
Green Audit

2017-2022

Yashoda Girls' College, Sneh Nagar,
Nagpur

Prepared by-

Reva Green Consultancy,

Nagpur

Certificate

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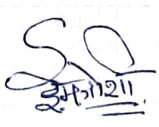
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1. EXECUTIVE SUMMARY

Educational Institutes are important components of society as they involve mass movements and major utilization of resources. Ecologically sustainable practices in such institutions serve for larger benefits to the society and the environment. Increasing environmental awareness among the stakeholders of institutions have resulted in development of Eco-campuses over the globe. Institutions generally take special efforts regarding cleanliness, safe waste disposals, plantations and environmental awareness etc. To find out the environmental performance of the educational institutions and to analyse the possible solutions for converting the educational campus as eco-campus conducting Green Auditing of an institution is essential. The green auditing of "Yashoda Girls College", Nagpur, enables to assess the campus life style, action and its impact on the environment. This is the first attempt to conduct green auditing of this college campus. This audit was mainly focused on greening indicators like consumption of energy in terms of electricity and fossil fuel, quality of soil and water, vegetation, waste management practices and carbon foot print of the campus etc. Interactive meetings, group discussions and questionnaire surveys were conducted to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analysed for its parameters. Collected datasets were grouped, tabulated and analyzed. Finally a report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of campus are documented.

2. INTRODUCTION

2.1 About the college

Vision and Mission



Yashoda Girls' Arts & Commerce College was founded on August 1, 1992 to cater to the local demand for a Girls' College. Since the date of its establishment the college has marched forward to fulfill its goal of promoting female education in this part of the suburb and shaping its students into citizens of caliber and character through various academic, literary, cultural activities and periodically organized events. The institution has been recognized under 2(f) and 12(B) scheme of the UGC Act 1956. The institution has been making its journey in the direction of progress under the guidance of functioning Internal Quality Assurance Cell. Vibrant and efficient leadership of the Principal; highly qualified, experienced and dedicated teaching staff; visionary and inspiring members of the Management body keeping strict vigil on the functioning of the institution; are some of the positive aspects of the institution due to which the institution is marching ahead to fulfill its well defined vision and mission. Almost all the faculties working in the institution are Ph. D. holders and are engaged in active research. The institution runs Undergraduate courses in Arts & Commerce (B.A. & B.Com). Junior College education is available in Arts faculty (Std. XI & XII-ARTS). The institution also publishes its Souvenir, "YASHODHAN" every year providing a platform to the students to boost their creative talent. Looking through the category-wise profile of the students, the number of enrolled SC/ST/OBC/ students is very high in our institution. Well-equipped Home-Economics Laboratory, Computer Laboratory, Library functioning as a Knowledge Resource Centre, almost all the classrooms with roof-mounted LCD projectors and the availability of good academic and physical infrastructure like College Canteen, Sports Facility, NSS for extension activities are some of the basic elements of the institution through which the vision of overall personality development of the students is sought with positive outcomes. Introducing and implementing almost all the programs and activities keeping in view the 'Students' Centric Approach' on the part of all the stakeholders of the institution is the real strength of the institution.

Location of Yashoda Girls' College



Number of stakeholders

Faculty:- 11

Non-Teaching Staff:- 07

Students:- 396

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2.2 Objectives of Green Audit

Foremost objective of this green audit is to assess the environmental quality and the management strategies being implemented in Institute.

The specific objectives are enlisted as follows

1. To assess the quality of soil in the college campus
2. To monitor the energy consumption pattern of the college
3. To quantify the solid waste generation and assess existing waste management strategies in the campus.
4. To assess the carbon footprints of the stakeholder of college
5. To assess direct/indirect measures implemented by College to reduce Carbon Footprints.
6. To review environment management plans of the college and suggest betterments, if any.
7. To assess whether extracurricular activities of the Institution support the collection, recovery, reuse and recycling of solid wastes.
9. To identify the gap areas and suggest recommendations to improve the Green Campus status of the College.

2.3 TARGET AREAS OF GREEN AUDITING

Green audit forms part of a resource management process. Green audit is a compilation of individual events, carried out at defined intervals which results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the conservation of ecological wealth, efficient use of natural resources like energy and water; minimum waste generation followed by safe disposal alongwith sustainable growth. All these indicators were assessed in the process of present audit. Eco-campus focuses on the reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, promotes personal action, reduce the institute's energy and water consumption, reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are green campus, waste, energy, and carbon footprint.

Auditing for Energy Management

Energy conservation is an important aspect of campus sustainability which is also linked with carbon foot print of the campus. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

Auditing for Waste Management

Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of, which can pose risks to the environment and to public health. Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Solid waste can be divided into three categories viz., bio-degradable, non-biodegradable and hazardous waste. Bio-degradable wastes includes food wastes, canteen waste, wastes from toilets etc. Non-biodegradable plastic, tins and glass bottles etc. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids and petrol. Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential and proper management is key for a sustainable campus. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Auditing for Green Campus Management

Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen released by the trees of the campus is good for the people in the campus.

Auditing for Carbon Footprint

Burning of fossil fuels (such as petrol) has an impact on the environment through the emission of greenhouse gases into the atmosphere. 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. Vehicular emission is the main source of carbon emission in the campus, hence to assess the means of transport that is practiced in the college is important.

