



yuva kshētra

Institute of Management Studies

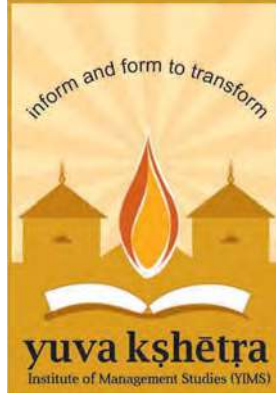
Ezhakkad PO, Mundur, 678 631 Palakkad, Kerala



GREEN AUDIT REPORT 2019 – '20



Nature's Green Guardians Foundation
Trivandrum 695 043



yuvakshētra

Institute of Management Studies
Ezhakkad PO, Mundur, 678 631 Palakkad, Kerala

GREEN AUDIT REPORT 2019 – '20



Nature's Green Guardians Foundation
Trivandrum 695 043



Green Audit Report 2019-'20

Contents

YIMS – Profile	5
Motto, Aims and Vision	7
YIMS Campus Layout	9
Executive Summary	11
Green Protocol	13
Green Audit 2019–'20: Procedures & Priorities	15
Campus Population	16
Programmes during 2019-20	16
1. Audit on Green Campus Initiatives	17
1.1. Campus Trespass Restrictions	17
1.2. Use of Bicycles and EVs	18
1.3. Pedestrian Friendly Pathways	19
1.4. Plastic Free Campus	20
1.5. Landscaping and Gardening	21
2. Audit on Green Cover, Energy, and Environment	23
2.1. Green Cover (Biodiversity) Audit	23
2.2. 1. Energy Audit	34
2.2. 2. Renewable Energy Use Audit	38
2.3. Water Audit	43
2.4. CGH – Clean, Green and Healthy – Audit	49
2.5. Audit on Societal Commitment, Outreach, and Greening	66
3. Audit on Accessibility and Gender Justice	71
3.1. Built Environment and Accessibility Audit	71
3.2. Rest Rooms Accessibility Audit	72
3.3. Signage and Guidance for <i>Divyangjan</i> Audit	73
3.4. Audit on Introduction of Assistive Technologies	74
3.5. Focus on Environment in Outreach & Social Service	75
3.6. Audit on Universal 'Information and Enquiry' System	75
4. Carbon Footprint	77
5. Future Directions	85
SWOT Analysis	86
Audit Certificate	87-92
6.1. Green Audit (Biodiversity) Compliance Statement	
6.2. Green Audit (Biodiversity) Certificate	
7.1. Energy Audit Compliance Statement	
7.2. Energy Audit Certificate	
8.1. Environment Audit Compliance Statement	
8.2. Environment Audit Certificate	



Yuvakshetra Institute of Management Studies

Ezhakkad, Mundur, Palakkad

Profile

Yuvakshetra Institute of Management Studies (YIMS), is established in 2005 as a premier Professional Training Institute and developed into an institution for higher learning by the Yuvakshetra Charitable Trust in Palakkad District, Kerala, by its visionary founder director Rev. Fr. Sebastian Panjikkaran, under the Diocese of Palakkad. The word 'Kshetra' in Sanskrit means a 'Gathering place' or 'Holy place'. Here, 'Yuvakshetra' is designed as the gathering place of young people, where they are moulded by professionalism, discipline, and holistic development.

The institute's approach towards professionalism is considered unique, as it focuses on providing a platform for even those from the lower economic strata to forge their skills and potentials and rise. YIMS remains the first college in Palakkad that offers a regular university degree course in Hotel Management. Affiliated to the University of Calicut, YIMS has 9 departments with 13 undergraduate courses and 3 postgraduate courses. It has also attained the status of a University Centre of Excellence.

YIMS, while equipping the students to face the educational, cultural, and other global challenges in an ever expanding world of knowledge, also teaches them that professionalism demands constant improvement in quality and competence. Attempts to advance its academic standards to the forefront is considered as foremost by YIMS.

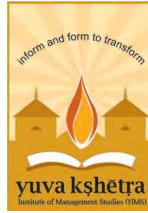
The College has a student strength of 1851 (945 boys and 906 girls) during the audit year of 2019-20. Of these, 57 girls stayed in the Ladies hostel, and 180 boys were in Boys' hostel-1 and 90 boys in Boys' hostel-2 (Total 327 students stayed in the campus). Among 51 female staff, 40 are teachers. Of the 36 male staff, 24 are in teaching and the remaining 12 are of non-teaching categories. Seven staff members also stay in the campus.

Students are encouraged to join NSS, Eco-clubs, Sports and Games, and all other possible group activities including socio-economic intervention projects, as well as in humanitarian campaigns and activities.

Rooftop Rainwater Harvesting, Modern Bore well Injection re-charging system, Solar electric power generation on roof tops, Biogas plants, Incinerator, and re-use of grey water etc. are implemented following a pragmatic practice of the Institute's beliefs on the relevance of environment and sustainability for building excellence in education.

The college is demonstrating simple and effective nature conservation measures, by active participation of students in farming, greening, animal husbandry, water and energy conservation, social work, arts and crafts, along with excellence in curricular learning.





yuva kshētra

Institute of Management Studies

Motto

“Inform and Form to Transform”

Inform students about ethics, values, behaviour etc with subjects of learning

Aim

Form the mind, intellect, behaviour, and personality

Vision

To develop the institute
as a centre of holistic excellence for budding professionals
by giving them quality and value added education
to meet the needs and challenges of tomorrow
by attaining intellectual and professional competence
for successfully coping with the rapid advancement in technologies
and the ever changing world of business, industry and service
Form better citizens, better job candidates, lovers of nature,
human beings of values, etc
are also part of the vision of YIMS



YIMS Campus Layout



Legend

- | | | |
|-------------------------|--------------------|-----------------------|
| 1. Christ Hill Block | 2. Jubilee Block | 3. Boys' Hostel-I |
| 4. Girl's Hostel | 5. Boy's Hostel-II | 6. HM Block; Symphony |
| 7. Administration Block | 8. Training Centre | ■ Playground ▲ ATM |



Executive Summary

This Green Audit Report of the campus of Yuvakshetra Institute of Management Studies, located in Ezhakkad, Mundur, Palakkad, Kerala, is prepared and presented in a format that is easy for the students to comprehend the ecological and ethical values of learning at this institution, as well as to get reminded on how each student can try to contribute to the ongoing greening initiatives of the College community. Their appreciation of the facts appraised from this report will go a long way in our nation moving fast towards green living. For the students 'Green learning' is their right, as well as a responsibility on them.

Observations and recommendations of the multidisciplinary green audit team on the overall green status of this higher education institution, is in effect an evaluation of the determination of the YIMS community to work towards sustainable practices. Our educated youth should realise that many of the natural calamities are avoidable, as they are only the end result of what we do to the nature and its components. The ability of our people to cope with the impacts of disasters – the resiliency – must be built up in stages. A change of lifestyle is inevitable for everybody, and that can be achieved only if the educational institutions assume their crucial role of directing their students' youthful energy and foresight towards a better tomorrow.

The findings of the Green Audit are only indicators on where and why additional efforts are required, and not in any way a criticism or commendation on its present performance. The College, affiliated to Calicut University has charted its course of development to becoming a 'temple of nature conservation', taking advantage of the latest in science and technology.

Yuvakshetra intends to come up as a NAAC accredited centre of excellence in the selected areas of knowledge it can profess. Green Auditing of the institution in a who undergo studies here. The Internal Quality Assurance Cell in the college has therefore assisted the audit team with the required data and clarified the queries the team had.

The 'Carbon Footprint' YIMS leaves behind through its activities over the year 2019-20 is seen to be modest, at 0.149 ton of CO₂ eq. per capita, compared to the per capita national average of 1.9 T CO₂eq. In addition, Yuvakshetra remains one of the very few higher education institutions which has in place a variety of conservation programs for energy, water, and natural resources, and committed to biodiversity conservation. Wastes recycling, organic farming, rain water harvesting, borewell injection re-charging, maximizing utilization efficiency of energy through newer technologies, etc. are carried out with active involvement of students and the rest of the campus community. On top of it strong remediation measures are taken and pushed forward.

The youth here, as responsible future citizens are now doubly convinced that they are required to be a part of the efforts for 'building back better' after the repeated disasters and health threats. No curriculum of studies in the past had covered anything akin to the causes and remedies of the problems that the State and the Country are to face upfront.

Therefore, students need to master the methods of analysing such situations objectively and act jointly for solving them. Students should also realise that Green Audit is the way to grapple with such situations. Green Audit is a useful tool to know how and where an institution is using the most of energy, water, and other resources. The audited education institution can thus plan for the needed changes to ensure such resources sustainably.

The Green Audit process for YIMS during 2019-'20 therefore, involved the getting together of environment conscious student groups in the form of Green Fan Nature Club, and Club Green Guardians, and evaluating their own work for the year for areas other than their study subjects. An audit team with teachers and a team of experts who have practiced greening for years (including certified and accredited energy and environmental auditors and ecological administrators) through the Nature's Green Guardians Foundation worked for its completion. The team conducted several component audits on Biodiversity, Energy, Use of Renewable energy technologies, Land use and water, Wastes, Transportation, Environment and ecology, Health, Gender justice, Accessibility, and Social outreach before arriving at the assessment of greening status to which the Institute belongs.

The Audit has made a number of observations in the respective chapters on component audits, and under the section on Future Directions, to help the Management, the Staff, and the Students in their plans for making the college premises greener than that of many others in the State.

Prof. V K Damodaran

Chairman, NGGFN

Former (Founder) Director of S&T and Environment Department &

Former (Founder) Director of Energy Management Centre-Kerala

And Former Secretary to Govt. of Kerala (Ex-Officio)

International Energy & Environment Expert/ Ex-Consultant to UNIDO & UNEP

Trivandrum, 695 035. Dated: 30.06.2021

The Green Audit Team 2019 -'20 for YIMS, Palakkad

YIMS	NGGFN
Rev. Dr Mathew George Vazhayil <i>Director</i>	Prof. V K Damodaran <i>Chairman</i>
Dr Tomy Antony <i>Principal</i>	Dr Sabu T <i>Program Director, CED</i>
Rev. Dr Joseph Olikkalkoonal <i>Vice Principal</i>	Er K M Dharesan Unnithan <i>Retd. Director, EMC Kerala</i>
Rev. Fr Shaju Angeveettil <i>Bursar</i>	Dr C Jayaraman <i>Chief Editor, Energy Manager</i>
Prof. Rajan T K <i>IQAC Coordinator</i>	Mr Hari Prabhakaran P S <i>ISO 14001 Lead Auditor; MD, NGGFN</i>
Mr Chandrasekar M <i>Assistant Professor, Geography Dept./IQAC</i>	Er K Madhukrishnan <i>CEO, Herbal Heritage Homes</i>
Mr Manoj M <i>Assistant Professor, Commerce Dept.</i>	Mr Ramkamal Manoj <i>Managing Trustee, Chakshumathi</i>



yuvakshetra

Institute of Management Studies (YIMS)
(Affiliated to the University of Calicut)

📍 Ezhakkad - Mundur, Palakkad - 678 631, Kerala, India ✉ yims@yuvakshetra.org / yuvakshetra@gmail.com
🌐 www.yuvakshetra.org / www.yuvakshetra.ac.in ☎ 0491 - 2846426 / 9400 012 368 / 9961 233 888

Green Protocol

- ✚ Bring food only as per requirement to avoid wastage
- ✚ Use ink pens to prevent accumulation of plastic waste through the discarded ball point pens
- ✚ Food and drinking water should be brought in stainless steel utensils and disposable materials should be avoided
- ✚ Use waste bins provided in the campuses and segregate waste into bio- degradable, non-bio degradable and hazardous categories
- ✚ Avoid paper and plastic cups and plates in public functions for serving food. Instead, use utensils that can be washed and reused
- ✚ All departments to deposit waste paper only in the common Materials Recovery Facility in the campus
- ✚ Store electrical and electronic waste and hand it over periodically to the concerned person to ensure its proper recycling
- ✚ Avoid flowers draped in plastic covers and flex items during public functions in campuses and welcome dignitaries with a single flower or a book
- ✚ Set up compost facility to turn bio degradable waste into compost. This should be used for cultivating organic vegetables in grow bags and pots
- ✚ Constitute Green Protocol teams for monthly monitoring of activities. Class leaders and Teachers be trained by Suchitwa Mission on ways of Greening



Green Audit 2019 – ‘20: Procedures and Priorities

The college management and the PTA are committed to keeping the premises as a “Green Campus”, and is contributing towards environmental conservation and sustainable development. The college administration works on several facets of the philosophy behind “Green Campus” - including Water and Energy Conservation, Tree Plantation, Waste Management, Community Outreach, Enriching campus Biodiversity, etc.

Towards Detailed Green Auditing

Maximizing performance efficiency through conservation is the broad objective of the management. The ‘green auditing’ is done for the academic year 2019-‘20, even though the COVID-19 pandemic disrupted the regular routines of teaching and learning towards the end of the academic year – i.e., from March 2020.

The stakeholders of this ‘temple’ of learning agree to ensure the following:

- a) Enhancement and coordination among various activities of the institution with importance given to ecological considerations and resources conservation;
- b) Institutionalizing all good practices initiated as part of review of activities;
- c) Driving a strong decision-making approach on the basis of ‘life cycle cost’ analysis on institutional issues; and
- d) Acceptance of a dynamic system for functional and lifestyle changes by the institution’s stakeholders including the students.

The Procedures and Priorities followed are:

Procedures:

1. Apart from the efficient use of energy, leading to substantial reduction in carbon footprint of the institution, renewable energy integration is attempted for compensating the unavoidable imprints.
2. The procedure for Green auditing adopted by the team is to collect basic data on the components of green audit through the Green Guardians, and showcase achievements - through statistical data and photographs, where possible.
3. Set up feasible goals for the year ahead, and help to go up in steps.

Priorities:

While all the listed green audit components are equally important, priority for the current audit was set on:

1. Evaluating the compliance potential of the stakeholders.
2. Examining in detail the reduction in carbon footprint possible in at least three major areas that emerge as the main emitters.
3. Convincing the management on investment required, as well as the return on investment that is possible through ‘Life Cycle Cost’ analysis.

YIMS Campus Population in 2019-'20

Category	Male	Female	Total
Students	945	906	1,851
Teaching Staff	24	40	64
Non-Teaching Staff	12	11	23
Total for 2019-'20	981	957	1,938

16 Programmes during 2019-'20

I	Post Graduate Programmes
1	M A English Language and Literature
2	M Sc Geography
3	M Com with Finance
II a	Under Graduate BA, BBA, BCA Programmes
1	B A English Language and Literature
2	B B A Business Administration
3	B C A Computer Applications
III b	Undergraduate – B Com Programmes
1	B Com with Computer Applications
2	B Com with Finance
3	B Com Taxation
III c	Under Graduate – B Sc Programmes
1	B Sc Geography
2	B Sc Psychology
3	B Sc Physics
4	B Sc Mathematics
5	B Sc Computer Science
6	B Sc Hotel Management and Catering Science
7	B Sc Hotel Management and Culinary Arts

1. Audit on Green Campus Initiatives

1.1. Campus Trespass Restrictions

The Yuvakshetra Institute of Management Studies (YIMS), though established recently, is known for high discipline, ecofriendly and green campus, and high standards of academic instruction. It is a mixed college with 1851 students in 16 courses, during the audit year. The daily entry of students and staff as well as visitors is strictly controlled through two gates which open to the public road, but guarded 24 hours by the Security Staff in uniform.



The campus is secure, and trespass is ruled out

No stranger can enter the college premises, except on solid reasons, even then without being verified by the Security staff on Duty. Vehicles are allowed to park only at assigned parking lots. There are 100 students arriving daily on foot. Around 590 students rely on public transport and 630 students use the nine college buses serving the daily commuters.



The campus offers a green welcome with grandeur

1.2. Use of Bicycles and EVs

Many roads even in Municipal Corporations in Kerala are without wide enough, obstacle free, and continuous footpath or cycle tracks. It is also well known that Kerala is on top of Indian states having higher population density. It is therefore unwise to depend too much on carefree walking or safe bicycling. The number of registered motor vehicles in Kerala is over 15 million for a population of 35 million, and the annual road accidents reported in Kerala are close to 50,000. This fact influences the parents while approving the choice of their mode of travel to the colleges. Yet, the 10 million plus 2-wheelers on the road belongs to the students, young working population, and particularly the working women. During working hours, staff and students walk the distance from hostel to college as well as between different activity areas inside the institution.

There are only 242 two wheelers (only one among them is electric or EV), and 7 cars (personal vehicles) in Yuvakshetra campus, commuting daily within a radius of 18 km. The College administration and the Hostel, as well as canteen management may hire three wheelers for bringing in purchased materials to the campus from stores and markets. There are no permanent pillion riders for the bike using persons. However, 54 are shared 2-wheelers. During the audit year, there was no spurt in the use of EV or its variant varieties.



The reason obviously is that the range of batteries (km run in a full charge), and the number of fast-charging outlets set up along the roads are comparatively low.

1.3. Pedestrian Friendly Pathways

The YIMS Mundur campus is carefully planned to accommodate all necessary buildings, playgrounds, internal roads, hostels, living areas, etc. well-connected, and leaving sufficient areas for gardening, greening, and for shaded pathways linking the different activity areas. The pathways are level, and even, for gentle strolling or hurried jogging, or leisurely passing with discussions proceeding. There are several hundreds of trees having distinctly dense and large canopy, dotting the 22.5-acre campus. No regular motor vehicle movements are allowed along the internal pathways, except odd scooters and cars at times. The Audit found the campus as very safe and hassle-free, for a rewarding learning environment.



The other roads are level, tiled or tarred or turfed and regularly cleaned, making it possible for students and the staff members to move freely, even with discussions and narratives continuing. Though the activity areas are well connected by surfaced roads, a public road keeps these areas divided – without causing any inconvenience for connectivity. There are adequate number of street lights making it possible for the hostellers, other essential staff and their families in the campus to move with ease to the buildings and the gardens.

