



“ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षणप्रसार” – शिक्षणमहर्षी डॉ. बापूजी साळुंखे

Shri Swami Vivekanand Shikshan Sanstha, Kolhapur's

PADMABHUSHAN DR. VASANTODADA PATIL MAHAVIDYALAYA

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● **Affiliated to Shivaji University, Kolhapur** ●

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▶ Established Year : June 1962 ▶ P. B. No. : 14 ▶ Jr. College No. : J22-10-001 ▶ Sr. College Code No. : $\frac{SI/AC/4}{X}$ Jr.: C-8



NAAC Reaccredited 'B⁺⁺' (2.76)

ISO Certified : 9001:2015

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Criterion VII

Institutional Values and Best Practices

7.1.4

Water conservation facilities

For Photos

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Green and Environmental Audit Report



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QUALITY MANAGEMENT SYSTEM



NAAC Accredited "B++" Grade
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Estd. : June 1962

"ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार"

- शिक्षणमहर्षी डॉ. बापुजी साळुंखे

Shri Swami Vivekanand Shikshan Sanstha Kolhapur Sanchlit,

PADMABHUSHAN DR. VASANTRAODADA PATIL MAHAVIDYALAYA, TASGAON

Submitted to
Internal Quality Assurance Cell (IQAC)

12 AUGUST 2021

Company Name:

D S Energy Consultancy and Services, Sangli

Authored by:

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We are also thankful to other staff and office members who were actively involved while collecting the data and conducting field measurements.



DS
12/08/21

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DISCLAIMER

Green Audit Team has prepared this report for Shri Swami Vivekanand Shikshan Sanstha Kolhapur Sanchalit, Padmabhushan Dr. Vasantrodada Patil Mahavidyalaya, Tasgaon based on input data submitted by the representatives of College complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the calculations are arrived flowing best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

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EXECUTIVE SUMMERY

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the green campus for the institute which will lead for sustainable development. In accordance with the Green Campus Evaluation Plan, as suggested by the Internal Quality Assessment Cell (IQAC) of the college, Shri Swami Vivekanand Shikshan Sanstha Kolhapur Sanchalit, PADMABHUSHAN DR. VASANTRAODADA PATIL MAHAVIDYALAYA, TASGAON planned for conducting a green audit of the college in April, 2021. After the field work and other formalities, the report was finally sent for approval to the authority (Principal and IQAC) in September 2021.

The purpose of the audit was to make sure that the practices followed in the campus are healthy and environment friendly. With this in mind, the specific objectives of the audit were to evaluate the degree to which the Departments are in compliance with the applicable regulations, policies and standards and to ensure that the development of the college aims at sustainable development and green campus. It works on several facets of green campus including water conservation, Electricity conservation, Tree plantation, Waste management, paperless work, Mapping of biodiversity. The methodology used included physical inspection of the campus and review of the relevant documentation. It can make tremendous impact on students' health and learning, college operational cost and the environment.

INTRODUCTION

Environmental audit or Green Audit is a systematic, documented, periodic and objective review by regulated entities of facility operations and practices related to meeting environmental requirements (EPA, 2003). In other words, it is a management tool comprising systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with company policies which would include regulatory requirements and standards applicable. (International Chamber of Commerce, 1989)

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organizations of all kinds now recognize the importance of environmental matters and accept that their environmental performance will be scrutinized by a wide range of interested parties. Environmental auditing is used to investigate, understand and identify opportunities for better green campus.

Utility of Green Auditing

These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment. An environmental auditor will study an organization's environmental effects in a systematic and documented manner and will produce an environmental audit report.

STATEMENT OF ASSURANCE

This audit already has been conducted in 2018-19 for the first time in the college. This green audit 2020-21 is mainly to check the implementation of energy conservation techniques which are suggested in previous green Audit Report 2018-19. Since last two years college has been trying to fulfill recommendations. The audit procedure tried to meet the terms of International Standards of Internal Auditing. In our decision, sufficient and appropriate audit procedures were completed and evidence gathered to support the precision of the conclusions reached and contained in this report. The conclusions are based on a comparison of the situations as they existed at the time of the audit.

SUMMARY OF FINDINGS

The main findings of the audit show that, in general, all the departments and students are aware about the need for environmental protection at a general level. It was also observed that a number of best practices such as maintaining garden, green plantation (Mulberry Plantation) in the campus, Vermi-composting to ensure a proper waste management technique, Rain water harvesting to ,Implement better water management technique etc. are followed in the campus. However, on detailed review, it was observed that, as the college is implementing Green Campus Policy for the first time, many of the practices followed in the institution are still in nascent stage and needs further nurture. In addition, certain processes could benefit from further review in order to improve their efficiency, fairness and consistency.

