ST. STEPHEN'S COLLEGE UZHAVOOR

# GREEN AUDIT REPORT

## JANUARY 2020

KOTTAYAM SOCIAL SERVICE SOCIETY

ENERGY AUDIT
WATER AUDIT
BIODIVERSITY AUDIT
WASTE MANAGEMENT AUDIT
CARBON AUDIT

# Preface

Envisioned by the creative and the futuristic leadership of the Knanaya Catholic Church in 1964, St.Stephen's College was established in Uzhavoor. The College is affiliated to the Mahatma Gandhi University, Kottayam and ever since its inception has made an indelible mark in the higher education scenario of Kerala. The College started its functions modestly as a Junior college affiliated to the University of Kerala with 218 students in four Pre-degree batches and seven faculty members. With great visionaries like Rev. Msgr. Dr. Peter Uralil, the founder Principal, in its administrative hierarchy and diligent teaching staff, the institution set on a fast pace of development despite the initial handicap in transportation facilities and the difficulties of being in a remote rural location. In 1968, the College was upgraded from the status of a Junior college, with the introduction of Undergraduate courses in Mathematics, Physics, Zoology, Economics and English Literature. Now the institution has four Post Graduate courses and nine Undergraduate courses to its credit. This underlines the strong scholastic tradition of the institution that spans over half a century. The College was assessed and accredited for the first time in 2003 and was accorded with 'B+' grade status.
The growth of the infrastructure of the College has been in tune with its growth in its academics activities. The facilities available include technology enabled learning space, science, language and computer labs. The automated spacious library with INFLIBNET facilities and the provision to access reference books, e journals and widely circulated magazines is truly an asset to the College. The Research Cell of the College aims at promoting research culture among the faculty. The K.R Narayanan Study Centre, an interdisciplinary unit which concentrates on research on the ideas and concerns of the former President of India, Late Dr. K.R. Narayanan, has been instrumental in the conduct of seminars and symposiums in collaboration with other units and institutes in the society. We are earnestly looking forward to the upcoming NAAC peer team visit for the assessment and accreditation as it would definitely help us rectify our shortcomings and also ensure sincere efforts to optimize excellent educational environment. We are resolute to uphold our mission to provide knowledge and values. The College in its Golden Jubilee year is all spruced up for the NAAC visit and is eagerly looking forward to it.

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## Executive Summary

As per the recommendations of the Green audit conducted during the academic year 2018-19, the following measures were taken during the academic year 2019-20. Major steps taken-

- Minimizing electricity consumption
- Bio-diversity enhancement in the campus
- Plastic waste reduction and improvement of solid waste management
- Promotion of Vehicle pooling to reduce carbon emission

. The cooperation and dedication shown by IQAC and CEERD club members of the College, during this audit phase was remarkable. By implementing the recommendations of Green Audit 2018-19, has enhanced green shades of the campus, reduced electricity, improved solid waste management, limited plastic wastes and reduced carbon emission inside the campus planning of future projects, and a document for implementation of sustainable development of St Stephen's College Uzhavoor.

Fr. Sunil Perumanoor
Secretary
Kottayam Social Service Society(KSSS)
Kottayam

# 1 Pre-Audit Stage

## 1.1 Introduction, Scope and Goal

Education means much more than acquiring knowledge or skills. it encompasses holistic development of the individual based on truthfulness, values and discipline. St. Stephen college Uzhavoor, with its distinct identity and tradition spanning more than half a century has been embracing its dear children towards fulfillment of 1 these goals. The college which belongs to the Arch-Diocese of Kottayam (Knanaya Catholic Community) is affiliated to the Mahatma Gandhi University. The College was graded B by the National Assessment and Accreditation Council (NAAC) in 2015. The brain child of His Excellency Rev. Dr. Thomas Tharayil, the then Bishop of the diocese of Kottayam, the college was established in 1964. Sri. Joseph Chazhikadan MLA and Rev. Fr. Peter Uralil, the first Principal of the college, were the guiding forces behind this noble endeavour. They were supported and encouraged by the active cooperation of the people of Uzhavoor and a host of well-wishers. The college is located in Uzhavoor, an expanding town in Kottayam district, Kerala in India. It is just 32 km away from the administrative capital Kottayam District. Since the area was famous for its agricultural practices, it is believed that the name Uzhavoor came from two Malayalam words Uzhavu (Ploughing or a word related to agricultural practices) and Ooru (Place or Region). When translated, it means The Land of Agriculture. The people of this village who belong to different religions and communities live here in peace, harmony, and unity. Former President of India K. R. Narayanan, who came from one of the poorest families of this village, is the role model for these people even today. St. Stephen's College is an academic fraternity of individuals dedicated to its motto. We strive to reach out to the star of human excellence based on the love of God and service to mankind as modelled in Jesus Christ, in a background of Indian heritage so as to produce intellectually trained, morally upright, socially committed and spiritually inspired citizens. Translating the vision into action, St. Stephen's College gives quality education that includes the imparting of sound learning, building of character, the spread of Truth and the knowledge of God. And inculcate moral values, social commitment and dignity of labour among the youth through value education programmes. Also helps to develop an attitude of reconciliation between man and nature which will help students to become peacemakers, defenders of the poor and keepers of the environment. In the beginning, St. Stephen's was a Junior College with four batches of Pre-Degree courses. The small step taken in 1964 culminated into a giant leap in a few decades. In 1968 the college was upgraded to the degree level. Today it has gained in strength and size with 4 postgraduate courses, 8 undergraduate courses, a computer centre, a media centre, a full-fledged library and its reading room, a big auditorium, a ladies' hostel, a well-functioning canteen, a co-operative store, spacious staff-rooms, rest rooms for students, a medicinal garden, a vermicompost unit, large grounds for sports and games, an indoor stadium and ample parking facilities. From its humble beginnings in remote and undeveloped place Uzhavoor, St. Stephen's College became the epicenter of development and progress of its locality in the past fifty years. The community comprises around 1100 students, 60 teachers and 25 members of the non-teaching staff. The dedication of the management and the community, combined with excellent infrastructural and teaching facilities help maintain high Standards in curricular and co-curricular spheres of the institution.

The road to excellence is an uphill task that calls for a consolidated effort by all the stake holders of the institution, comprising the management, staff, parents, alumni and the local community. Together they create a conducive atmosphere that ensures all round development of the students in particular and the community and society in general, elevating St. Stephen's College into greater and nobler heights, setting new benchmarks for excellence. In keeping with the lofty vision, St.stephen's College is a melting-pot of students from all communities and creeds, thus preserving a secular character by promoting the

ideal concept of love and service. The institution aims to empower and make student's life ready for an emerging world by inculcating in them the spirit of intellectual enquiry, independent thinking, self- reliance, leadership, co-operation, expression of cultural talents, social service and eco consciousness. The college prepares students to become Global Citizen through cooperation and peaceful coexistence and inspire them for lifelong learning.

CAMPUS INFRASTRUCTURE

MAIN BLOCK The main block of college was blessed by His Grace Mar Thomas Tharayil in 1964. The main building consisting of classrooms, Laboratories, principal's room, bursar's room, College office, various department, department libraries, College library, astroview centre, zoology Museum, Language lab, seminar hall, media room , Unarvu etc.

THE COLLEGE LIBRARY The college library is the key resource of information for the academic community. It started functioning right from the beginning of the College in 1964. At present it has attained the position of a First Grade Library with more than 34,000 books and 150 periodicals and a subscription of 10 newspapers. Xerox facility is also available in the library. The library is automated using 'Koha', a well known open source integrated library management software which has a number of advanced features, Enabling the college library to become more user oriented in the current digital era. Besides very suitable and convenient library administrative modules, Koha software can provide a handful of attractive interfaces from the user point of view, like Quick Search and access, Web-OPAC, and the feasibility of of integrating new technologies like RFID. The library has a website which lists the services offered by the library for users. It also provides links to other information resources. The college library consists of reference library, reading room and general library section. Photocopy service is also available in the library.