1.4. Plastic Free Campus

The students, teachers and all other stakeholders at YIMS are very conscious of the need to keep away the single-use type of plastics or plastics containing materials at all times. They rigorously follow the College Green Protocol, which is in line with the suggestions of the highly environment conscious Kerala higher education department. The Audit also found that the students keep up their pledge of banishing plastics in letter and spirit. Avoidance of plastics is targeted for all activities including honoring of guests at functions. The students have gone out into the towns and villages under the NSS banner and approached their own homes and their neighborhoods to garner support for their campaign to avoid plastics completely, and embrace 'Kerala's Green Philosophy'.



Litter free, plastic free, nature-scape like this are 'Green Learning Grounds' also at YIMS

The Audit team could not find plastics strewn around anywhere in the campus during the audit visits. The working policy for disposal or re-use of wastes in the College has become, though gradually, a 'lifestyle step-up' acquired by the pupils from their studies at Yuvakshetra in addition to the avoidance of plastics. The students have all tried to eliminate the use of plastic water bottles and lunch boxes (day scholars) and most of them have turned to safer steel substitutes.

1.5. Landscaping and Gardening



The YIMS or Yuvakshetra campus is truly a temple for the youth to worship ecological practices, and learn how to keep one's environment meticulously clean, waste free, and falling into the channels that ensure resources efficiency and nature conservation. 'Nurturing the Nature' is a motto the students imbibe on joining the college for studies. The campus is rich in its floristic composition. In addition, the campus has smaller hedges, and places under tree canopies with plants around, and such other escapades for the tired minds at various parts of the campus (9.1 hectare).



Various sites in the college are planted with shade giving trees, supplemented by beautiful garden and area landscaped with grass and green shrubs – an activity in which the Green Fan Nature Club and the Club Green Guardians of YIMS are interested. The suggestions in Green Cover Audit section is meant to supplement these.

Grow bag plants from YIMS have helped in cultivating several new trees in the campus and in the homes.



Ducks have 'enough for their needs' in YIMS

Climber Bamboo: *Dinochloa andamanica* is a vigorous, evergreen, clump-forming bamboo with prostrate or scandent zig-zag culms that creep along the ground, rooting at the nodes, or climb over tall trees.

yuvakshetra
Institute of Management Studies (YIMS)
Ezhakkad, Mundur, Palakkad - 676321, Kerala

SASA JAPONICA

Introduced in 1850, this is probably the most useful and adaptable species of bamboo. Sometimes known as "Arrow Bamboo". Growing in rather dry woodland conditions, our own plants have remained as tidy clumps for 25 years, showing no tendency to run. Under the more favourable conditions of most gardens however, it is likely to be moderately spreading, forming a steadily expanding clump or grove. It can be readily controlled if necessary.

USES
Asia



yuvakshetra
Institute of Management Studies (YIMS)
Ezhakkad, Mundur, Palakkad - 676321, Kerala

CLIMBER BAMBOO

Dinochloa andamanica is a vigorous, evergreen, clump-forming bamboo with prostrate or scandent zig-zag culms that creep along the ground, rooting at the nodes, or climb over tall trees.

Binomial Name
Dinochloa andamanica

Habitat
Mostly occurs as impenetrable tangled thickets and often climbing on the tall trees.

Origin
East Asia

Uses
Use as a Rope Substitute



Rare bamboos in the lush bamboo garden of YIMS campus

The YIMS campus in Ezhakkad, Mundur, Palakkad is a unique setting with nurtured forest, almost 4.5 acres of grassland meant as cattle fodder – planted, irrigated, and harvested as needs arise, as well as green production of milk and vegetables primarily for campus consumption.

2. Audit on Green Cover, Energy, Water & Environment

2.1. Biodiversity (Green Cover) Audit

Biodiversity is essential for human subsistence. At present biodiversity is an area of major concern all over the world mainly because of the worldwide perception that the world's biodiversity is being lost at rates that are unprecedented in human history. Human activities such as habitat fragmentation caused by urbanization and agriculture, and the overexploitation of resources are the main causes of biodiversity loss. In order to create awareness among the youth on conservation of biodiversity there is a need for proper understanding of the local biological diversity.

The Yuvakshetra in Mundur, Palakkad, is in a district of Kerala, situated at the foothills of Western Ghats located at 10°50'48" N latitude and 76°32'59" E longitude. The campus of 9.10 ha is situated at an altitude 117 to 140 m. above MSL.

The biodiversity audit of the campus is intended to create awareness among the students on the need for conservation of the biodiversity in the campus, together with outside environs by providing hands-on training to them on measuring the value of every bit of biodiversity, and on the role of green vegetation in mitigating the impacts of climate change.

The campus with green and green only vegetation is in an area preferred for film shooting locales, tourism, and agriculture. Palakkad is also known as the granary of Kerala (rice paddy cultivation). YIMS too gives emphasis for farming, nature care, nature cure, animal husbandry, and scientific water management. The main stakeholders viz., the students also are very much conscious of the need to maintain the green surroundings for the entire campus by putting in their efforts too. Therefore, they are willing to 'touch and feel' the plants and flowers, learn the plants by looks, and also give care and maintenance to them while they are in the campus.

In addition to creating awareness among the students, the green audit training program was also intended to:

- conduct a rapid survey on biodiversity composition of the campus.
- find out the carbon sequestration potential of the trees in the campus.
- find out areas within the campus which have potential for restoration of biodiversity.
- provide recommendations for future activities with respect to the scientific documentation of the campus biodiversity and activities to make the campus more biodiversity rich, through the involvement of students and faculty.
- make the students capable of dealing with environmental and ecological issues in their surroundings.

As an initial step towards this, the students did take stock of the trees in the campus by measuring the girth of each tree at breast height (Dicot trees), the girth of clump at breast height (Bamboos) and the height of plant (Palms).

Based on the data collected by the students, the following analyses were done using standard procedures:

1. Botanical identity of plants collected with common names
2. Status of plants based on its origin/distribution
3. Total number of plants present in each species (For Bamboos, the number of clumps are considered)
4. Girth Range at Breast Height in centimetre (For Bamboos, Girth Range of Clumps at Breast Height in metres is taken & for Palms, Trunk Height Range in metres is taken)
5. Total carbon dioxide sequestered by the trees so far is arrived by calculating the 'above ground biomass' (AGB) of each tree using simple allometric equations:
 - a. For dicot trees below 60 cm diameter at breast height (DBH):
 $AGB = \exp \{-2.134 + 2.530 \cdot \ln(DBH)\}$ (Brown, 1997)
 - b. For dicot trees above 60 cm diameter at breast height (DBH):
 $AGB = 42.69 - 12.800 \cdot (DBH) + 1.242 \cdot (DBH)^2$ (Brown et. al, 1989)
 - c. For palms: $AGB = 4.5 + 7.7 \cdot \text{Trunk height in metres}$ (Brown, 1997)
 - d. For Bamboos: $AGB = -3225.8 + 1730.4 \cdot DBH$ [DBH here is Diameter of Clump at Breast Height in metres] (Kumar et. al. 2005)
 - e. The below ground biomass (BGB) is taken as 26% of AGB (Cairns et al. (1997))
 - f. Carbon content of trees is assumed as 50% of Total biomass, from which CO₂ equivalent is found out by multiplying it with 44/12.
6. The annual carbon sequestration potential is roughly estimated by using the following assumptions:
 - a. A mature tree will sequester on average 22 kg of carbon dioxide/year.
 - b. Palms will sequester around 10 kg of carbon dioxide per year.
 - c. One hectare of Bamboo plantation of multiple species combination will sequester 3 tons of carbon dioxide per year.
 - d. One hectare of organic vegetable cultivation will add around 150 kg of net carbon to the soil/year which is equivalent to around 550 kg carbon dioxide.

Major findings:

- There are 387 trees present in the campus, of which 248 are Dicot trees and 139 monocot trees.
- In Bamboos, one clump is taken as a tree and if we consider individual culms, another 725 number can be added. [*Other Findings follow*]

The results of the observations/analysis are summarised in Table 2.1.1.

Sl. No	Botanical Name	Common Name	Family	Status Exotic /Native	No. of plants	Girth Range at Breast Height (cm)*	Total CO ₂ Eq. sequestered (ton)
DICOT TREES							
1	<i>Anacardium occidentale</i> L.	Cashewnut	Anacardiaceae	E	1	77	0.89
2	<i>Artocarpus heterophyllus</i> Lam.	Jack fruit tree (Plavu)	Moraceae	N	20	20-220	31.79
3	<i>Azadirachta indica</i> A. Juss	Neem (Ariyaveppu)	Meliaceae	N	5	32-156	10.15
4	<i>Briedelia retusa</i> (L.) A. Juss	Mulluvenga	Euphorbiaceae	N	2	123-150	7.76
5	<i>Bunchosia argentea</i> (Jacq.) DC	Peanut Butter Fruit	Malpighiaceae	E	1	15	0.01
6	<i>Carica papaya</i> L.	Papaya	Caricaceae	E	6	30-62	1.62
7	<i>Cassia fistula</i> L.	Goldem Shower (Kanikonna)	Fabaceae	N	1	79	0.95
8	<i>Casuarina equisetifolia</i> L.	River oak (Kaattadi)	Casuarinaceae	E	1	80	0.98
9	<i>Cinnamomum malabatum</i> (Burm. f.) Blume	Vayana	Lauraceae	N	1	32	0.10
10	<i>Coffea arabica</i> L.	Coffee	Rubiaceae	E	10	15-30	5.63
11	<i>Erythrina variegata</i> L.	Mullu Muruk	Fabaceae	N	1	150	4.83
12	<i>Ficus auriculata</i> Lour	Giant Indian Fig (Atthi)	Moraceae	N	1	39	0.16
13	<i>Macaranga peltata</i> (Roxb.) Muell.	Podukanni	Euphorbiaceae	N	3	32-94	0.40
14	<i>Mangifera indica</i> L.	Mango Tree	Anacardiaceae	N	60	20-365	513.47
15	<i>Manilkara zapota</i> (L.) P. Royen	Sapodilla (Sappota)	Sapotaceae	E	2	15-33	0.12
16	<i>Moringa pterygosperma</i> Gaertn.	Drumstick tree (Muringa)	Moringaceae	N	2	25-36	2.14
17	<i>Myristica fragrans</i> Houtt.	Nutmeg tree (Jaathi)	Myristicaceae	E	2	16-17	0.04
18	<i>Persea americana</i> Mill.	Avocado Vennapazham	Lauraceae	E	2	16-17	0.04
19	<i>Phyllanthus emblica</i> L	Gooseberry (Nelli)	Euphorbiaceae	N	13	18-126	60.78
20	<i>Plinia cauliflora</i> (Mart.) Kausel	Jaboticaba	Myrtaceae	E	1	79	0.95

Table 2.1.1: Tree Diversity from Yuvakshetra Biodiversity Survey

Tree Diversity contd. ...

Sl. No.	Botanical Name	Common Name	Family	Status Exotic /Native	No. of Plants	Girth Range at Breast Height (cm)*	Total CO ₂ Eq. sequestered (ton)
21	<i>Psidium guajava</i> L.	Gauva (Pera)	Myrtaceae	E	2	44-87	1.43
22	<i>Saraca asoca</i> (Roxb.) de Wilde	Ashoka Tree	Fabaceae	N	63	18 - 115	39.59
23	<i>Simarouba glauca</i> DC.	Lakshmitharu	<i>Simaroubaceae</i>	E	2	33	0.21
24	<i>Spathodea campanulata</i> P. Beauv	Spathodia (Scarlet-bell tree)	Bignoniaceae	E	1	45	0.23
25	<i>Swietenia mahagoni</i> (L.) Jacq.	Mahogany	Meliaceae	E	4	15-195	13.49
26	<i>Syzygium cumini</i> (L.) Skeels	Njawal	Myrtaceae	N	1		34.76
27	<i>Syzygium samarangense</i> (Blume) Merr. & L.M.Perry	Wax Apple	Myrtaceae	N	2	17-25	0.07
28	<i>Tectona grandis</i> L.	Teak	Verbenaceae	N	23	18-160	29.87
28	<i>Tectona grandis</i> L.	Teak	Verbenaceae	N	23	18-160	29.87
29	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Belliric myrobalan (Thanni)	Combretaceae	N	1	162	5.87
30	Un-identified	(Arali)		N	1		5.00
31	Un-identified	(Murrankuly)		N	1		2.92
32	Un-identified	(Eratty)		N	1		2.92
33	Un-identified			N	11	20-300	52.53
		Total Dicot	Trees ->		248	15 - 365	781.90

2.1.1.a: Tree Diversity from Yuvakshetra Biodiversity Survey (Continued)

Major findings (contd.):

- There are 48 tree species coming under 18 families (15 dicot and 3 monocot families).
- The highest species diversity is in the family *Myrtace* (4 species) followed by *Fabaceae* and *Euphorbiaceae* (3 species each). 11 families represented by only 1 species and rest 4 have 2 species each.
- 10 species of Bamboo is cultivated in the campus in an area of 1.00 ha.
- Out of the 48 species present 26 are native to India and 22 are exotic plants. Out of the 10 Bamboo species present, only 3 are native, and 7 are exotic. [to be contd.]

MONOCOT TREES - BAMBOOS							
34	<i>Bambusa balcooa</i> Roxb.	Bamboo	Poaceae	N			
35	<i>Bambusa bambos</i> (L.) Voss	Bamboo	Poaceae	N			
36	<i>Bambusa vulgaris</i> Schrad. ex J.C.Wendl.	Thorny Bamboo	Poaceae	E			
37	<i>Dendrocalamus asper</i> (Schult.f.) Backer	Sweet Bamboo	Poaceae	E			
38	<i>Dendrocalamus brandisii</i> (Munro) Kurz	Burma Bamboo	Poaceae	E			
39	<i>Dendrocalamus hamiltonii</i> Nees & Arn. ex Munro		Poaceae	E			
40	<i>Dendrocalamus strictus</i> (Roxb.) Nees	Solid Bamboo (Kallanmula)	Poaceae	N			
41	<i>Gigantochloa austroyunnanensis</i> N.H.Xia & Y.Zeng		Poaceae	E			
42	<i>Guadua angustifolia</i> Kunth		Poaceae	E			
43	<i>Thyrsostachys oliveri</i> Gamble	(Lathimula)	Poaceae	E	75	4.5 – 9.0	204.24
MONOCOT TREES - PALMS							
44	<i>Areca catechu</i> L.	Arrecanut Palm	Arecaceae	N	12	8-14	2.47
45	<i>Caryota urens</i> L.	Elephant's palm (Choondappana)	Arecaceae	N	1	15	0.26
46	<i>Cocos nucifera</i> L.	Coconut Palm	Arecaceae	N	34	5 to 18	5.50
47	<i>Ravenala madagascarensis</i> Sonner	Traveler's Palm	Sterlitziaceae	E	1	11	0.21
48	<i>Roystonea regia</i> Kunth) O.F. Cook	Bottle Palm/ Royal Palm	Arecaceae	E	16	9 to 12	3.28
Total Palms					64	8-18	11.72
Grand Total					387		997.86

Major findings (contd.):

- However, if we consider number of plants, more than 70% are native plants.
- The highest number of plants present in a single species is Ashoka tree (*Saraca asoca*) with 63 plants, followed by Mango tree (*Mangifera indica*) with 60 trees.
- In addition to trees, there are many shrubs and herbaceous plants present in the campus which are not documented now.
- Organic vegetable cultivation is undergoing in around 0.50 ha of land in the campus.



Creating New Models in Greening
 Kerbs of road in front of academic building is used as a hedge

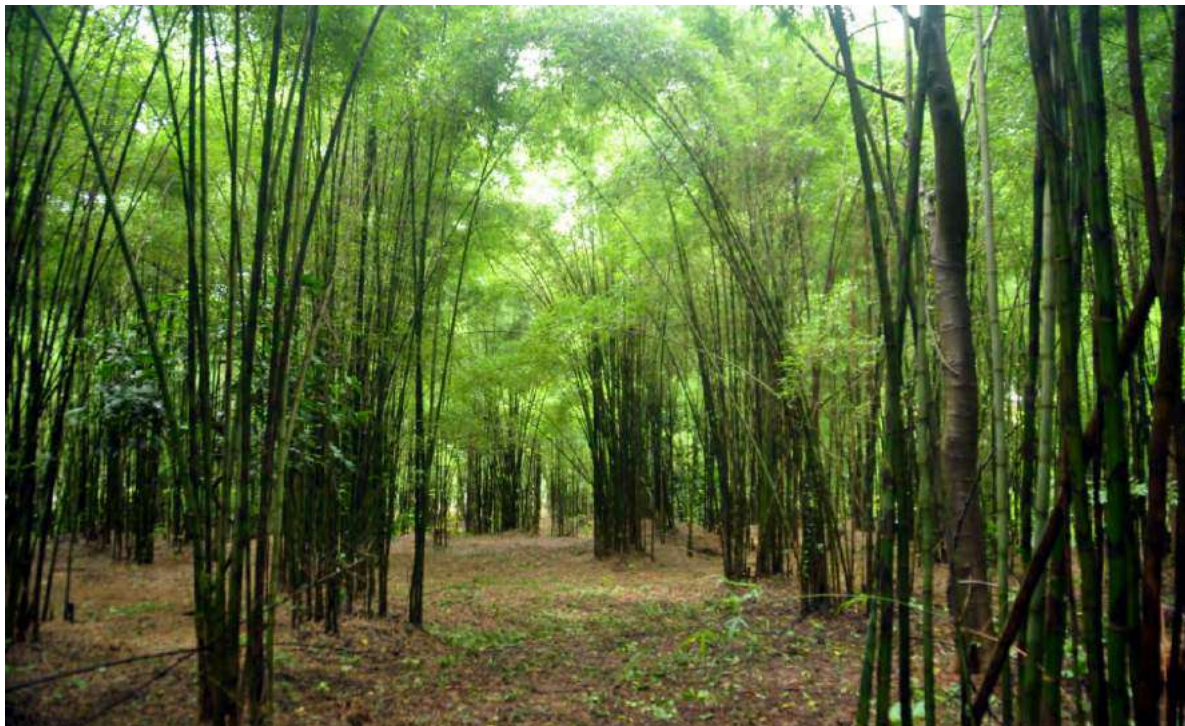
Green farming, novelty in land use, water conservation, and demonstration value – ‘four in one’ package of green living in YIMS.

