

# **GREEN AUDIT – 2018**



**BISHOP CHULAPARAMBIL MEMORIAL COLLEGE FOR WOMEN**  
Kottayam  
Kerala

*EXECUTED BY*



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## ACKNOWLEDGEMENTS

We express our sincere gratitude to the **BISHOP CHULAPARAMBIL MEMORIAL COLLEGE FOR WOMEN** for giving us an opportunity to carry out the project of Green Audit. We are extremely thankful to all the staffs for their support to carry out the studies and for input data, and measurements related to the project of Green audit.

1	Prof. Josephina Simon	Principal
2	Fr. Philmon Kalathra	Secretary Corporate Educational Agency of Colleges
3	CA Reshma Rachel Kuruvilla	Asst. Professor in Commerce
4	Dr. Peter K Mnai	Head Department of Botany
5	Mr. Jimmy K Stephen	System Administrator
6	Mr. Shiju Joseph	Mechanic on Contract

**Table 1**

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

### GREEN AUDIT TEAM

**1. Mr. Ashok KMP**

Registered Energy Manager of Bureau of Energy Efficiency (BEE – Govt. of India)  
GRIHA Certified Professional, Energy Manager No – EA 25612

**2. Mr. Jaideep P P, Project Engineer - ME, Energy Engineering.**

Yours faithfully

Managing Director  
Athul Energy Consultants Pvt Ltd

## 1. ENERGY CONSUMPTION & COST ANALYSIS

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The energy consumption and cost for the college campus premises are listed below-Monthly

Location	Average Units	Average Cost
	kWh	Rs
<b>College</b>	1762	27562
<b>Auditorium</b>	557	4619
<b>Library</b>	1088	8077
<b>Computer Centre</b>	179	2451

TABLE 2: ENERGY CONSUMPTION & COST ANALYSIS

## 2. GREEN AUDIT SUMMARY

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The actionable summary of the audit report is given in the table below.

- ❖ In its limited free space BCM College developed botanical garden, birds' nest and maintained well.
- ❖ College constructed its buildings without disturbing its natural geography of land and thus avoid the damage to the ecosystem
- ❖ The buildings are constructed as to provide maximum sun light and ventilation to classrooms, and we observed the carbon dioxide levels are as per standard level in college.
- ❖ Rainwater harvesting done by collecting water from main office, hostels and stored and then reused.
- ❖ Students of NSS unit of college and nature club volunteers conducted several programmes as nature camps, environmental day celebrations, seminars, photo exhibition, rally's, etc.
- ❖ Special program for organic farming called Jaivam, connected with more than 10,000 persons got several appreciations from different sectors.
- ❖ Special programme as Nadhi Arivu, Puzha Arivu and Kayal Arivu is another well-known programme of college.

### Suggestions for Improvement

- ❖ Vertical garden can be done in the college because it has limited space in the college.
- ❖ Botanical garden to be improved with proper tagging.
- ❖ Due to limited space in the college photos of trees with explanation can be depicted in the college class rooms. This will change the overall aesthetic look and gave psychological impact among students.

## 3. GENERAL DETAILS

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The general details of the BCM College are given below in table.

Sl.No:	Particulars	Details
1	Name of the College	Bishop Chulaparmabil Memorial College
2	Address	Kottayam Kumily Road Kottayam - 686001
3	Contact Person	Dr. Stephy
4	Contact Phone numbers & Fax	0481-2562171 0481-2560307
5	E-mail ID	<a href="mailto:bcmkty@yahoo.com">bcmkty@yahoo.com</a>
6	Type of Building	Educational Institution
7	Annual Working Days	210
8	No: of Shifts	Day Shift (One) (9AM -4PM)

**TABLE 3: GENERAL DETAIL**

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### ABOUT BISHOP CHULAPARMABIL MEMORIAL COLLEGE

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Bishop Chulaparmabil Memorial College was founded by His Excellency Bishop Thomas Tharayil, a pioneer in women's education in the Christian Community of Central Travancore. A priest true to heaven and an educationalist concerned with the progress of the world, Bishop Thomas Tharayil founded this institution in honour of his illustrious predecessor, His Excellency Bishop Alexander Choolaparambil, in 1955, with a student community of 63 girls. Bishop Thomas Tharayil felt that women's education was the key to social progress.

