

Chapter 1

Introduction

St. Teresa's College, Ernakulam, Kerala, committed to the cause of higher learning of women and their empowerment was established on 15th June 1925 by the Carmelite Sisters of St. Teresa under the leadership of the visionary foundress Mother Teresa of St. Rose of Lima. This pioneering institution is the first government aided women's college in the state of Kerala. St. Teresa's College, Ernakulam, affiliated to Mahatma Gandhi University, is an Arts and Science College.

Situated in the heart of the city of Kochi, the College has 2786 students, 135 faculty members and 48 non teaching staff at present. This minority institution has always opened its doors to beneficiaries irrespective of caste, creed and community and works tirelessly towards the building of a better world.

The College has been the recipient of several awards and honours over the decades, including the prestigious R. Sankar Award for the best college in the state. The college was accredited by the NAAC at the Five Star Level in 1999 and reaccredited with A level in 2006. It was reaccredited with A level Certification in third cycle 2012 and conferred the status of "College with Potential for Excellence" status by the UGC in 2010 and granted Autonomous status in June 2014.

To keep pace with the drastic changes in the global scenario, the institution has developed cross-border and trans-border tie-ups with London Metropolitan University, U.K, Deakin University, Australia and Normal University, China.

The college pays special attention to inculcate values in the students at every opportunity. Students are encouraged to join the NSS, NCC and Red Cross so that they may contribute in a meaningful way to national development and the society. Teresian Rural Outreach Programme [TROP] is a unique endeavour of the college and is an extension activity aimed at reaching out to the marginalized and underprivileged. The faculty makes optimum use of the Information and Communication Technology [ICT] and the college has made a conscious effort to invest in the hardware.

As of 2014-15, the college has 21 departments offering 11 regular and 6 self-financing UG programmes, 9 regular and 3 self-financing PG programmes and 6 PhD programmes.

1.1 Vision and Mission Statements of the College

Vision:

St. Teresa's College envisions a life-oriented education that empowers students to respond proactively to social concerns and work for the integrity of creation, thereby building a 'civilization of love' and advancing the Kingdom of God as envisaged by the foundress Mother Teresa of St. Rose of Lima.

Mission

1. To promote a college community/society/nation where spiritual, moral and genuine values are lived and witnessed.
2. To create a climate for human and academic excellence with an openness to learning, research and the development of professional skills
3. To promote peace and harmony through an intercultural and inter-religious dialogue.
4. To contribute to the transformation of society through an openness to life and living the challenges of being socially conscious and socially responsible.
5. To promote programmes/movements that foster inter-connectedness, kinship and eco-justice.

1.2 Objectives of the College

The College aims at the integral formation of Intellectually creative, Emotionally mature, Morally responsible, Spiritually enlightened, Socially committed and Truly liberated young women who will be capable of assuming their rightful place in society and playing a vital role for its transformation.

The Message, this temple of learning spells out to its inmates is the pursuit of excellence of mind and heart. Excel in your own field so that you become competent and confident; to offer better service to your co-pilgrims, especially to the downtrodden and the marginalised. These noble ideals are geared towards developing and strengthening Christian ideals and leadership. The goals are brought to effective realisation in an atmosphere of mutual trust, cordial relationship and active participation of all the sections of the College Community.

1.3 Total Campus Area & College Building Spread Area

Campus area	7.27 Hectares
Built up area	11832.09 sq. mts.

List of places from where students are coming to the college

Ernakulam, Vypeen, Paravur, Edappally, Kottayam, Idukki, Pathanamthitta, Aluva, Fort Kochi, Mattanchery, Kakkanad, Thrupunithura, Maradu, Vyttila, kadavanthara, Eroor, Cherthala, Aroor, Edakochi, Kumbalanghi, Chellanam, Mulvukad, Cheranelloor, Varapuzha

Previous NAAC grading in assessments

Sl. No.	Cycle	Grade	CGPA	Year of Accreditation	Validity Period
1	1 st Cycle	5 star	-	1999	2006
2	2 nd Cycle	A	-	2006	2012
3	3 rd Cycle	A	3.40	2012	2017

1.4 Campus infrastructure

Facilities
Class rooms
Laboratories- including language lab
Seminar Halls
Platinum Jubilee Auditorium
CCTV monitored in the Principal's office and the library ensures discipline and security of resources.
Information display and notification
D-space Digital Repository Library; computer with internet facility
Canteen
Basket Ball & Volleyball Court
Gymnasium
Badminton & Tennis Court
Library
Table Tennis Board, Chess board, Caroms
Hostel for Students and Staff
Guest House
Smart Class

Chapter 2

Pre-Audit Stage

A pre-audit meeting is an important prerequisite for the green audit because it is the first opportunity to meet the auditee and deal with any concerns. This was held at St. Teresa's college, Ernakulam on September 1st 2014. It was an opportunity to gather documentation that the audit team can study before arriving on the site. The audit protocol and audit plan was handed over at this meeting and discussed in advance of the audit itself. The meeting provided an opportunity to reinforce the scope and objectives of the audit and discussions were held on the practicalities associated with the audit.

2.1 Management Commitment

The Management of the college has shown great commitment towards green auditing during the pre-audit meeting. They were ready to encourage all green activities. It is decided to promote all activities that are environment friendly such as awareness programmes on the environment, campus farming, planting more trees on the campus etc., after the green auditing. The management of the college will formulate policies based on the green auditing report. The management commitment is an indicator which addresses institutional commitment, governance, and investment policy. College administration is vital to the process of realizing campus sustainability, and college policy is an essential instrument for any substantial change in the campus environment.

2.2 Scope and goals of Green Auditing

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Green auditing is one among them for educational institutions. Once a baseline is established, the data can serve as a point of departure for further action in campus greening. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. This 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. This audit initiative focused initially on educating colleges and universities through workshops, guidebooks, fact sheets and ensuring compliance through inspections and self audits.

A very simple indigenized system has been devised to monitor the environmental performance of St. Teresa's College, Ernakulam. It comes with a series of questions to be answered on a regular basis. This innovative scheme is user-friendly and totally voluntary. The aim of this is to help the institution to set environmental examples for the community, and to educate the young learners.

2.3 Benefits of the Green Auditing

- ✓ More efficient resource management
- ✓ To create a green campus
- ✓ To enable waste management through reduction of waste generation, solid-waste and water recycling
- ✓ To create plastic free campus and evolve health consciousness among the stakeholders
- ✓ To provide a basis for improved sustainability
- ✓ Impart environmental education through systematic environmental management approach and Improving environmental standards
- ✓ Benchmarking for environmental protection initiatives
- ✓ Financial savings through a reduction in resource use

- ✓ Curriculum enrichment through practical experience
- ✓ Development of ownership, personal and social responsibility for the College and its environment
- ✓ Enhancement of college profile
- ✓ Developing an environmental ethic and value systems in young people

2.4 Target Areas of Green Auditing

➤ Auditing for Water Management

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.