<p>yuvakshetra Institute of Management Studies (YIMS) Changanassery, Kerala - 689323, Kerala</p> <p>Prepared by the College Office in respect submitted to the concerned faculty</p> 	<p>DENDROCALAMUS STRICTUS</p> <p>Found normally at altitudes upto 1000m, in dry, open deciduous forests. Widely distributed, it is the most common bamboo in India. Grows very congested especially in drier areas. Emerging shoot is greenish in colour with dense dark hairs on outer surface of culm sheath.</p> <p>POTENTIAL USES: The culms are used as building material and for making furniture, mats, basketry and implements.</p>	<p>yuvakshetra Institute of Management Studies (YIMS) Changanassery, Kerala - 689323, Kerala</p> <p>Prepared by the College Office in respect submitted to the concerned faculty</p> 	<p>GIGANTOCHLOA ATROVITTOLEA</p> <p>Native to Indonesia. Very dark erect culms with predominantly white nodes. Fairly tight clumping habit. Dense heavy culms with thick walls. Culm sheath broad with narrow blade. Comes up well in peninsular India. Emerging shoot is greenish.</p> <p>POTENTIAL USES: Furniture making, landscaping, construction fencing, handicrafts etc.</p>
<p>yuvakshetra Institute of Management Studies (YIMS) Changanassery, Kerala - 689323, Kerala</p> <p>Prepared by the College Office in respect submitted to the concerned faculty</p> 	<p>GUADUA ANGUSTIFOLIA</p> <p>Commonly known as 'vegetable steel'. Mid sized to large bamboo species. Native of South America. Considered to be out standing in its physical and mechanical properties as well as highly durable. Grows well along rivers and creeks and also in patches away from water logged areas. Emerging shoot.</p> <p>POTENTIAL USES: Scaffolding, building material, as a source of pulp for paper industry, furniture and edible shoots.</p>	<p>yuvakshetra Institute of Management Studies (YIMS) Changanassery, Kerala - 689323, Kerala</p> <p>Prepared by the College Office in respect submitted to the concerned faculty</p> 	<p>THYRSOSTACHYS OLIVERI</p> <p>Commonly known as 'kanakach'. Small to mid-sized bamboo species. Look similar to D. stocks in culm characteristics but culms are clump forming.</p> <p>POTENTIAL USES: Fencing, furniture, potential species for agroforestry due to its ideal stoop, and scaping.</p>

Some of the Bamboo Varieties maintained in the YIMS Campus

Major findings (contd.):

- There are more than 10 local breeds of cows reared in the campus. The local breeds of cattle that are farmed are well-adapted to their environments in terms of disease resistance, heat tolerance, and low nutrition needs. However, this will contribute to methane emission. The impact is neutralised by reducing footprints in milk/milk products and manure purchase for the various needs of the campus.
- The total carbon sequestrated by all trees in the campus so far is **997.86 tons**.
- The **annual carbon sequestration potential** of the Campus is thus **9.37 tons**.



A view of the Bamboo Garden at YIMS

Suggestions / Recommendations:

1. It is essential to prepare the biodiversity register of the campus in a scientific way with photographs of all plants, and visiting/nurturing animals.
2. The trees shall be geotagged and monitored annually for girth increment so that a real picture of the annual carbon sequestration potential is obtained.
3. In view of the fairly rich greenery that is well maintained, there is a need for including more indigenous plant species which has more conservation value such as food, medicine, carbon sequestration potential, rarity etc. This will also attract more birds and butterflies to the campus and increase faunal diversity. Some plant species suggested for introduction to the campus are given in Table 2.1. 2.

Table 2.1.2: Suggested additions to YIMS Flora

Sl. No.	Botanical Name	Malayalam name	Family	Use	Remarks
1	<i>Aegle marmelos</i>	Koovalam	Rutaceae	Medicinal /Edible fruit	
2	<i>Alangium salviifolium</i>	Ankolam	Alangiaceae	Medicinal /Edible fruit	
3	<i>Alstonia scholaris</i>	Ezhilampala	Apocynaceae	Medicinal	Fast growing
4	<i>Antidesma bunius</i>	Mayilkombi, Neelathali	Euphorbiaceae	Edible fruit	Small tree
5	<i>Antidesma ghaesembilla</i>	Kattupulinchi	Euphorbiaceae	Medicinal	
6	<i>Artocarpus gomezianus</i> ssp. <i>zeylanicus</i>	Kattukadaplavu Pulichakka	Moraceae	Medicinal	
7	<i>Artocarpus hirsutus</i>	Anjili	Moraceae	Edible fruit	Endemic to Southern western Ghat
8	<i>Averrhoa bilimbi</i>	Irumpan puli	Oxalidaceae	Medicinal-Edible fruit	
9	<i>Averrhoa carambola</i>	Chathurapuli	Oxalidaceae	Medicinal Edible fruit	
10	<i>Baccaurea courtallensis</i>	Moottippazham	Euphorbiaceae	Edible fruit	
11	<i>Bombax ceiba</i>	Ilavu	Bombacaceae	Medicinal	
12	<i>Butea monosperma</i>	Chamatha, Plash, Brahmavriksham	Fabaceae	Medicinal	Small tree
13	<i>Chionanthus mala-elengi</i>	Kallidala Mala elengi	Oleaceae	Medicinal	Small tree
14	<i>Cinnamomum malabattrum</i>	Illavangam, Vayana	Lauraceae	Medicinal	Endemic to Southern western Ghat
15	<i>Croton persimilis</i>	Somaraaji Thomarayam	Euphorbiaceae	Medicinal	Small tree
16	<i>Dillenia pentagyna</i>	Malampunna	Dilleniaceae	Medicinal	
17	<i>Elaeocarpus variabilis</i>	Kara	Elaeocarpaceae	Medicinal-Edible fruit	
18	<i>Flacourtia jangomas</i>	Loovikka, Lavalolikka	Flacourtiaceae	Edible fruit	Native of SE Asia and East Africa
19	<i>Garcinia gummi-gutta</i>	Kudampuli	Clusiaceae	Edible fruit	

Sl. No.	Botanical Name	Malayalam name	Family	Use	Remarks
20	<i>Garcinia indica</i>	Punampuli	Clusiaceae	Edible fruit	Small tree endemic to western Ghat
21	<i>Grewia tiliifolia</i>	Chadachi, Dhanaunavriksham, Unnam	Tiliaceae	Edible fruit	
22	<i>Hydnocarpus pentandra</i>	Marotti	Flacourtiaceae	Medicinal	Small tree endemic to western Ghat
23	<i>Kingiodendron pinnatum</i>	Churali, Ennappayin, Kiyavu	Fabaceae	Medicinal	Endemic to Southern western Ghat
24	<i>Phyllanthus acidus</i>	Pulinelli	Euphorbiaceae	Medicinal-Edible fruit	
25	<i>Pterospermum rubiginosum</i>	Chittilaplavu, Ellooti Malamthodali	Sterculiaceae	Medicinal	Endemic to Southern western Ghat
26	<i>Spondias pinnata</i>	Ambazham	Anacardiaceae	Edible fruit	
27	<i>Strychnos nux-vomica</i>	Kanjiram	Loganiaceae	Medicinal	
28	<i>Syzygium chavaran</i>	Chavaran	Myrtaceae	Edible fruit	
29	<i>Syzygium palghatense</i>	Sevappunjaal	Myrtaceae	Edible fruit	Critically endangered and endemic to Kerala
30	<i>Tabernaemontana alternifolia</i>	Koonampala	Apocynaceae	Medicinal	Small tree endemic to Southern western Ghat
31	<i>Tamarindus indica</i>	Valanpuli	Fabaceae	Medicinal Edible fruit	
32	<i>Ziziphus mauritiana</i>	Lanthapazham	Rhamnaceae	Medicinal-Edible fruit	

Suggestions / Recommendations Contd. ...

- As undergrowth of trees where the cattle are tied in the day time, try to raise buffalo grass which will help to avoid soil erosion, increase water harvesting, and cattle feed.
- The cow dung, urine etc. may be scientifically processed to make value added products, and to reduce methane emission from the farm.
- In addition, the college may try to assort and add attractive specialized gardens such as Butterfly garden, Herbal/Medicinal garden (May explore funding from National Medicinal plant Board for this), *Nakshatra Vanam*, etc. as well. This will help student groups, and visiting school students to appreciate the plant kingdom.

-
7. Explore the possibility for farm/educational tourism with the well-maintained greenery in the campus.
 8. A “special campus greening drive” with fast growing afforestation technique like the “Miyawaki Model” also may be made to keep the lead YIMS has in Climate change mitigation activities.



Organic Farming in Organised Form



Managing land resources with least disturbance to the nature

9. Audit suggests that a similar biodiversity register on Fauna of Yuvakshetra campus be prepared during the following years, once the COVID disruptions are over. The campus has already more than average visits by birds, and many large trees are already home to many birds and small animals.
10. It is also desirable to get authentic records through regular measurements on how the biodiversity is helping in the greening process.



Nature care and Vegetable farming



Fruits of Water Frugality



Annexed Animal husbandry shed – Conservation of indigenous breeds targeted

2.2.1. Energy Audit

'Energy Audit' is a very useful activity for the students to learn, and practice. It is profitable to all if a portion of energy used is saved effectively instead of it being wasted in the normal course. Energy saving is easy to achieve as well. The results in terms of performance, and the profits are immediately visible. But, what is pitiful is that people seldom pay attention to the simple approaches that can save volumes of energy, even without spending a rupee on it. To get the same or more of work is done with judiciously chosen energy saving measures, in other words with energy management, and to minimise the losses and piling up of wastes within the campus, staff and students should know where and when, and how and how much energy is used in getting the needed energy services. Targeting a better energy efficiency scenario – i.e., either reduce energy input for the same work, or get more from every unit of energy – is the beginning of better energy management. The major sources of carbon emissions in an educational institution are the use of electricity and other forms of energy, transportation, and wastes linked to food preparation and consumption, as well as other throw-away things people are tempted to use.

As a part of the current year's green audit, the data pertaining to electricity, transportation, and various types of wastes are closely monitored to see whether the Yuvakshetra students are 'conservation conscious' or not.

In a campus like YIMS in Kerala, it is customary to have energy use from different sources – such as electricity, petroleum gas, diesel, petrol, firewood, solar electricity, solar thermal energy, etc. with a view to minimising the expenses. For getting 'energy services' that are unavoidable for the community to live inside the campus, as well as for the day scholars attending the programmes offered therein, a part of the energy used has to go waste. Most of the time, the major component of carbon footprint – an indicator of ecological performance - in an educational institution is likely to be from the energy related activities.

Electrical energy consumption nowadays are quantified as taking place during three distinct times as normal, peak, and off-peak (defined so, for tariff purpose) in different areas within the campus, with different purposes. Unless electricity is availed at 11 kV (high) voltage (tension) level, and distributed within the campus – which is on either side of the public road in YIMS – by the college, the technical features useful for efficient management of energy with time specific particulars will be difficult to obtain. In YIMS, the power supply is effected through 8 Medium Voltage and 2 Low voltage connections labelled - 2 for Educational Institution/Academic area, 3 for hostels, guest house etc, 1 for the Convent, 1 separately for pumping, 1 for agricultural purposes, and another one for business related activities (as commercial), etc. Therefore, the power factor of AC electricity use, 'time of the day' consumption pattern etc. are unable to be assessed. An 'Investment Grade' energy audit will have to be conducted for the YIMS campus, as the present system of several connections that are billed at different times and at different tariffs, does not present a picture of 'conducive to control of costs' and for ensuring security of power supply. Having a single point supply at 11kV, and distribution by the college can improve the energy management opportunities.

The campus population of the Yuvakshetra Institute is as follows:

Students (boys and girls): 1851; Teaching Staff: 64; Non-teaching staff: 23

Staff and students staying in the campus: 334

Month	Edn 1@	Edn 2@	Host 1*	Host 2*	Host 3@	Convent*	Com*	Pump@
8/19	--	--	3,494	--	--	1,944	1,941	--
10/19	--	--	3,267	--	--	1,484	1,437	--
12/19	--	--	4,640	1,556	--	1,768	1,791	--
2/20	--	--	3,799	2,395	--	1,565	1,877	--
4/20	--	--	1,995	1,790	--	804	1,456	--
6/20	--	--	--	10	--	39	--	--
9/19	4,260	1,495	--	--	--	--	--	1,095
10/19	4,500	1,126	--	--	2,133	--	--	397
11/19	4,840	1,455	--	--	2,827	--	--	2,280
12/19	4,540	1,833	--	--	3,281	--	--	1,381
1/20	3,960	1,822	--	--	3,822	--	--	1,365
2/20	4,760	2,917	--	--	3,965	--	--	1,474
	26,860	10,688	17,195	5,751	16,028	7,604	8,502	7,992

Annual Total Consumption in kWh = 1,79,112

Monthly Average Consumption (@Group A connections) = 4,130

Monthly Average Consumption (*Group B connections) = 10,796

Table 2.2.1: Data on Electrical Energy Consumption

	Name	HM GF	HM GF	HM 1F	HM 1F	HM 2F	HM 2F	JB	JB	ADM	ADM
1	Fan	46	60	40	60	30	60	70	30	22	60
2	Tube Light	71	10/20	71	10/20	71	10/20	102	20	42	20
3	LED Light							2	8	10	8
4	Computer System							5	200	42	200
5	Printer	3	50					3	50	3	50
6	Projector							3	300	3	300
7	Speaker	5	75							5	50
8	Refrigerator										
9	AC										
10	Chimney	4	200								

		CH GF*	CH GF	CH 1F*	CH 1F	CH 2F*	CH 2F	CH 3F*	CH 3F		
1	Fan	41	40	61	40	159	40	51	60		
2	Tube Light	50	20	40	20	67	20	107	20		
3	LED Light	5	8	15	6	5	6	15	8		
4	Computer System	9	200	94	200	3	200	50	200		
5	Printer	5	50	2	50	1	50	1	50		
6	Projector	3	300	3	300	3	300	1	300		
7	Speaker	5	75					1	315		
8	Refrigerator										
9	AC	3	2000	5	2000	2	2000				
10	Chimney										

Total: Tube lamps – 621 (All LED); Fans – 520 (331 energy saving); Computers – 203; Printers – 18

**GF/1F/2F/3F = Ground/First/Second/Third Floor

Table 2.2.2: Block-wise Data on Electricity Use

YIMS's average monthly electricity consumption comes to 14,926 kWh during the year 2019-'20. The annual energy consumption that accounts for GHG emission due to electricity use in the campus is therefore based on the total for the year (1,79,112 units). This has been generated based on the available bills at the Finance Section from the Utility company (KSEBL). The per capita annual electricity consumption is $179,112/1938 = 92$ kWh (units), which is quite modest.

Observations and Suggestions

1. As an educational institution, it is not possible for keeping a uniform energy demand level either on daily or monthly basis. Yet, the monthly variations are not very high. The Institute does not monitor the energy use pattern in different activity zones or for exclusive uses like energy used for water pumping, sewerage pumping, water purification, irrigation, hostel laundry, etc. Monthly evaluation of such sub-sectors will add to the envisaged strategy of energy conservation.
2. A College with a large number of computers (203 Nos.) with UPS devices in the circuit, needs to be analysed more precisely through a detailed energy audit to find out the power quality aspects, as well as for excessive 'phantom load' (drain in the off-state). In the case of YIMS, during the detailed energy audit, this aspect may be got separately examined.
3. The extent of power failures and how often (reliability) - are to be recorded regularly in a separate register (A sample format is provided).

Date	Time failed	Time restored	Gen start	Gen stop	Reason

Generator Capacity: kVA; Diesel/Fuel Cons. per hr:L. Total hrs run/yr:

(Format) Record of Standby Power & Power supply Interruptions

4. Yuvakshetra's strategy of purchasing only energy efficient lighting and ventilation devices, and working out their economics on 'Life Cycle Cost' basis (i.e., the total of initial cost added to the maintenance and energy costs for a reasonable period of their life - should be lower when compared to the traditional practice) are commendable policies.
5. It is suggested that a detailed (investment grade) energy audit with sector-wise electrical consumption studied, for the campus to evaluate the system arrangements and consider economic opportunities through efficiency enhancement, and at the same time to bring the carbon footprint to the minimum, be conducted at the earliest.
6. Yuvakshetra's electrical loads are of critical nature (Smart Class rooms, large number of computers, elaborate pumping arrangements, water purifying systems, etc.) and this need a properly designed distribution system originating from own transformers and control measures. In short, HT power supply may be availed.

Energy Efficiency Improvement

Improving energy efficiency is an important task before any manager in these days of climate change manifestations. The most attractive opportunity in the path of greening through energy management is the avoidance of incandescent bulbs and replacement of ordinary fluorescent tubes. The institution has for its new buildings installed only energy efficient equipment – like refrigerators, LED lighting devices, super-efficient fans, inverter kind of air conditioners etc. In the earlier installations, only through replacements can the energy efficiency be improved.

Major reduction in GHG gases emitted and the Carbon Footprint, can arise from electrical energy savings from LED tubes. With LED tubes of 16 watts in place of the 52 to 56 Watt fluorescent tubes, the power saving is roughly 36 watts. Assuming 6 hrs per day of use, and 250 days in a year, the energy cost savings (assuming a net cost of Rs. 7.00 per kWh) will be $(36 \text{ W} \times 6 \text{ h} \times 250 \text{ d})$ divided by 1000 and multiplied by Rs. 7. That is Rs. 378 in a year from one tube lamp alone. Such a tube can now be purchased at a bulk rate price of Rs. 250. That is ‘money back’ in even less than one year. Assuming a minimum of 5 years’ life for the tube, the net profit from each replaced tube is approx. Rs. 2,000 for an investment of Rs. 250. Good quality tubes may last much longer than 5 years. It will be an illuminating exercise for the students to learn how much energy charges could the college save due to the use of better technology and compare it with the investment required and learn about the ‘Life Cycle Cost’ approach. There will be substantial reduction in carbon emissions too. Students can very well plan to save on energy charges on their own - for their families too.

