
| **1** | *Vanguirea spinosa* | 1 |
| **2.** | *Clerodendron infortunatum* | 6 |
| **3** | *Ziziphus oenopolia* | 1 |
| **4** | *Eupatorium odoratum* | 16 |
| **5** | *Lamtana camara* | 5 |

**Herb quadrat (1m x 1m)**

| Sl. No. | Scientific name | Number of individuals |
|---|---|---|
| 1 | *Boerhavia diffusa* | 3 |
| 2. | *Acalypha indica* | 5 |
| 3 | *Sida cordifolia* | 2 |
| 4 | *Rungia pectinata* | 3 |
| 5 | *Evolvulus alsenoides* | 2 |
| 6 | *Eragrostis tenella* | 3 |
| | *Andropogon aciculatus* | 29 |

**Table -4 : Carbon sequestration potential of trees in college campus**

| Sl. No. | GBH Class (in cm) | No. of Trees | | Carbon stock (in Kg.) |
|---|---|---|---|---|
| 1 | 50 | 1 | | 53 |
| 2 | 50-100 | 7 | | 2338 |
| | | | **Total** | **2394** |

**Faunal Diversity-** The College has one pond, huge trees, waste land, low land, flower garden which are habitat of faunal components. So, wide variety of fauna are supporting its rich biodiversity. The college campus is the feeding and breeding ground of the many animals. Different types of earth worm, insects (moths, butterfly, wasp, and bees), amphibian, reptilian, birds and mammals are found here and there in the college campus. There is one big, one small size pond are present under the college premises. In those ponds there have many indigenous

| **Faunal Diversity** | | |
|---|---|---|
| **Phylum: Annelida** | | |
| **Local Name** | | Scientific Name |
| **1** | Kecho | *Pheretimaposthuma* |
| **2** | Joke | *Hirudinaria*sp |
| **Phylum: Arthropoda** | | |
| **1** | Prajapati | *Papilio*sp |
| **2** | Moth | *Galleria* sp |
| **3** | Moumachi | *Apis*sp |
| **4** | Jonaki | *Lampyrisnoctiluca* |
| **5** | Arsola | *Periplanetaamericana* |
| **6** | Vimrul | *Vespa orientalis* |
| **7** | Lalpipra | *Oecophyllasmaragdina* |
| **8** | Kakrabicha | *Buthus*sp |
| **9** | Tetulbicha | *Scolopendra*sp |
| **10** | Kenno | *Julus*sp |
| **11** | Pangapal | *Schistoceragregaria* |
| **12** | Anopilis masa | *Anopheles* sp |
| **13** | Culex masa | *Culex*sp |
| **14** | Ades masa | *Aedes*sp |
| **15** | Gubrepoka | *Coprislunaris* |
| **16** | Pharing | *Orthetrum*sp |
| **17** | Wepoka | *Odontotermes*sp |
| **18** | Machi | *Muskadomestica* |

| | | |
|---|---|---|
| **19** | Makarsa | *Nephila*sp |
| **Phylum: Mollusca** | | |
| **20** | Sthalsamuk | *Acatinafulica* |
| **21** | Jalsamuk | *Pilaglobosa* |
| **22** | Gugli | *Bellamyabengalensis* |
| **23** | Jhinuk | *Lamellidensmarginalis* |
| **24** | Kath joke | *Limax*sp |
| **Class : Amphibia** | | |
| **1** | Kuno bang | *Duttaphrynusmelanostictus* |
| **2** | Sona bang | *Ranatigrina* |
| **Class: Reptilia** | | |
| **1** | Loudaga | *Ahaetullanasutas* |
| **2** | Jaldhora | *Xenochriphispiscator* |
| **3** | Matiali sap | *Elachistodonwestermanni* |
| **4** | Jamna sap | *Ptyasmucosus* |
| **5** | Godi sap | *Varanus*sp |
| **6** | Keute | *Naja*sp |
| **7** | Tiktiki | *Hemidactylusflaviviridis* |
| **8** | Girgiti | *Calottes versicolor* |
| **9** | Kachhap | *Tryonix*sp |
| **Class : Aves** | | |
| **1** | Charaipakhi | *Passer domesticus* |
| **2** | Tuntuni | *Orthotomus*sp |
| **3** | Satbhaya | *Turdoideseaudatus* |