➤ Auditing for Energy Management

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.

➤ Auditing for Waste Management

This indicator addresses waste production and disposal, plastic waste, paper waste, food waste, and recycling. Municipal solid waste has a number of adverse environmental impacts, most of which are well known and not in need of elaboration. Solid waste can be divided into two categories: general waste and hazardous waste. General waste includes what is usually thrown away in homes and schools such as paper, plastics tins and glass bottles. Hazardous waste is waste that is likely to be a threat to one's health or the environment like cleaning chemicals and petrol.

Unscientific landfills may contain harmful contaminants that leach into soil and water supplies, and produce greenhouse gases contributing to global climate change. Furthermore, 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.

➤ **Hazardous materials**

This indicator addresses hazardous wastes of laboratories, medical waste, art supplies, and chemicals (paints, cleaning materials etc.) used in campus maintenance. 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 to the long-term health of the planet.

➤ **Auditing for Green Campus Management**

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 healthy ecosystems and ultimately 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 work hard to keep the air we breathe clean and healthy. They are like sponges. 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. This system of absorbing gases on which all plants rely for their food is called photosynthesis. 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. At night when there is no sunlight the plant no longer makes food, so it does not release the same amount of oxygen. One is often told not to sleep with plants in one's room, as they will use up all the oxygen. However, at night although photosynthesis does take place the plants also rest, so that little oxygen is absorbed from the air and very little harm can be done to the sleeper.

The roots of trees dig deep into the earth and hold it together so that the rain and wind cannot 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. If this is washed, blown or worn away leaving rock or sand on which no plants can grow then the earth would become a desert. The removal of this top-soil is called soil erosion. Scientists, all over the world are trying to find ways to prevent soil erosion. One of the most important ways is creating by planting more trees.

Trees send up water vapour into the atmosphere through their leaves. When this vapour meets the cool air above it turns into drops of water which then fall as rain. They give us beauty, colour and greenery. This is something which we often forget and fail to appreciate. They are the homes of many birds, animals and insects. Each of these is important in maintaining the balance of nature.

Trees give us food, and juice to drink. Ropes, medicines, wood, paper, and so many other things we use in our daily life, or which are necessary for our health, are made from trees.

➤ **Auditing for carbon footprint**

How we get around and commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels (such as petrol). The most common greenhouse gases are carbon dioxide, 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 our 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 your home and college every day.

The above target areas particular to the college was evaluated through a questionnaire circulated to the students for data collection. Five categories of questionnaires were distributed. The formats of these are given below.

I

Survey forms used for the auditing @ St. Teresa's College, Ernakulam Green Auditing

Auditing for Water Management

1. List uses of water in your college.
2. What are the sources of water in your college?
3. How many wells are there in your college?
4. No. of motors used for pumping water from each well?
5. What is the total horse power of each motor?
6. What is the depth of each well?
7. What is the present depth of water in each well?
8. How does your college store water?
9. Quantity of water stored in your overhead water tank? (in litres)
10. Quantity of water pumped every day? (in liters)
11. If there is water wastage, specify why.
12. How can the wastage be prevented / stopped?
13. Locate the point of entry of water and point of exit of waste water in your College.
14. Where does waste water come from?
15. Where does the waste water go?
16. What are the uses of waste water in your college?
17. What happens to the water used in your labs? Whether it is mixing with ground water?
18. Is there any treatment for the lab water?
19. Are your labs practicing green chemistry methods?
20. Write down four ways that could reduce the amount of water used in your college.
21. Record water use from the college water meter for six months.
22. Bimonthly water charges paid to water connections if any
23. No. of water coolers. Amount of water used per day? (in litres)

- 24.No. of water taps. Amount of water used per day?
 - 25.No. of bath rooms in staff rooms, common, hostels.
Amount of water used per day?
 - 26.No. of toilet, urinals. Amount of water used per day?
 - 27.No. of water taps in the canteen. Amount of water used per day?
 - 28.Amount of water used per day for garden use.
 - 29.No. of water taps in laboratories. Amount of water used per day in each lab?
 - 30.Total use of water in each hostel?
 - 31.At the end of the period, compile a table to show how many litres of water have been used in the college for each purpose
 - 32.Is there any water used for agricultural purposes?
 - 33.Does your college harvest rain water?
 - 34.If yes, how many rain water harvesting units are there? (Approx. amount)
 - 35.How many of the taps are leaky? Amount of water lost per day?
 - 36.Are there signs reminding people to turn off the water? ___ Yes ___ No
 - 37.day?(Approx)
 - 38.Is there any waterless toilets? _____
 - 39.How many water fountains are there? _____
 - 40.How many water fountains are leaky? _____
 - 41.Is drip irrigation used to water plants outside?
 42. ___ YES ___ NO
 - 43.How often is the garden watered?
 - 44.Amount of water used to watering the ground?
 - 45.Amount of water used for bus cleaning? (liters per day)
 - 46.Amount of water for other uses? (items not mentioned above)
 - 47.Area of the college land without tree/building canopy.
 - 48.Is there any water management plan for the college?
 - 49.Are there any water saving techniques followed in your college?
What are they?
 - 50.Please share Some IDEA for how your college could save more water.
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II

Green auditing @ St Teresa's College, Ernakulam Auditing for Energy Management

1. List ways that you use energy in your college. (Electricity, electric stove, kettle, microwave, LPG, firewood, Petrol, diesel and others).
2. Electricity bill amount for last one year
3. Amount paid for LPG cylinders for last one year

4. Weight of firewood used per month and amount of money spent? Also mention the amount spent for petrol/diesel/ others for generators?
5. Are there any energy saving methods employed in your college? If yes, please specify. If no, suggest some.
6. How much money does your college spend on energy such as electricity, gas, firewood, etc. in a month.(Record monthly for the year 2014).
7. How many CFL bulbs has your college installed? Mention use (Hours used/day for how many days in a month)
8. Energy used by each bulb per month? (for example- 60 watt bulb x 4hours x number of bulbs = kWh).
9. How many LED bulbs has your college installed? Mention use (Hours used/day for how many days in a month)
10. Energy used by each bulb per month? (kwh).
- 11.How many incandescent (tungsten) bulbs has your college installed?
Mention use (Hours used/day for how many days in a month)
- 12.Energy used by each bulb per month? (kwh).
- 13.How many fan has your college installed? Mention use (Hours used/day for how many days in a month)
- 14.Energy used by each fan per month? (kwh)
- 15.How many air conditioner has your college installed? Mention use (Hours used/day for how many days in a month)
- 16.used/day for how many days in a month)
- 17.Energy used by each air conditioner per month? (kwh).
- 18.How many electrical equipment including weighting balance has your college installed? Mention use (Hours used/day for how many days in a month)
- 19.Energy used by each electrical equipment per month? (kwh).
- 20.How many computer has your college installed? Mention use (Hours used/day for how many days in a month)
21. Energy used by each computer per month? (kwh)
- 22.How many photocopier has your college installed? Mention use (Hours used/day for how many days in a month).
- 23.How many cooling apparatus has your college installed? Mention use(Hours used/day for how many days in a month)
- 24.Energy used by each cooling apparatus per month? (kwh) Mention use (Hours used/day for how many days in a month)
25. Energy used by each photocopier per month? (kwh) Mention use (Hours used/day for how many days in a month)
- 26.How many inverters your college installed? Mention use (Hours used/day for how many days in a month)Energy used by each inverter per month? (kwh)
- 27.How many electrical equipment used in different labs of your college ?
Mention use (Hours used/day for how many days in a month)
- 28.Energy used by each equipment per month? (kwh)
- 29.How many heaters used in the canteen of your college ? Mention use (Hours used/day for how many days in a month)Energy used by each heater per month? (kwh)
- 30.Number of street lights in your college? Energy used by each street light per month? (kwh)
- 31.Number of TVs in your college and hostels? Energy used by each TV per month? (kwh)