Observations and suggestions (for improvement of energy use pattern):

1. In the case of major equipment, the strategy of physical isolation – i.e., removing the plugs from the plug base (socket) – when not in use – may be adopted, and this should be made known to the operators and other staff, through stickers on or near such equipment in the laboratories and workplaces. This will help: (i) in improving safety to the users and the equipment, and (ii) in reducing ‘Phantom load’ (consumption of a small amount of energy in the ‘switched off’ condition).
2. A Maintenance schedule for the switchboards and distribution boards should be prepared, and exhibited for all those involved to follow without fail.
3. Arrange to keep Log Books for recording energy consumption, extent of power failures, and running of standby generator etc. These shall be periodically inspected by a designated member of teaching staff.
4. Install own Energy Meters for sub-units (different institutions, hostels, auditorium, laboratories, canteen etc.) for monitoring and managing the monthly energy consumption in those buildings/divisions.
5. Every month the electricity bill amounts should be compared with that of previous month as well as with the same month in the previous year, and if major difference is noted, the likely reason for that should be guessed. Major differences should be investigated.

2.2.2: Renewable Energy Use Audit

Natural calamities in the recent past, like Okhi & great floods of 2018, and viral diseases such as Nipa & H1N1 and now COVID-19 gave Kerala, a louder alarm on the serious consequences of the causes leading to climate change, which in turn result from excessive warming of the globe when compared to the situation at the time global industrialisation started (around 1850). The excessive warming of the globe was no doubt on account of the trapped greenhouse gases in our atmosphere. The major portion of these gases, to the extent of 70% plus, is due to CO₂ owing to the increased use of fossil fuels for energy generation, for motive power, lighting, and for industrial and commercial uses. Therefore, global warming can only be halted through reduced use of energy from carbonaceous fossil fuels such as coal, oil, and natural gas. Right in 2019, more than 70% of electricity the Kerala state utilised, came ultimately from fossil fuel power stations from states outside of Kerala. Because of this, we cannot limit the energy as it will go against the efforts for development and raising people's welfare. Yet, it is possible even to improve our welfare using less energy, at the same time sticking on to increased energy efficiency, and depending on energy through non-fossil, renewable sources such as wind, sunshine, water, biomass, etc.

	Type of RE	No. of Units	Size of Unit	Energy Output	% of Total	Incurred Cost Rs.
1	Solar Energy (SPV)	2	95 kW (60+35)	425 kWh per day	87%	48,00,000 (Subsidised) Grid-tie
2	Biomass Energy (Biogas)	2	15+3 m ³	108 kWh (eqvt.) Per day	Small (Cooking Energy)	6,00,000
3	Solar Thermal Hot Water (SWH)	3	300 LPD	--	Small	1,00,000
4	Steamer Steam Cooking; Improved Chulah	1 2+2*	-- 2 Large	--	25% Saving Save 60%	-- --

Table 2.2.2.1: Status of RE installations in YIMS, Palakkad

Observations and Suggestions:

1. With the main objective of raising the share of renewable energy in the total energy mix, and taking advantage of this window of opportunity, Yuvakshetra Institute management has installed two Roof Top Solar PV units of 35 kW and 60 kW capacity on its buildings to compensate for the carbon footprints created by the college functioning. This will bring down the college's energy bills considerably through KSEBL's payment for the energy pumped into its Grid.

2. The campus had standalone Solar Street lights before this Grid-tied SPV systems got installed. There are two Biogas plants as well with a total capacity of 18m³ to utilize the wet organic wastes being produced daily in the campus. The campus has also, almost all the proven renewable energy technologies put into use – improved firewood chulah, steam cooking, solar water heaters, and the like.

Other Fuels Used: 1. LPG

No. and type of LPG Cylinders used during the year in different places							
(14.2 kg Cylinder) Canteen		(19 kg Cylinder) Hostel+ Canteen		(14.2 kg Cylinder) Laboratory		(specify) Other places	
Commercial	Domestic	Commercial	Domestic	Commercial	Domestic	Commercial	Domestic
-	-	240	-	0	1	-	-

2. Wood

Wood used/year in different places					
Canteen for cooking	kg	Hostel For steam cooking	kg	(specify) Training Centre	Kg
-	kg	3,200	kg	1,400	Kg

3. Kerosene

Kerosene used/day in different places					
(specify) Place/Purpose	Litre	(specify) Place/Purpose	Litre	(specify) Place/Purpose	Litre
--		--		--	

4. Biogas

Biogas used/day in different places					
Canteen for Cooking	Cum	Hostel For Cooking	Cum	Heating Water Place/Purpose	Hours/ Cum
		2 Biogas plants	15 + 3 m ³		

Table 2.2.2.3: Energy sourced from sources other than electricity



Biogas plant at YIMS (left); (Right) Solar Street light installed in 2009



35 kW SPV Installation on rooftop of YIMS Administrative Block



Jubilee Block at YIMS has 60 kW of SPV
The energy is fed to the KSEBL grid and YIMS draws power from its existing connections



Steam Cooking room at YIMS
Can cook 80 kg of rice/250 Idlis/20 Steam Cakes (*Puttu*) in one round



Solar Thermal Water Heating Systems (3 x 100 LPD) capable of raising water to 85°C
Addition of Steam Cooker in hostel kitchen saves lot of fuelwood



Smokeless Chula (highly efficient and smoke free kitchen) for comfortable cooking experience, as well as for reducing firewood use to less than one-third.
Firewood is used super-efficiently

Observations & Suggestions Continued

3. Optimize energy use in the campus:

The College may link up with any one of the Engineering Colleges either in Palakkad or Thrissur, and conduct an energy optimization study by which every energy consuming area is analyzed separately to find out to what level energy saving technologies are to be deployed to bring the energy use to the minimum. If an economic analysis is also conducted, the savings possible in carbon emissions and also the economic benefits can be clearly assessed. Based on the findings, YIMS can choose to invest further in energy efficiency and reap money savings every year. This can be taken up as a mandatory project of a batch of final year B. Tech. (EEE or ME branches).

4. Re-visit water and waste scenarios from energy point of view:

The water recycling, campus farming, and other water conservation projects also be re-visited along with the optimisation study to have YIMS' eco-conscious programs and schemes, in view of the comparatively large volume of water being purified and reused. This will be a model activity for several colleges in the State.

2.3. Water Audit

1

Average annual rainfall for Kerala is 3000 mm. Palakkad gets an average annual precipitation of 2032 mm. Adequate and uninterrupted water supply for drinking, personal use, gardening, agriculture, and animal husbandry is however, uncertain nowadays in several districts of Kerala, especially in the northern districts. Water conservation is hence a major essential activity that should be pursued as part of greening initiatives in Kerala. But, on the ground, many people including good many students in Kerala, cannot imagine the prospect of a water shortage even after several calamities have struck the State severely in the recent times. But, Kerala state on the whole is 'Green' and 'God's Own'.

Globally, The Alliance for Water Stewardship, Carbon Disclosure Project (CDP), Ceres, The Nature Conservancy, Water Footprint Network (WFN), World Resources Institute (WRI), WWF, and the Water Mandate Secretariat jointly conducted an exercise in 2013 to make people all over the world to understand the different stages of water shortage like, Water Scarcity, Water Stress, and Water Risk. Technically they are to be understood as indicating clearly defined situations.

“*Water Scarcity*” refers to the volumetric lack of water supply. This is generally calculated as a ratio of human water consumption to the available water supply in a given area. Water scarcity is an “*objective reality*” that can be measured with accuracy across regions and over a time scale.

“*Water Stress*” refers to the ability to meet human and ecological demands for water. Compared to scarcity, “*water stress*” is a broader concept. It considers several physical aspects related to water resources, including water scarcity, but also water quality, environmental flows, and the accessibility of water.

“*Water Risk*” refers to the probability of a difficult water-related event. Water risk is felt differently by any sector of society and the organizations or families within them. Many water-related conditions, such as water scarcity, water pollution, poor governance, inadequate supply infrastructure, climate change, and others, create *risk* for many different sectors and organizations simultaneously. NAAC's aim is to ensure that such situations are avoided in the college premises at all times of the year.

In 'water stressed' regions, 'extra care' is required for discouraging the methods of wasteful water use by the campus residents as well as by the public. As of 2019, according to World Resources Institute (WRI), the extremely high water-stress experiencing countries are - in order of their ranking - Qatar, Israel, Lebanon, Iran, Jordan, Libya, Kuwait, Saudi Arabia, Eritrea, UAE, San Marino, Bahrain, India (13th), Pakistan, Turkmenistan, Oman, and Botswana. It is in these 17 nations that nearly 1.7 billion (22%) of the world's population reside, with the lion's share (1.37 billion or 18%) living in India. The annoying conclusion is that these 17 countries could experience the biggest economic losses from climate-related water scarcity – up to 14% of GDP by 2050 - and as many as 3.5 billion people could experience water scarcity by 2025. In spite of the two extra wet rainy seasons, Kerala too is on the verge of serious problems beyond 2050. The annual variation of temperature in

Palakkad plains is higher than the average for Kerala. It is in this context that the ‘water audit’ of 2019-‘20 of Yuvakshetra in Mundur, Palakkad, is assuming importance.

The Yuvakshetra campus, the higher education institution audited, has 1 open well, 2 bore wells, an extensive rain water harvesting system, a scientific Borewell Injection Recharge system, and 8 overhead water tanks with a total storage capacity of 315,000 L.

Sl. No:	OH Tank in Buildings	Capacity Litre	Pump Power	Pumping/day
1	Jubilee Block	35,000	5.0 HP *B	1.5 hr
2	Christ Hill	70,000	3.0 HP *R	2.0 hr
3	HM Block	30,000	1.5 HP *R	1.5 hr
4	Admin Block	30,000	1.5 HP *R	1.5 hr
5	YTC Block	2x30,000	7.5 HP *W	1.5 hr
6	Agriculture	35,000	7.5 HP *B	1.0 hr
7	Boys Hostel & Canteen	35,000	7.5 HP *B	1.5 hr
8	Ladies Hostel	20,000	1.0 HP *B	1.5 hr
	Total	3,15,000	34.5 HP	

Note: (*) Water source: B = Bore Well, R = Rain Water Harvest Tank, W = Open Well

Table 3.1.1: Overhead Tank Capacity, Water Primary Source and Pumping Details

There is no need for the campus community to depend upon KWA public water supply. The various functionalities for which this water is utilized is assessed by the student volunteers through surveys and sample measurements taken at user end (see table 2.3.1). Through repeated awareness and education programmes, the students have acquired the water use behaviour of water starved area, and is very conscious of water use in a frugal way.

As per the survey conducted to assess the quantum of water used for flushing, utensil washing, face washing, floor washing, bathing, cooking etc., the position during the current year is as given below in Table 3.1.2. Separate water meters are not installed in the system to measure these. Therefore, the Student Green Guardians have collected data on water use for the green audit, through representative surveys and user point assessments.

Toilets	: 21,000 LPD
Cooking	: 19,000 LPD
Utensils Wash	: 10,000 LPD
Floor Wash	: 9,000 LPD
Gardening	: 3,000 LPD
Loss thro’ pipe break/leaks	: 50 LPD
Other points	: 10,950 LPD
Bathing/Personal cleaning	: 25,000 LPD

Total	: 98,000 LPD

Table 3.1.2: YIMS Water use [According to Students’ Assessment]

The per capita water consumption of campus mates is 85 LPD, and that of day scholars and visitors is 40 LPD, considered as very satisfactory and adequate. In view of hotel management courses, cooking and washing requirements are a little higher than regular colleges in the state.

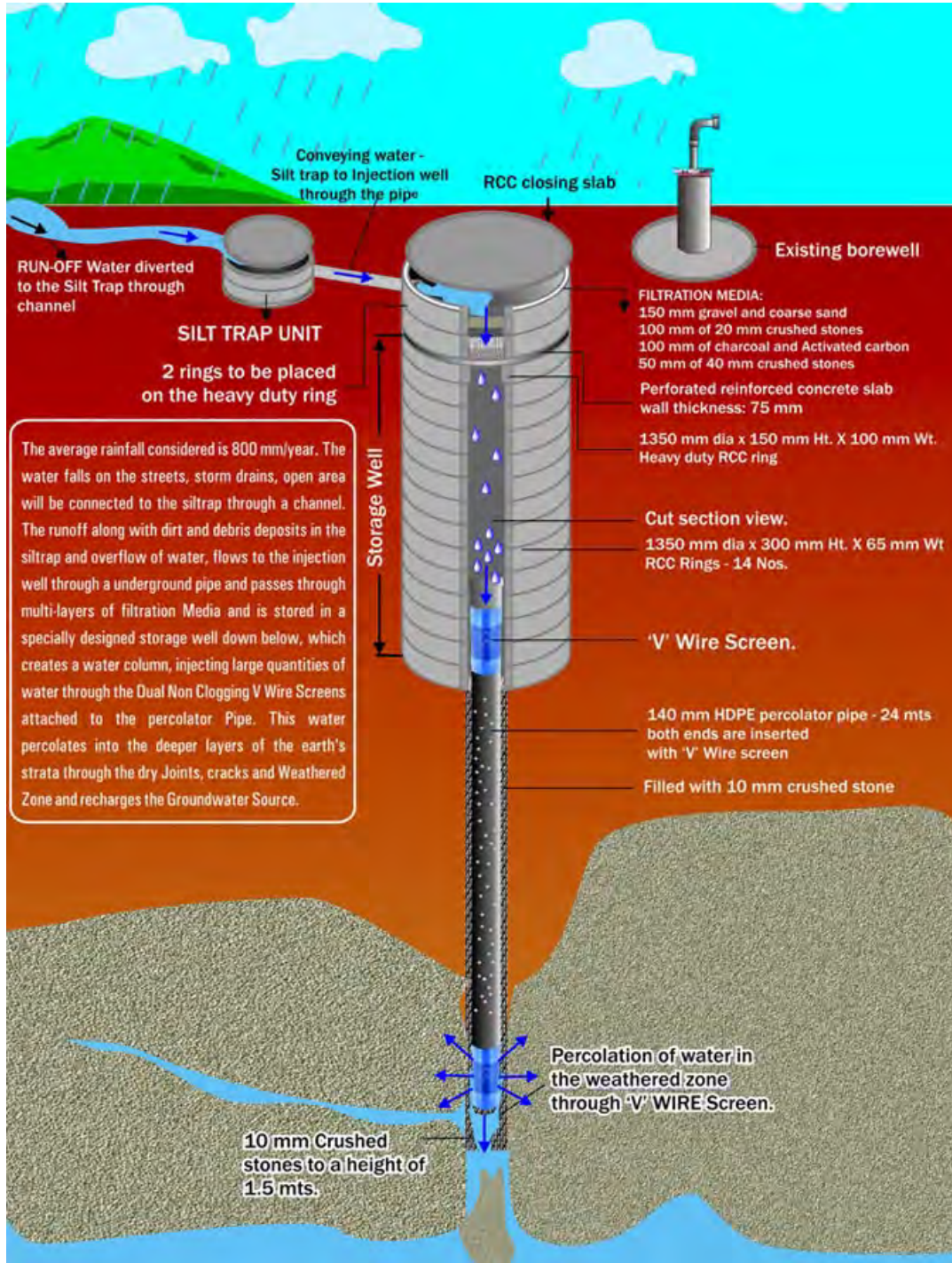


Waste water Treatment Plant at Yuvakshetra



Systematic Rain Water Harvesting, and Bore Well Re-charging system capable of collecting 1.5 Lakh Litre of rain water is operational in Yuvakshetra

V' Wire Technology - Advanced System
 In use at Yuvakshetra
 Artificial Recharge and Aquifer Storage



Drinking Water Bore Well Injection Recharge System



Sprinkler Irrigation as a means of water conservation is widely employed in YIMS Campus in grass cultivation for the Cattle Farm, and for all other irrigation purposes



Observations and Suggestions:

- 1) The total water use works out to about 50 LPD (85 LPD for hostellers and 40 LPD for day scholars). Bureau of Indian Standards BIS 1172-1993 had set a per capita LPD of 100-150 for India, which in its 1998 revision has reduced this to 70 LPD per capita. Thus, the water audit finds the arrangements including the sourcing, purifying, recycling, and judicious use of water in Yuvakshetra are excellent protocols for other colleges to follow.
- 2) There is no adequacy problem in the campus at present on quantity or quality.
- 3) Conservation of water through effective rainwater harvesting is considered as a helpful educational activity, to appreciate the potential impacts of climate change and for building resiliency against such impacts. Work on rooftop rainwater harvesting has been commendably done in the campus.
- 4) Audit suggests that it will be beneficial for the college to prepare a water management plan jointly by the Green Fan Club and Club Green guardians after conducting a

more pointed water use survey, and taking into consideration the needs of the next decade.

- 5) The water quality, as proved by testing at regular intervals is acceptable. However, attempt should be made to obtain annual test certificate from a statutory laboratory.

(Model) Register for Water Quality Test

Date Sample taken	Tested by (Lab.)	Findings	Other reference

While YIMS may make very frequent routine checks, seasonal checks may be got done by nearby Statutory Labs like the District PCB Lab.



Water Treatment Plant at YIMS



Reverse Osmosis (RO) Plant at YIMS

2.4. CGH – Clean, Green and Healthy – Audit

[Waste, Transportation, Health & Environmental Quality]

Yuvakshetra Institute, Mundur, or the YIMS Campus focused their attention on developing the campus into a green, serene, and resource conserving environment which prompts an ethical attitude in the minds of its students. It is well known that bodily health is difficult to flourish without a 'Healthy Planet' to live in. The health of Planet Earth, in turn, is ensured only through a 'Clean, Green and Healthy' way of life by the people. Every citizen should therefore respect the laws of nature and try to lead a way of life very close to the ways of Nature. The Nature as we understand now is 4.5 billion years old, and the health of Nature is very crucial for the sustenance of life on the planet. The future citizens are, therefore, not to deviate too far from Nature's "limits of tolerance". The present day lifestyles create problems of wastes, pollution to the environment through transport vehicles, and in general results in the poor status of land, water, and air in terms of quality. The CGH audit is to ensure that the 'learning environment' for the students of the audited campus is of the right type, and healthy - in other words 'Green'.

