

ENVIRONMENT AUDIT – 2021-22



MAR THOMA COLLEGE FOR WOMEN PERUMBAVOOR, ERNAKULAM KERALA

EXECUTED BY



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PREFACE

Every institution should be imparting knowledge about the campus environment and its surroundings through activities that follows the principles of sustainability and waste management. Hence an evaluation is needed to understand where it stands in the path to be an environment friendly, and in talent nurturing educational institution.

This Environment Audit was done with the aim to assess mainly on waste management of the campus. The college vision is “To become a centre par excellence of learning, where the best in humans is unveiled, based on human values, focused on life enhancement and constructive in adapting to the needs of the world”. The mission of college is “to mould individuals into successful and vibrant professionals facilitating comprehensive and rounded formation, to function as effective and empathetic human beings, grounded with courage of conviction, personal integrity, professional ingenuity and social commitment “and it was we observed by us from the students’ participation during the environmental audit.

This report is compiled by the BEE certified energy auditor along with the project engineers who are experienced in the field of energy, environment and management. The student volunteers made a mammoth contribution with data collection and in preparing an initial skeleton for the report.



ACKNOWLEDGEMENTS

We express our sincere gratitude to the M/s Mar Thoma College for Women's Perumbavoor for giving us an opportunity to carry out the project of Environment Audit. We are extremely thankful to all the Management and staffs for their support to carry out the studies and for input data, and measurements related to the project of Environment audit.

Mar Thoma College for Women- TEAM – Faculties and Students of Botany Department and students from Zoology and Physics

- 1 Dr. Sujo Mary Varghese *Principal, Mar Thoma College for Women*

Also congratulating our Environment audit team members for successfully completing the assignment in time and making their best efforts to add value.

ENVIRONMENT AUDIT TEAM

1. **Mr. Santhosh A**
Registered Energy Auditor of Bureau of Energy Efficiency (BEE – Govt. of India)
Accredited Energy Auditor No – EA 7597
2. **Mr. G. Krishnakumar, Energy auditor Lead auditor ISO 14000**

Yours faithfully

Managing Director
Athul Energy Consultants Pvt Ltd



ENVIRONMENT AUDIT SUMMARY

- ❖ College segregated the waste from college, canteen, and hostels by waste protocol mechanism based on color code and treated in a scientific manner.
- ❖ Separate storage provisions are done for metal and plastics in college.
- ❖ Biodegradable wastes are treated in a biogas plant installed behind the hostel.
- ❖ Non-biodegradable wastes are incinerated in incinerator.
- ❖ Pipe compost 3 no: are installed in the college

Suggestions for improvement

- ❖ Internal inspection team to be formed which comprises of staff and students for internal auditing of the waste management in the campus
- ❖ Display the weight of segregated wastes that collected from the canteen, hostels and college in prominent locations which will be an eye-opener for all and it will help in reduce the waste generation.
- ❖ Monthly Records should be kept for segregated wastes which will give the administration to pinpoint the source and can take necessary steps to reduce it.

**GENERAL DETAILS**

The general details of the Marthoma College for Womens are given below in table.

Table 1 GENERAL DETAILS

Sl. No:	Particulars	Details
1	Name of the College	Mar Thoma College for Women
2	Address	Perumbavoor, Ernakulam District, Kerala-683542
3	Contact Person	Principal
4	Contact Phone numbers	0484-2522723 9446438500
5	E-mail ID	mtcwpbr@yahoo.in
6	Type of Building	Educational Institution
7	Annual Working Days	210
8	No: of Shifts	Day Shift (One) (9AM -4PM)
9	No: of students enrolled	969
10	No : of teaching staff	50
12	Total campus area	10Acre
13	Total Built Up area	9200m ²
14	No: of courses	Degree -11, PG -02 , Integrated PG -01 and departments - 09
15	Bio gas	Yes -01 No:
16	Vermicompost	Yes- 03 no:
	Pipe compost	Yes – 03 No:
17	Incinerator	Yes -01 No
18	Segregation of Waste	Yes based on colour code



