

ENVIRONMENTAL AUDIT REPORT

BISHOP MOORE COLLEGE Mavelikara

September 2021
Executed by



OTTOTRACTIONS
Energy-Engineering-Environment



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MAVELIKARA

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Environment Audit Report
BISHOP MOORE COLLEGE
Report No: EA 800
2021- September

Environment Audit Team

Ottotractions

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About OTTOTRACTIONS

OTTOTRACTIONS established in 2005, is an organization with proven track record and knowledge in the field of energy, engineering, and environmental services. They are the first Accredited Energy Auditor from Kerala for conducting Mandatory Energy Audits in Designated Consumers as per Energy Conservation Act-2001. Government of Kerala recognized and appreciated **OTTOTRACTIONS** by presenting its prestigious **“The Kerala State Energy Conservation Award 2009”** for the best performance as an Energy Auditor.

Acknowledgment

We were privileged to work together with the administration and staff of Bishop Moore College, Mavelikara. for their timely help extended to complete the audit and bringing out this report.

With gratitude, we acknowledge the diligent effort and commitments of all those who have helped to bring out this report.

We also take this opportunity to thank the bona-fide efforts of team OTTOTRACTIONS for unstinted support in carrying out this audit.

We thank our consultants, engineers and backup staff for their dedication to bring this report.

Thank you.

B V Suresh Babu
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INTRODUCTION

Ottotractions was asked by the Bishop Moore College, Mavelikara to carry out an environmental audit of their campus building.

Each section contains recommendations for improvements relating to environmental issues, which are consolidated in the action plan in section 4.



BACKGROUND

Bishop Moore College had its genesis in the imagination of Bishop M.M. John, the then Bishop of the C.S.I. Madhya Kerala Diocese. When the Government of Kerala announced its decision to start new junior colleges in 1964, Bishop M. M. John saw it as an opportunity to fulfill the urgent need for a quality educational institution in this part of the world. Thus Bishop Moore College took concrete shape and he christened it in honour of the late Rt. Rev. Edward Alfred Livingstone Moore, the fourth Anglican Bishop of the Diocese of Travancore- Cochin. Rev. K.C. Mathew was appointed Principal.

society, especially the most downtrodden. They aimed at shaping the citizens imbued with a patriotic outlook for the nation providing equal opportunities for all irrespective of religion, caste, class or gender. The College began at Kallumala, Mavelikara in the Alappuzha District

of Kerala as a Junior College offering two years Pre-Degree Course in 1964 and has since then grown to an institution that offers several Under Graduate, Post Graduate Courses and Research facilities. The College has been able to do justice and attain the vision and mission of its founding fathers.



Particulars	2018-19	2019-20	2020-21
Total Students	1418	1417	1456
Staffs	85	84	87
Total Occupancy of the college	1503	1501	1543

Total student strength of the campus is 1300. For calculating per capita carbon emission estimation, the student strength is taken into account.



ENVIRONMENTAL ISSUES

This section is broken down into the following different areas: waste, water, energy, resource and materials use and procurement. A final 'other' section is also included for any additional issues.

1.1. Waste

The way communities generate and manage their waste plays an absolutely key role in their ability to use resources efficiently. All buildings contain bins for both general waste and mixed recyclables

(plastic bottles, card, cans and paper). On average each floor in the buildings areas has its own general waste bin and one recycling bin. When the bins are emptied by the cleaning staff.

Bins are marked and kept in different colors for identification, however in some locations throughout the building it was unclear which bins were for which waste streams.

There are four basic ways in which campus can do plastic recycling collection services for plastic bottles and containers – curbside, drop-off, buy-back or deposit/refund programs. The first, and most widely accessible, collection method is curbside collection of recyclables. The campus is installed bins to collect plastic bottles and single use plastics. SGC has given a proper awareness on plastic waste problems and they are discouraging the students or teachers to carry plastics to the campus. The ECO club is very active in the campus and do a variety of programs to build awareness on waste management. The reports on different activities of the club is attached as technical supplement of this report.

The major concern of waste management will be focused on the solid waste produced by the campus. Solid wastes produced in the campus are mainly of three types, food waste, paper waste, and plastic waste. Food wastes produced in the campus are mainly by two means. The vegetable wastes produced in the kitchen during the food preparation. The food waste produced by the students and staffs of the campus after the consumption of meals. The degradable waste is treated in the biogas plant, the biogas generated is used in the kitchen. A state of art sewerage treatment plant is installed in the campus

Degradable Waste Generation			
BISHOP MOORE COLLEGE			
	2018-19	2019-20	2020-21
Waste generated in kg /day	28.9	32.6	8.9
Waste generated in kg /Yr	3814.8	4303.2	1174.8
Normalisation Value for campus waste generation is 0.06			

Burning plastics shall be strictly restricted inside the campus. Burning plastic and other wastes releases dangerous substances such as heavy metals, Persistent Organic Pollutants, and other toxics into the air and ash waste residues. ... Such pollutants contribute to the development of asthma, cancer, endocrine disruption, and the global burden of disease.

Solid non degradable Waste Generation			
BISHOP MOORE COLLEGE			
	2018-19	2019-20	2020-21
Waste paper generated in kg /day	1.11	1.25	0.58
Waste plastic generated in kg /day	0.4295	0.48095	0.1954
Waste paper generated in kg /Yr	146.52	165	76.56
Waste plastic generated in kg /Yr	56.69	63.49	25.79
Normalisation Value for solid waste is 0.06			

WASTE MINIMIZATION AND RECYCLING		
1	Does your institute generate any waste? If so, what are they?	Yes, Solid waste Canteen waste, paper, plastic, Horticulture Waste etc
2	What is the approximate amount of waste generated per day? (in Kilograms/month) (approx.)	Bio Non- Hazardous others Degradable Biodegradable
3	How is the waste generated in the institute managed? By	Reuse of one side printed Paper for internal communication. Sewage water is discharged to public Sewer. Kitchen waste is used to generate manures. Two types of Waste bins are provided at campus for biodegradable and non biodegradable waste.
	1 Composting	In-house
	2 Recycling	In-house
	3 Reusing	In-house
	4 Others (specify)	
4	Do you use recycled paper in institute?	Yes
5	Do you use reused paper in institute?	Yes
6	How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.	Number of awareness programs through ECO Club
7	Can you achieve zero garbage in your institute? If yes, how?	Not yet achieved. Possible through waste management plan.