OBJECTIVES AND SCOPE

The main objectives of the green audit are to promote the environment management and conservation in the college campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of environment sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out green audit are

- ✚ To introduce and make aware students to real concerns of environment and its Sustainability
- ✚ To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus
- ✚ To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections require high cost.
- ✚ To bring out present status report on environmental compliance.

ABOUT COLLEGE

Shri Swami Vivekanand Shikshan Sanstha Kolhapur Sanchalit, Padmabhushan Dr. Vasantrodada Patil Mahavidyalaya, Tasgaon was established on June 1962. The college is situated in a culturally rich locale, on the Sangli- Tasgaon Road, Tasgaon. It was founded by Shikshanmaharshi Dr. Bapuji Salunkhe with the aim of spreading education in rural area. Gradually the college gained eminence, not only from Tasgaon but also from nearby places.

Shri Swami Vivekanand Shikshan Sanstha Kolhapur Sanchalit, Padmabhushan Dr. Vasantrodada Patil Mahavidyalaya, Tasgaon is a NAAC (B++ Grade) and 56 years old college having Three streams- Arts, Commerce, Science and computer applications. This is a government aided UGC-approved and NCTE recognized college affiliated by the Shivaji University. The college is situated on a beautiful campus of 11 acres inside. The college building is located in a rural backdrop amidst lush green surroundings. The college has academic buildings and 1 hostel building. The college has an intention to adopt the 'Green Campus' system for environmental conservation and sustainability.

The goal is to reduce CO₂ emission, energy and water usage, while creating an environmentally literate campus where students can learn the idea of protection of environment and stay healthy. The 'Green Campus' has been a very new concept adopted by this college. The college administration is still working on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, carbon footprints and Alternative Energy.

AUDIT GOALS OF THE COLLEGE

The college, with the advice of the Internal Quality Assessment Cell (IQAC) has set up an environmental quality assessment body (GREENCAMPUS) that aimed at performing the green audit of the institution. The main objectives of the audit are:

- 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
- Recognize the cost saving methods through waste minimizing and managing
- Point out the prevailing and forthcoming complications
- Impart environmental education through systematic environmental management approach and Benchmarking for environmental protection
- Financial savings through a reduction in resource use
- Enhancement of college profile

METHODOLOGY

The Green Audit taken up by the Padmabhushan Dr. Vasantodada Patil Mahavidyalaya, Tasgaon had been divided into three stages:

The Pre Audit Stage:

In the pre-audit stage, meetings provide an opportunity to support the capacity and objectives of the audit and enable discussions on the feasibility associated with the audit. The meeting provides the first opportunity to meet the audit and deal with several practical knowledge and concerns. The meeting provided the chance to gather information that the audit team can study before arriving on the site. The audit procedure and audit plan was handed over at this meeting and discussed in advance of the audit itself. In Padmabhushan Dr. Vasantodada Patil Mahavidyalaya, Tasgaon, the planning of audit processes was discussed in the pre-audit meeting. Audit team was also selected in this meeting with the help of staff and the college management. The audit protocol and audit plan were handed over at this meeting and discussed in advance of the audit itself.

The Management of the college has shown the commitment towards the green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees on the campus, etc., after the green auditing. The management of the college was willing to formulate policies based on green auditing report.

The Audit Stage:

The Audit Stage encompasses of the team selection and the field works performed. Looking after the unique structure, location and ambiance of the college, the Green Audit Team focused on Material Issues pertaining to college which have the highest influence on the Green Attributes of the College. The Audit stage also focused on the Methodology adopted. Checklist approach is adopted for transparent evaluation of the topics and increase readability for independent reader.

The Post Audit Stage:

The post-audit stage ensures formulation of Draft findings and sent to management response. Since the audit is done internally, it was important to ensure management approval for the draft. After getting draft approval, the audit team went for final report formulation.

The methodology adopted to conduct the Green Audit of the Institution had the following components.

Onsite Visit :

The Green Audit Assessment Team started the audit at the Institution on (write date) which extended for about 3 days. Greenhouse gas emissions and carbon footprint reduction through adoption of green energy and energy-efficient measures were assessed. The key focus was on assessing the status of the green cover of the Institution.