Prof. V.J. Joseph was the first principal of this college which began with eight members on the teaching staff and one member in the non-teaching staff. The college was formally inaugurated by Cardinal Valerian Gratius. As per the University specification a lady Principal, Sr. Fidelius of the Mangalore Carmel Convent was appointed.

From its humble beginnings, the college has made steady progress and is now one of the foremost Women's Colleges in Kerala with over 1400 students.

The college motto is SAPIENTIA ET GRATIA i.e. WISDOM AND GRACE, the two essential qualities in a woman. Believing that the true purpose of education is the overall development of personality, the college tries to promote spiritual and moral growth along with intellectual development. It is expected that when a student leaves the portals of B.C.M. after her education, she will have become what our founder visualized as the ideal educated woman, one who combines in her wisdom and grace.





## GREEN AUDIT

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The whole world is on the road to a sustainable development, and the environment conservation is the top priority among the list as every human activity has its effect on their surroundings, which is the environment. Hence be it a house, a commercial building, an industrial building, or any other construction will disturb the balance of the environment. It is very important to do a detailed study about the effects on the environment. This is conducted under the name of *Green Audit*, which can be defined as *the official examination of the effects a company or other organization has on the environment, especially the damage that it causes*.

The objectives of the green audit can be listed as follows:

- Including participants from every section of the organization in the auditing process.
- Understanding the environment by drawing a simple sketch of the total area.
- Identifying the activities in the premises and listing them.
- Calculating the resource consumption like the land and water.
- Assessing the waste management and disposal.
- Study the energy usage pattern.
- Identify the good practices.
- Suggest the viable solutions to improve the sustainable nature of the organization.
- Compile the report with the above-mentioned details.
- Conduct a walkthrough audit to check the suggestions implemented by the institution and suggest for further improvements
- Verify all the points with actual measurements is it is meeting the performance and gave suggestions for improvement

## CAMPUS ENVIRONMENT

The environment in and around the college campus plays an important part in maintaining a healthy atmosphere in nurturing talents. Trees are the major source of the oxygen we breathe and receiver of the carbon dioxide we exhale. The sustainability of an ecosystem depends on the number of plants and trees in and around the surroundings. But Bishop Chulaparambil Memorial College Kottayam is located inside in the city of Kottayam and with limited open space after the constructed areas. The college is constructed in a hilly terrain area using its geometrical shape benefits but not disturbed its natural flow. They perfectly maintain different buildings of college such as main building, academic block, auditorium, hostels, convent etc. in an aesthetic way and do not affecting the terrain environment. Limited open space in the college is used for gardening and maintain a botanical garden and different species of birds in a vernacular manner.

Scientific studies are proved that the nature can able to cure any diseases and this will reduce the stress among students during their studies and increase the compassion among them and to nature

Ultimately the campus is maintaining natural equilibrium trees, birds and cattle's and water bodies with human beings.



**FIGURE 1: BOTANICAL GARDEN**

Trees are the major source of the oxygen we breathe and receiver of the carbon dioxide we exhale. The sustainability of an ecosystem depends on the number of plants and trees in and around the surroundings. There is well maintained garden inside of the college.

Scientific studies are proved that the nature can able to cure any diseases and this will reduce the stress among students during their studies and increase the compassion among them and to nature. Ultimately the campus is maintaining natural equilibrium trees, birds and water bodies with human beings. Gardens and landscape are an aesthetic delight and it promotes attentiveness of students.

Persons exposed to plants have higher level of positive feelings (pleas ants, calm) as opposed to negative feelings (anger, fear).

### 1. LIST OF TREES IN THE CAMPUS

The table shows the list of trees in the near to the nursing college, its count and the carbon di oxide sequestered annually. A total of 79 tons of CO<sub>2</sub> sequestered annually through these trees in the campus.