2.4.1. Waste Audit

As a higher education institution operating in Kerala, Yuvakshetra Institute of Management Studies in Mundur, Palakkad is to dispose of its wastes as is being done in every public institution. As the College has a limited area, and the area being used predominantly for academic activities (see table below) mostly in full day light, the nature and quantum of wastes are only of a limited pattern and quantum.

Buildings:

	Name of Block	Utility	Plinth Area in m ²	No. of floors
1	Administration	Office	896	2
2	Hotel Management	Academic	2,092	3
3	Christ Hill	Academic	6,185	3
4	Jubilee	Academic	2,355	4
5	Hostels & Canteen	Service	1,138	3
	Total buildings area		(sq. metre) 12,666	

Total Land and its Utilization:

	Land Utilization	Area in hectare
1	Area under buildings	1.86 ha
2	Playgrounds	0.40 ha
3	Open Auditorium	0.20 ha
4	Under Agriculture/Gardening	1.82 ha
5	Area under tree cover	1.28 ha
6	Other	3.54 ha
	Total Area of the Campus	9.10 ha

There are differences in quantity of wastes generated between workdays and holidays, as well as between seasons, as the lion share of the students (1577/1938) are 'day scholars'. An average figure per person per day for YIMS activity type, is however worked out by observing students' activities through a sample survey for a week by the student volunteers, and inspecting the disposal area, quantifying the measured wastes, and then extrapolating for the whole campus.

For Indian academic campuses, assessment of wastes generation is done using empirical constants arrived at by research studies on waste generation, and these are given as guidelines for arriving at values for GHG emissions from wastes. These are used in evaluating data on wastes in the YIMS campus as well. The summary of Data Sheets on Wastes with Auditors' Remarks is given in Table 2.4.1.1.

The wastes generation in the YIMS campus, is at a very low level, in view of the rigorous lifestyle training - with simplicity as its highlight. Wastes are systematically collected and disposed of, through means suggested by the Municipal/Panchayat bodies. Wet wastes are digested in the biogas plants (referred in Renewable Energy use audit with photographs. The energy obtained is used for cooking. Solid and liquid residues are used as manure in the farming section.

Sl. No.	Type of Waste Practice	Qty. kg/day	Type of Disposal	Remarks
1.	Food wastes: Food brought by students & Staff	--	--	--
2.	Food (Kitchen) Waste: Canteen + Hostel	26.00	Sent to Biogas Plant	Good system
3.	Paper Waste by Students & Staff	2.50	Sold at Wastes Shops	Okay.
4.	Paper Waste Bulk: Canteen + Hostel + Documentation	8.00	Collection by Local body	Okay.
5.	Water (waste water) (in kL)	10.00	Soak pit + Irrigation	Good system
6.	Plastic Waste: Individual	Nil	--	--
7.	Plastic Waste – Bulk: Canteen + Hostel + Office	2.00	Collection by Local body	Okay
8.	Glass & other utensils: Canteen + Hostel + Office	0.05	Collected by Local body	Okay
9.	Electronic Waste: Canteen + Office + Laboratories	0.20	Stored & sent to Municipality	Okay

Notes: (i). Carbon footprint calculations are in Chapter - 4; (ii). Being of small quantity, alternative solutions are not possible. (Quantities Based on Student Sample Survey)

Table 2.4.1.1: Summary of Wastes Audit in Yuvakshetra campus, Ezhakkad, Palakkad

Adequate numbers of small garbage bins are provided in hostel rooms, as well as in the office and academic areas in the College. Large enough waste receptacles are deployed prominently in open areas accessible by visitors.

Hostel Name/ Area	Number of students	Number of Bathrooms + Toilets	Number of Floors	Number of Rooms	No. of garbage bins/floor	No. of garbage bins per building
Ladies Hostel	57	16	2	8	16	32
Boys' Hostel – I	180	25	3	10+ 2 dorm	25	50
Boys' Hostel - II	90	16	3	16	25	75

Table 2.4.1.2: Garbage Bins Placed in the Hostels



Incinerator operating at temperature above 700°C & Fem friendly toilets at YIMS

Observations and Suggestions:

1. Using waste paper for value added recycling could be seen in getting paper pulp out of it, and to make handmade cards (with designs) and encouraging students to use them as Greeting Cards, or for making Sign Boards during events, etc.
2. Napkins disposal facilities may be reviewed. With the dispersion of toilets, its direct link to the napkin dropping facilities should be ensured.
3. Chemical wastes originating from the laboratories or treatment units are of low daily volume. The same sources produce glass wastes as well - on a very limited scale. They are now disposed of safely. These are not on a daily basis, and the overall quantity is of low volumes.
4. The waste handling system may be reviewed at higher levels for compliance to the state/local government guidelines and rules as and when they are revised.

2.4.2. Transportation Environment Audit

For Colleges, reducing carbon footprint is a difficult task, as the share due to transportation and energy use will be the most prominent. Travel of students and employees to and from the campus has to be inexpensive and as comfortable as possible, for which college buses and public transport facilities should be easily accessible. In the case of Yuvakshetra Institute, college buses are the most comfortable option for daily commutation. The data on the number of people using public and personal transport are collected by the student green guardians..

Students/ Staff coming in Own/Hired Vehicle:

1. Motor bike/scooter (single, shared) Per day
 - a. No. of Motor bike/scooter : 242 (students + staff)
 - b. No. of persons : 296
 - c. Total km travelled/day (To and fro) : 18 km
2. Auto Rickshaw
 - a. No. of Auto Rickshaw used : 30
 - b. No. of Students : 90
 - c. Total km travelled/day : 180 km
3. Own Car (single, shared)
 - a. No. of Own cars : 7 (shared)
 - b. No. of persons : 26
 - c. Total km travelled/day (To and fro) : 320 km to and fro
4. Shared Taxi Car
 - a. No. of Taxi cars : Nil
 - b. No. of Students & Visitors :
 - c. Total km travelled/day (To and fro) :
5. Private Van/Mini Bus/Bus
 - a. No. of Autos – material transport :
 - b. No. of persons : Refer Table 2.4.2.2
 - c. Total km travelled/day (To and fro) :
6. Public Transportation (Bus & Train)
 - a. No. of students : 589
 - b. Total km travelled/day (To and fro) : 30 km avg. to & fro
7. Students Cycling to College
 - a. No. of students : Nil
 - b. Average km travelled by person/day :
8. Students Walking to College
 - a. No. of Students : 100
 - b. Average km travelled by person/day : 4 km/pax (to and fro)

Educational Institution Vehicles Operated during the Academic Year 2019-20

Car/Bus Nos.	Average No. of Persons per trip	Total distance travelled during one day (km)	Fuel Consumed (Litre)
4W: 4	3	236	4,500
Bus: 9	65	655	32,600

*The emission calculation is made based on available data from test running:
2.3 kg CO₂/litre (petrol); 2.68 kg CO₂/litre (diesel) [DEFRA 2016]*

Table 2.4.2.1: Transportation data for YIMS

The predominant mode of transportation for college students in Kerala is bus or train. In limited cases, they travel by bicycle or even may walk. Buses need diesel having heavy carbon footprint, in other words contribute to the generation of greenhouse gases (GHGs) generally referred to as carbon emissions (in the form of CO₂, Methane, Sulphur compounds, Nitrogen oxides etc.) and the total impacts are heavy. This has a direct bearing on the Global Warming and the consequent Climate Change (CC) effects. The purpose of Green Auditing is to make every staff and student understand the extent of damage each one inflicts on earth and on our own environment. Accurate assessment of such environmental damages is a time-consuming exercise.

Bus No	Route	Distance To & fro Km/day	km/litre	Average Fuel Consumption LPD
1	Vadakkenchery to YIMS & back	62	5	27
2	Kanjikode to YIMS & back	65	4	17
3	Shornur to YIMS & back	95	5	20
4	Mannarkkad to YIMS & back	65	4	17
5	Cherpulassey to YIMS & back	78	5	16
6	Mangalam dam to YIMS & back	160	6	30
7	Palakkad -1 to YIMS & back	50	4	14
8	Pathiripala. to YIMS & back	30	4	8
9	Palakkad – 2 to YIMS & back	50	4	14
	Total	655	--	163

Table 2.4.2.2a: The Routes, Distances, and km-age of the 9 College Buses of YIMS

No.	Vehicle Type & Purpose	Distance km/day	km/litre	Consumption Fuel LPD
1	Jeep 4WD, Campus internal	50	10	5
2	Van, Pick up	60	15	4
3	Bolero, Purchases & other	56	14	4
4	Hyundai Creta, Emergency	70	15	5
	Total	236	--	--

Table 2.4.2.2b: Fuel Consumption on account of the 4 Institute Vehicles

At the UN Framework Convention on Climate Change (UNFCCC-21) in December 2015, India too had committed to bring down our country’s Carbon Foot Print on the global environment. Every Indian – be it a student, teacher, parent, or anybody else not connected with it directly, should know how much burden each one is inflicting on the environment, and try to bring such impacts to ‘near zero’ through all possible remedial actions. ‘Simple living’ and ‘Greener travel’ generally help in keeping a low carbon footprint profile.

Emission of climate changing gases through transport system – both public and personal – is very high in India, and India stands third in respect to GHG emitting resource utilization globally. India is also at the 6th place in the ‘after industrialization accumulated emissions’ [170 years starting from 1850]. But, if we take per capita emissions, India is not a heavy polluter – it stands at 10th position only, and the quantum is less than one-third of the world average. For assessing the carbon footprint due to transportation related to the functioning of the College, the following specific details were also gathered by student volunteers through the survey.

Sl. No.	Details: Type	No. of Vehicles	No. of Staff/ Students	Total km/day to & fro
1.	Motor bike/Scooter (Single/Shared)	242 (54 shared)	296	18 km
2.	Auto Rickshaw used	30	90	180 km
3.	Own Car (Single/Shared)	7 (shared)	26	320 km
4.	Car - Visitors/Parents	Nil		
5.	Private Van/Mini Bus	Nil		
6.	College Buses	9	630	655 km
7.	Public Transport/Bus, Train	--	589	30 km
8.	Cycling to College	Nil		
9.	Walking to College		100	4 km

*Carbon Footprint calculations are at Chapter 4

Table 2.4.2.3: Summary of the Mode of Transportation for Students and Staff of YIMS

The following additional assumptions are used for a rapid evaluation of the trend in transportation related carbon footprint:

1. Parents and occasional visitors generally use public transport; own car or taxi is used only in a limited way.
2. Within the campus, students do walk regularly, and since all buildings are close to each other, ordinarily there is no need to use vehicles inside the campus.
3. Among the bus users, there are college bus, private-bus, or public-bus service users.
4. The management allows the hostellers to choose their own mode of travel for occasional family visits, as most of them are children of middle class parents.

Observations & Suggestions:

1. Audit suggests that a more precise assessment of the mode of travel, daily ‘to and from’ distances involved etc. through future surveys. The distance range of bus users may be re-classified into 2 or 3 distance ranges close to the clusters identified.: [Number within 6 km, 10 km, 10-20 km, 20-30 km etc.].
2. The distance range of cars and scooters used by staff and students for commuting daily may also be studied with better precision. Vehicle sharing option may be encouraged.

-
3. Awareness on the benefit of using e-vehicles may also be propagated more vigorously.
 4. Every motor vehicle owner should be reminded to plant additional tree/s within any greening exercise inside or outside the college campus, and around their own homes.



To save on fuels and time of pick up, YIMS park the buses for night at the Start point



YIMS Welcome Port

2.4.3. Health Audit

A healthy environment for learning is what every student and parent expect in a higher education institution. The purpose of greening of college campuses is to ensure that the students are able to live and learn in as rich a healthy environment as possible. Parents generally expect the institution to pamper the children with facilities for developing their physical and intellectual capabilities to the full.

The method adopted by NGGFn for assessing the physical well-being of the educational institution in Green Auditing is as follows:

1. Examine the prevalence of major 'sick leave' cases, if there are any;
2. Examine the first aid and medical facilities available for students and staff, as well as for others during working hours;
3. Evaluate the atmospheric quality for adequacy, drainage systems for fast evacuation of liquid wastes, and the extent of land pollution, if any in the campus; and
4. Assess the active involvement and achievements of students in arts, sports and games, especially in inter-collegiate and inter-university contests - as these are indications of their healthy mind and body.

Observations on these aspects in respect of YIMS, Palakkad for 2019-'20 are:

Sick leave: College maintains Sick leave register, but there are only a few cases on record, indicating that this is an environmentally healthy campus. Kerala is known for its low mortality and high morbidity status in comparison to the national health status. This is because most mothers are educated, and so even a minor headache is promptly taken to the notice of, at least at the nearest primary health centre, or a government or private clinic/hospital.

However, in most colleges, fascination of the students for fast-foods and overuse of mobile phones and social media tend to create health problems. Common cold and minor flu usually affect some of them at least for a few days every year, and these interrupt their undivided attention to classes. Notwithstanding these, Audit found that at YIMS the student participation in cultural and social activities is not weak. The students of YIMS are active in environment-related programs, as well as in cultural activities, and sports and games.

Campus Medical Centre: There is adequate 'First-Aid' facility in the campus to give the students the needed, immediate care. Further, the campus has a Medical Centre, which caters to the medical needs of all the students and staff. The center has also a dedicated full time Lady Nursing Assistant who attends to the campus community's health needs both in the morning and evening hours, as well as anytime during emergencies.

In addition, there is arrangement for annual medical check-up for every student and it is organised every year without fail. YIMS also has a tie up with reputed private hospitals near the campus to attend to the students and staff of the Institute in case of serious illness or medical emergencies for specialized care and hospitalisation.

Emergency Medical facilities: Moreover, the institute maintains at least one motor vehicle (a Jeep) available round the clock to transport students and others to the hospital in case of any emergency. The hospitals having tie-up with YIMS (at Kongad and Mundur) and the Govt. PHC are within a radius of 3 km only. Emergency Treatment and Transportation to the hospital is also free to the students.



YIMS has sick room facility in all hostels and special attention is given to the sick. Entry to the sick room is restricted for other inmates.



Blood donation by Yuvakshetra students

Those who need medical assistance according to other systems of medicine are free to have such consultation and treatment – for which facilities are available nearby. Transportation facilities are offered free for such medical consultations for the students. Counselling facilities and Individual Mentoring facilities are also available for every student in YIMS.

Blood Donation by YIMS students: Many students of YIMS are voluntary blood donors, registered with the Blood Donors' Forum. Apart from that 106 students gave blood donation in the camp conducted during 2019-20.

Sports & Games facilities:

Yuvakshetra being a new college, the campus is gradually getting noticed as an institution where the talents of the students in sports and games would be nurtured properly. It has already good sports infrastructure for several of the items of competition which Keralite youth generally aspire to get drilled.

Available Outdoor Sports Facilities:

Sl. No.	Description	Number
1	Basket Ball Court	2
2	Volley Ball Court	1
3	Multipurpose Ground (Football, cricket, and Tracks)	1

Available Indoor Sports Facilities:

Sl. No.	Description	Number
1	Badminton	2
2	Table Tennis	1
3	Carrom Board	2
4	Chess	5
5	Gymnasium	1

Notable Achievements by YIMS students during the include:

- 20 students achieved medals from *C Zone, Kozhikode District Athletic championship*, Reliance Foundation athletic meet, Rajagiri Fest etc.
- 45 Students achieved first three position in various competitions held in *A Zone and Interzone* (Calicut University).
- *Rajagiri Fest – Basket Ball*
 - Sebin Sunny, Jerin Joseph, Bilmin Biju, Sreerag, Joseph Manual
- *Reliance Foundation Athletic Meet- Javelin Throw*
 - Sneha
- *63 Kozhikode athletic championship - Disc Throw & Hammer Throw*
 - Daniel Antony



Students at YIMS look at Sports for Health through various options throughout the year



Winning teams receive accolades from their teachers

The green surroundings and better sports infrastructure, as well as generous support and encouragement from the teachers push the students into healthy competitions with students in their own age group in institutions within Kerala and nationally. There are facilities for practicing yoga, pranayama, jogging, gymnastics.



Court under high roof



Volley Ball soaring high for building Team Spirit



YIMS Students Health Club and Gymnasium

Observations

The Institute has developed sports activities under all major items of intercollegiate competitions, as well as for the development of the body and mind of the youth. Teams have been formed and they are participating in competitions within the University, and even outside the State. During the year 2019-20 also YIMS had notable achievements in individual and team competitions.

On the whole, the campus offers healthy environment for students to learn, and for recreation, as well as for pastimes that will signal the potential for growing greener.

2.4.4. Environmental Quality Overview

The environmental quality of the campus of Yuvakshetra Institute in Palakkad, Kerala, is unique in that the natural environment is maintained well when compared to many other colleges in the region. The Principal, members of teaching staff, students, and the Parent Teacher Association, as well as the management are very much enthusiastic in conserving the nature, in moderating consumption, and in appropriately reusing and recycling materials wherever possible.

1. The college has from its beginning been very frugal in using electricity, and all the natural resources. The per capita values are very moderate.
2. The same concept of 'conservation of resources' has been followed in the case of water use as well. Available ground water sources are exploited at a sustainable level and purchase of water from municipal source is not resorted to. Rainwater harvesting is done enthusiastically. Opportunities to enhance these positives do exist and is currently practiced and strongly deployed.
3. The 2018 'Great Floods of Kerala, and landslides, and excess rains of 2019 did not inconvenience the campus; instead, it could help those who were affected in multifarious ways utilizing the youth power in the campus and available resources of YIMS.
4. All major environment and conservation-oriented national and UN days are observed with programs and interaction with experts from outside the locality.

Right from the inception of YIMS, the students are encouraged to identify themselves as protectors of environment, through the following activities:

1. Green Fan Nature Club and Club Green Guardians

A club of Nature's Fans among the students organises a number of green projects and awareness programmes in the campus as well as in outreach work, since 2015. Major activities are planting of useful and value-adding trees, organic farming, farm visits, bio diversity training programmes, visit to Silent Valley National Park, Awareness of students about nature and promoting the Institute green protocol.

