# *Report on Environmental Audit*

**OF**

**GOVERNMENT GENERAL DEGREE COLLEGE SALBONI**

P.O. Bhimpur; District Paschim Medinipur; PIN 721516

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**Environmental Audit Committee**
**Vidyasagar University**
**Midnapore, Paschim Medinipur 721102**

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## (2023-24)

## Environmental Audit Committee,
## Vidyasagar University,

**Midnapore, Paschim Medinipur, 721102**

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# *Content*

# 1. Prologue

Environment is under tremendous stress due to inefficient use of resources, pollution, ecosystem degradation, insufficient expertise and awareness to waste management, climate change and bio-diversity loss. In this perspective environmental regulations and laws are becoming more stringent and compulsory, where it is expected the every organisation and institute (college in this case) shall adopt a systematic approach of environment management with equal importance to environment, societal needs and economy, the three pillars of sustainability. Environment audit is performed to review how efficiently one organisation performs to minimise its environmental impacts and protects environment both within and outside the campus. Organisation (College) must identify its significant environmental aspects and impacts on environment and must put sincere efforts to minimise those impacts in a way to contribute in sustainable development. Environmental Auditing is the process of assessment of institution's practices to examine whether those are ecofriendly and sustainable. Higher Education Institutes (HEIs) should perform to make environmentally sensible citizens through its activities and practices designed in a systematic manner in the line of its strategies, aims and objectives.

# 2. Objective

In the context of unprecedented human impacts on environment and consequent environmental degradation, it is expected that every organisation /institute (college in this case) will display their commitment and accountability towards sustainability in a transparent manner. From this perspective, the main objective to carry out environmental audit is to check whether an organisation or institute designs an Environment Management System (EMS) of its own to address its significant environmental aspects, minimise its impact on environment by systematic planning and planned execution of targets, timely review of performance and continual improvement of existing EMS.

## 3. Government General Degree College Salboni - Institutional context

The college was established in the year 2014. The college premise holds a four-storey building, students' amenity building, electrical power generation station, garden and a large open space. The college possesses a built up area of 4000 sq m, garden of 1200 sq m, grass covered area including playground covering 10100 sq m, open bare land of 4000 sq m, and area under plantation on 800 sq m. College building accommodates 11 academic departments of Bengali, English, Sanskrit, Santali, History, Philosophy, Political Science, Physics, Chemistry and Mathematics. Principal's room, Office and Cashier room, Teaching staff rooms, Library, Seminar room, Laboratories (Mathematics Lab, Physics Lab, Chemistry Lab and S. N. Bose Lab), Adibasi museum, etc.

Table 1: Stakeholders of the college (Data Source: College authority)

| | 2022-23 | | | 2023-24 | | |
|---|---|---|---|---|---|---|
| | **Male** | **Female** | **Total** | **Male** | **Female** | **Total** |
| Students | 516 | 344 | 860 | 382 | 328 | 710 |
| Teaching staff | 26 | 5 | 31 | 26 | 4 | 30 |
| Non-Teaching staff | 8 | 2 | 10 | 9 | 2 | 11 |

## 4. Scope of the Present Environment Audit

Environmental Audit of the Government General Degree College Salboni was done within the following scopes.

a. Whether the college has a sound environmental policy integrated into the priorities and strategic directions of the institute.

b. Whether a systematic plan is formulated to achieve measurable environmental objectives aiming to prevention and mitigation of adverse environmental impacts and enhancing beneficial environmental impacts in tune with environmental policy.

c. Whether commitments from all levels and functions of the organisation including top management are reflected and documented in their activities to

execute the plans for enhancing environmental performances.

d. Whether mechanism is set for periodical review of environmental performance and what measures are taken for continual improvement.

e. Whether effective communications are made about the environmental information to interested parties and stakeholders.

f. Whether documented information on varied aspects of environmental impacts, monitoring and measurement, corrective actions are maintained.

# 5. Environmental Setup of the Institute

## 5.1 Land Use

The College covers an area of 20,234 $m^2$, of which 800 $m^2$ is under plantation,10,100 $m^2$ under grass cover including playground, 4000 $m^2$ under built-up area, 4000 $m^2$ with open bare land and 1200 $m^2$ area under orchard (Figure-1 and 2).


Figure 1: College Campus (Source: College Authority)

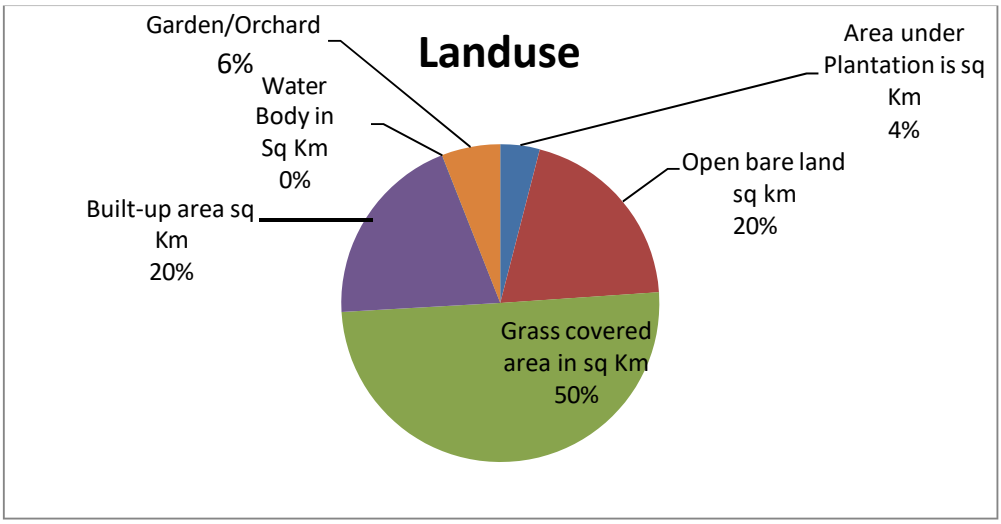


Figure 2: Comparison among the landuses (Source: Based on the data supplied by the college)

## 5.2 Flora and Fauna

Altogether, 127 plants belonging to 19 species are there in the college campus. Among those, 14 species are naturally occurring plants and the rest are planted. 03 species are medicinally important, 06 are fruit plants, palms are of 02 types, 08 are tree species and 03 species are garden plants for beautification. Plants are of different ages. Average age of plants is 06 years. The plants are well maintained in the campus. As plenty of open spaces are there in the college campus, therefore, more fruit and tree species should be planted. The college authority has set set-up a Herbal Garden in recent past. The number of ethno-medicinal plants may be increased in the said garden. For beautification, lotus and water lily may be cultured in front of the gymnasium by using rain water (Fig. 3 and Table 2).