| | | |
|---|---|---|
| **4** | Doyel | *Copsychussaularis* |
| **5** | Bulbul | *Pycnonotus*sp |
| **6** | Kak | *Corvussplendens* |
| **7** | Shalik | *Acridotherestristris* |
| **8** | Phinge | *Dicrurousadsimilis* |
| **9** | Kajalpakhi | *Laniuscristatus* |
| **10** | Kat thokra | *Dinopiumbenga* |
| **11** | Baspati | *Meropsorientalis* |
| **12** | Chotomachranga | *Alcedoatthis* |
| **13** | Sadabookmachranga | *Halcyon* sp |
| **14** | Lakhsmipancha | *Tyto alba* |
| **15** | Kuturepancha | *Athenebrama* |
| **16** | Kokil | *Eudynamysscolopacea* |
| **17** | Tia | *Pisttacula*sp |
| **18** | Gughu | *Streptopeliachinensis* |
| **19** | Paira | *Columba livia* |
| **20** | Dahuk | *Amaurornisphooniurus* |
| **21** | Bak | *Ardeolagrayii* |
| **Class : Mammalia** | | |
| | | |
| **1** | Katbirali | *Funambuluspennantii* |
| **2** | Neul | *Herpestesedwardsii* |
| **3** | Mechobiral | *Prionailurusviverrinus* |
| **4** | Katas | *Felischaus* |

| | | |
|---|---|---|
| **5** | Khaksial | *Vulpesbengalensis* |
| **6** | Chucha | *Suncusmurinus* |
| **7** | Indur | *Bandicotabengalensis* |
| **8** | Nenhtiindur | *Musmusculus* |
| **9** | Badhur | *Pteropus*sp |
| **10** | Chamchika | *Pipistrellus tenuis* |

fresh water fishes which are nourished. From conversation with faculty members, different stakeholders of the college, following information are collected.

Table-10 Green Coverage of the College Premises

| **DIFFERENT TYPE OF VEGETATED AREA** | | |
|---|---|---|
| **Use of Area** | Area in Percentage(%) | Area in Acres |
| **Natural & Native Plants** | 24 | 0.67 |
| **Plantation Trees** | 39 | 1.09 |
| **Agro Forest** | 22 | 0.61 |
| **Herbal Plants** | 15 | 0.42 |
| | | |

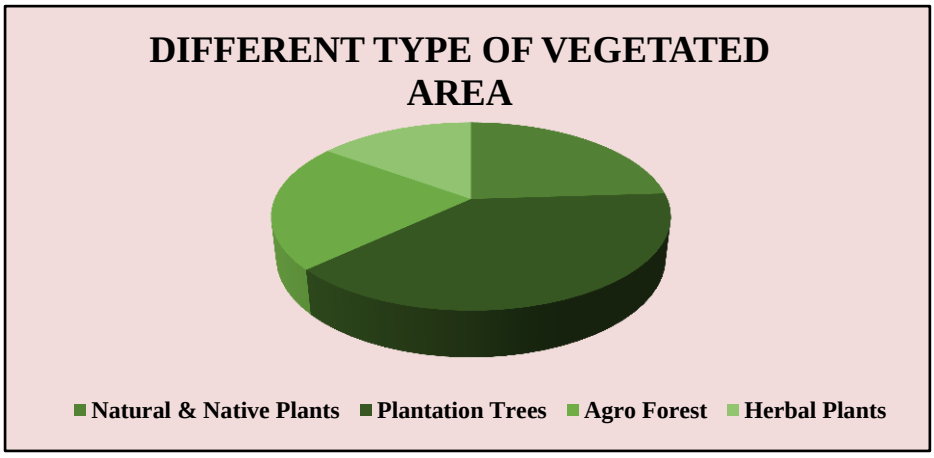



Fig. 9 Green Coverage of the College Premises

**Spice Garden –** There is a small proposed spice garden in the south side of academic building. The area will be approximately 2-3decimal.

