

GREEN AUDIT REPORT

2022 -23

**AMAL COLLEGE OF ADVANCED STUDIES
NILAMBUR, MALAPURAM
KERALA**



**AMAL COLLEGE
OF ADVANCED STUDIES**

CONTENTS	PAGE
1. Introduction	- 8
2. Objectives	- 10
3. Study area	- 10
4. Biodiversity	- 11
4.1 Floral diversity	- 11
4.2 Invasive Alien Species	- 17
4.3 Lichen diversity in the college campus	- 18
4.4 Faunal diversity	- 19
4.5 Amphibians and Reptiles	- 24
4.6 Threats to biodiversity	- 27
4.7 Recommendations	- 27
5. Energy Management	- 28
5.1 Findings	- 29
5.2 Renewable Source of Energy	- 30
5.3 Carbon Footprint Audit	- 32
5.4 Major findings	- 33
5.5 Methods proposed to reduce carbon foot print	- 33
6. Water management	- 34
6.1 Observations	- 34
6.2 Suggestions	- 35
7. Best Practices	- 36
7.1 Green initiatives	- 36
7.2 Fruit garden	- 36
7.3 Vegetable Garden	- 37
7.4 Kavu	- 38
7.5 Open theatre	- 40
7.6 Disabled friendly	- 41
7.7 Ecofriendly approach	- 41
7.8 Herbal Garden	- 41
7.9 Floral diversity	- 42
7.10 Silent zone and Oxygen Park	- 42
7.11 Water recycling	- 43
7.12 Rain water harvesting	- 43
7.13 Compost	- 44
7.14 Incineration unit	- 45
7.15 Weather forecast	- 46
7.16 Soil and water testing	- 46
8. Recommendations	- 48
9. Conclusion	- 49
10. Acknowledgement	- 51

List of Tables

Table 4.1: Classification of trees, shrubs, herbs & climbers	- 12
Table 4.2: List of trees in the campus	- 13
Table 4.3: List of oxygen generating plants in the campus	- 14
Table 4.4: List of Shrubs, Herb, Climbers and Grasses	- 15
Table.4.5: Lichen diversity- Family Growth forms	- 18
Table 4.6: List of birds in the campus	- 19
Table 4.7: List of butterflies identified in the campus	- 22
Table 4.8: List of moths identified in the campus	- 22
Table 4.9: List of mammals identified in the campus	- 23
Table 4.10: List of reptiles identified in the campus	- 24
Table 4.11: List of amphibians identified in the campus	- 24
Table 5.1 : List of lights,fan and their load	- 26
Table 5.2 : List of computers and peripherals	- 26
Table 5.3 : List of air conditioners	- 26
Table 5.4: details of miscellaneous items	- 27
Table 6.1: Details of water sources and usage	-32
Table 7.1: Result of soil test	- 45
Table 7.2: Result of water test	- 45

List of Figures

Figure 1: Front view of the college	- 6
Figure 2: Campus view	- 10
Figure 3: <i>Lantana camera</i>	- 17
Figure 4: <i>Eupatorium odoratum</i>	- 17
Figure 5: Birds seen in the campus	- 21
Figure 6: The solar panels	- 28
Figure 7: The silent Generator	- 30
Figure 8: The greeneries of the campus	- 34
Figure 9: The Green house	- 35
Figure 10: The fruit garden	- 35

Figure 11: The vegetable garden	- 36
Figure 12: Kuttivanam	- 37
Figure 13: Open auditorium	- 39
Figure 14: Silent zone	- 41
Figure 15: Oxygen Park	- 41
Figure 16: Water recycling units	- 41
Figure 17: Artificial pond	- 42
Figure 18: Waste to wealth	- 43
Figure 19: Incineration plant	- 44
Figure 20: Weather forecasting unit	- 44
Figure 21: The audit team with the management	- 49
Figure 22: The audit team in discussion with the Principal	- 49
Figure 23: The audit team in discussion with internal audit team	- 50
Figure 24: Awards and Recognitions	- 50
Figure 25: Weather forecasting systems	- 51
Figure 26: Community forest	- 52
Figure 27: Abundance of flora and fauna	- 52
Figure 28: Open well in the campus	- 53

Annexure 1

Photos taken during physical verification of the campus

Annexure II

Filled Questionnaire submitted by the internal audit team

OISCA - International
ORGANISATION FOR INDUSTRIAL SPIRITUAL AND
CULTURAL ADVANCEMENT - INTERNATIONAL



SOUTH-INDIA CHAPTER

H. O. of all Chapters in South India

OISCA Youth Centre
UKS Road, Calicut-673 001
Kerala, India

Ph - 9447113567, 9447171079, 9847530360

E-mail : oiscaindia@gmail.com, Visit us : www.oiscaindia.org

NGO in Consultative Status with UN and Winner of India Priyadarshini Vriksha Mithra Award (IPVM) Award

GREEN AUDIT CERTIFICATE

This is to certify that the Green Audit Team of OISCA International South India Chapter has conducted the Environment Audit of Amal College of Advanced Studies Nilambur, Malappuram for the period 2021-2022.

This Certificate is based on the original data collected during the period of study. Further it is certified that the base line data was prepared by internal audit team of Amal College of Advanced Studies, Nilambur and submitted to us on the basis of the questionnaire provided by us. The content of the base line data has been physically verified, analyzed and studied in detail by the functional area experts of the audit team.

The audit included Sectoral audits in Water, Energy, Waste Management, Bio Diversity, Infrastructure and outdoor environment. It is certified that the data used in the study are original and found to be true on physical verification of the audit team. The photographs used in the report are either taken by the audit team, directly or given by the internal audit team.

Calicut
31st March 2023



M. Aravinda Babu,
Director & Secretary General

AMAL COLLEGE, NILAMBUR A BRIEF HISTORY



Figure 1: Front view of the college

Amal College of Advanced Studies is set in a serene nature of 25 acres of landscaped gardens and aesthetically built buildings. The College is located at Santhigramam in the river banks of Chaliyar, Myladi, Nilambur well known for tribal settlements and teak plantations. Amal College of Advanced Studies was established by the Nilambur Muslim Orphanage Committee (NMOC) in 2005. The idea of the college was conceived by Sri. PV Abdul Wahab who was chairman of the orphanage committee. His enthusiasm and farsighted vision paved the way for the establishment of this educational institution. The college comes under section 2F&12(B) of the UGC Act 1956. The college is a minority educational institution, covered under section 2(g) of the National Commission of Minority Educational Act 2004.

Currently, it is a post graduate college and runs eight programmes. The college is the only college in the country with 20% reservation in all courses for Muslim orphans. The college has been meritoriously serving the educational needs of the younger people in and around Nilambur and is now making strides in projects aimed at the overall development of the institution.

Vision

Amal college is envisioned to be an advanced learning centre that transforms lives, spearheads social empowerment and inspires individuals to excellence.

Mission

We dedicate ourselves to provide opportunities for academic, professional and lifelong learning in an environment of compassion and inclusivity. College is keen on instilling patriotic fervour coupled with global competitiveness.

About OISCA International

OISCA International, an NGO with UN's General Category status, was established in 1961 with its headquarters in Tokyo, Japan. The South India office of OISCA functions in Calicut, since 1985. The prime emphasis of the activities of OISCA is to impart knowledge and to create awareness in the key areas of environmental education, soil, water, biodiversity conservation and youth empowerment activities for students of both schools and colleges. As a part of this program we have Love Green Clubs in 1700 schools and Save Green clubs in 124 colleges. As recognition to these activities, Govt. of India conferred the "**INDIRA PRIYADARSHINI VRIKSHA MITHRA AWARD-**"to OISCA in the year 1998. At present we have 109 chapters in South India with more than 5000 members. Children's Forest Program (CFP) the most prestigious project of OISCA is effectively functioning in 1700 schools in South India. . Few other projects implemented by OISCA are Sacred Grove Conservation Project, Herbal Garden Development Project, Tree planting projects in educational institutions, Mangrove Forestation and River Protection Project, In addition we are the implementing agency of the Government projects like Jalanidhi, Sujithwa Mission etc. Our vision is sustainable environment and our mission is to promote Earth ethics.

GREEN AUDIT REPORT

Prepared by OISCA International SIC

1. Introduction

The Green Campus concept assists in promoting sustainability by improving human and environmental health. However, to address the key issues leading to environmental and resource degradation on the campus is vital to generate comprehensive baseline data regarding the existing system. In this context we carried out a Green Audit on the campus. Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of ecological diversity of various establishments. It is a management system instrument that is used methodologically to protect and conserve the environment. It is also utilized to keep the environment in good shape. For environmental protection, the audit suggests many standard metrics, methodologies, and initiatives. The green audit is beneficial for detecting and monitoring sources of pollution in the environment, and it focuses on waste management of all types, energy consumption monitoring, water quality and quantity monitoring, risks monitoring, stakeholder safety, and even disaster management. The objectives in the present report involved evaluation of biodiversity, energy management practices, water usage, green initiatives and the best practices followed in the campus. The findings from this audit are expected to have an impact on student/faculty health, productivity, operational costs, and the ecological systems in the campus.

The green audit was done with the full cooperation and participation of the internal audit team. OISCA International, the external audit agency provided a questionnaire covering all areas of the environment related information of the campus. The internal audit team submitted the filled questionnaire and an expert audit team from OISCA visited the college and physically verified the data thoroughly and prepared this green audit report.