ABOUT MATHOMA COLLEGE FOR WOMENS

Mar Thoma College for Women, established in 1982, has, since the inception been an institution striving towards excellence in all spheres of higher education, catering to the educational requirements of women from various parts of the state. The college has played an instrumental role in the progress of the locality, contributing proactively to its growth and development. It has been particularly successful in moulding generations of women into progressive thinkers and leaders contributing to the nation in multifarious ways. Over the years, the student strength has almost doubled and various new courses, including One new generation aided integrated Msc Physics two PG courses and 3 UGC-sanctioned B.Voc courses, have been introduced to cater to the increasing needs of higher education in the region. The college, initially affiliated to the University of Kerala, started functioning as a junior college, offering the third and fourth groups of Pre-degree course with 92 students. When Mahatma Gandhi University was established in 1984, the college was affiliated to it. Science courses were offered since 1984. In 1991 the college was upgraded to a degree college. At present, it offers 8-degree courses – B.Sc. Mathematics (1991), B.Sc Zoology (1993), B.Com –Finance and Taxation (1995), B.Com-Computer Applications, B.A. History Vocational Archaeology and Museology (1998), B.A. English Vocational Administrative Assistant (1999), B.Sc Physics Vocational Applied Electronics (2001), B.Sc. Chemistry Model I (2006) and 2 postgraduate courses – M.Sc. Zoology and M.Sc Mathematics and integrated Msc Physics in 2021. Mar Thoma College for Women is included under Sections 2(f) and 12B of the University Grants Commission. The college was accredited at the B+ level (2.63) by the National Assessment and Accreditation Council (NAAC) in 2017. Sprawling over an area of 10 acres, the college currently has a faculty strength of above 100. It serves as a district-level skill development centre of ASAP and conducts certified DCA courses in association with the IHRD. Other significant facilities in the college include a language lab, History Museum and a Biological Museum among others.

The student community of the college is a cross-section of society. The majority of the students of the college hail from socially and economically backward sections of the society. The total student strength at present is about 1000, of which SC/ST, OBC and students from other minority communities constitute a substantial part. Being a women's college, the institution has been significantly involved in the holistic development of young women for decades. It is the responsibility of the college to provide high-quality education for a broad range of students from all strata of society. The college has great potential to advance into a major higher educational institution in Kerala in the near future.

Our Vision

To enlighten and empower women in rural and suburban society and enable them to act as agents of social transformation and acquire knowledge of self and surroundings and to make the world a better place

Our Mission

- ❖ To stimulate the most conducive ambience for the promotion of quality in teaching and learning.
- ❖ To empower women students hailing from rural background to face the challenges of life with dignity, honour and self-respect and to inculcate self-esteem in them.
- ❖ To become a centre of excellence providing value-based education aimed at the integrated development of individuals into responsible citizens with social commitment.
- ❖ To groom the personality of students making them self-sufficient to reach out to the less privileged, the downtrodden and the abandoned in the community
- ❖ To mould a team of students with the required knowledge, skills and attitude with global competency, capable of working towards the transformation of the society.
- ❖ To create awareness to live in harmony with the natural environment, to preserve it and to act as agents of peace, goodwill, natural integration and solidarity to make the world a better place.
- ❖ To enable students to communicate effectively and to empower them to face the issues and challenges with poise and confidence.

Being a reputed institution in a backward region dominated by low-income families, the college has been striving to provide the best possible academic platform for underprivileged girls. Despite the challenges, our students have managed to bring laurels to the institution by being university toppers in the academic and non-academic arena. We have also enabled them to become financially empowered by helping them secure employment in reputed institutions. Besides the regular courses, the college conducts certificate courses and vocational training programmes, including tailoring classes and courses in foreign languages, and also provide PSC and bank coaching. These endeavours have hugely benefited our students who, in turn, contribute proactively to the welfare of the local community, thus contributing to its development. The institution has also been growing quantitatively as the increasing number of enrolments in various courses and the inclusion of new courses testify.



FIGURE 1: COLLEGE CAMPUS

ABOUT ENVIRONMENT AUDIT

The ICC defines Environmental Auditing as: **“A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environment and natural resources in its operations/projects.”**

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. Environmental conditions may be monitored from angles that are relevant to Indian requirements, without stress on legal issues or compliance. This innovative scheme is user friendly and totally voluntary. The environmental awareness helps the institution to set environmental examples for the community and to educate young learners.

Here we can mainly divided this report waste management initiatives and installations of systems such as bio gas plant, vermin-compost , Pipe compost ,incinerator and collection and segregation of waste in the campus etc and students initiates in waste management as a social cause.

WASTE MANAGEMENT

Waste is generally termed as ‘a resource at the wrong place’. The college authorities are aware of the possible methods and have installed waste management measures like biogas systems. The waste clearance measures associated with different types of wastes are briefly given below. In this college normally three types of wastes are generated and we can divide the same as,

1. Bio degradable
2. Non bio degradable and
3. E-waste

1. BIODEGRADABLE WASTES

Biodegradable waste includes any organic matter in waste which can be broken down into carbon dioxide, water, methane or simple organic molecules by micro-organisms and other living things by composting, aerobic digestion, anaerobic digestion or similar processes also includes some inorganic materials which can be decomposed by bacteria. These materials are non-toxic to the environment and mainly include the natural substances like Plants and animals waste, even the dead plants and animals, fruits, paper, vegetables, etc. get convert into the simpler units, which further get into the soil and are used as manures, biogas, fertilizers, compost, etc.

