GREEN AUDIT REPORT

ST. STEPHEN'S COLLEGE

PATHANAPURAM

Executed by

OTTOTRACTIONS
Energy-Engineering-Environment

2024

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Energy - Engineering - Environment

ISO 9001:2015, ISO 14001:2015, ISO/IEC:17020 : 2012, ISO 14067:2018

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Bureau of Energy Efficiency
Government of India.

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PATHANAPURAM, KOLLAM

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Energy Engineering Environment

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St. Stephen's College, Pathanapuram

Report No: EA 1195/GA
2023-24

Audit Team

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About OTTOTRACTIONS

Established in 2005, OTTOTRACTIONS is a renowned organization with extensive expertise in energy, engineering, and environmental services. We hold the distinction of being the first Accredited Energy Auditor from Kerala authorized to conduct Mandatory Energy Audits for Designated Consumers under the Energy Conservation Act of 2001. Our excellence in energy auditing was recognized by the Government of Kerala with the prestigious "Kerala State Energy Conservation Award 2009."
OTTOTRACTIONS is an ISO 9001:2015, ISO 17020:2012, ISO 14001:2015 and ISO 14067:2018 certified organization, underscoring our commitment to quality and excellence in service delivery. With a proven track record, we have successfully completed over 3,000 audits across various domains, including Energy Audit, PAT, Electrical Safety Audit, Green Audit, Environmental Audit, Biodiversity Audit, Water Audit, and Air Audit.

Acknowledgment

We had the privilege of collaborating with the administration and staff of St. Stephen's College, Pathanapuram and we express our gratitude for their invaluable assistance, which played a crucial role in the timely completion of the audit and the preparation of this report.

In heartfelt appreciation, we recognize the diligent efforts and commitments of all individuals involved in contributing to the production of this report. Their unwavering support has been instrumental in bringing this project to fruition.

Furthermore, we extend our thanks to the dedicated audit team for their unwavering support throughout the audit process. Their bona-fide efforts have significantly contributed to the successful execution of the audit.

A special acknowledgment goes to our consultants, engineers, and backup staff for their unwavering dedication, which has been pivotal in ensuring the quality and accuracy of this report. We appreciate their tireless efforts in making this collaboration a success.

Thank you.

B V Suresh Babu
Accredited Energy Auditor
AEA 33, Bureau of Energy Efficiency
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Preface

Throughout the annals of history, educational institutions have consistently played a pivotal role in addressing the pressing challenges of their times, guiding societal progress and shaping the intellectual landscape. In contemporary times, a global movement has taken root within these institutions, championing sustainability and aspiring to achieve recognition as carbon-neutral schools. A watershed moment in this global endeavor unfolded in 2018 when the state of Kerala in India emerged as a pioneer in establishing 15 carbon-neutral schools, employing innovative strategies that set a new standard for environmental consciousness.

Concurrently, local self-governments, exemplified by the proactive engagement of the Meenangadi Grama Panchayath, embraced the “Carbon Neutral Meenangadi” project. This initiative reflects a concerted effort to actively pursue carbon-neutral status, with Ottotractions standing as a key knowledge partner, providing invaluable insights and expertise.

Furthermore, Ottotractions has demonstrated unwavering support for the “Carbon Neutral Kattakkada” project, a transformative initiative within a legislative assembly constituency in Kerala. The project ambitiously strives to achieve net-zero status for all public establishments, aligning itself with the prestigious BEE's Shunya or Shunya Plus rating. Notably, even major entities such as Indian Railways are committed to achieving net-zero status for their non-traction buildings soon. These collective endeavors signify a broader trend in our country towards sustainability—a movement that not only deserves recognition but also serves as a model worthy of emulation.

However, it is crucial to acknowledge the challenges inherent in the pursuit of carbon neutrality. While the concept is commendable, it does not guarantee permanent carbon capture, and the implementation can incur significant costs. Despite these challenges, the movement underscores the substantial role that educational institutions can play as catalysts for positive change, influencing not only the present but also shaping the future trajectory of sustainable practices.

The transformative potential of any academic institution, regardless of its geographical location—whether nestled in a remote village or situated in an urban setting—is indeed significant. By assuming leadership roles within their communities, educational institutions can actively champion and influence the widespread adoption of carbon-neutral living practices, setting an example for others to follow.

To effectively address the major contributors to carbon emissions—Energy, Transportation, and Waste—coordinated efforts for reduction are paramount. Initiatives targeting these sectors may range from low-cost behavioral changes to high-cost technological investments. Proper education of students on the concept of carbon-neutral campuses and the methods to achieve it is essential in facilitating these transformative changes, fostering a culture of environmental responsibility.

In India, the momentum behind carbon-neutral campuses is steadily gaining traction. The implementation of Green Audits in campuses involves a comprehensive assessment of greenhouse gas emissions and carbon sequestration from relevant sources. The recommendations derived from these assessments are strategically designed to diminish the carbon footprint and guide campuses towards becoming carbon-neutral environments, exemplifying a commitment to sustainable practices that resonate on a global scale.

B Zachariah
Director
OTTOTRACTIONS

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Introduction

Background

In developed nations, educational institutions are actively embracing a sustainable future by transforming into carbon-neutral and environmentally conscious spaces. Recognizing their environmental impact, these institutions are taking proactive measures to mitigate and neutralize their effects. The journey toward carbon neutrality involves a multifaceted approach, including efforts to reduce greenhouse gas emissions, minimize energy consumption, adopt energy-efficient technologies, increase the utilization of renewable energy sources, implement green cover initiatives, and emphasize the significance of sustainable energy practices.

Institutions that have committed to achieving carbon neutrality are demonstrating a heightened awareness of the threat posed by global warming and are making deliberate efforts to reverse this concerning trend. However, it's noteworthy that the propagation of such initiatives has not yet taken root in many developing countries, particularly among students. The need for extensive studies and awareness campaigns in these regions is evident to foster a broader understanding and commitment to sustainable practices.

The United Nations introduced the Sustainable Development Goals (SDGs) in 2015 as a powerful catalyst for transformative change. These goals serve as a comprehensive action plan, aiming to propel the planet and society towards prosperity by the year 2030. Offering a strategic framework, the SDGs present an opportune avenue for devising multifaceted operational strategies to adapt to climate change. Encompassing pivotal aspects of human progress and sustainable development, the SDGs tackle challenges like poverty, hunger, and climate change. Additionally, they address crucial issues such as gender equality, access to clean

water and sanitation, and the promotion of responsible consumption and production.

The Green Audit conducted St. Stephen's College, Pathanapuram is geared towards aiding the campus in minimizing its carbon footprint. The overarching goal is to educate the future leaders about effective strategies for carbon mitigation, utilizing the campus as a tangible model for sustainable practices. This comprehensive audit not only addresses carbon reduction but also evaluates the institute's responses to Sustainable Development Goals (SDGs), specifically targeting SDG 3, 6, 7, 9, 11, 13, and 15.

Furthermore, the Green Audit serves as an educational tool for both students and teachers. It aims to familiarize them with the concept of carbon footprint and empowers students to gather relevant data on carbon emissions and sequestration within their campus. The ultimate objective is to equip students with the skills needed to calculate the specific carbon footprint of the campus, fostering a deeper understanding of environmental impact and sustainability. The project also suggests plans to make the campus carbon neutral or even carbon negative by implementing carbon mitigation strategies in areas such as,

a. Energy
b. Transportation
c. Waste minimisation
d. Carbon Sequestration etc.

The primary goals of the audit include:

- Raising awareness among students and teachers about the concept of carbon footprint and sustainability.
- Estimate the specific carbon footprint of the campus and categorizing it as either carbon negative, neutral, or positive.
- Developing carbon mitigation plans informed by the generated data to systematically reduce the campus's carbon footprint.

ST. STEPHEN'S COLLEGE, PATHANAPURAM

St. Stephen's College, Pathanapuram Established in 1964 after the name of Saint Stephen, the college is the fulfilment of a long-cherished desire of its founder, His Grace Mar Thoma Dionysius, Metropolitan of Niranam Diocese of the Malankara Orthodox Church. The College, affiliated to the University of Kerala, offers undergraduate programmes in Botany, Chemistry, Mathematics, Physics, Zoology, Economics, English and Commerce and postgraduate programmes in Botany, Chemistry, Mathematics, Physics and Zoology. The department of Zoology and Chemistry are recognized as Research Centres under the University of Kerala. The college was re-accredited by the NAAC Peer team at B++ Grade with CGPA 2.91 in 2022.

The college aims at the development of an integrated personality. The College Chapel serves as the nerve centre for ethical development. The college has a well-equipped library with more than books. It has a fine volley ball court. There are many academic and cultural societies and clubs functioning in the college to kindle interest in the students in their respective subjects as well as in socially relevant issues.

Occupancy Details	
Particulars	2023-24
Total Students	698
Staffs	77
Total Occupancy of the college	775

To determine per capita carbon emissions, the calculation exclusively considers the student population. The campus actively engages in routine green audits to meticulously track the impact of its practices on sustainability. This proactive approach aims to instil a sense of responsibility among students, fostering a community of future champions committed to sustainable living practices.

The institution is dedicated to implementing the recommendations derived from the green audit reports, striving to adopt sustainable practices that align with environmental best practices. Additionally, the campus encourages innovative in-house activities, serving as a model that can be replicated by peer groups. These

initiatives reflect a commitment to continuous improvement and the dissemination of sustainable practices within and beyond the campus community.

It is noteworthy that all the images of flowers and plants featured in this report are the result of collective efforts by students and faculty who actively planted and preserved them. This hands-on involvement underscores the campus's commitment to not only theoretical sustainability but also the tangible cultivation of a greener and more eco-conscious environment, symbolizing a harmonious coexistence between the institution and nature.

The Audit Team

1. Er. B V Suresh Babu, Accredited Energy Auditor, BEE
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Form-A										
BASELINE DATA SHEET FOR GREEN AUDIT										
1	Name of the Organization	St. Stephen's College, Pathanapuram								
2	Address (include telephone, fax & e-mail)	St. Stephen's College, Maloor College P.O, Pathanapuram, Kollam Dist 689695 Phone : 0475 2352385 , 2354385 ststephenspathanapuram@gmail.com								
3	Year of Establishment	1964								
4	Name of building and Total No. of Electrical Connections/building	St. Stephen's College (8)								
5	Total Number of Students	Boys	278	Girls	420	Total	698			
6	Total Number of Staff	77								
7	Total Occupancy	775								
8	Total area of green cover	52 acres								
9	Type of Electrical Connection	HT	-	LT	8					
10	Total Connected Load (kW)	122								
11	Average Maximum Demand (KVA)	-								
12	Total built up area of the building (M^2)	23000								
13	Number of Buildings	5								
14	Average system Power Factor	0.99								
15	Details of capacitors connected	Nil								
16	Transformer Details (Nos., kVA, Voltage ratio)	TR 1	TR 2	TR 3	TR 4					
17	DG Set Details (kVA)	DG1	DG2	DG3	DG4	DG5	Remarks			
18	Details of motors	Rating		Nos.		Remarks				
		5 to 10		4						
19	Brief write-up about the firm and the energy/environmental conservation activities already undertaken.	Energy conservation projects. Installed Biogas plant and Solar power plant and Rain water harvesting								
20	Contact Person & Telephone number	Principal								
		0475 2352385, 2354385								

2

METHODOLOGY

2.1. Sensitisation

The effectiveness of Low Carbon campus initiatives hinges on the collective engagement of every member within the campus community, encompassing students, teachers, and staff alike. To facilitate this inclusive approach, a dedicated team consisting of students, teachers, and staff was formed to actively participate in the audit process. Recognizing the importance of awareness and understanding, a comprehensive sensitization program was conducted among both students and teachers to familiarize them with the concept of carbon footprint.

This collaborative effort underscores the commitment to a holistic involvement in sustainable practices, where each stakeholder within the campus plays a pivotal role. By fostering awareness and education on carbon footprint, the campus community is not only informed but also empowered to contribute meaningfully to the collective goal of reducing carbon impact. The formation of a dedicated team signifies a shared responsibility, ensuring that the Low Carbon initiatives are not only successful but also ingrained in the collective consciousness of the entire campus.

As part of the audit process, a concerted effort was made to sensitize both students and staff members about the project, equipping them with the necessary training to actively contribute to the data collection team. This strategic approach aimed to conduct the survey in a participatory mode, ensuring that awareness permeates to the grassroots level within the campus community.

During the field visits for data collection, a key emphasis was placed on the team's role in disseminating these ideas to their homes and friends. This intentional outreach strategy was designed to facilitate a horizontal and vertical spread of the message, reaching a broader audience. It is anticipated that the approximately 3100

occupants of these campuses will, in turn, extend the message to an equivalent number of households, resulting in the potential dissemination of this important message to around 14100 individuals.