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3. METHODOLOGY

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

3.1 Onsite Visits

Three visits were conducted by the Green Audit Team. The key focus of the visit was on assessing the status of the green cover of the Institution, their waste management practices and energy conservation strategies etc. The sample collection (water, soil) was carried out during the visits. The water samples from two tap water sources were taken and soil samples from two different places of the campus were collected. The sample collection, preservation, and analysis were done in the scientific manner as prescribed by the standard procedures.

External Audit Team's Visit and Soil Sample Collection



3.2 Focus Group Discussions

The Focus Group discussions were held with the students and staff members focusing various aspects of Green Audit. The discussions were focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

Group discussions at college campus



3.3 Energy, waste management and carbon footprints analysis surveys

With the help of teachers and students, the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

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Survey Forms**A. Energy Audit**

| Sr. No. | Room no./Name | Name of electrical device | Number | Power requirement | Usage duration |
|---------|---------------|---------------------------|--------|-------------------|---------------------------------------------------------------------------------------|
| | | | | | *Average usage duration is to be hypothesized depending on before pandemic activities |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

(*As due to pandemic there was not much educational activities in college during 2020-2021 session, the current year data was at very much minimal side. To avoid the error, some assumptions were made).

B. Waste audit

| Sr. No. | Room no./Name | Type of waste generated | Approx wt. per week | Mode of disposal |
|---------|---------------|-------------------------|------------------------------------------------------|------------------|
| | | | *To be hypothesized depending on non pandemic period | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

(*As due to pandemic there was not much educational activities in college during 2020-2021 session, the current year data was at very much minimal side. To avoid the error, some assumptions were made).

C. Green Audit

| Sr. No. | Area | Type of plant | Number of plants | Avg. stem girth | Avg. height |
|---------|------|---------------|------------------|-----------------|-------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

D. Carbon footprint analysis

Survey form is attached in Annexure I.

From green audit form, data was collected and green cover was assessed in terms of biomass. Using biomass calculation, an estimate was prepared to find out carbon capture capacity of the campus. Methodology adopted for green cover estimation was as follows.

Biomass calculation was done using methodology described by Chavan et al. (2010). The method relies on the model developed by Patwa et al. (1989) to estimate above ground biomass. Accuracy and applicability of this model has been advocated by many researchers (Alves et al., 1997; Brown, 1997; Schroeder et al., 1997; FAO, 1997). The equation used in the present investigation is as follows:

$$Y = \text{Exp. } \{-2.4090 + 0.9522 \ln (D^2 \times H \times S)\}$$

Where, Exp. {...} means the "raised to the power of {...}". Y is the above ground biomass (kg), H is the height of the trees (meter), D is the diameter at breast height in cm. and S the wood density (gm/cm³). Wood densities were taken from World Agroforestry Database (<http://db.worldagroforestry.org/wd>). Wherever the wood density of tree species was unavailable, the standard average value 0.6 gm/cm³ were taken (Warren and Patwardhan et al., 2001). Below ground biomass was calculated considering 15% of the above ground biomass (MacDicken, 1997). Carbon sequestration potential was calculated using the relation as explained by Ugle et al. (2010). For generation of one tonne biomass barely 13.46 tonnes of carbon dioxide is removed from the atmosphere and removal of one tonne carbon dioxide is equivalent to one carbon credit. Thus probable carbon credit generation per year was calculated by multiplying biomass generation capacity of trees by 13.46.

4. AUDIT STAGE

Green auditing in Yashoda girls' college began with the assessment of the status of the green cover of the Institution followed by waste management practices and energy utilization vis-a-vis conservation strategies etc. The team monitored different facilities at the college, determined different types of appliances and utilities as well as measuring the usage per item and identifying the relevant consumption patterns and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain appliances.

Data collection was done in the sectors such as Energy, Waste, Greening, and Carbon footprint. College records and documents were verified several times to clarify the data received through survey and discussions. The environment samples viz., water and soil were collected from various location of the campus and analyzed at Bhumitra laboratories (a sister concern of Reva Green Consultancy).

5. GREEN AUDIT REPORT

5.1 Green cover audit

Institute campus is beautified with greenery all around. Campus has a small sections of well maintained landscapes. There are 104 trees and 320 shrubs in campus. Trees include *Pongamia pinnata*, *Mangifera indica*, *Psidium guajava*, *Poliathia longifolia*, *Terminalia cattapa*, *Bauhinia rceamosa*, *Syzigium cumini*, etc. Shrubs in campus are mainly *Hibiscus rosasinensis*, *Ixora coccinia*, *Aloe vera*, *Jasminum sambac*, snake plant etc. Institute conducts various plantation programs within Nagpur city to educate and encourage students about their social and ecological responsibility.

College is associated with an NGO "Ayurvan" where regular programs are conducted for like plantation, seed collection, awareness programs, sapling distribution, etc. National Service Scheme (NSS) wing of college is also active in plantation, cleanliness drives and many other environment focused activities. Following table summarises various activities done by college in recent period,

Events summary

| Date of program | Location |
|----------------------------|-------------------------------|
| Cleanliness drives | |
| 01.09.2020 | College campus |
| 07.10.2020 | College campus |
| 04.10.2021 | College campus and Sneh nagar |
| Plantation programs | |
| 10.09.2020 | College campus |
| 03.09.2021 | College campus |
| 06.09.2021 | Rajeev nagar |
| Awareness program | |
| 16.09.2021 | Ozone day |
| 21.12.2021 | Cleanliness awareness drive |

Soil Quality assessment

Soil samples were collected from four locations of the campus and analysed for the basic parameters. The results are tabulated and presented in following table.