Since 2018, for more in-depth interaction with environmentalists and planners, the Club Green Guardians is established in association with the Nature's Green Guardians Foundation. Training programmes and greening programmes are strengthened under this student nature club.

2. *Ente Maram* (My Tree) Project

The students of UG and PG programs are entrusted with the task of protection of trees and plants in the YIMS campus, starting from the date of admission till they pass out. Under this program, the students engage in watering and manuring the trees and plants as well. As providing tree guards during the early stage of nurturing trees.



Ente Maram Program

3. Rain Water harvesting

The Institute has cared for having extensive Rain Water Harvesting system in the campus. The target is collection of water around 1 million Litre. The students are involved in the collection and management. There is an injection re-charging system that will help in maintaining the ground water table high.

4. Organic Farming

In the campus 4 acres of land is exclusively for Organic Farming. A variety of vegetables, fruits, and even green grass for the cattle are cultivated here. There is a dairy farm which has the famous breed of cows called “Vechur Cow”. Students are encouraged to associate with these activities and care for the environment in totality. In 2019-‘20 Green Fan Nature Club took the lead in conducting the ‘Grow bag Organic Farm’. The major crops cultivated are Ginger, Chilly, Ladies Finger (Okra), Cabbage, Cauliflower, and Beans. ‘Kara Nel krishi’ or ‘paddy on land’ is another star product.

5. Waste Management

YIMS campus is very particular in segregating all the waste materials in four categories and collecting them in separate bins for proper disposal:

- i. Food waste
- ii. Plastic
- iii. Glass materials
- iv. Hazardous

6. Biogas Plants

Food waste, cow dung, and other recyclable waste materials are converted to energy (methane gas) in two Biogas plants (3 m³ & 15 m³) and the gas is used for cooking (partially). Students learn such practices for transferring to their families and others [See also Audit on Renewable energy use].

7. Energy Conservation Programmes

Students familiarise themselves with these technologies, which are the stepping stones to becoming an eco-positive campus:

- i. *Solar Power and Solar Water heater* : Solar Light Energy for electricity, and solar heat for water heating is in YIMS campus.
- ii. *Steam Cooking*: Hostel uses this technology for speedy bulk cooking and for saving heavily on fuel cost.
- iii. *Smokeless Oven*: High-efficient and pollution free firewood *chulahs* are used for saving on firewood and making the kitchen, smoke and dirt free.
- iv. *LED Lights*: College is extensively using LED lighting devices to save energy and money, as well as for eliminating the 'end of life' pollution.
- v. *Energy Auditing*: Auditing of energy for making energy services of least cost, carbon free, and resource conserving is a model worth emulating by other colleges.



World Environment Day: Grow bag cultured plants for outreach

8. Scientific Water Treatment Plant (SWTP)

Water Treatment Plant of YIMS treats grey and waste water in the Campus with a capacity of 1 lakh litre per day to save large volume of water being discarded. Treated water is used for watering the Garden and for Organic Farming.

9. Beautification of Campus Corridor

In front of the College Campus, the avenue trees on both sides are planted, maintained and nurtured by the students and staff.

10. Bamboo Garden

The rare and lovely Bamboo (Thyrostatic Oliveri/Korna) garden in the Campus is a unique attraction. It was planted in 1942 by Mr. Abdul Mouji, who brought the saplings from Myanmar, now maintained with the help of staff and students.



Nature Clubs and Nature Nurture
Getting down to work around YIMS



2.5. Audit on Societal Commitment, Outreach & Promoting Green

The students in colleges, especially undergoing degree level classes should be alert on problems arising in the society, those which adversely affect our immediate environment, and also learn to chalk out programmes and projects for solving the problems through the sustainable development route. In almost every country, activities related to economic development is found to be contributing to large scale decline in species diversity. Experts point out that the very survival of our planet Earth is endangered.

A committee similar to IPCC on Climate Change, under the name “Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services” (IPBES) had its 7th session in Paris in 2018 with 132 nations attending, and the findings of it in its 1500-page report is more frightening than the IPCC Reports and its dire warnings.

IPBES studied 15,000 research papers and government reports that have come out during the past 50 years on the biodiversity status and has concluded that the global biomass with mammals have declined 82% over this period (rapid decline from 1970). Further, the natural ecosystems have declined by 47%, and the species threatened with extinction have reached 25%. 145 experts and 310 content authors from 50 countries had a 3-years’ study on these aspects before coming out with this report.

In India, we have always believed in bringing out the best from our college students through social service volunteering, such as thro’ National Service Scheme (NSS) units. The IPBES Report (2018) actually underlines the focus of UGC and NAAC on assessing how best the higher education institutions are in moulding the adolescent population into planners and leaders who would reverse the trend of the suicidal slide towards destruction of our living planet in many countries.

At YIMS, such commitments are met by the students through: 1) Activities under Nature Clubs, 2) by maintaining the well-designed campus in harmony with the natural environment through Green Fan club, Club Green Guardians and the like.

School Outreach and Community Outreach programmes are important elements of YIMS eco-initiatives. Students are considered as powerful antennas to sense public needs and opinions on topics of this kind, and thus activities are spread to the community through assisting the school children towards acceptance of green living. Some activities are taken to schools in the locality, some others to the rural communities.



Tree planting demo to school children



Landscaping in progress in own campus

2.5.1. Expression of Societal Commitment

Yuvakshetra Institute of Management Studies, as any other college in and around Palakkad, has been doing a lot of social work, a major one being titled "Sneha veedu" or house of love – of building homes intended for interaction with deprived. Community interaction programmes are planned department-wise also. Such activities by students are coordinated by one or more members of the teaching staff.



‘Sneha Veedu’

Activities

Activities include: Protection of the Elderly, Post-flood care of habitats and habitants, Waste Management Training, Environment related activities, Tree planting, etc.

The activities of 2019-'20 covered the following, but not limited to these only:

- I. Support to the schools in the locality
- II. Annual Blood Donation Camp; Blood Testing Camp
- III. Energy Conservation Day
- IV. Free Meal distribution
- V. Green Fan Nature Club; Green Guardians Club
- VI. Attappady Tribal Village Camp; Charity drive, Orphanage visit
- VII. Tree Planting drive
- VIII. Teachers' Day; Republic Day; Women's Day; Gandhi Jayanthi
- IX. World Environment Day
- X. Zero Waste Campus, Plastic Waste Prevention Campaign

In connection with the World Environment day on 5th June 2019, hundreds of tree saplings were distributed exclusively to the students for planting in any land they had access to. The day was also observed by holding a special cleaning drive, which covered the surrounding roads too.

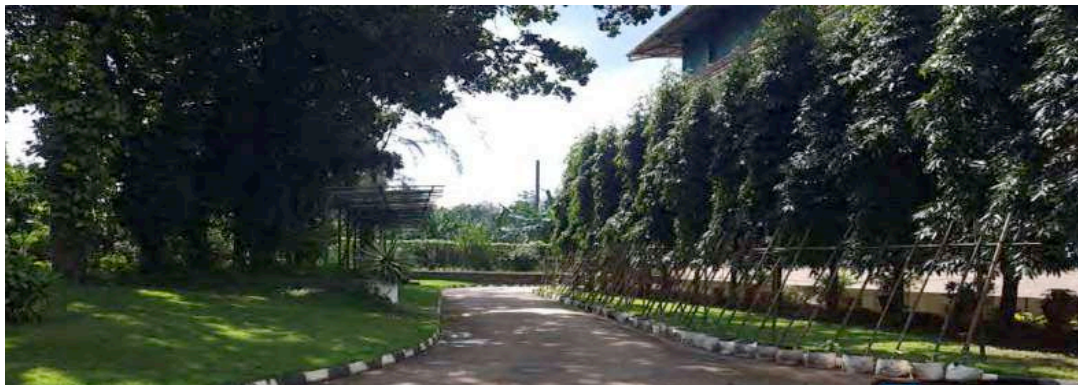
Support to Pudur HS School in Attappadi

Under its Institutional Social Responsibility, and as a part of social outreach, and working on humanitarian issues, during the year under audit, on 26 Sept 2019, Yuvakshetra signed an MOU with the Govt. Tribal Higher Secondary School at Pudur, Attappady, as a part of adopting the school, and concentrating the Institute's humanitarian and educational activities in this socio-economically disadvantaged area. As per the MOU, YIMS will help in improving the academic performance of the tribal students, and work together to enhance the profile of the Tribal School – known for its deprivation – through successive interaction by students and staff of Yuvakshetra. During the year, 5 visits were conducted and the Pudur students and parents are overjoyed at this rare opportunity in those children's educational attainments.



2.5.3. Promoting Green Strategies

For promoting Green strategies, the management team of YIMS follows the initial vision of Yuvakshetra, which states “form better citizens, better job candidates, lovers of nature, and human beings of values”. Campus is meant, and maintained as a Green Campus and Clean campus. The actors are the “green fans” and “green guardians” among the students.



Suggestion: Since there is good vegetation and tree cover in the campuses, it may be worthwhile to develop a Biodiversity Park, enriched by Miyawaki model fast afforestation techniques, and also by selectively introducing rare native species of medicinal and other trees.

3. Audit on Accessibility and Gender Justice

3.1. Built Environment and Accessibility Audit

Yuvakshetra Institute of Management Studies, Mundur, Palakkad, has during the Audit Year (2019-'20), a student strength of 1,851. Total campus strength including staff is 1,938.

Accessibility: There are four differently-abled students (3 male and 1 female) studying during the audit year in the college. Students with physical, mental or visual

Table 3.1.1: Accessibility check points for YIMS, Mundur

No.	Accessibility Check Point	Data
1	How many gates? How many are accessible/wheelchair entry type?	2 (Two) Wheel Chair entry type
2	Any tactile marked lines for visually impaired persons?	Yes. Work in progress
3	Foot paths with wheel Chair marks? Foot path with tactile lines?	Newly re-doing
4	Total no. of buildings? Multi-storey buildings?	Class rooms and common – 3 Three storeyed
5	Building – 1, 2 & 3	
A	Ramps with wheel chair accessibility	Ramps provided
B	Tactile marking	Work Progressing
C	Accessible Toilets @ Floor – Ground	Yes
D	Accessible Ladies Toilet, Floor	Yes
E	Accessible furniture (on demand)	Yes
F	Signage	Yes
G	Accessible parking	Yes
6	Accessible Library	
A	Computers with screen readers	Yes
B	Accessible Books	<i>Bookshare</i> membership sought
C	Print to Text conversion facility	No
D	Trained Staff (on Accessibility)	No
7a	Location of Information Office	Decided to set up according to the advice from accessibility expert, MD of Chakshumathi Trust.
7b	Location of Documentation Centre	

challenges have very special considerations in the campus. These are available for parents and visitors also, in case they need help during their visits. The College has already requested NGGFN to get the help of Chakshumathi charitable Trust to have a special accessibility audit by accessibility experts, once the COVID protocols are withdrawn and to advice the management on the needed modifications in this respect. The list of *divyangjans* is at Table 3.1.2 (Names withheld).

YIMS with humanitarian considerations as its core values is understood to be envisioning expansion of such facilities required by *Divyangjan* stakeholders in the future and the work has commenced. A green campus is conducive to the *divyangjans* as a safe locale for peaceful and stress-free learning.

No.	Type of DP	No.	Gender	Age	Course studying
1	Deafness 100%	1	F	19	B Com (Finance)
2	Orthopaedic 60%	1	M	19	B Com (CA)
3	Ophthalmic 80%	1	M	19	BCA (Comp. Sc.)
4	Learning Disorder	1	M	19	Hotel Management

Table 3.1.2: Differently-abled students studying in YIMS, Mundur in 2019- '20

3.2. Rest Rooms Accessibility Audit



Toilets for Differently abled are easily located

YIMS campus has provided adequate consideration in location of accessible toilets for the differently abled with all the requirements. Apart from this, in every building, gentle ramps are provided to allow for wheel chair entry too. There are paved passages between the buildings.

Institute is also getting the ramps for independent self-navigated wheel chair entry, any more additions required, and wheeling route to those areas in an unobstructed manner, reviewed currently by accessibility experts.

Electric lifts are also provided in the buildings with multiple floors.



Wheel Chair movements are along wide corridors
suitable for keeping pace with others

3.3. Audit on Signage and Guidance for *Divyangjan*

Differently-able persons can have the feeling of inclusiveness only if they are self-guided through easily understandable signage, and guidance for locating and reaching the various venues, rest rooms, dining facilities, office and the common service areas. YIMS has planned proper signage and guidance, including floor signs. Further, the D-A assistance when needed, starts from the point of entry through the security guards, and later through the Information Office, which is very close to the main gate. The Green Clubs volunteers will be trained in 'Mobility' practices – how differently abled persons are to be assisted, guided, or briefed. This will be extended to students joining environment related clubs and groups, as well as to all newly joining members of the faculty too. The College is advised by the Audit to follow the international non-linguistic signs to be used.

Observations:

1. Wherever physical support is required, as well as equipment such as special wheelchairs, easy release door locks and latches, etc. are to be used, for having unaided free movement, the toilets, ramps, lifts etc. follow accessibility norms.
2. It is also ensured that there are no door or window leaves opening outward into the entry way of access, to avoid obstructing the way.

Suggestions:

1. A special workshop may be arranged during the next available opportunity on how others can contribute to an 'inclusive environment' within a higher education institution. This could be educative on "Accessibility requirements" to the management, entire staff, and all students, and organized with an accessibility specialist present.
2. When accessibility rendered spots are not used regularly, sometimes cleaning staff and casual workers employed for small tasks may find it useful to make such open areas for stacking the sparingly used tools and furniture. The Estates Officer of the Institute should inspect such spots in the campus with at least weekly regularity, and sign inspection slips/tags with compliance status recorded promptly.
3. Like having fire safety training (even when there has been no history of fire hazards in the past), accessibility training to all levels of employees in administration should be imparted every year to make the campus fully "*divyangjan*-proof".

3.4. Audit on Introduction of Assistive Technologies

YIMS has planned to have accessible software for the main library, and appropriate screen readers for the computers of *divyangjans*. However, it is decided to have the 'book share' membership meant for the visually challenged readers, and offer these facilities for such needy students or youth or others who are 'print disabled'. This will keep the college ready with assistive technologies, duly updated and glitch free.



YIMS students make every guest comfortable in their company



Library Entry with E-Identification at YIMS

3.5. Focus on Environment in Outreach & Social Service

For healthy living, environment plays an important role. Students are made to understand that nature provides all living beings with air, food, etc. It is correctly said that the difference between animals and humans is that “animals change themselves for the environment, but humans change the environment for themselves”. All outreach programmes of YIMS are heavily weighted towards environment and sustainability related observances, interactions, and learning opportunities. The Institute has organised outreach programmes in Attappady, the tribal land in the district, where eco-restoration is urgently needed. A camp in Attappady was organised this year for a very meaningful interaction with the community there. This adoption of working together for their welfare will be continued in the coming years as well.

3.6. Audit on Universal Information and Enquiry Systems

The present arrangement of first interception for any visitor, parent or student at the YIMS campus is the Reception & the Information Desk/Centre, which can be directly accessed. With the present-day affinity to social media, the College has transferred several details required by prospective students and employees to the online platform and social media. However, updating these data and instructions is an ongoing task with the IT Department. There is full time staff to attend to the enquiries from visitors, parents and the public.



Diligent YIMS Reception



ICT Enabled Classrooms

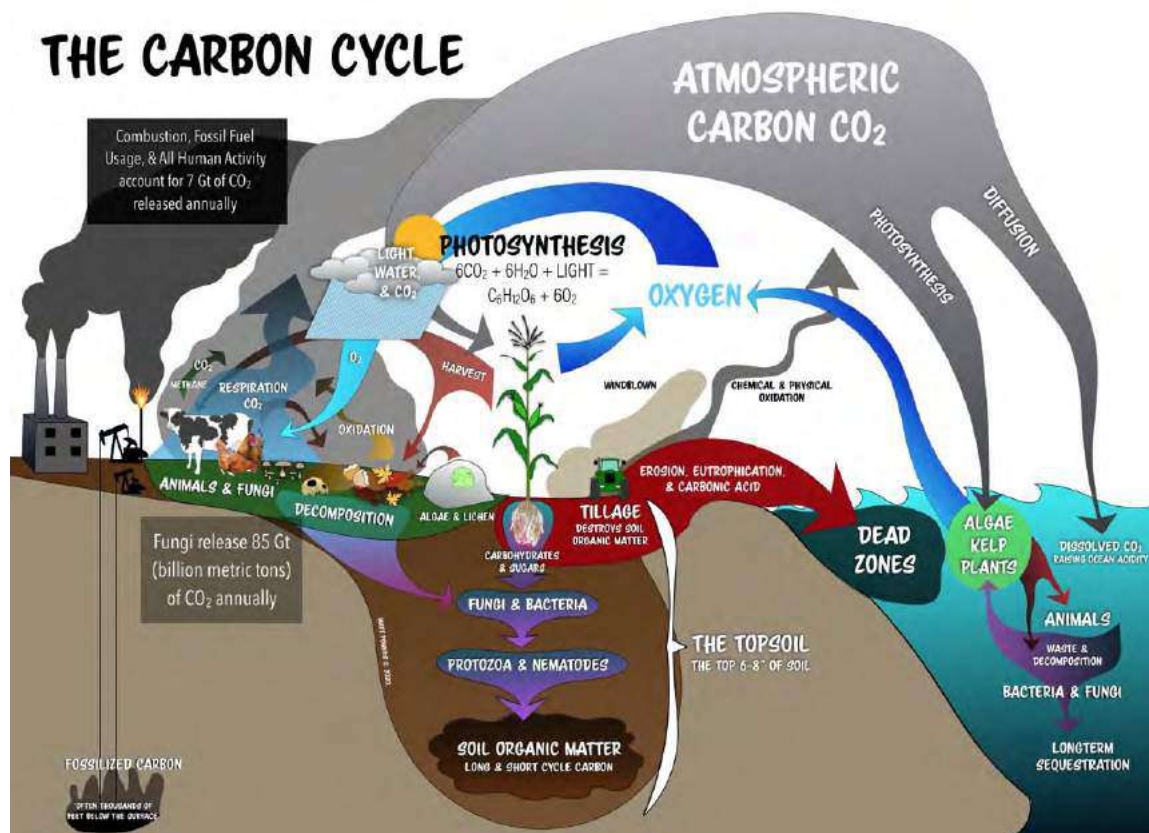


Enter a College - Cool, Clean & Shaded by Trees

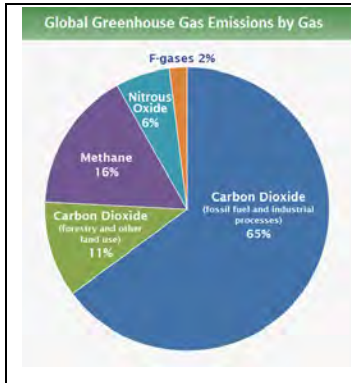
4. Carbon Footprint

Carbon is an essential element, and we cannot go without it. Yet, the whole world is now bent upon decarbonising. Why so? The very essence of green auditing is to find answers to it - from our own environment about our own lifestyles.