MSGR. PETER URALIL BIBLIOTHECAL INFORMATION CENTRE Msgr Peter Uralil Bibliothecal information Centre was established in the College Library in 1995. Msgr. Peter Uralil was the Founder Principal and Pro-manager of the College for a long time. The aims and objectives of the Centre are to improve the quality of education, to facilitate access to the library resources more efficiently, to improve house-keeping operations, to improve the efficiency or services to users and to provide career and course guidance. The students and staff of the college can have the services of the Centre during the working hours of the library.

BISHOP KUNNACHERRY COMPUTER CENTRE Bishop Kunnacherry computer centre was established as a nonprofit academic body with the specific mission of imparting high quality Computer Education to young men and women aspiring for a career in Computer technology. Over the years many students have benefited from the various training programmes of the center. As a token of recognition, the center has been granted with accreditation by the department of Electronics, Government of India. The centre provides high quality short-term and cost effective programs in software engineering and computer application. The centre is also affiliated to Xavier Board of computer education in India (XBCE). The centre has also been granted full accreditation by DOACC to conduct DOEACC 'O' LEVEL computer course. DOEACC Is an autonomous body of the Department of Information Technology, Ministry of Communications and Information Technology, Government of India.

BISHOP THARAYIL SEMINAR HALL Bishop Tharayil Seminar Hall is named after the Founder patron of the college, Bishop Mar Thomas Tharayil. This Seminar Hall with a capacity of more than 150 seats is equipped with all modern amenities. It is utilised for various college activities including regional and national seminars.

COLLEGE AUDITORIUM The College auditorium called, "The Chazhikattu Hall" is named after the late Sri Joseph Chazhikattu who was a member of the Kerala Legislative Assembly. He was a visionary who held the interests of the people of Uzhavoor close to his heart and was instrumental in getting Govt. sanction

for the college in 1964. This spacious Hall with a capacity of more than a thousand seats is utilised for all common functions of the college.

MEDIA CENTRE This centre has a seating capacity of fifty. It is equipped with art communication equipments which include an O.H.P. slide projector, L.C.D. and Computer. Instructional sessions are carried out here with the help of these modern gadgets.

ENGLISH LANGUAGE LAB The English Language Lab facilitates students to fine tune their communication skills. It can accommodate 24 students at a time and is equipped with modern amenities like computers, DVD Player, latest language software, LCD etc.

MEDITATION CENTRE – 'UNARVU" A special meditation centre named 'Unarvu" is open from 9 A.M. to 5.00 P.M. for the use of staff and students. It helps to be more peaceful . And this Discipline improves brain function, increase optimism and enhance alertness among students.

COMPUTER LAB The Commerce computer lab was installed in the year 2013 with the MP fund of Adv. John Abraham and The MLA fund of Advocate Mons Joseph. Lab is equipped with 40 computers, LCD and internet facility. And also there are computer labs for Chemistry, Physics, Zoology, Computer science departments.

HEALTH AND FITNESS CENTRE With grants received from the U.G.C. and the Ministry of Sports and Youth affairs, a health and fitness centre has been set up. The centre which cost about 6 lakhs is equipped with the latest state of the art multi gym facilities. Teachers and students may utilise the centre, from 2.30 p.m. to 8.30 p.m. on all week days. These facilities are also available to the Alumni and general public at nominal cost.

STORE There is a store functioning in the college by the members of entrepreneurship club. All items necessary for staff and students of the college are provided at a nominal price.Students can make use of this facility during morning, evening and noon breaks.

HOSTEL The girl students are provided neat and safe residential accommodation at hostel which is in the vicinity of the college.It can accommodate around 150 students and there are two separate study hall for under graduate and post graduate students.

MEDICINAL GARDEN The college has a species rich medicinal garden which consists of about 100 rare and valuable plants. The service of the garden is also open to the public of Uzhavoor panchayat. K R NARAYANAN STUDY CENTRE K R Narayanan Study Centre was established in St.Stephens College Uzhavoor in the year 2010 with assistance of University Grants Commission(UGC) under the scheme of Epoch Making Social Thinkers of India.This inter disciplinary centre concentrates on research on the life,ideas and concerns of Dr. K.R Narayanan and disseminates the result to the students, academics and policy making circles. The centre organize courses, lectures and seminars. It also documents the speeches and writings of Dr.K R Narayanan on various issues and maintains them for the benfit of researchers and students. It is also the duty of the cntre to bring out publications based on the research.

VERMI CULTURE UNIT. A Vermi Compost Unit was started in the college in 1999 as a Vanitha project sanctioned under the "Peoples Planning Project" of the Uzhavoor Block Panchayat. The objectives of the unit includes production and promotion of organic manure, training the students in vermi compositing etc.

COLLEGE CANTEEN There is a canteen within the campus, run on contract basis. The college canteen caters to the nutritional needs of the staff and students at subsidized rates. Noon meals and other food items are available here on all working days.

PROF.K.M MATHEW ASTROVIEW CENTRE Prof. K.M Mathew Astro view Centre was installed in the college as memorial of late Prof, K.M Mathew,the HoD of PhysicsAnd former principal of of the college. 2009 was observed as the International year of astronomy. The Astro view centre also stand as monument of the the IYA09 and the ruby jubilee of the department of Physics.The sender was sponsored by the family

of the former principal late Prof. K. M. Mathew .

UGC -NETWORK RESOURCE CENTRE UGC Network resource centre (UGC NRC) is a scheme introduced by the UGC in the tenth plan where assistance was provided for the purchase of computers and also for internet connectivity, which will continue in the 12th plan. The objectives of the scheme are to create awareness among staff and students about the use of computers in various activities. In our college NRC is attached with computer centre.

DST-FIST NETWORK LAB DST-FIST Network lab was established in 2017 using the Grand provided by Department of Science and Technology, Government of India . The lab has 10 all in one PC and a server computer. This facility is provided to Science Students for scientific computational studies. The lab is open during regular college timings.

INDOOR STADIUM The college indoor stadium is a multipurpose sports complex which provides good and enough facilities for various games. The stadium is Designed to house arena which can host number of indoor sports events like Basketball, badminton, table tennis tennis .etc. apart from Other cultural events .

COLLEGE GROUND College has a bigger and heavy ground for Football and cricket and also basketball court, tennis court, Volleyball court and badminton court. GOLDEN JUBILEE BLOCK As the part of half century celebration His Grace Mar Mathew Moolakkattu blessed our new Golden jubilee block in 2016 in presence of Sri. Jose K Mani MP and Sri. Mons Joseph MLA.

IQAC ROOM The IQAC room is a multi-purpose administrative room, Which is for IQAC members for their executive meetings and discussions.

NCC ROOM The college has a special room for National Cadet Corps. NCC training will foster 'esprit de-corps' among the cadets and instill in them a sense of discipline and selfless service for the defence of the country.

CEERD ROOM There is a room for CEERD (Centre for environmental education and rural development) which is an organisation established in 2001 to undertake studies related to the development problems of Uzhavoor panchayat and neighbouring areas and to identify the potential resources available in the area for sustainable development. The room for CEERD is used for the discussions and meetings related to all activities conducted by CEERD.

GUEST ROOM

There is a guest room which is located in the first floor for visitors. The guest room is primarily meant for official guest of the university, participants of seminar, workshops and other guests.