| Sr. No. | Test Parameter | Unit | Garden Soil | Ground Soil |
|-----------------------------|-------------------------|-------------------|-------------|-------------|
| 1 | pH (@25°C) | - | 7.18 | 6.18 |
| 2 | Electrical conductivity | µS/cm | 98.26 | 86.26 |
| 3 | Total Organic Carbon | g/100gm | 0.63 | 0.156 |
| 4 | Available Manganese | mg/kg | 92.38 | 92.38 |
| 5 | Available Calcium | mg/kg | 237.08 | 237.08 |
| 6 | C:N ratio | - | 1.69 | 2.04 |
| 7 | Bulk density | g/cm ³ | 1.086 | 1.086 |
| 8 | Water holding capacity | % | 57.039 | 57.039 |
| 9 | Porosity | % | 22.637 | 22.637 |
| 10 | Salinity | - | Non saline | Non saline |
| 11 | Available Potassium | kg/ha | 170 | 170 |
| 12 | Available Phosphorous | kg/ha | 9 | 9 |
| 13 | Available Nitrogen | kg/ha | 140 | 116 |
| 14 | Available Iron | mg/kg | 31.3 | 31.3 |
| 15 | Available Zinc | mg/kg | 0.72 | 0.72 |
| 16 | Available Magnesium | mg/kg | 63.2 | 63.2 |
| 17 | Available Copper | mg/kg | 2.69 | 2.69 |
| 18 | Available Boron | mg/kg | 0.15 | 0.15 |
| Heavy Metal Analysis | | | | |
| 19 | Chromium | ppb | NA | NA |
| 20 | Lead | ppb | NA | NA |
| 21 | Arsenic | ppb | NA | NA |
| 22 | Cadmium | ppb | NA | NA |
| 23 | Mercury | ppb | NA | NA |

Soil test reports suggest that soil in premises is devoid of heavy metals as well as values of other components are also at modest ranges so soil can be termed to have non-polluted status. The garden soil is found to have less nutrient content as far as need of plantation is concerned but regular compost amendment as taken up by institute can be helpful in increasing nutrient content in due course of time. College runs their own compost unit where good quality compost can be prepared soon.

5.2 Energy Audit

The college consumes an average of 850 kW/hr electricity in a month and spends around Rs. 80,000/- on account of electricity bill every year. College is planning for some of the green energy initiatives like solar light and pannels in campus in near future which will hopefully reduce electric consumption.

Also in campus mostly natural ventilation is favoured over use of air-conditioning system which saves a big chunk of energy. Maximum usage accounts for tubelight followed by fan. It is thus suggested that maximum tubelights should be replaced by solar lights or at least CFL lights to minimize the consumption.

Energy consumption pattern of the college for a month is detailed in Annexure II.

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5.3 Waste management audit

Waste management is important for an eco-friendly campus. In a college different types of wastes are generated, its collection and management are very challenging. The following data provide the details of the waste generated and the disposal method adopted by the college.

Summary of type of waste generated and disposal methods

| Sr No | Location | Number of Dustbins | | Type of waste | Disposal method | Fate of waste |
|-------|---------------------------|--------------------|-----------|------------------|-----------------------------------------|---------------|
| | | Wet waste | Dry waste | | | |
| 1 | Library | 0 | 1 | News papers | Disposed in NMC waste collection system | Disposed |
| | | | | Waste paper | | |
| 2 | Staff Room | 0 | 1 | Tissue papers | Disposed in nmc waste collection system | Disposed |
| | | | | Waste papers | | |
| 3 | First Floor Corridor | 0 | 1 | Waste paper | Disposed in NMC waste collection system | Disposed |
| 4 | Office | 0 | 1 | Waste paper | Disposed in NMC waste collection system | Disposed |
| 5 | Computer room | 0 | 1 | Waste paper | Disposed in NMC waste collection system | Disposed |
| 6 | Staff room | 0 | 1 | Waste papers | Disposed in wet waste dustbin | Disposed |
| | | | | Waste cardboards | Added to compost facility in premise | Recycled |
| 7 | Store room | 0 | 1 | Waste paper | Disposed in dry waste bins | Disposed |
| 8 | Home economics department | 2 | 2 | Vegetable waste | Added to compost facility in premise | Recycled |
| | | | | Woolen waste | Disposed to dry waste bins | Disposed |
| | | | | Waste papers | | |
| | | | | Leftover food | Added to compost facility in premise | Recycled |

Institute is aware of its responsibility to Reduce, Reuse and Recycle the waste and staff keeps on encouraging students to follow it. Some of the remarkable activities of institute include segregation of waste (dry & wet) and its planned disposal, composting wet waste, etc. It was observed that institute is following ideal methods to handle the waste. To add, it is suggested to use waste papers also for composting or other recycling methods like art-work etc. instead of disposing to NMC facility.

Institute may also work at segregating electronic wastes and its safe disposal. Being a girls' college, institute may focus on disposal of sanitary waste too.