Carbon Footprint is a measure of the total greenhouse gases emissions released into the atmosphere. This may result from either individual, organizational, or community based human activities. An acceptable definition is: *Carbon Footprint is the total amount of greenhouse gases produced directly and indirectly for supporting human activities, usually expressed in equivalent tons of Carbon dioxide (CO₂).*



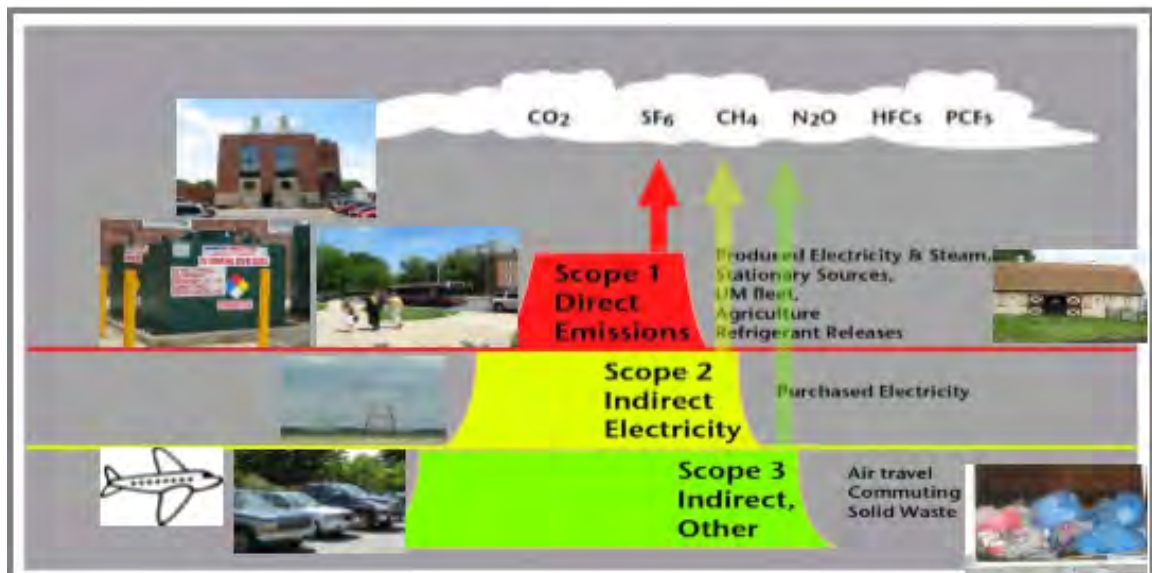
The diagram above is due to Matt Powers, a famous author and powerful teacher. Matt says: “This is the carbon cycle, including oxygen and photosynthesis. Windmills or solar panels cannot solve the ‘brokenness’ of these loops. We need joint action to heal our planet, and keep it liveable for humans.” Matt continues in a recently published book titled ‘Regenerative Soils’: “We come to understand ‘*deep down in our hearts and guts*’ that we are part of nature. Not above it, not ruling over it. Part of it.” “Our earth operates in cycles and feedback loops. We need to slow down, observe and make wise decisions about energy, storage, and creating surpluses.” “We are dealing with an Oxygen problem as much as a stagnating Carbon cycle”.



The most common greenhouse gases (GHGs) in our environment are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the least harmful, but it is the most prominent GHG according to Intergovernmental Panel on Climate Change (IPCC), as it comprises 76% or more of all greenhouse gases, globally. The release of CO₂ into the earth's environment through human activities is commonly known as carbon emissions and its total impact is called 'carbon footprint' [Source: IPCC 2014].

The ability of earth to meet the excessive demands on resources of its population has been increasing day by day. This brings about adverse ecological impacts, which can be quantified as 'Ecological Footprints'. But, its computation is very complex and time consuming. The concept of 'Carbon Footprint' as a part of the 'Ecological Footprint' was put forward in 1990 by William E. Rees and Mathis Wackernagel.

Carbon Footprint (CF) by itself is not the complete measure of the damage to environment. The advantage of Carbon footprint approach is that it measures mainly the emissions of gases that cause climate change, and therefore can be more accurately assessed than the ecological footprint.



How emissions (Carbon Footprints) arise
Source: University of Maryland Study Report

There are several popular software tools called 'CF calculator' for use by interested individuals and institutions for estimating the CF. Figures obtained from such tools are not very exact, but are good enough to have a comparison, or a picture of how

large it is. This is in reality, more than sufficient to suggest how deep should the remedy be for the damages inflicted.

If the purpose of knowing the carbon footprint is only to create awareness on the related environmental problems, such software available on the internet can be handy. But, to plan remedial actions, a little more detailed, item-wise assessment is required. The 'carbon footprint' assessment, as an idea, was popularized worldwide by British Petroleum (BP) company under one of their campaigns only in 2005.

While the whole world believes now that CF is a simpler way than the EF to assess and look at the extent of damages to the environment that can happen, or is happening, Christopher Weber of Carnegie Mellon University is of opinion that the calculation of carbon footprints for many commonly used products is in effect a "complex job".

Take for example, the smart phones that being used in almost all countries. The data required for calculating the carbon footprint of a smart phone will require the CF figures connected with its: production, shipment, technology used, and how long it is used every day, as well as on what all functions of the device are actually being utilized. Therefore, to accurately calculate the carbon footprint of a smart phone, we require too much time, energy, and resources. It is not worth the trouble and time to go for such detailed study – just to know the CF.

To calculate the CF of an institution, industry, product, event, or service, we should first appreciate the fact that it is a complex task, and the efforts to obtain the same should be commensurate with what we want to do with that result.

Life Cycle Assessment

One such tool for CF assessment, now considered meaningful, is the LCA (Life Cycle Assessment) approach, which has as its base "the entity's impact during its whole life period". The ISO (The International Organization for Standardization) has a standard for this in ISO 14040:2006 (with the framework for conducting an LCA study). Another method is through the Greenhouse Gas (GHG) Protocol and the set of standards it has for tracking GHG emissions.

The Carbon Footprint calculation of a college like Yuvakshetra Institute of Management Studies is to know whether or not the college activities are making excessive demands on the ecology of the campus and its surroundings, and then to attempt 'remediation' through possible 'reductions in consumption' as well as 'expansion of carbon sinks' such as the biodiversity. The Institute is at liberty to choose whether or not to go for remediation to the exact required level, or aim at 'excess' remediation even, if that doesn't cost heavily. But, doing it either way and feeling relaxed that one has remedied it to the satisfactory level, is possible only after assessing the damages it is inflicting on the immediate environment in a practical manner. We should not be using a 'cannon' for killing a fly.

The important stakeholders like students, staff, and the management can explore all means of reducing the ‘consumption’ that may result in higher emissions, increase the use of low-emission energy forms, employ the 4R or ‘reduce-reuse-recycle-refuse’ strategy for waste management, and expand the GHG absorbing and sequestering technologies and greenery – to achieve a little more than what is demanded as per the findings. That will help the campus to grow ‘Greener’ than a ‘Green Campus’.

The team assessing the CF should know that very tedious procedures involving continuous monitoring throughout the year to obtain a precise measure of the damages to the environment is not warranted. This green audit by NGGF_n, therefore, is employing only empirical measures that quantify the ecological footprint to a reasonable accuracy, and suggest simple remediation measures within the reach of the institution, that would neutralise the impacts completely or to a substantial measure. Also, looks at the possibility of taking the positives present within reach, to levels a little higher than what is required. As the major contributors of damaging impacts are the higher number of stakeholders, their nature of consumption, and the transportation modes requiring fossil fuels, the approach for this Green Audit is to use empirical constants on the quantities arrived at for the major contributors. Remediation is to depend on expanding the available positive factors.

Creating awareness to the entire campus community on these and getting them to contribute voluntarily will be an effortless change in lifestyle, on which the institution as a whole can feel contented and be proud of.

Data Obtained from Component Audits

Component Audits in Chapters 1 to 3 are the base elements for this Chapter.

These component audit findings give us the following data:

1. The area covering the higher education institution/college
2. The total number of persons (students, teachers, other members of staff, visitors including parents and guests) involved in normal functioning
3. The number of people resident in the campus
4. The type and number of vehicles normally used for transportation
5. The forms and quantity of energy used in the campus and their origin
6. The amount of energy, water, food materials, stationeries etc. consumed
7. The amount of wastes including food waste and e-wastes
8. Amenities provided in the campus and their contribution to emissions

On the positive side:

1. The biodiversity in the campus and their potential to remediate emissions
2. The ‘carbon positive’ (renewable) energy generation within the campus
3. The amount of recycling/reuse of resources
4. The type of waste management resorted to
5. Water harvesting, water management, and waste reduction approaches

Assumptions:

The following assumptions based on well researched and globally accepted empirical procedures, are used for assessing the carbon footprint as well as for determining the remediation measures:

1. The coefficients taken are as per IPCC, International Energy Agency, India's BEE, or United Nations' FAO [in the case of food related ones] as well as from India specific studies by Research Institutions.
2. The carbon emitted by a car while consuming 1 litre of petrol is taken as 2.3 kg CO₂, and of diesel as 2.68 kg CO₂.
3. Average distance covered by a car per litre of petrol in cities at 10 km.
4. The 'km run' by a bus as 4 km/L of diesel in towns and cities.
5. For the 'per capita carbon footprint' calculation, a bus is assumed to carry 50 passengers with the kilometrage as at assumption 4.
6. For an autorickshaw, the fuel need is assumed at 1 litre of fuel capable of getting 16 km of running on petrol.
7. Two wheelers are expected to get 50 km/litre on Petrol.
8. Carbon absorption capacity of one full-grown tree as 6.8 kg CO₂.
9. Carbon absorption capacity of semi-grown trees as 50% of that of full grown.
10. Carbon absorption of bush plants as varying widely according to the species. Certain bushes absorb as high as 49,000 gCO₂ per plant, whereas some others absorb as low as 150 g CO₂ per plant. As a general guide, the per-plant carbon absorption is assumed as 200 g CO₂.
11. The carbon absorption capacity of a 10-sq. ft. area of lawn is 1 g CO₂ per day.
12. A person uses about 550 litre of pure oxygen/day (Arbor Day Foundation).
13. Paper used is assumed to be of density 80 gsm (average).
14. Firewood is assumed to have not more than 10-20% moisture before burning.
15. Contribution of events & festivals in the campus to CF is based on the no. of events, participating pax and extent of festivities with high emission levels.

Carbon Footprint Assessment Required:

The following activity related carbon footprints are to be assessed in Table – 4.1 based on data available from component audits in the previous chapters.

1. Carbon Footprint due to energy use
 - a) Electricity use including for water pumping, water purification and waste water treatment.
 - b) Use of Fossil fuels like Diesel, Petrol, LPG etc.
 - c) Use of Firewood.
2. Carbon Footprint due to production of Wastes
 - a) Food Waste.
 - b) Paper use & Paper waste.
 - c) Waste water.
 - d) Other wastes (e-wastes, hazardous wastes etc., if any).

-
3. Carbon Footprint due to Transportation needs
 - a) Day scholars commuting between home and college.
 - b) Staff & Students – weekly/quarterly travel to home and back.
 - c) Use of Cars & Taxis by Staff, Parents, Management and others.
 - d) Autorickshaws (3-wheelers) hired.
 - e) Bikes and Scooters (2 wheelers) – Students and Staff.
 4. Carbon Foot print due to Events and Festivals within the campus

Remediation Available and/or Created:

1. Due to increased use of renewable energy (RE)
 - a) Solar PV electricity
 - b) Solar Hot Water
 - c) Wind energy
 - d) Biogas
 - e) Micro Hydro Power & Other
2. Due to energy efficiency improvement
 - a) Replacement of old tube lights
 - b) Replacement of incandescent bulbs & CFLs
 - c) Replacement of Fans/Pump Motors etc.
 - d) Up-grading of UPS network
 - e) Phantom load reduction
 - f) Other means
3. Due to waste reduction, recycling and waste to energy projects
 - a) Waste Reduction
 - b) Recycling
 - c) Waste to Energy
4. Due to innovations in transportation
 - a) Sharing of Vehicles
 - b) Adopting Means of low CF travel options
 - c) Others like introduction of electric vehicles/Solar autos, boats etc.
5. Due to biologic means
 - a) Conservation of existing greenery
 - b) Tree plantation (new) & Biodiversity conservation
 - c) Gardening, including lawns and hedges
6. Due to 'Outreach' for Promotion of Green Living

The CF calculated by the 5se considerations (T CO₂ eqvt.) has to be brought into a Balance Sheet with remediation available and see how far it will compensate for the damages. The uncompensated part will indicate the Carbon Footprint.

Carbon Footprint Calculation for Yuvakshetra Institute, Palakkad for 2019-'20

Sl. No:	Source	Rate	Quantity x Days/year	Total Quantity	Annual Eqvt. CO ₂
1.a	Electricity use	0.82 kgCO ₂ /kWh (India in 2018)	14.91 MWh/m x 12	179.1 MWh	146.9 T CO ₂
1.b	Fossil fuel use	2.68 kgCO ₂ eq/kg 2.30 kgCO ₂ eq/kg	LPG (240x19x12 @1.90)	54.7 T	103.9 T CO ₂
1.c	Firewood	1.8 kgCO ₂ eq/kg	3.2+1.4	4.6 T	8.3 T CO ₂
2.a	Food waste	1.9 kgCO ₂ eq/kg	19.0 kg x 200*	3.8 T	2.8 T CO ₂
2.b	Paper waste	1.725 kgCO ₂ eq/kg	10.5 kg x 200	2.1 T	3.6 T CO ₂
2.c	Water waste	0.298 kgCO ₂ eq/kL	Nil	--	--
2.d	Plastic/Other	6.0 kgCO ₂ eq/kg	2.0 kg x 200	400 kg	2.4 T CO ₂
3.a	Bus/Train: Staff, Students daily travel	2.68 kgCO ₂ eq/L	589x30x200/200 College vehicles	17.7 kL 37.1 kL	47.4 T CO ₂ 99.4 T CO ₂
3.b	Student weekly trips	2.68 kgCO ₂ eq/L	--	LS	10.0 T CO ₂
3.c	Cars, Taxis	2.30 kgCO ₂ eq/L	{7x45}x200/10	6.3 kL	14.5 T CO ₂
3.d	Auto rickshaws	2.30 kgCO ₂ eq/L	--	LS	1.0 T CO ₂
3.e	Two wheelers	2.30 kgCO ₂ eq/L	242x18x200/50	17.4 kL	40.1 T CO ₂
4	Events, Festivals	Approx.	1000x3x1.2	LS	4.4 T CO ₂
5	Construction	Lump sum	--	Nil	0.0 T CO ₂
	Total				484.7 TCO₂

*No. of activity days in 2019-20: 200 days

Table 4.1: Calculation of Carbon Footprint Source-wise

Remediation for Carbon Footprint – Yuvakshetra, Palakkad for 2019 – '20

Sl. No:	Source	Rate	Quantity x Days/year	Total Quantity	Annual Eqvt. Saved CO ₂
1	1.a. Solar PV electricity 1.b. Solar Hot Water 1.c. Wind energy 1.d. Biogas 1.e. Micro Hydro Power, other	0.82 kgCO ₂ /kWh 1.34 kgCO ₂ /kg --	425 kWhx365 300 LPD Nil 365x18x1 None	155.1 MWh Eqvt. -- 6.6 --	127.2 T CO ₂ 18.0 T CO ₂ -- 9.0 T CO ₂ --
2	2.a. LED tube lights 2.b. Replacing bulbs & CFLs 2.c. Replacing Fans, Motors 2.d. UPS Upgrading 2.e. Reduce Phantom load	0.82	350x.036x1200 None None None	15.2 -- -- -- --	12.5 T CO ₂ -- -- -- --
3	3.a. Waste Reduction 3.b. Recycling 3.c. Waste to Energy	0.26 kgCO ₂ /kL	44.0 kL/day Limited No other	13,200 kL -- --	3.4 T CO ₂ -- --
4	4.a. Sharing of vehicles 4.b. Low footprint options 4.c. Electric/Solar vehicles		Limited Yes, small Nil	-- -- --	-- -- --
5	5.a. Greenery forest retained 5.b. Tree planting, Biodiversity 5.c. Gardens, Lawns etc. (per acre)	Nil 22 kg/yr 2200 kg	Per acre/yr. LS	-- As worked ou 1.0 acre	-- 9.4 T CO ₂ 2.2 T CO ₂
6	6.Walking & bicycle use (100)	2.68 kg/L Avoided	100x200/50x4	0.1 T	0.3 T CO ₂
7	7. Outreach activities	22 kg/yr	600 trees	50%	6.0 T CO ₂
	Total				188.0 TCO₂

Table 4.2: Remediation for Carbon Footprints: available/created

The International Organization for Standardization (ISO) also provides some general standards for

- o Greenhouse gas emissions at Organization level (ISO 14064 - 1) and
- o Greenhouse gas emissions at project level (ISO 14064 - 2)
- o Specifications to validate and verify relevant accountings are documented in (ISO 14064 - 3)

**Yuvakshetra Institute for Management Studies, Palakkad
Carbon Footprint Analysis and Evaluation**

The actual per capita carbon footprint for the Yuvakshetra Institute for Management Studies, Palakkad, Kerala, is 243 kg (0.243 Ton) of CO₂ equivalent [484.7 Ton/1988* persons] (See Table 4.1), and a part of it (39% of it) is compensated by the judicious choice of remedial routes adopted by the college. The net carbon footprint during 2019-'20 is thus [484.7 – 188.0 = 296.7 T CO₂ eq.]. (* Average number of visitors @ 50 added)

The effective CF is 296.7/1988* or 0.149 T or 149 kg of CO₂ per capita [2019-20]

According to the Economic Survey of Govt. of India, the per capita emission for an Indian is 1.9 Ton CO₂ eq. per annum in 2020. It was projected to reach 2.0 – 2.5 T of CO₂ by 2020, and to 3.0 – 3.5 T of CO₂ by 2030 as per evaluation in 2010. In the year 2018, the actual assessed PC CF for India is 1.94 T. India's efforts for greening has luckily brought about a 5% reduction from the expected CF level, nationally.