Team of Experts

1. Dr. K.M.Khaleel Chowa
 Course Director (Retd), Dept. of Environmental Studies
 Kannur University.
2. Dr. Thomas Thevara
 Professor in Chemistry (Retd),
 Chemist, Soil and Water Testing Lab
 Brahmagiri Development Society, Meenangadi.
3. Pavithran.K
 Asst. Engineer,
 Kerala State Electricity Board, Kozhikode
4. Mr. P.K.Nalinakshan
 Chief co-ordinator, Children's Forest Programme
 OISCA International
 South India Chapter

2. Objectives

- To study the biodiversity of college campus
- To make report on electric power management
- To make a report on the water management
- To analyze the best practices and green initiatives of the college

3. Study area- The Campus of Amal College

The environment in and around the college campus plays an important part in maintaining a healthy atmosphere in nurturing talents. Trees are the major source of the oxygen we breathe, and receiver of the carbon dioxide we exhale. The sustainability of an ecosystem depends on the number of plants and trees in and around the surroundings. The open space in the college is used for buildings, gardens, plantations, parking space, and play grounds and other amenities giving care and concern to the sustainability of the ecosystem. Ultimately the campus is maintaining natural equilibrium with open spaces, buildings, trees, birds along with human interactions.



Figure 2: Campus view

Scientific studies suggest that a clean and green nature can cure many diseases and will reduce the stress among students during their studies. A good relationship

with nature increases the compassion among the students and guides them to be good volunteers of the green planet our mother earth. Ultimately the campus should be an excellent model in maintaining coexistence of trees, birds, animals, fertile lands, water bodies and human beings. Gardens and landscape are an aesthetic delight that promotes the awareness on natural beauty and natural resources. Persons with a spiritual relationship with nature have higher levels of positive feelings (pleasant, calm) as opposed to negative feelings (anger, fear).

4. BIODIVERSITY

4.1 Floral diversity

The floral diversity of the campus is classified into trees, shrubs, herbs, and climbers belonging to different families. There are 89 species identified and recorded. The campus consists of angiosperms, gymnosperms, pteridophytes and bryophytes. However, in this report, we focused on angiosperms, gymnosperms and pteridophytes. Fabaceae with 27 species is the dominant family, followed by other families. Angiosperms are predominant of both major groups – dicotyledons and monocotyledons. A total of 89 species belonging to 56 families are recorded from the study area. In comparison, monocotyledons are accounted with 33 species belonging to 14 families. Poaceae is the dominant monocotyledon family (11 species), and Fabaceae is the dominant dicotyledonous family (15 species). Gymnosperm flora of the campus includes *Cycas revoluta* (Cycadaceae) and *Araucaria columnaris* (Araucariaceae). These two species of gymnosperm are cultivated as ornamental plants. Pteridophytes include four terrestrial ferns.

Trees, shrubs, herbs, climbers and creepers of the campus are classified into native, exotic and invasive alien species (Table.1). Native species under trees, herbs and climbers are more diverse in number than exotic and invasive alien ones. *Mimosa pudica* is the only creeper identified as an exotic species from the

campus. The list of trees, excessively oxygen releasing plants, and the shrubs, herbs, climbers & grass identified inside the campus is presented in Table 4.2, Table 4.3, and Table 4.3 respectively.

Table 4.1: Classification of trees, shrubs, herbs, climbers and creepers into native, exotic and invasive alien species.

Category	Native (N)	Exotic (E)	Invasive alien Species (IAS)
<i>Trees</i>	889	76	5
<i>Shrubs,herbs,climbers</i>	857	22	4
<i>Grasses</i>	218	7	2

Table 4.2: List of trees in the campus.

Sl.No	Common Name	Scientific name	Number
1	Acacia	<i>Acacia nilotica</i>	1
2	Anapana	<i>Caryota urens</i>	17
3	Arinelli	<i>Phyllanthus acidus</i>	1
4	Aranamaram	<i>Monoon longifolium</i>	23
5	Aryaveppu	<i>Azadirachta indica</i>	1
6	Asokam	<i>Saraca asoka</i>	5
7	Aathacakka	<i>Annona reticulata</i>	1
8	Ayani	<i>Artocarpus hirsutus</i>	1
9	Cassia	<i>Cassia siamea</i>	2
10	Chadachi	<i>Grewia tilifolia</i>	13
11	Charakonna	<i>Peltophorum pterocarpum</i>	2
12	Chembaruthi	<i>Hibiscusrosa-sinensis</i>	1
13	Chethi	<i>Ixora coccinea</i>	6
14	Crotton	<i>Croton sparciflorus</i>	6
15	Dantapala	<i>Wrightia tinctoria</i>	1
16	Ezhilampala	<i>Alstonia scholarsis</i>	10
17	Ficus	<i>Ficus benjamina</i>	3
18	Green Arekka	<i>Cryrtostachys renda</i>	41
19	Helicornia	<i>Helicornia psittacorum</i>	200
20	Idampiri	<i>Helicteres isora</i>	2
21	Indian Badam	<i>Terminalia catappa</i>	3
22	Kanikonna	<i>Cassia fistula</i>	14
23	Kanjiram	<i>Strychnosnux-vomica</i>	5
24	Karinhotta	<i>Samadera indica</i>	1
25	Karisu	<i>Butea monosporma</i>	6
26	Kasumavu	<i>Anacardium occidentale</i>	3
27	Kumil	<i>Gmelina arborea</i>	4
28	Laxmitharu	<i>Simarouba glauca</i>	1
29	Mahagnani	<i>Swietenia mahogany</i>	22
30	Mandaram	<i>Bauhnia accuminata</i>	1
31	Manimaruthu	<i>Terminalia arjuna</i>	4
32	Maruthu	<i>Terminalia arjuna</i>	1
33	Matti	<i>Ailanthus excelsa</i>	11
34	Mavu	<i>Mangifera indica</i>	22
35	Nandyarvattam	<i>Tabernaemontana divaricata</i>	35

36	Narakam	<i>Citrus limon</i>	1
37	Nelli	<i>Phyllanthus emblica</i>	12
38	Noni	<i>Morinda citrifolia</i>	1
39	Pannal	<i>Glycosmis pentaphylla</i>	1
40	Pappaya	<i>Carica papaya</i>	2
41	Parakam	<i>Ficus asperima</i>	1
42	Parijatham	<i>Nyctanthesarbor-tristus</i>	3
43	Parinni	<i>Bombax ceiba</i>	3
44	Peelivaka	<i>Leucena leucocephala</i>	1
45	Plasu	<i>Butea monosperma</i>	6
46	Plavu	<i>Artocarpus heterophylla</i>	15
47	Poopathiri	<i>Sterosperm umcolias</i>	1
48	Poovaka	<i>Delonix regia</i>	2
49	Puli	<i>Tamarindus indica</i>	7
50	Rubber	<i>Heveabra siliensis</i>	212
51	Seemakonna	<i>Gliricidia sepium</i>	5
52	Teak	<i>Tectona grandis</i>	167
53	Thanni	<i>Terminalia bellirica</i>	1
54	Thengu	<i>Cocos nucifera</i>	23
55	Ungu	<i>Pongamia pinnata</i>	14
56	Uruvanchi	<i>Sapindus trifociatus</i>	4
57	Vatta	<i>Marcrgia peleta</i>	11
58	Veeti	<i>Dalbergia latifolia</i>	4
59	Ventekau	<i>Gmelina arborea</i>	1
Total			965

Table 4.3: List of oxygen generating plants in the campus

Malyalam Name	English Name	Botanical Name	Importance
Aal	Pipalva	<i>Ficus religiosa</i>	Ficus family plants are high oxygen sproducers.
Aryaveppu	Neem	<i>Azadirachta indica</i>	This ever green plant absorbs SO ₂ , and other toxic gases to a certain extent.
Asoka	Asoka	<i>Sarga asoka</i>	Absorbs particulate matter from air.
Curry Veppu	Curry Tree	<i>Murraya koenigii</i>	The leaves are used in cooking to provide taste to foods. It helps

			digestion and removes toxic substances.
Ezhilampala	Sarpagandi	<i>Alstonia scholaris</i>	Heavily attracted by honey bee and absorbs pollutants
Maruthu	Maruthu	<i>Terminalia arjuna</i>	Important in Ayurveda, absorbs particulate matter along with CO ₂
Mula	Bamboo	<i>Bamboos bambooseae</i>	Bamboos are high oxygen producers, prevent soil erosion and conserves water.
Njaval	Jamun	<i>Syzygium cumini</i>	This plant also absorbs SO ₂ , and particulate matter.
Peraal	Banyan	<i>Ficus benghalensis</i>	Ficus family plants are high oxygen producers.

Table 4.4: List of Shrubs, Herb, Climbers and Grasses in the campus.

1.	Acacia	<i>Acacia cinuata</i>	3
2.	Amaranthus	<i>Amaranthus speciosus</i>	13
3.	Amorphophallus	<i>Amorphophallus sp.</i>	2
4.	Boerhaavia	<i>Boerhaavia diffusa</i>	41
5.	Borreria	<i>Borreria ocimoides</i>	230
6.	Chromolaena	<i>Chromolaena odorata</i>	14
7.	Creeping daisy	<i>Wadelia trilobata</i>	150
8.	Crotalaria	<i>Crotalaria laburnifolia</i>	22
9.	Desmodium	<i>Desmodium gangeticum</i>	24
10.	Dioscorea	<i>Dioscorea alata</i>	4
11.	Euphorbia	<i>Euphorbia prostrata</i>	18
12.	Gloriosa	<i>Gloriosa superba</i>	3
13.	Guava	<i>Psidium gjava</i>	2
14.	Gymnema	<i>Gymnema sylvestre</i>	8
15.	Merremia	<i>Merremia vitifolia</i>	120
16.	Phyllanthus	<i>Phyllanthus niruri</i>	32
17.	Pulichi	<i>Hibiscus vitifolius</i>	12
18.	Sacred basil	<i>Ocimum sanctum</i>	16
19.	Scoparia	<i>Scoparia dulcis</i>	56
20.	Sida	<i>Sida acuta</i>	34

21.	Syndrella	<i>Syndrella nodiflora</i>	6
22.	Touch me not	<i>Mimosa pudica</i>	48
23.	Vigna	<i>Vigna trifoliata</i>	12
24.	Zehenaria	<i>Zehenaria sp</i>	6
25.	Ziziphus	<i>Ziziphus oenoplia</i>	7
<i>Total</i>			883
Grasses			
26.	Bermuda grass	<i>Cynodon dactylon</i>	150
27.	Cymbidium	<i>Cymbidium floribundum</i>	34
28.	Cymbopogon	<i>Cymbopogon citratus</i>	26
29.	Digitaria	<i>Digitaria ischaemum</i>	22
30.	Gunea grass	<i>Panicum maximum</i>	56
<i>Total</i>			228

4.2 Invasive Alien Species

An alien species is a species, subspecies or lower taxon introduced outside its natural past or present distribution, including gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce (CBD, 2002). An invasive alien species refers to an alien species whose introduction and spread threaten the region/habitat (CBD, 2002).