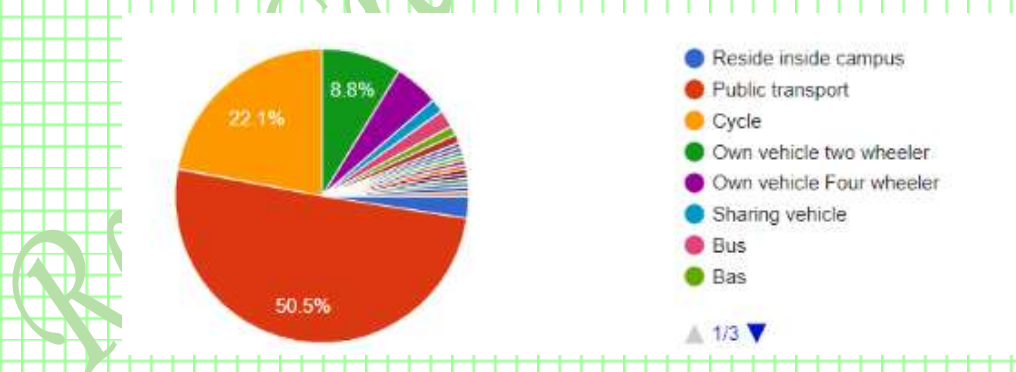
5.4 Carbon Footprint Analysis

Carbon footprint analysis was done through online survey responded by 209 persons. Out of these, 186 were students, 2 were alumni, 16 were teachers and non-teaching staffs, 3 were among the management and rest were indirect stakeholders like non-staff supports and service providers. All these stakeholders contribute to carbon footprints of institutions activities though, 72.8% people often visit college on daily basis except holidays. These stakeholders contribute the most to the carbon footprints of institute.

For analysing carbon footprints, mode of travel of stakeholders to the college, travel frequency, electric usage and their personal energy use habits were assessed cumulatively.

Means of transport

All the stakeholders travel to college campus regularly. Before pandemic, around 30 students used to reside in hostel and travel to their household once a week, but present survey is done during pandemic situation and thus reflects slightly different scenario. Means of transport, is one of the major attribute affecting the carbon footprint of any individual. Variability in means of transport can be seen in following chart.



Means of transport of stakeholders to the college

This shows that most of the stakeholders travel to college by public transport and good volume of population prefer using cycles. Use of bicycle is always considered to be sustainable and eco-friendly way of transport. Such a good number of stakeholders using a sustainable transport system explains eco-friendly thoughts of the institute.

Only 18 stakeholders travel by two-wheelers and 10 by car. According to the residential addresses provided by all the stakeholders, each of these vehicle must be travelling at least 5 km per day. Minimum carbon emission of any of these vehicle is atleast 300gms per km., considering these facts all these stakeholders together are emitting at least 1.1 Mt carbon per month for their institutional activities. Similarly, 103 stakeholders use either public transport or shared vehicle for travel. When transport facility is shared among the individuals, it shares the carbon emission responsibility and thus reduces carbon footprints of individual. Considering all these stakeholders sharing the transport with average at least 3 people, carbon emission responsibility of each individual become 100gms per km. As per the addresses provided by these stakeholders, they must be travelling at least 8 km per day. Considering these figures, these stakeholders are together emitting 2.1 Mt carbon per month for their presence in campus.

Electricity consumption

Use of 1kWh energy accounts for emission of average 250g CO₂. As institute roughly consumes 850 kWh electricity every month, the average emission must account for around 212.5 kg carbon emission per month. This emission is at a very modest level as far as scope of activities in college is concerned. Still to define the usage pattern and find any probable way to reduce the use, detailed survey of electricity use pattern was done during carbon footprint survey. It was observed that 164 stakeholders use fans the most and 80 of them use tubelights also. This infers that most of the electric usage accounts for use of fan and tubelight. Replacing tubelights by CFLs can reduce electric consumption and thus carbon emission. Institute should also keep a check on timely and appropriate use of fans. Rather students must be educated time to time for switching off all electric appliances when not in use.

Green Cover Assessment

From the data collected in green audit, green cover of campus in terms of trees and big shrubs was calculated. Details are given in Annexure III. It was observed that around 10059.44 kg biomass is present in the form of trees or big shrubs which grows at the rate of at least 1200kg per year. This accounts for absorption of at least 500kg carbon per year.

Summary of carbon footprint analysis

- Carbon generation through transport = 2.1 Mt/month
- Carbon generation through electricity consumption = 212.5 kg/month
- Carbon absorption per year = 500 kg/year

6. ENVIRONMENTAL AWARENESS OF STAKEHOLDERS

Educational institutes have a good impact on minds of its stakeholders. Assessing environmental awareness of stakeholders, gives a clear picture of environment friendly activities occurring in the institute. Institute is known to take various awareness programs like talks of eminent personalities, various workshops, celebrations like ozone day etc. for its stakeholders. It inculcates interesting information and inspires stakeholders to take eco-friendly actions.

Group discussions and one to one interactions with stakeholders helped in understanding the mind-sets of stakeholders. It was found that most of the stakeholders are aware of their basic duties towards environmental awareness, ill effects of waste disposal, air pollution, deforestation, etc. Teachers are well aware of their responsibilities towards environment and always try to disseminate it among their students. Still there is room for increasing environmental awareness.

7. CONCLUSIONS AND SUGGESTIONS

This audit has found that Yashoda Girls' College can be termed as an eco-campus provided some of the following suggestions implemented on urgent basis. These suggestions, committee feels, to be implemented by the institute to increase its stake towards environment protection and conservation.

- Segregating and recycling e-waste.
- Replacing tubelights with CFLs.
- Encouraging stakeholders to use shared transport.
- Use compost regularly to enrich garden soil.
- Increase number of awareness programs carried out in campus.