PARKING AREA

College has separate parking area for students and staff for two wheelers and four wheelers.

SECURITY ROOM

College has a security room at the entrance. So that the watch man who is available 24 hours can make sure the security of the college campus effectively. The real value of green audits is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco campus concept mainly focuses on the efficient use of energy and water minimization of waste generation or pollution and also economic efficiency. All these indicators are assessed in the process of Green Auditing of educational institute. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint.

**SCOPE AND GOALS OF GREEN AUDITING**

Green audit serve as a means to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities and save money and achieve values of virtue. Environmental audits can be a highly valuable tool for college in a wide range of ways

to improve their environmental and economic performance and reputation – while reducing wastages and operating costs. Once a baseline data is prepared after the auditing process, the data can serve as a point of departure for further action in campus greening. It will also help the college to compare its programmes and activities with other peer institutions, identify areas for improvement and prioritize the implementation of future projects. The data will also provide a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs. Simple but effective system was devised and applied to prepare a baseline data and monitor the environmental performance of St. Stephen's College, Uzhavoor. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

**General and Specific Objectives of Green Auditing**

The essential purpose of an environmental audit is the systematic scrutiny of environmental performance throughout college's existing functions. At best, an audit is a comprehensive examination of management systems and facilities. Green Audit is the most efficient and ecological way to manage environmental problems. It is a kind of professional care which is the responsibility of each individual who are the part of social and environmental processes. It is necessary to conduct green audit in college campus because it helps the students to be aware of the green audit, its advantages and thereby Create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of green impact on campus. Thus Green audit becomes necessary at the college level.

Environmental audit can be a highly variable tool for college in a wide range of ways to improve their environmental and economic performance and reputation-while reducing the wastage and operating cost. once a baseline data is prepared after the auditing process, the data can serve as a point of departure for further action in campus greening.It will also help the college to compare it programs and activities with other peer Institutions, identify areas for improvement and prioritise the implementation of future projects. The data will also provide a basis for calculating the economic benefits of resources conservation projects by establishing the current rates of resource use and their associated costs . Simple but effective system was devised and applied to prepare a baseline data and monitor the environmental performance of St. Stephen's College Uzhavoor. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

The general objective of green audit is to prepare a baseline report on biodiversity and other resources, measures to mitigate resource wastage and improve resource quality and sustainable practices. The specific objectives are:

- To prepare a checklist of flora and fauna diversity in and around the college campus.
- To suggest measures to improve biodiversity within the college campus.
- To monitor the energy consumption pattern of the college.
- To assess the quantity of water usage within the college campus.
- To suggest sustainable energy usage and water conservation practices.
- To find out various sources of organic and solid waste generation and mitigation possibilities.
- To inculcate values of sustainable development practices through green audit mechanism and enhance existing practices.

The Governing Council of the college asked the Principal to find a suitable organization to provide training and support regarding Green Audit and the Principal in the Staff Meeting authorized CEERD to conduct the audit process. After consultation with quite a few agencies the Principal along with CEERD and IQAC decided to render the expertise of KOTTAYAM SOCIAL SERVICE SOCIETY (KSSS), an environmental research and training organization situated in Kottayam, Kerala.Green Audit Agency

KOTTAYAM SOCIAL SERVICE SOCIETY (KSSS) is a leading environmental research and training organization in Kerala with several national and international linkages. KSSS is the pioneer for giving training for conservation of natural resources and environment protection. After consultation with KSSS a Memorandum of Understanding was prepared between St. Stephen's College and Kottayam Social Service Society to provide training for the conduct of Green Audit and equip the students to complete the report.

**Green Audit Training by KOTTAYAM SOCIAL SERVICE SOCIETY (KSSS)**

Training for staff and students were provided by KSSS on 1 December 2018. Fr. Sunil Perumanoor, Director KSS inaugurated the Green Audit Training. Dr. Shiney Baby Principal of St. Stephen's College presided the meeting and IQAC Co-coordinator Lt. Jais Kurian felicitated the meeting. The selected 60 students of CEERD along with teacher coordinators attended the training sessions which lasted till evening. The students were divided into five groups of 10 - 12 students, soon after the inaugural session for five audits. One Student coordinator and an Assistant coordinator was selected for each group. The schedule of various audit, time table and duty assignments for each students were fixed and assigned. Weekly progress and monitoring meeting was arranged regularly.

**Management Support**

The St. Stephen's college Manager and Governing Council extended whole hearted support and commitment in conducting Green Audit during the pre-audit meeting. The management decided to carry-out various environment friendly programmes such as efficient energy and water use practices, energy efficient electronic and computer goods purchase, proper segregation and waste disposable methods, water conservation methods, medicinal garden, butterfly garden, planting tree saplings, distribution of tree saplings to the community, observation of environment related days, nature camps, field trips, environmental club activities and so forth. The management is also keen to implement sustainable practices based on findings and suggestions from Green Audit report. The management is fully committed to inculcate virtues amongst students in conservation and preservation of nature.

## 1.2 Targeted Areas

**Energy Audit**

This indicator addresses energy consumption, energy sources , energy monitoring, lighting, appliances and vehicles. Energy use is clearly an important aspects of Campus sustainability and thus requires no explanation for its inclusion in the assessment . An energy audit establishes the baseline for any improvements in an organisation's energy use. It provides a comprehensive and systematic method for targeting cost effective efficiency gains. The energy audit is a detailed inventory of the energy performances of the institution carried out by an auditor. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment.

**Water Audit**

Water audit is an assessment of how much water is used and how much water can be saved in the college. Conducting a water audit involves calculating water use and identifying simple ways for saving water in

the college.This indicator addresses water consumption , water sources, irrigation, storm water, appliances and fixtures. Many people in Uzhavoor have difficult access to drinking water. It is therefore essential that St Stephen's College Uzhavoor as an environmentally responsible institution should examine its water use practices. Water auditing is a mechanism for conserving water, which will grow in significance in the future as demand for water increases. This audits provide a way to catalog all water uses in a facility and identify ways to increase water use efficiency. The results can help to prioritize steps to implement cost-effective water-saving measures. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water.

This indicator addresses water consumption, water sources, irrigation, storm water, appliances and fixtures. Aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.

**Biodiversity Audit**

According to the U.S. Department of Agriculture, "One acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. This is enough to meet the annual needs of 18 people".This shows the importance of Green audit in the college campus. The trees work hard to keep the air we breathe clean and healthy. Trees, shrubs and turf also filter air by removing dust and absorbing other pollutants like carbon monoxide, sulfur dioxide and nitrogen dioxide. Trees control climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in summer. Trees also preserve warmth by providing a screen from harsh wind. Trees also lower the air temperature and reduce the heat intensity of the greenhouse effect by maintaining low levels of carbon dioxide.College campus is a place where large number of students are gathering. So it is necessary to have sufficient number of trees and plants to improve the quality of air and getting healthy atmosphere . Our parks, playgrounds and backyards are lined with trees that create a peaceful and aesthetically pleasing environment and help to reduce mental stress. All plant and animal species - including humans - are linked together in a complex web of life; we depend upon biodiversity for our survival. Biodiversity is the key to a healthy eco- systems and ultimately to a healthy planet. It keeps the air and water clean, regulates our climate and provides us food, shelter, clothing, medicine and other useful products. Each part within this complex web diminishes a little when one part weakens or disappears. The trees strive to keep the air we breathe clean and healthy. Their leaves take in much of the poisonous unwanted carbon dioxide in the air, and replace it with the oxygen we need for healthy living. In this process, the plants with the help of sunlight, water, minerals and the green material called Chlorophyll within the leaves change the carbon-dioxide into food for themselves. When doing this they release oxygen into the air which is vital for all life on earth. The roots of trees dig deep into the earth and hold it together so that the rain and wind can not wash or blow it away. This is very important as the earth has only a very thin layer (seldom more than one foot) of fertile soil covering it.