Plate 1: Plants in the college campus (Source: College authority)

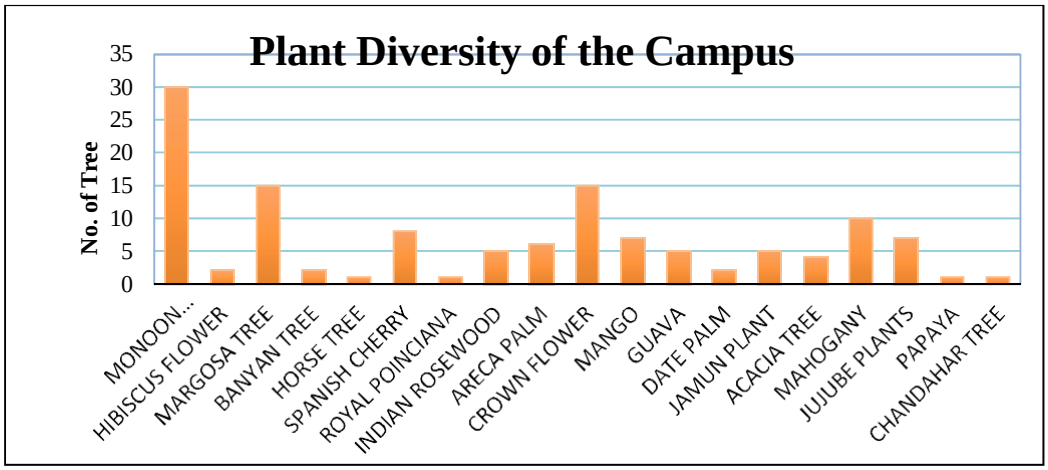


Figure 3: Plant types and their Abundance (Source: Based on the data supplied by the college)

Table 2: Plant Diversity and Abundance (Data Source: Supplied by the College)

| S. No. | Plant name | Scientific Name | Number | Plant Height (Feet) | Age of the plant (Yrs) |
|---|---|---|---|---|---|
| | MONOON LONGIFOLIUM | POLYALTHIA LONGIFOLIA | 30 | 7 | 4 |
| | HIBISCUS FLOWER | HIBISCUS ROSA-SINENSIS | 2 | 5 | 1 |

| | | | | | |
|---|---|---|---|---|---|
| | MARGOSA TREE | AZADIRACHTA INDICA | 15 | | 15 |
| | BANYAN TREE | FICUS BENGHALENSIS | 2 | 30 | 8 |
| | HORSE TREE | FICUS RELIGIOSA | 1 | 25 | 10 |
| | SPANISH CHERRY | MIMUSOPS ELENGI | 8 | 6 | 3 |
| | ROYAL POINCIANA | DELONIX REGIA | 1 | 10 | 3 |
| | INDIAN ROSEWOOD | DALBERGIA SISSOO | 5 | 5 | 1 |
| | ARECA PALM | ARECA CATECHU | 6 | 10 | 5 |
| | CROWN FLOWER | CALOTROPIS GIGANTEA | 15 | 3 | 1 |
| | MANGO | MANGIFERA INDICA | 7 | 35 | 12 |
| | GUAVA | PSIDIUM GUAJAVA | 5 | 20 | 8 |
| | DATE PALM | PHOENIX DACTYLIFERA | 2 | 5 | 3 |
| | JAMUN PLANT | SYZYGIUM CUMINI | 5 | 30 | 7 |
| | ACACIA TREE | ACACIA AURI-CULIFORMIS | 4 | 25 | 3 |
| | MAHOGANY | SWIETENIA MAHAGONI | 10 | 20 | 4 |
| | JUJUBE PLANTS | ZIZIPHUS MAURITIANA | 7 | 7 | 6 |
| | PAPAYA | CARICA PAPAYA | 1 | 16 | 3 |
| | CHANDAHAR TREE | GMELINA ARBOREA | 1 | 25 | 9 |

The campus is home to different species of birds, amphibians, mammals, and reptiles. 8 birds, 4 amphibians, 5 mammals, and 8 reptiles are observed in the campus (Table 3).

Table 3: Animal Diversity and Abundance ( Data Source: Supplied by the College)

| Sl. Number | Fauna Species | Name |
|---|---|---|
| 1 | Amphibian | Agile Frog |
| 2 | Amphibian | Green Frog |
| 3 | Amphibian | Commin Toad |
| 4 | Amphibian | Green Toad |
| 5 | Birds | Barn Swallaw |
| 6 | Birds | Black Kite |
| 7 | Birds | Black Stork |
| 8 | Birds | Blue tit |
| 9 | Birds | Common Nitangale |
| 10 | Birds | Calandra Lark |
| 11 | Birds | Little Owl |
| 12 | Birds | Common Starling |
| 13 | Mammals | Bat |
| 14 | Mammals | Brown Rat |
| 15 | Mammals | Mongoose |
| 16 | Mammals | Forest Dormouse |
| 17 | Mammals | House Mouse |
| 18 | Reptile | Balkan Green Lizard |
| 19 | Reptile | Wall Lizard |
| 20 | Reptile | Grass Snake |
| 21 | Reptile | Russell Viper |
| 22 | Reptile | Sand Boa |
| 23 | Reptile | Slow worm |
| 24 | Reptile | Common Krait |
| 25 | Reptile | Buff striped keelback |

## 5.3 Electricity Use

With the progress of society both energy demand and toxic waste production are increasing. For a sustainable growth proper policies are to be adopted to fulfill the energy demand and control over hazardous wastes.