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Annexure I

Google Survey Forms for carbon footprint analysis

Carbon footprint analysis

Fill up following information about yourself. For any queries about filling up the form do call on +91 8237815224 Reva Green Consultancy

* Required

Personal Information

You are being requested to fill up this form because you are directly or indirectly associated with Yashoda Girls College, Nagpur

1. Your Name *

2. Your association with Yashoda Girls College

Check all that apply.

| | Column 1 |
|-------------------------------------|--------------------------|
| Student | <input type="checkbox"/> |
| Alumni | <input type="checkbox"/> |
| Management | <input type="checkbox"/> |
| Teaching Faculty | <input type="checkbox"/> |
| Non Teaching staff | <input type="checkbox"/> |
| Guardian of student | <input type="checkbox"/> |
| Non-staff support/ Service provider | <input type="checkbox"/> |

3. Address *

4. Number of persons in household (Including yourself) *

5. Your age

6. How frequently you visit Yashoda Girls College

Mark only one oval.

- Every day (Except Holidays)
- Everyday including holidays
- Atleast thrice a week
- Atleast once a week
- Fortnightly or monthly once
- Once a year
- Never

7. How much time you spend in Yashoda Girls College during your visit (answer in hrs)

8. In which room or section of institute you spend most of your time

9. What facilities out of following do you use when you are in campus

Check all that apply.

Fan

A/C

Cooler

Tube lights

Other: _____

10. How do you travel to College

Mark only one oval.

Reside inside campus

Public transport

Cycle

Own vehicle two wheeler

Own vehicle Four wheeler

Sharing vehicle

Other: _____

Personal
Electric Use

Mention the information about your residence (Your room in your home or hostel or the room where you spend most of your time)

11. How much time you spend in your room (average hrs/day)

12. Number of fans

13. Number of A/c

14. Number of Coolers

15. Number of Tube-lights

16. Number of CFLs

17. How much time you watch TV in one day

18. How often you charge your phone and for how much time (eg. once a day for 1hr)

**Personal
transport
use**

Describe about means of transports you generally use with the help of following questions. Think of your activities within a month while answering the questions

19. Which of the following transports you use frequently (You may choose more than one)

Check all that apply.

- Cycle
- Public transport like bus, train, etc.
- Shared transports like auto-rikshaw, cab, etc.
- Two wheeler (W/O Gear)
- Two wheeler (with Gear)
- Battery operated two wheeler
- Car
- Battery operated car

20. Which of the above transport you use the most?

21. How many km do you travel with above mentioned transport vehicle per day?

22. What is average fuel consumption of your vehicle

Cooking fuel
consumption

Describe about fuel used in your household or hostel mess where you eat more frequently

23. Which of the followings cooking fuels are used at your home

Check all that apply.

- LPG gas
- Microwave
- Solar cooker
- Induction cooker
- Other: _____

24. In case of LPG gas for how many days one cylinder is used?

25. In case of microwave, induction cooker and electric kettle how much time you use these appliances per week (mention in hours)

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Annexure II
Energy consumption pattern

| Location | Tube Light | CFLs | Fans | Cooler | CCTV Camera | Computer | Scanner | Printer | Xerox | Water Purifier | Projector | TV |
|--------------------------------|------------|-----------|-----------|----------|-------------|-----------|----------|----------|----------|----------------|-----------|----------|
| First floor | | | | | | | | | | | | |
| First Floor | | | | | | | | | | | | |
| Library | 4 | 0 | 5 | 1 | 1 | 4 | 1 | 2 | 1 | 0 | 0 | 0 |
| Office | 6 | 0 | 0 | 2 | 0 | 4 | 1 | 1 | 1 | 0 | 1 | |
| Class rooms | 4 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Staff room | 4 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Second Floor | | | | | | | | | | | | |
| Computer room | 0 | 15 | 2 | 1 | 1 | 16 | 2 | 2 | 0 | 0 | 1 | 0 |
| Economics department | 0 | 0 | 4 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Management department | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Home economics department | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Corridor | 0 | 5 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Terrace | | | | | | | | | | | | |
| Store room | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Physical education room | 6 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 26 | 23 | 20 | 4 | 3 | 26 | 4 | 5 | 2 | 0 | 3 | 0 |
| Avg usage duration | 6 | 6 | 6 | 4 | 10 | 6 | 1 | 1 | 1 | 2 | 2 | 4 |
| Watt/hr | 55 | 15 | 50 | 200 | 50 | 150 | 5.5 | 400 | 1000 | 1000 | 290 | 70 |
| Total consumption per day (kW) | 8.58 | 2.07 | 6 | 3.2 | 1.5 | 23.4 | 0.022 | 2 | 2 | 0 | 1.74 | 0 |