Lantana camara and *Eupatorium odoratum* are the main invasive species noted in the college campus.



Figure 3: Lantana camara



Figure 4: Eupatorium odoratum

4.3 Lichen diversity in the college campus

Lichens are one of the most fascinating symbiotic organisms found worldwide. The lichens species are ubiquitous and common inhabitants of the bark of the tree, rock surface, soil etc. They are a lower group of plants coming under non-flowering plants that live in a variety of substrates under a wide range of environmental conditions with or without causing harm to the hosts. Ecologically, lichen plays important roles in soil formation; re-establishes life on earth; fixes atmospheric Nitrogen, plant's health, ecology distribution, and in the formation of organic matter of habitat which in turn benefitting mosses in nutrient availability. A unique synergetic association between a fungal and an algal species results in lichens and occupied in

plant kingdom. In this relationship both the organisms are mutually benefited. The major forms of lichens are;-

- a) Foliose lichens exhibit a flat leaf like thallus.
- b) Fruticose lichens exhibit erect, pendulous and bushy thallus.
- c) Squamulose lichens exhibit thallus with minute, scale like squamules.
- d) Crustose lichens exhibit flat crust shaped thallus. Lichen diversity recorded in the college campus showed a total of three different lichens.

Table. 4.5: Lichen diversity- Family Growth forms

Buellia pullata	Caliciaceae	Crustose
Graphis glauconigra	Graphidaceaea	Furticose
Lecanora perplexa	Lecanoraceae	Foliose

4.4 Faunal diversity

Out of the 69 species of fauna identified from the campus, 19 were birds, 21 butterflies, 6 moths, 6 reptiles, 12 mammals and 5 amphibian .Including the visiting birds campus is also home to 23 other invertebrate organisms belonging various orders. House crow, rock pigeon and common myna are the dominant birds found on the campus.

The presence of an appreciable diversity of butterflies on the campus is due to the abundance of butterfly host plants which include *Albizia sp*, *Pterocarpus marsupium*, *Manihot carthaginensis* and *Smilax zeylanica*. Nectar providing plants like *Lantana camera*, *Ixora coccinia*, *Saraca asoka*, *Tridax sp*, *Clerodentron sp*, *Cassia sp*. etc., retains the butterfly diversity of the campus. *Felis catus*, *Canis lupus*, *Bos taurus*, *Bubalus bubbalis* and *Capra aegagrus hircus* are the common mammals of the campus. The great diversity of herbivores insects is thought to be linked to their interactions with host plants.

The artificial pond constructed for water conservation support good fish fauna.

Concrete ponds in various departments are home to many insects like damselflies and dragonflies because their life cycle has an aquatic larval stage.

Table 4.6: List of birds in the campus

Sl.No	Common Name	Scientific Name
1	House sparrow	<i>Passer domesticus</i>
2	Indian cuckoo	<i>Cuculus micropterus</i>
3	Barn owl	<i>Tyto alba</i>
4	Lesser whistling duck	<i>Dendrocygna javanica</i>
5	Red-vented bulbul	<i>Pycnonotus cafer</i>
6	House crow	<i>Corvus splendens</i>
7	Rock pigeon	<i>Columba livia</i>
8	Common myna	<i>Acridotheres tristis</i>
9	Asian koel	<i>Eudynamys scolopacea</i>
10	Greater coucal	<i>Centropus sinensis</i>
11	Black-rumped flame back	<i>Dinopium benghalense</i>
12	Indian pond heron	<i>Ardeola grayii</i>
13	Median egret	<i>Mesophoyx intermedia</i>
14	Rose ringed parakeet	<i>Psittacula krameri</i>
15	Indian treepie	<i>Dendrocitta vagabunda</i>
16	Purple-rumped sunbird	<i>Leptocoma zeylanica</i>
17	Scaly breasted munia	<i>Lonchura punctualata</i>
18	Blue-tailed bee- eater	<i>Merops phillippinus</i>
19	Red-whiskered bulbul	<i>Pycnonotus jocosus</i>

Frequently seen birds in the campus



Greater Coucal



Common Hawk-Cuckoo



Common Cuckoo



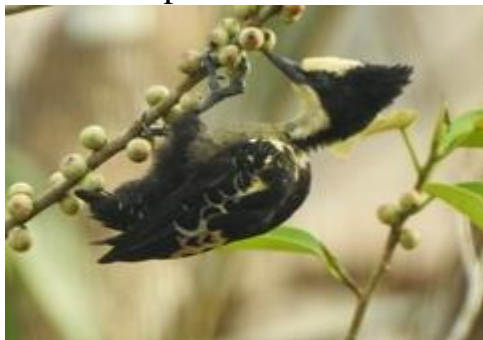
Asian Koel



Black-rumped Flameback



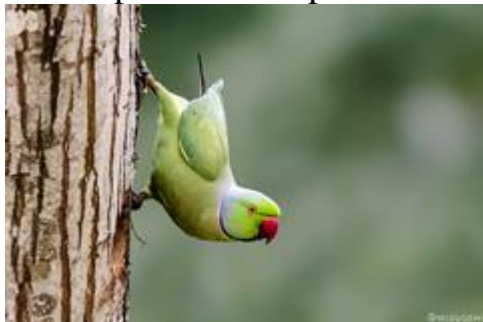
Rufous woodpecker



Heart-spotted Woodpecker



White-cheeked Barbet



Rose-ringed Parakeet



Malabar Parakeet



Jungle owlet



Mottled Wood owl



Indian Roller



Stork-billed Kingfisher



Gray-fronted Green Pigeon



Indian Grey Hoopbill



Spotted Dove



Crested Serpent Eagle



Brahminy Kite



Long-tailed Shrike

Figure 5: Birds seen in the campus

Table 4.7: List of butterflies identified in the campus

Sl.No	Common Name	Scientific name
1	Common emigrant	<i>Captopsilia pomona</i>
2	Common grass yellow	<i>Eurema hecabe</i>
3	Psyche	<i>Leptosia nina</i>
4	Common Indian crow	<i>Euploea core</i>
5	Glassy blue tiger	<i>Ideopsis vulgaris</i>
6	Blue tiger	<i>Tirumala limniace</i>
7	Chocolate pansy	<i>Junonia iphita</i>
8	Common evening brown	<i>Melanitis leda</i>
9	Dark brand bush brown	<i>Mycalesis mineus</i>
10	Common bush brown	<i>Mycalesis perseus</i>
11	Medus brown	<i>Orsotrioena medus</i>
12	Common five-ring	<i>Ypthima baldus</i>
13	Common four-ring	<i>Ypthima huebneri</i>
14	Ceylon four-ring	<i>Ypthima ceylonica</i>
15	Common cerulean	<i>Jamides celeno</i>
16	Lesser grass blue	<i>Zizina otis</i>
17	Monkey puzzle	<i>Rathinda amor</i>
18	Common mormon	<i>Papilio polytes</i>
19	Lime butterfly	<i>Papilio demoleus</i>
20	Sahyadri bird wing	<i>Troides minos</i>
21	Crimson rose	<i>Pachliopta hector</i>

Table 4.8: List of moths identified in the campus.

Sl.No	Common Name	Scientific Name
1	Blue tiger moth	<i>Dysphania percota</i>
2	Crotalaria moth	<i>Utetheisa lotrix</i>
3.	Hawk-moth	<i>Daphnis nerii</i>

4.	Tiger moth	<i>Asota caricae</i>
5.	Ailanthus web worm moth	<i>Atteva fabriciella</i>
6	Atlas silk moth	<i>Attacus atlas</i>

4.5 Amphibians and Reptiles

The campus habitat harbours many species of reptiles, amphibians and mammals. Systematic and seasonal study would add many interesting species to the campus check list. From the rapid assessment and discussions with the campus inmates the following species were sighted in the campus area.

The reptiles found in the campus includes, common garden lizard, Monitor Lizard, common skink and snake varieties such as Chera(*Elaphe carinata*), Rat snake (*Ptyas mucosa*), Common krait, Wolf snake (*Lycodonaulicus*), Checkered keel back (*Xenochrophis piscator*), Common vine snake (*Ahetulla nasuta*) and Common kukri snake (*Oligodon arnensis*). In addition to the above, the campus has good diversity of butterflies and moth, dragonflies and damselflies, spiders and many other pollinators and plant pest insects.

Table 4.9: List of mammals identified from the campus.

Sl.No	Common Name	Scientific Name
1	Jungle cat	<i>Felis chaus</i>
2	Domestic cat	<i>Felis catus</i>
3	Dog	<i>Canis lupus</i>
4	Indian grey mongoose/Keeri	<i>Herpestes edwardsii</i>
5	Three-striped palm squirrel	<i>Funambulus palmarum</i>
6	Indian flying fox	<i>Pteropus gigantecus</i>
7	House rat	<i>Rattus rattus</i>
8	Brown rat/Panni eli	<i>Rattus norvegicus</i>

9	Jackal/Kurukkan	<i>Canis aureus</i>
10	Toddy cat/marapatti	<i>Paradoxurus jerdoni</i>
11	Indian mole-rat	<i>Bandicota bengalensis</i>
12	Black-naped hare	<i>Lepus nigricollis</i>

Table 4.10: List of reptiles identified from the campus.