32. Any other item that uses energy (Please write the energy used per month) Mention use (Hours used/day for how many days in a month)
33. Are there any alternative energy sources/nonconventional energy sources employed / installed in your college? (photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.
34. Do you run "switch off" drills at college?
35. Are your computers and other equipment put on power-saving mode?
36. Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on stand by modes most of the time? If yes, how many hours?
37. What are the energy conservation methods adapted by your college?
38. How many boards displayed for saving energy awareness?
39. How much ash collected after burning fire wood per day in the canteen?
40. Write a note on the methods/practices/adaptations by which you can reduce the energy use in your college campus in future.

Calculation of energy for electrical appliances

Appliance	Power used in (watt)	Usage per day (hours)	Number of appliances	Average kWh per day (Watt X hours X Number X 1000)	Average kWh per month (Watt X hours X Number X 1000 x 30)
Incandescent bulb	60 watt				
CFL	18 W				
Microwave	1000W				
Stove	3000W				
Kettle	2500W				

III

Green auditing @ St. Teresa's College, Ernakulam Auditing for Waste Management

1. What is the total strength of students, teachers and Non teaching staff in your College?

	No. of Students	No. of Teachers	No. Non teaching staff
Gents			
Ladies			
Total			

2. Which of the following are available in your College? Give area occupied and number

Garden area	Garbage dump (number)
Play ground area	Laboratory
Kitchen	Canteen

Toilets (number)
Number of class rooms

Car/scooter shed area
Office rooms
Others (specify)

3. Which of the following are found near your college?

Mark the level of disturbance it creates for the college in a scale of 1 to 9.

- Municipal dump yard
- Garbage heap
- Public convenience
- Sewer line
- Stagnant water
- Open drainage
- Industry – (Mention the type)
- Bus / Railway station
- Market / Shopping complex / Public halls

4. **Details of WASTE generated**

4.1 Does your college generate any waste?

If so, what are they? How much quantity? Number or weight

E-waste

Hazardous waste (toxic)

Solid waste

Dry leaves

Canteen waste

Liquid waste

Glass

Unused equipment

Medical waste if any

Napkins

Others (Specify)

4.2 Is there any waste treatment system in the college?

4.3 Is there any treatment for toilet/urinal/sanitary napkin waste?

4.4 What is the approximate amount of waste generated per day? (in Kilograms)
(approx.)

Office

Approx	Bio degradable	Non-Bio degradable	Hazardous	Others
< 1 kg.				
2 - 10 kg.				
> 10 kg.				

Laboratories

Approx	Bio degradable	Non-Bio degradable	Hazardous	Others
< 1 kg.				
2 - 10 kg.				
> 10 kg.				

Canteen/kitchen

Approx	Bio degradable	Non-Bio degradable	Hazardous	Others
< 1 kg.				
2 - 10 kg.				
> 10 kg.				

- 5 Is there a problem with the waste produced ?
- 6 Whether waste is polluting ground/surface water? How?
- 7 Whether waste is polluting the air of the college? How?
- 8 How is the waste generated in the college managed? Methods
 - 8.1 Composting
 - 8.2 Recycling
 - 8.3 Reusing
 - 8.4 Others (specify)
- 9 How many separate boxes do you think you would need to put into a classroom to start a waste segregation and recycling campaign?
What would each be used for? (Develop a colour code with reasons)
- 10 Do you use recycled paper in College?
- 11 Is there any waste wealth programme practiced in the college?
- 12 How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.
- 13 Can you achieve zero garbage in your college? (Reduce ,Recycle, Reuse, Refuse) If yes, how?

IV

**Green auditing @ St. Teresa's College, Ernakulam
Auditing For Green Campus Management**

1. Is there a garden in your college? 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. Are 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. Whether you are 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 any 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 are you doing with the vegetables harvested? Do you have any student market?
18. Is there any botanical garden in your campus? If yes give the details of campus flora.
19. Name number and names of the medicinal plants in your college campus.
20. 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. Are there any fruit yielding plants in your college? If yes details of the trees planted.
24. Are 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 is the nature awareness programmes conducted in the campus? (2014-15)
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.

V

Green auditing @ St. Teresa's College, Ernakulam Auditing for Carbon Footprint

1. What is the total strength of students and teachers in your College?
No. of Students No. of Teachers No. of Non teaching staff
2. Gents
3. Ladies
- Total
4. Total Number of vehicles used by the stakeholders of the college.(per day)
5. No. of cycles used
6. No. of two wheelers used (average distance travelled and quantity of fuel and amount used per day)
7. No. of cars used (average distance travelled and quantity of fuel and amount used per day)
8. No. persons using common (public) transportation (average distance travelled and quantity of fuel and amount used per day)
9. No. of persons using college conveyance by the students, nonteaching staff

- and teachers (average distance travelled and quantity of fuel and amount used per day)
10. Number of parent-teacher meetings in an year? Parent turn out (approx.)
 11. Number of visitors with vehicles per day?
 12. Number of generators used every day (hours). Give the amount of fuel used per day.
 13. Number of LPG cylinders used in the canteen (Give the amount of fuel used per day and amount spent).
 14. Quantity of kerosene used in the canteen/labs (Give the amount of fuel used per day and amount spent).
 15. Amount of taxi/auto charges paid and the amount of fuel used per month for the transportation of vegetables and other materials to canteen.
 16. Amount of taxi/auto charges paid per month for the transportation of office goods to the college.
 17. Average amount of taxi/auto charges paid per month by the stakeholders of the college.
 18. Use of any other fossil fuels in the college (Give the amount of fuel used per day and amount spent).
 19. Suggest the methods to reduce the amount of use of fuel by the stakeholders/students/teachers/non teaching staff of the college.