The grid-electricity supplied by the West Bengal State Electricity Distribution Company Ltd. (WBSEDCL), is primarily utilized in the college. The annual electricity consumptions during last 6 years in the college are:

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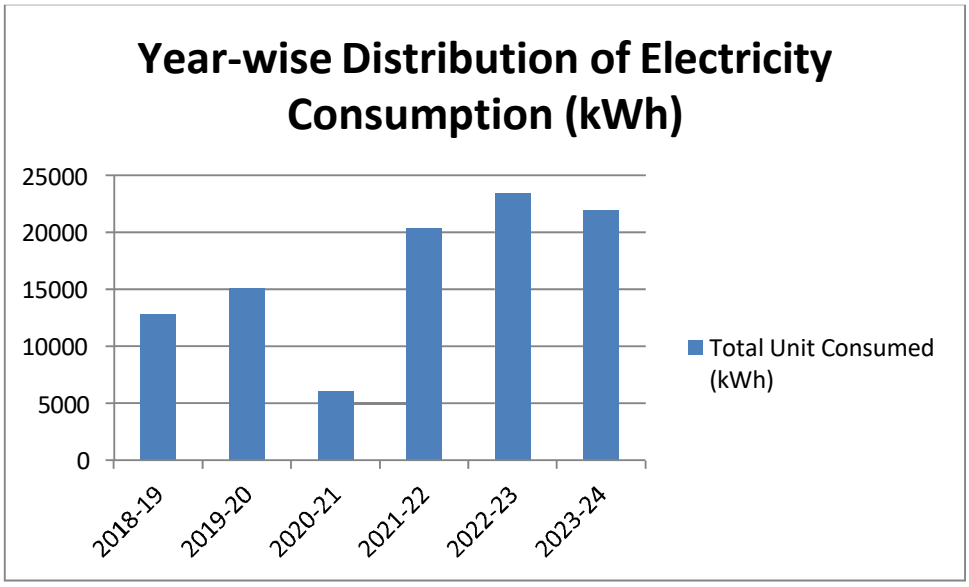



Figure 4: Annual Electricity Consumption (Source: Based on the data supplied by the college)

It shows that the electricity consumption has been increased in the last three years. In the Summer months demand for electricity is high than that of winter (Fig 5)

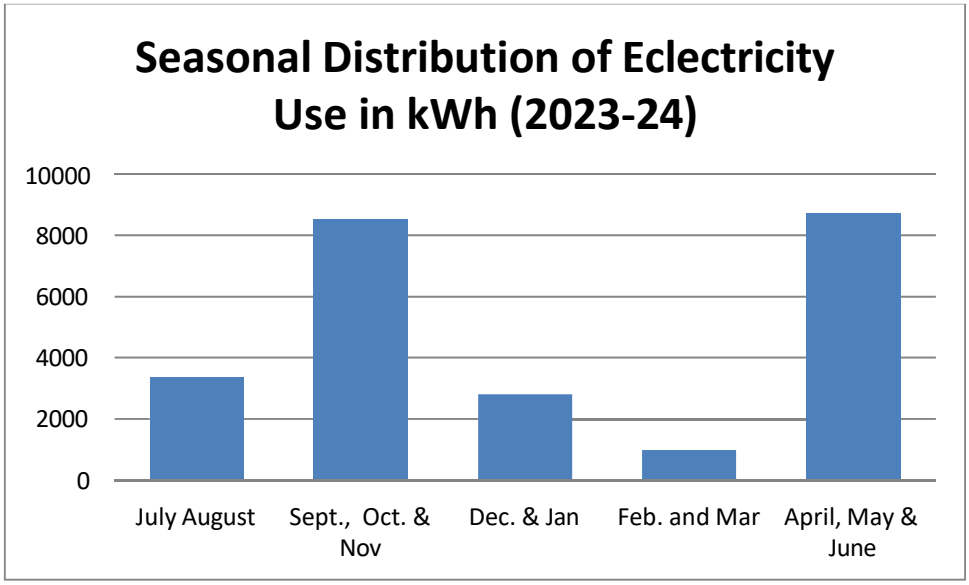



Figure 5: Seasonal Electricity Consumption (Source: Based on the data supplied by the college)

Table 4: Floor-wise electrical loads in the college building

| Floor | Tube light (40 W) | Ceiling fan (75 W) | 1.5t Air conditioner (1800 W) |
|---|---|---|---|
| Ground floor | 130 | 89 | 04 |
| 1st floor | 116 | 87 | 0 |
| 2nd Floor | 118 | 88 | 0 |
| 3rd floor | 179 | 78 | 0 |

It is imperative to reduce the electrical bill of the college. This can be done by:

i) Utilization of natural light and air flow.
ii) A lux meter is to be used for accounting necessary illumination in different rooms, corridor and covered space.
iii) Replacing the 40 W fluorescent tube lights by 20 W LED tube lights.
iv) 9-12 W LED bulbs can be used on the corridors instead of the present tube lights.
v) A low-wattage high speed ceiling fans may be installed phase wise replacing the existing fans.
vi) On the 2nd floor corridor the installed fans may be removed.
vii) The rooms with AC are to be insulated to minimize heat load.
vii) To keep the operating temperature for an AC at 25 $^{o}$C.

The college procured a DG set (Kirloskar) but it is non-functional now due to lack of maintenance and fuel supply. Inverters (Exide) are noticed at Principal's room, Office and Cashier room, Labs, Library and Teaching staff rooms. The present DG set may be used to supply emergency electricity instead of using multiple inverters.