Focus Group Discussion :

The Focus Group included staff members and management people. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional, district, national and global level. The discussion evolved around three key

questions: Do the members of the group consider themselves eco-conscious? Do they consider the Institution to be eco-friendly? What do they think are the issues that need to be given top priority?

Office/Building Survey :

Information on office-based environmental impacts like built-up area, utility bills, energy-saving devices and IT equipment was collected. This information was added to the carbon footprint data, generating a fairly clearer picture of the Institution's annual greenhouse gas emissions and impact of the reduction measures undertaken.

Carbon Footprint :

- ✚ Data collected from the following sources were taken into consideration to calculate carbon footprint emission and reduction. The floristic richness of the campus – total number of plants, trees, shrubs – was estimated. The impact of alternate green energy production and consumption to reduce fossil fuel-based energy was assessed, e.g. the number of CFL, LED, tube lights and electronic chokes was counted. The Carbon Footprint Calculator was used to arrive at conclusions.
- ✚ Carbon Footprint Calculator enables the measurement of carbon emission by the Institution. Besides, by breaking down the value to key 'carbon drivers', the institution can know how much of carbon footprint comes from which type of behaviour (high power-consuming incandescent bulbs vs. LED lights, solid waste management, etc.).

AUDIT FRAMEWORK AND DETAILED FINDINGS

The following audit framework is used for conducting Green Audit in 2020-21. The framework also lists the findings and observations for every criterion.

A] WATER MANAGEMENT:

I) Rain Water Harvesting:

The **Rainwater harvesting** is the simple collection or storing of **water** through scientific techniques from the areas where the **rain** falls. It involves utilization of **rain water** for the domestic or the agricultural purpose.

In the campus, roof runoff water is collected through network of pipelines and stored in the tank. The total capacity of storage is 144 cubic meters. The remaining roof runoff water is allowed to infiltrate in the ground for recharge. The stored water is used for gardening and washing of vehicles.

This practice has solved the problem of deficiency of water and ground level of water has increased. The stored water is supplementary for the gardening and washing vehicles.

Water Harvesting Capacity of PDVP Campus:

Terrace Area (water collecting surface): 837 Sq. meters

Area m ²	Average Depth of rainfall (m)	Volume of Runoff (m ³)	30% losses	Total quantity (m ³)
837	0.4	334.8	100.44	234.36

Total quantity of Runoff = 234.36 cubic meters

Storage tank for rainwater harvesting = 144 cubic meters

The available total capacity of harvesting in campus = 90.36 cubic meters

Audit Observations:

- ✚ Regular checking and maintenance of pipelines are done to control water wastage.
- ✚ Water pipelines are arranged properly to collect the rain water from terrace to storage tank on ground.
- ✚ Proper cleanliness has maintained around the water storage area.
- ✚ No Water recycle Mechanism is adopted



Recommendations:

- ✚ It is recommended to construct secondary water storage tank for excess water collecting.
- ✚ Use of cover plate or any covering material on water area will be helpful for cleanliness.
- ✚ Use an efficient and hygienic water storage mechanism to minimize the loss of water during storage
- ✚ Encourage to decrease excess water usage.
- ✚ Install water recycling mechanism.

II) Water distribution system: Borewell

Underground water is one of the important sources of water in urban areas. With increasing urbanization, underground water has indiscriminately exploited causing depletion in water table and water availability. To reduce the effect of over exploitation, ground water discharge need to be taken up in large scale at residential and institutional buildings.

College has used rainwater from the roof and allowed to flow through filters and recharge ground water from bore well. During heavy rainfall, water level in well raises and subsequently descends to maintain the ground water level. Total terrace area for ground recharge is 570 sq. meter.



Audit Observations:

- ✚ the college has 3 aqua guard filters installed in all departments.



- ✚ Though water is used nominal in the college, but to ensure a further minimal rate, placards and warnings are set up in the college premise.
- ✚ Campus has efficient plumbing system from maintenance and operation point.
- ✚ Drip irrigation (this refers to plant watering system) is observed in campus to minimize wastage of water.



Recommendations:

- ✚ It is recommended to use aerators to water taps, automatic toilet faucets and dual flush toilet with cistern.
- ✚ Use of low flow/ flow control water equipment or gadget.
- ✚ Water distribution diagram/ water network/ water balance diagram would be useful for monitoring and reducing water consumption.
- ✚ Sewage treatment plant for treated sewage recycle would be useful for recycling water after treatment.