Annexure III
Assessment of green cover

| Sr. no. | Local name | Botanical name | DBH (cm) | Height (m) | Average Wood Density (g/cm) | Biomass (kg) | Average age (yr) | Average Biomass Production per year (kg) | Carbon accumulation per yr (kh) |
|---------|---------------|-----------------------------|----------|------------|-----------------------------|--------------|------------------|------------------------------------------|---------------------------------|
| 1 | False ashoka | <i>Polyathia longifolia</i> | 29.9 | 3.05 | 0.8 | 136.07 | 8 | 17.76 | 7.24 |
| 2 | False ashoka | <i>Polyathia longifolia</i> | 18.6 | 3.05 | 0.8 | 55.02 | 6 | 8.65 | 3.53 |
| 3 | False ashoka | <i>Polyathia longifolia</i> | 38.8 | 3.36 | 0.8 | 244.59 | 9 | 28.16 | 11.49 |
| 4 | False ashoka | <i>Polyathia longifolia</i> | 15.4 | 3.05 | 0.8 | 38.24 | 6 | 6.38 | 2.60 |
| 5 | False ashoka | <i>Polyathia longifolia</i> | 29.1 | 3.05 | 0.8 | 129.15 | 8 | 17.06 | 6.96 |
| 6 | False ashoka | <i>Polyathia longifolia</i> | 22.6 | 3.36 | 0.8 | 87.63 | 7 | 12.83 | 5.24 |
| 7 | False ashoka | <i>Polyathia longifolia</i> | 21.0 | 3.36 | 0.8 | 76.10 | 7 | 11.46 | 4.67 |
| 8 | False ashoka | <i>Polyathia longifolia</i> | 21.8 | 3.66 | 0.8 | 88.83 | 7 | 13.19 | 5.38 |
| 9 | False ashoka | <i>Polyathia longifolia</i> | 21.0 | 3.36 | 0.8 | 76.10 | 7 | 11.46 | 4.67 |
| 10 | False ashoka | <i>Polyathia longifolia</i> | 26.7 | 3.97 | 0.8 | 140.48 | 7 | 19.27 | 7.86 |
| 11 | False ashoka | <i>Polyathia longifolia</i> | 20.2 | 2.75 | 0.8 | 58.34 | 7 | 8.91 | 3.63 |
| 12 | False ashoka | <i>Polyathia longifolia</i> | 25.9 | 2.44 | 0.8 | 83.44 | 7 | 11.59 | 4.73 |
| 13 | False ashoka | <i>Polyathia longifolia</i> | 6.5 | 3.05 | 0.8 | 7.36 | 5 | 1.48 | 0.60 |
| 14 | False ashoka | <i>Polyathia longifolia</i> | 4.9 | 3.05 | 0.8 | 4.26 | 5 | 0.89 | 0.36 |
| 15 | False ashoka | <i>Polyathia longifolia</i> | 28.3 | 3.05 | 0.8 | 122.40 | 7 | 16.37 | 6.68 |
| 16 | False ashoka | <i>Polyathia longifolia</i> | 29.9 | 3.66 | 0.8 | 161.86 | 8 | 21.12 | 8.62 |
| 17 | False ashoka | <i>Polyathia longifolia</i> | 35.6 | 3.05 | 0.8 | 189.26 | 8 | 22.76 | 9.29 |
| 18 | False ashoka | <i>Polyathia longifolia</i> | 47.7 | 3.66 | 0.8 | 393.62 | 10 | 40.53 | 16.53 |
| 19 | False ashoka | <i>Polyathia longifolia</i> | 24.3 | 3.66 | 0.8 | 108.57 | 7 | 15.48 | 6.32 |
| 20 | False ashoka | <i>Polyathia longifolia</i> | 25.1 | 3.36 | 0.8 | 106.37 | 7 | 14.97 | 6.11 |
| 21 | False ashoka | <i>Polyathia longifolia</i> | 20.2 | 3.05 | 0.8 | 64.49 | 7 | 9.85 | 4.02 |
| 22 | Aapta tree | <i>Bauhinia raceamosa</i> | 19.4 | 2.14 | 0.63 | 33.84 | 6 | 5.24 | 2.14 |
| 23 | Aapta tree | <i>Bauhinia raceamosa</i> | 20.2 | 2.14 | 0.63 | 36.58 | 7 | 5.58 | 2.28 |
| 24 | Aapta tree | <i>Bauhinia raceamosa</i> | 18.6 | 1.53 | 0.63 | 22.65 | 6 | 3.56 | 1.45 |
| 25 | Aapta tree | <i>Bauhinia raceamosa</i> | 9.7 | 2.14 | 0.63 | 9.04 | 5 | 1.69 | 0.69 |
| 26 | Aapta tree | <i>Bauhinia raceamosa</i> | 21.0 | 2.44 | 0.63 | 44.76 | 7 | 6.74 | 2.75 |
| 27 | Aapta tree | <i>Bauhinia raceamosa</i> | 6.5 | 1.83 | 0.63 | 3.61 | 5 | 0.72 | 0.30 |
| 28 | Aapta tree | <i>Bauhinia raceamosa</i> | 12.1 | 1.22 | 0.63 | 8.12 | 6 | 1.44 | 0.59 |
| 29 | Aapta tree | <i>Bauhinia raceamosa</i> | 12.1 | 1.53 | 0.63 | 10.04 | 6 | 1.78 | 0.73 |
| 30 | Aapta tree | <i>Bauhinia raceamosa</i> | 9.7 | 1.53 | 0.63 | 6.56 | 5 | 1.23 | 0.50 |
| 31 | Aapta tree | <i>Bauhinia raceamosa</i> | 17.0 | 1.53 | 0.63 | 19.05 | 6 | 3.08 | 1.26 |
| 32 | Aapta tree | <i>Bauhinia raceamosa</i> | 16.2 | 1.53 | 0.63 | 17.36 | 6 | 2.85 | 1.16 |
| 33 | Aapta tree | <i>Bauhinia raceamosa</i> | 4.0 | 2.14 | 0.63 | 1.71 | 5 | 0.36 | 0.15 |
| 34 | Indian almond | <i>terminalia cattapa</i> | 15.4 | 3.97 | 0.54 | 33.77 | 6 | 5.63 | 2.30 |
| 35 | Indian almond | <i>terminalia cattapa</i> | 17.0 | 3.66 | 0.54 | 37.86 | 6 | 6.13 | 2.50 |
| 36 | Jamun | <i>Syziugium cumini</i> | 5.7 | 4.27 | 0.7 | 6.93 | 5 | 1.42 | 0.58 |
| 37 | Jamun | <i>Syziugium cumini</i> | 5.7 | 1.83 | 0.7 | 3.09 | 5 | 0.63 | 0.26 |
| 38 | Chiku | <i>Manilkara zapota</i> | 4.9 | 1.83 | 0.91 | 2.96 | 5 | 0.62 | 0.25 |
| 39 | Custard apple | <i>Annona squamosa</i> | 38.8 | 2.44 | 0.59 | 135.15 | 9 | 15.56 | 6.35 |