The college has a large open area roof-top at the main building. It is recommended to the college authority to install grid-connected solar photovoltaic (SPV) panels on the roof-top with the assistances from the State and Central Governments. About 50 kWp capacity SPV electricity generation may be possible by utilizing the roof-top. This will appreciably reduce the electricity bill and carbon foot-print.

Applications of electrical and electronic goods have been increased and E-waste is now a serious concern to our society. A maintenance contract for servicing and repairing of electrical and electronic goods can minimize the volume production of e-waste in the college. Presently e-waste in the college is managed by local electric shops. The college authority should take proper step to make an annual contract for maintenance and servicing electrical and electronic products and also to sign an MOU with government authorized vendor to dispose of e-wastes. The science faculty and technical staff members can encourage the students to learn from the discarded instruments before final disposal. A short term course on 'Electrical and Electronic instruments Repairing' can be introduced in the college for the benefit of the students.

## 5.4 Water Use and Management

Government General Degree College Salboni has sufficient facility of water and distribution system. This water resource is used from 09 water coolers and purifiers, 22 wash basins, 25 toilets and 40 urinals and distributed among almost 750 users. Total daily water use is estimated about 33,750 considering a demand of 45L/day/per person (https://cgwa-noc.gov.in/landingpage/Guidlines/NBC2016WatRequirement.pdf)

Table 5: Water Demand, Distribution and Sanitation Facility at Government General Degree College Salboni (Data source: College Authority)

| S. No. | Floor | Wash Basin Numbers | Toilet Number | Urinal Number | Number of Taps | Numbers of Water Purifier and Coolers | Total Number of Users | Total Water Demand in L |
|---|---|---|---|---|---|---|---|---|
| 1 | GROUND FLOOR | 7 | 7 | 10 | 0 | 4 | 750 (Including all floor) | 33,750 |
| 2 | 1ST FLOOR | 5 | 6 | 10 | 0 | 2 | | |
| 3 | 2ND FLOOR | 5 | 6 | 10 | 0 | 3 | | |
| 4 | 3RD FLOOR | 5 | 6 | 10 | 0 | 0 | | |

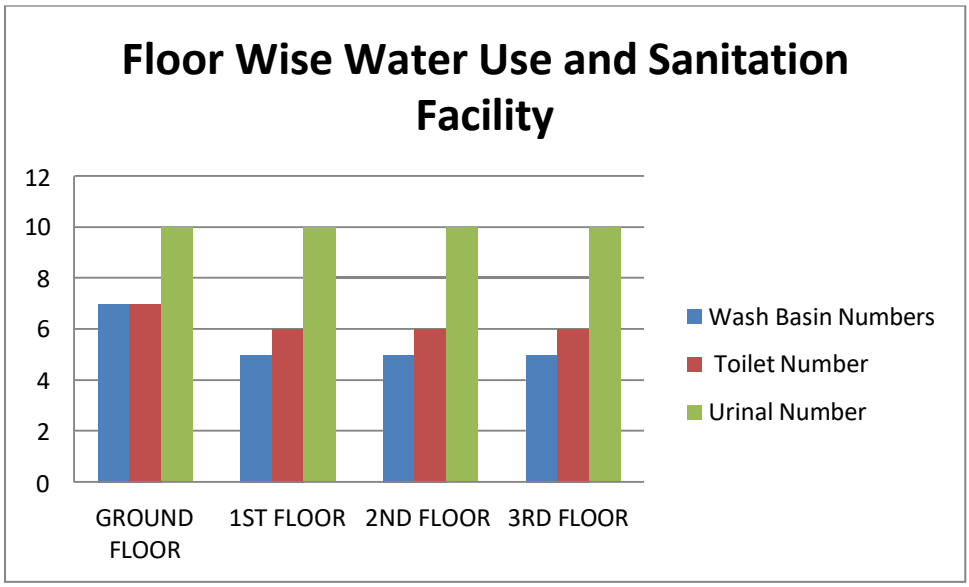



Figure 6: Building-wise distribution of water use and Sanitation Facility (Data source: College Authority)

## 5.5 Waste Management

College has installed different colour bins at required locations for segregation of waste. Scope of developing a standard protocol is there for efficient segregation, and reduce-recycle and reuse of generated solid wastes. Signage and labelling on the protocol for handling, collection and disposal and potential hazards of hazardous waste generated from different laboratories are needed. Instruction as poster highlighting different categories of waste may be placed at proper locations. Initiatives are taken to collect chemical wastes from chemistry laboratory in to a chamber which disposed into a pit where a modification is suggested to avoid risk of leaching into ground water. Extensive use of plastic bottles for consuming drinking water might be replaced by durable metal or glass bottles. Sanitary GI pipes are seriously damaged with a high risk of spreading of gastrointestinal and other infectious diseases. Sanitary napkin incinerator installation is desirable. Washrooms need proper cleaning to avoid dirty and unhygienic situations.

# 6. Within Campus Green Initiatives and Sensitisation Programmes

## 6.1 Rain Water Harvesting System

Government General Degree College Salboni has setup a rain water harvesting system for collection of rooftop rain water via an network of pipes into a tank which is used for gardening. In this way water conservation has been practiced and this imparts awareness on the necessity and mechanism of water harvesting and conservation.


Plate 2: Rainwater Harvesting System in the College Campus (Source: College authority)

## 6.2 Tree Plantation Programme and Celebration of NSS Day on 22.09.2023

Plantation programme was organized on the eve of NSS Day on 22.09.2023. Large numbers of plants were introduced at suitable places of college campus.


Plate 3: Stakeholders participate in plantation programme in the College Campus (Source: College authority)

## 6.3 Campus Cleaning on 13.09.2023

Campus cleaning initiative was taken by the college authority on 13.09.2023, where all the stakeholders especially the students took part voluntarily. It reflects the dedication and attachment of the students towards their college.