Sl.No	Common Name	Scientific Name
1	Rat snake	<i>Pytas mucosa</i>
2	Chera	<i>Elaphe carinata</i>
3.	Garden lizard	<i>Calotes versicolor</i>
4.	House gecko	<i>Hemidactylus sp.</i>
5.	Common skink	<i>Mabuya carinata</i>
6.	Monitor lizard	<i>Varanus bengalensis</i>

Table 4.11: List of amphibians identified from the campus.

Sl.No	Common Name	Scientific Name
1.	Asian common toad	<i>Duttaphrynus melanostictus</i>
2.	Indian bull frog	<i>Hoplobatrachus tigerinus</i>
3.	Malabar tree toad	<i>Pedostibes tuberculosus</i>
4.	Small wood frog	<i>Indosylvirana aurantica</i>
5.	Malabar gliding frog	<i>Rhacophorus malabaricus</i>

4.6 Threats to biodiversity

Generally, mass clearance of plants and trees for construction works is the

main reason behind the disappearance of many native plants and trees. It also causes habitat destruction and eventually affects the faunal diversity of the campus. The invasive species like *Acacia auriculiformis*, *Mikania micrantha*, *Chromolaena odorata* and *Lantana camara* are found in the campus. These aliens never support indigenous plants. Lab waste, including hardwires and chemicals released directly into the soil, is deteriorating soil quality, and making soil unsuitable for supporting plants. It also affects soil micro and macro fauna. So, care must be taken during new constructions not to disturb the biodiversity of the campus. Similarly, growth of the invasive and alien species should be controlled by selective eradication.

4.7 Findings and Suggestions

The audit team observed around thousand trees of 59 species in the college campus. Nilambur is famous for teak plantations. Nilambur teak is a unique variety and is the most important timber. Its durability and quality gave its reputation in the world's timber market. The geographical conditions of the Nilambur area are suitable for the healthy growth of the tree. On economic aspects growing teak is profitable. So far as a campus is considered, it is advisable to grow trees of different species. There are only 59 species of trees in the campus. It is observed that 30 % of the existing teaks are at the stage of selection felling and hence can be removed. Teak consumes large quantity of water thus lowering the ground water table. In case of college campus it is advisable to increase the number of species with local as well as indigenous plants. Jack fruit, Mango tree, Eanji, Asoka, and Bamboo etc are water conserving plants and are suitable for making the campus more green and attractive. The indigenous plants can address the challenges of climate change.

5. Energy Management

The Functional Area Expert of the Audit team has assessed the energy consumption, energy sources, energy management, lighting devices and other appliances used in the campus. The use of energy is a very important aspect of the sustainability of any community. The audit team assessed the number of electrical appliances and their respective uses in terms of consumption of energy per month in kW

Table 5.1: List of light, fans and their loads

Particulars	LED	LED	LED	LED	LED	T8	Wall	Ceiling	P.fan	Exhaust
					tube	tube	fan	fan		Fan
Wattage	6	9	50	18	20	36	60	60	60	20
Number	61	209	3	13	73	10	18	276	2	4
Total (kW)	0.366	1.88	0.15	0.23	1.46	0.36	1.08	16.56	0.12	0.08
Net total (kW)	22.2									

Table 5.2: List of computers and peripherals

Particulars	PC	Projector	Scanner	Printer	Printer	Xerox	TV
Wattage	120	100	20	300	400	600	120
Number	96	1	1	6	3	1	3
Total (kW)	11.52	0.1	0.02	1.8	1.2	0.6	0.36
Net Total (kW)	15.6						

Table 5.3: Details of air conditioners

Capacity	Star rating	Quantity	Power consumption
1.5	5	5	1.452
2	Nostar	3	7.8
Net Total (kW)	9.25		

Table 5.4: Deails of miscellaneous items

Particulars	Mixer	Grinder	Fridge	Water cooler	Freezer	Oven	Pump	Pump
Wattage	300	500	250	500	150	800	3728	1118
Number	1	2	2	5	1	1	1	1
Total (kW)	0.3	1	0.5	2.5	0.15	0.8	3.728	1.118
Net total (kW)	10.096							

5.1 Findings

UG 4 wire R.Y.B and N is drawn from the transformer to the end of the power supply cable is observed at a length of 330 meters. Due to the same Load Line for such a long distance, the power factor will decrease and affects the efficiency of equipments and the electricity bill will increase. It is preferable to arrange the power Load through two or more path, or the way from the main distribution junction (DB), 4 wire cables may refer to a cable with 4 conductor or 4 current carrying conductors. Red, yellow, blue or (black hot line) and white neutral line and green equipment (proper earthling) usually have a line voltage output of 415 V and so the voltage between any line and the neutral conductor is 230 volt.

Green building concept is employed in the construction of the buildings. The door - window ratio is properly considered in the building design so that maximum natural light and wind is utilized. The materials used for wiring, switchgear, earthling, and safety systems and UG cables are of good quality.

5.2 Solar Energy Generation.

As the alternative energy source, solar energy is utilized by the college. Every three months the solar panel needs to be sprayed with water to wash off the dust particles on the panels. This will ensure maximum power generation.

Single panel power: 335 watts

Total panels installed: 26 Nos

Minimum power generation: 34.85 units/day

Maximum generation: 46.3 units/day



Figure 6: The solar panels installed in the college

5.3 Audit on the use of fans

Hundred and fifteen (115) electric fans are used in the college. 22 to 24 % of them are in use for more hours than others. If these over used fans are converted to BLDC, then eight units of electricity can be saved per day. It is suggested to replace the electric fans in the canteen, visitor's room, administrative office and science block with BLDC fans to save energy.

5.4 Energy audit for air conditioner

AC is used in Principal's room and in the seminar hall. This device requires an inverter and other equipments. The use total 4000 watts of energy (4 units/hrs) at normal conditions at cooling position 18°C – 20 °C are required. $4000 \times 1 \text{ hrs}/1000 = 4\text{kwh}$ (4 units), then for 7 hours per day use of the air conditioner needs 25 to 28 units. If thermostat is reset to 26°C – 28 °C, energy consumption can be reduced 50%, thus monthly 400 units of energy can be saved.

5.5 Water cooler cum filter

The water cooler of 300 Watts is used in the college, From the very date of installment the cooler, no maintenance work s have been done and hence the water cooler does not cut off after full cooling. It is observed that 6 units of current per day are consumed by the cooler system. Hence the total energy consumption for one month for one cooling system is $30 \times 6 = 180$ units. There are three water cooling systems in the college and a net total of 540 units of energy are consumed by these cooling equipments. If the equipments are properly maintained, under normal condition the energy consumption is $300 \text{ W} \times 4 \text{ hrs} = 1.2$ units /day, so 30 days 108 units, hence for three systems the total energy is 324 units, thus saving 226 units of energy. Hence the audit team recommends the timely maintenance of the cooling system.

5.6 Lead acid battery

It has been found that Lead acid battery is used for office building computer functions. The battery on long use and due to lack of proper maintenance, energy usage has been increased. The battery needs 6 unit current for full charge, but 1.4 units are recovered with the loss of 4.6 units per day. So in one month, $4.6 \times 30 \text{ days} = 138$ units of energy are lost. Hence proper maintenance of the lead acid battery is recommended.



Figure 7: The silent Generator installed in the college

The audit team has not observed the working o generator. Otherwise the system is found to be well maintained .

5.7 Green initiatives and Carbon Footprint Audit

Green initiatives design mitigation solutions to address climate changes risks. Reuse, Recycle and Reduce are the basic principles of green initiatives and carbon foot print. The natural resources are finite and students should be aware of the need of the conservation of the most precious natural resources like soil water and biodiversity. Education should provide values to the students so that they will not misuse natural resources. Environmentally conscious students will never waste water and energy.

The green house gases are carbon dioxide, methane, oxides of nitrogen, ozone and water vapor. Of these green house gases the major one is carbon di oxide and that is the one usually dumped into the campus atmosphere by the day to day activities related the functioning of the college. The basic knowledge of carbon foot print is useful in controlling the release green house gases into the atmosphere. Carbon foot print is the total amount of green house gases particularly carbon di oxide and methane that are generated by human activities. The carbon foot print is an indicator to compare the total amount of green house gases emitted from human activity. By

reducing the emission of green house gases to the atmosphere, an environmentally conscious person is contributing towards the sustainability of our environment. We produce green house gas emissions by burning fossil fuels when we drive, burning gas or wood, or by using electricity.

If we control the use of materials that cause greenhouse gas emissions, our carbon foot print can be reduced. Thus by changing an individual's personal choices or habits, the carbon emission to the atmosphere can be controlled. Hence the Carbon foot print audit of the institution can definitely educate the youth and make them aware of the carbon foot print and its impact on climate change.

5.8 Major findings

Total number of students	: 1428
Total number of teachers	: 56
Number of non-teaching staff	: 14
Approximate No of daily visitors	: 265
Number of persons using cars	: 16
Number of persons using two wheelers	: 40
Number of persons using public transport	: 2020
LPG usage – number of cylinders per month	: 6
Firewood used in the canteen-kg/day	: 300

5.9 Methods proposed to reduce carbon foot print

1. Public transport will be promoted to staff and students. At present the college has a bus to for the conveyance of students. Few staff members are also using this public conveyance system. The public conveyance system will be increased in the near future.
2. The use of firewood in the college canteen will be replaced by LPG/biogas.
3. Teachers from nearby destination may share the vehicles whenever possible.
4. Plant more trees in the campus for earth ethics.
5. Select and grow indigenous plants.
6. Awareness programmes should be regularly organized to impart better environmental education.