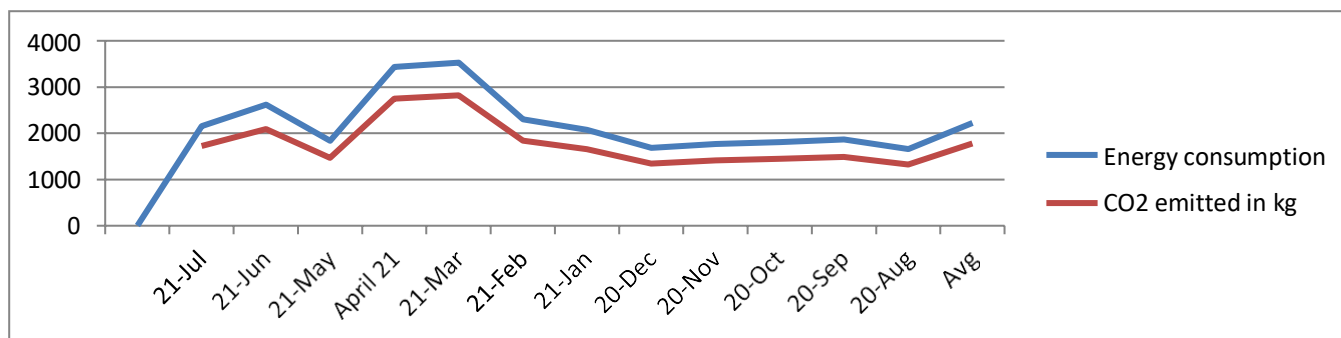
B] ENERGY MANAGEMENT

CARBON-DI-OXIDE EMISSION

For consumption of 1 Unit (1 kWh) of Electricity, the CO₂ emitted is 0.8 Kg. OR the Emission is 0.8 Kg/kWh. In the following Table we present the total units consumed and CO₂ emitted asunder:

Sr.No	month	Energy consumption (kWh)	CO ₂ emitted in kg
1	July 21	2153	1722.4
2	June 21	2615	2092
3	May 21	1832	1465.6
4	April 21	3436	2748.8
5	March 21	3525	2820
6	Feb 21	2301	1840.8
7	Jan 21	2071	1656.8
8	Dec 20	1680	1344
9	Nov 20	1763	1410.4
10	Oct 20	1805	1444
11	Sept 20	1861	1488.8
12	August 20	1655	1324
	Avg	2224.75	1779.8

Chart: Monthly CO₂ Variation



a) Audit Observations:



Hybrid (Solar with wind miles) energy generation system is available in college campus. The device has rated power 2KW.

Assuming total working hours -4 hours

Total kWh or units energy obtained from renewable source is 8 kWh

- ✚ The college also has 1 ecofriendly generator for the supply of emergency electricity to save our ecosystem.
- ✚ The college is planning for introduction of SOLAR PANNELS.
- ✚ The college is using LED lights as expected.
- ✚ College ensures that all electronic and electrical equipment, such as computers, are switched off when not in use and is generally configured in power saving mode when such option is available
- ✚ The college tries to put the main switch off when there is no need of electricity.

b) Recommendation:

- ✚ Appreciate that it is preferable to purchase electricity from a company that invests in new sources of renewable and carbon-neutral electricity
- ✚ Look in to the possibility of on-site micro-generation of renewable electricity.
- ✚ Give preference to the most energy efficient and environmentally sound appliances available, this includes only using energy-saving light bulbs
- ✚ Encourage staff, students and conference guests to save energy through visible reminders, incentives and information to increase awareness. This particularly concerns turning off electrical appliances when not in use.

C] GREEN CAMPUS



The Carbon Audit tools and analysis methodology were developed collectively by the Green Audit Team and based on that the audit was conducted in three major thematic areas. Carbon footprint is historically defined as the total set of greenhouse gas emissions caused by an individual, event, organization or product, expressed as carbon dioxide equivalent. Collected data at college campus is given below.

Sr.No.	Type of trees	No. of trees/ area
1	Full grown trees	300
2	Semi grown trees	800
3	Bushes	500
4	lawn	60X30

A] Tools to measure Carbon Absorption:

Assumptions

1. Number of mature trees in 1 acre = 700
2. Carbon absorption capacity of 700 trees is equivalent to carbon emitted by a speeding car for 26,000 miles
3. 26,000 miles = 41,843 km
4. Average kilometers covered by a car per litre of petrol is 20 km
5. Total quantity of petrol consumed by the car $(41,843/20) = 2092$ litres

✚ The carbon emitted by a car due to consumption of 1 litre of petrol is 2.3 kg CO₂.