Plate 4: NSS volunteers and students are engaged in the Campus Cleaning (Source: College authority)

## 6.4 Awareness on 'Tobacco free campus' on 10.03.2022

On 10.03.2022, college authority organized an awareness programme of tobacco free campus. Teachers made the students aware about the health impacts of tobacco consumption citing examples and photographic as well as scientific evidences. Students took oath not to consume tobacco and to take active role in making people aware about the ill-impacts of tobacco.


Plate 5: Students make anti-tobacco awareness posters (Source: College authority)

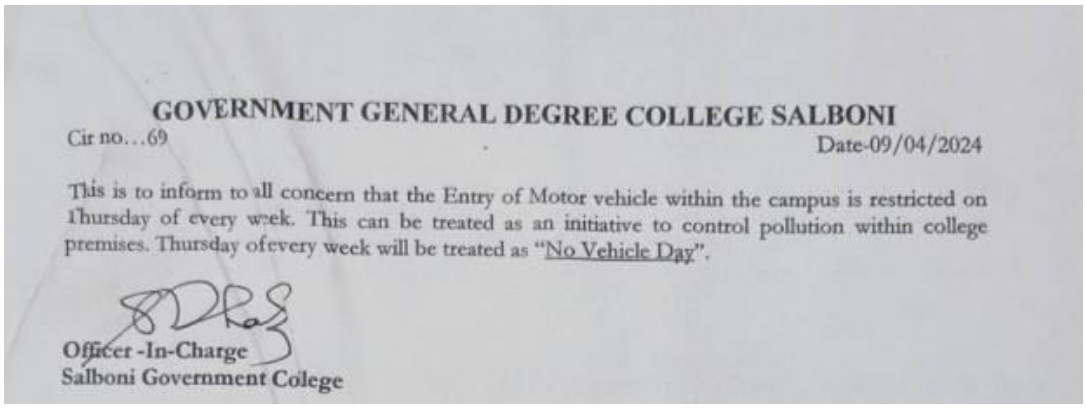
## 6.5 Herbal Garden

At suitable position of the campus a herbal garden is introduced by the college authority with active involvement of the students especially NSS volunteers. Numbers of plants with medicinal properties are selected which are best suited to the local climate and soil.


Plate 5: Students took part in the plantation at herbal garden (Source: College authority)

## 6.6 No Vehicle Day

Since 9th April 2024, every Thursday has been observed as No-vehicle Day. Teachers, staff and students keep their vehicle outside the campus and walk inside the premise. This step became essential in imparting environmental education among the students; they are made aware about their responsibility towards environment.



GOVERNMENT GENERAL DEGREE COLLEGE SALBONI

Cir no…69 Date-09/04/2024

This is to inform to all concern that the Entry of Motor vehicle within the campus is restricted on Thursday of every week. This can be treated as an initiative to control pollution within college premises. Thursday ofevery week will be treated as "No Vehicle Day".

Officer -In-Charge
Salboni Government College

Plate 6: No-vehicle day adoption notice (Source: College authority)


Plate 6: Empty car shade during no-vehicle day (Source: College authority)

## 6.7 Awareness of Plastic-Free Campus on 23.09.2022

A poster rally was organized on 23.09.2022 in the college campus to sensitize all the stakeholders about the potential danger of plastic use. Number of students took part in this rally with much enthusiasm.

Plate 7: Awareness rally on plastic free campus (Source: College authority)


Plate 7: Awareness rally on plastic free environment outside the college (Source: College authority)

## 6.8 Banners Displayed in the Campus for Awareness Generation

At prominent locations of the campus several banners and posters are placed for various instructions on green initiatives. These banners plays directive and instructional roles as well as important roles of awareness generation.




Plate 8: Banners displayed in the campus for green-initiative instructions and awareness generation on different issue (Source: College authority)

## 6.9 Initiatives to Facilitate the Differently Abled Students

College authority took initiatives for constructing ramp and arranged wheel chair for differently abled students.


Plate 9: Initiative to facilitate differently-abled students (Source: College authority)

# 7. Carbon Budget of the College

Carbon budget is estimated by calculation of combined capacity to carbon sequestration against the total carbon emission from different sources. Carbon sequestration is mainly done by plants in biomass and soil in the form of organic carbon. On the other hand, carbon is emitted from electricity consumption, fossil fuel burning during transport, LPG use, water consumption and building material use. In all the cases amount of carbonis transferred into $CO_2$ equivalent by standard factor.

## 7.1 Carbon Sequestration

Table 6: Estimation of Carbon Sequestration by Vegetation per Year (Calculated based on the data supplied by the college)