**Biodegradable and hazardous Waste Audit**

This indicator addresses biodegradable waste from college and hostel canteen, paper waste to hazardous wastes of Laboratories and worn out electric and electronic goods and plastic waste. Hazardous materials represent significant risk to human health and ecological integrity. Hazardous wastes are also leached out through the e-waste generated in the campus. They often persist in the environment leaving a legacy of land and water contamination for generations. They also accumulate in the tissues of organisms and become concentrated within food chains, leading to cancer, endocrine disruption, birth defects and other tragedies. The minimization, safe handling and ultimate elimination of these materials are essential to the long-term health of the planet. solid waste often includes wasted material resources that could otherwise be channeled

into better service through recycling, repair, and reuse. Thus the minimization of solid waste is essential for a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems. This indicator addresses biodegradable waste from college and hostel canteen, paper waste to hazardous wastes of laboratories and worn-out electric and electronic goods, and plastic wastes. Hazardous materials represent significant risks to human health and ecological integrity. Hazardous wastes are also leached out through the e-waste generated in the campus. They often persist in the environment leaving a legacy of land and water contamination for generations. They also accumulate in the tissues of organisms and become concentrated within food chains, leading to cancer, endocrine disruption, birth defects, and other tragedies. The minimization, safe handling, and ultimate elimination of these materials are essential for the long-term health of the planet.

**Carbon foot print Audit**

A carbon footprint audit can highlight all contributory causes of carbon dioxide emissions and establish overall carbon dioxide generation. It enables college to see exactly where to take measures to reduce their carbon footprint. Students are passionate about making their campuses more sustainable and are trying hard to make it happen. Carbon footprint is produced via direct emissions of greenhouse gases associated with combustion of fossil fuels for heating and transportation, indirect emissions associated with electricity purchase and finally other emissions related to solid waste, refrigerants, land use management, etc.The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone.

An important aspect of doing an audit is to be able to measure the impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy and green audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. One aspect is to consider the distance and method travelled between home and college every day. It undertakes the measure of bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is necessary to know how much the organization is contributing towards sustainable development. To become carbon neutral, Colleges are trying to reduce their emissions of greenhouse gases, cut their use of energy, use more renewable energy, and emphasize the importance of sustainable energy sources. Commutation of stakeholders has an impact on the environment through the emission of greenhouse gases into the atmosphere, consequent to burning of fossil fuels (such as petrol). The most common greenhouse gases are carbondioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions.An important aspect of doing an audit is to be able to measure your impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. One aspect is to consider the distance and method traveled between home and college every day. It undertakes the measure of the bulk of carbon dioxide equivalents exhaled by the organization through which the carbon accounting is done. It is necessary to know how much the organization is contributing towards sustainable development. It is therefore essential that any environmentally responsible institution examines its carbon footprint.

**Management Support**

The St. Stephen's college Manager and Governing Council extended whole hearted support and commitment in conducting Green Audit during the pre-audit meeting. The management decided to carry-out various environment friendly programmes such as efficient energy and water use practices, energy efficient electronic and computer goods purchase, proper segregation and waste disposable methods, water conservation methods, medicinal garden, butterfly garden, planting tree saplings, distribution of tree saplings to

the community, observation of environment related days, nature camps, field trips, environmental club activities and so forth. The management is also keen to implement sustainable practices based on findings and suggestions from Green Audit report. The management is fully committed to inculcate virtues amongst students in conservation and preservation of nature.

## 1.3 Survey Forms

**Energy Audit**

| Room No. / name | Electrical device/ items | Number | Power | Usage time (hr/day) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

**Water Audit**

| Sl.no. | Parameters | Responses | Remarks |
|---|---|---|---|
| 1 | Source of water | | |
| 2 | No of Wells | | |
| 3 | No of motors used | | |
| 4 | Horse power – Motor | | |
| 5 | Depth of well –Total | | |
| 6 | Water level | | |
| 7 | Number of water tanks | | |
| 8 | Capacity of tank | | |
| 9 | Quantity of water pumped every day | | |
| 10 | Any water wastage/why? | | |
| 11 | Water usage for gardening | | |
| 12 | Waste water sources | | |
| 13 | Use of waste water | | |
| 14 | Faith of waste water from labs | | |
| 15 | Whether waste water from labs is mixed with ground water | | |
| 16 | Any treatment for lab water | | |
| 17 | Whether any green chemistry method practiced in labs | | |
| 18 | No of water coolers | | |
| 19 | Rain water harvest available? | | |
| 20 | No of units and amount of water harvested | | |
| 21 | Any leaky taps | | |
| 22 | Amount of water lost per day | | |

**Biodiversity Audit**

*Questionnaire*

1. Is there a garden in your college? If yes what is the Area?
2. Do students spend time in the garden?
3. List the plants in the garden, with approx. numbers of each species.
4. Suggest plants for your campus. (Trees, vegetables, herbs, etc.)
5. List the species planted by the students, with numbers.
6. Whether you have displayed scientific names of the trees in the campus?
7. Is there any plantations in your campus? If yes specify area and type of plantation.
8. Is there any vegetable garden in your college? If yes how much area?
9. Is there any medicinal garden in your college? If yes how much area?
10. What are the vegetables cultivated in your vegetable garden? (Mention the quantity of harvest in each season)
11. How much water is used in the vegetable garden and other gardens? (Mention the source and quantity of water used).
12. Who is in charge of gardens in your college?
13. Are you using any type of recycled water in your garden?
14. List the name and quantity of pesticides and fertilizers used in your gardens?
15. Whether you are doing organic farming in your college? How?
16. Do you have any composting pit in your college? If yes What are you doing with the compost generated?
17. What do you doing with the vegetables harvested? Do you have any student market?
18. Is there any botanical garden in your campus?
19. If yes give the details of campus flora.
20. Give the number and names of the medicinal plants in your college campus.
21. Any threatened plant species planted/conserved? 21. Is there a nature club in your college? If yes what are their activities?
22. Is there any arboretum in your college? If yes details of the trees planted.
23. Is there any fruit yielding plants in your college? If yes details of the trees planted.

24. Is there any groves in your college? If yes details of the trees planted.
25. Is there any irrigation system in your college?
26. What is the type of vegetation in the surrounding area of the college?
27. What are the nature awareness programmes conducted in the campus?
28. What is the involvement of students in the green cover maintenance?
29. What is the total area of the campus under tree cover? Or under tree canopy?
30. Share your IDEAS for further improvement of green cover.

**Biodegradable and Hazardous Waste Audit**

*Approximate amount of waste generated per day (in Kg)*

| **Sources** | **Biodegradable** | **Non -biodegradable** | **Hazardous** | **Others** |
|---|---|---|---|---|
| Office | | | | |
| Laboratories | | | | |
| Canteen and kitchen | | | | |
| Staff Rooms | | | | |
| | | | | |
| | | | | |
| | | | | |

**Carbon foot print**

*Questionnaire*

1. Total number of vehicles used by the stakeholders of the college.(per day)
2. No of cycles used
3. No of two wheelers used (average distance travelled and quantity of fuel and amount used per day)
4. No of cars used (average distance travelled and quantity of fuel and amount used per day)
5. No of persons using public transportation
6. No of persons using college conveyance
7. No of generators used per day
8. Amount of fuel used
9. Number of LPG cylinders used in canteen/labs
10. Use of any other fossil fuels in the college
11. Any suggestion to reduce the use of fuel

# 2 Audit Stage

Green auditing was done, by the involvement of different students from CEERD, NSS, NCC, Forestry Club, Birds club supported by teaching and non-teaching staff of the College. The green audit began with the teams assessing through all the different facilities at the college, determining the different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring the usage per item (Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and the impact that they have. The staff and learners were interviewed to get details around usage, frequency or general characteristics of certain appliances. Data collection was done in the sectors such as Energy, Water, Biodiversity and Waste management.