Table: The Avian fauna observed in the campus is enlisted below-

| SL. NO. | COMMON NAME | BENGALI NAME | SCIENTIFIC NAME | IUCN STATUS |
|---|---|---|---|---|
| **1** | Red Whiskered Bulbul | Sipahi Bulbul | *Pycnonotusjocosus* | LC |
| **2** | Red Vented Bulbul | Bulbul | *Pycnonotuscafer* | LC |
| **3** | House Sparrow | ChotiCharai | *Passer domesticus* | LC |
| **4** | Eurasian Collared Dove | Par ghughu | *Streptopeliadecaocto* | LC |
| **5** | Oriental Turtle Dove | | *Streptopaliaorientalis* | |
| | Spotted Dove | Chhiteghughu | *Streptopeliachinensis* | DD |
| **6** | Rock Dove | Rock Pigeon | *Columba livia* | LC |
| | Black Drongo | Finga | *Dicrurusmacrocercus* | LC |
| **7** | Asian Pied Starling | GuyeSalik | *Sturnus contra* | LC |
| **8** | White-breasted Kingfisher | SandabukMachhranga | *Halcyon smyrnensis* | VU |
| **9** | Common Kingfisher | ChottoMachhranga | *Alcedoatthis* | LC |
| **10** | House Crow | Kak | *Corvussplendens* | LC |
| **11** | Jungle Babbler | Chhatare/Satbhai | *Argyastriatus* | LC |
| **12** | Black-headed Oriole | BeneBau | *Oriolusxanthornus* | LC |
| **13** | Eurasian Golden Oriole | SonaBau | *Oriolusoriolus* | LC |
| **14** | Common Myna | Salik | Acridotherestristis | LC |
| **15** | Blue Rock Pigeon | GolaPayra | *Columba liviadomestica* | |
| **16** | Common Hoopoe | Mohonchura | *Upupaepops* | LC |
| **17** | Asian Koel | Kokil | *Eudynamysscolopacea* | LC |
| **18** | Rose-ringed Parakeet | Tia | *Psittaculakrameri* | LC |
| **19** | Brown Shrike | Karkata | *Laniuscristatus* | LC |
| **20** | Indian Treepie | HandiChacha | *Dendrocittavagabunda* | LC |

Table: The Mammalian checklist is as follows-

| SL. NO | COMMONNAME | BENGALINAME | SCIENTIFICNAME | IUCN RED LIST |
|---|---|---|---|---|
| 1 | FivestripedPalm Squirrel | Kath Berali | *Funambuluspennantii* | Least Concern (LC) |
| 2 | Free-rangingCat | Biral | *Felisdomesticus* | DD |
| 3 | Free-rangingDog | Kukur | *Canisfamiliaris* | DD |
| 4 | AsianPalmCivet | Bham | *Paradoxurushermaphroditus* | LC |
| 5 | FieldRat | MethoIndur | *Bandicotabengalensis* | LC |
| 6 | GreyMongoose | Beji | *Herpestesedwardsii* | LC |
| 7 | HouseMouse | NengtiIndur | *Musmusculus* | LC |
| 8 | Small Indian Civet | Kotas | *Viverriculaindica* | LC |
| 9 | Bengal Fox | Fox | *Vulpesbengalensis* | LC |
| 10 | Indian gray mongoose | Neul | *Herpestesedwardsii* | LC |

*NE: Not evaluated; LC: Least concerned; NA: Not accessed

| Implemented Biodiversity & Green Management | | |
|---|---|---|
| Sl. No | Factors/ Indicators | Weightage |
| 1 | Plants Diversity | H |
| 2 | Birds and Insects | M |
| 3 | Mammals | M |
| 4 | Fishes and Amphibian | L |
| 5 | Fungus & Organisms | M |

* H denote- Taken management policy level above 60%
** M denote- Taken management policy level 40%-60%
*** L denote-Taken management policy level below 40%

## 3.7 Reviews of Documents and Records:

Documents such as admission registers, registers of Engineering and water charge remittance, furniture register, laboratory equipment registers, purchase register, audited statements, and office registers were examined and data were collected. College calendars, college magazines, annual report of the college and NAAC self-assessment reports, UGC report etc. were also verified as part of data collection.

## 3.8 Review of Policies:

Discussions were made with the College management regarding their policies on environmental management. Future plans of the College were also discussed. The management would formulate a revised environment /green policy for the college in the light of green auditing. The purpose of the green audit was to ensure that the practices followed in the campus are to be in accordance with the Green Policy adopted by the institution.

## 3.9 Interviews:

In order to college information for green auditing different audit groups which are IQAC Cell, HOD of Dept., Teaching and non-teaching staff, students, Students Union, parents and other stakeholders of the College. Discussions were also made with the office bearers to clarify doubts regarding certain points.




Counting of Indoor Plants Diversity

## 4.0 POST AUDIT STAGE :

## 4.1. Data Analysis and Assessment :

The base of any Green audit and Environmental audit is that its findings are supported by documents and verifiable information. The audit process seeks, on a sampled basis, to track past actions, activities, events, and procedures to ensure that they are carried out according to systems requirements and in the correct manner. Although Green & Environmental audits are carried out using policies, procedures, documented systems and objectives as a test, there is always an element of subjectivity in an audit. Each of the three components is crucial in ensuring that the organization's environmental performance meets the goals set in its green policy. The individual functioning and the success of integration will all play a role in the degree of success or failure of the organization's environmental performance.