Green Cover Audit			
1	Is there a garden in your institute?	Yes	
2	Do students spend time in the garden?	Yes	
3	Total number of Plants in Campus	Plant type	Approx. number
		Trees	203
		Ornamental	Not estimated
4	Number of Tree Plantation Drives	Yes, Through ECO club	
5	Number of Trees Planted in Last FY.	NA	
	Survival Rate	80%	

All the activities including energy consumption and waste management have their equivalent carbon emission and they positively contribute to the carbon footprint of the campus. Carbon sequestration is the reverse process, at which the emitted carbon dioxide will get sequestered according to the type of carbon sequestration employed. Even though there are many natural sequestration processes are involved in a campus, the major type of sequestration among them is the carbon sequestration by trees.

Trees sequester carbon dioxide through the biochemical process of photosynthesis and it is stored as carbon in their trunk, branches, leaves and roots. The amount of carbon sequestered by a tree can be calculated by different methods. In this study, the volumetric approach was taken into account, thus the details including CBH (Circumference at Breast Height), height, average age, and total number of the trees, are required. Details of the trees in the campus compound are given in the Table 3.18. Detailed table is included in the technical supplement.

Carbon Sequestration			
Particulars	2018-19	2019-20	2020-21
Total number of trees	156	184	203
Carbon sequestered by trees in the campus (tCO ₂ e)	28.16	36.23	40.47

Carbon sequestered by a tree can be found out by using different methods. Since this study is employed the volumetric approach, the calculation consists of five processes.

- Determining the total weight of the tree
- Determining the dry weight of the tree

- Determining the weight of carbon in the tree
- Determining the weight of CO₂ sequestered in the tree
- Determining the weight of CO₂ sequestered in the tree per year

Carbon sequestered by each species of trees in the campus compound is given in the Table. Detailed calculation results are listed out in the tables provided in the technical supplements of 'Carbon sequestration'.



Sl. No.	Botanical Name		Family
1	<i>Acacia auriculiformis</i> Benth.	Acacia	Fabaceae
2	<i>Albizia saman</i> (Jacq.) Merr.	Monkey pod tree	Fabaceae
3	<i>Amherstia nobilis</i> Wall.	<i>Amherstia nobilis</i>	Fabaceae
4	<i>Artocarpus heterophyllus</i> Lam.	Jack fruit	Moraceae
5	<i>Artocarpus hirsutus</i> Lam.	Anjili	Moraceae
6	<i>Azadirachta indica</i> A.Juss.	Neem Tree	Meliaceae
7	<i>Bambusa wamin</i> E.G.Camus	Bamboo	Poaceae
8	<i>Bambusa vulgaris</i> Schrad.	common bamboo	Poaceae
9	<i>Bridelia retusa</i> (L.) A.Juss.	Spinous Kino Tree	Phyllanthaceae
10	<i>Caesalpinia coriaria</i> (Jacq.) Willd.	Konapuli	Fabaceae
11	<i>Caesalpinia sappan</i> L.	Indian redwood	Fabaceae
12	<i>Carallia brachiata</i> (Lour.) Merr.	Freshwater Mangrove	Rhizophoraceae
13	<i>Caryota urens</i> L.	Palm	Areaceae

14	<i>Cassia fistula</i> L.	Indian laburnum	Fabaceae
15	<i>Casuarina equisetifolia</i> L.	Whistling Pine	Casuarinaceae
16	<i>Chrysophyllum cainito</i> L.	Star Apple	Sapotaceae
17	<i>Cochlospermum religiosum</i> (L.) Alston	silk-cotton tree	Bixaceae
18	<i>Cocos nucifera</i> L.	coconut	Arecaceae
19	<i>Couroupita guianensis</i> Aubl.	Cannonball tree	Lecythidaceae
20	<i>Dalbergia latifolia</i> Roxb.	Indian rosewood	Fabaceae
21	<i>Gmelina arborea</i> Roxb.	Kumizhu	Lamiaceae)
22	<i>Livistona chinensis</i> (Jacq.) R.Br. ex Mart.	chinese palm	Arecaceae
23	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Champak	Magnoliaceae
24	<i>Mangifera indica</i> L.	Mango	Anacardiaceae
25	<i>Mesua ferrea</i> L.	Ceylon ironwood	Calophyllaceae
26	<i>Mimusops elengi</i> L.	Spanish cherry	Sapotaceae
27	<i>Monoon longifolium</i> (Sonn.) B Cue.R.M.	false ashoka	Annonaceae
28	<i>Peltophorum pterocarpum</i> (DC.) K. Heyne	Yellow Flame	Fabaceae
29	<i>Phyllanthus emblica</i> L.	nelli	Phyllanthaceae
30	<i>Pongamia pinnata</i> (L) Pierre	Pongame oiltree	Fabaceae.
31	<i>Psidium guajava</i> L.	Guava	Myrtaceae
32	<i>Pterocarpus santalinus</i> L. f.	Red sandalwood	Fabaceae
33	<i>Ravenala madagascariensis</i> Sonn.	Travelers palm	Strelitziaceae
34	<i>Roystonea regia</i> (Kunth) O.F.Cook	Bottle palm	Arecaceae
35	<i>Saraca asoca</i> (Roxb.) Willd.	Ashoka tree	Fabaceae
36	<i>Spathodea campanulata</i> P.Beauv.	African Tulip Tree	Bignoniaceae
37	<i>Swietenia mahagoni</i> (L.) Jacq.	mahogany	Meliaceae
38	<i>Syzygium cumini</i> (L.) Skeels	Java Plum	Myrtaceae
39	<i>Tectona grandis</i> L.f.	Teak	Lamiaceae
40	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Thanni	Combretaceae
41	<i>Vateria indica</i> L.	white dammar	Dipterocarpaceae