## 2.1 List of Students and Staffs involved

**Energy Audit**
Faculty in charge : Anu Thomas
List of students

| Sl.No. | Name | Department | Club |
|---|---|---|---|
| 1 | Ananthakrishnan (Leader) | Physics | CEERD |
| 2 | Aswathy M S | Physics | CEERD |
| 3 | Kausthub Rajan | Chemistry | CEERD |
| 4 | Mareena Sunny | Mathematics | CEERD |
| 5 | Sharon M Paulose | Zoology | CEERD |
| 6 | Sabin James | Physics | CEERD |
| 7 | Devika G Nair | Chemistry | CEERD |
| 8 | Betcy Mathew | Chemistry | CEERD |
| 9 | Gopika S Vinodh | Physics | CEERD |
| 10 | Ajay P Anil | Zoology | CEERD |

**Water Audit**
Faculty in charge : Aby Jimson
List of students

| Sl.No. | Name | Department | Club |
|---|---|---|---|
| 1 | Abin C Joy (Leader) | Mathematics | CEERD |
| 2 | Akshay K Babu | Economics | CEERD |
| 3 | Varsha Vijayan | Physics | CEERD |
| 4 | Boban Biju | Zoology | CEERD |
| 5 | Albin Tomy | Chemistry | CEERD |
| 6 | Justeena Thomas | Economics | CEERD |
| 7 | Krishnapriya Babu | Zoology | CEERD |
| 8 | Divya S Nair | B Com | CEERD |
| 9 | Gopika S | Economics | CEERD |
| 10 | Unnimaya Raju | English | CEERD |

**Biodiversity Audit**
Faculty in charge : Dr.Sincy Joseph
List of students

| Sl.No. | Name | Department | Club |
|---|---|---|---|
| 1 | Devika Premkumar (Leader) | Zoology | CEERD |
| 2 | Akshara U A | Physics | CEERD |
| 3 | Stebin T B | English | CEERD |
| 4 | Aswin Kumar | English | CEERD |
| 5 | James Thomas | Physics | CEERD |
| 6 | Jomol John | Mathemathics | CEERD |
| 7 | AparnaRaju | Physics | CEERD |
| 8 | Naveen Raju | Chemistry | CEERD |
| 9 | Christy Joy | Zoology | CEERD |
| 10 | Aijin Joy | Physics | CEERD |

**Waste Management Audit**
Faculty in charge : Abhishek Thomas
List of students

| Sl.No. | Name | Department | Club |
|---|---|---|---|
| 1 | Rajalakshmi S (Leader) | Economics | CEERD |
| 2 | Parvathy Saju | Physics | CEERD |
| 3 | Nikhitha Rajan | B Com | CEERD |
| 4 | Mohith Manoharan | Economics | CEERD |
| 5 | Nayanthara Saji | Zoology | CEERD |
| 6 | Amaldev S | Economics | CEERD |
| 7 | Anakha K R | Economics | CEERD |
| 8 | Ajay P Anil | Zoology | CEERD |
| 9 | Alan Cyril | Physics | CEERD |
| 10 | Ananthu Sabu | B Com | CEERD |

**Carbon Footprint Audit**
Faculty in charge : Thomas Mathew
List of students

| Sl.No. | Name | Department | Club |
|---|---|---|---|
| 1 | Abhijith P S (Leader) | Physics | CEERD |
| 2 | Alexander Cyriac | English | CEERD |
| 3 | Hari N | Mathematics | CEERD |
| 4 | Aiswarya T | English | CEERD |
| 5 | Amrutha N Nair | B Com | CEERD |
| 6 | Akhil Kishore | Zoology | CEERD |
| 7 | Greeshma Shaji | Zoology | CEERD |
| 8 | Jayalal J M | Physics | CEERD |
| 9 | Archa Rajesh | Physics | CEERD |
| 10 | Priskamol Peter | B Com | CEERD |

## 2.2 Site Inspection and data Collection

Site inspection was done by Faculty and students. The process of green audit was an enriching environmental awareness program for the students who participated in the Green auditing. The experience of green auditing was a first time experience for most of the students. **Audit teams**
Teams for various auditing were formed in order to collect information and map the electrical and water equipment's and devices used in various buildings and campus premises. The information thus gathered was marked in the structured questionnaire for further analysis. With the expertise of faculty's in Zoology and Botany departments flora and fauna diversity were identified and listed.

## 2.3 Energy Audit

**(Average values of consumption are included in the Table)**

| **Appliance** | **No.of appliances** | **Power rating (Watts)** | **Total Power (KW)** | **Operation per day (Hours)** | **No.of days in a month** | **Average usage per month (KWh)** |
|---|---|---|---|---|---|---|
| bulb - Incandescent | 8 | 60 | 0.48 | 2 | 22 | 21.12 |
| CFL | 1 | 15 | 0.02 | 2 | 22 | 0.66 |
| LED bulb | 164 | 9 | 1.48 | 2 | 22 | 64.944 |
| Photocopier | 4 | 200 | 0.80 | 1 | 15 | 12 |
| Fan | 292 | 75 | 21.90 | 4 | 22 | 1927.2 |
| AC | 4 | 1000 | 4.00 | 3 | 22 | 264 |
| Desktops | 98 | 150 | 14.7 | 2 | 22 | 646.4 |
| Laptops | 9 | 50 | 4.5 | 4 | 22 | 7.4 |
| Tube lights | 242 | 60 | 14.52 | 2 | 22 | 638.88 |
| Printers | 19 | 40 | 0.76 | 1 | 15 | 11.4 |
| Water cooler cum purifier | 5 | 200 | 1 | 3 | 22 | 66 |
| LCD Projector | 3 | 300 | 0.90 | 1 | 15 | 13.5 |
| Refrigerators | 2 | 250 | 0.50 | 5 | 22 | 55 |
| Water pump | 1 | 11936 | 11.94 | 1 | 24 | 286.464 |
| Television | 2 | 140 | 0.28 | 5 | 22 | 30.8 |
| Inverters | 10 | 100 | 1.00 | 3 | 22 | 66 |
| Water heaters | 1 | 400 | 0.40 | 1 | 7 | 1.4 |
| Diesel generators | 2 | 2000 | 4 | 1 | 2 | 8 |
| Public addressing system | 3 | 300 | 0.90 | 1 | 15 | 13.5 |
| UPS | 6 | 100 | 0.60 | 5 | 22 | 66 |
| **TOTAL (KWh)** | | | | | | **4200.6** |