## 4.2 Results and Findings:

### a) Water -

**Water Audit and Assessment**

| Sl. No. | Object and Parameter | Observation and Finding |
|---|---|---|
| **1.** | Source of water | ➢ Underground( 55000 liter) |
| **2.** | Capacity of water storage (Daily) | ➢ Reservoir and Overhead tanks- 20000 liter<br>➢ Total amount of used & misused water- 51000ltr<br>➢ Total misuse of water-500ltr |
| **3.** | Amount of used water per day | 50500liter |
| **4.** | Misuse of water in daily | Leakage, overflow and Misuse-500 liter |
| **5.** | Maximum used of water per day - for Bathing and washroom purpose | 51% ( 26550 liter) |
| **6.** | Amount of water for used per day- Drinking Purpose | 9 % (4500liter) |
| **7.** | Surface water Harvesting | A small surface water body and two micro water reservoir are available in college campus.. |
| **8.** | pH level of drinking water | 7-7.2 |
| **9.** | TDS level of drinking water | 110ppm -130ppm |


## b. Energy

- Electricity Consumption - 43000 Unit, Rs.- 301000/- Per Year
- Fossil fuel consumption :
  a. Number of Gas cylinders used for canteen & laboratories purpose - 10 PC /year
  b. Diesel used for green Generator- 60 liter/month
- Number of Green Generators - 01
- Cost of fuel for generator purpose – Rs. 5400/month

**Energy Audit and Assessment**

| Sl. No. | Object and Parameter | Observation and Finding |
|---|---|---|
| 1 | Source of energy ( conventional) | 94 % |
| 2 | Source of Energy( Nonconventional) | 06 |
| 3 | Total consumption of Electric Power | 43000 unit |
| 4 | The maximum use of conventional Electric Power | 94% |
| 5 | Maximum energy consumption in the purpose | Light and fans - 25370 Unit/year |
| 6 | Energy Consumption in Computer & Lab. | 6450 unit /year |
| 7 | No. of LPG Gas cylinder for cooking & Laboratories purpose | 10PC/ Year |
| 9 | Amount of diesel used for green generator | 420 liter/Year |

## c. Wastes-

- Total Students - 1623 persons
- Other Stakeholders – 124 persons
- Total Stakeholders - 1747 persons
- Hostel students- 220

- Departments – 19
- Student Hostels & Staff Quarters - 05
- Canteen- 01

# D. Wastes Management Policy:

- Food wastes – Waste Rice, Vegetable, Paper plates- Disposal in Earthen pit and Compost pit.
- Biological Wastes treatment by Bio-compost methods.
- E-wastes- computers, electrical and electronic parts – Disposal by selling
- Plastic waste- disposal by selling
- Solid wastes –Iron & Metal scraps- Disposal by Selling
- Chemical wastes – Laboratory waste – Not proper treatment
- Waste water – washing, urinals, and bathrooms in soak pits.
- Glass waste – Broken glass wares from the labs by selling.
- Napkin & Clothes incinerators- Disposal in earthen pit

**Waste Audit and Assessment**

| Sl. No. | Object and Parameter | Observation and Finding |
|---|---|---|
| 1 | Degradable waste | 96 (Kg/Day) |
| 2 | Non degradable | 08(Kg/Day) |
| 3 | Main Source of waste ( Organic) | Hostels, Canteen and Garden |
| 5 | Plastic waste management | Use of separate dustbin and Established of different waste unit |

## d) Green Campus-

Green cover of the campus- 2.8acre area

Free space including Playground- 6.00 acre area

**Crops cultivated in the campus:** Tapioca, Chilly, Cabbage, Tomato, Spinach, Brinjal, Cauliflower, Ladies finger, Pea and different seasons flowers are produced during different seasons in Hostels , Quarters Kitchen garden and College premises area.

Table 13 Biodiversity and Green Coverage

| Sl. No. | Object and Parameter | Observation and Finding |
|---|---|---|
| **1** | Vegetation coverage area | 25 %( 2.8 Acre) |
| **2** | Types of green coverage | ➢ Native and Natural Vegetation- 24%<br>➢ Medicinal plants- 15%<br>➢ Agro-plants- 22 %<br>➢ Plantation Tree-39% |
| **3** | Different types of Animal | ➢ Mammals -Squirrel, Rat, Free ranging Cat, Free ranging Dog, Field Rat, Bengal Fox etc.<br>➢ Amphibian-Snake, Frogs<br>➢ Birds- Crow, Common Moyna, Pigeon, etc.<br>➢ Insects- Ants, Butterfly, Spider etc. |
| **4** | Biodiversity and Green Management Programme | ➢ Awareness program arrange by- Nature club, Dept. of Geography, Dept. of Botany, Dept. of Zoology and Dept. of B. P. Ed of the college among the students and Stuff through the year<br>➢ Observation and celebration of environmental days<br>➢ Installation of different trees and plants naming plate and numbering the trees. |