3.1.1 ENERGY

a. Electricity

The total emission of the carbon dioxide per student is 17.91 kg per year (2021). Emission reduction plans were prepared to bring the existing per capita carbon footprint to zero or below so as to bring the campus a carbon neutral or carbon negative campus. This can be achieved in many ways but, every alternate plan must be in such a way that, it must fulfill the actual purpose of each activity that is considered.

Here, three major methods are taken in to account as the plans for reducing the carbon emission of the campus.

- Resource optimization
- Energy efficiency
- Renewable energy
- Electricity Consumption

Base Line Energy Data				
BISHOP MOORE COLLEGE				
		2018-19	2019-20	2020-21
1	Electricity KSEB (kWh)	48195.00	46300.00	13964.00
2	Electricity Solar - Off grid (kWh)	0.00	0.00	0.00
3	Electricity (KSEB + Off grid) kWh	48195.00	46300.00	13964.00
4	Electricity Grid Tied (kWh)	0.00	0.00	0.00
5	Diesel (L)	169.00	275.00	61.00
6	LPG (kg)	627.00	570.00	124.00
7	Biogas (kg)	-	-	-

Consolidated kWh Consumption for all Consumers				
LT Consumer Nos		kWh/Yr		
		18-19	19-20	20-21
1	1338	35388	34154	9024
2	2974	8892	8300	3354
3	10598	3915	3846	1586
Total		48195	46300	13964

Occupancy Details			
Particulars	2018-19	2019-20	2020-21
Total Students	1418	1417	1456
Staffs	85	84	87
Total Occupancy of the college	1503	1501	1543

Sl.No	Location	Lights			
		T8	T12	CFL	LED B
1	Office	15			
2	Msc chemistry Lab	8			4
3	Bsc chemistry Lab	3	11	3	4
4	Bottony Lab		14		
5	Physics Lab				
6	Zoology Lab	8			
7	Library		16		
8	English Department		16		
9	Auditorium	18			
10	Class rooms*36	108			
Total		160	57	3	8

During the energy audit filed studies, 160 T-8 lamps and 57 T-6 Lamps were identified, which is considered as inefficient. 3 CFLs and 8 LED tubes were found during the audit. The detailed energy efficiency projects are given in the respective chapters of this report.

LUX MEASUREMENTS		
1	Office	56
2	Msc chemistry Lab	78
3	Bsc chemistry Lab	46
4	Bottony Lab	74
5	Physics Lab	59
6	Zoology Lab	68
7	Library	73
8	English Department	28
9	Auditorium	57
10	Class rooms*36	47

RESOURCE OPTIMISATION

The effective use of resources can limit its unnecessary wastage. Optimal usage of the resources (such as fuels) can save the fuel and can also reduce the carbon emission due to its consumption. This technique can be effectively implemented in the 'transportation' and 'waste' sectors of the campus.

WASTE MINIMISATION

Optimal utilization of paper and plastic stationaries can reduce the frequency of purchase of items. This can reduce the unnecessary wastage of money as well as the excess production of waste. In the case of food, proper food habits and housekeeping practices can optimise its usage.

Currently, SGC is taking an appreciable effort to reduce the unnecessary production of wastes. But the campus still has opportunities to reduce the generation of waste and can improve much more. Resource optimization can be effectively implemented in all type of waste generated in the campus and the campus can expect about 50% reduction the total waste produced.

ENERGY EFFICIENCY

Energy efficiency is the practice of reducing the energy requirements while achieving the required energy output. Energy efficiency can be effectively implemented in all the sectors of the campus.

FUELS FOR COOKING

The campus can install a solar water heater to rise the water temperature to a much higher level, then it has to consume only very less amount of thermal energy for preparing the same amount of food. This can make a positive benefit to the campus by saving money, energy and can reduce the carbon emission of the campus due to thermal energy consumed for cooking.

TRANSPORTATION

Energy efficiency of the transportation sector is mainly depended on the fuel efficiency of the vehicles used. Here mileage of the vehicle (kmpl - Kilometres per Litre) is calculated to assess the fuel efficiency of the vehicle. Percentage of closeness is the ratio of actual

mileage of the vehicle to its expected mileage. If the percentage of closeness of mileages of each vehicle is greater than that of its average, then the efficiency status of the vehicle is considered as 'Above average' and else, it is considered as 'Below average'

Renewable Energy

Biogas plants and solar power plants are installed in the campus which helps offsetting the carbon foot print. The details of these projects are given in the concerned chapters.

After analyzing the historical and measured data the following projects are proposed to make the campus carbon neutral. The projects are from energy efficiency and renewable energy. The further additions in the green cover increase will also give positive impact in the carbon mitigation.

Executive Summary					
Consolidated Cost Benefit Analysis of Energy Efficiency Improvement Projects					
BISHOP MOORE COLLEGE					
Sl No	Projects	Investment	Cost saving	SPB	Energy saved
		(Lakhs Rs)	(Rs)/Yr	Months	kWh/Yr
1	Energy Saving in Lighting by replacing existing 160 No's T8 (40W) Lamps to 18W LED Tube	0.40	0.200	23.97	2534
2	Energy Saving in Lighting by replacing existing 57 No's T12 (55W) Lamps to 18W LED Tube	0.14	0.119	14.31	1512
3	Energy Saving by replacing existing 137No's in-efficient ceiling fans with Energy Efficient Five star fans	2.06	0.545	45.21	6905
4	Installation of 50kWp Solar Power Plant	37.50	5.28	85.29	63875
	Total	40.10	6.14	78.35	74827

(The saving are projected as per the assumed operation time observed based in the discussions with the plant officials.)