Chapter 3

Audit Stage

Green auditing was done by CMJ eco-associates involving different student groups & teaching and non-teaching staff. The green audit began with the teams walking 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, Waste, Greening, Carbon footprint and Water uses. College records and documents were verified several times to clarify the data received through survey and discussions. The whole process was completed within three months period, *ie.* September to November, 2014.

3.1 Student groups involved

Students from the departments of English, Botany, Commerce, Zoology, Physics, Chemistry, Sociology, Economics, Hindi and Mathematics took part in the data collection of green auditing.

Names of students who participated

Sl.No	Name of the Student	Class
1.	Linta (Leader)	II MSc Physics
2.	Aswathy	
3.	Reshma	
4.	Toolika Suresh	III BA Economics
5.	Amala	Msc.Physics
6.	Anija	
7.	Navya	
8.	Laya	
9.	Tanya Tom	II BA English
10.	Sandria Sheen	
11.	Delicia Rachel	
12.	AswathyJayachandran	
13.	Sreedevi R	II BA English
14.	Ansila O M	
15.	Safna K S	
16.	Lakshmi T A	
17.	Joshna	III B.Com
18.	AiswaryaJohny	
19.	Arsha Prakash	
20.	Asha Mendez	
21.	Jinu	III B.Com
22.	Sona Susan	
23.	Meera V M	
24.	Ciara Johny	
25.	Syno Paul	II B.Sc.Chemistry
26.	Athira S Kumar	
27.	Sreeja P K	
28.	Tinu P S	
29.	Mary Ann Raphel	
30.	Akshya Antony	III BA Economics
31.	Naveena Richard	
32.	Jishina Joseph	
33.	Sharon Maria P J	
34.	Rose	II BA English
35.	Collin	
36.	Manju	
37.	Lakshmi	

38.	SreeveenaMenon	II BA Sociology
39.	Athira	
40.	Krishna	
41.	Amrutha	
42.	Brazina	

3.2 Student clubs and forums that participated in the green auditing

Nature Club-Bhoomithra Sena club, Tourism Club, Entrepreneur club , NSS, NCC, Youth Red cross and Department level associations

3.3 Comments on site inspection

Site inspection was done along with students and staff. It was quite interesting and fascinating. It was an environmental awareness programme for the students who participated in the green auditing. The experience of green auditing was a first time experience for most of the students. They shared their expectations about a green campus and gave suggestions for the audit recommendations.

3.4 Review of documents and records

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

3.5 Review of policies

Discussions were made with the college management regarding their policies on environmental management. Future plans of the college were also discussed.

3.6 Interviews

In order to collect information for green auditing different audit groups interviewed office staff, Principal, Teaching and non-teaching staff, students, parents and other stakeholders of the college. Discussions were also made with the PTA office bearers to clarify doubts regarding certain points.

3.7 Site inspection

The college and its premises were visited and analyzed by the audit-teams several times to gather information. Campus trees were counted and identified, vegetable garden, play grounds, canteen, library, office rooms and parking grounds were also examined to collect data.

Chapter 4

Post Audit Stage

4.1 Key Findings and Observations

a) Water

- ❖ Water uses different
- ❖ Number of water treatment system in place - nil
- ❖ Water cooler with drinking water filtration is installed (9).
- ❖ Number of urinals and toilets – 94
- ❖ Number of waterless urinals - nil
- ❖ Number of bathrooms – 70
- ❖ Number of water taps – 202 (a few are leaky)
- ❖ Number of wells – 3
- ❖ Quantity of water pumped – 10000-15000 liters/day
- ❖ Water charges paid – Rs.10000/Month
- ❖ Water use in hostels – 40000 liters/day (total-50000liters)

b) Energy

- ❖ Electricity charges Rs.20600/month
- ❖ Cost of Gas cylinders used Rs. 834/month

- ❖ Cost of generator fuel – Rs.300/month
- ❖ Number of CFL bulbs – 200 (3857.04 kwh)
- ❖ Number of LED bulbs – 13 (8.58 kwh)
- ❖ Number of incandescent bulbs – 265 (142.56 kwh)
- ❖ Fans – 797 (8416.32 kwh)
- ❖ ACs – 22 (4356 kwh)
- ❖ Computers – 182 (6006kwh kwh)
- ❖ Cooling apparatus – 16 (232.32 kwh)
- ❖ Water pumps – 3
- ❖ Tubes – 120
- ❖ Photocopier – 7 (196.78 kwh)
- ❖ Printers – 60
- ❖ LCD projector – 15
- ❖ Television – 9 (28.8 kwh)
- ❖ Number of inverters – 2 (264 kwh)
- ❖ Number of water heaters – 11 (1452 kwh)

c) **Waste**

- ❖ Total Stakeholders – 2950
- ❖ Class rooms – 98
- ❖ Other rooms – 28
- ❖ Number of hostel inmates - 600
- ❖ Number of Garbage dumps – 2
- ❖ Number of toilets - 94
- ❖ E-wastes- computers, electrical and electronic parts – Disposal by selling
- ❖ Plastic waste- disposal by selling
- ❖ Solid wastes – Damaged furniture, paper waste, paper plates, food wastes – to Municipal waste collection centers
- ❖ Chemical wastes – Laboratory waste
- ❖ Waste water – washing, urinals, bathrooms
- ❖ Glass waste – Broken glass wares from the labs

- ❖ Waste treatments – biogas plant and compost system
- ❖ Napkin incinerator - 1

Quantity of waste generated:-

- ❖ Bio degradable – 3 kg/day (office)
- ❖ Non bio degradable – 8 kg/day (office)
- ❖ Bio degradable – 1 kg/day (labs)
- ❖ Non-bio-degradable – 1½ kg/day (labs)
- ❖ Hazardous waste – ½ kg/day

Canteen waste

- ❖ Biodegradable – 10kg/day
- ❖ Non-biodegradable – ½ kg/day

d) Green Campus

Campus tree cover – 436.76 Sq.M

Total number of campus plant species identified – 135

LIST OF PLANTS IDENTIFIED DURING GREEN AUDITING

SL.NO	NAME OF THE PLANTS	NO.OF EACH SPECIES
1.	<i>Achyranthes aspera</i>	10
2.	<i>Acorus calamus</i>	01
3.	<i>Aerva lanata</i>	8
4.	<i>Allamanda cathartica</i>	5
5.	<i>Aloe vera</i>	1
6.	<i>Alpinia galangal</i>	1
7.	<i>Andrographis paniculata</i>	4
8.	<i>Anthurium andraeanum</i>	8
9.	<i>Apama siliquosa</i>	1
10.	<i>Aralium</i>	3
11.	<i>Ardesia littoralis</i>	1
12.	<i>Aristolochia indica</i>	1