**Laboratory Usages**

| **Physics** | | | | | | |
|---|---|---|---|---|---|---|
| **Appliance** | **No.of appliances** | **Power rating (Watts)** | **Total Power (KW)** | **Operation per day (Hours)** | **No.of days in a month** | **Average usage per month (KWh)** |
| Michelson's Apparatus | 2 | 300 | 0.6 | 2 | 1 | 1.2 |
| e/m apparatus | 2 | 400 | 0.8 | 2 | 1 | 1.6 |
| Photoelectric effect apparatus | 2 | 400 | 0.8 | 2 | 1 | 1.6 |
| Constant deviation Spectrophotometer | 1 | 200 | 0.2 | 2 | 1 | 0.4 |
| LCR meter | 1 | 100 | 0.1 | 2 | 2 | 0.4 |
| I C trainer kit | 6 | 100 | 0.6 | 2 | 2 | 2.4 |
| Electronics and electrical practical average power | 1 | 200 | 0.2 | 2 | 2 | 0.8 |
| Mercury vapor lamp | 2 | 200 | 0.4 | 2 | 2 | 1.6 |
| Sodium vapor lamp | 2 | 200 | 0.4 | 2 | 2 | 1.6 |
| **Chemistry** | | | | | | |
| UV-Vis Spectrometer | 1 | 200 | 0.2 | 1 | 3 | 0.6 |
| Rotary vacuum evaporator | 1 | 450 | 0.45 | 1 | 17 | 7.65 |
| Hot plate | 2 | 2000 | 4 | 1 | 1 | 4 |
| Vacuum pump | 1 | 750 | 0.75 | 2 | 18 | 27 |
| Hot air oven | 1 | 500 | 0.5 | 1 | 22 | 11 |
| Distillation unit | 1 | 750 | 0.75 | 1 | 16 | 12 |
| Ice flaking machine | 1 | 250 | 0.25 | 1 | 15 | 3.75 |
| Microwave oven | 1 | 1300 | 1.3 | 1 | 15 | 19.5 |
| Magnetic stirrer | 1 | 250 | 0.25 | 1 | 18 | 4.5 |
| electronic balance | 3 | 40 | 120 | 3 | 23 | 2 |
| BOD incubator | 1 | 750 | 0.75 | 0.25 | 3 | 0.5625 |
| **Total(KWh)** | | | | | | **103.37** |

| Zoology | | | | | | |
|---|---|---|---|---|---|---|
| **Appliance** | **No.of appliances** | **Power rating (Watts)** | **Total Power (KW)** | **Operation per day (Hours)** | **No.of days in a month** | **Average usage per month (KWh)** |
| BOD incubator | 1 | 750 | 0.75 | 2 | 1 | 1.5 |
| Hot air laboratory oven | 1 | 1000 | 1 | 2 | 1 | 2 |
| Shaker | 1 | 200 | 0.2 | 1 | 1 | 0.2 |
| Water bath | 1 | 750 | 0.75 | 2 | 1 | 1.5 |
| High speed table top centrifuge | 1 | 1000 | 1 | 1 | 1 | 1 |
| Remi Cenrtifuge | 1 | 1500 | 1.5 | 1 | 1 | 1.5 |
| microwave oven | 1 | 1200 | 1.2 | 1 | 1 | 1.2 |
| **Botany** | | | | | | |
| Autoclav | 1 | 6000 | 6 | 1 | 1 | 6 |
| incubator | 2 | 2000 | 2 | 1 | 1 | 2 |
| magnetic stirrer | 1 | 250 | 0.25 | 1 | 1 | 0.25 |
| Laminar flow hud | 1 | 500 | 0.5 | 1 | 2 | 1 |
| **Total(KWh)** | | | | | | **18.15** |

**Energy Usage**

Electricity charges – Rs 49,200 / month
Cost of Gas cylinders – Rs 8,120 / month
Cost of generator fuel – Rs 3,000 / month

The total energy utilization of the college for different purposes was approximately 4600 kWh/month for the academic year2018-19, followed recommendations of last year's energy audit could reduce the total power consumption to 4200 KWh/month. Alternate source of energy comprising solar type of non-conventional category of energy will be a good energy management system for the college. No greenhouse gas emissions are released into the atmosphere when you use solar panels to create electricity. And because the sun provides more energy than we'll ever need, electricity from solar power is a very important energy source in the move to clean energy production. Electricity charges per month is Rs.53,400/-month. Energy saving through the replacement of incandescent bulbs to LED light may be a good energy management system for the college. Awareness programmes for the stakeholders to save energy may also increase sustainability in the utilization of various energy source. Although staff are encouraged to switch off their own lights, monitors and other equipment, the college administrative staff should carry out a lock down of the building at the end of every day and switch off any lights or equipment that have been left on. All the incandescent bulbs have to be replaced by low energy bulbs. Lighting in the library should be predominately LEDs and energy saving bulbs. The College should improve its monitoring and reporting of energy usage and provide information to campus users. Older wiring if necessary has to be replaced. The college building is nearly 55 years old, there fore wiring maybe replaced from electricity leakage and to protect college and its appliances from potentially dangerous or expensive damage that may arise due to faulty wiring.

**Existing energy management methods in the campus**

- The college produces LED bulbs as an outreach program organised by Dept. of Physics with the support of students.
- Energy saving campaigns are organised by CEERD
- Older and damaged equipment's are replaced if necessary.
- Wiring and electrical maintenance are periodically monitored and replacements are made.

## 2.4 Water Audit

The water audit was done during the second week February where the usage of water is at the peak. The college uses 14800 litres of water every day. The main source of water is ground water. Water from the public water supply is also utilized. 405 Litres of water is lost through the leaking of pipes.Leakage has to be prevented and various other sources of water need to be found out as well. If water treatment system is installed at canteen and chemical laboratories the amount of water lost through pollution can be prevented. A major preference to the recycling of water may be adopted in the college for an efficient water management. Awareness programmes for the management of sustainable water use will be highly efficient in this college. Efficient water saving devices should be installed in all toilets. New toilets that are to be installed should have a dual flush system in place. Water management systems are to be introduced in the urinals. Some alternatives include spray taps, which can save about 80 percentage of water and energy used for hand washing. Consider carrying out meter readings on a regular basis (e.g. bi-monthly) in order to monitor water usage. Not only will this make checking water bills much easier but will also allow a baseline to be set from which further reductions can be measured, as well as possibly altering the any leaks.
**Overall Usage of Water in the Campus**

| Sections | water use per day |
|---|---|
| Toilets and urinals | 18,000 Ltr |
| Hostel | 3,500 Ltr |
| Bathrooms | Ltr |
| Canteen | 5,000 Ltr |
| Garden and ground | 2,500 Ltr |
| Laboratories | 1,500Ltr |
| Leakage | 300 Ltr |

Existing water management methods installed in the campus

- Water conservation and green awareness campaigns has been conducted on behalf of CEERD and NSS
- Rain water collection pits are digged inorder to recharge ground water.
- More greenery has been added consistently inorder to improve ground water resource

## 2.5 Waste measure and its disposal

- Total Stakeholders – 1100
- Class rooms –35
- Other rooms –32
- Number of hostel inmates - 120
- Number of Garbage dumps – 5
- Number of toilets - 59

**Quantity of waste generated**

- Bio degradable – 1 kg/day (office)
- Non bio degradable – 0.5 kg/day (office)
- Bio degradable – 0.3 kg/day (labs)
- Non-bio-degradable – 0.5 kg/day (labs)
- Hazardous waste – ½ kg/day
- Canteen waste (biodegradable)– 14 kg/day
- Non-biodegradable – ½ kg/day

**Amount of Waste Estimated**

Biodegradable waste = 30 kg/day
Non-biodegradable waste = 1.5 kg/day
**Existing waste management methods practiced**

- Cleaning the campus on daily basis.
- Vermi compost
- Anaerobic pipe compost (2 no:s)
- Bio gas
- Segregation of waste into degradable and non-degradable by the cleaning staff.
- Waste bin's placed in corridors, office and staff rooms.
- E-wastes- computers, electrical and electronic parts – Disposal by selling
- Campaigns for reduce, reuse and recycle by CEERD
- Paper Pen and Bag production by NSS and CEERD