For the year 2019-'20, for Yuvakshetra Institute for Management Studies, Palakkad, Kerala, the Carbon Footprint per capita at 0.149 T CO₂ equivalent, is modest compared to other colleges in the State. This is achieved due to the vigorous Green initiatives of its management, staff and students as the main stakeholders of the college.

The whole CF due to electricity use (146.9 MWh) is substantially wiped out by having 95 kW solar PV in two roof top installations (by feeding the power to the grid) and also by insisting on buying energy efficiency equipment and devices. The installed energy and water saving systems will go a long way in educating the students, staff, and their families many valuable lessons in sustainable living, and for giving resilient responses to the collapsing climate scenario.

The Yuvakshetra Institute of Management studies in Mundur, Palakkad, Kerala is undoubtedly a green campus, having brought it to a 'low carbon footprint' institution, with high potential to reach higher shades of GREEN within a short period.

CF Balance

The remediation gap between the assessed footprint and available remediation is 296.7 Ton CO₂ eq. On a closer look, the major CF contributors are:

1. Transportation contributing: 212.4 T of CO₂
2. Use of Purchased Electricity: 146.9 T of CO₂
3. Use of Fossil fuels for other purposes (mainly cooking): 103.9 T of CO₂

Being a college with low use of personal vehicles like use of cars, scooters/bikes, and with also a limited number of students arrive walking, the number of bus users commuting daily is comparatively high. In the case of YIMS, the distance range happens to be much higher than an ordinary city college. The campus has a high greenery content and it is viable for further enrichment. Renewable energy development like solar roof top PV has made major positive difference.

5. Future Directions

The Internal Quality Assurance Cell of the educational institution can turn the observations and recommendations in this report into action points after an internal discussion according to the factors indicated as guidelines.

Strengths and Weaknesses:

- Human resources : Staff, students, PTA, public, NGOs
- Physical resources : Location, land, building, equipment
- Financial : Grants, project funding, fees, and other sources
- Activities and processes : Green Protocol, programs, services rendered
- Past experiences : Learning tools, Reputation of the institution

Opportunities and Threats:

- Future trends : What is in the horizon or what is expected shortly
- The economy : Own, Yuvakshetra Trust, local, national, or other
- Funding sources : Own, donors, governments, subsidies and incentives
- Demographics : Change of players – students + staff joining & leaving
- Physical environment : Sensitivities related to locality, public & political
- Legislation : Change in government policies, rules & regulations

Points for Consideration: The YIMS management should be given a strategic plan for making the campus greener than before, and simultaneously for creating awareness among the students on the need for a determined local effort to bring down all the negatively weighing factors. For this,

- Decide on the directions that will be most effective to proceed with
- Assess possibilities and limitations for the intended change
- Identify barriers that will limit the objectives
- Find out new solutions to the problems in sight
- Re-look at plans to navigate the students and staff to get the best results

As both the internal and external environments are liable to change from time to time, it is necessary to review the scenario again - just before implementing any project.

Future Directions and ‘Search for New Opportunities’ are indicated in the chapters covering the component audits. The main thrust appears to be:

1. To increase the remediation, invest more in roof top solar PV (with good returns too)
2. Conduct a more detailed energy audit, water audit, and transportation audit
3. Prepare a detailed bio-diversity register (both flora and fauna) for the campus
4. Attempt a *Miyawaki* model micro forest development jointly
5. Strengthen College Database. Keep all required data on a weekly or monthly basis entered in appropriate Registers/Computer Folders. Students can help in this.

SWOT Matrix for a Greener Yuvakshetra Campus, Ezhakkad, Mundur, Kerala

S	W
<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> ➤ The college community practices a Green Protocol and the newcomers are encouraged to follow it ➤ Students and Staff are helping in having a litter free campus ➤ Rain Water Harvesting, Waste reduction and conversion to useful energy etc. are in line with the community's aspirations ➤ The Green Fan Nature Club and Club Green Guardians are established, and active ➤ Links for outreach activities are very strong 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> ∞ 80% of the students are available only during working hours, limiting their contributions to greening ∞ Due to the wide variety of courses having different patterns of training during working hours, sensitization and awareness creation have to be repeated at least once in a year ∞ Life sciences courses including Biotechnology are not offered, and the Institution lacks an internal knowledge base to support
O	T
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> ❖ There is ample opportunity for expanding the use of renewable energy, for becoming a Net Zero or Carbon positive campus ❖ There is still scope for improving energy efficiency in the campus ❖ Additions to the rainwater harvesting set up and recharging facility after optimization studies can pay of as remarkable water management strategies ❖ Tree plantation with Biodiversity expansion as per Green Audit recommendation can be implanted with student support, as basic set up is one of the strongest in Kerala 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> ⚡ The majority of students remain in the campus only for 2 or 3 years and so, repeating the campaigns is a must to make the greening drive sustainable ⚡ Having a large number of daily commuting students from outlying areas is boosting the transportation carbon footprint ⚡ The increase in the types and quantum of e-wastes, for which safe disposal is yet not in sight, is a threat to be tackled locally ⚡ Climate change impacts in urban spaces tend towards reduction in potable water availability



Green Audit - Biodiversity

Compliance Statement for AY 2019 - '20

Yuvakshetra Institute of Management Studies, Mundur, Kerala

Overall Objective	Main Objectives	Compliance Status
Ensure that an effective biodiversity protection plan is followed in the campus with the maintenance of all plants and animals living in and around the campus, and expanding the same even to communities outside the campus in addition to working for capacity building to withstand Climate Change impacts.	<ol style="list-style-type: none">1. Ensure that there is a competent Biodiversity Expert from an external agency, who will provide guidance on Biodiversity and Resource conservation, and improve the ecology.2. Ensure that an Environment Protocol is adopted and followed by the entire campus community, adherence of which is reviewed, monitored, and targets reset annually.3. Ensure that frequent training and awareness programs are planned and carried out focusing on climate change resiliency.4. Ensure that every student and staff member commit to the lowering of carbon footprint of the institution through sustained greening measures.5. Ensure that Environment Audit is conducted annually, with participation of staff and students, and that recommendations are followed up.	<p>Ensured continuous guidance of experts from CED and NGGFm</p> <p>Ensured [Vide Page 13 of Green Audit Report for Green Protocol]</p> <p>Done Committed to continue</p> <p>Commitment Ensured</p> <p>Annual Green Audit commitment ensured</p>

Prof. V K Damodaran

Ex-UNEP Expert

For NGGFm Audit Team, date 30 June 2021



Green Audit – Environment Quality

Compliance Statement for AY 2019 - '20

Yuvakshetra Institute of Management Studies, Mundur, Kerala

Overall Objective	Main Objectives	Compliance Status
Ensure that an effective environmental protection plan is followed in the campus with the maintenance of highest level of air quality, and 3 R policy on waste management - focusing on mitigation, adaptation and capacity building for Climate Change impacts resiliency, which is periodically reviewed and got implemented by all stakeholders.	<ol style="list-style-type: none">1. Ensure that there is a competent Environment Expert from an external agency, who will provide guidance on Resource conservation, Waste management and Air and Water quality assurance.2. Ensure that an Environment Protocol is adopted and followed by the campus community, adherence of which is reviewed annually.3. Ensure that frequent training and awareness programs are chalked out and implemented, focusing on climate change resiliency, maintenance of air quality in the campus and students' living environment.4. Ensure that every student and member of staff commits to the lowering of carbon footprint of the institution from all facets of energy use, including for transportation and mobility needs.5. Ensure that Environment Audit is conducted annually, necessarily with involvement of staff and students, and action taken on all recommendations arising out of it.	<p>Ensured guidance from NGGFN - having international environment, transportation, and energy management experts</p> <p>Ensured. Green Protocol included in the Green Audit Report for the year]</p> <p>Ensured. Training given. Regular work experience also ensured.</p> <p>Commitment Ensured. [Elaborate infrastructure for environment quality assurance installed.</p> <p>Ensured. Environmental Audit conducted and actions initiated for the next year. [Vide GA Report Ch. 5, Page 85]</p>

Prof. V K Damodaran

Ex-UNEP Expert

For NGGFN Audit Team, date 30 June 2021



Nature's Green Guardians Foundation

Trivandrum 695 043 India

Biodiversity - Green Audit Certificate

Yuvakshetra Institute of Management Studies, Mundur, Palakkad, Kerala

For AY 2019 - '20

This Green Audit including evaluation of Biodiversity conservation has been conducted for Yuvakshetra Institute of Management Studies, Mundur, Palakkad, Kerala, in accordance with the International Standards for ISO 14000 family of standards set by ISO TC 207 and its sub-committees, Bureau of Energy Efficiency standards, and stipulations under the Energy Conservation Act 2003 of Government of India and other relevant mandates for promotion of sustainable living and education in a healthy environment.

In our opinion, the Institution has presented true and up-to-date data on the various aspects of working of this higher education institution before the audit team, and appropriate audit procedures have been completed for preparing this report. The assessments and recommendations are based on data presented before the team at the time of audit.

The audit methodology did combine physical inspection of the campus on several work days and holidays, with analytical reviews of relevant documents and activities, as well as interviews with the Director, Principal, selected Staff and students of the College.

This audit is conducted to ensure that a Green lifestyle is followed and implemented in the campus across all academic and non-academic departments, as well as the body of students undergoing studies in the College.

The Yuvakshetra Green Audit 2019-'20 has found that the institution's per capita carbon footprint for the year is only 0.149 ton of CO₂ equivalent, a level well below the current national per capita average of 1.94 t CO₂, with potential to develop into a carbon neutral campus. All efforts are taken to conserve and protect the existing biodiversity and also to extend the efforts even beyond the college boundary through outreach, and further by implementing the Green Protocol, and having a commitment to continue its green practices to positively impact the society at large.

Prof. V K Damodaran

Ex-UNEP Expert

For NGGFn Audit, dated 30 June 2021

I agree with the data presented in this report, as true, and further express my willingness to implement the recommendations of this audit report after internal review, even if any or many of them are in excess of the relevant mandates.

Dr. Tomy Antony

Principal

Yuvakshetra Institute of Management Studies

Palakkad, Kerala

Date:

Signature & Seal



Nature's Green Guardians Foundation

Trivandrum 695 043 India

Energy Audit Certificate

Yuvakshetra Institute of Management Studies, Palakkad, Kerala
For the AY 2019 - '20

Energy Audit for the period July 2019 to June 2020 has been conducted for Yuvakshetra Institute of Management Studies, Ezhakkad, Mundur, Palakkad, Kerala in accordance with the International Standards for ISO 14000 family of standards set by ISO TC 207 and its Sub-committees, Bureau of Energy Efficiency Standards, and stipulations under the Energy Conservation Act 2003 of Government of India, and other relevant mandates for maintenance of sustainable and healthy environment for education in the campus.

In our opinion, the Institution has presented true and up-to-date the audit team, and appropriate audit procedures have been completed for issuing this Audit Certificate and the Compliance Statement. The recommendations are based on verified data presented on the situation as they existed at the time of audit.

The inspection methodology did combine physical inspection of the campus, with analytical reviews of relevant documents and activities, as well as interviews with the Director, Principal, and selected members of Staff and Students of the College.

Audit findings indicate that, of the 484.7 T CO₂ of carbon footprint of the institution for the year, the contribution from direct use of energy was limited to 259.1 T CO₂. Transportation including public transport use (outside the campus) is at 212.4 T CO₂ – with only 54.6 T CO₂ coming from the use of personal vehicles by staff and students. Wastes contributed only 8.8 T CO₂, but wastes to energy returned 9.0 T CO₂ (remedial measures). Effective awareness and training programs were conducted during the year and are planned for the future as well, to make all stakeholders aware of the need for individual efforts.

Prof. V K Damodaran

*Ex-UNIDO International Energy Expert
For NGGFn Audit, dated 30 June 2021*

I agree with the data presented in this report, as true, and further express my willingness to implement the recommendations of this audit report after internal review, even if any or many of them are in excess of the relevant mandates.

Dr. Tomy Antony

*Principal
Yuvakshetra Institute of Management Studies
Palakkad, Kerala.*

Date:

Signature & Seal



Nature's Green Guardians Foundation

Trivandrum 695 043 India

Green Audit – Environment Quality Certificate

Yuvakshetra Institute of Management Studies, Palakkad, Kerala

For the AY 2019 - '20

Environment Audit for the period July 2019 to June 2020 has been conducted for Yuvakshetra Institute of Management Studies, Mundur, Palakkad, Kerala, in accordance with the International Standards for ISO 14000 family of standards set by ISO TC 207 and its Sub-committees, Environmental Protection Act 1986 (and its amendments) of Government of India, and other relevant mandates for maintaining sustainable and healthy environment for education in the campus.

In our opinion, the Institution has presented true and up-to-date data on the various aspects of working of this education institution, and appropriate audit procedures have been completed by the audit team for issuing this Audit Certificate and the Compliance Statement. The recommendations are based on verified data presented on the situation as they existed at the time of audit.

The audit methodology did combine physical inspection of the campus on several occasion, with analytical reviews of relevant documents and activities, as well as interviews with the Director, Principal, and selected members of Staff and Students of the Institute.

Audit findings indicate that, of the 484.7 T CO₂ of carbon footprint of the institution for the year, the contribution from Transportation and mobility including public transport use is at 212.4 T CO₂ – with only nominal share coming from the use of personal vehicles by staff and students, and that out of Wastes is at 8.8 T CO₂. But, remedial activities including the use of solar energy contributed relief of 188 T CO₂. The campus is maintained truly litter free, clean and green. Environmental Quality in the campus is seen to be 'superior' to many other institutions of the same size.

Prof. V K Damodaran

Ex-UNIDO International Energy Expert

For NGGFn Audit, dated 30 June 2021

I agree with the data presented in this report, as true, and further express my willingness to implement the recommendations of this audit report after internal review, even if any or many of them are in excess of the relevant mandates.

Dr. Tomy Antony

Principal

*Yuvakshetra Institute of Management Studies
Palakkad, Kerala.*

Date:

Signature & Seal



Green Audit - Biodiversity

Compliance Statement for AY 2019 - '20

Yuvakshetra Institute of Management Studies, Mundur, Kerala

Overall Objective	Main Objectives	Compliance Status
Ensure that an effective biodiversity protection plan is followed in the campus with the maintenance of all plants animals living in and around the campus, and expanding the same even to communities outside the campus in addition to working for capacity building to withstand Climate Change impacts.	<ol style="list-style-type: none">1. Ensure that there is a competent Biodiversity Expert from an external agency, who will provide guidance on Biodiversity and Resource conservation, and improve the ecology.2. Ensure that an Environment Protocol is adopted and followed by the entire campus community, adherence of which is reviewed, monitored, and targets reset annually.3. Ensure that frequent training and awareness programs are planned and carried out focusing on climate change resiliency.4. Ensure that every student and staff member commit to the lowering of carbon footprint of the institution through sustained greening measures.5. Ensure that Environment Audit is conducted annually, with participation of staff and students, and that recommendations are followed up.	<p>Ensured continuous guidance of experts from CED and NGGFn</p> <p>Ensured [Vide Page 13 of Green Audit Report for Green Protocol]</p> <p>Done Committed to continue</p> <p>Commitment Ensured</p> <p>Annual Green Audit commitment ensured</p>

Prof. V K Damodaran

Ex-UNEP Expert

For NGGFn Audit Team, date 30 June 2021



Green Audit – Energy Audit

Compliance Statement for AY 2019 - '20

Yuvakshetra Institute of Management Studies, Mundur, Kerala

Overall Objective	Main Objectives	Compliance Status
Ensure that an effective energy management plan is followed in the campus with high degree of energy efficiency and increasing rate of utilization of renewable energy, as also help raise the Climate Change resiliency, which is periodically reviewed and implemented incessantly.	<ol style="list-style-type: none">1. Ensure that there is a competent Energy Management Expert from an external agency, who will provide guidance on Energy conservation and energy transition initiatives.2. Ensure that the Energy Conservation Strategy is reviewed annually, progress monitored and achievable and measurable targets set for the future course3. Ensure that a Policy on embracing Green energy, energy efficiency, and wastes to energy is evolved, enforced, and reviewed regardless of it exceeding legal mandates.4. Ensure that every student and member of staff commits to the lowering of carbon footprint of the institution from all facets of energy use.5. Ensure that Energy Audit is conducted annually, with involvement of staff and students and action taken on all the viable recommendations of the linked external expert energy agency.	<p>Ensured continuous support and guidance from NGGFm, headed by an International Energy Expert and other experts.</p> <p>Ensured. [Vide Chapter on Renewable Energy Use, and Wastes Audit in the Green Audit Report for the year.]</p> <p>Ensured. Vide Green Protocol in Green Audit Report of 2019-20.</p> <p>Ensured. Training programs organised.</p> <p>Energy Audit conducted and actions for 2020-21 initiated like 11 kV HT Connection,</p>

Prof. V K Damodaran

Ex-UNIDO International Energy Consultant
For NGGFm Audit Team, dated 30 June 2021



yuvakshētra



Nature's Green Guardians Foundation
Trivandrum 695 043