At this rate the total quantity of carbon emitted by 2092 litres of petrol $(2092 \times 2.3 \text{ kg}) = 4812 \text{ kg CO}_2$ or 4.8 tonnes of CO₂.

Therefore, the carbon absorption of one full-grown tree is $4812/700 = 6.8 \text{ kg CO}_2$.

The footprint calculation is based on the standard unit of 1 litre petrol = 2.3 kg CO₂.

1. Carbon absorption capacity of one full-grown tree = 6.8 kg CO₂.
2. Therefore the carbon absorption capacity of 300 full-grown trees in the campus of the Institution

$$(300 \times 6.8 \text{ kg CO}_2) = 2040 \text{ kg of CO}_2.$$

3. The carbon absorption capacity of 120 semi-grown trees is 50% of that of full grown trees. Hence, the carbon absorption

$$(800 \times 3.4 \text{ kg CO}_2) = 2720 \text{ Kg of CO}_2.$$

4. There are 500 bushes of various species being raised in the gardens of the Institution.

Carbon absorption of bush plants varies widely according to the species. Certain bushes absorb as high as 49,000 g CO₂ per plant, whereas some others absorb as low as 150 g CO₂ per plant. In the absence of a detailed scientific study and botanical survey, the per-plant carbon absorption was assumed to be 200 g (in consultation with environment scientists).

Based on this, the total carbon absorption of 500 plants was calculated to be

$$500 \times 200 \text{ g} = 100000 \text{ g or } 100\text{kg} .$$

5. College has lawn around 60 X 30 Sq.m. Buffalo variegated grass, Mexican grass and indigenous grass species are being raised and maintained in the lawn.

The total area of the lawn is 1800 sq.m. i.e. 19375 Sq.ft the carbon absorption capacity of a 10 sq.ft. area of lawn is 1g CO₂.

Hence, for 19375 sq.ft. of lawn absorbs 1937.5g or 2kg CO₂ per day.

At this rate, the total carbon absorption per year

$$(2\text{kg} \times 365) = 730 \text{ kg}$$

Sr No.	Type of trees	No. of trees/ area	Quantity of CO ₂ absorption per tree	Total quantity of CO ₂ absorbed (Kg)
1	Full grown trees	300	6.8 kg	2040 kg
2	Semi grown trees	700	3.4 kg	2720 kg
3	Bushes	500	200 gram	100 Kg
4	lawn	60X30	10/sqft	730 Kg

B] Tools to measure oxygen emission:

According to the Arbor Day Foundation, 'a mature leafy tree produces as much oxygen in a season as 10 people inhale in a year' A person breathes 7 or 8 litres of air per minute. Air is about 20% oxygen. But the exhaled air has about 15% oxygen, and hence the net consumption is about 5%. Therefore, a person uses about 550 litres of pure oxygen each day.

Calculation of oxygen emission by flora:

The number of litres in 1 kilogram depends on the density of the substance being measured. Litre is a unit of volume, and kilogram a unit of mass. Litres and kilograms are approximately equivalent when the substance measured has a density of close to 1 kilogram per litre.

1. On average, one full-grown tree produces nearly 117.6 kg of oxygen each year.

Two mature trees can provide enough oxygen for a family of four. Total oxygen emitted by 220 full-grown trees per year

$$(117.6 \text{ kg} \times 300) = 35280 \text{ Kg of O}_2$$

2. One semi-grown tree produces 58.8 kg of oxygen per year.

Total oxygen emitted by semi-grown trees (oxygen emission is 50% of that of the full-grown tree).

$$(58.8 \text{ kg} \times 700) = 41160 \text{ kg of O}_2$$

3. Total oxygen emitted by 500 bushes is calculated based on the following oxygen-inhaling requirement per person per day. A normal human being requires 550 litres of oxygen per day. 400 bushes produce enough oxygen per day to enable a person to breathe adequate quantity of oxygen of 550 litres.

Total quantum of oxygen produced by 400 plants per day is 550 litres of oxygen.

Taking 400 plants as one unit, the number of units of bushes in the campus $(500/400) =$

1.25

Total quantity of oxygen produced by 1.25 units is $(1.25 \times 550 \text{ litres}) = 687.5$ litres of oxygen per day.