## 2.6 Biodiversity Audit

LIST OF CAMPUS PLANTS

| Sl. No. | Location | Botanical Name | Local Name | Family | No. of Plants |
|---|---|---|---|---|---|
| 1. | Volleyball Ground | Bamboosa vulgaris | Bamboo | Poaceae | 40 |
| 2. | Volleyball Ground | Bamboosa Bambos | Illi | Poaceae | 8 |
| 3. | Volleyball Ground | Mangifera indica | mavu | Anacardiaceae | 2 |
| 4. | Volleyball Ground | Sweitenia mahogany | mahagony | Meliaceae | 5 |
| 5. | Volleyball Ground | Carica Papaya | kappalam | Caricaceae | 1 |
| 6. | Volleyball Ground | Ficus benghalensis | aal | Moraceae | 1 |
| 7. | Foot ball Ground | Mangifera indica | mavu | Anacardiaceae | 1 |
| 8. | Foot ball Ground | Bamboosa Bambos | illikootam | Poaceae | 2 |
| 9. | Foot ball Ground | Carica Papaya | kappalam | Caricaceae | 1 |
| 10. | Foot ball Ground | Ailanthus excels | pongalyam | Simaroubiaceae | 1 |
| 11. | Foot ball Ground | Delonix regia | gulmohar | Caesalpiniaceae | 12 |
| 12. | Foot ball Ground | Cocos nucifera | thengu | Arecaceae | 2 |
| 13. | Entrance | Delonix regia | gulmohar | Caesalpiniaceae | 1 |
| 14. | Entrance | Bauhinia acuminata | Mandaram | Fabaceae | 1 |
| 15. | Entrance | Cocos nucifera | Thengu | Arecaceae | 5 |
| 16. | Entrance | Mimusops elengi | Elanji | Sapotaceae | 1 |
| 17. | Entrance | Trachycarpus fortunei | Garden Palm | Arecaceae | 13 |
| 18. | Canteen side | Sweitenia mahogany | Mahagony | Meliaceae | 3 |
| 19. | Canteen side | Carica Papaya | Kappalam | Caricaceae | 2 |
| 20. | Garden | Psidium guajava | Paera | Myrtaceae | 2 |
| 21. | Garden | Casuarina equisetifolia | Kattadimaram | Casuarinaceae | 4 |
| 22. | Garden | Cocos nucifera | Thengu | Arecaceae | 12 |
| 23. | Garden | Wodyetia bifurcata | Foxtail palm | Arecaceae | 3 |
| 24. | Garden | Livistonia chinensis | Garden Fan palm | Arecaceae | 4 |
| 25. | Garden | Duranta repens | Golden Duranata | Verbenaceae | 4 |
| 26. | Garden | Araucaria araucana | Chile pine | Araucariaceae | 3 |
| 27. | Garden | Bamboos vulgaris | Mula | Poaceae | 1 |
| 28. | Garden | Cananga odorata | Manoranjini | Annonaceae | 1 |
| 29. | Garden | Artocarpus hirsute | Anjili | Moraceae | 1 |
| 30. | Garden | Raphis flabelliformis | Red palm | Arecaceae | 2 |
| 31. | Garden | Hamelia patens | Hamelia | Rubiaceae | 2 |
| 32. | Garden | Sweitenia mahogany | Mahagony | Meliaceae | 1 |
| 33. | Garden | Tecoma stans | Yellow bell | Bignoniaceae | 1 |
| 35. | Garden | Bougainvillea glabra | Bogainvilla | Nyctaginaceae | 1 |
| 36. | Garden | Bauhinia acuminata | Mandaram | Fabaceae | 2 |
| 37. | Garden | Plumeria rubra | Chempakam | Apocyanceae | 4 |
| 38. | Hostel Entrance | Artocarpus hirsute | Anjili | Moraceae | 1 |
| 40. | Hostel Entrance | Terminalia catappa | Badam | Combretaceae | 1 |
| 41. | Chazhikattu hall plot | Lantana camara | Kongini | Verbenaceae | 1 |
| 42. | Chazhikattu hall plot | Gliricidia sepium | Seema konna | Caesalpiniaceae | 1 |

| Sl. No. | Location | Botanical Name | Local Name | Family | No. of Plants |
|---|---|---|---|---|---|
| 43. | Chazhikattu hall plot | Azadiracta indica | Arya veppu | Meliaceae | 1 |
| 44. | Chazhikattu hall plot | Aristolochia indica | Easwaramuli | Aristolochiaceae | 1 |
| 45. | Chazhikattu hall plot | Biancaea sappan | Pathimugham | Fabaceae | 1 |
| 46. | Chazhikattu hall plot | Phyllanthus emblica | Nelly | Euphorbiaceae | 1 |
| 47. | Chazhikattu hall plot | Bignonia capreolata | Bignonia | Bignoniaceae | 1 |
| 48. | Chazhikattu hall plot | Desmodium gangeticum | Orila | Fabaceae | 1 |
| 49. | Chazhikattu hall plot | Phyllanthus myrtifolius | Hedge plant | Euphorbiaceae | 1 |
| 50. | Chazhikattu hall plot | Enterolobium saman | Mazhamaram | Mimosaceae | 1 |
| 51. | Chazhikattu hall plot | Casuarina equisetifolia | Choolamaram | Casuarinaceae | 1 |
| 52. | Chazhikattu hall plot | Albizzia odoratissima | Vaka | Mimosaceae | 4 |
| 53. | Chazhikattu hall plot | Azadiracta indica | Aryaveppu | Meliaceae | 1 |
| 54. | Chazhikattu hall plot | Asoka indica | Asokam | Fabaceae | 1 |
| 55. | Chazhikattu hall plot | Croton sp. L. | Rush foil | Euphorbiaceae | 3 |
| 56. | Chazhikattu hall plot | Euphorbia pulcherrima | Poinsettia | Euphorbiaceae | 1 |
| 57. | Chazhikattu hall plot | Hevea brasiliensis Mull. Arg. | Rubber | Euphorbiaceae | 1 |
| 58. | Chazhikattu hall plot | Costus igneus | Insulin plant | Costaceae | 1 |
| 59. | Chazhikattu hall plot | Cinchona officinalis | Quina | Rubiaceae | 1 |
| 60. | Chazhikattu hall plot | Phyllanthus emblica Emblica officinalis | Indian Gooseberry | Phyllanthaceae | 1 |
| 61. | Chazhikattu hall plot | Caesalpinia sappan Linn | East Indian redwood | Leguminosae | 1 |
| 62. | Chazhikattu hall plot | Heliconia rostrata | Hanging lobster Claw | Heliconiaceae | 1 |
| 63. | Chazhikattu hall plot | Polyalthia longifolia | Aranamaram Indian mast tree | Annonaceae | 1 |
| 64. | Chazhikattu hall plot | Asparagus officinalis L | Asparagaceae | Golden asparagus | 1 |
| 65. | Chazhikattu hall plot | Ficus benghalensis | Idian fig (Aal) | Moraceae | 1 |
| 66. | Chazhikattu hall plot | Citrus limonum Risso | Citrus | Rutaceae | 1 |
| 67. | Chazhikattu hall plot | Peltophorum roxburghi | Thurumbu maram | Caesalpinaiaceae | 1 |

## 2.7 Carbon Foot Print Audit

- Petrol used by two wheelers/day–192 L (Per person to and fro 40 kms =1L)
- Fuel used by four wheelers (52 Persons) - 104 L (Per person to and fro 40 kms = 2L)
- Fuel for persons (total 2513 persons) travelling by common transportation = 200 L (4L x 50 persons) Total fossil fuel use is 502 L / day Total fuel cost per day for transportation = Rs 30120/- (502 L x Rs 60 )
- Cost of Gas cylinders used Rs. 24000/month (28 cylinders)

- Cost of generator fuel – Rs. 10800/month (6 L per day)
- Amount spent for transportation (office) – Rs. 4000/month (Approx.)
- Amount spent for transportation (canteen) – Rs. 4000/month "
- Amount spent for transportation (visitors) – Rs. 15000/year
- Other expenditures for the energy – Rs. 1467/day

Burning of fossil fuels is the main source and cause of carbon dioxide release to the atmosphere. Carbon dioxide release for the stakeholders to reach the college is very high. It is contributing to the global warming and increasing the pace of climate change. If a College bus is plying for the staff and students carbon dioxide released for the stakeholders' commutation can be reduced. More trees may be planted in the campus to make a source of sink for the carbon dioxide and for other green house gases.