13.	<i>Artemisia parviflora</i>	1
14.	<i>Asclepias curassavica</i>	3
15.	<i>Asparagus racemosus</i>	1
16.	<i>Azadirachta indica</i>	1
17.	<i>Begonia rex.</i>	2
18.	<i>Biophytum sensitivum</i>	4
19.	<i>Blepharis boerhaavifolia</i>	3
20.	<i>Boerhaavia diffusa</i>	2
21.	<i>Bougainvillea spectabilis</i>	4
22.	<i>Brunfelcia Americana</i>	1
23.	<i>Caesalpinia sappan</i>	1
24.	<i>Calanthe veratifolia</i>	2
25.	<i>Calliandra emarginata</i>	1
26.	<i>Callistemon lanceolatus</i>	1
27.	<i>Calotropis gigantia</i>	1
28.	<i>Cananga odorata</i>	1
29.	<i>Cardiospermum halicacabum</i>	1
30.	<i>Catheranthus rosea</i>	4
31.	<i>Centella asiatica</i>	5
32.	<i>Chlorophytum sensitivum</i>	2
33.	<i>Cissus quadrangularis</i>	1
34.	<i>Clematis paniculata</i>	1
35.	<i>Clitoria ternatea</i>	2
36.	<i>Codiaeum variegatum</i>	12
37.	<i>Coffea travancorensis</i>	1
38.	<i>Coleus vetiveroides</i>	1
39.	<i>Convolvulus</i>	2
40.	<i>Cordia</i>	1
41.	<i>Cosmos pinnata</i>	3
42.	<i>Costus pictus</i>	2
43.	<i>Cuphaea miniata</i>	3
44.	<i>Cyathula prostrate</i>	2
45.	<i>Cymbopogon citrates</i>	1
46.	<i>Datura stramonium</i>	1
47.	<i>Dendrobium jasminoides</i>	1
48.	<i>Desmodium gangeticum</i>	2

49.	<i>Dorstenia indica</i>	3
50.	<i>Dracaena terminalis</i>	4
51.	<i>Dracaena terniflora</i>	2
52.	<i>Duranta plumerii</i>	1
53.	<i>Duranta repens</i>	1
54.	<i>Ehretia</i>	1
55.	<i>Elephantopus scaber</i>	1
56.	<i>Epiphyllum</i>	
57.	<i>Eupatorium ayapana</i>	1
58.	<i>Euphorbia hirta</i>	4
59.	<i>Evodea roxburghiana</i>	1
60.	<i>Excoecaria bicolor</i>	1
61.	<i>Ficus sp.</i>	4
62.	<i>Gomphrena globosa</i>	3
63.	<i>Hamelia patens</i>	1
64.	<i>Hedychium coronarium</i>	1
65.	<i>Heliotropium indicum</i>	1
66.	<i>Heliotropium scabrum</i>	1
67.	<i>Hemidesmus indicus</i>	1
68.	<i>Hemigraphis colorata</i>	1
69.	<i>Hibiscus rosa-sinensis</i>	2
70.	<i>Holarrhena antidysentrica</i>	1
71.	<i>Ilysanthes serrata</i>	9
72.	<i>Impatiens balsamina</i>	4
73.	<i>Isotoma longiflora</i>	2
74.	<i>Ixora coccinea</i>	2
75.	<i>Jacobina</i>	1
76.	<i>Jatropha curcas</i>	1
77.	<i>Jatropha padagrica</i>	1
78.	<i>Jatropha pandurifolia</i>	1
79.	<i>Justicia beddomei</i>	3
80.	<i>Kaempferia galanga</i>	1
81.	<i>Knoxia mollis</i>	4
82.	<i>Lantana camara</i>	2
83.	<i>Loranthus longiflorus</i>	2
84.	<i>Mangifera indica</i>	2

85.	<i>Maranta bicolor</i>	1
86.	<i>Melastoma malabathricum</i>	1
87.	<i>Mentha piperita</i>	2
88.	<i>Micrococca mercurialis</i>	2
89.	<i>Mimosa pudica</i>	5
90.	<i>Mirabilis jalappa</i>	2
91.	<i>Murraya exotica</i>	1
92.	<i>Nicodemia diversifolia</i>	1
93.	<i>Nymphaea stellata</i>	5
94.	<i>Ocimum basilicum</i>	2
95.	<i>Ocimum sanctum</i>	1
96.	<i>Ophiorhiza mungos</i>	1
97.	<i>Oxalis corniculata</i>	3
98.	<i>Pentas lanceolatus</i>	2
99.	<i>Petrea volubilis</i>	1
100.	<i>Phyllanthus urinaria</i>	10
101.	<i>Pimenta officinalis</i>	1
102.	<i>Piper longum</i>	1
103.	<i>Pistia stratiotes</i>	2
104.	<i>Plumbago indica</i>	1
105.	<i>Polyalthia pendula</i>	1
106.	<i>Polygonum chinensis</i>	1
107.	<i>Rauwolfia canescens</i>	1
108.	<i>Rawolfia serpentina</i>	1
109.	<i>Rosa indica</i>	2
110.	<i>Ruellia macrantha</i>	2
111.	<i>Rusellia equisitifolia</i>	1
112.	<i>Sansevieria roxburghiana</i>	1
113.	<i>Saraca asoka</i>	1
114.	<i>Scaveola</i>	1
115.	<i>Scoparia dulcis</i>	4
116.	<i>Strobilanthes heynianus</i>	1
117.	<i>Thalinum cuniefolium</i>	1
118.	<i>Torenia asiatica</i>	2
119.	<i>Tradescantia bicolor</i>	10
120.	<i>Triphasia trifoliata</i>	1

121.	<i>Vetiveria zizanioides</i>	1
122.	<i>Vitex negundo</i>	1
	GYMNOSPERMS	
123.	<i>Cycas sp.</i>	3
124.	<i>Podocarpus sp.</i>	5
125.	<i>Zamia sp.</i>	1
126.	PTERIDOPHYTES	
127.	<i>Adiantum</i>	1
128.	<i>Azolla</i>	1 pot full
129.	<i>Equisetum</i>	1 pot full
130.	<i>Lygodium</i>	2
131.	<i>Marsilea</i>	1 pot full
132.	<i>Ophioglossum</i>	5
133.	<i>Salvinia</i>	Numerous
134.	<i>Selaginella</i>	Numerous
135.	<i>Angiopteris</i>	1

Space allotted for vegetable gardens – 4 cents

List of seasonal vegetables cultivated regularly – 14

- ❖ Spinach
- ❖ Turmeric
- ❖ Colocasia
- ❖ Plantain
- ❖ Ladies finger
- ❖ Beans
- ❖ Green chilly
- ❖ Tapioca
- ❖ Birds eye chilly(kanthari mulaku)
- ❖ Curry leaves
- ❖ Brinjal
- ❖ Cooking plantain

❖ Bitter gourd

❖ pepper

Plants of the Botanical Garden

- Beans
- Green chilly
- Tapioca
- Birds eye chilly(kanthari mulaku)
- Curry leaves
- Brinjal
- Cooking plantain
- Bitter gourd
- Banana
- Papaya
- Semarang rose apple
- Cherry
- Pineapple
- Guava
- Sapodilla (chickoo)
- Ashoka chethi
- Ramba
- Money plant
- Green horns
- Anthurium
- Dracaena
- Comelina
- Cupresus
- Rajamalli
- Cactus
- Pepper