This approach not only enhances the reach of the project but also transforms it into a community-wide endeavour, emphasizing the importance of individual participants acting as ambassadors for sustainable practices in both their immediate and extended social circles.

2.2 Estimation of carbon footprint

A carbon footprint serves as a quantifiable metric, measuring the volume of greenhouse gases—predominantly carbon dioxide—emitted into the atmosphere due to a specific human activity. This metric can encompass a broad range, from individual actions to the collective impact of families, events, organizations, or entire nations. Typically expressed as tons of CO_2 released annually, this figure can also be complemented by tons of CO_2-equivalent gases. These equivalents include methane, nitrous oxide, and other greenhouse gases that contribute to the overall impact on climate change.

The concept of Global Warming Potential (GWP) further refines our understanding of the environmental impact of different gases. GWP is a quantitative measure of how much heat a particular greenhouse gas traps in the atmosphere within a defined time horizon, relative to the heat-trapping capacity of carbon dioxide. This metric was developed to facilitate comparisons of the global warming impacts associated with various gases.

More specifically, GWP represents the amount of energy that the emissions from one ton of a particular gas will absorb over a specified timeframe, relative to the emissions from one ton of carbon dioxide (CO_2). By utilizing GWP, we can better grasp the relative contributions of different gases to the greenhouse effect, allowing for a more comprehensive assessment of their environmental consequences. In essence, GWP serves as a crucial tool for understanding the nuanced and varied impacts of diverse greenhouse gases on global warming.

Global Warming Potentials (IPCC Second Assessment Report)					
Species	Chemical formula	Lifetime (years)	Global Warming		
			20 years	100 years	500 years
Carbon dioxide	CO2	variable §	1	1	1
Methane *	CH4	12±3	56	21	6.5
Nitrous oxide	N2O	120	280	310	170
HFC-23	CHF3	264	9100	11700	9800
HFC-32	CH2F2	5.6	2100	650	200
HFC-41	CH3F	3.7	490	150	45
HFC-43-10mee	C5H2F10	17.1	3000	1300	400
HFC-125	C2HF5	32.6	4600	2800	920
HFC-134	C2H2F4	10.6	2900	1000	310
HFC-134a	CH2FCF3	14.6	3400	1300	420
HFC-152a	C2H4F2	1.5	460	140	42
HFC-143	C2H3F3	3.8	1000	300	94
HFC-143a	C2H3F3	48.3	5000	3800	1400
HFC-227ea	C3HF7	36.5	4300	2900	950
HFC-236fa	C3H2F6	209	5100	6300	4700
HFC-245ca	C3H3F5	6.6	1800	560	170
Sulphur hexafluoride	SF6	3200	16300	23900	34900
Perfluoromethane	CF4	50000	4400	6500	10000
Perfluoroethane	C2F6	10000	6200	9200	14000
Perfluoropropane	C3F8	2600	4800	7000	10100
Perfluorobutane	C4F10	2600	4800	7000	10100
Perfluorocyclobutane	c-C4F8	3200	6000	8700	12700
Perfluoropentane	C5F12	4100	5100	7500	11000
Perfluorohexane	C6F14	3200	5000	7400	10700

The approach to calculating carbon footprints is continually evolving, emerging as a pivotal tool for greenhouse gas management. In the current study, we are actively engaged in estimating carbon emission data from the campus, categorizing it into four distinct and crucial dimensions. This methodology not only allows us to quantify our environmental impact but also contributes to the broader understanding of greenhouse gas management, paving the way for more effective and targeted sustainability strategies.

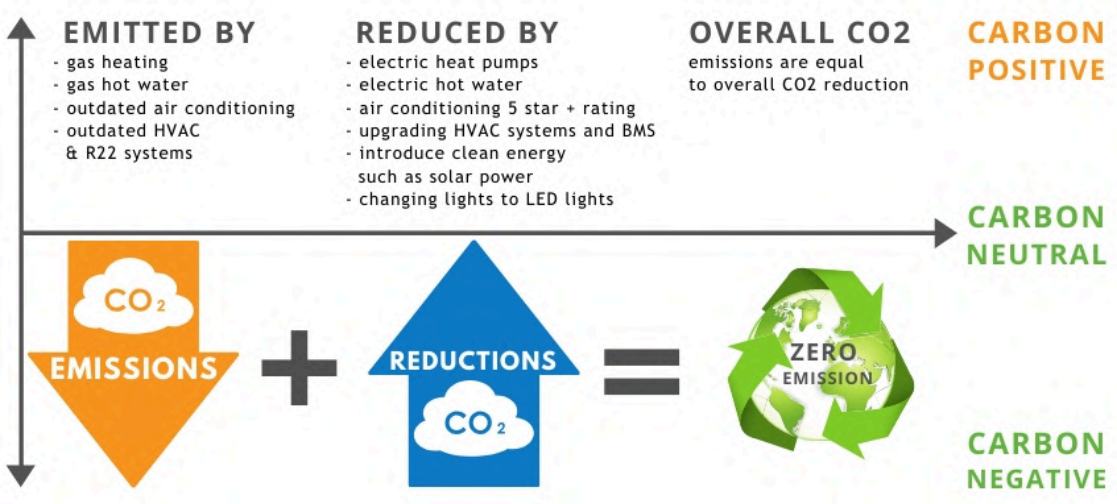
By adopting a comprehensive approach to categorizing carbon emissions, we aim to delve deeper into the intricacies of our campus's environmental footprint. This evolving methodology is reflective of our commitment to staying at the forefront of sustainable practices, contributing to the ongoing discourse on effective greenhouse gas management within academic institutions. As we refine our understanding and

measurement of carbon footprints, we position ourselves to make informed decisions that align with our environmental stewardship goals.

1. Energy
2. Transportation
3. Waste minimisation
4. Carbon Sequestration

Carbon neutrality entails attaining a state of equilibrium in greenhouse gas (GHG) emissions by offsetting the amount of carbon released into the atmosphere through human activities with an equivalent amount sequestered in carbon sinks. This holistic approach is imperative for curbing the rise in atmospheric concentrations of GHGs stemming from diverse socio-economic, developmental, and lifestyle activities. The goal is to employ biological or natural processes to counteract the emissions, aligning with sustainable practices.

Recognizing the complexity of addressing climate change, carbon neutrality goes beyond the simplistic solutions of solely transitioning to renewable energy or offsetting GHG emissions. Instead, it serves as a catalyst for fostering innovation in new developmental activities. This approach aims to provide a viable and effective means of addressing the multifaceted challenges posed by climate change. By encouraging innovative thinking and sustainable practices, carbon neutrality serves as a strategic and comprehensive response to the environmental issues associated with human activities.



Energy

On the campus, carbon emissions resulting from energy consumption are classified into two distinct categories: namely, energy derived from Electrical sources and Thermal sources. The evaluation of energy utilized for transportation purposes falls within the purview of the transportation sector. This systematic categorization enables a more detailed understanding and assessment of the campus's carbon footprint, providing valuable insights for sustainable energy management and environmental conservation efforts.

A detailed energy audit is conducted to understand the energy consumption of the campus. Information on total connected loads, their duration of usage and documents like electricity bills are evaluated. Connected loads are calculated by conducting a survey on electrical equipment on each location. Duration of usage was found out by surveying the users. The survey of equipment was conducted in a participatory mode.

The fuel consumption for cooking, like LPG, was studied by analysing the annual fuel bills and usage schedules during the study. Discussions were carried out with the concerned individuals who actually operate the cooking system.

Transportation

The calculation of carbon emissions stemming from transportation involves the application of a specific formula, delineated as follows:

Carbon Emission = Number of Each Type of Vehicles × Average Fuel Consumed Per Year × Emission Factors (Based on the Fuel Used by the Vehicle)

This formula encapsulates a multifaceted approach to assess the environmental impact of transportation. The "Number of Each Type of Vehicles" accounts for the diversity in the vehicle fleet, acknowledging variations in emission profiles across different types. The "Average Fuel Consumed Per Year" parameter reflects the aggregate fuel consumption, providing a comprehensive view of the overall energy usage within the transportation sector. The "Emission Factors," tailored to the specific fuel utilized by each vehicle, introduce a nuanced dimension to the calculation by considering the varying environmental impact associated with different fuel types.

This methodological framework enables a thorough and precise evaluation of carbon emissions, facilitating a data-driven understanding of the environmental footprint attributed to transportation activities. It serves as a valuable tool for sustainability initiatives, allowing for targeted interventions and informed decision-making to mitigate the ecological impact of transportation.

Waste Minimisation

The waste produced within the campus plays a significant role in contributing to greenhouse gas emissions. Consequently, to comprehensively gauge the total carbon footprint of the campus, it becomes imperative to estimate the greenhouse gas emissions arising from the waste generated through the activities of students, teachers, and staff.

To ascertain the volume of waste generated, a systematic approach has been adopted. This involves strategically placing measuring buckets across various locations within the campus to collect the daily waste generated by the diverse community of students, teachers, and staff. Subsequently, the collected waste is meticulously weighed to quantify its mass accurately.

This meticulous measurement and weighing process provides a quantitative foundation for assessing the environmental impact associated with the waste generated on campus. By accounting for the diverse sources and activities that contribute to this waste stream, the calculation of greenhouse gas emissions becomes more nuanced and reflective of the campus's overall sustainability performance. This data-driven approach is pivotal in formulating targeted strategies

for waste reduction, recycling initiatives, and ultimately mitigating the ecological impact of campus activities.

Carbon Footprint Estimation

The process by which trees remove carbon from the atmosphere is called carbon sequestration. The amount or weight of carbon accumulated by a tree is called carbon storage (Nowak et al., 2012). Carbon Sequestration is closely related to the greenhouse emission reduction order imposed by Kyoto Protocol established in 2004. There are two basic methods of carbon sequestration viz. direct and indirect. The direct method is implemented by immediately binding carbon components at the sources of its formation- before it enters the atmosphere in specially designated Landfills. The indirect method of sequestration involves using plants that bind carbon dioxide in photosynthesis.

During the present study, only carbon sequestration by plants was estimated. Hence, it does not, therefore, account for carbon in dead wood- whether standing or fallen. Similarly, the minimum diameter of a measurable tree was 7cm and the smallest stem was defined as either a sapling or seedlings. Similarly, carbon sequestered by grasses was not taken into account while measuring the carbon sequestration potential of plants.

Seedlings:	A living stem less than 15cm tall
Saplings:	A living stem greater than 15cm tall and with a diameter at bust height (DBH approximately -1.3m above the ground level), less than 7cm
Tree:	A living stem greater than 7cm at D BH

Study Area

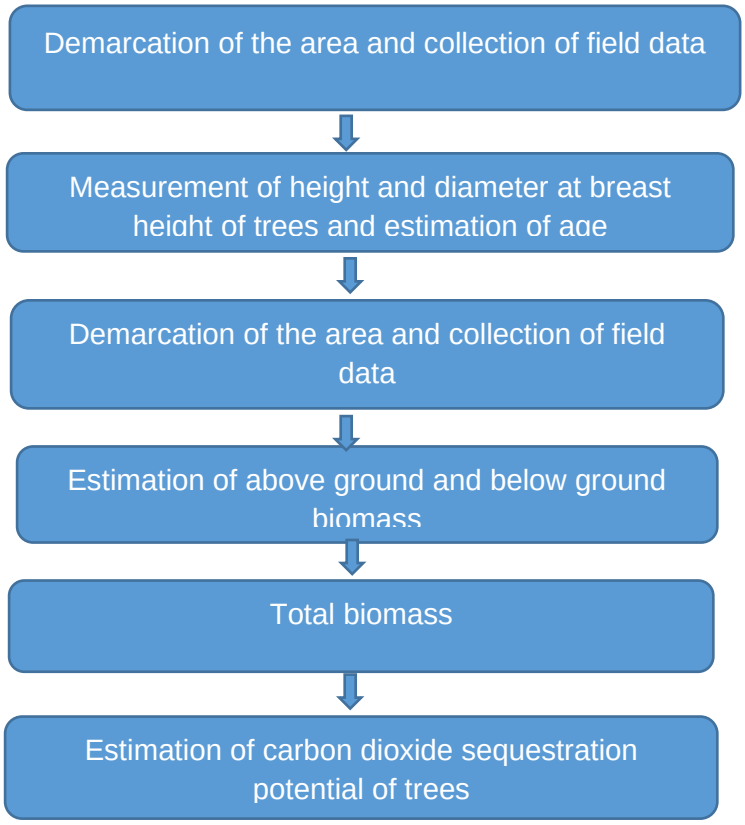
The present work was carried out at the St. Stephen's College campus, located in Kollam District. The campus is spread over with different trees in and around it. The survey was conducted during December 2024.