The biodegradable wastes are mainly from the college canteen and pushed it to the Biogas plant. The bio-slurry is used as manure to the plantation.

I. BIO GAS PLANT

Biogas is the mixture of gases produced by the breakdown of organic matter in the absence of oxygen (anaerobically), primarily consisting of methane and carbon dioxide. Biogas is a renewable energy source. Biogas is produced by anaerobic digestion with methanogen or anaerobic organisms, which digest material inside a closed system, or fermentation of biodegradable materials. This closed system is called an anaerobic digester, biodigester or a bioreactor.

Biogas is a renewable, as well as a clean, source of energy. Gas generated through bio digestion is non-polluting; it actually reduces greenhouse emissions. No combustion takes place in the process, meaning there is zero emission of greenhouse gasses to the atmosphere; therefore, using gas from waste as a form of energy is actually a great way to combat global warming. Another biogas advantage is that, unlike other types of renewable energies, the process is natural, not requiring energy for the generation process. In addition, the raw materials used in the production of biogas are renewable.

Bio gas plant reduces soil and water pollution. Consequently, yet another advantage of biogas is that biogas generation may improve water quality. Moreover, anaerobic digestion deactivates pathogens and parasites; thus, it's also quite effective in reducing the incidence of waterborne diseases.

Bio gas generation produces organic fertiliser. The by-product of the biogas generation process is enriched organic (digestate), which is a perfect supplement to, or substitute for, chemical fertilizers. The fertilizer discharge from the digester can accelerate plant growth and resilience to diseases, whereas commercial fertilizers contain chemicals that have toxic effects and can cause food poisoning, among other things.

The biogas plant converts food wastes into methane gas and usable bio fertilizers which will be used for plants. The methane gas from the biogas plant is used in the canteen for cooking purpose and for heating drinking water hot water. Approximately 100 kg of LPG /month is saved by using biogas plant. The bio manure from the biogas plant is used for gardening, agriculture and for trees. This biowaste also acts as the best bio insecticide and thus the college avoided the usage of environmentally toxic pesticides for the environment. Here the college is using a fixed dome permanent structure biogas plant of size 4 M³ for treating bio waste. The slurry coming from the plant is collected in drums and reused after diluting with water for agriculture and for gardens. The methane gas is used in the canteen for hot water generation which is used for drinking and tea making.

II. VERMI-COMPOST

It is the product of the decomposition process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast. Vermicompost contains water-soluble nutrients and is an excellent, nutrient-rich organic fertilizer and soil conditioner.^[3] It is used in farming and small scale sustainable, organic farming.

The major source of raw material for vermi-compost is the leaves in the college campus and also the wastes generated which are not fed into biogas such as Chicken bones etc. The vermi-compost plants installed near to the scrap yard in the college campus

Benefits of Vermi-compost

a. For Soil

- ❖ Improves soil aeration
- ❖ Enriches soil with micro-organisms (adding enzymes such as phosphatase and cellulase)
- ❖ Microbial activity in worm castings is 10 to 20 times higher than in the soil and organic matter that the worm ingests
- ❖ Attracts deep-burrowing earthworms already present in the soil
- ❖ Improves water holding capacity

b. For Plant growth

- ❖ Enhances germination, plant growth, and crop yield.
- ❖ Improves root growth, Enriches soil with micro-organisms, adding plant hormones such as auxins and gibberellic acid.

c. For Economic

- ❖ Biowastes conversion reduces waste dumping in landfills.
- ❖ Elimination of biowastes from the waste stream reduces contamination of other recyclables collected in a single bin (a common problem in communities practicing is single-stream recycling)
- ❖ Creates low-skill jobs at local level.
- ❖ Low capital investment and relatively simple technologies make vermicomposting practical for less-developed agricultural regions.

d. For Environmental

- ❖ Helps to close the "metabolic gap" through recycling waste on-site.
- ❖ Large systems often use temperature control and mechanized harvesting, however other equipment is relatively simple and does not wear out quickly

- ❖ Production reduces greenhouse gas emissions such as methane and nitric oxide (produced in landfills or incinerators when not composted).

Remarks : Marthoma College for womens installed 3 Numbers of Vermicompost plants in the college for treating bio degradable wastes generated in the college which is not able to trat in bio gas plantn such plat leaves etc.

2. PIPE COMPOST PLANT

Pipe composting is kind of vermicomposting often called as worm tube composting which is carries by using PVC tube. This is simpler method for treating wastes of lower volume.



Figure 2: PIPE COMPOST PLANT

3. NON-BIODEGRADABLE WASTE

Materials that remain for a long time in the environment, without getting decompose by any natural agents, also causing harm to the environment are called non-biodegradable substances. These materials are metals, plastics, bottles, glass, poly bags, chemicals, batteries, etc. But as these are readily available, convenient to use, and are of low cost, the non-biodegradable substances are more often used. But instead of returning to the environment, they become solid waste which cannot be broken down and become hazardous to the health and the environment. Hence are regarded as toxic, pollution causing and are not considered as eco-friendly.