- Edampiri valampiri
- Kanjiram
- Noni
- Aadalodakam
- Lemon (Narakam)
- Brahmi
- Bamboo
- Njaval
- Mukutty
- Moovila
- Orila
- Bouquet leaves
- Pathimukam
- Peral
- Aal
- Bridal bouquet
- Thipalli
- Spinach
- Turmeric
- Arbi(chembu)
- Ridge gourd
- Ladies finger

e) Carbon footprint

No. persons using cycles – 2

No. persons using cars – 17

No. persons uses two wheelers – 69

Persons using other transportations – 2862

No. visitors per day - 15

Average distance travelled by stake holders – 15kms/day

Money spent for transportation by per person per day – Rs.40/-

No of LPG cylinders used per month – 31 (Rs. 20000/Month)

Amount of fuel used per day for the operation of generators – 15 L(Rs. 2000/-)

Transportation charges for office goods – Rs. 1350/Month

Transportation charges for canteen materials – Rs. 1000/Month

4.2 Evaluation of findings

Water

Water audit at St. Teresa's College, Ernakulam					
1	2	3	4	5	6
Activity	Average litres of water used per activity (litres)	Number of times activity done each day	Total water used by a person each day (litres)	Number of people in the College using water	Total household water consumption per day
Wash hands and face	1.5 litres	3 times a day	1.5 litres x 3 times a day = 4.5	2600 people	4.5 litres x 300people = 1350 L
Bath	80 – 150	once	100	600	1000 L
Toilet flush	6-21	once	10	2000	2000 L
Drinking (cup)	0.25	twice	0.5	2500	250 L
Washing dishes (hand)	18 single & 36 double basin	twice	25	2500	7500 L
Leaking/dripping tap (1 drop/second /day)	30 to 60	continuous	50	-	250 L
Food garden (m ² /day)	4	once		800	1000 L
Cooking (average meal for 5 people)	3				1000 L
Using the garden hose for an hour	1000	1	1000		1000 L
				Total	15350 L

15350 liters of water is used per day by the college for its different uses. The main source of water is ground water. Water from the public water supply is also utilized. 250 L of water per day is lost through the leaking of pipes. This can be prevented and other sources of water loss may be identified. Drip irrigation should be practiced in gardens. 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% 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.

Existing water management methods in the campus

- Rain water harvesting system (1)
- 5 awareness boards are displayed to save water

Energy

Electric Appliance Audit Sheet of St. Teresa's College					
1	2	3	4	5	6
Appliance	Power use (Watt)	Usage per day (hours)	Number of appliances	Average kWh per day (watt x hours x no/1000)	Average kWh per month
light bulb Incandescent	60W	5 hours	46 lights	$60 \times 5 \times 46 = 13800 / 1000 = 13.8$ kWh per day	$13.8 \times 30 = 414$ kWh/ month

Light bulb CFL	18W	5 hours	15 lights	$18 \times 5 \times 15 = 1350/1000$ = 1,35 kWh per day	$1.35 \times 30 = 40.5$ kWh/ month
Motor	1000W	1 hours	3		135 kWh/ month
Photocopier			1		31.25 kwh/month
Fan			178		7.5 kwh/month
AC			1		51 kwh/month
Computers			46		7.5 kwh/month
Tubes			120	$40 \times 5 \times 120 =$	720 kwh/month
Printers			6		15.625 kwh/month
Water filter			1		51 kwh/month
LCD Projector			2		18 kwh/month
Electricity consumption total					1212.75 kwh/month

The total energy utilization of the college for different purposes is approximately 1212.75 kwh/month. A hybrid source of energy comprising solar and wind type of non-conventional category of energy will be a good energy management system for the college. Electricity charges per month is Rs.32131/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 House maintenance team 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 some areas such as the toilets are controlled by PIR (passive infra red light) sensors. 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. In order to do this the College must install meters for campus buildings.

Existing energy management methods in the campus

- ✓ 6 Awareness boards are displayed to save energy

Waste

Biodegradable waste = 30 kg/day

Non-biodegradable waste = 3 kg/day

A composting pit is highly essential for the treatment of bio degradable waste generated from the canteen, office, vegetable garden and from the college campus cleaning operations. Different methods such as pit composting, vermi-composting, bacterial composting using bacterial consortium, may be used to treat the bio degradable waste. Hazardous waste generated from the college can be collected properly and may be handed over to the local self-governments treatment yards. Bottles, plastics, cans, broken glass wares, tins etc., may be recycled or sold out.

The College has missed few major recycling opportunities, with the exception of food waste from the dining halls. There should be proper sign boards displayed to tell students where to go for the disposal of other recyclables, plastics and hazardous wastes. There should be in place a policy for the handling and disposal of hazardous materials. The college should have in place plans for dealing with hazardous wastes in academic departments (art, chemistry, etc.) as well as the maintenance activities (paints, etc.). The college should ensure that the hazardous materials are disposed of properly. Chemistry department may change their experiments to green chemistry.

Existing waste management methods in the campus

- ✓ Green (biodegradable), Yellow (plastic) and red (e-waste) coloured bins are placed in the class rooms for the waste segregation
- ✓ Re use of plastic carry bags

- ✓ Training in bag making from polyester, and cotton materials for nature club members
- ✓ Incinerator is used for napkin burning
- ✓ Waste segregation is done regularly

Green Campus

There are 134 different types of plants in the campus. Tree cover of the campus is 436.76 Sq.M. The tree populations of the campus comprise the following species.

LIST OF PLANTS IDENTIFIED DURING GREEN AUDITING

SL.NO.	NAME OF THE PLANTS	NO.OF EACH SPECIES
1.	<i>Achyranthes aspera</i>	10
2.	<i>Acorus calamus</i>	01
3.	<i>Aerva lanata</i>	8
4.	<i>Allamanda cathartica</i>	5
5.	<i>Aloe vera</i>	1
6.	<i>Alpinia galanga</i>	1
7.	<i>Andrographis paniculata</i>	4
8.	<i>Anthurium andraeanum</i>	8
9.	<i>Apama siliquosa</i>	1
10.	<i>Aralium</i>	3
11.	<i>Ardesia littoralis</i>	1
12.	<i>Aristolochia indica</i>	1
13.	<i>Artemisia parviflora</i>	1
14.	<i>Asclepias curassavica</i>	3
15.	<i>Asparagus racemosus</i>	1
16.	<i>Azadirachta indica</i>	1
17.	<i>Begonia rex.</i>	2
18.	<i>Biophytum sensitivum</i>	4
19.	<i>Blepharis boerhaavifolia</i>	3
20.	<i>Boerhaavia diffusa</i>	2
21.	<i>Bougainvillea spectabilis</i>	4