# 3 Post-Audit stage

## 3.1 Findings and Observations

Green Audit helps create a greater appreciation and understanding of the impact of College's functioning on the environment. St.Stephen's College Uzahvoor has successfully identified the impacts on environment through various auditing exercises. The Green auditing exercises brainstormed has provided insights on practical ways to reduce negative impact on the environment. Participating in this Green auditing procedure has enabled us to attain knowledge about the need of a Sustainable College Campus. It will create awareness about the use of the Earth's resources in our home, college, local community and beyond. St.Stephen's College should adopt an Environmental Responsible Purchase Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.Although twice expensive, LCD monitors are to be purchased instead of CRTs taking into account their efficiency in energy consumption. All computers purchased by the college should have an Energy Star rating, which is a standard requirement for optimal energy usage.

**Preparation of action plan**

Management policies regarding the College and the approach towards the use of resources need to be considered in purview of Green audit report. An Environment friendly policy formulated by the Management should be followed. Programmes related to Green awareness and environment consciousness should be encouraged among the staff and student community . Based on these policies, the College should have an action plan for which the Green audit report would serve as a foundation.

## 3.2 Suggestion for Green Campus

Green Audit is the most effective way to identify the strength and weakness of the current sustainable practices. Green Audit provides a professional approach for utilising economic, financial, social and environmental resources in a responsible way. Green audits can "add value" to the Management policies taken up by the College and serves as a platform for identifying, evaluating and managing environmental risks. There is scope for further improvement, particularly in waste management, energy consumption and water conservation. . Even though the College perform fairly well, the recommendations in this report

highlight many a ways in which the College can work to improve its actions and become a more sustainable institution.

**Suggestions**

Some of the very important suggestions are:-

1. Adopt the proposed Environmental Responsible Purchase Policy, and work towards creating and implementing a strategy, to reduce the environmental impacts.
2. Strengthen and reinforce Environment awareness by making use of resources available at Management, University and Government levels.
3. Groom and cultivate Environment responsible citizens.
4. Practice Institutional Ecology policies pertaining to waste reduction and recycling.
5. Involve All Stakeholders- Expand work with local community and Non-governmental organizations to assist in finding solutions to environmental problems.
6. Collaborate for Interdisciplinary Approaches- Convene University faculty and administrators to develop interdisciplinary approaches especially in curricula. Encourage research initiatives and outreach activities that support an environmentally sustainable future.
7. Adopt the proposed Environmentally Responsible Purchase Policy, and work towards creating a sustainable environment.
8. Increase Reduce, Reuse, and Recycle awareness in Campus.

## 3.3 Follow up action and Plan

Green Audits generate valuable environment and resource management guidelines. Continuous follow up and assessment on a regular basis is crucial for the accomplishment of Green audit objectives.

**Environmental Education**

The following environmental education programmes may be implemented in the College before the next Green audit:-

- Training programmes in solid and liquid waste management, setting up of biodiversity garden, medicinal plant nursery, butterfly garden, pollution mitigation methods, and water filtration methods are to be initiated.
- Display of environmental awareness boards such as – Save Water, Save Electricity, No Wastage of food/water, No smoking, Switch off light and fan after use, Plastic free campus'
- Give due importance to Environmental clubs and its programmes.
- Set up a model Rainwater Harvesting system, Vegetable garden, Medicinal plant garden, etc,
- Display various slogans and pictures to protect environment
- Implement chemical treatment system for managing waste water from the laboratories.
- Use coloured waste bins to segregate waste and its easy collection.

# 4 Recommendations

- Installation of rooftop Solar panels of 60KW capacity
- Installation of Bio-gas plant and Compost units with larger capacities
- Increase the capacity of Incinerators
- Installation of rain water harvest tank of 1 Lakh liter capacity
- Dig as many rain water pits in the 11 acre campus and maintain it regularly.
- Set up water recycling unit where the recycled water can be used for gardening purpose in college and hostel.
- Grow Vegetable garden and Medicinal garden and gradually develop it as a Nursery.
- Layout 'Green Chemistry' that reduces or eliminates the use or generation of hazardous substances in the design, manufacture and application of chemical products.
- Install waste water treatment system for Chemistry and Zoology labs.
- Organize eco-friendly programs
- Arrange training programs on Environmental Management system and Nature conservation.
- Implement plastic free policy thoroughly.
- Establish an E-waste collection centre in campus.
- Renovation of cooking system in the canteen to save gas.
- Establish a purchase policy that is energy saving and eco-friendly.
- Introduce add-on courses eco-friendly income generating to all interested students.
- Encourage students to use cycles.

# 5 Acknowledgements

Kottayam Social Service Society is thankful to the Management and the Principal of the St Stephen's College, Uzhavoor for entrusting processes of Green auditing with us. We thank all the participants of the auditing team especially students and staff from CEERD, who took pain along with us to gather data through survey. We also thank the office staff who helped us during the document verification.

# 6 Photographs





Vine Graden- Passion Fruit


Vine Garden- Passion Fruit


Vine Garden- Passion Fruit


Vine Garden- Passion Fruit

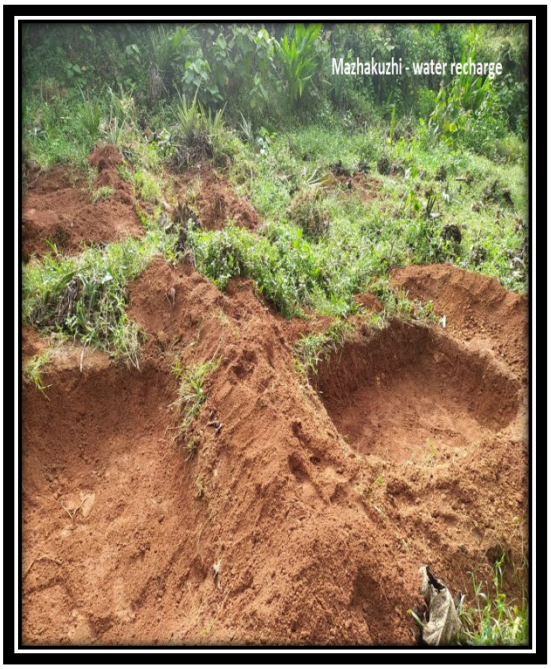

College Well before maintenance


College well After Maintenance


College - Aerial View


College - Aerial View


mazhakkuzhi- water recharge
GPS Map
Camera Lite
Uzhavoor College Rd, Alppara, Uzhavoor, Kerala 686634,


Mazhakuzhi - water recharge


Rain Water Harvesting


CLEAN TOILETS
KEEP YOUR NOSE OPEN


Solar Panel


Solar light


Biogas


Pipe Compost


Star Garden


Butterfly Garden