Water Conservation Activities

List four uses of water in your institute	Basic use of water in campus:
	1. Drinking -
	2. Gardening - STP treated water
	3. Kitchen and Toilets -
	4. Others -
How does your institute store water? Are there any water saving techniques followed in your institute?	Overhead Water Tanks and Sumps installed for storage of water.
	Water conservation are in place

If there is water wastage, specify why and How can the wastage be prevented / stopped?	No
Record water use from the institute water meter for six months (record at the same time of each day). At the end of the period, compile a table to show how many litres of water have been used.	No logbooks are available
Does your institute harvest rain water?	Yes
Is there any water recycling system?	Yes

Rain Water Harvesting



General Environmental Awareness Questioner	
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
Dose Environmental Ambient Air Quality Monitoring conducted by the Institute?	Yes
Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
Dose stack monitoring of DG sets conducted by the Institute?	Yes
Is any warning notice, letter issued by state government bodies?	No

Dose any Hazardous waste generated by the Institute? If yes explain its category and disposal method	Yes
Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
Does your institute have any rules to protect the environment? List possible rules you could include.	No
Does housekeeping schedule in your campus?	Yes
Are students and faculties aware of environmental cleanliness ways? If Yes Explain	Yes
Dose Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
Dose Institute participated in National and Local Environmental Protection Movement?	Yes
Dose Institute has any Recognition/certification for environment friendliness?	Yes
Dose Institute using renewable energy?	Yes
Dose Institution conducts a green/environmental audit of its campus?	Yes
Has the institution been audited / accredited by any other agency such as NABL, NABET, TQPM, NAAC etc.?	Yes

Best Practices and Initiatives	
Renewable Energy	No
Solar Power Plant	
Energy Audit and Green Audit Conducted	
Biogas Plant installed	
Biodiversity Conservation	Yes
Green Cover	
Tree Plantation Drives	Yes
ECO clubs	
Ground Water Recharge	Yes
Rain Water Harvesting System.	
Pollution Reduction Public Transportation	Yes
E Waste Management	Yes
Connected to authorized recycler	
Solid Waste Management	Yes
Lifting of garbage from campus on alternate day by Municipal Corporation.	
Adoption of Village	Yes
CSR	
Water Conservation	Yes
Energy Conservation	Yes



RECOMMENDATIONS

1. Implement a utility monitoring program.
 - Allocate staff to carry out meter readings for electricity, waste and water on regular basis
 - Add monitoring data to spreadsheet so results can be viewed graphically
 - Compare with the utility bills meter readings in order to ensure accuracy;
2. Consider adopting and implementing a sustainable procurement policy which takes into account the whole life cycle of a product, and make sure environmental issues are written into tenders when contracting out.
3. Consider trialing recycled paper again – many recycled brands today, such as

Evolve, are just as good as virgin paper.

4. Trial the use of re-manufactured (i.e. refilled) ink and toner cartridges rather than purchasing new ones.
5. Consider producing some designated 'environmental' pages on the intranet to make it easier for staff to find environmental information. If possible a discussion forum could be set up to allow easy internal communications and staff to make suggestions for environmental improvements.
6. Environmental training could be formalized and carried out for all staff. It does not have to be too long or onerous, providing it covers key points, particularly in relation to waste so all staff are aware of the legal requirements. At the very least, environmental information should be included in the induction pack.
7. It is strongly recommended that environmental information is also given to students and staff during induction. It is particularly important for them to be aware of what waste they can dispose on site and where they can dispose of it, and what waste streams they must take away with them.
8. Consider implementing an environmental management system to incorporate all improvements and monitoring requirements. It does not need to be a complex system certified to any particular standard, merely a way of ensuring that baselines are set and progress is measured. Formation of Environment Policy and communicated to all faculties and other staff.
9. Plan for Zero Waste Campus Project
10. E-waste monthly inventory be maintained at campus as per E waste rules 2016.
11. Water Meter should be installed at institute for monitoring of water consumption per capita.
12. Increase in Environmental promotional activities for spreading awareness at campus.
13. Environment/Green committee formation for regulating eco-friendly initiatives at campus premises and periphery.



CONCLUSION

This audit involved extensive consultation with all the campus team, interactions with key personnel on wide range of issues related to Environmental aspects. The audit has identified several observations for making the campus premise more environmental friendly. The recommendations are also mentioned with observations for SGC team to initiate actions.

However, there is scope for further improvement, particularly in relation to waste minimization and energy monitoring. By implementing a basic environmental management system, current good practice can be formalized and a framework can be set up for monitoring, implementation of action plans and continual improvement.

The audit team observed that the overall site is maintained well from environmental perspective. There is no major observations but few things are important to initiate urgently are waste management records by monthly inventory of hazardous waste,

rainwater harvesting recharge; water balance cycle and periodic inspection of buildings;
environment policy and initiation of composting at campus.