22.	<i>Brunfelsia americana</i>	1
23.	<i>Caesalpinia sappan</i>	1
24.	<i>Calanthe veratifolia</i>	2
25.	<i>Calliandra emarginata</i>	1
26.	<i>Callistemon lanceolatus</i>	1
27.	<i>Calotropis gigantia</i>	1
28.	<i>Cananga odorata</i>	1
29.	<i>Cardiospermum halicacabum</i>	1
30.	<i>Catheranthus rosea</i>	4
31.	<i>Centella asiatica</i>	5
32.	<i>Chlorophytum sensitivum</i>	2
33.	<i>Cissus quadrangularis</i>	1
34.	<i>Clematis paniculata</i>	1
35.	<i>Clitoria ternatea</i>	2
36.	<i>Codiaeum variegatum</i>	12
37.	<i>Coffea travancorensis</i>	1
38.	<i>Coleus vetiveroides</i>	1
39.	<i>Convolvulus</i>	2
40.	<i>Cordia</i>	1
41.	<i>Cosmos pinnata</i>	3
42.	<i>Costus pictus</i>	2
43.	<i>Cuphaea miniata</i>	3
44.	<i>Cyathula prostrata</i>	2
45.	<i>Cymbopogon citratus</i>	1
46.	<i>Datura stramonium</i>	1
47.	<i>Dendrobium jasminoides</i>	1
48.	<i>Desmodium gangeticum</i>	2
49.	<i>Dorstenia indica</i>	3
50.	<i>Dracaena terminalis</i>	4
51.	<i>Dracaena terniflora</i>	2
52.	<i>Duranta plumerii</i>	1
53.	<i>Duranta repens</i>	1
54.	<i>Ehretia</i>	1

55.	<i>Elephantopus scaber</i>	1
56.	<i>Epiphyllum</i>	
57.	<i>Eupatorium ayapana</i>	1
58.	<i>Euphorbia hirta</i>	4
59.	<i>Evodea roxburghiana</i>	1
60.	<i>Excoecaria bicolor</i>	1
61.	<i>Ficus sp.</i>	4
62.	<i>Gomphrena globosa</i>	3
63.	<i>Hamelia patens</i>	1
64.	<i>Hedychium coronarium</i>	1
65.	<i>Heliotropium indicum</i>	1
66.	<i>Heliotropium scabrum</i>	1
67.	<i>Hemidesmus indicus</i>	1
68.	<i>Hemigraphis colorata</i>	1
69.	<i>Hibiscus rosa-sinensis</i>	2
70.	<i>Holarrhena antidysentrica</i>	1
71.	<i>Ilysanthes serrata</i>	9
72.	<i>Impatiens balsamina</i>	4
73.	<i>Isotoma longiflora</i>	2
74.	<i>Ixora coccinea</i>	2
75.	<i>Jacobina</i>	1
76.	<i>Jatropha curcas</i>	1
77.	<i>Jatropha padagrica</i>	1
78.	<i>Jatropha pandurifolia</i>	1
79.	<i>Justicia beddomei</i>	3
80.	<i>Kaempferia galanga</i>	1
81.	<i>Knoxia mollis</i>	4
82.	<i>Lantana camara</i>	2
83.	<i>Loranthus longiflorus</i>	2
84.	<i>Mangifera indica</i>	2
85.	<i>Maranta bicolor</i>	1
86.	<i>Melastoma malabathricum</i>	1
87.	<i>Mentha piperita</i>	2

88.	<i>Micrococca mercurialis</i>	2
89.	<i>Mimosa pudica</i>	5
90.	<i>Mirabilis jalappa</i>	2
91.	<i>Murraya exotica</i>	1
92.	<i>Nicodemia diversifolia</i>	1
93.	<i>Nymphaea stellata</i>	5
94.	<i>Ocimum basilicum</i>	2
95.	<i>Ocimum sanctum</i>	1
96.	<i>Ophiorhiza mungos</i>	1
97.	<i>Oxalis corniculata</i>	3
98.	<i>Pentas lanceolatus</i>	2
99.	<i>Petrea volubilis</i>	1
100.	<i>Phyllanthus urinaria</i>	10
101.	<i>Pimenta officinalis</i>	1
102.	<i>Piper longum</i>	1
103.	<i>Pistia stratiotes</i>	2
104.	<i>Plumbago indica</i>	1
105.	<i>Polyalthia pendula</i>	1
106.	<i>Polygonum chinensis</i>	1
107.	<i>Rauwolfia canescens</i>	1
108.	<i>Rawolfia serpentina</i>	1
109.	<i>Rosa indica</i>	2
110.	<i>Ruellia macrantha</i>	2
111.	<i>Rusellia equisitifolia</i>	1
112.	<i>Sansevieria roxburghiana</i>	1
113.	<i>Saraca asoka</i>	1
114.	<i>Scaveola</i>	1
115.	<i>Scoparia dulcis</i>	4
116.	<i>Strobilanthes heynianus</i>	1
117.	<i>Thalinum cuniefolium</i>	1
118.	<i>Torenia asiatica</i>	2
119.	<i>Tradescantia bicolor</i>	10
120.	<i>Triphasia trifoliata</i>	1

121.	<i>Vetiveria zizanioides</i>	1
122.	<i>Vitex negundo</i>	1
	GYMNOSPERMS	
123.	<i>Cycas sp.</i>	3
124.	<i>Podocarpus sp.</i>	5
125.	<i>Zamia sp.</i>	1
126.	PTERIDOPHYTES	
127.	<i>Adiantum</i>	1
128.	<i>Azolla</i>	1 pot full
129.	<i>Equisetum</i>	1 pot full
130.	<i>Lygodium</i>	2
131.	<i>Marsilea</i>	1 pot full
132.	<i>Ophioglossum</i>	5
133.	<i>Salvinia</i>	Numerous
134.	<i>Selaginella</i>	Numerous
135.	<i>Angiopteris</i>	1

Total area for cultivation :- 4 cents

There is enough space to set up a garden in front of the college. Large pots can be used for this purpose. A model grove will be ideal for the college. At least 60 different types of trees can be planted in the campus in the next one year period. An area may be demarcated for the establishment of a garden of medicinal plants, and vegetable garden.

Carbon Footprint

Petrol used by two wheelers/day 50 L (1 L for 15x2=30 km)

Petrol/diesel used by four wheelers 20 L (2 L for 15x2=30km)

For persons travelling by common transportation = 42 L(3 Lx 850 persons)

Total fossil fuel use is 112 L / 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. The cost of using the cars is very high and therefore discourages stakeholders from using them. If a College bus is plying for the staff and students carbon dioxide released for the stakeholders 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.