| Sl. No. | Plant Name | Height of the tree in feet | Circumference of the tree trunk at the breast height in feet | DBH (Diameter at breast height) in feet | DBH (Diameter at breast height) in inches | Green weight of trees above ground | No of trees | Green weight of the trees above ground ($W_1$ | Green weight of the trees below ground ($W_{2)}$ | Total green weight ($T_w$) | Dry weight of the tree ($D_w$) | Weight of the carbon in tree ($W_c$) | Weight of Carbon-di-oxide Sequestration ($W_{cs}$) (Pounds) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MONOON LONGIFOLIUM | 7 | 1.30 | 0.41 | 4.967 | 25.900 | 30 | 777.01 | 155.40 | 932.41 | 675.99 | 317.72 | 1164.85 |
| 2 | HIBISCUS FLOWER | 5 | 0.80 | 0.25 | 3.056 | 7.006 | 2 | 14.01 | 2.80 | 16.81 | 12.19 | 5.73 | 21.01 |
| 3 | MARGOSA TREE | 26 | 1.20 | 0.38 | 4.585 | 81.970 | 15 | 1229.55 | 245.91 | 1475.46 | 1069.71 | 502.76 | 1843.27 |
| 4 | BANYAN TREE | 30 | 0.70 | 0.22 | 2.674 | 32.184 | 2 | 64.37 | 12.87 | 77.24 | 56.00 | 26.32 | 96.50 |
| 5 | HORSE TREE | 26 | 1.60 | 0.51 | 6.113 | 145.724 | 1 | 145.72 | 29.14 | 174.87 | 126.78 | 59.59 | 218.46 |
| 6 | SPANISH CHERRY | 6 | 0.30 | 0.10 | 1.146 | 1.182 | 8 | 9.46 | 1.89 | 11.35 | 8.23 | 3.87 | 14.18 |
| 7 | ROYAL POINCIANA | 10 | 0.40 | 0.13 | 1.528 | 3.503 | 1 | 3.50 | 0.70 | 4.20 | 3.05 | 1.43 | 5.25 |
| 8 | INDIAN ROSEWOOD | 5 | 0.40 | 0.13 | 1.528 | 1.751 | 5 | 8.76 | 1.75 | 10.51 | 7.62 | 3.58 | 13.13 |
| 9 | ARECA PALM | 10 | 0.60 | 0.19 | 2.292 | 7.882 | 6 | 47.29 | 9.46 | 56.75 | 41.14 | 19.34 | 70.90 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | CROWN FLOWER | 3 | 0.30 | 0.10 | 1.146 | 0.591 | 15 | 8.87 | 1.77 | 10.64 | 7.71 | 3.63 | 13.29 |
| 11 | MANGO | 35 | 2.10 | 0.67 | 8.023 | 337.928 | 7 | 2365.50 | 473.10 | 2838.60 | 2057.98 | 967.25 | 3546.24 |
| 12 | GUAVA | 0.7 | | 0.00 | 0.000 | 0.000 | 5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13 | DATE PALM | 5 | 1.5 | 0.48 | 5.731 | 24.630 | 2 | 49.26 | 9.85 | 59.11 | 42.86 | 20.14 | 73.85 |
| 14 | JAMUN PLANT | 30 | 2 | 0.64 | 7.641 | 262.724 | 5 | 1313.62 | 262.72 | 1576.34 | 1142.85 | 537.14 | 1969.31 |
| 15 | ACACIA TREE | 25 | 1.6 | 0.51 | 6.113 | 140.119 | 4 | 560.48 | 112.10 | 672.57 | 487.62 | 229.18 | 840.24 |
| 16 | MAHOGANY | 20 | 1.8 | 0.57 | 6.877 | 141.871 | 10 | 1418.71 | 283.74 | 1702.45 | 1234.28 | 580.11 | 2126.86 |
| 17 | JUJUBE PLANTS | 7 | 0.4 | 0.13 | 1.528 | 2.452 | 7 | 17.16 | 3.43 | 20.60 | 14.93 | 7.02 | 25.73 |
| 18 | PAPAYA | 16 | 0.9 | 0.29 | 3.438 | 28.374 | 1 | 28.37 | 5.67 | 34.05 | 24.69 | 11.60 | 42.54 |
| 19 | CHANDAHAR TREE | 25 | 1.1 | 0.35 | 4.202 | 66.228 | 1 | 66.23 | 13.25 | 79.47 | 57.62 | 27.08 | 99.29 |
| | **Total** | | | | | | **127** | | | | | | **12184.88** |

***Reference:***
Charl De Villiers Sile Chen Chenxing jin Yiner Zhu , (2014),"Carbon sequestered in the trees on a university campus: a case study", Sustainability Accounting, Management and Policy Journal, Vol. 5 Iss 2 pp. 149 -171
http://dx.doi.org/10.1108/SAMPJ-11-2013-0048

Table 7: Estimation of Carbon Sequestration by Vegetation in carbon dioxide equivalent (Calculated based on the data supplied by the college)

| Number of trees | Weight of Carbon Dioxide Sequestration (Pound) | Weight of Carbon Dioxide Sequestration (Kg) |
|---|---|---|
| 127 | **12184.88** | **5527** |

Table 8: Estimation of Carbon Sequestration by Soil per Year (Calculated based on the data supplied by the college)

| Type of the area | Area (meter square) | Soil Organic carbon (%) | Soil Organic Carbon (SOC) ($g/m^2$) | Total Carbon (C) sequestration (kg) | Carbon Dioxide (CO2) sequestration (kg) [ *Pearson et al 2007 https://www.fs.usda.gov/research/treesearch/13292#]* |
|---|---|---|---|---|---|
| **Area under Plantation (Vegetative cover)** | 2000 | 1.1 | 0.357502681 | 0.72 | **2.6241** |
| **Open bare land** | 4000 | 0.5 | 0.162501219 | 0.65 | **2.3855** |
| **Grass covered area** | 10100 | 1.1 | 0.357502681 | 3.61 | **13.2516** |
| **Total** | | | | **4.975787** | **18.26** |