Determining the carbon content of trees

As the first step in determining the total carbon content of the trees in the entire campus were counted and identified.

The biomass of plants comprises all woody stems, branches, leaves and root systems. Biomass of trees can be calculated in two ways-destructive sampling and non-destructive sampling. In the present study, the non-destructive technique suggested by Jenkins et al (2011) of the Forest Research Agency of the Forest Commission was used to calculate the carbon content of trees. This involved the following steps: -

Fig 1 Carbon dioxide potential of trees



Estimating trunk biomass

To calculate the volume of the tree trunk the circumference of the tree trunk at chest height (approximately 1.3m from ground level) was measured using a measuring tape

Estimating the height of trees

The height of the tree was calculated by “the STICK method. For this, a stick and a measuring tape were used. The length of the stick was of the same length as the person’s arm. The stick was held pointing straight up, at 90 degrees to the outstretched, straight arm. Carefully walk backwards until the top of the tree lines up with the top of the stick and that point is marked. The distance between the marked point and the tree is roughly equivalent to the height of the tree (Fig). From these values volume of the tree trunk was calculated using the formula

$V=\pi r^2 h$

where:

V is the volume,

π is a mathematical constant (approximately 3.14159),

r is the radius of the tree at chest height

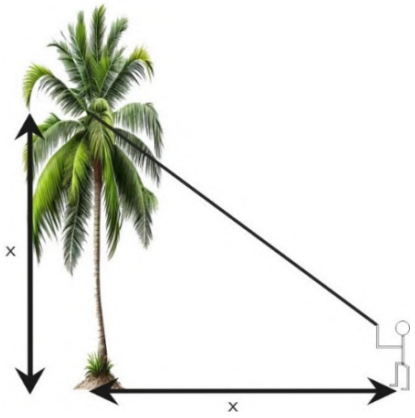
h is the height of the tree

Biomass = Volume X Nominal Specific Gravity

For estimating the Nominal Specific Gravity of a tree trunk the constant suggested by Jenkin et al (2011) was used.

- For broad-leaved trees Nominal Specific Gravity = 0.53
- For conifers Nominal Specific Gravity = 0.39

Stick method of measuring the tree



Estimating root biomass

Tree's root systems produce large quantities of biomass underground. Quantification of root biomass is difficult. Hence, in the present study factor of 0.3 of the above-ground

biomasses were used to estimate below-ground biomass as suggested by Shadmanet al (2022).

Estimation of carbon content based on the biomass of the whole tree

Biomass of the whole tree was calculated using the formula:

- Biomass of the whole tree= Trunk Biomass + Root Biomass

On average a tree consists of 72.5% dry matter and 27.5% moisture content. To calculate the total dry weight the total biomass was multiplied by 72.5. Since carbon occupies nearly 50% of total dry weight the total carbon content of the tree was calculated multiplying total dry weight by 0.5.

After estimating the total carbon content of the tree, the carbon dioxide equivalent sequestration of the tree was calculated as given below;

The atomic weight of carbon = 12

The atomic weight of oxygen = 16

The weight of carbon dioxide in a tree = 44 (16 X2 + 12) /12 =3.67

Thus, one tonne of carbon stored in the tree represents the removal of 44/12 or 3.67 tonnes of Carbon from the atmosphere and the release of 2.67 tonnes of oxygen back into the atmosphere.

The weight of carbon dioxide Sequestered in a tree = Total carbon X 3.67

The above value represents the total carbon dioxide sequestered by a tree during the entire life span of the tree. To ascertain the annual or yearly rate of carbon dioxide sequestered the value was divided by the age of the tree.

3

RESULTS AND DISCUSSIONS

College campuses are test beds for environmental change. The initiatives that are emerging at the college are models for the larger society. Since many of the students of the college are joining hands with the administrators to streamline operations of the college the campus becomes part of the solution for solving the problem of global warming. To this end St. Stephen's College, Pathanapuram started a comprehensive plan to make the campus carbon neutral. Carbon neutral means contributing no net greenhouse gases to the atmosphere either by not generating them or by offsetting them through the process of greening the campus. Even though there are many natural sequestration processes involved in the campus the major one continues to be the one where carbon di oxide is sequestered by the plants in the campus.

Distribution of Trees in the Campus

St. Stephen's College, Pathanapuram campus covers area of 9.7 ha. Even though all plants with chlorophyll contribute to sequestration of carbon, in the present study only trees having a diameter of more than 7 cm at chest height (1.3 m above ground level) were included in carbon sequestration calculations.

The most dominant species on the campus are *Artocarpus hirsutus, Tectona grandis* and *Hyophorbe lagenicaulis.* This species are commonly seen in this area as it can survive drought conditions, requires very little maintenance and can thrive in a range of soil types.

Carbon sequestration Potential

Carbon stored in a tree is directly proportional to its biomass, increasing its diameter, height, and canopy spread (McPherson 1998). The amount of carbon sequestration depends on the growth characteristics of the tree species, the condition for growth where the tree is planted and the density of the tree's wood (Jana et al., 2010).The carbon sequestration potential of the trees on the campus was calculated as per the method described under Materials and Methods.

Among the trees, the maximum carbon sequestered was *Artocarpus hirsutus, Tectona grandis* and *Hyophorbe lagenicaulis* amounting to 1.45 Tonn. The above-ground biomass (AGB) and below-ground biomass (BGB) of all the trees on the campus are equivalent to 1.95 and 5.39 tonn, respectively. The total carbon sequestered by all the trees in a year is 8.15 Tonn.

Oxygen released by the trees on the campus

In general, one kg of carbon stored in the tree represents the removal of 44/12 or 3.67 Kg of Carbon from the atmosphere and the release of 2.67 Kg of oxygen back into the atmosphere. The total carbon stored by trees on the campus is 3.24. Hence, the quantity of oxygen released by the trees of St. Stephen's College, Pathanapuram is 8.65 Tonn per year.

Constraints

- Carbon sequestration value computation involves a lot of variables like the girth of the plant, per year increment, soil type, vegetation type, damage to the plant due to human interference
- The amount of carbon dioxide sequestered by shrubs, small trees and grasses have not been taken into account during the study.
- The indirect method of carbon sequestration in the campus was not taken into account while estimating the carbon sequestration ability of the campus.
- Carbon sequestration rates fluctuate seasonally and annually. Assessments should account for these variations over time. This was not considered in the present study

- Since the actual age of the trees is not known an approximation is done while calculating the carbon dioxide sequestered annually.
- Much of the vegetation in the college is still young and needs to be given more time to mature further and have more potential for carbon stock storage in its terrestrial carbon pools.
- Trees near buildings, roads, or utilities have restricted root space, affecting their growth and carbon sequestration.

Recommendations and suggestions

- As this is the first time the carbon footprint of the campus is estimated, whether the college has shown development over the previous years or not cannot be estimated.
- A tree register of the campus is to be maintained of all the trees with diameter more than 7 cm. They are to be properly numbered so that it will be possible to study the growth pattern of the trees during subsequent years and to calculate their carbon sequestration ability.

To ensure the improvement is further achieved, the major focus areas may include:

- Optimize resource usage through enhanced efficiency in processes and controls
- Avoid wastage through the use of technology and human-controlled processes
- Work towards water neutral campus
- Transition/expansion of clean energy sources with the aim of achieving 100% green power
- Undertake “Zero Cost” Improvement projects with the participation of Students, Faculty & Non-teaching staff
- Usage of new & energy-efficient technologies to reduce energy consumption
- Increase green cover by planting of trees with high carbon sequestration index
- Engage stake holders within the campus and from nearby society through increased
- participation in structured events like Earth-day, Environment-day, Safety weeks, etc.
- Ensure effective management of Integrated Management System

- Adopt, deploy and achieve certification to water efficiency management system ISO
- Ensure energy optimization and conduct of regular energy audit
- Encourage and promote paperless documentation for official communication and
- academic activities like online submission of assignments / providing notes
- Sub-metering to identify high consumption areas of electricity to be able to drive
- specific optimization initiatives
- Review the possible impact of key events towards GHG emissions (example: Increased

Carbon Footprint Estimation

In accordance with the carbon footprint estimation methodology outlined in the preceding chapter, this section provides a comprehensive breakdown of the carbon emissions associated with this campus, specifically attributed to energy consumption, transportation, and waste generation.

3.1. Energy Consumption

Base Line Energy Data		
St. Stephen's College, Pathanapuram		
Sl No	Particulars	2023-24
1	Electricity KSEBL (kWh)	19356
2	Electricity DG (kWh)	188
3	Electricity Solar, Off grid (kWh)	0
4	Electricity (KSEB + DG + Off grid) kWh	19544
5	Electricity Grid Tied (kWh)	12775
6	Diesel (L)	62.5
7	LPG (kg)	180.00
8	Biogas generated/year (kg)	165.00

The campus relies on both electricity and thermal energy to facilitate its day-to-day operations. Electricity is sourced from four distinct sources: the Kerala State Electricity Board (KSEBL), Solar Photovoltaic (SPV) system, and one Diesel Generator (DGs). The campus utilizes DGs in instances of grid failure to ensure a continuous power supply.

Energy Consumption Profile		
Sl No	Fuel	2023-24
		kCal
1	Electricity	16807520
2	Diesel	656250
3	LPG	2160000
4	Biogas	770000
Total		20393770

In summary, the campus strategically sources thermal energy from Diesel, Biogas and LPG, tailoring each energy type to meet the specific needs of transportation, laboratories, and canteens. This diversified approach reflects a thoughtful consideration of efficiency, cleanliness, and sustainability in addressing the campus's thermal energy.

3.1.1. Electricity

Electricity is purchased from KSEBL under Eight LT Connections, details are given below.

Electricity Connection Details		
St.Stephen's College, Pathanapuram		
1	Name of the Consumer	St.Stephen's College, Pathanapuram
2	Tariff	LT-6A/ Three
3	Consumer Numbers	1146853002589
		1146853002590
		1146853002574
		1146855002571
		1146856002005
		1146856001985
		1146853018642
		1146851002004
4	Connected Load Total (kW)	122
5	Annual Electricity Consumption (kWh)	19356

Annual Electricity Consumption (kWh)			
Sl No	**Consumer No**	**2023-24**	**Connected Load (kW)**
1	1146853002589	10710	59
2	1146853002590	1664	27
3	1146853002574	3731	12
4	1146855002571	78	12
5	1146856002005	583	2
6	1146856001985	156	5
7	1146853018642	12	1
8	1146851002004	2422	5
TOTAL		**19356**	**122**

3.1.2 Diesel

The campus is equipped with one diesel generator. This generator is strategically connected to both the Main Building and other buildings, ready to activate seamlessly in the event of a power failure in the grid.

Electricity Generated through DGs			
Year	Generator in L	kWh /yr	cost in Rs
2023-24	63	187.5	6000

3.1.3 LPG

LPG cylinders are used in Lab for Experiments and in the Canteen for cooking.

LPG Consumption Details	
Particulars	**2023-24**
No Cylinders	12
Canteen/Lab LPG Consumption in kg	180.0
Total in kg	180.0

3.2. Thermal Energy

The thermal energy needs for buses, laboratories, and cooking on the campus are fulfilled through the utilization of Diesel and LPG. Further details regarding each fuel source are elaborated below.

Thermal Fuel Consumption	
St. Stephen's College, Pathanapuram	
Particulars	2023-24
Annual LPG consumption in kg	180.0
Annual Diesel consumption in L	62.5
Annual petrol consumption in L	0
Annual Biogas consumption in kg	165.00

3.2.1. Diesel for Transportation

The college does not provide bus services for transportation.

3.3. Energy Performance Index

The Energy Performance Index (EPI) serves as a key metric to gauge the energy efficiency of the campus. This index provides a quantitative measure that indicates how effectively and efficiently energy is utilized within the campus. Essentially, a lower EPI value signifies a more energy-efficient process, while a higher value suggests a less efficient utilization of energy resources.

To calculate the EPI, various factors related to energy consumption and total built-up area in m^2 is taken in to account. This includes assessing the energy inputs required to run the campus in one year.

The EPI not only helps in identifying areas for improvement but also supports the development and implementation of strategies to enhance overall energy efficiency.

The EPI not only helps in identifying areas for improvement but also supports the development and implementation of strategies to enhance overall energy efficiency.

In essence, the Energy Performance Index plays a crucial role in promoting sustainable and responsible energy management practices across various sectors.