Sl no	Name	Biological Name
	Kanikonna	<i>Cassia fistula</i>
	Chembakam	<i>Plumeria rubra</i>
	Cheriyu Rudraksham	<i>Guazuma tomentosa</i>
	Swarnapathri	<i>Chrysophyllum cainito</i>
	Umbrella Tree	<i>Caesalpinia coriaria</i>
	Fox tail palm	<i>Wodyetia bifurcata</i>
	Theku	<i>Teak Wood Tectona grandis</i>
	Mango tree	<i>Mangifera indica</i>
	Karimanjal	<i>curcuma caesia</i>
		<i>Riccia sps</i>
	Rose	<i>Rosa Indica</i>
		<i>Dracaena sp. Var. 1</i>
		<i>Dracaena sp. Var. 2</i>
		<i>Dracaena sp. Var. 3</i>
		<i>Nolina recurvata</i>
		<i>Lycopodium phlegmaria</i>
		<i>Cycas revoluta</i>
		<i>Zamia pygmaea</i>
	Annanthookki	<i>Drynaria sps</i>
	Elanji	<i>Mimusops elengi</i>
		<i>Money plant (Scindapsus sps)</i>
		<i>Balsam indica</i>
	Chakkaramavu	<i>Mangifera indica</i>
	Chembarathi	<i>Hibiscus rosa-sinensis</i>
	Mysoor Chembakam	<i>Cananga odorata</i>
		<i>Bignonia Unguiscati</i>
	Bamboo	<i>Bamboosa arundinacea</i>
		<i>Ficus (Bonsai)</i>
	Total	

**Table 4: List of trees**

## BHOOMITHRA SENA ORCHIDAIUM

**Bhoomithrasena in the college maintained and nurtured certain special orchids in the college such as** Eg.Dendrobium, Oncidium, Vanda, Peristeria alata (dove Orchid)

Tagetes erectus, Clerodendron panniculatum, Cactsalpinia coriaria

They also developed hydrophytes in the artificial pond created in the college

Potted Plants in front all the departments also one of the activity done by them

## 2. SUSTAINABLE CONSTRUCTION OF BUILDINGS

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BCM Kottayam has developed an ecological design in their buildings and adopted minimum negative impact on ecosystem. They approach the constructional activities consciously to conserve energy and ecology and avoid the adverse effects of ecological damage.

Energy consuming devices installed to achieve the comfort levels for the occupants of the building gives rise to heat generation which adversely affects the environment within the building and in the surrounding. Buildings are thus the major pollutants that affect the urban air quality and contribute to climate change. Buildings are the major consumers of energy during their construction, operation and maintenance.

BCM management constructed the building to optimum utilisation of land and classrooms and with abundant light and natural ventilation. Maximum day light ingress and natural ventilation increases the indoor air quality and avoid the sick building syndrome. The whole facility and buildings are designed to maximum and optimum utilisation of land without affecting the natural hill area design and thus avoiding the landslides.

## 3. CARBON DIOXIDE LEVELS

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Air quality is a major area of concern inside a building. The percentage share of oxygen and carbon dioxide should be such that the occupants are able to perform their tasks without any discomfort. This is generally done through a provision of fresh air duct for the air conditioning systems or by providing windows. Numerous factors need to be considered for the design and fabrication of the fresh air supply system like the number of occupants, weather pattern and air quality of the location, and so on. For the human comfort, production of carbon-dioxide (CO<sub>2</sub>) within a building space is the prime area of consideration. This is associated with respiration which produces CO<sub>2</sub>. As a result, the carbon-dioxide levels will increase if ventilations are not provided.

As per various standards (like the ASHRAE Standard 62.1-2016), indoor CO<sub>2</sub> concentrations up to 1200 ppm is considered acceptable. For a typical outdoor condition, this value may change from 300 to 500 ppm.

The measurements were recorded along different locations inside the campus and the peak values are given in the following sections. The key concentration was on the study of carbon dioxide levels. The measurement has been done. The measured readings are given below in Table.

Sl. No.	AREA	Measured CO <sub>2</sub>	Standard Maximum CO <sub>2</sub> level	Remarks
1	Class rooms	415	410	Satisfactory
2	Staff rooms	412	410	Satisfactory
3	Air-conditioned labs	520	410	Good

TABLE 5: CARBON DIOXIDE LEVELS

## Special initiatives of college

### Establishment of oxygen park

Plantation of oxygen rich plants Our college has a beautiful green campus. We have skilfully planted the plants like, Neem Trees and Tulsi to make the campus full of oxygen. The greenery has remained useful in developing Oxygen Park in our college.