References

- The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
- The Petroleum Act: 1934 – The Petroleum Rules: 2002
- The Central Motor Vehicle Act: 1988 (Amended 2011) and The Central Motor Vehicle Rules:1989 (Amended in 2005)
- Energy Conservation Act 2010.
- The Water [Prevention & Control Of Pollution] Act – 1974 (Amended 1988) & the Water (Prevention & Control of Pollution) Rules – 1975
- The Water [Prevention & Control Of Pollution] Cess Act-1977 (Amended 2003) and Rules- 1978
- The Air [Prevention & Control Of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982
- The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981)
- E-waste management rules 2016
- Electrical Act 2003 (Amended 2001) / Rules 1956 (Amended 2006)
- The Hazardous Waste (Management and Handling and Trans-boundary Movement) Rules, 2008 (Amended 2016)
- The Noise Pollution Regulation & Control rules, 2000 (Amended 2010)
- The Batteries (Management and Handling) rules, 2001 (Amended 2010)
- Relevant Indian Standard Code practices

TECHNICAL SUPPLEMENTS

ENVIRONMENT RELATED ACTIVITIES

1. BHOOMITRASENA SCHEME (2015-20)

The Bhoomitrasena unit of the College organizes and participates in various environmental programmes. The unit is lead by Dr. Prakash G. Williams, Assistant Professor of Biotechnology, Department of Botany and Biotechnology. The activities for the Year 2015-16 was inaugurated by The Principal, Dr. Sabu George on June 6th, 2015. Forty four of the undergraduate students are the members of this scheme.



The detailed report of the activities of this academic year is given below:

Environmental day celebration

The first one day camp was held on Environmental awareness June 6th, 2015 at the College premise. It was conducted as part of *Environmental Day observation* and was jointly organised by the Bhoomothrasena Club and National Service Scheme, Bishop Moore College, Mavelikara. The forest department gifted 1000 tree saplings to the College.





Pledge to Protect the Environment

Planting of trees and afforestation campaign

Many tree saplings were planted in the campus and the remaining are distributed to the students for the afforestation campaign. The tree saplings like Teak, Eety, Poovarasu and the fruit trees like Nelli, Pomogranate, Guava saplings *etc* were distributed to the people living in the vicinity. The 'Krishnatharu' tree sapling was much demanded among the college students.

Beautification of the campus

A one day camp was organized on 24th November, 2015 at the College for campus beautification. Members cleaned the Campus and planted various flowering plants inside the campus. Beautiful grass plants were planted in the College portico.

Campaign against plastics

The College premises including the verandas were cleaned and made into a "*Plastic free Campus*". All the club members participated in the programme. The club members collected and disposed off plastic pens, refills, wrappers, carry bags, kits etc.



Eco Garden

An Eco Garden was constructed by the Bhoomithrasena Club members in the Quadrangle of Botany and Biotechnology Department. Brick boundaries for the garden was constructed and painted. All the Club members actively participated in the programme. **Short Film competition**

An inter-departmental Short Film competition was held on 1st February, 2015 in association with Folklore and Performing Arts Club of Bishop Moore College campus, Mavelikara. The theme of the short film was Nature and Human beings.

Essay competition

An Environmental Essay competition was held on 10th February, 2016 at the Remedial Coaching centre, Bishop Moore College, Mavelikara jointly with BPCL, Kochi. 26 students participated in the competition.

Painting competition

A painting competition on Environment was held on 8th February, 2016 at the Remedial Coaching Centre, Bishop Moore College, Mavelikara jointly with BPCL. About 40 participants were there for the competition. Mr. Anandhudharan of S2 Mathematics bagged the first, Ms. Reshma Nath of S4 Malayalam bagged the second and Ms. Remya Reghu of S4 Chemistry bagged the third. Cash Prize of Rs. 1000 /- was distributed for the first, Rs. 75



Quiz competition

An inter-departmental Environmental Quiz competition was held on 12th February, 2016 at the Seminar Hall, Bishop Moore College, Mavelikara jointly with BPCL. Fifty students participated in the competition. There were two rounds for the competition. The short listed participants competed in the second round. Former alumnus of the club, Sri. Vishnu Rajendran was the quiz master.

Environmental trip to Thenmali Ecotourism

On February 12th, 2016 Bhoomithrasena Club members organised an environmental study trip to Thenmali Ecotourism area. All members of the Bhoomithrasena Club of Bishop Moore College participated in the trip.

Day Observations

The Bhoomithrasena Club members actively involved in observing various days like Environmental Day, Earth Day, Water conservation Day, Forest Conservation Day *etc.*

Water Quality Project

A study was conducted by the Club members about the water quality of Kallumala region. The study report says that some the drinking water of the region is much polluted and needs much attention of the Thazhakkara panchayat.

Rain water harvesting Project

The rain water harvesting project was one of the prestigious project of Bishop Moore College, which gives much importance to the Environmental activities and Conservation.

Planting Red Palms

The Bhoomithrasena scheme of the College planted 50 red palms to commemorate the Golden Jubilee of the project on 16.03.2016. Concrete pots were made and Red palm varieties were planted. They are kept in a row near the Science block.

Helping the Endosulfan victims

The Bhoomithrasena Club of Bishop Moore College contributed a cheque for Rs. 20,000/- for the rehabilitation of Endosulfan victims in coordination with *Malayala Manorama* in the presence of Shri. Mullakara Retnakatan MLA on 22.01.2016 at the College Auditorium, Bishop Moore College.



Project on Energy Conservation

A project on Energy conservation was planned among the students as the pilot project. Also energy conservation campaign was held on 23rd March and notices were distributed.

WWF PROMOTIONAL TALK:

WWF (World Wildlife Fund) India is a National Volunteering platform for College students. WWF promotional talk was held on 11-10-2019 at the Prof. Elizabeth Mathew Hall. Sri A. K Sivakumar, Senior Education Officer, WWF, delivered the talk. Dr. Jacob Chandy, Principal, Bishop Moore College inaugurated the programme. Dr Prakash Williams, Coordinator, gave the welcome speech and the Vote of Thanks was delivered by Ms. Jesna Jose.

SAVE ELECTRICITY:

A project on 'Energy Conservation' was planned among the students as. Almost everyone in the Club actively participated in it. Through this, the members learned to reduce the use of electricity in everyday life.