OTTOTRACTIONS- ENERGY AUDIT		
St. Stephen's College, Pathanapuram		
Energy Performance Index (EPI)		
Sl No	**Particulars**	2023-24
1	Total building area (m^2)	23000
2	Annual Energy Consumption (kCal)	20393770
3	Annual Energy Consumption (kWh)	23714
4	Total Energy in Toe	2.04
5	Specific Energy Consumption kWh/m^2	1.03

3.4. Waste Management

Waste management is a significant focus for the campus, with particular attention directed towards the solid waste generated within its premises. The solid waste stream on the campus predominantly consists of three main categories: food waste, paper waste, and plastic waste. Food waste is a substantial component of the solid waste generated, originating from two primary sources.

Firstly, within the campus kitchen, vegetable waste is generated during food preparation. This includes peels, trimmings, and other organic remnants produced during the cooking process. Secondly, after meals, both students and staff contribute to the generation of food waste. This can include leftover food, plate scrapings, and other consumable remnants.

Degradable Waste Generation	
St. Stephen's College, Pathanapuram	
Particulars	2023-24
Total Occupancy	775
Waste generated in kg /day	15.5
Waste generated in kg /Yr	3410

Efficient management of food waste is crucial not only for environmental reasons but also for sustainability and hygiene. Implementation of strategies to minimize waste at its

source, such as better portion control and meal planning, can significantly reduce the overall volume of food waste generated. Furthermore, composting can be explored as a sustainable solution for managing organic waste, converting it into valuable compost that can be used for campus landscaping or agricultural activities.

Solid non degradable Waste Generation	
St. Stephen's College, Pathanapuram	
Particulars	2023-24
Total Occupancy	775
Waste paper generated in kg /day	0.155
Waste plastic generated in kg /day	0.2325
Waste paper generated in kg /Yr	34.10
Waste plastic generated in kg /Yr	51.15

In addition to food waste, the campus grapples with paper waste and plastic waste. Paper waste may encompass used notebooks, printed materials, and packaging, while plastic waste includes items like bottles, containers, and packaging materials. A comprehensive waste management plan should address the proper disposal and recycling of these materials, promoting a circular economy where recyclable items are reprocessed and reintroduced into the production cycle.

By focusing on these specific waste streams, the campus can tailor its waste management strategies to effectively reduce, reuse, and recycle materials, contributing to a more sustainable and environmentally friendly campus environment

Carbon Emission Profile (2023-24)

The calculation of carbon emissions resulting from everyday activities on the campus is outlined and detailed below. The units and emission factors considered for the estimation are provided.

Emission Factors		
Item	Factor	Unit
Electricity	0.00082	tCo2e/kWh
Diesel	0.0032	tCo2e/kg
LPG	0.0015	tCo2e/kg
Biogas	0.0014	tCo2e/m^3
Petrol	0.0031	tCo2e/kg
Food Waste	0.00063	tCo2e/kg
Paper Waste	0.00056	tCo2e/kg

Carbon Foot Print 2023-24

Carbon Foot Print			
Sl. No.	Particulars	2023-24	tCO_2e
1	Electricity (kWh)	19544	16.03
2	Diesel (L)	63	0.20
3	LPG (kg)	180.00	0.27
4	Biogas (kg)	165.00	0.231
5	Degradable Waste in kg/yr.	3410.0	2.15
6	Paper Waste in kg/yr	34.10	0.02
Total Carbon Foot Print tCO_2e/yr			18.89

3.5. Carbon Sequestration

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestrated according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Carbon Sequestration	
Particulars	2023-24
Total No of Trees	125
Carbon sequestrated by trees in the campus (tCO2e)	8.15

Trees sequestrate carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestrated by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Details of the trees in the campus compound are given in the Table. Detailed table is included in the technical supplement. Carbon sequestrated by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree

- Determining the dry weight of the tree
- Determining the weight of carbon in the tree
- Determining the weight of CO_2 sequestrated in the tree
- Determining the weight of CO_2 sequestrated in the tree per year

Carbon Balancing (2023-24)

Various carbon emitting activities such as consumption of energy, transportation and waste generation leads to the total emission of **18.89 tCO_2e** per year by the campus. The total carbon sequestration by trees in the campus compound is **8.15 tCO_2e**. Thus, the current carbon footprint of the campus will be the difference of total carbon emission and total carbon sequestration/mitigation.

Specific CO2 Footprint

Amount of Carbon to be mitigated for Low Carbon Campus		
Sl No	Particulars	2023-24
1	Total carbon emission tCO2e	18.89
2	Total carbon sequestration tCO2e	8.15
3	Amount of carbon mitigated through renewable energy tCO2e	10.71
4	To be mitigated tCO2e	0.04
5	Total No of Students	698
6	Specific Carbon Footprint kg CO2e/Student/Yr	0.06

The total specific carbon footprint is estimated as **0.06** kg of CO_2e per student for the year 2023-24.

4

Carbon Mitigation Plans

In the academic year 2023-2024, the per-student carbon dioxide emission for the campus was measured at **0.06** kg CO_{2e} per year. In response to this carbon footprint, strategic emission reduction plans have been formulated with the ambitious goal of achieving a carbon-neutral or even carbon-negative status for the campus.

To reach this environmental milestone, a thoughtful approach has been adopted, ensuring that each proposed plan aligns with the primary purpose of the corresponding activity. The emphasis is not just on emission reduction but on holistic sustainability that maintains the functionality and purpose of each campus activity.

The main avenues identified for reducing the campus carbon footprint are as follows:

Resource Optimization: This involves maximizing the efficiency of resource use, minimizing waste, and ensuring that every resource is utilized judiciously to minimize environmental impact.

Energy Efficiency: Enhancing energy efficiency across campus operations is a key strategy. This includes measures to optimize energy consumption, upgrade infrastructure for better energy performance, and implement technologies that reduce overall energy demand.

Renewable Energy: Embracing renewable energy sources is a pivotal aspect of the reduction plans. Transitioning towards renewable energy, such as solar or wind power, contributes significantly to decarbonizing the campus energy supply.

Waste Minimization: Optimal utilisation of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimise its usage.

Fuels for Cooking: The campus commercial LPG cylinders for its cooking purpose. The campus can install a biogas plant to treat food waste and the

biogas thus generated can be used in kitchen. Installation of a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food is another method. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

Transportation: Energy efficiency of the transportation sector is mainly depended on the fuel efficiency of the vehicles used. Here mileage of the vehicle (kmpl - Kilometres per Litre) is calculated to assess the fuel efficiency of the vehicle.

Percentage of closeness is the ratio of actual mileage of the vehicle to its expected mileage. If the percentage of closeness of mileages of each vehicle is greater than that of its average, then the efficiency status of the vehicle is considered as 'Above average' and else, it is considered as 'Below average'.

Currently, the campus is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimisation can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

By incorporating these methods, the campus aims not only to reduce carbon emissions but to transform into a model of sustainable practices. The overarching objective is to create a campus environment where carbon neutrality is achieved or even surpassed, demonstrating a commitment to responsible and eco-friendly operations.

Carbon Mitigation Proposals

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

OTTOTRACTIONS- ENERGY AUDIT						
St.Stephen's College, Pathanapuram						
Greenhouse Gas Mitigation through Major Energy Efficiency Projects						
Sl No	Projects proposed	Energy saved(Yearly)		Sustainability (Years)	First year ton of CO2 mitigated	Expected Tons of CO2 mitigated throughout life
		(kWh)	MWh	Years		
1	Energy Saving in Lighting by replacing existing 39 No's T8 (40W) Lamps to 18W LED Tube	823.68	0.82	10	0.60	6.01
2	Energy Saving in Lighting by replacing existing 38 No's T12 (55W) Lamps to 18W LED Tube	1008.22	1.01	10	0.74	7.36
3	Energy Saving by replacing existing 193 No's in-efficient ceiling fans with Energy Efficient Five-star fans	8301	8.30	10	6.06	60.59
Total		**10132**	**10**	**10**	**7.40**	**73.97**

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving in Lighting by replacing existing 39 No's T8 (40W) Lamps to 18W LED Tube	
Existing Scenario	
39 numbers of T8(40 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T8 may be replaced to LED Tube of 18W in phased manner and the savings will be of 55% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	39
Total load (kW)	1.56
Annual Energy Consumption (kWh)	1498
Expected Annual Energy saving for replacing all fittings (kWh)	824
Cost of Power	9.15
Annual saving in Lakhs Rs (1st year)	0.08
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.12
Simple Pay Back (in Months)	18.63

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving in Lighting by replacing existing 38 No's T12 (55W) Lamps to 18W LED Tube	
Existing Scenario	
38 numbers of T12(55 W) lamps were identified during the energy audit field survey in the facility. During discussion with officers it is observed that the average utility of these fittings are of 30%.	
Proposed System	
The existing T12 may be replaced to LED Tube of 18W in phased manner and the savings will be of 67% (inclusive of improved light output and reduced energy consumption)	
Financial Analysis	
Annual working hours (hr)	2400
No of fittings	38
Total load (kW)	2.09
Annual Energy Consumption (kWh)	1505
Expected Annual Energy saving for replacing all fittings (kWh)	1008
Cost of Power	9.15
Annual saving in Lakhs Rs (1st year)	0.09
Investment required for complete replacements [@Rs 300 per fittings](Lakhs Rs)	0.11
Simple Pay Back (in Months)	14.83

OTTOTRACTIONS- ENERGY AUDIT	
Energy Saving Proposal	
Energy Saving by replacing existing 193 No's in-efficient ceiling fans with Energy Efficient Five star fans	
Existing Scenario	
There are 193 numbers of ceiling fans installed in the facility with minimum 8 hrs a day operation. All are conventional type and most of them are very old.	
Proposed System	
There is an energy saving opportunity in replace the existing fans with new five star labelled fans. The five star labelled fans give a savings up to 30% with higher service value (air delivery/watt).	
Financial Analysis	
Annual working hours (hrs)	2400
Total numbers of ordinary fans	193
Total load (kW)	15.44
Annual Energy Consumption (kWh)	14822
Expected Annual Energy saving, for total replacement(kWh)	8301
Cost of Power (Rs)	9.15
Annual saving in Lakhs Rs (1st year)	0.76
Investment required for a total replacement (Lakhs Rs)[@3000 Rs per Fan with 50W at full speed]	5.79
Simple Pay Back (in Months)	91.48

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
St. Stephen's College, Pathanapuram					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 39 No's T8 (40W) Lamps to 18W LED Tube	0.12	0.08	18.6	824
2	Energy Saving in Lighting by replacing existing 38 No's T12 (55W) Lamps to 18W LED Tube	0.11	0.09	14.8	1008
3	Energy Saving by replacing existing 193 No's in-efficient ceiling fans with Energy Efficient Five star fans	5.79	0.76	91.5	8301
	Total	**6.02**	**0.93**	**41.65**	**10132**
(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials. The data of saving percentages are taken from BEE guide books and field measurements.)					

5

CONCLUSION

The carbon emission from different sectors namely, Energy, Transportation and wastes were calculated using standard procedures. Carbon sequestration by the trees present in the campus was also estimated. From these the total carbon footprint of the campus was arrived at.

Net Carbon Emission after implementing Energy Efficiency projects and Renewable Energy Projects Proposed		
1	Total Carbon Foot Print tCO_2e/yr	18.89
2	Carbon Sequestered tCO_2e/yr	8.15
3	Carbon mitigated by Renewable Energy tCO_2e/yr (Installed)	10.71
4	Carbon mitigated by Renewable Energy tCO_2e/yr (Proposed)	0.00
5	Carbon mitigated by Energy Efficiency (Proposed) tCO_2e/yr	7.40
6	Effective Carbon footprint tCO_2e/yr	-7.36
7	Total No of Students	698
8	Specific Carbon Footprint kg CO_2e/Student/Yr	-10.54

From this study it was found that carbon footprint of the campus to be **-10.54**$kgCO_2e$/ Student/ Year in place of current footprint i.e., **0.06** $kgCO_2e$/ student/ Year. To achieve this, an investment of **5.79 Lakhs Rs** is required through energy efficiency projects proposed. It will be around **830 Rs per student** to make the campus the carbon negative.