### “Parking bay for Vehicles”

To avoid the air pollution the vehicles are not allowed in the campus, but they are parked in the parking area, reasonably away from college. Our college has a separate parking area to avoid pollution

### Compulsory pollution check-up of 2W/4W

To have a PUC certificate is a mandatory document by RTO authorities; we are creating awareness and instructing students through periodic notices to go for PUC certification of their vehicles.

### Silence zones in the college

Various display boards have been placed in the library and other places for awareness to maintain silence in the college



FIGURE 2: OXYGEN PARK



## 1. WATER RESOURCES

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The requirement of water for the college, hostels and gardening etc are met by municipal water supply from by Kerala Water Authority. The water is collected in two tanks. One is located near to Auditorium. Then the water is pumped using submersible pumps to synthetic water tanks located in main building, hostels and to convent and nearby school which is managed by same management of college. Rain water is collected from college building and stored in two concrete tanks of capacity 1.5LACS KL located near to auditorium and of 1LAKHS KL located back side of hostel The college building itself located in a step by step terrain Hence the water from taps are collected and used for gardening in the downside.

The treated water from ETP is reused in watering grass in the ground and various areas of campus trees and garden through piping network.



**FIGURE 3: RAIN WATER COLLECTION TANK**

The details of Water distribution system in the college are in this section:

Around 605000 litres of water is used daily for the requirements and the details are given below:

## RO plant.

The water from different ponds are checked in a accredited laboratory in time to time as it is maintaining its potable quality by authorities.

## 2. GROUND WATER RECHARGING

Rainwater harvesting (RWH) is a technique of collection and storage of rainwater into natural reservoirs or tanks, or the infiltration of surface water into subsurface aquifers (before it is lost as surface runoff). One method of rainwater harvesting is rooftop harvesting. With rooftop harvesting, most any surface — tiles, metal sheets, plastics, but not grass or palm leaf — can be used to intercept the flow of rainwater and provide a household with high-quality drinking water and year-round storage. Other uses include water for gardens, livestock, and irrigation, etc. The tanks also served as natural aquifers and helped recharge groundwater

Rainwater harvesting for ground water recharge.

Aim and Objectives:

- Conservation of rainwater for future use
- To use rainwater for gardening Activity: Conservation of rainwater in soil or in a container is known as rain-water harvesting.

The rainwater from entire college campus and roof top of building is flowing according to slope of ground in college campus is accumulates in different three places. These three natural sites are selected for rainwater harvesting, ground water recharge, and bore well recharge

Preferred Location	Source	Result
Old borewell near ground	Run-off water from the ground	Improved ground water level near banana plantation
Canteen	Roof	Resource for borewell and increase of water table
North of college well	College roof	Avoid water wastage to outside
Playground soak pit on side	Rainwater of ground	Avoid the washing of top sand from ground and increase of water table.

Table 6: RECHARGING PITS - STRATEGY

**Notes:**

- The use of biomass in the form coconut shells can be used to cover the foot of the trees which can behave as recharging soak pits.

Approximate water consumption details are given below.

Sl.No:	Location	Capacity of Water Tanks	Quantity	Total Capacity	Tank Filling	Consumption per day
		Litres	Nos	Litres	Times	Litres
1	Hostels	30000	2	60000	2	120000
2	Main Building	30000	2	60000	2	60000
<b>TOTAL LITERS</b>						

**TABLE 7: WATER CONSUMPTION DETAILS**

The details of the pumps which is installed in various places of college

Sl.No:	Name	Rated Power	Quantity
		HP	Nos
1	Main Motor	3	2
2	Rain water tank Pumps	1.5	2

**TABLE 8: WATER PUMP DETAILS**



## STUDENT ACTIVITIES FOR NATURE

### NATURE CLUB

Trees are the major source of the oxygen we breath and receiver of the carbon dioxide we exhale. The sustainability of an ecosystem depends on the number of plants and trees in and around the surroundings. There is well maintained garden and pond inside of the college.