7. Develop a green house in the campus with flowering climbers so that students can experience the true spirituality of nature.

6. Water Management

Table 6.1: Details about the sources and usage of water

Sl.No	Particulars	Details
1	The sources of water in the campus	Open well, Bore well and Rain water harvesting
2	The number of open wells	1
3	The number of bore wells	2
4	The number of electric motors for pumping	4
5	Water availability	No water scarcity in the campus
6	The depth of deepest well	116 feet
7	Water table of bore wells	300 feet and 410 feet
8	Capacity of the overhead tanks in the campus	19000,10000,3000, and 2000 litres
9	The mechanism for the use of waste water	The waste water is Recycled and used for gardening vegetables and for fruit garden.
10	Number of water coolers in the campus	10
11	Number of water purifiers in the campus	4
12	Number of water taps in the campus	235
13	Number of wash rooms in the campus	35
14	Number of wash rooms in the hostel	10
15	Amount of water consumed per day	10000 litres
16	Number of water taps in the canteen	3
17	Amount of the water used in the canteen	3000 litre
18	Amount of water used in the laboratories	2000 litre
19	Mount of water used for irrigation purpose	150 litres

6.1 Observations

The college has a clear vision on water management. Students are aware on the necessity of water conservation, as observed from their attitude in the use of water. Stickers are placed near water taps to promote the minimal use of water. The open well in the campus well maintained. The water quality is analyzed at least once in a year. The quality parameters are within the BIS limits. The overhead tanks are hygienic and cleaned at frequent intervals. The college has rainwater harvesting

mechanisms. There is a large earthen pond to collect rain water. This pond can be developed to an excellent water storage system which will definitely increase the water table of the locality. It can also be used for pisciculture. The rain water harvesting system is the best practices on water awareness among students and public. Moreover the rain water in the open area are not allowed to run away, instead by soil conservation practices the water is allowed to filter to the soil and finally to aquifers thus maintaining the water table of the nearby area. Hence the college does not face any water scarcity during summer season. The National service scheme and Bhoomitrasena of the college organize awareness programs on water conservation frequently to spread the message of water conservation and water quality. It is a regular practice of the college to organize special programs on March 22, the World Water Day. The geography of the campus indicates that the area is water rich with a high level of water table.

6.2 Suggestions

Amal College, Nilambur, is located on a 25-acre plot, with a gradient of approximately 100 meters from the entrance. To ensure sustainable ground water, it is recommended to establish a groundwater management system on the campus. Currently, water from a large area of land and building rooftops is collected through drainage systems near the entrance into an artificial pond of 10 x 10 meters dimension with 4 meter depth. This pond is enriching groundwater recharge.

Considering the future demand of water in the campus and the condition of the terrain, it is crucial to conserve and optimize the available resources including the whole precipitation in the campus. The rooftop rainwater from the buildings can be harvested for use in lower-lying areas, utilizing gravitational force and reducing the need for electric pumps to transfer water to tanks located on the upper parts of the buildings in lower areas.

The college currently relies on an open well and two bore wells for its water sources. All three of these sources can benefit from recharging with rainwater collected from rooftops. To mitigate runoff and soil erosion, the terrain should be reinforced with counter bunds reinforced with biofencing. It is to be mentioned that over head water

tanks are kept clean and closed properly. College has a good water purification system before pumping to over head tanks. All supply points are maintained properly. Waste water is recycled and used for irrigation.

7 Best practices followed in the college for Sustainable Environment

7.1 Green Initiatives.

The green initiatives aim to achieve the highest level of pollution prevention by deliberate attempt to minimize pollution from the source. The wastes and the waste water from the laboratories, have to be minimized. If any toxic substances are used in the laboratories, it should be prepared at a very low level of concentration and micro analytical approaches are to be followed with the minimum use.



Figure 8: The beautiful greeneries of the college campus

7.2 Fruit garden.

The audit team has observed the development of a fruit garden in the campus. It is an excellent practice to grow fruit trees gardens so that the students will get aware of many fruit trees and may get an inspiration to plant such trees in their own orchards.



Figure 9:Green house



Figure 10: The fruit gardens of the college

7.3 Vegetable garden

The development of vegetable gardens is also an educative programmes. Farming has become a business other than a method to produce healthy food. To get

maximum yield the farmers apply excess fertilizers and pesticides to get better yields. As a result the soil, water and biodiversity have been polluted with toxic chemicals. To minimize the pollution due to farming the agricultural department promotes organic as well as good agricultural farming. Farming has become unattractive for the educated youth. So to attract the educated youth and also to keep a lively relationship with soil, many educational institutions are motivating their students to engage in kitchen gardening and to produce pesticide free fruits and vegetables for their own day to day use. Amal College is an excellent model in promoting vegetable cultivation. The students are actively engaged in the cultivation of various types of vegetables. The college has constructed a small green house to teach the students on precision farming. In short Amal College of advanced studies takes deliberate attempts to promote learning by doing.



Figure 11: The vegetable garden of the college

Gardening provides students with hands-on learning opportunities while increasing environmental awareness and vital experience in problem-solving.

Vegetable gardens are a wonderful way to use the college campus as a classroom and to connect students with the natural world, the source of all food produces. It teach them valuable gardening, agriculture concepts, skills and techniques that integrate with several subjects, like mathematics, science, art, health, physical education, and social studies.

7.4 Kavu (Sacred groves)

Kavu or sacred groves are tiny forests that have been untouched and undisturbed by

the people, particularly the tribes as a part of their religious and cultural beliefs. In the modern era the so-called developments have wiped out the majority of such sacred groves. Since climate change and global boiling have become a reality, the people have realized the need of such undisturbed tiny forests to address the climate variations. So many educational institutions and local self governments are promoting to develop small forest belts by selectively planting and growing indigenous and religious trees like *Aegle marmelos*, *Ficus religiosa*, *Saraca Asoka*, *Couroupita guianensis*, *Artocarpus heterophylla* etc. Amal College of advanced studies developed an untouched and protected area in their premises. This is maintained in the form of a traditional Kavau to make the students aware of the following concepts.



Figure 12: Kuttivanam

1. **Maintain the equilibrium of air and food:** Humans and animals need food and oxygen and excrete carbon dioxide and water. The plants, algae, etc, in the Kuttivanam use carbon dioxide and water and release or produce oxygen and food.
2. **Filter and store water, and drastically reduce storm-water runoff:** Forests

filter and regulate the flow of water. The litter over the forest floor acts as a sponge which filters, stores and gradually releases the water to natural channels and ground water.

3. **Conserve valuable topsoil and reduce soil erosion:** A forest is like a protective green cloth over Mother Earth's fragile body.
4. **Conserve biodiversity and balance ecology:** In a natural environment, the populations of species are balanced to an optimum minimum level.
5. **Reduce pollution:** Plants can remove or phyto remediate pollutants and contaminants from soil and water.
6. **Arrest or reverse global warming:** Global warming can cause extinction of species, tropical cyclones, extreme weather, tsunamis, abrupt climatic change, sea level rise, increased human stress resulting in violence, etc. These are just a few of its catastrophic effects. Plants can lock CO₂ in their bodies to save our green planet and the life on it.

7.5 Open Theatre

An open stage has been constructed on the side of the main building. It can accommodate more than 400 persons. This stage is constructed in the style of an Amphi theatre. No echo will be produced in this open theatre during the public programs. Moreover the shades provided by the nearby trees always provide a cool atmosphere in the theatre. This open stage is the clear proof of green building concept of the college management.



Figure 13: Open auditorim

7.6 Disabled friendly

Disability is only disabling when it prevents someone from doing what they want or need to do. Government of India signed the UNCRPD (United Nations Convention on the Right of Persons with Disabilities) on 1st October 2007. In this article 9 says about the requirements of disabled persons on accessibility to buildings. As per the signed UNCRPD Indian Parliament passed an act as RPD (Right to Persons Disability) act on March 2016. As per new act, all buildings should have ramps at the entry, exit, lifts for higher floors, separate wash rooms with suitable arrangements such as hand rails etc.

7.7 Eco friendly Approach

The Amal College is maintaining more than 65% of the green cover area after completing the construction works. The management has tried to follow the guidelines of World Green Building Council and Indian Green Building Council to provide an ecofriendly environment to the stakeholders. Deliberate attempts were made to maintain the natural vegetations to the maximum extent and trees of the

campus are mostly of indigenous species.

The campus is established without causing detrimental impact to the ecosystem of twenty five acres of the natural vegetation along with the artificial pond, path ways, and parking areas. The beautiful auditorium of the college illustrates the ecofriendly approach followed in construction activities.

7.8 Herbal Garden and Butterfly Garden

The Amal College created a ‘Herbal Garden’ with more than 50 medicinal plants and a natural butterfly garden. The college takes keen interest in afforestation programs in which selected indigenous seedlings and shrubs species are planted and protected under the title ‘Biodiversification’ to increase the number of flora on the campus. Flowering plants are selected and planted in the campus to attract more butterflies.

7.9 Floral Diversity.

In view of floral biodiversity in the college campus, around 130 species are being identified. These species consists of angiosperms, gymnosperms, pteridophytes and bryophytes. Eighty nine families covering trees, herbs, shrubs, climbers, lianas, twiners and lawns are recorded. The institution has started the initial works for the preparation of a biodiversity register.

7.10 Silent Zone and Oxygen Park

Now a day’s silent zones are getting important in academic institutions. The noise pollution leads to stress and other health and neurotic problems to few students. Silent zone and oxygen park reduce the academic stress level and provide relaxation to both mind and body. Amal College has aerated certain silent zones in the college itself. Natural silence zones are also created in the college campus where there is no sound other than natures sound. The green space in the college helps the students to spend their free time in the serenity of nature. In fact oxygen park is a green belt where the stakeholders can rest and get relaxed by enjoying this aesthetic location with fascinating breeze and natural beauty. Silent zones and oxygen parks promote earth ethics.