Cost to make the campus Carbon Negative		
1	Cost of implementation in Energy Efficiency Lakhs Rs	5.79
2	Cost of implementation in Renewable Energy Lakhs Rs	0.00
3	Total Lakhs Rs	5.79
4	Total number of students	698
5	Cost per student to make the campus carbon negative Rs/ Student	830

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OTTOTRACTIONS
Energy-Engineering-Environment

6

TECHNICAL SUPPLEMENT

Form 5																
Sl No	Name of the tree	Circumference (cm)	Radius (cm)	Radius (m)	Height (m)	Trunk volume (m^3)	Trunk Biomass (Ton)	Root biomass (Ton)	Total biomass (Ton)	Tree dry weight (Ton)	Carbon content of the tree (Ton)	Carbondioxide Sequestered (Ton)	No of Similer trees	Carbondioxide Sequestered (Ton) for all similer trees	Age of the tree (Years)	Carbon sequestered per year (Ton)
1	Jack Fruit	135	21.50	0.21	2.10	0.30	0.16	0.21	0.37	0.27	0.12	0.48	2	0.95	3	0.32
2	Anjili	127	20.22	0.20	2.80	0.36	0.19	0.25	0.44	0.32	0.14	0.56	4	2.25	4	0.53
3	Mahagoni	95	15.13	0.15	3.96	0.28	0.15	0.20	0.35	0.25	0.11	0.44	4	1.78	4	0.47
4	Mahagoni	57	9.08	0.09	6.00	0.16	0.08	0.11	0.19	0.14	0.06	0.24	4	0.97	3	0.33
5	Teak	54	8.60	0.09	6.20	0.14	0.08	0.10	0.18	0.13	0.06	0.22	13	2.92	5	0.59
6	Cocunut tree	54	8.60	0.09	5.30	0.12	0.07	0.09	0.15	0.11	0.05	0.19	11	2.11	4	0.51
7	Vatta	56	8.92	0.09	7.10	0.18	0.09	0.12	0.22	0.16	0.07	0.28	1	0.28	2	0.12
8	Jack Fruit	55	8.76	0.09	3.96	0.10	0.05	0.07	0.12	0.09	0.04	0.15	1	0.15	2	0.07
9	Cinnamomum	54	8.60	0.09	3.10	0.07	0.04	0.05	0.09	0.06	0.03	0.11	2	0.22	2	0.10
10	Teak	57	9.08	0.09	6.60	0.17	0.09	0.12	0.21	0.15	0.07	0.27	1	0.27	2	0.12
11	Teak	45	7.17	0.07	5.30	0.09	0.05	0.06	0.11	0.08	0.03	0.13	1	0.13	2	0.06
12	Acacia	61	9.71	0.10	4.20	0.12	0.07	0.09	0.15	0.11	0.05	0.19	1	0.19	2	0.09
13	Badam	53	11.20	0.11	3.30	0.13	0.07	0.09	0.16	0.12	0.05	0.20	1	0.20	2	0.09
14	Vatta	46	7.32	0.07	6.00	0.10	0.05	0.07	0.12	0.09	0.04	0.16	1	0.16	2	0.07
15	Cotton Tree	45	7.17	0.07	3.00	0.05	0.03	0.03	0.06	0.04	0.02	0.08	1	0.08	2	0.04
16	Aranamaram	45	7.17	0.07	3.70	0.06	0.03	0.04	0.07	0.05	0.02	0.09	19	1.77	4	0.47
17	Aranamaram	53	8.44	0.08	6.80	0.15	0.08	0.11	0.19	0.14	0.06	0.24	19	4.51	7	0.69
18	Yellow gulmohar	108	17.20	0.17	6.20	0.58	0.31	0.40	0.71	0.51	0.23	0.90	3	2.70	5	0.57
19	Nelli	66	10.51	0.11	5.80	0.20	0.11	0.14	0.25	0.18	0.08	0.31	1	0.31	2	0.14
20	Cheruthekku	54	8.60	0.09	6.20	0.14	0.08	0.10	0.18	0.13	0.06	0.22	1	0.22	2	0.10
21	Rubber	55	8.76	0.09	5.80	0.14	0.07	0.10	0.17	0.12	0.06	0.22	10	2.18	4	0.52
22	Tamerind	47	7.48	0.07	3.96	0.07	0.04	0.05	0.09	0.06	0.03	0.11	1	0.11	2	0.05
23	Bread Fruit Tree	45	7.17	0.07	6.00	0.10	0.05	0.07	0.12	0.09	0.04	0.15	1	0.15	2	0.07
24	Mahagoni	61	9.71	0.10	6.20	0.18	0.10	0.13	0.23	0.16	0.07	0.29	1	0.29	2	0.13
25	Mahagoni	53	10.90	0.11	5.30	0.20	0.10	0.14	0.24	0.18	0.08	0.31	1	0.31	2	0.13
26	Mahagoni	47	7.48	0.07	5.10	0.09	0.05	0.06	0.11	0.08	0.04	0.14	2	0.28	2	0.12
27	Mahagoni	45	7.17	0.07	3.96	0.06	0.03	0.04	0.08	0.06	0.03	0.10	1	0.10	2	0.05
28	Anjili	45	7.17	0.07	3.10	0.05	0.03	0.03	0.06	0.04	0.02	0.08	5	0.39	2	0.16
29	Jack Fruit	56	8.92	0.09	6.60	0.16	0.09	0.12	0.20	0.15	0.07	0.26	1	0.26	2	0.11
30	Jack Fruit	79	12.58	0.13	5.30	0.26	0.14	0.18	0.32	0.23	0.11	0.41	1	0.41	2	0.17
31	Mahagoni	88	14.01	0.14	4.20	0.26	0.14	0.18	0.32	0.23	0.10	0.40	1	0.40	2	0.17
32	Mango Tree	66	10.51	0.11	3.30	0.11	0.06	0.08	0.14	0.10	0.05	0.18	1	0.18	2	0.08
33	Mahagoni	43	6.85	0.07	6.00	0.09	0.05	0.06	0.11	0.08	0.04	0.14	1	0.14	2	0.06
34	Mahagoni	57	9.08	0.09	4.00	0.10	0.05	0.07	0.13	0.09	0.04	0.16	1	0.16	2	0.07
35	Mahagoni	52	8.28	0.08	3.70	0.08	0.04	0.06	0.10	0.07	0.03	0.12	1	0.12	2	0.06
36	Mahagoni	44	7.01	0.07	6.80	0.10	0.06	0.07	0.13	0.09	0.04	0.16	1	0.16	2	0.08
37	Mahagoni	86	13.69	0.14	8.20	0.48	0.26	0.34	0.59	0.43	0.19	0.75	1	0.75	3	0.27
38	Mahagoni	39	6.21	0.06	7.80	0.09	0.05	0.07	0.12	0.08	0.04	0.15	1	0.15	2	0.07
39	Mahagoni	42	6.69	0.07	7.21	0.10	0.05	0.07	0.12	0.09	0.04	0.16	1	0.16	2	0.07
40	Mahagoni	97	15.45	0.15	4.20	0.31	0.17	0.22	0.39	0.28	0.13	0.49	1	0.49	2	0.20
Total						6.57	3.48	4.60	8.08	5.86	2.64	10.26	125	29	3	**8.15**

NATIONAL SERVICE SCHEME

Unit No 32 A & B

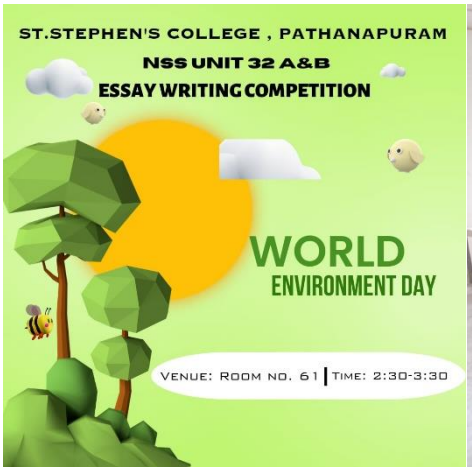
St. Stephen's College, Pathanapuram

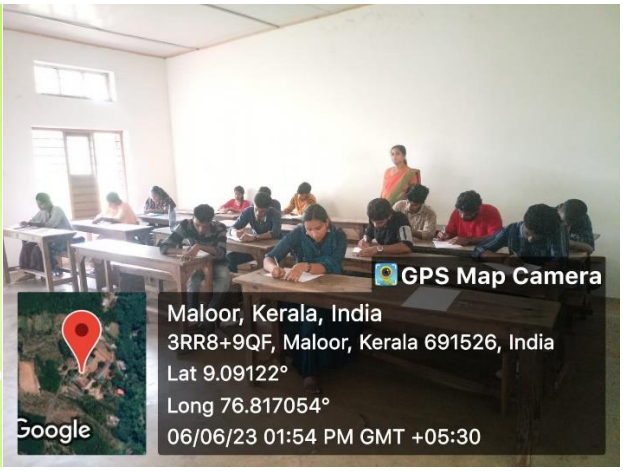
REGULAR ACTIVITY REPORT FOR THE YEAR 2023-2024

The National Service Scheme (NSS) is a Central Sector Scheme of the Government of India, Ministry of Youth Affairs & Sports. The sole aim of the NSS is to provide hands-on experience to young students in delivering community service. The Regular activities of National Service Scheme Unit No 32 A & B of St. Stephens College, Pathanapuram for the year 2023-2024 is as below:

1.World Environmental Day Celebration

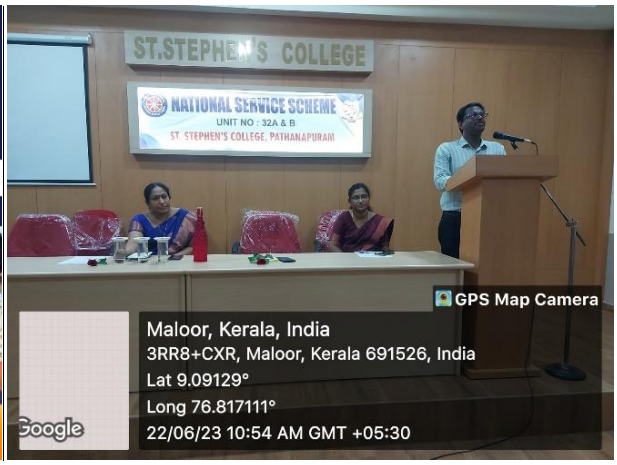
The NSS unit of St. Stephen's College conducted an Essay Writing Competition in connection with World Environmental Day on 06June 2023 at 2.30 pm in Room No.61. 14 Participants were participated.





2.World Blood Donor Day Celebration

The NSS unit of St. Stephen's College conducted an awareness class in connection with World Blood Donor Day on 22nd June 2023 at 10.30 am in ApremRamban Seminar Hall. Dr.Ranichandran L (Assistant Surgeon, PattazhiVadakekara) was the Chief Guest. The Presidential address was conducted by Mr. Roy John (Principal, St. Stephen's College, Pathanapuram), Welcome speech by the NSS P.O Dr.Sheeba K. John and Vote of thanks was given by NSS Volunteer Prasida P.S. 83 NSS volunteers were participated.



3.Anti Drug Awareness Programme

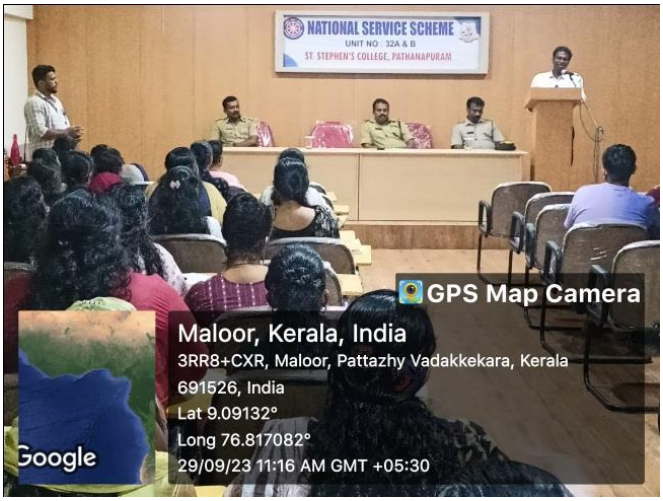
The NSS unit of St. Stephen's College in association with anti drug committee conducted an awareness programme about anti drug on 04/07/2023 at Room No.47. NSS volunteers presented their ideas for a 10 min. speech. 80 NSS volunteers participated in this programme.

4.Charity

In connection with Onam celebration of our college, the NSS volunteers donated a 'MIXER GRINDER' to Ms.Sulochana on 23/08/2023.

5.Awareness Class

Drug awareness class was conducted on 29th September 2023 at AphremRamban Seminar Hall at 10.30am by Pathanapuram excise division and NSS unit of St.Stepehn's College. Excise officers Mr.Muhammed Ansari and Mr.Arunkumar were the Chief Guests. After that a Quiz competition was held by excise department. First year students Mr.Ramananth from Chemistry department & Ms.Sruthy from Zoologhy Department got first and second prizes. 85 NSS volunteers were participated in this programme.