## Campus farming

Organic vegetable cultivation as interim crop is another plan to be materialized soon. The department of Zoology has been involving to aqua culture, Geography department planting of Indoor plants and Trees, Botany department has been planting of Medicinal plants and ornaments trees and also students of Hostels have been introducing Kitchen garden. NSS and dept. of Geography have been maintaining the garden throughout the year.

## e) Carbon Footprint-

- Number of Students & Staff using cycles – 660
- Number of persons using cars – 15
- Number of persons uses two wheelers – 70
- Number of students uses Buses - 280
- Number of persons using other transportations – 75
- Number of visitors per day – 25
- Number of Students staying in the hostel –220
- Average distance travelled by stake holders – 50 kms /day
- Expenditure for transportation per person per day – Rs.30/-

## 4.3 SUMMARY:

I. The environmental awareness initiatives are adequate.
II. The College campus is plastic free and maintained the outdoor air quality.

III. The installation of solar panels, organic vegetable cultivation, Bio composting practices are adequate.
IV. There is NSS team and Dept. of Geography of the College towards its environmental performance for Community development.
V. Indoor air quality of the laboratories is very uncomfortable and inhospitable.
VI. Use of notice boards and signs are adequate to reduce over exploitation of natural resources.
VII. Programs on green initiatives have to be increased. Campus is declared "Clean and Green Campus"
VIII. Fully carbon foot prints and wastes free zone actions should be taken to maintain this.
IX. Rain water harvesting and Ground water Recharge systems, solar power generation, Re-use of water and Ground water observation system etc. environmental education programs have to be taken policy for installation.

| **Implemented Air Quality management** | | |
|---|---|---|
| **Sl No** | **Indicator** | **Weightage** |
| 1 | Carbon & Smoke free | H |
| 2 | Exhaust fans &Ventilation | L |
| 3 | Emission of GHGs | M |
| 4 | Indoor Plants | H |

* H denote- Taken management policy level above 60%
** M denote- Taken management policy level 40%-60%
*** L denote-Taken management policy level below 40%

| **Major Audit Observations** | | |
|---|---|---|
| **Sl. No** | **Sectors/Indicators** | weightage |
| 1 | Water efficiency Audit | M |
| 2 | Energy efficiency Audit | M |
| 3 | Air Quality & Carbon foot print Audit | H |
| 4 | Wastes Audit | H |
| 5 | Green & Biodiversity Audit | H |