Figure 14: Silent zone



Figure 15: Oxygen park

7.11 Water recycling

The College is aware of water management. Even though the college is situated in a water abundant area, special care and attention is given for water conservation. Used water from wash rooms are collected and recycle by the permanently fitted water recycling units. The filter in these units are recharged on frequent intervals and thus the capability of the filter for water purification is ensured. The recycled water is used for gardening.



Figure 16: Water recycling units

7.12. Rain Water harvesting.

Rain water harvesting is a simple process used to conserve rain water by collecting

and storing by suitable technologies. Amal College has established a rainwater harvesting model by collecting running rainwater to a pond of 100 sq.meters constructed with the services of NSS volunteers. The pond resembles a natural pond enriched with plenty of aquatic plants, fishes, frogs and different aquatic living beings. Thus the institution has given prime importance for water conservation and so for spreading the message of “water is precious, every drop counts”.



Figure 17: Artificial pond

7.13 Compost units

The eco friendly activities of the institution have proved its concern and commitment of environment and environmental education. with the active involvement of the students the college has established a compost plant. All the organic wastes are collected and converted to compost both by aerobic and anaerobic methods. These composts are used in the college garden, fruit garden and for vegetable garden. No chemical fertilizers are applied in any of the gardens of the college. Thus the institution is well aware of maintaining the equilibrium of the ecological system.



Figure 18: Waste to wealth

7.14 Incineration Plant

All the organic wastes are converted to valuable wealth such as compost. All other wastes are collected by the local Grama Panchayath at frequent intervals. If any other wastes like litter remain in the campus, such items are destroyed by the incinerator unit. The college has developed its own system of cleanliness. The audit team was really impressed by the clean and green campus of Amal College of advanced studies.



Figure 19: Incineration plant

Incineration is the process of burning hazardous wastes at a high temperature. Incineration is conducted in incinerators, a type of furnace designed for burning hazardous materials in a combustion chamber. In this institution no hazardous wastes are generated.

7.15 Weather instruments

College has installed modern weather instruments in the campus to understand the weather conditions of the area. Weather warnings are very useful in taking precautions on weather variations. Forecasts based on temperature and precipitation is given to students so that they get prior information about the weather conditions. The students are getting an opportunity to understand different instruments needed for weather forecast and attracted towards meteorological and climatological studies.



Figure 20: Weather forecasting unit

7.16 Soil and Water Analysis.

The institution ensures the water quality by doing water analysis in recognized water testing laboratories. It was observed that the water analysis was done at least once in an academic year. Moreover ample drinking water facilities are provided to the stake holders. So it is well evident that the institution gives care and concern to health of the student community. Similarly it is observed that soil samples from the campus have been analyzed to understand about the quality parameters of the soil. Since soil is the medium for plant growth and also for the medium of hydrological cycle, the soil sustainability should be conserved. Amal College has given good attention in maintaining the quality parameters of soil and water.

Table 7.1: Result of Soil Test

Sample code	pH	EC	OC	P	K	Ca	Mg	Zn	S	Fe	Cu	Mn
A	5.20	0.009	0.93	19.5	136	75	24	0.68	5.5	1.23	0.59	0.80
B	5.10	0.014	0.80	17.4	129	78	21	0.66	5.1	0.99	0.61	0.92

Table 7.2: Result of Water test

Sl.No	Parameters	Open well Sample	Bore well 1 Sample	Bore well 2 Sample	Acceptable limit as per (BIS)
1	Colour	Colourless	Colourless	Colourless	
2	Odour	Odourless	Odourless	Odourless	
3	pH	6.60	6.50	6.00	6.5 -8.5
4	EC	217	257	268	500 (mS/cm)
5	Turbidity	0.5	1.2	1.4	1.00 (NTU)
6	TDS	215	331	347	500 (mg/l)
7	Iron	0.13	0.15	0.17	0.38 (mg/l)

8 . Recommendations

1. **Create a Biodiversity Plan:** Develop a comprehensive biodiversity conservation plan that outlines specific goals, strategies, and timelines. Ensure it aligns with the overall mission and values of the college.
2. **Native Landscaping:** Replace non-native and invasive plant species with native plants. Native plants provide essential habitat and food sources for local wildlife.
3. **Habitat Restoration:** Identify areas on campus that could be restored to their natural state, such as wetlands, meadows, or woodlands. These areas can attract and support a diverse range of wildlife.
4. **Butterfly Gardens:** Plant pollinator-friendly gardens with native flowering plants to support local bee, butterfly, and bird populations.
5. **Garden with RET species:** The KFRI (Kerala Forest Research Institute) provides different species of RET (Rare, Endemic and Threatened) species of plants which may be procured and planted in the campus.
6. **Bird houses and Bat boxes:** Install bird houses and bat boxes around campus to provide nesting sites for these species, which can control insect populations.
7. **Water Features:** Create and maintain natural water features, such as ponds or wetlands, to support aquatic life and attract amphibians and waterfowl.
8. **Education and Outreach:** Use the campus as a living laboratory for students and the community. Host workshops, lectures, and guided tours on biodiversity conservation.
9. Even though dustbins are kept at many parts of the college, litters were seen in the campus. Hence more awareness classes should be given to the students for keeping the campus free of litters.
10. It was observed that few water taps were not fully closed thus wasting water. Daily usage of water should be monitored and wasting of the precious water should be avoided.

11. The campus is green and clean, but the diversity of plant species is not enough for a campus area of twenty five acres. Hence campus biodiversification should be done with more indigenous plants.
12. The management should consider to establish robust botany and zoology departments in the college because life sciences will create an intimate relationship with students and environment.
13. Various birds, butterflies and other creatures including small wild animals were observed in the campus. So it is advised to expand the community forest to a natural forest with suitable indigenous plants, shrubs, herbs and climbers. A small forest in the campus can help to maintain the institutions' integrity to conserve its valuable flora and fauna.
14. Labels should be provided, for all trees in the campus. It is advised to do the labeling with QR code.
15. It is proposed to increase the number of medicinal plants in the campus by setting up a medicinal plants garden, especially to conserve various plants listed under the Rare Endemic and Threatened species, by Govt. of India.
16. Year wise green audit should be conducted on biodiversity, water, soil and energy by the internal audit team of the college.
17. Proper management and month wise mapping of water and energy usage to be conducted and recorded for future references.
18. The waste water from all sources of usage should be recycled and used for gardening and irrigation.
19. Research Opportunities: Encourage research projects focused on biodiversity on campus. This can involve students and faculty in ongoing conservation efforts.
20. Sustainable Practices: Implement eco-friendly and sustainable campus practices. Reduce pesticide and herbicide use, promote recycling, and reduce light pollution that can disrupt nocturnal wildlife.
21. Bhoomitrasena and Save Green Clubs: The Bhoomitrasena and Save Green clubs of the college must take initiative on biodiversity conservation involving students and teachers.

22. Collaborate with Local Organizations: Partner with local environmental organizations, conservation groups, and governmental agencies to gain support, share knowledge, and access resources for conservation efforts.
23. Monitoring and Data Collection: Regularly monitor the campus's biodiversity and maintain a database of observed species. This data can help in making informed conservation decisions.
24. Green Infrastructure: Incorporate green infrastructure elements, such as green roofs, permeable pavements, and urban forests, to improve ecosystem services and support wildlife.
25. Community Engagement: Involve the campus community in biodiversity conservation efforts. Encourage participation in planting, clean-up, and monitoring activities.
26. Policy and Planning: Ensure that biodiversity conservation is integrated into the college's long-term planning and policy decisions.
27. Celebrate Biodiversity: Host events and celebrations that promote the importance of environmental science such as Earth Day, Environment day, meteorological day, Ocean day, Soil day and Biodiversity Day.
28. By implementing these recommendations, the college campus can play a significant role in sustainable development, while educating and inspiring the student community to become responsible citizens.

9. Conclusion

Amal College is a well-established private institution of Malapuram district which imparts quality education to rural, tribal and urban people. This institution is excellent in terms of curricular and co curricular activities. The academic performance of many departments is very good and their basic knowledge on climate issues is appreciable. The institution has taken enormous efforts to maintain green campus, unpolluted water and tiny forests. The extracurricular activities through NSS, NCC, Bhoomitrasena and other Nature clubs benefit the rural and tribal communities of Nilambur. The audit team was influenced by the sufficient green cover area of the college campus and wish that the greenery should be protected to the maximum

extent. Of course the institution has to grow in future, so new construction cannot be avoided. On such inevitable situations, green building concept should be practiced so as to cause minimum damage to the natural resources of the campus area. Carbon foot print, green building concept, green and clean atmosphere and thereby environmental sustainability should be considered in every human interference on the ecosystem which is the habitat of innumerable microorganisms.

10. Acknowledgement

The OISCA International, South India Chapter audit team thanks the Management, Dr. Zacaria T.V the Principal, and Mrs. Suhana Mehar. M, the IQAC coordinator of Amal College, Nilambur, Kerala for entrusting us the green auditing of their campus. We express our gratitude to the teaching staff, nonteaching staff, and NSS volunteers of the college, for their friendly attitude and co-operation during the physical verification of the campus. We thank the internal audit team for the realistic approach in answering the green audit questionnaire. We hope that the concept proposed by the management for establishing and maintaining the green campus of the college is effective and viable in maintaining the environmental sustainability of this institution. The support from the college office for the verification of the documents is also highly appreciated.

Annexure – I**Photos taken during physical verification of the campus**

Figure 21: The audit team with the Principal and Management officials



Figure 22: The audit team in discussion with the Principal of the college



Figure 23: The audit team in discussion with the Principal, IOAC coordinator and internal audit team members.