6.KERALA PIRAVI PROGRAMME

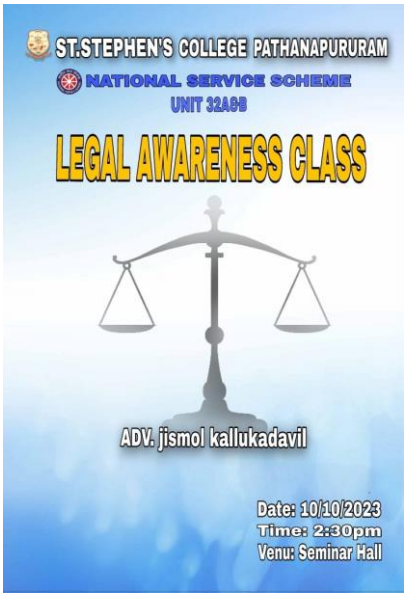
NSS Unit of St Stephen's College, Pathanapuram on 3rd October 2023 at 11:00 am conducted a Seminar on Kerala Piravi Day and Malayalam Language Day. In this program Mr.Linu Joshi, Ms.Ramadevi .V. P and Ms.Aswathy. M. G were the chief guests. After that, Syriac language teacher Father George Mathew welcomed everyone and Principal Mr. Roy John presided over the seminar. Then the Panchayat President Ms.Ramadevi . V.P inagurated the programme. Later, Panchayat member and alumnus of St. Stephen's College Ms. Ashwathi M.G. gave her greetings to all. After that, the main speaker and honorable teacher Mr.Linu Joshi started the Seminar. He was able to present the classes to the students in a very attractive manner.65 NSS volunteers were participated in this programme.

7. Campus Cleaning

A college level campus cleaning was conducted by the NSS volunteers on 06/10/2023. 100 NSS volunteers were participated in this programme

8. Legal Awareness Class

The NSS unit of St.Stepehens College, Pathanapuram Organized a Legal Awareness Class on 10/10/2023. Adv. Jismol Kallukadavil was the chief guest. 100 NSS volunteers were participated in this programme

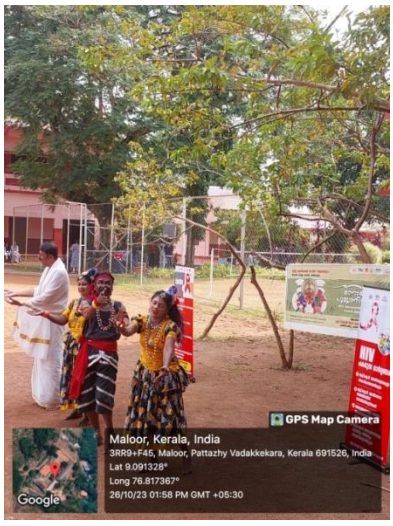


9. Quiz Competition

As a part of Excise department of kollam district, district level quiz programme was conducted at SN college, kollam on 21st October 2023 at 10 am. From B.Sc. first year students Ramnadh and Sruthy were selected from St Stephen's college to attend the quiz programme

10.AIDS AWARENESS DRAMA

The NSS unit of St.Stepehens College, Pathanapuram conducted an 'AIDS AWARENESS DARMA' on 26/10/2023. It was organized by the Health Center, Pathanapuram & presented by the members of Kalakshethra, Pathanamthgitta. All the students from the college participated in this programme.

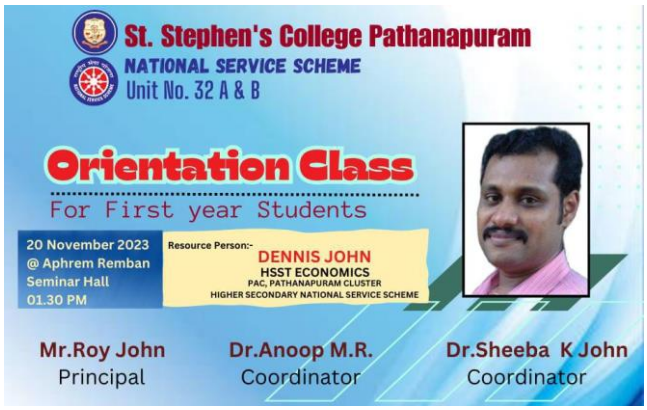


11.Celebration of Vigilane Awareness Day

The NSS unit of St.Stepehens College, Pathanapuram celebrated the 'VIGILANCE AWARENESS DAY' on 03/11/2023. A poster presentation programme was arranged by the volunteers. 25 NSS volunteers prepared their posters and presented.

12. ORIENTATION CLASS

The NSS unit of St.Stepehens College, Pathanapuram Organized an Orientation Class for First Year students on 20/11/2023 at 1.30pm. Mr. Dennis John(HSST Economins) was the chief guest. 100 NSS volunteers were participated in this programme.



13. CELEBRATION OF HUMAN RIGHTS DAY

The NSS unit of St.Stephen's College, Pathanapuram conducted a poster making competition in connection with International human rights day on 10-12-23, 10:30 am at NSS office .The program was inaugurated by NSS Programme Officer Dr. Sheeba K John. 20 NSS volunteers attended in this programme.

14. CAKE FEST

The NSS unit of St.Stepehen's College, Pathanapuram Organized a 'CAKE FEST' in association with Vipani, Women's Cell & College Union on 21/12/2023 at 10.30am. Mr. Roy John, Principal (St.Stephen's College, Pathanapuram) was the Chief Guest. 100 NSS volunteers were participated in this programme.

15. CHARITY

The NSS unit of St.Stepehen's College, Pathanapuram distrtibuted stationary items to three families from the income generated from the 'CAKE FEST' on 22/12/2023 at 10.30am. All the NSS volunteers were participated in this programme.

16.MY BHARATH LINK REGISTRATION

The NSS Unit of St Stephen's College, Pathanapuram organized My Bharat link registration class on 8th January 2024 at 11:00 am at Room No.47. The NSS volunteer welcomed everyone and the NSS Programme Officer Dr. Sheeba K John presided over the class. The vote of thanks was done by one of the NSS volunteer. Around 100 NSS volunteers attended the program.

17. Campus Cleaning

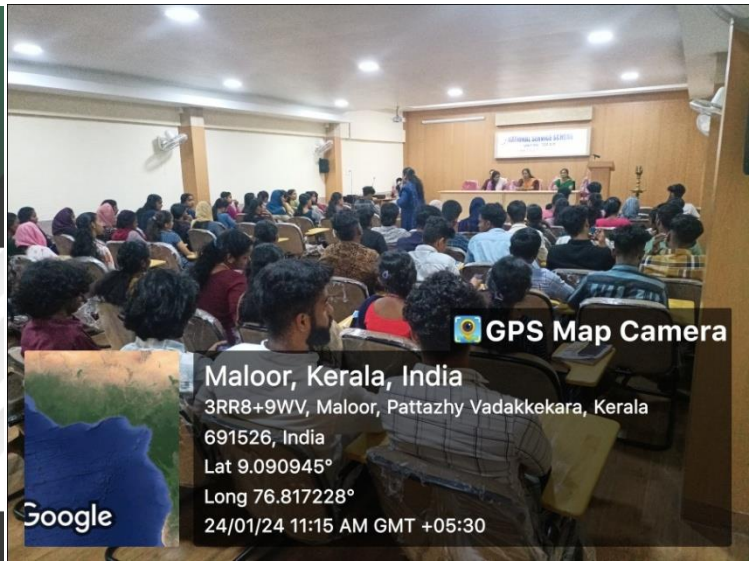
A college level campus cleaning was conducted by the NSS volunteers on 13/01/2024. 100 NSS volunteers were participated in this programme.

18. CELEBRATION OF NATIONAL YOUTH DAY

The NSS unit of St. Stephen's college, pathanapuram organized National Youth Day program at NSS office on 16th January 2024 at 10:30 a.m. The program was inaugurated by NSS coordinator Dr Sheeba K John. As part of National Youth day, NSS unit decide to conduct an essay writing competition about National Youth day and 20 NSS volunteers attended the program.

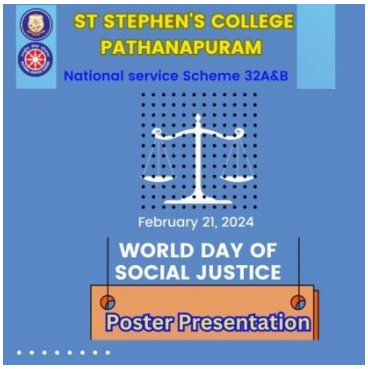
19. AWARENESS CLASS ON GENDER EQUALITY

The NSS unit of St.Stephen's College, Pathanapuram Organized Gender relations and self defence training class on 24th January 2024 at Aprem Remban seminar hall at 10:20 am. The Chief Guest was Ms Arathy Mohan who is the founder of LAMBDA Thapas. This programme started with the NSS song. Dr.Sheeba.k.John Programme Officer of NSS unit welcomed the chair. Then the honourable College Principal Mr.Roy John delivered the inaugural address. After that the Keynote speaker of the program Ms. Arathy Mohan led the training class. The program was then concluded by the vote of thanks which was done by NSS volunteer.100 NSS volunteers participated in this programme.



20. CELEBRATION OF SOCIAL JUSTICE DAY

NSS unit of St. Stephen's college, pathanapuram conducted World social justice day program at NSS office on 21th February 2024 at 10:30 am. The program was inaugurated by NSS PO Dr. Sheeba K John. As part of World day of social justice, NSS unit decide to prepare posters about World day of social justice and around 20 NSS volunteers attended the program.

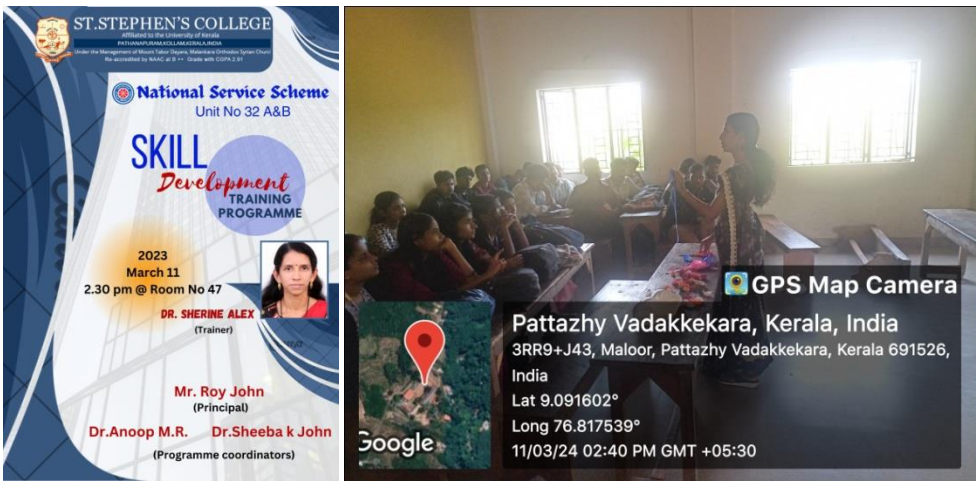


21.Celebration of international Womens Day

The NSS unit of St. Stephen's College, Pathanapuram conducted an essay writing competition in International Women's day on 07-03-24, 10:30 am at NSS office on the topic based on "Invest in women : Accelerate progress". The program was inaugurated by NSS PO Dr Sheeba K John. Around 25 NSS volunteers attended in this program

22. SKILL DEVELOPMENT TRAINING PROGRAMME

As a part of Pathanapuram St Stephen's College NSS unit a skill development class was held on 11- 03 -2024, 2.30 pm for the first year students at Room no: 46. In this programme the main objective was to make the students about to find their skill development abilities and to know various skills and tricks in designing arts. The programme was welcome by cordinator of NSS program Dr. Sheeba.K.John and the programme was inaugurated by Dr.Sherin Alex who is the Assistant Professor in Chemistry Department. Then Dr. Sherin Alex conducted the skill development class which was well interactive and had all primary information about topic which students needed.



Nature club activities 2023-24 - Report

Nature club teaches students to love their nature and conserve the resources in it. This organization is focused on increasing students understanding and appreciation of nature and raising awareness about the consequences of human activities on the natural world. Also, nature club aims at inculcating an appreciation of nature among students and encouraging them to participate in a variety of conservation initiatives.

An executive meeting of nature club unit was held on July 31st 2023. Class representatives were participated and a whatsup group were created and interested students from different streams were joined the club. Aarathy A.S, 2nd year BSc Botany and Althaf Muhammad M.S, 1st year BSc Botany were selected as secretary and joint secretary respectively.

The inaugural programme of nature club 2023-24 was held on 29th November 2023 10:30am at college seminar Hall. The chief guest of the meeting was Mr. Dinesh S, Deputy Forest conservator (RTD) Kollam. Principal incharge Dr.Blessy John inaugurated the Nature club unit and addressed the gathering. Mr.Sandhu John Sajan, IQAC Coordinator was felicitated the section.