* H denote- Taken management policy level above 60%
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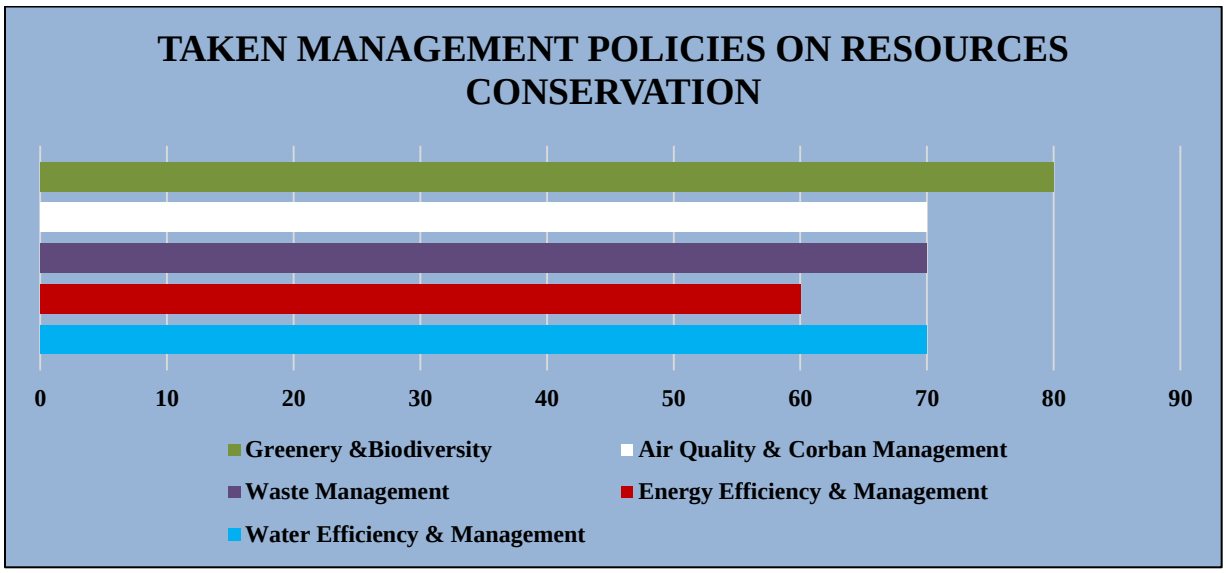
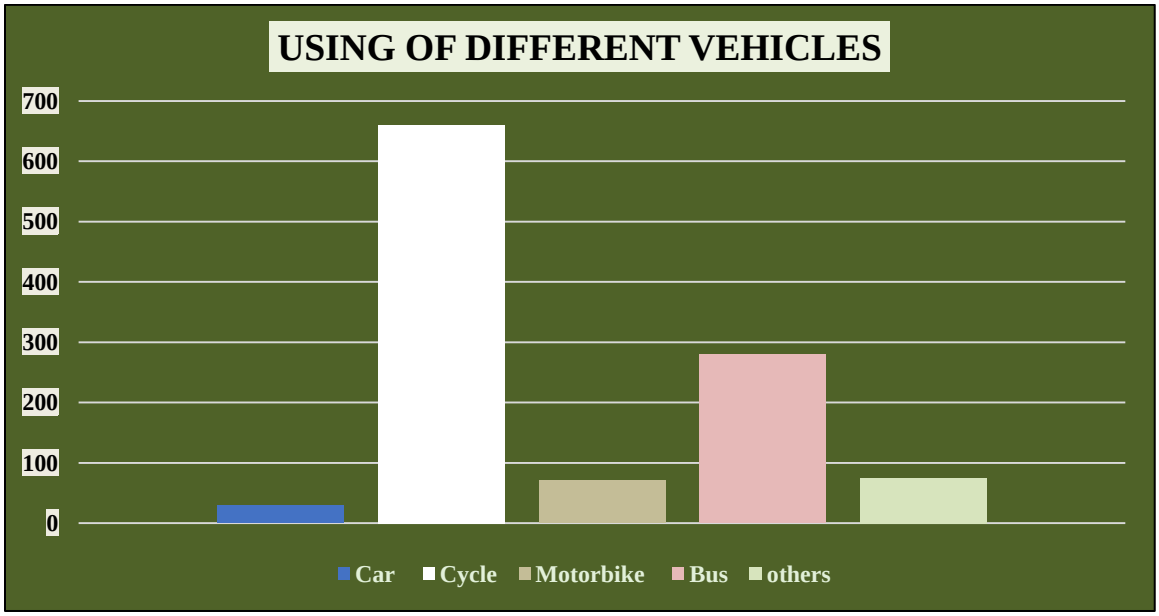



| USING OF DIFFERENT VEHICLES/ WAYS | |
|---|---|
| **Types of Vehicles** | Number of Vehicles |
| **Car** | 30 |
| **Cycle** | 660 |
| **Motorbike** | 70 |
| **Bus** | 280 |
| **others** | 75 |



## 4.4 Environmental Education:

The following environmental education program may be implemented in the College before the next green and environmental auditing:-

- ❖ Setting up Water recycles and Reuse project for Gardening & Drinking water purpose.
- ❖ Setting up of medicinal plant nursery, implementation of micro irrigation technology , organic vegetable cultivation, tree planting around the ground , electric energy management, landscape management programme , and rain water harvesting and water re-use methods.
- ❖ Increase the number of display boards in each building on environmental awareness such as – save water, save electricity, no wastage of food/water, no smoking, switch off light and fan after use, plastic free campus etc.
- ❖ Establish the Nature or Green clubs.
- ❖ Set up Organic vegetable garden, Honey farm, Mushrooms, Indigenous fish farm, Butterfly park, Trees Library , Wall garden, Nursery Hubs etc. for providing proper training to the students and to save of our ecological home.
- ❖ Conduct exhibition and poster competition on Green and Clean campus for sustainable and healthy academic environment.