- ❖ College NSS club conducting various programmers on environmental day June-5. Protecting the pond and garden is the duty of nature club.
- ❖ College NSS organized to conduct seminars and photo exhibition on world environment day on evert year.



- ❖ Agricultural activist Oraganic Farming named as Veettilloru Adukkala Thottam. The classes are conducted for organic farming for volunteers and the yield from the bare land where the organic farming of students done, sell for charity usage



- ❖ Special program as ***tapioca harvest done by NSS volunteers of college which is inaugurated by University Registrar Mr. Unni .***



- ❖ **Champakathottle Chayavattom.** A special program done NSS volunteers as bench out of bamboo as a gift to the college and this turned out to be a spot for friends to hang out, for discussions and for people to wait after class hours On June 15 bamboo trees are cut nearby Forest and provide natural bench by volunteers.
- ❖ NSS camp is named as **Jaivam** and main theme of camp is **Organic farming**, waste management and classes are conducted by famous organic person Mr, K V Dayal and the main mission behind the class is Concern for, Self, family, neighborhood, society, nature and ecosystem.
- ❖ **Jaivam** MG University's organic farm drive is for transforming Kottayam district of Kerala into a 100% literate district in organic farming, in co-operation with NSS Kerala Jaiva Karshaka Samati, academic department of the university and Kudumbashree units. The aim of the project is to make each family members of the district literate about organic farming. As a part of this the trained volunteers would visit 4, 87,296 households in 71 panchayats and six municipalities in the district. The volunteers would interact with the 1, 97400 people in the district to adopt ethical organic practices to enrich the soil and preserve the environment for a healthy generation.
- ❖ We conducted an exhibition of agricultural equipment's on 01.11.2017 with respect to **Keralpiravi**. It shows the culture of Kerala.
- ❖ That equipment's were not like new generation; and that was a good opportunity to understand the uses of those implements
- ❖ **NATDHI ARIVU . PUZHA ARIVU, KAYAL ARIVU** -Programme of NSS, it is our responsibility to safe guards the rivers - God's gift. A programme named 'Thoniyathra' was conducted for the youngsters to understand the really value and the charming beauty of rivers.
- ❖ **Seminar conducted on climate change** by Dr. Murali Thumarukudi the director general of UN Disaster control authority.
- ❖ **Nature camp** conducted at Thekkady.
- ❖ **Kerala Jaiva Karshaka Samithi Award:** An award was instituted by the Kerala Jaiva Karshaka Samithi to recognize the institution which outperform in Organic farming activities. It was bagged by our NSS unit this year from Mg university registrar M R Unni Sir



- ❖ **Butter fly Garden** Butterflies are attracted to brightly coloured, fragrant flowers and feed on nectar produced by the flowers. As the butterflies travel from one flower to another, they pollinate the plants, resulting in further development of plant species. Numerous plants rely on pollinators, such as butterflies, for reproduction. BCM College has a butterfly garden. NSS volunteers and programme officers of BCM college NSS unit has decided and has set up a butterfly garden in their homes for a healthy ecosystem. Areas rich in butterflies and moths are rich in other invertebrates. These collectively provide a wide range of environmental benefits, including pollination and natural pest control.









***NSS Programme Officers along with Shri. Jaimon Allapat receiving Best Public Institution award for its agricultural activities in Kottayam district from the Government of Kerala***

### ***Conclusion***

Green Audit is the most efficient & ecological way to solve such an environmental problem. Green Audit is one kind of professional care which is the responsibility of everyone who are the part of economic, 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.

The auditors observed during the campus visit and after the conversation with the staff and students of Bishop Chulaparmabil Memorial College that they have taken continuous and considerable effort to establish certain green aspects in the limited space in a central of town. There is still opportunity to attain the perfection some of the identified suggestions are listed in the executive summary.



# CERTIFICATE



Ministry of New and Renewable Energy  
Government of India



GRIHA Council



The Energy and Resources Institute

This is to certify that

*Ashok K M P*

of

**Athul Energy Consultants Pvt Ltd, Thrissur**

has qualified as

**GRIHA Certified Professional**

on

**01st August 2018**

Sanjay Seth  
Chief Executive Officer  
GRIHA Council

*Note: This certification is valid for a period of 2 years from the date of qualification (exam).*



# GRIHA

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