The annual production of oxygen at this rate

$$(687.5 \times 365) = 250,937.5 \text{ litres or kg of oxygen per year}$$

4. Lawn is an incredible oxygen-making machine. A 25-sq.ft. area will supply enough oxygen to support one person for a day. Quantitatively speaking, this area of grass produces 550 litres of oxygen per day.

The total area of lawn in the campus is 19375 sq.ft.

In units, the value $(19375/25) = 775$ units,

which produce $(775 \times 550 \text{ litres of oxygen}) = 426,250$ litres of oxygen per day.

Total quantity of oxygen produced by the 19375 sq.ft. of lawn per year

$(426,250 \text{ litres/day} \times 365) = 155,581,250$ litres or kg of oxygen per year.

Sr.No.	Type of trees	No. of trees/area	Quantity of oxygen emission per tree per year	Total Quantity of oxygen emission in kg
1	Full grown trees	220	117.6 kg	35280 kg
2	Semigrown trees	120	58.8 kg	250937.5kg
3	Bushes	500	687.5 kg per day	250,937.5 Kg
4	lawn	60X30	426,250 kg per day	155,581,250 Kg

Summary:

Sr. No.	Type of trees	No. of trees/area	Quantity of CO2 absorption per tree	Total quantity of CO2 absorbed (tonnes)	Quantity of oxygen emission per tree	Total Quantity of oxygen emission
1	Full grown trees	220	6.8 kg	1496 kg	117.6 kg	25,872 kg
2	Semi grown trees	120	3.4 kg	408 kg	58.8 kg	7056 kg
3	Bushes	500	200 gram	100 Kg	687.5 kg per day	250,937.5 Kg
4	lawn	60X30	10/sqft	730 Kg	426,250 kg per day	155,581,250 Kg
Total				2734 kg or Approx. 3 Tonne per year		155,865,115.5 kg 155,865.115 tonne per year

a) Audit Observations:

- ✚ College already has a well maintained garden.



- ✚ The college celebrates an annual tree plantation program in the campus where students and teachers plant trees in the campus.
- ✚ Moderate amounts of bio-fertilizers are used in the college.
- ✚ Negligible amounts of washing liquids are used in the college and all the toilet cleaners are not eco-friendly.
- ✚ Green education has been given to improve environmental awareness
- ✚ College has been reducing, reusing and recycling the products such as books, electronic appliances etc (e.g. at the time of de-selection and disposal of library material
- ✚ Digitalization of majority of processes has been done.
- ✚ College has been providing E- Resources: E books, Online Journals to save papers.

SOIL TO SILK

- ✚ SOIL TO SILK A HANDS ON TRAINING PROGRAMME in “**Sericulture and Silk worm rearing**” has been carried out for 28 days. The training programmes have covered following subjects: 1)Mulberry cultivation.
2)Silkworm rearing (Young age and Late age silkworm rearing),
3)Silkworm seed production technology,
4)Extension management and transfer of technology, and Post cocoon technology



Mulberry Plantation:



as a unique plant on this earth due to its broader geological distribution across the continents; ability to be cultivated in different forms; multiple uses of leaf foliage and its positive impact in environmental safety approaches such as eco-restoration of degraded lands, bioremediation of polluted sites, conservation of water, prevention of soil erosion and improvement of air quality by carbon sequestering

It has issued as a medicinal plant in improving and enhancing the life of human beings by utilizing the biologically active pharmacokinetic compounds found in leaf, stem and root parts.

Further industrial exploitation of mulberry through preparation of various products in pharmaceutical, food, cosmetic and health care industries has gained the \attention of industrialists

As mulberry is being exploited by sericulture, pharmaceutical, cosmetic, food and beverage industries along with its utilization in environmental safety approach; it is appropriate to call it as a most suitable plant for campus plantation



b) Recommendation:

- ✚ Encourage the faculties and students to plant trees in the garden.
- ✚ Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment, i.e. are biodegradable and non-toxic
- ✚ Dispose the chemical waste generated from the laboratories in a scientific manner.
- ✚ Create “Green Team” in the institution to increase awareness among students.
- ✚ E Publishing reviews of new green resources in the newsletter or news.
- ✚ Recycling beyond paper i.e. plastic, e- waste.

D] WASTE MANAGEMENT

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, glass, dust etc. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair and reuse. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone.