## 4.5 Common Recommendations

- ✓ Maintain of Indoor air quality in the Staff room, Laboratories, Principal Chamber , IQAC Office and Reading Room.
- ✓ Establish a solar pump house or solar submersible pump
- ✓ Adopt an environmental policy for the college
- ✓ Establish a purchase policy for environmental friendly materials
- ✓ Introduce UGC Environmental Science course to all students
- ✓ Conduct more seminars and group discussions on environmental education
- ✓ Students and staff can be permitted to solve local environmental problems
- ✓ Renovation of cooking system in the hostels to save wooden fuel and air pollution.
- ✓ Installation of modern e-waste management unit
- ✓ Establish the crasser machine for plastic waste treatment
- ✓ Establish a biodiversity park
- ✓ Establish a scientific treatment unit for chemical waste management.

## 4.6 Criteria Wise Recommendations

### Water Audit

- Establish rain water harvesting systems for each building and each campus.
- Establish the more water reuse unit in the Hostel & staff quarter's area.
- Establish water treatment systems.
- Awareness programs on water conservation to be conducted.
- Install the Auto-water lifting panel board to stop of overflow water
- Remove damaged taps and install sensitive taps is possible.
- Drip irrigation for gardens and micro irrigation technology can be initiated.
- Establish the re-use water management methods.

### Energy Audit

- ✓ Employment of more solar panels and other renewable energy sources.
- ✓ Conduct more save energy awareness programs for students and staff.
- ✓ Replace old computers and TVs with LED monitors.
- ✓ More energy efficient fans, tubes and bulb should be replaced.
- ✓ Automatic power switch off systems may be introduced.

### Waste Audit.

- ❖ A model solid waste treatment system to be established.
- ❖ Practice of waste segregation to be initiated.
- ❖ Establish of a unit for chemical liquid wastes and Hazardous waste management
- ❖ A model Vermi composting plant to be set up in the Hostels, canteen and Quarters of college campus.
- ❖ Establish the crasser machine for plastic waste treatment

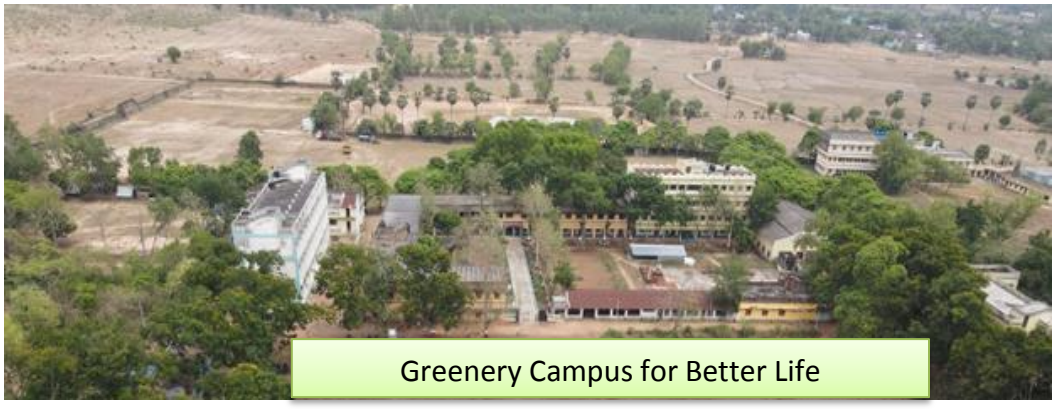
### Green Campus Audit

- ✓ Establish an Orchid ex-situ zone.
- ✓ Develop the Fruits trees area for Birds conservation
- ✓ Grow potted indoor plants at verandah, class rooms and Laboratories.
- ✓ Create automatic drip irrigation system during summer holidays.
- ✓ Not just celebrating environment day but making it a daily habit.
- ✓ Providing funds to nature club for making campus more green
- ✓ Encouraging students not just through words, but through action for making the campus green
- ✓ All trees in the campus should be named scientifically with the help of AI application
- ✓ Establish a biodiversity park
- ✓ Create more space for planting in vacant land.
- ✓ Develop the Herbal and medicinal plants garden for large area
- ✓ Establish a butterfly park.
- ✓ Conducting competitions among departments for making students more interested in making the campus green.

## Carbon footprint Audit

- Establish the indoor plants in Principal chamber, office rooms , Reading room, computer lab and other laboratories to $CO_2$ management
- Providing a college bus services to the students and staff.
- Encourage students and staff to use cycles.
- Establish a more efficient cooking system to stop $CO_2$ emission.

Audit Team with Staff.