WORKSHOP @ S N COLLEGE, KOLLAM:

Under the Volunteer Engagement Program, WWF launched ECHO (Building Environment Conservation Heroes), an action-packed model for the young volunteers, to connect to the environment, innovate solutions and take action towards a sustainable future. A Workshop was

held on 29-10-2019 at SN College, Kollam from 9.am to 4pm. Three club members of Bhoomithrasena scheme Jesna Jose, Aiswarya R, Maanas Baby and Akshaya N. C. participated in the same.

PAPER BAGS MAKING:



With the motto 'Go Green, Go Clean' a workshop was conducted on 8-11-2019 on 'how to make paper bags' at the Botany Lab by Dr. Prakash Williams. The volunteers made around 300 paper bags. All the bags were distributed to the shops in the vicinity of the College.

WORKSHOP FOR KUDUMBHASREE MEMBERS:

On 9-01-2020 a workshop was conducted for 'Kudumbhasree members' as a part of 'National Seminar on Scientific solutions for sustainable Rebuilding of Kerala' in the post flood scenario. This Workshop was organised by the Club, IQAC & Dept. of Physics, Bishop Moore College, Mavelikara in association with Directorate of Environment and Climate Change, Government of Kerala. In this workshop, the kudumbasree members were trained successfully.

ZERO PLASTIC CAMPUS:



For doing away with the use of plastic cups and plates, the Club purchased 100 steel glass and 100 steel plates with funding by the Directorate of Environment and Climate Change, Government of Kerala. It was dedicated for the College use by Dr. Jacob Chandy, the Principal, Bishop Moore College. █

BEAUTIFICATION USING PLASTIC BOTTLE GARDENING:

On 14-02-2020, with the twin purpose of putting waste plastic bottles to good use and to beautify the campus, the members of the Club filled empty plastic bottles with soil and created hanging and vertical gardens. This proved to be an inspiration for many to replicate the idea.



SPORTS DAY:

Bhoomithrasena scheme volunteers distributed boiled drinking water on the sports day of Bishop Moore College (06-03-2020) Water was distributed using steel glass. This programme was aimed to reduce the use of coloured carbonated drinks which are harmful to human health.



COMPETITIONS :

a. **Essay competition**

An 'Environmental Essay Competition' was held on 24th February, 2019 at the Botany Laboratory, Department of Botany and Biotechnology, Bishop Moore College, Mavelikara. About 30 participants participated in the competition. The cash awards were funded by BPCL.



b. **Paining competition**

A painting competition on Environment was held on 27th February, 2019 at the Botany Laboratory, Department of Botany and Biotechnology. About 35 participants were there for the competition. The cash awards were funded by BPCL.

c. Quiz competition

An inter-departmental Environmental Quiz competition was held on 28th February, 2019 at the Seminar Hall, Bishop Moore College, Mavelikara jointly with BPCL. About fifty-four participants were there for the competition. The cash awards were funded by BPCL, Kochi.

ONLINE PHOTOGRAPHY COMPETITION:

Bhoomithrasena organized an 'online photography competition' for the members on theme: 'Lockdown with Nature'. The programme was conducted by abiding with the Covid 19 protocol on June, 5th, 2020 in association with 'Environmental Day' celebration. Many participants were there for the competition. Ms. Anjali S. Nair (S3 English) bagged the first prize. Ms. Jahana Fathi (S3 Botany) bagged the second. Ms. Jesna Jose of S3 Chemistry bagged the third



position.



SENSITIZATION ON 'CORONA'

On 10-03-2020, Corona awareness classes were arranged by the volunteer leaders- Ms. Dhanalekshmi and Ms. Jesna Jose. Also, posters were exhibited in the campus for the prevention of the spread against "CORONA VIRUS".

2. Nature Club - Report 2015-20

Sensitizing the students of the College, their parents and the society in general, towards the importance of preserving Nature and greening the Earth further has been the avowed aim of the 47 members of The Nature club and its convener Dr. Reeja Jose, Assistant Professor, Dept. of Zoology. The following activities were a result of the Club's endeavors:

- **Environment Day Celebrations**

In connection with "World Environment Day Celebrations- 2015, Nature related reports were invited from the students of the College and it was decided to give the "Best Nature Reporter Award" for the best report.

- **Wild Life Week Celebrations**

Nature Club celebrated Wild Life Week by organizing the following programmes:

- **Video show**

A Video show on wildlife was arranged on 12th October 2015 in college seminar hall. About 65 students participated in this show.

- **Interdepartmental Essay writing competition**

Interdepartmental Essay writing competition was conducted on the second day (October 14th).

- **Inter-School Painting Competition**

On 15th October an Inter-School Painting Competition for Upper Primary and High School section was conducted. This painting competition was a grand success, as fourteen schools participated in this competition. For the High School section, Ghanasyam S. (X.B) of Vidyadhiraja Vidyapeetom Central School, Mavelikara won the first prize and Rakhi G. Hari (IX.B) of K.K.M.G.V.H.S.S, Elippakulam won the second prize. Surya Samyog P. (VII.B) of St. Mary's Cathedral Public School, Puthiyacavu won the first prize for UP section and Aswin S. Kumar (VI A) of Sree Narayana Central School, Cherukunnam won the second prize. Trophies and Certificates for the winners were distributed on 30th November in College seminar hall.

- **Bird watching Day Celebrations**

Nature Club members celebrated National Bird watching day on 12th November 2015 by presenting a slideshow regarding "Common Birds". More than 65 participants attended this programme.

- **Survey on water and soil quality of Mavelikara Taluk**

The members of Nature Club prepared a questionnaire for gathering information regarding the existing scenario of water and soil in Mavelikara taluk. The survey was conducted in eight panchayaths of Mavelikara taluk during the last week of December.

- **T. Shahul Hameed Environmental Essay Competition 2016**

Nature Club conducted a College level Essay writing competition on 19th January, for selecting the best entries from the College for participating in T. Shahul Hameed Environmental Essay Competition 2016, organised by PG and Research Department of Zoology, FMN College, Kollam.