The present Prime Minister of India Sri Narendra Modi launched 'Swachh Bharat Abhiyan' (Clean India Mission) on 2nd October, 2014. In this mission, the proper use of dust/waste bins is one of the major priorities. For the implementation of this mission, collective mass effort is necessary. For proper segregation and management, proper use of waste bins is the only solution for waste management purpose in the college campuses.

a) Audit Observations:

I) VERMICOMPOSTING:

Vermicomposting is an environment friendly, low-technology method for the disposal of organic waste. It is the process in which the worms are used to convert the organic materials (usually wastes) into a humus-like material which is known as the vermin-compost.

It is one of the easiest methods to recycle agricultural wastes and to produce quality compost. The resultant vermicompost produced is very beneficial for plant growth and health. The values, fertility and productivity of organic waste which has been returned to soil can be improved by beneficial impacts on soil resources and other processes. The production of organic wastes by the use of vermin compost technology is remarkably an effective technology for the reduction in processing time and also beneficial for the production of nutrients which are essential for the plants growth.

It is a key component of the integrated plant nutrient supply system in order to maintain a healthy fertilization system along with maintaining safety. This organic fertilizer is considered to be present in both agriculture and horticulture as an alternative to the inorganic fertilizers in greenhouse.



Preparation of bed for vermin-composting

Quantity of Waste generated:

- Biodegradables - 1kg/Day (office,classrooms)
- Non Biodegradables – 1 & ½ kg/Day (office, classrooms)
- Biodegradable- 1kg/day(labs)
- Non- Biodegradable- ½ kg /Day (including glass bottles)
- Hazardous waste -150gm/Day
- Canteen waste: Biodegradables- 20kg/Day

Non- Biodegradables – ½ kg/Day

Total Waste:

Biodegradablewaste–22kg/Day

Non- Biodegradables- 2 ¾ kg/Day

Hazardous waste – 150 grams/ Day

- ✚ Skill Oriented Training Programme for non teaching staff on ‘Vermicomposting organized by Department of Zoology.had organized a 30 days training programme, from 22nd July 2020 to 21st August , 2020 on ‘Vermicomposting’ to cover a total duration of 200 hours. The said training programme imparted theory as well as practical (hand-on) exposure on vermicomposting and management of organic wastes in agriculture for productivity improvement and livelihood security.

II) CHEMICAL EFFLUENT TREATMENT PLANT:

PDVP college is committed to the green campus philosophy and to saving the precious treasure of nature. This chemical effluent treatment plant consists of all the process units which help to minimize the chemical and biological load.

This is used to treat waste water coming out from chemistry department. Effluent Treatment Plant (ETP) is a process design for treating the chemical waste for its reused or safe disposal to the environment.



- ✚ The college does not have any such recycling device to carry on the waste recycle procedure.
- ✚ The college has set up separate bins to ensure proper segregation and collection of the various wastes. The responsibility of recyclable waste is however still not taken up the college.
- ✚ The college organized several seminar and community program by the departments to ensure both consciousness and awareness among students and community members.
- ✚ All dry wastes (paper, metal, glass, other dry waste, e-waste, etc.) are separated in different bins in the college and resell to the local vendor

a) Recommendation:

- ✚ Make full use of all recycling facilities provided by Gram Panchayat and private suppliers, including glass, cans, white and brown paper, batteries, print cartridges, cardboard and furniture.
- ✚ The color coded bins for different wastes are placed at different locations of the campus for collection of waste and its easy sorting at source.
- ✚ ✚ Dispose all waste, whether solid or otherwise, in a scientific manner and ensure that it is not released directly to the environment
- ✚ Recycle and reuse of kitchen wastes (from canteen and hostels) and garden waste

E] CARBON FOOTPRINT

✚ Solar water heater at hostel:

Resident: 100

Assuming an average requirement of 20 L of hot water per day

Thus daily amount of hot water used = $100 \times 20 = 2000$ L

An average flat plate collector area of 2 m^2 gives 125 L of hot water per day.

Required collector plate area = 16 m^2

Available collector plate area = 20 m^2

Solar water heater is successfully used in Girls hostel

a) Use of Renewable Energy

Hybrid (Solar with windmills) energy generation system is available in college campus. The device has rated power 2 KW.