The nature awareness programme was conducted by nature club jointly with social forestry Extension unit Kollam. Mr. Dinesh S, Deputy Forest conservator (RTD) gave an informative talk about nature conservation. K. S Harilal, Deputy Forest range officer, Mr.Reji S.R, Section forest officer were actively participated in the awareness programme. 81 students from various departments were actively participated.

Pathanapuram
18/03/25

Ms.Chinju Merin Abraham
Nature club Coordinator

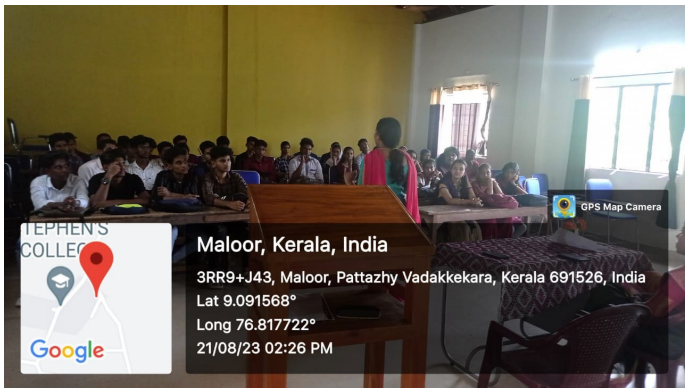
Report of Entrepreneurship Development Club 2023-2024

Entrepreneurship Development Clubs have been formulated in colleges to inculcate Entrepreneurial Culture amongst youth and equip them with the skills, techniques and confidence to act as torch-bearers of entrepreneurship of the new generation. ED Club conducts programmes to inculcate entrepreneurship qualities, to sensitise industrial scenario of the state, to nurture the latent entrepreneurial talent, develop awareness among its members of the attitudes, values, and skills of successful entrepreneurs around the globe etc.

ED club of St. Stephen's College, Pathanapuram has conducted many programmes during the academic year 2023-24 with the above objectives.

1. Celebration of World Entrepreneurship Day (21.09.2023)

Every year, August 21 is celebrated as World entrepreneurship Day to recognise the risk takers and trailblazers who transforms ideas into reality. This year ED club of the college in association with the Department of Commerce and under the auspices of Institutional Innovation Council (IIC) conducted an experience sharing programme to celebrate the Day. Ms. Athira G. K, II Year M. Sc Physics of our college shared her journey from an ordinary student to student entrepreneur. She is the proprietor of Shiva Food Products and also a member of ASAP Skill Development Executive. Her journey of courage and willpower kindled the entrepreneurial attitude of the aspiring entrepreneurs. 38 students and five teachers participated in the programme.

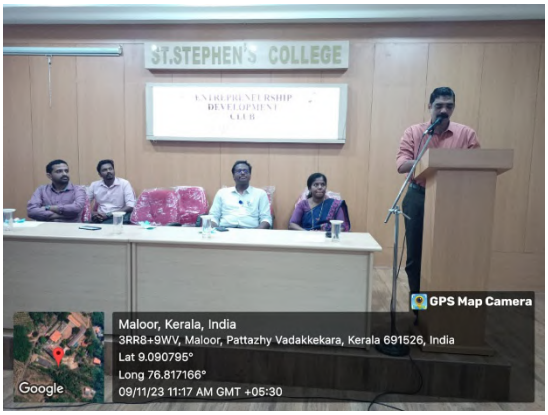


2. Industrial Visit (04.11.2023)

The ED club in association with the Department of Commerce visited Kerala Industrial Infrastructure Development Corporation (KINFRA), Punalur unit. The industrial visit aimed at helping the aspiring entrepreneurs to prepare for their future work positions by exposing them to practical challenges. The team of 40 students led by Dr. Deepa T. S and Mr. Blesson Mathew visited two industrial units working at

KINFRA-M/s Golden Cherry International and M/s Design IT interiors. The students interacted with the entrepreneurs and workers there. The production processes were exhibited and explained to the team by the staff. The visit was really helpful for the students.

3. National Entrepreneurship Day Celebration (09.11.2023)



The ED club in association with the Department of Commerce organised a seminar on "Entrepreneurial Opportunities under DIC" in connection with the National Entrepreneurship Day. Mr. John Mathew, Assistant District Industries Office, Pathanapuram delivered the keynote address. He emphasised the role of DIC in the context of NAVA KERALA (New Kerala). He encouraged students to take up risk and become a successful entrepreneur. 80 students and six faculty members participated in the programme.

4. One Day Workshop on "Creativity to Startups"

A workshop in association with Department of Economics and IEDC was conducted on 19.03.2024 on "Creativity to Startups". The session was handled by Mr. Jikku James, Nodal Officer, IEDC, St. Thomas College, Ranni.

DEPARTMENT OF BOTANY

REPORT OF ACTIVITIES

2023-2024

WORLD ENVIRONMENTAL DAY CELEBRATIONS-2023; 05 June 2023

The Department of Botany celebrated World Environment Day 2023. The theme for World Environment Day on 5 June 2023 focussed on solutions to plastic pollution under the campaign #BeatPlasticPollution. The event aimed to engage students, faculty members, and the wider community in thought-provoking discussions, educational activities, and initiatives that promote sustainable practices.

The event began with a welcome address by the Head of the Department Fr. Dr. Roy John, emphasizing the significance of World Environment Day and the role of botany in understanding and preserving the environment. The importance of plant diversity and its impact on ecosystem health were highlighted.

The programme was inaugurated by Roy John, Principal. He pointed out the need for conserving the nature in sustenance of life.

Poster Exhibition: Students displayed a series of informative posters that showcased various plant species, their ecological importance, and the threats they face. They also exhibited posters on the theme topic. The exhibition aimed to educate attendees about the delicate balance of nature and the importance of maintaining it.

By bringing together education, awareness, and practical initiatives, the celebration inspired attendees to be conscientious stewards of the environment and advocates for sustainable practices. Faculty members, research scholars and students participated in this programme.

SEMINAR ON PHYTOCHEMISTRY-07 JUNE 2023

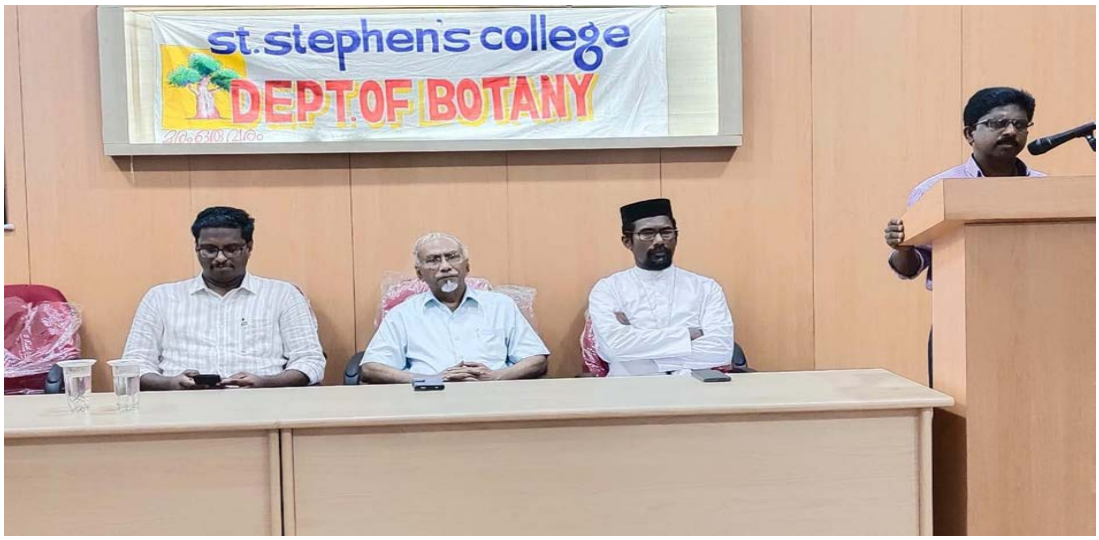
A one-day seminar on "Phytochemistry: Exploring the Wonders of Plant Chemistry" was organized with the aim of providing participants with insights into the fascinating world of plant compounds and their significance in various fields. The seminar brought together academicians and students interested in the study of phytochemistry.

The seminar commenced with a warm welcome address by Fr. DR. Roy John, Head, Dept. of Botany. The chief guest emphasized the interdisciplinary nature of phytochemistry and its potential to address global challenges. The programme was inaugurated by Roy John, Principal.

Dr. Mammen Daniel, a distinguished phytochemist, delivered the keynote address. The presentation provided an overview of phytochemistry, its historical development, and its contemporary applications. He emphasized the critical role of phytochemical research in drug discovery, plant physiology, and ecological interactions.

The one-day seminar on phytochemistry provided a platform for fruitful discussions and knowledge exchange among participants. It underscored the significance of plant

compounds in various domains, from medicine and agriculture to food science and environmental conservation.



30.07.23 Alumni meet

An alumni meet of B.Sc 2001 batch was held on 30.07.23.

17.08.2023

PTA meeting of S5 B.Sc was held.

23.08.2023

Onam was celebrated by whole college. Department made floral carpet and conduct various competition for students.

PTA Meeting- Semester IV M.Sc. Botany 14 August 2023

Semester IV M.Sc. Botany PTA meeting was held on 14 August 2023 at College seminar hall. Teachers shared information about the classroom activities and student progress. The meeting provides an opportunity for the parents to raise their queries and share their ideas regarding student related activities.

PTA meeting for B.Sc Semester II(2022 admission) - 15th September 2023

A class PTA meeting was conducted on15/09/23 Friday 10;00 am for the semester II U.G students at seminar hall. Ms.Chinju Mrin Abraham welcomed the gathering, Fr.Dr.Roy John (HoD) delivered the presidential address, Dr.Shibu P.Varughese & Dr.Praveen Dhar were addressed the parents and students. A total of 14 parents along with their wards and teaching faculties were attended the meeting. Semester II internal examination result was critically evaluated and conveyed to parents especially to failed students and slow learners. Feedback from parents were collected, open discussion and personal interaction were conducted and the meeting was concluded at 12:45 pm after tea.

One day training program was conducted for M.Sc 1 and 2 year students at National Institute for Rubber, Kottayam- 20th October 2023

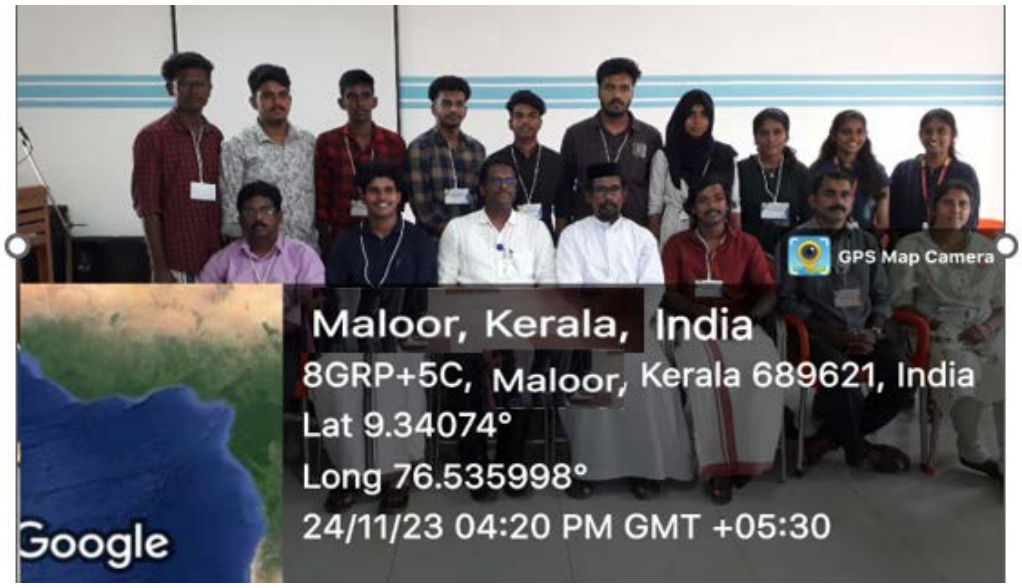
One day training programme was conducted for P.G students on 20th October 2023 to the National Rubber Research Institute Kottayam, as a part of '**SHASTRADARSHAN'** organised by the NIRT, Kottayam. Students visited the Agronomy and Soil division, Genomics division, Biotechnology lab, Botany Division, Microbiology lab, Physiology division, Pathology division and learned about the various equipment used in different scientific experiments and finally the processing and making of latex products were observed.