- **Visit to Thenmala Ecotourism Centre**

Nature Club arranged a one-day trip to Thenmala Ecotourism Centre on 26th March, 2016. 45 members along with three teaching staff were a part of this trip.

- **Valedictory function**

The Valedictory function of the club was held on 13th June, 2016. 'Haritha Spandhanam' the manuscript prepared by club members was released in this function by the Principal. The winners of various competitions conducted by Nature club were honoured with trophies in this programme.



Inter-School Painting Competition - Prize Distribution



Video show on Wildlife



Release of Manuscript "Haritha Spandanam"

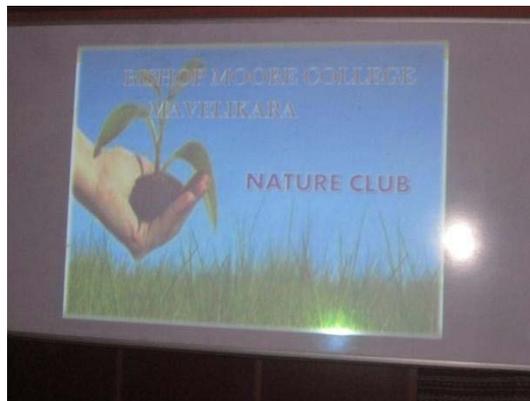
- **Interdepartmental Quiz Competition on birds**

The club celebrated 'National Bird watching day' by conducting an Interdepartmental Quiz Competition on 17th November 2016. Students from ten departments participated in this competition. B.Com (Finance) won the first prize and B.Com (Computer Applications) won the second prize.



- **World Soil Day celebrations**

As a part of soil day celebrations, Nature Club arranged a PowerPoint Presentation on 19th December 2016. Ms. Rakhi R. (S₃ Botany) did this presentation. More than 55 participants attended this programme.



3. Science Club (2015-20)

National Seminar on Scientific Solutions for Sustainable Rebuilding of Kerala in the Post Flood Scenario was organized jointly by the Department of Physics, IQAC, DBT STAR College Scheme and Science Club in association with Directorate of Environment & Climate Change (DoECC), Govt. of Kerala, on **09-10 Jan 2020**. Famous activist Smt. Medha Patkar (Indian Social Activist, Founder member of Narmada Bachao Andolan) and Dr. M.C. Dathan (Scientific Advisor to the Chief Minister of Kerala) delivered the keynote talks.

1. Seminar on World Wetland Day (WWD-18)

The Science Club of Bishop Moore College, Mavelikara celebrated the World Wet Land Day : “**WWD 18**” in association with Department of Botany and Biotechnology with the sponsorship from **Kerala State Council for Science and Technology, Thiruvananthapuram**.

- **Dr. Abhilash R**, Associate Professor, Christian College, College inaugurated WWD-18 and delivered the key note address on “**Wetlands for Urban development**” on 02/02/2018.
- An **Intercollegiate Power Point Presentation** competition on WWD-18 was also organized. Dr. Arun Aravind welcomed the participants and audience to the programme.
- An **Intercollegiate Quiz** competition on WWD-18 too was organized as part of celebrating wetland day. **Dr. Abhilash R** was the Quiz Master. Dr. Arun Aravind welcomed the participants and audience to the programme.. Dr. Deepthi, Dept. of Zoology announced the results at the end of the programme.



WWD-18 Lecture by Dr. Abhilash R



Quiz Competition Prize Distribution by Dr. Abhilash R

1. National Science Day Celebrations (Sci-Rostrum '18)

The National Science Day is celebrated on 28th of February every year. Science Club of Bishop Moore College jointly with Physics Association organized the National Science day Celebrations in the College on 23, 27 & 28 February 2018 with financial support from the Kerala State Science Technology and Environment (KSCSTE), Thiruvananthapuram.

An Inter Collegiate Power point presentation competition “**Science and Technology for Sustainable Development**” was conducted on 26th February, 2018. A Lecture class was arranged for the students on 27th February, 2018. Dr. B. Premlet, Rtd Professor, TKM College of Engineering, Kollam, inaugurated the National Science Day Celebrations. The Inaugural meeting was presided over by Dr. Lynnette Joseph, Dr. Arun Aravind, Co-ordinator Science Club welcomed the gathering and Ms. Gowri proposed the vote of thanks.

An intercollegiate quiz programme was conducted Dr. Praveen C S (FDP Substitute) of Bishop Moore College as part of National Science Day Celebrations. More than 10 teams were participated from various Colleges.



Inauguration of Sci-Rostrum '18



NSD-18 Quiz Competition prize distribution by Dr. Praveen C S



NSD-18 Power point Presentation Competition

4. BIODIVERSITY CLUB AND SANTHISTHALL



Kerala State Biodiversity Board is supporting the 'Biodiversity Clubs' in Bishop Moore College, Mavelikara in order to implement programmes to conserve biodiversity in a timely manner. Biodiversity Conservation programmes will be conducted by the Biodiversity Club in the College Campus.

OBJECTIVES OF THE CLUB

The main objectives are:

- To conduct biodiversity studies in association with Bhoomithrasena
- Involve in the activities of forming People's Biodiversity Registers
- Assessing the local biodiversity and come up with programmes on benefit sharing of biodiversity resources in association with BMCs
- Conducting awareness programmes on biodiversity conservation
- Equip younger generation to create biodiversity awareness in the community
- Help to materialise Biodiversity conservation plans proposed by BMC of the area

ORGANIZATIONAL STRUCTURE

Biodiversity clubs will have an organisational structure as given below:

Patron : Principal, Bishop Moore College, Mavelikara

Teacher in Charge: Dr. Prakash G. Williams

Executive committee: JILS VARGHESE (Asst Prof of Physical Education)

DR. BRIJITHLAL N. D (Asst Prof of Botany)

Ms. LINDA E. JACOB (Asst Prof of Chemistry)

KSBB District Coordinator, One BMC member, Local Forest Officer and Local Agricultural Officer.