Assuming total working hours - 4 hours

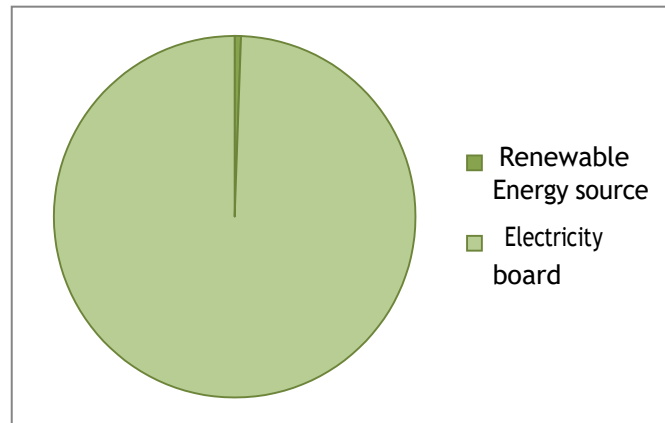
Total kWh or units energy obtained from renewable source is 8 kWh Equipment working on renewable energy

Sr. No	Equipment	Quantity	Actual consumption by equipment	Total Energy consumption in kWh or units
1.	Computer	1	520 W	$520 \text{ W} \times 4 = 2080 \text{ Wh}$ 2.08 kWh
2.	Printer	1	200 W	$200 \text{ W} \times 4 = 800 \text{ Wh}$ 0.8 kWh
3.	Tube light	2	40 W	$80 \text{ W} \times 4 = 320 \text{ Wh}$ 0.32 kWh
4.	Fan	2	78 W	$156 \text{ W} \times 4 = 624 \text{ Wh}$ 0.624 kWh
Total				5.736 kWh

Total daily energy consumption by Renewable Energy source = 3.824 kWh

Therefore monthly energy consumption by Renewable Energy source = 21.92 kWh

Monthly Average energy consumption by Electricity board = 3862.25 kWh



a) Audit Observations:

- ✚ About 60% of the students and teaching and non-teaching staffs of the college use bicycle as the main mode of transport. The college also encourages transport by bicycle to students.
- ✚ College encourages UGC projects on sustainable development/natural resources. There is compulsory ENVS paper of 100 marks in the University Syllabus for all the students of all streams to develop Environmental Awareness.
- ✚ College does not directly or indirectly participate in depletion and degradation of natural resources
- ✚ Seminars and awareness programs are conducted periodically on nature and natural resources.

b) Recommendation:

- ✚ Ensure use of ecofriendly transport option
- ✚ Review architecture of existing buildings and reviews ways, in consultation with experts, to reduce usage of energy for such buildings, offering greatest efficiency for energy and water usage.
- ✚ Conduct environmental awareness posters and seminars as part of the program

COMPREHENSIVE RECOMMENDATIONS

There exists vast scope to improve the green campus status of the College through biodiversity promotion and tapping green energy sources.

1. Another 5,000 sq.ft. area of lawn shall be raised through the involvement of students from NSS or NCC to enhance oxygen emission by another 40%.

Solar panels shall be installed on top of the buildings to produce another 10,000 kW of electricity. To enhance solar power productivity, aluminium foil-based reflectors shall be installed on the eastern and western sides of the solar panel.

2. Energy-efficient measures such as replacement of all incandescent bulbs with LED lamps, old electrical regulators of fans with energy-efficient electronic regulators, air-conditioning units with all-star rated systems need to be undertaken.
3. Students from the Computer Science Department shall be trained as e-waste managers to manage e-waste. These e-managers shall be in constant touch with schools, orphanages and parish houses through social media and inform them of the outdated computer systems that shall be used by them. They also shall dispose of the less efficient, damaged and non-functioning e-wastes to the vendors.
4. Biogas plants shall be installed in the campus using solid waste and night soil generated from the Girls Hostel in the campus. The biogas shall be used by the Hostel Kitchen and College canteen.
5. Water quality testing laboratory will be installed in one part of the laboratory to test the drinking water to ensure the students are free from water-borne diseases. All the water taps shall be fitted with high-efficiency aerator taps to reduce wastage of water. All toilets shall be fitted with dual flush water closets, which will reduce water consumption by 40%.
6. Environment education shall be imparted to all college students through 1-hr life-skill classes once a week. This will create wide-level environment consciousness among the student community. They will be sensitized to encourage pillion riding with their peers or use public transport instead of two wheelers. Moreover, they will also motivate their parents to replace all the incandescent or fluorescent bulbs with energy-efficient LED bulbs.

PHOTOGRAPHS



**TREE PLANTATION CAMPAIGN UNDER
NATIONAL SERVICE SCHEME (NSS) PDVP
COLLEGE TASGAON.**

(Principal Dr.Milind Hujare)

**TREE PLANTATION CAMPAIGN UNDER
NATIONAL SERVICE SCHEME (NSS) PDVP
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