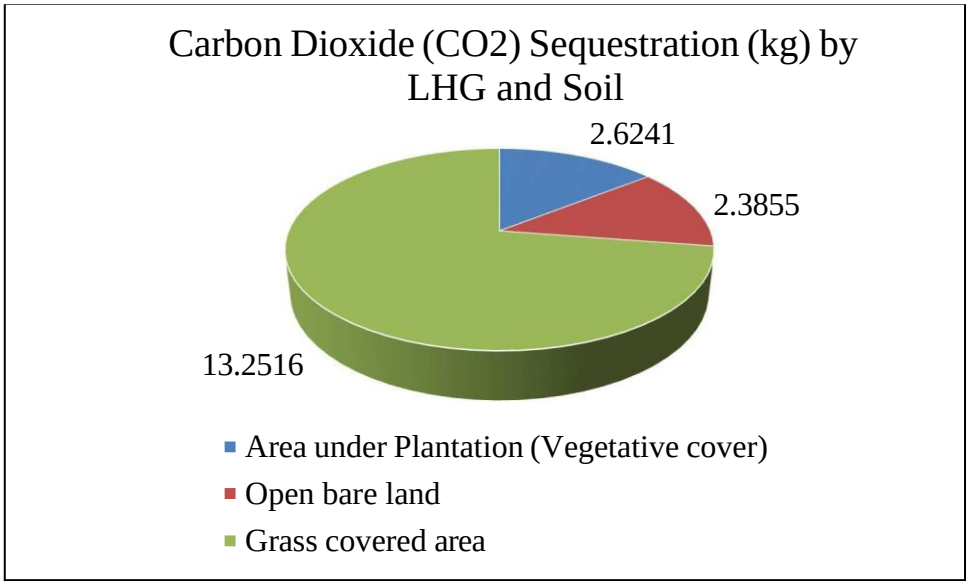



Fig. 7: Relative share of carbon sequestration in different media

## 7.2 Carbon Emission

Table 9: Estimation of Carbon Emission from Electricity Consumption per Year (Calculated based on the data supplied by the college)

| **Electricity Consumption in KWh** | **$CO_2$ Emission/KWh** | **Emission of $CO_2$ in kg/ Year** |
|---|---|---|
| 21953 | **The Emission Factor for Electricity is 0.82 kg CO2/KWh** *https://iitbhu.ac.in/contents/institute/admin/doc/admin_carbon_emissions%20in_co2.pdf* *https://cea.nic.in/wp-content/uploads/baseline/2023/01/Approved_report_emission_2021_22.pdf* | **19099.11** |

Table 10: Estimation of Carbon Emission from LPG Consumption per Year (Calculated based on the data supplied by the college)

| **Component** | **Uses** | **Consumption of LPG Cylinder / Year** | **CO2 Emission Factor in kg/ LPG (IPCC, 4, APRIL 2014) https://ghgprotocol.org/sites/default/files/Emission Factors_from_Cross_Sector_Tools_March_20 17.xlsx** | **$CO_2$ Emission/Year** |
|---|---|---|---|---|
| LPG (14.2) | Laboratories | 4 | 6.1 | 346.48 |
| **Total** | | | | **346.48** |

Table 11 : Estimation of Carbon Emission from Fuel Consumption per Year (Calculated based on the data supplied by the college)

| **Component** | **Type of Fuel** | **Consumption of Fuel/ Year** | **Emission factor of Petrol/ Diesel in Kg CO2 /litter *https://shaktifoundation.in/wp-content/uploads/2017/06/WRI-2015-India-Specific-Road-Transport-Emission-Factors.pdf*** | **$CO_2$ Emission/Year** |
|---|---|---|---|---|
| Car | Petrol | 4800 | 2.27 | 10896 |
| Bike | Petrol | 1920 | 2.27 | 4358.4 |
| Bus | Diesel | 5604 | 2.64 | 14794.56 |
| **Total** | | | | **35067.6** |

Table 12: Estimation of Carbon Emission from Water Consumption per Year (Calculated based on the data supplied by the college)

| Type of User | Number of users | Per capita Water Consumption (Liter/Day) https://cgwa-noc.gov.in/landingpage/Guidlines/NBC2016WatRequirement.pdf | Water Consumption in a day (Litter) | Water Consumption/Liter/ 204 Day | Emission factor of Water https://www.researchgate.net/figure/Calculation-boundary-for- CO-2-emission-factor-of- water_fig.2_276044385 | Liter to $m^3$ | Emission of kg CO2 from Water |
|---|---|---|---|---|---|---|---|
| **Without boarding facilities** | 750 | 45 | 33750 | 6885000 | 0.59 kg $CO_2$/ $m^3$ | 6885 | **4062.15** |

Table 13: Carbon Budget of the College (2023-24)

| **Carbon Sequestration (CO2 in Kg)** | | **Carbon Emission (CO2 in Kg)** | | | |
|---|---|---|---|---|---|
| **Plant** | **Soil** | **Electricity** | **Fuel (Transport)** | **LPG** | **Water** |
| 5527 | 18.26 | 19099.11 | 35067.6 | 346.48 | 4026.15 |
| | | | | | |
| Total Sequestration- 5545.26kg/ year | | Total Emission- 58539.34 kg/year | | | |
| **Carbon Budget- 52994.08 (-ve )** | | | | | |

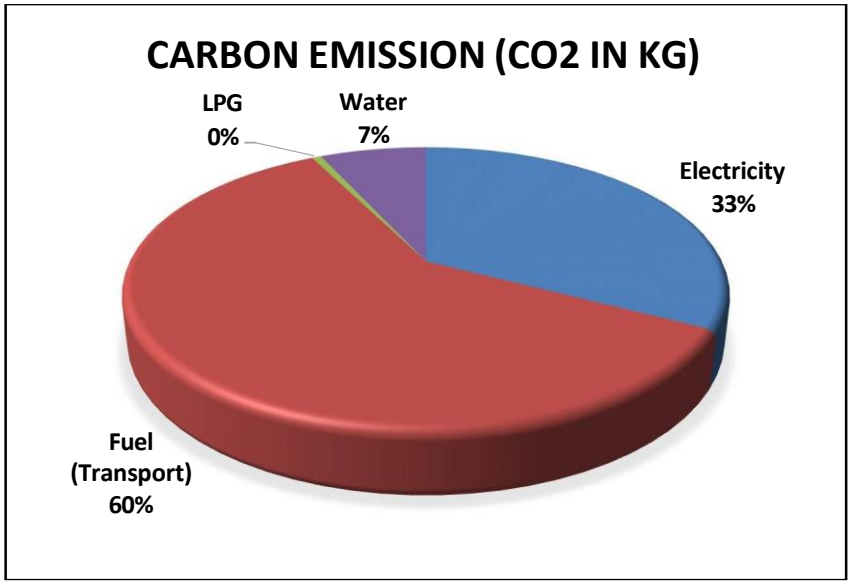



Figure 8: Relative share of carbon emission

## 8. Best Practices

1. College took initiative in ***chemical waste management*** generating fro laboratories.
2. College has organized a number of environment-related activities round the year involving all the stakeholders both within and outside the campus. It incudes

- ***Plantation drive*** involving students, teachers and staffs
- Awareness program for the necessity of ***plastic free campus***
- Raising awareness for ***tobacco free society***

3. College took initiative in setting up of ***rainwater harvesting*** facility in the college premise.
4. Wall magazine and notice board includes numerous ***environment related posters***.
5. Instructions and signage on ***resource (water) conservation and energy savings*** are placed at prominent locations.
6. One ***herbal garden*** is setup by the college with direct involvement of all stakeholders.