| | | | | | | | | | |
|----|-----------|-------------------------------|------|------|------|--------|----|-------|-------|
| 40 | Guava | <i>Psidium guajava</i> | 12.1 | 1.83 | 0.67 | 12.66 | 6 | 2.25 | 0.92 |
| 41 | Bamboo | <i>Dendrocalamus strictus</i> | 4.0 | 5.49 | 0.63 | 4.19 | 5 | 0.89 | 0.36 |
| 42 | Bamboo | <i>Dendrocalamus strictus</i> | 4.0 | 5.49 | 0.63 | 4.19 | 5 | 0.89 | 0.36 |
| 43 | Bamboo | <i>Dendrocalamus strictus</i> | 3.2 | 5.80 | 0.63 | 2.89 | 5 | 0.63 | 0.26 |
| 44 | Bamboo | <i>Dendrocalamus strictus</i> | 3.2 | 5.80 | 0.63 | 2.89 | 5 | 0.63 | 0.26 |
| 45 | Morpankhi | <i>Thuja orientalis</i> | 6.5 | 2.44 | 0.6 | 4.53 | 5 | 0.91 | 0.37 |
| 46 | Morpankhi | <i>Thuja orientalis</i> | 9.7 | 1.53 | 0.6 | 6.26 | 5 | 1.17 | 0.48 |
| 47 | Morpankhi | <i>Thuja orientalis</i> | 6.5 | 2.14 | 0.6 | 3.99 | 5 | 0.80 | 0.33 |
| 48 | Morpankhi | <i>Thuja orientalis</i> | 9.7 | 2.14 | 0.6 | 8.63 | 5 | 1.61 | 0.66 |
| 49 | Morpankhi | <i>Thuja orientalis</i> | 6.5 | 2.14 | 0.6 | 3.99 | 5 | 0.80 | 0.33 |
| 50 | Ficus | <i>Ficus benghalensis</i> | 15.4 | 4.88 | 0.49 | 37.51 | 6 | 6.26 | 2.55 |
| 51 | Ficus | <i>Ficus benghalensis</i> | 14.6 | 4.88 | 0.49 | 33.84 | 6 | 5.73 | 2.34 |
| 52 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 6.41 | 0.63 | 11.89 | 5 | 2.39 | 0.97 |
| 53 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 6.10 | 0.63 | 8.80 | 5 | 1.80 | 0.74 |
| 54 | Palm tree | <i>Phoenix sylvestris</i> | 4.0 | 6.41 | 0.63 | 4.86 | 5 | 1.03 | 0.42 |
| 55 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 6.10 | 0.63 | 8.80 | 5 | 1.80 | 0.74 |
| 56 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 5.80 | 0.63 | 10.81 | 5 | 2.17 | 0.89 |
| 57 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 5.80 | 0.63 | 10.81 | 5 | 2.17 | 0.89 |
| 58 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 5.19 | 0.63 | 7.54 | 5 | 1.54 | 0.63 |
| 59 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 6.10 | 0.63 | 8.80 | 5 | 1.80 | 0.74 |
| 60 | Palm tree | <i>Phoenix sylvestris</i> | 7.3 | 7.02 | 0.63 | 16.22 | 5 | 3.20 | 1.31 |
| 61 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 4.88 | 0.63 | 9.18 | 5 | 1.84 | 0.75 |
| 62 | Palm tree | <i>Phoenix sylvestris</i> | 7.3 | 5.49 | 0.63 | 12.85 | 5 | 2.53 | 1.03 |
| 63 | Palm tree | <i>Phoenix sylvestris</i> | 7.3 | 5.80 | 0.63 | 13.53 | 5 | 2.67 | 1.09 |
| 64 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 5.19 | 0.63 | 9.72 | 5 | 1.95 | 0.80 |
| 65 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 6.10 | 0.63 | 8.80 | 5 | 1.80 | 0.74 |
| 66 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 7.02 | 0.63 | 10.05 | 5 | 2.06 | 0.84 |
| 67 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 5.80 | 0.63 | 8.38 | 5 | 1.72 | 0.70 |
| 68 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 5.19 | 0.63 | 7.54 | 5 | 1.54 | 0.63 |
| 69 | Palm tree | <i>Phoenix sylvestris</i> | 7.3 | 6.10 | 0.63 | 14.20 | 5 | 2.80 | 1.14 |
| 70 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 7.02 | 0.63 | 12.96 | 5 | 2.61 | 1.06 |
| 71 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 4.88 | 0.63 | 9.18 | 5 | 1.84 | 0.75 |
| 72 | Palm tree | <i>Phoenix sylvestris</i> | 5.7 | 5.49 | 0.63 | 7.96 | 5 | 1.63 | 0.67 |
| 73 | Palm tree | <i>Phoenix sylvestris</i> | 6.5 | 5.80 | 0.63 | 10.81 | 5 | 2.17 | 0.89 |
| 74 | Palm tree | <i>Phoenix sylvestris</i> | 7.3 | 3.66 | 0.63 | 8.73 | 5 | 1.72 | 0.70 |
| 75 | Chafa | <i>Plumeria</i> | 6.5 | 2.14 | 0.8 | 5.24 | 5 | 1.05 | 0.43 |
| 76 | Bakul | <i>Mimusops elengi</i> | 17.0 | 4.88 | 0.6 | 55.04 | 6 | 8.91 | 3.63 |
| 77 | Bakul | <i>Mimusops elengi</i> | 22.6 | 5.19 | 0.6 | 100.86 | 7 | 14.77 | 6.03 |
| 78 | Jatropha | <i>Jatropha curcus</i> | 26.7 | 2.14 | 0.6 | 59.25 | 7 | 8.12 | 3.31 |
| 79 | Lemon | <i>Citrus limon</i> | 24.3 | 2.44 | 0.7 | 64.98 | 7 | 9.27 | 3.78 |
| 80 | Lemon | <i>Citrus limon</i> | 8.9 | 2.14 | 0.7 | 8.47 | 5 | 1.61 | 0.66 |
| 81 | Jaswand | <i>Hibiscus rosasinensis</i> | 4.0 | 1.53 | 0.6 | 1.18 | 5 | 0.25 | 0.10 |
| 82 | Neem | <i>Azadirachta indica</i> | 17.0 | 5.80 | 0.73 | 78.14 | 6 | 12.65 | 5.16 |
| 83 | Neem | <i>Azadirachta indica</i> | 33.2 | 4.88 | 0.73 | 237.22 | 8 | 29.52 | 12.04 |
| 84 | Neem | <i>Azadirachta indica</i> | 35.6 | 5.19 | 0.73 | 287.49 | 8 | 34.58 | 14.11 |
| 85 | Neem | <i>Azadirachta indica</i> | 48.5 | 5.49 | 0.73 | 548.01 | 10 | 55.88 | 22.80 |