Figure 24: Awards and appreciations



Figure 25: Weather prediction instruments



Figure 26: Community forests for earth ethics



Figure 27: Abundance of flora and fauna



Figure 28: Open well in the campus

Annexure – I1

Filed Questionnaire submitted by Amal College of Advanced studies.

1. General Details

Sl.No	Particulars	Details
1	Name of the college	Amal College of Advanced Studies Nilambur
2	Address	Shanthigramam. Eranhimanghad Post , Malappuram 679329
3	Contact Person	Dr. Shemeer Babu T, Ms. Suhana Mehar
4	Ph.No.of the Contact Person	9895996066
5	Email id	shemeerthappi@gmail.com , suhanamehar@amalcollege.ac.in
6	Annual working Days	210
7	Number of shifts	Day Shift (9 AM- 4 PM)
8	Number of Departments	11
9	Number of Buildings	10
10	Total Campus Area	25 Acre

2. Details of the green audit conducted earlier.

The institution conducts green, energy and environment auditing regularly in every year. We can attach the auditing reports of institution with this questionnaire.

Sl.No	Phase	Grade	CGPA%	Year of accreditation	Accreditation period
1	I				
2	II				
3	III				
4	IV				
5	V				

3. Details of the Students and Staff members of the college

	Female	Male	Others	Total
Students	820	608	0	1428
Teachers	23	33	0	56
Non-Teaching Staff	13	1	0	14
Approximate No of Daily visitors	65	200		265

4. Details of the Buildings in the Campus.

Sl.No	Floor	Total Built-up Area(Ft)
1	Commerce Block	2400
2	Language and Administrative Block	2400
3	BTHM Block	2600
4	Library Block	2200
5	Library Hall1	3600
6	Library Hall 2	2400

7	Economics. Psychology and Physical Education Block	1600
8	Toilet Block	800
9	Canteen	400
10	Administrative block	6800

TABLE 2: BUILDING AREA

Name of Block	Details	No: of Rooms
BLOCK A- Commerce and management	Class rooms	4
	Department	1
	Seminar Hall	1
	IQAC Office	1
BLOCK B- Administrative Office	Class rooms	18
	Department	5
	Computer Lab	1
	Administrative office	1
	Principal Room	2
	Exam. Cell	1
BLOCK C	Class room	2
	Department room	1
	Seminar Hall	1
	Management room	1
	Food service lab	1
	Food production lab	1
	Store	1
	Quantity Kitchen	1
BLOCK-D and E	Class room	8and6
BLOCKG	Psychology lab	1
	Department	3
	Fitness centre	1
Toilet Block	Toile tBlock1	1Set
Ladies Hostel	Rooms	18
Library		

Table 3 BUILDING DETAILS

Sl.No	Name of the Building	Purpose
1	Security Cabin	Security
2	Office Building	Administration
3	Academic Block I	Academic
4	Academic Block II	Academic
5	Library	Reading and Reference
6	Auditorium	Multipurpose
7	Canteen	Food supply

5. Details of the facilities available in the college

Sl.No	Facilities	Available	Not available	Number	Remarks
1	Office buildings	1		1	
2	Class rooms	40			
3	Departments	10			
4	Laboratories	4			
5	Auditoriums	3			
6	Library	1			
7	Hostel Facility	Not yet			
8	Guest house	0			
9	Staff quarters	0			
10	Canteen	1			
11	Recreation Centre	1			
12	Children's Daycare	0			
13	Prayer hall/Meditation centre	1			
14	Toilets for Gents	30			
15	Toilets for Women	30			
16	Toilets for physically challenged	1			
17	Gardens	3			
18	Playgrounds	3			
19	Garbage/Waste store yard	3			
20	Recycling Unit	2			

6. Details of the Campus Landscape

Sl.No	Questions	Answers	
1	Is there a garden in the college?	Yes	
2	Is there a botanical garden/herbal garden in the college?	Yes	
3	Is there a butterfly garden in the college?	No	
4	Do the students spend time in the garden	Yes	
5	Types and Total number of Plants in the Campus	Trees	Number
		Shrubs	
		Indigenous plants	Detailed description given below
		Exotic plants	
		Medicinal plants	
		Climbers	
6	Any threatened species conserved in the campus?	Not identified	
7	Approximate Fauna in the campus	125	
8	Do you have space to plant more trees in the campus in future?	Yes	
9	Have you displayed the scientific names of the plants in the campus?	Yes	
10	Have you adopted any landscape management plan? If yes, specify.	Under Process.	
11	How do you irrigate the plants	Appointed a Gardener to water the plants and A team of NSS and Bumithrasena are assigned for watering.	
12	Do you have any water bodies inside the campus	Yes	

13	The number of staff working in horticulture	1
14	Do you a Biodiversity Register?	yes

7. List of Plants on the Campus

Sl.No	Name of trees	Botanical name	Quantity
Location: Front of ADM block, behind library and new building			
1	Teak	<i>Tectona grandis</i>	4
2	Kanjiram	<i>Strynos nuxvomica</i>	5
3	Kanikonna	<i>Cassia fistula</i>	8
4	Ezhilampala	<i>Alstonia scholaris</i>	10
5	Dantapala	<i>Wightia tinctoria</i>	1
6	Poovaka	<i>Delonix regia</i>	2
7	Ungu	<i>Pongania pinnata</i>	8
8	Kumil	<i>Gmelina arborea</i>	4
9	Thanni	<i>Bahedab terminalia</i>	1
10	Charakonna	<i>Peltophorus pterocarpus</i>	1
11	Veeti	<i>Dalbergia latifolia</i>	4
12	Vatta	<i>Marcarangia peltata</i>	6
13	Aranamaram	<i>Monoon longifolium</i>	13
14	Parijatham	<i>Nyctanthes arbor-tristus</i>	3
15	Matti	<i>Akanthus excelsa</i>	4
16	Helikornia	<i>Helikornia psitiacorum</i>	200
17	Badam	<i>Terminalia castappa</i>	3
18	Ficus	<i>Ficus benjamina</i>	3
19	Arinelli	<i>Phyccanthus acidus</i>	1
20	Nadyarvattam	<i>Tasernae monsana divarikata</i>	35
21	Nelli	<i>Phyccanthus emblica</i>	1
22	Crotton	<i>Crotton</i>	3
23	Chethi	<i>Ixora coccina</i>	6
24	GreenArekka	<i>Cryrtostachys renda</i>	16
25	Karisu	<i>Butea monosporma</i>	1
26	Aathachakka	<i>Annona reciticucata</i>	1
27	Mavu	<i>Mangifera indica</i>	2

<i>Sl.No</i>	<i>Name of trees</i>	<i>Botanicalname</i>	<i>Quantity</i>
28	Noname	<i>Notidentified</i>	1
29	Karisu	<i>Butea monosporma</i>	4
30	Seemakonna	<i>Gliricidia sepium</i>	5
31	Mahagani	<i>Swietenia macrophycus</i>	1
32	Rubber	<i>Hevea brasiliensis</i>	2
33	Acacia	<i>Acacia nilotica</i>	1
34	Anapana	<i>Carvota urens</i>	1
Location:Main gate entrance to Herbal garden,College Ground, Back side of Main Block			
1	Aranamaram	<i>Monoon longifolium</i>	10
2	Teak	<i>Tectona grandis</i>	70
3	Matti	<i>Akanthus excelsa</i>	1
4	Kasumavu	<i>Anacardium occidentala</i>	3
5	Karisu	<i>Butea monosporma</i>	1
6	Asokam	<i>Saraca asoka</i>	1
7	Mahagnani	<i>Swietenia macrophycus</i>	1
8	Thengu	<i>Cocus nucifera</i>	4
9	Manimaruthu	<i>Terminalia arjuna</i>	4
10	Kanikonna	<i>Cassia fistula</i>	1
11	Noni	<i>Morinda citrifolium</i>	1
12	Mavu	<i>Mangifera indica</i>	3
13	Nelli	<i>Phyccanthus emblica</i>	1
14	Ungu	<i>Pongania pinnata</i>	1
15	Puli	<i>Tamarinduous indica</i>	4
16	Kanjiram	<i>Strychnos nuxvonica</i>	1
17	Parinni	<i>Bombax ceiba</i>	3
18	Peelivaka	<i>Leucena leucocephala</i>	1
19	Plavu	<i>Artocarpus hetcrophyllu</i>	5
20	Anapana	<i>Carvota urens</i>	2
21	Kanikonna	<i>Cassia fistula</i>	4
22	Vatta	<i>Marcarangia peltata</i>	5
23	Pannal	<i>Glycosmis pentaphylla</i>	1
24	Matti	<i>Akanthus excelsa</i>	1
25	Mahagani	<i>Swietenia macrophycus</i>	1
26	Poopathiri	<i>Sterospermum colias</i>	1
27	Parakam	<i>Streblus asper</i>	1
28	Uruvanchi	<i>Sapindus trifociatus</i>	3
29	Chadachi	<i>Grewia tilifolia</i>	6
30	Nelli	<i>Phyccanthus emblica</i>	5
31	Kumil	<i>Gmelina arborea</i>	5