The club have members from various classes of Bishop Moore College, Mavelikara. Most of them are members of the Bhoomithrasena club of the college. The establishment of 'Shanthisthal' was carried out with the support of Kerala Biodiversity Board.

MEMBERS OF THE CLUB

- PATRON: Dr. Jacob Chandy, PRINCIPAL
- TEACHER IN CHARGE: Dr. PRAKASH G. WILLIAMS
- EXECUTIVE COMMITTEE: Mr. JILS VARGHESE (Asst Prof of Physical Education)

Dr. BRIJITHLAL N. D (Asst Prof of Botany)

Ms. LINDA E. JACOB

Two Students representatives shanthisthal

50 members (all streams of students are enrolled)

CONSTRUCTION OF SHANTHISTHALL

The project was constructed in the Boys Hostel area, Bishop Moore College, Mavelikara near the College. An area of 20 cents has been allotted and an agreement was signed between the College and the Kerala State Biodiversity Board.

- An area of 20 cents made available for the 'Shanthisthal'
- The forest grove being made in the allotted land, shall be only with RET and local varieties of trees/ plants
- The project is being supported by State Biodiversity Board, Govt. of Kerala for initial establishment/ protection
- It is assumed that during the course of time the forest grove referred to as 'Shanthisthal' would be an assembling of plant/ tree varieties of RET species and also would automatically enrich the faunal elements
- 'Shanthisthal' is maintained in a sustainable manner so that the future generations of students and the local community will get benefit out of it
- It is also assumed that after trees/ plants are established, the local/ scientific names are to be displayed so that the Shanthisthal will also have an educative value
- In course of time a 'register' with the plants and animals in the 'Shanthisthal' to be prepared and maintained in the Bishop Moore College for reference.

FUNDING

An amount of Rs. **Sixteen thousand** was received from the Kerala State Biodiversity Board as the first installment and the Board members visit the 'Shanthisthal' frequently and give necessary instructions whenever needed.

ACTIVITIES DONE

- Land was protected with maintenance of the walls
- Board was displayed in the College, Gate and in the project site
- The land was fenced with tapioca and Konna plants (Biofencing)
- Cloth fencing was also made
- Plastic and other wastes are removed
- Ground was cleared, tilled and ploughed
- Watering facilities are done
- Planted trees



LIST OF PLANTS/ TREES

We have presently ten trees and rich in biodiversity with Jack fruit tree (*Artocarpus heterophyllus*), Anjili tree (*Artocarpus hirsutus*), mango tree (*Mangifera indica*), cashew tree (*Anacardium occidentale*), papaya tree (*Carica papaya*), aathi tree or Mullan Chakka (Soursop Fruit), Vaha (musa) etc.

SHANTHI STHALL



Kerala State Biodiversity Board
(KSBB / BDC / 04163 dt 28.07.2016)

BISHOP MOORE COLLEGE, MAVELIKARA

Objectives

- ◆ **To Conserve local biodiversity in accordance with biodiversity Acts.**
- ◆ **To Create a man made forest ecosystem in the campus.**
Area : 20 cents
Sanction Order : PF 02 / F / KSBB / 16 (2016-17)
Maintained by : Biodiversity Club,
Bishop Moore College, Mavelikara

Activities

- ◆ **Cultivate RET and local Varieties of Trees/ Plants.**
- ◆ **Enrich Flora and fauna of the Campus.**
- ◆ **Sustainable maintenance of the santhisthal area for the future generations of students.**
- ◆ **To Create an educative value by displaying local scientific names.**
- ◆ **Maintain a biodiversity register with available plants & Animals.**

6. OZONE DAY CELEBRATIONS

- **SHIELD 2015 - Ozone Day Celebrations**

As part of Ozone Day celebrations, RESONANCE -2015 conducted a variety of programmes from 14 to 18 September, 2015. Powerpoint presentation competition on the topic-“Ozone-All there is between you and UV” was conducted at the College and the intercollegiate level. On 16th September, Dr. M. S. Bindhu, Environmental and Safe Guard Specialist of Kerala Local Self Government, delivered an invited lecture on Preservation of Ozone Layer. Following the lecture, a documentary on “Ozone-All there is between You and UV” prepared by Fujin Fernandez, Gokul Krishna, Amal Raj, Sajay Ghosh and Rahul



R. Krishna of Final Year Physics was released.

The students of our Department actively participated in an Awareness Programme on Protection of Ozone Layer as part of Ozone Day Celebrations. They visited nearby schools and conducted an awareness programme including a documentary show, Street Play and Awareness Class. They have visited five schools-Bishop Hodges Higher Secondary School, Mavelikara, Govt. UP School Varenickal, CMS LP School Kallumala, Pope Pius XI HSS Kattanam and Bishop Moore Vidhyapith Mavelikara .



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Lynnette John



Sep 19, 2015 •

Dept of physics presenting awareness documentary and skit on protection of ozone layer at govt ups vare nickel



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- **SHIELD 2016 - Ozone Day Celebrations**

As part of Ozone Day celebrations, RESONANCE -'16 conducted a variety of programmes from 23 - 29 September, 2016. On 23rd September, Dr. Athira O, Assistant Professor of Biotechnology, Amrita Institute, inaugurated SHIELD 2016 and delivered an invited lecture on "Save Ozone, Our Planet's Safe Zone". Inter department PowerPoint presentation competition and Painting Competition on the topic-"Ozone and Climate – Restored by a world united" was conducted at the College level on 28th September. Inter Collegiate PowerPoint presentation competition and a lecture on "Climate Change and Ozone layer depletion" by Dr. Suresh V Vettoor, Associate Professor (Rtd.), St. Dominics



College, Kanjirappally, were held on 29th September.