| | | | | | | | | | |
|--------------|--------------|---------------------------|------|------|------|-----------------|----|----------------|---------------|
| 86 | Neem | <i>Azadirachta indica</i> | 17.0 | 5.80 | 0.73 | 78.14 | 6 | 12.65 | 5.16 |
| 87 | Neem | <i>Azadirachta indica</i> | 33.2 | 4.88 | 0.73 | 237.22 | 8 | 29.52 | 12.04 |
| 89 | Neem | <i>Azadirachta indica</i> | 35.6 | 5.19 | 0.73 | 287.49 | 8 | 34.58 | 14.11 |
| 90 | Neem | <i>Azadirachta indica</i> | 48.5 | 5.49 | 0.73 | 548.01 | 10 | 55.88 | 22.80 |
| 91 | Neem | <i>Azadirachta indica</i> | 33.2 | 4.88 | 0.73 | 237.22 | 8 | 29.52 | 12.04 |
| 92 | Neem | <i>Azadirachta indica</i> | 35.6 | 5.19 | 0.73 | 287.49 | 8 | 34.58 | 14.11 |
| 93 | Neem | <i>Azadirachta indica</i> | 48.5 | 5.49 | 0.73 | 548.01 | 10 | 55.88 | 22.80 |
| 94 | Neem | <i>Azadirachta indica</i> | 33.2 | 4.88 | 0.73 | 237.22 | 8 | 29.52 | 12.04 |
| 95 | Neem | <i>Azadirachta indica</i> | 35.6 | 5.19 | 0.73 | 287.49 | 8 | 34.58 | 14.11 |
| 96 | Neem | <i>Azadirachta indica</i> | 48.5 | 5.49 | 0.73 | 548.01 | 10 | 55.88 | 22.80 |
| 97 | Neem | <i>Azadirachta indica</i> | 33.2 | 4.88 | 0.73 | 237.22 | 8 | 29.52 | 12.04 |
| 98 | Neem | <i>Azadirachta indica</i> | 35.6 | 5.19 | 0.73 | 287.49 | 8 | 34.58 | 14.11 |
| 99 | Neem | <i>Azadirachta indica</i> | 48.5 | 5.49 | 0.73 | 548.01 | 10 | 55.88 | 22.80 |
| 100 | Neem | <i>Azadirachta indica</i> | 33.2 | 4.88 | 0.73 | 237.22 | 8 | 29.52 | 12.04 |
| 101 | Neem | <i>Azadirachta indica</i> | 35.6 | 5.19 | 0.73 | 287.49 | 8 | 34.58 | 14.11 |
| 102 | Neem | <i>Azadirachta indica</i> | 48.5 | 5.49 | 0.73 | 548.01 | 10 | 55.88 | 22.80 |
| 103 | Curry leaves | <i>Murraya koengeni</i> | 5.7 | 2.44 | 0.6 | 3.51 | 5 | 0.72 | 0.29 |
| 104 | Curry leaves | <i>Murraya koengeni</i> | 6.5 | 2.75 | 0.6 | 5.06 | 5 | 1.02 | 0.42 |
| Total | | | | | | 10059.44 | | 1234.68 | 503.78 |