7. Every Thursday is as ***No Vehicle Day***, when no vehicle is allowed in the campus. The entire stakeholder walks within the campus for the sake of environment. It is a praiseworthy way to impart environmental education.
8. Initiative to showcase local tribal culture and society through a ***museum*** is praiseworthy effort.
9. Initiatives are taken for facilitating differently abled students.

# 9.Recommendations

## 9.1 Strategic Recommendations

1. College should design, implement, and maintain an Environment Management System (EMS) to address its significant environmental aspects, minimise its impact on environment by systematic planning and planned execution of targets, timely review of performance and continual improvement of existing EMS.
2. A systematic plan is to be formulated to achieve measurable environmental objectives aiming to prevention and mitigation of adverse environmental impacts andenhancing beneficial environmental impacts in tune with environmental policy.
3. Commitments from all levels and functions of the organisation including top management should be reflected and documented in their activities to execute the plans for enhancing environmental performances.
4. A mechanism must be set for periodical review of environmental performance and measures will be taken for continual improvement.
5. Effective communications should be made about the environmental information to interested parties and stakeholders either via electronic media or printed version.

## 9.2 Specific Recommendations:

1. College should adopt a targeted plan for reducing resource consumption.
2. Initiatives are to be taken to ensure the implementation of standard procedure ofwaste disposal, processing, recycling etc.
3. Installation of sanitary napkin incinerator is desirable.
4. College may introduce vermicomposting in the backyard.
5. Chemical waste management system needs to be modified with a provision of primary and secondary clarifier before allowing the discharge to percolate down the ground.
6. Steps may be taken to initiate roof top rain water harvesting in the tank in front of students' amenity Centre and scope for water lily plantation may be explored.
7. Repairing and up gradation of lights and fans are required for ensuring efficient energy use.
8. All the existing fire-extinguishers are to be refilled and made operational. Hands-on training on the use of these are required for fire safety.
9. Solar power panels may be installed on the extensive roofs of the college to encourage alternate energy initiative and for achieving a target of zero-carbon emission. Use of fans in the corridor may be controlled for electricity conservation.
10. Centralized generator system may be installed for efficient power backup to class room and laboratories.
11. Replacement of the 40 W fluorescent tube lights by 20 W LED tube lights is highly suggested.
12. 9-12 W LED bulbs can be used on the corridors instead of the present tube lights.
13. A low-wattage high speed ceiling fans may be installed phase wise replacing the existing fans.
14. On the 2nd floor corridor the installed fans may be removed.

15. Scopes are there for cleaning the campus and controlling weeds.

16. Waste water pipes may be improved from cast-iron type to PVC type to restrict leakage and pollution.

17. Water leakage through windows in the laboratories may be controlled.

18. Broken doors and windows are to be repaired with priority.

19. Initiative may be taken for biodiversity documentation with in the campus.

20. Entrepreneurship programs of certificate course may be introduced on honey harvesting considering the location of the college at the fringe of a forest and natural abundance of honey beehives.

21. Scopes of improving tribal museum may be explored.

# Observation during on-site Visit


Plate 10: Environment Audit team in the college campus (Source: Dr. Priyanka Halder Mallick)


Plate 11: Environment Audit team during meeting with top-management of the college (Source: Dr. Priyanka Halder Mallick)

Plate 12: Fruit plants in the campus- Guava, Mango, jackfruit, berries, etc. (Source: Dr. Priyanka Halder Mallick)

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Figure 13: Butterflies, insects with their host plants including weeds
(Source: Dr. Priyanka Halder Mallick)


Plate 14: Prospect of composting unit is explored for proper waste management
(Source: Dr. Priyanka Halder Mallick)


Plate 15: Safe drinking water facility (Source: Dr. Priyanka Halder Mallick)


Plate 16: Audit team members inspect out-door environment of the college (Source: Dr. Priyanka Halder Mallick)


Plate 17: Sanitary pipes are damaged (Source: Dr. Priyanka Halder Mallick)


Plate 18: A large green playground perfect for students' sports and open activities (Source: Dr. Priyanka Halder Mallick)


Plate 19: Signage for environmental awareness (Source: Dr. Priyanka Halder Mallick)


Plate 20: Expansive class room (Source: Dr. Priyanka Halder Mallick)


Plate 21: The vast terrace of college has high potential for Solar panel installation (Source: Dr. Priyanka Halder Mallick)


Plate 22: Visit to Physics Laboratory (Source: Dr. Priyanka Halder Mallick)


Plate 23: Colorful charts to enhance interest of students in Chemistry (Source: Dr. Priyanka Halder Mallick)


Plate 24: Wall posters in the class room (Source: Dr. Priyanka Halder Mallick)


Plate 25: Innovative Tribal Museum (Source: Dr. Priyanka Halder Mallick)


Plate 26: Closing meeting with all stakeholders of the college (Source: Dr. Priyanka

Halder Mallick)


Plate 27: Stakeholders of the college present in the closing meeting with all (Source: Dr. Priyanka Halder Mallick)


Plate 28: College is blessed to be located amidst minimal pollution zone with perfectly green environment and beautiful landscape (Source: Dr. Priyanka Halder Mallick)

## Signature


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