4.3 Recommendations/consolidation of audit findings

We hope that you will have developed a greater appreciation and understanding of the impact of your actions on the environment. You have successfully been able to determine your impacts on the environment through the various auditing exercises. The green auditing exercise have brainstormed and implemented practical ways to reduce your negative impact on the environment. Participating in this green auditing procedure you have gained knowledge about the need of sustainability of the college campus. It will create awareness around the use of the Earth's resources in your home, college, local community and beyond.

St Teresa's College should adopt an Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions. Computer companies are rapidly developing in the area of energy efficiency. Many computer hardware and electrical supply companies now cooperate with customers to reclaim old or damaged parts. Although over twice as expensive up front, LCD monitors are estimated to use 40-60% less energy overall than CRTs. All computers purchased by the college have an Energy Star rating, which is beginning to be a standard requirement for computers.

4.4 Preparation of action plan

Policies referring to your College's management and approach towards the use of resources need to be considered. An environmental policy should be formulated by the management of the college. Where there are policies they need to be listed as part of your analysis documentation. The college should have a policy on awareness raising or training programmes (for ground staff or kitchen staff for example) and college also should have a procurement policy (the College's policy for purchasing materials). Based on the policies college should have an action plan. The green auditing report will be a base line for the action plan to be evolved.

4.5 Follow up action and plans

Green Audits are exercises which generate considerable quantities of valuable management information. The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organisation and that action plans and implementation programmes result from the findings.

Audit follow up is part of the wider process of continuous improvement. Without follow-up, the audit becomes an isolated event which soon becomes forgotten in the pressures of organisational priorities and the passing of time.

4.6 Environmental Education

The following environmental education programmes may be implemented in the college before the next green auditing:-

Training programmes in solid waste management, liquid waste management, setting up of medicinal plant nursery, water management, vegetable cultivation, paddy cultivation,

tree planting, energy management, landscape management, pollution monitoring methods, and water filtration methods.

- Display of environmental awareness board such as – Save water, save electricity, No wastage of food/water, no smoking, switch off light and fan after use, plastic free campus etc.,
- Activate the environmental clubs
- Set up model rainwater harvesting system, vegetable garden, medicinal plant garden, paddy fields etc.,
- Conduct exhibition of recyclable products
- Display various slogans to protect environment
- Implement chemical treatment system for waste water from the laboratories.

4.7 Conclusion and full list of recommendations

Green Audit is the most efficient & ecological way to solve such an environmental problem. The experiments on the nature by avoiding natural rules, this can be a one major reason behind Green audit process. Green Audit is one kind of professional care which is the responsibility of each individual who are the part of economical, financial, social, environmental factor. Green audits can “add value” to the management approaches being taken by the college and is a way of identifying, evaluating and managing environmental risks (known and unknown). The green audit reports assist in the process of attaining an eco friendly approach to the development of the college. There is scope for further improvement, particularly in relation to waste minimization and energy monitoring. The findings of this report show that the college performs fairly well on sustainability issues. The college does consider the environmental impacts of most of its actions and makes a concerted effort to act in an environmentally responsible manner. In conversations with faculty, staff, and administration at the college, a major theme has been the improvements made over the last several decades in how the college performs environmentally. Even though the college does perform fairly well, the recommendations in this report highlight many ways in which the college

can work to improve its actions and become a more sustainable institution. Some of the very important recommendations are 1. Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions. 2. Increase recycling education on campus. 3. Increase Awareness of Environmentally Sustainable Development- Use every opportunity to raise public, government, industry, foundation, and university awareness by openly addressing the urgent need to move toward an environmentally sustainable future. 4. Educate for Environmentally Responsible Citizenship- Establish programs to produce expertise in environmental management, sustainable economic development, population, and related fields to ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens. 5. Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations. 6. Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development. Expand work with community and nongovernmental organizations to assist in finding solutions to environmental problems. 7. Collaborate for Interdisciplinary Approaches- Convene university faculty and administrators with environmental practitioners to develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.

List of other recommendations

1. Installation biogas plant and compost units
2. Solar panels should be installed to generate electricity
3. Planting of 25 trees/year in the campus
4. Set up vegetable and medicinal plant gardens
5. Purchase of college bus exclusively for college students
6. Increase the number of water taps and set up recycling of water system

7. Install waste water system for chemistry labs
8. Set up an efficient water recycling system in the college canteen
9. Install rain two more water harvesting system
10. Organize earn while learn eco-friendly programmes
11. Arrange more training programmes on environmental management system and nature conservation
12. Declare the campus plastic free and arrange awareness programmes to make the campus plastic free
13. Set up a common waste water treatment plant
14. Adopt an environment policy for the college
15. Establish an e-waste collection centre
16. Participation of students and teachers in local environmental issues
17. Renovation of cooking system in the canteen to save gas
18. Establish a purchase policy for environmental friendly materials
19. Replace incandescent and CFL lamps with LED lights
20. Replace computer with LED monitors
21. Conduct seminars and workshops on environmental education
22. Establish water, waste and energy management systems
23. Avoid plastic plates and plastic items in the college functions
24. Set up a nursery for plants to be distributed to the students
25. Introduce UGC environmental science course to all students

4.8 Commitments after Green Auditing

Audit Area	Indicators
Institutional workplace environment policy	Institutional environmental sustainability policy
Structures to address environmental issues	Environmental committee in place
Strategic plan and Service Charter	Commitments
Compliance with the Environmental Green auditing	Annual environmental internal audit reports
Waste management interventions	Initiatives to segregate, reducing, reusing, and recycling of waste
	Modes of waste handling

In the light of green audit the College should, adopt some additions in the vision and mission statements promoting compliance with environmental laws and regulations for sustainable existence of the college.

Vision Statement

The college is committed to becoming an innovative leader among academic institutions in the areas of environmental education and research and in the practice of environmental management and stewardship. The college is committed to the principle of sustainable development, and will use its resources in a manner that does not compromise the ability of future generations of the college and global communities to meet their needs.

Mission Statement

The college is committed to minimizing its impact on the environment in the areas of solid and hazardous waste, indoor and outdoor air quality, water supply and quality, energy, and transportation. The college strives to continually improve its environmental performance in these areas.

Chapter 5

Exit Meeting

The exit meeting was conducted by the lead auditor Dr. C.M. Joy and was the mechanism to feedback broad, preliminary findings to site management and staff before the audit team completing the audited report. The exit meeting was held in the college on 10th November, 2014. Clarification for certain information gathered was sought by the audit team from the management and staff of the college.

Draft Audit report

The information gathered by the audit team was consolidated and written up as a draft audit report. This draft report was then circulated to the audit team and those directly concerned with the audit. The purpose was to check the report for accuracy. The draft green audit report was also discussed in the exit meeting.

Final Audit report

The final audit report was the corrected final document which contains the findings and recommendations of the audit. This was submitted on 14th November, 2014 to the Principal of the college.

Follow up and Action Plans

Green audits form a part of an on-going process.

Next Audit

In order to promote continuous improvement it is recommended to conduct the next green auditing during the year 2017.

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Photographs