08.11.2023

One day workshop on " Floristic diversity of the Western Ghats- Scope for Herbal technology start-ups". Dr K B Rameshkumar, Principal Scientist, JNTBGRI, Plaode was resource person.

College Union Election 2023-2024; 24 November 2023

The Department of Botany conducted the College Union Election 2023-2024 on 24 November 2023. It was started with Notification of election on 10 November 2023 and proceeds with Publication of electoral roll, scrutiny of nominations, publication of final list of candidates, polling and counting of votes etc. The entire faculty members of the Department, including non teaching staff uphold fairness and transparency, and facilitate the smooth functioning of the election in accordance with the guidelines.



One Day seminar on "Nature Conservation" - 29th November 2023

As part of the nature awareness programme of the department a one day seminar and invited talk on "Nature conservation" was conducted jointly with Kerala Forest & Wildlife department, Social Forestry Extension unit Kollam on 29.11.23, 10:30am at seminar hall. Principal in-charge Dr.Blessy John inaugurated the meeting, chief guest and resource person of the meeting was Mr.Dinesh S, Deputy Forest Conservator(RTD) Kollam. Mr. K.S Harilal, Deputy Range forest officer; Mr.Reji S.R, Section forest officer and Mr. Sandhu John Sajan, IQAC Coordinator, felicitated the meeting. 81 students from various department were actively participated.

13.12.2024

Very Rev Aprem Ramban memorial lecture was held. Dr. Achuth Sankar S. Nair, Professor , Department of Computational Biology and Bioinformatics, University of Kerala delivered memorial talk.

M.Sc internship

One week internship for M.Sc students was held from 18.12.2024 to 23.12.2024 at Sangrose Laboratories Pvt Ltd, Mavelikara

25.01.2024

PTA meeting for B.Sc S5 was held.

22.03.2024

Inauguration of Botany Research Center

The University of Kerala has approved the Department of Botany, St Stpehen's College, Pathanapuram as a research center in Botany. Kerala Transport Minister Sri K.B. Ganesh Kumar inaugurated the Center. Principal Mr Roy John welcomed the gathering. HG Dr Joseph Mar Dionysius, Metropolitan of Kollam Diocese delivered blessing speech. Very Rev Dr N J Koshy, Treasurer of Mount Tabor Diara presided over the meeting.

Seminar on Plant Diversity: Significance.

In the afternoon section Dr. Mathew Dan, Principal Scientist, JNTBGRI, Palode delivered a lecture on Plant Diversity: Significance. Faculties and students of the department actively participate in the meeting

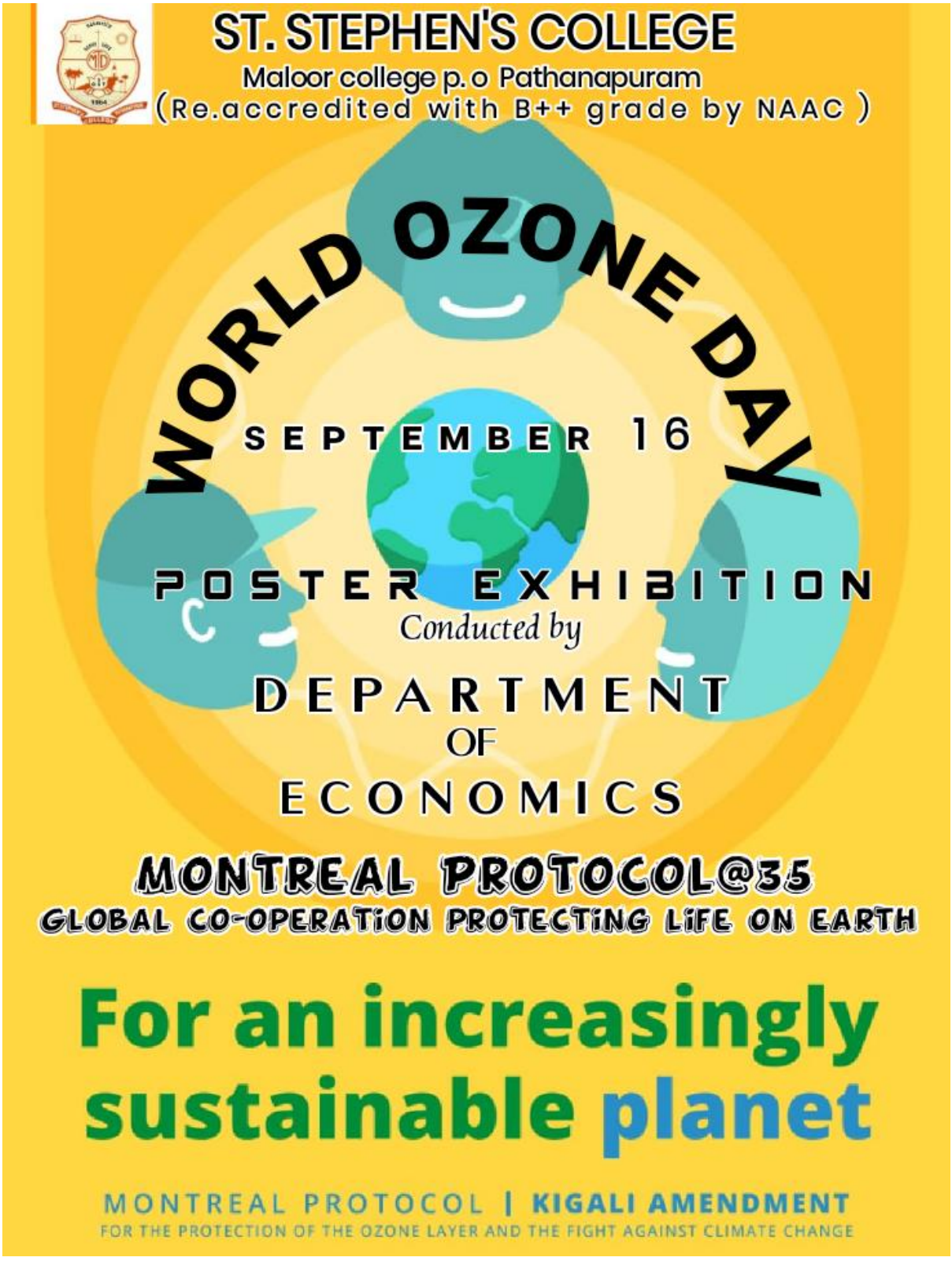
Students Achievement

Ms Athira Prasad of B.Sc Botany 2017-2020 secured CSIR NET

Ms. Amrutha A, B.Sc. Botany 2017-2020 got staff selection recruitment and placed at Naval Base, Kochi.

Mr Robin J Raj of B.Sc 2019 get Job - Livestock officer in Animal Husbandry, Government of Kerala

6.OZONE DAY CELEBRATION(SEPT.16)



ST. STEPHEN'S COLLEGE, PATHANAPURAM

Annual Report- Energy Conservation Club (2023-2024)

The Energy Conservation Club at St.Stephen's College,Pathanapuram strives to foster awareness and action towards sustainable energy practices among students, faculty, and the broader community. Over the past year, we have diligently pursued our mission to promote energy conservation, educate others about its importance, and implement impactful initiatives within our campus.

Through our club's efforts, we aim to instil a culture of energy consciousness and responsibility among individuals, empowering them to make informed decisions and take meaningful actions towards conservation.

Conducted numerous awareness campaigns through workshops of LED making, seminars, and social media platforms to educate students and faculty about the importance of energy conservation.

Distributed informative materials and resources highlighting practical tips and techniques for energy-efficient living.

Energy Audits and Efficiency Measures:

Collaborated with campus facilities management to conduct energy audits, identifying areas for improvement and implementing energy-saving measures. Installed energy-efficient lighting systems such as LED's, implemented power management strategies, and promoted the use of renewable energy sources such as solar panel where feasible.

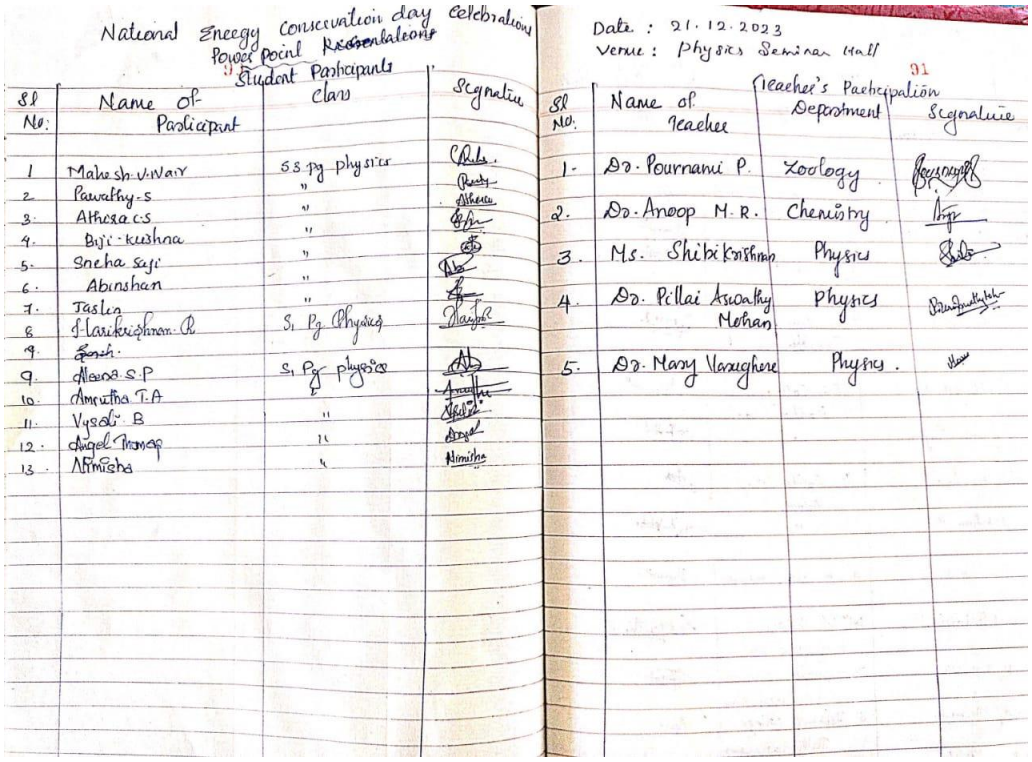
Student Engagement Initiatives:

Organized interactive events and competitions to actively engage students in energy conservation efforts. Also, in association with National Energy Conservation Day Celebrations, there was hosted a Power Point Competition on 21th December 2023 at 11.30 am under the auspices of the Energy conservation club and Post Graduate Department of Physics, where students showcased their innovative ideas and solutions for energy conservation through presentations.

Winners were awarded for their creativity and contributions towards sustainability.

Future Directions:

Looking ahead, the Energy Conservation Club is committed to expanding its impact and continuing to spearhead efforts towards a more sustainable and energy-efficient campus. We will seek to strengthen partnerships, enhance educational initiatives, and implement innovative solutions to further our mission of promoting energy conservation and environmental stewardship.



National Energy Conservation day Celebrations
Power point Presentation
Student Participants

Sl No:	Name of Participant	class	Signature
1	Mahesh.V.Nair	S.S.Pg physics	
2	Parvathy.S	"	
3	Athira.C.S	"	
4	Biji krishna	"	
5	Sneha Saji	"	
6	Abinshan	"	
7	Jasla	"	
8	J.Harikrishnan.R	S.Pg Physics	
9	Ganesh		
9	Aleena S.P	S.Pg physics	
10	Amritha T.A		
11	Vysali B	"	
12	Angel Thomas	"	
13	Nimisha	"	

Date : 21.12.2023
Venue : Physics Seminar Hall

Teacher's Participation

Sl No.	Name of Teacher	Department	Signature
1.	Dr. Pournami P.	Zoology	
2.	Dr. Anoop M.R.	Chemistry	
3.	Ms. Shibi Krishnan	Physics	
4.	Dr. Pillai Aswathy Mohan	Physics	
5.	Dr. Mary Varughese	Physics.	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3RR9+F45, Maloor, Pattazhy Vadakkekara, Kerala 691526, India
Lat 9.091555°
Long 76.81727°
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Google


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3RR9+F45, Maloor, Pattazhy Vadakkekara, Kerala 691526, India
Lat 9.091554°
Long 76.817266°
21/12/23 12:01 PM GMT +05:30
Google


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Long 76.817115°
21/12/23 11:20 AM GMT +05:30
Google


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Long 76.817266°
21/12/23 12:01 PM GMT +05:30
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3RR9+F45, Maloor, Pattazhy Vadakkekara, Kerala 691526, India
Lat 9.091541°
Long 76.817311°
21/12/23 01:01 PM GMT +05:30
Google


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