Many measures are taken these days, concerning the use of non-biodegradable materials. The **three 'R'** concept which says **Reduce-Recycle -Reuse** is in trend, which explains the use of the non-biodegradable materials. As we already discuss that these substances do not decompose, or dissolve easily so can be recycled and reuse. And one can help in reducing this waste by instead of throwing the plastics and poly bags in the garbage; it can be put in the recycling bags to use again.

Non-recyclable wastes are collected and burned once in a month using incinerator places inside the campus itself. The recyclable wastes are sorted out into categories and supplied it to the collecting units.

I. INCINERATOR

The objective of waste incineration, in common with most waste treatments, is to treat waste to reduce its volume and hazard, whilst capturing (and thus concentrating) or destroying potentially harmful substances. Incineration processes can also provide a means to enable recovery of the energy, mineral and/or chemical content from waste. Basically, waste incineration is the oxidation of the combustible materials contained in the waste. Waste is generally a highly heterogeneous material, consisting essentially of organic substances, minerals, metals and water. During incineration, flue-gases are created that will contain most of the available fuel energy as heat. The organic substances in the waste will burn when they have reached the necessary ignition temperature and come into contact with oxygen. The actual combustion process takes place in the gas phase in fractions of seconds and simultaneously releases energy. Where the calorific value of the waste and oxygen supply is enough, this can lead to a thermal chain reaction and self-supporting combustion, i.e. there is no need for the addition of other fuels.

The incinerator is used for incinerating non-biodegradable waste such as paper, plastic, sanitary napkins etc. The ash generated are as for manoeuvre after mixing with cow dung for plants. The ash generated from plastic will be treated separately.

The ash generated from canteen were wood is used as a fuel is used as manoeuvre for plants. The college campus promoting biodegradable packaging and reducing the consumption of plastic to a large extent.





4. ELECTRONIC WASTE

Electronic waste or e-waste describes discarded electrical or electronic devices. E-waste or electronic waste is created when an electronic product is discarded after the end of its useful life. The rapid expansion of technology and the consumption driven society results in the creation of a very large amount of e-waste in every minute. Used electronics which are destined for refurbishment, reuse, resale, salvage recycling through material recovery, or disposal are also considered e-waste. Informal processing of e-waste in developing countries can lead to adverse human health effects and environment pollution. Certain components of some electronic products contain materials that render them hazardous, depending on their condition and density.

FACILITIES PROVIDED BY COLLEGE FOR WASTE MANAGEMENT COLLECTION

- ❖ Toilets in every floor of all buildings separately for girls, boys and staff.
- ❖ There is separate toilet facility for staff rooms, administrative department and common facility.
- ❖ Certain toilets are facilitated for disable friendly with suitable hand rails and support mechanisms.
- ❖ Bins are provided in various areas of Campus for segregated collection of bio degradable (food,) and non-bio degradable wastes (Plastic, bottles)
- ❖ Every day cleaning and sanitisation is done at each and every toilet by cleaning personnel which used to check by housekeeping supervisor.
- ❖ Separate team is maintained by college for maintain the clean campus, removal of wastes from pets, collection wastes from bins, which is supervised by maintenance supervisor.



FIGURE 3: WASTE BINS



CONCLUSION

Environment audit is the best way to analyse and solving the critical issues of waste management. Environment audit can add value to management approach being taken by college for identifying, collecting, segregating and processing of waste generated in the college campus. By analysing the waste generation in each segment such as biodegradable, non-degradable, R waste etc. gave an indication of waste generation and thus put control for the same to reduce the environmental impacts in due course.

The findings in the report shows that college perform fairly well in waste management issues and taken considerable efforts in a responsible manner. During audit and the conversations with the college team, we observed that Marthoma College for Women's done various approaches in the past few years to performing well to sustainable environment. Even though there is space for further improvement that mentioned in the executive summary, the college is a good example for the minimisation of environment issues in the existing conditions.

ANNEXURE



G KRISHNAKUMAR

has attended the following live virtual classroom course:

Transition training for Environment Management System as per ISO 14001:2015

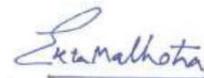
Course is designed to explain:

- Requirements of ISO 14001:2015 in context of audit.
- Key changes from ISO 14001: 2004 to 14001:2015

Session Duration: 16 Hours

CERTIFICATE NUMBER
2020260507

TRAINING DATE:
25th & 26th May, 2020

A handwritten signature in blue ink, appearing to read "S. Malhotra".

Authorising Signature:



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