Greenery Campus for Better Life

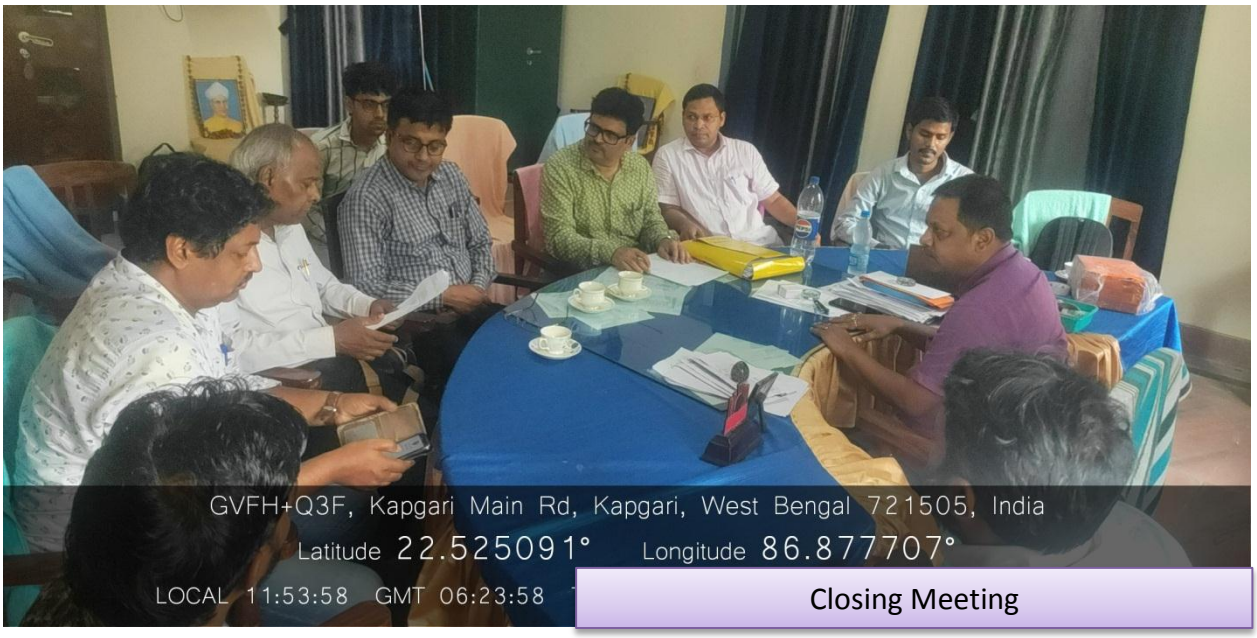

# Executive Summary: 2022-23

Environmental Audit is a process of systematic, documented, periodic and objective evaluation of components of environmental diversity with the aim of safeguarding the environment and natural resources. The process starts with the systematic identification, quantification, recording, reporting and analysis of components of environmental diversity and is a means of assessing environmental performance (Welford, 2002). It aims to analyze environments within and outside of the concerned area, which will have an impact on the eco-friendly atmosphere. Green and Environmental audit is a valuable means for an institution to determine how and where they are using the most resources; the institution can then consider how to implement changes and take necessary management measures. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of green impact on their area of work. Environmental auditing and the implementation of mitigation measures is a win-win situation for the institution, the learners and the planet. It can also create health consciousness and promote to holistic approaches to environmental management, awareness, values and ethics. Green and Environmental auditing promote financial savings through efficiency of resource usage. It gives an opportunity for the development of ownership, personal and social responsibility for the students and teachers. 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. Thus it is imperative that the institute 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.

In Seva Bharati Mahavidyalaya,Jhargram,W.B the audit process involved initial interviews with the teachers and staffs to clarify policies, activities, records and the

cooperation in the implementation of mitigation measures. This was followed by collection of data through the questionnaires, review of records, observation and enquiry of practices and observable outcomes. In addition, the approach ensured that the management and staff are active participants in the Green and Environmental auditing process. The baseline data prepared for the Seva Bharati Mahavidyalaya,Jhargram,W.B will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development. Existing data will allow the College to compare its programmers and operations with those of peer institutions, identify areas in the need of improvement, and prioritize the implementation of future projects.

The area of the College premises is 11.4 acres out of which about 2.80 acres areas is covered by trees, plants etc. and 0.20 acres areas is covered by surface water bodies and micro water bodies . In the present audit report most of the aspects are covered such as tree plantation, awareness about environment programmers, rain water harvesting and plastic free premises. The College has already taken some steps to protect the environment with help of teachers, staff and students under the guidance of Dr. Deba Prasad Sahu, Principal, Seva Bharati Mahavidyalaya, Jhargram, W. B. We expect that the management will be committed to implement the green and environmental audit recommendations. We are happy to submit this green and environmental audit report to the Seva Bharati Mahavidyalaya,Jhargram, W.B.




Closing Meeting