Sl.No	Name of trees	Botanicalname	Quantity
32	GreenArekka	<i>Cyrtostachys renda</i>	25
33	Badam	<i>Terminalia camappa</i>	1
34	Ungu	<i>Pongania pinnata</i>	4
35	FashionFruite	<i>Passiflora educis</i>	1
36	Rubber	<i>Hevea brasiliensis</i>	210
Ladies hostel, front side of orphanage, on the way from main gate			
1	Kanikonna	<i>Cassia fistula</i>	1
2	Thengu	<i>Cocus nucifera</i>	7
3	Mahagani	<i>Swietenia macrophycus</i>	11
4	Nelli	<i>Phyccanthus emblica</i>	1
5	Kasumavu	<i>Anacardium occidentala</i>	1
6	Teak	<i>Tectona grandis</i>	3
7	Mavu	<i>Mangifera indica</i>	6
8	Nelli	<i>Phyccanthus emblica</i>	2
9	Puli	<i>Tamarinduous indica</i>	1
10	Ayani	<i>Artocarpus hirsutus</i>	1
11	Laxmitharu	<i>Simarocaba gcauca</i>	1
12	Ungu	<i>Pongania pinnata</i>	1
13	Aanapana	<i>Carvota urens</i>	5
14	Aryaveppu	<i>Azadirachta indica</i>	1
15	Pappaya	<i>Carica pappaya</i>	2
16	Puli	<i>Tamarinduous indica</i>	1
17	Maruthu	<i>Terminalia arjuna</i>	1
18	Uruvanchi	<i>Sapindus trifociatus</i>	1
19	Chadachi	<i>Grewia tilifolia</i>	3
20	Teak	<i>Tectona grandis</i>	67
21	Nelli	<i>Phyccanthus emblica</i>	1
22	Asokam	<i>Saraca asoka</i>	1
23	Maruthu	<i>Terminalia arjuna</i>	1
24	Plavu	<i>Artocarpus hetcrophyllu</i>	1
25	Mavu	<i>Mangifera indica</i>	6
26	Thengu	<i>Cocus nucifera</i>	12
27	Vazha		
28	Charakonna	<i>Peltophorus pterocarpus</i>	2
29	Narakam	<i>Citrus limon</i>	1
30	Chembaruthi	<i>Hibiscus rosasilensis</i>	1
31	Asokam	<i>Saraca asoka</i>	3
32	Mandaram	<i>Bauhnia accuminata</i>	1
33	Crotton		3

Sl.No	Name of trees	Botanical name	Quantity
34	Aranamaram	<i>Monoon longifolium</i>	2
35			
36	Plavu	<i>Artocarpus hetcrophyllu</i>	9
37	Kaladhatta		1
38	Chadachi	<i>Grewia tilifolia</i>	4
39	Mahagani	<i>Swietenia macrophycus</i>	4
40	Kasumavu	<i>Anacardium occidentala</i>	1
41	Pannal	<i>Glycosmis pentaphylla</i>	1
42	Puli	<i>Tamarinduous indica</i>	1
43	Kasumavu	<i>Anacardium occidentala</i>	1
44	Kumil	<i>Gmelina arborea</i>	1
45	Mavu	<i>Mangifera indica</i>	5
46	Mahagani	<i>Swietenia macrophycus</i>	5
47	Teak	<i>Tectona grandis</i>	23
48	Kasumavu	<i>Anacardium occidentala</i>	3
49	Ventekau	<i>Gmelina arborea</i>	1
50	Aanapana	<i>Carvota urens</i>	2
	Total		768

5. Waste Minimization and Recycling

Sl.No	Questions	Answers
1	What is the approximate amount of wastes generated per day?	125 litre
2	Food waste/organic waste	65 litre
3	Plastic wastes	25litre
4	Dry waste/Paper waste	25 litre
5	E-waste	5 litre
6	Laboratory waste	Nil
7	Others if any	5 litre
8	How is the waste on the campus managed? <ul style="list-style-type: none"> • Composting • Recycling • Reusing • Burning • Any other method 	Composting Biogas plant Recycling Burning
9	Have you taken any initiative to spread the Message of scientific waste management in society? If yes, give details.	Yes. The institution organizes programs to make the public aware of preserving greenery and managing wastes properly under the clubs like Bhoomithra Sena, Nature club and NSS
10	No of garbage bins in the campus	12

Questionnaire for Water Management Auditing

Sl.No	Questions	Answers
1	What is the total area of the campus?	25 Acre
2	Number of total teachers, non-teaching staff and students in the campus	Teachers 56 Non-teaching staff 14 Students 1428
3	What are the different sources of water in the campus?	Open well, bore well, rain water harvesting
4	Is there water scarcity in the campus during summer season?	No
5	How many wells are there in the campus?	Three. Two bore wells and one open well
6	How many electric motors are used for pumping?	4
7	What is the total horse power of pumping systems?	9.5 HP
8	What is depth of the deepest well in the campus?	16ft
9	Provide the water table of all the wells in the campus	300ft, 410ft
10	Do you have a tube well? What is its depth?	yes
11	How does the college store water?	Tanks
12	Capacity of the overhead tank/synthetic tanks in campus/ liters	19000 ltr, 2000 ltr, 3000ltr, 10,000lt
13	What is the quantity of water pumped every day?	
14	Is there any water wastage?	No
15	What is the mechanism in the campus to identify water wastage?	
16	How is the waste water disposed?	Recycling and gardening Vegetable , fruit garden
17	Do you reuse the waste water after recycling it?	yes
18	What are the systems of management of water used in the labs, especially chemistry lab?	Nil
19	Is there any treatment of wastewater from labs?	Nil
20	Does this water leach into aquifer?	NA
21	Is there a system of practice of green chemistry in the college campus?	NA
22	Provide the record of water used, from the college water meter for the last six months	
23	Number of water coolers in the campus	10
24	Number of water purifiers in the campus	4
25	Number of water taps in the campus	154
26	Number of damaged water taps if any	0
27	Number of bathrooms and toilets in the college campus	35
28	Number of bathrooms and toilets in the college hostels	
29	Total number of bathrooms / toilets	45
30	Amount of water used per day in the bath rooms/toilets	10,000 ltr
31	Number of water taps in the canteen	3
32	Amount of water used in the canteen in liters	3000ltr
33	Number of water taps in each laboratories	2000ltr
34	Amount of water used per day in each lab	2000 ltr
35	Is there any rainwater harvesting system in the campus? If yes, details of the storage capacity	YES
36	Report of the status of their functioning	Using for watering Gardens

37	How many water fountains are there in the campus?	0
38	Amount of water used for the college vehicles cleaning in liters/day	0
39	Amount of water used for irrigation purpose	65 liter
40	How often the gardens are getting irrigated?	On day basis
41	How often the quality of drinking water is analyzed?	Once in 2 months
42	What is the frequency of cleaning the overhead tanks?	Weekly
43	Provide a list of month wise water usage in different areas of the campus	
44	Area of the college lands under tiles	
45	Is there any water saving techniques followed in the campus?	Water recycling
46	Is there any mechanisms for spreading the message of water conservation to the students	Posters and campaigns
47	Do you have a water gauge in the campus?	Yes
48	What is the average rainfall in the campus?	255.09 millimeter
49	What is the average rainfall in the Chaliyar GP	
50	Is there any future plan for water management?	yes

Water quality Monitoring

Sl.No	Questions	Answers
1	Do you have a water purification system?	Yes
2	What are the possibilities of water pollution in the campus?	Nil
3	Which are the sources of waste water?	Kitchen
4	What is the distance from waste water points to the water sources?	
5	Any water wastage/why?	
6	Do you use this waste water for any purpose?	
7	How is the waste water from labs disposed? Any treatment for the waste water from lab?	To garden
8	Whether any green chemistry method is practiced in labs?	No labs are using water Water from hotel management lab is directed to vegetable garden
9	Is there any chance for the waste water from labs to leach into aquifer?	Nil
10	Are there any sign boards reminding people to use water cautiously?	Yes
11	Do you analyze the quality parameters of drinking water?	Purifiers are being used
12	Have you analyzed the presence of coliform bacteria in the water sources of the campus	Yes
13	How often you check the pH of the water in the open wells?	Yearly
14	What are the practices followed to maintain the water quality in the water resources of the campus	

I. ENERGYAUDIT**LIGHT AND FAN LOADS**

Particulars	LED	LED	LED	LED	LED Tube	T8tube	Wall fan	Ceiling fan	P.fan	Exhaust fan
Wattage	6	9	50	18	20	36	60	60	60	20
Number	61	209	3	13	73	10	18	276	2	4
Total(kW)	0.366	1.881	0.15	0.234	1.46	0.36	1.08	16.56	0.12	0.08
Net Total (kW)	22.2									

COMPUTER AND PERIPHERALS

Particulars	PC	Projector	Scanner	Printer	Printer	Xerox	TV
Wattage	120	100	20	300	400	600	120
Number	96	1	1	6	3	1	3
Total(kW)	11.52	0.1	0.02	1.8	1.2	0.6	0.36
Net Total (kW)	15.6						

AIR CONDITIONERS

Capacity	Star Rating	Quantity	Power consumption
1.5	5	1	1.452
2	No star	3	7.8
Net Total (kW)	9.25		

MISCELLANEOUS

Particulars	Mixer	Grinder	Fridge	Water cooler	Freezer	Oven	Pump	Pump
Wattage	300	500	250	500	150	800	3728	1118
Number	1	2	2	5	1	1	1	1
Total(kW)	0.3	1	0.5	2.5	0.15	0.8	3.728	1.118
Net Total(k W)	10.09 6							

Best Practices for Energy Conservation followed in the college

: ENERGY PERFORMANCE INDEX

Energy Performance and climate impact	Unit	Baseline	Projection
Annual Electricity Consumption	kWh	14,692	13,146
Annual electricity consumption	TOE	1.26	1.13
Annual Diesel Consumption	Liters	180	180
Annual Diesel Consumption	TOE	0.17	0.17
Annual LPG Consumption	Kg	120	120
Annual LPG Consumption	TOE	0.13	0.13
Total Energy Consumption	TOE	1.56	1.43
Energy Performance Index	TOE/Sq.m	0.000178181	0.000163
Annual Energy Cost	Rs in lakhs	98,686	88328.2
Annual Specific Electricity Consumption	kWh/Student	10.04	8.98
Annual Specific Electricity Consumption	kWh	1.68	1.50
Annual Specific Electricity Consumption	TOE/Student	0.000863055	0.000772238
Annual Carbon Footprint-Electricity	TonCO2	11.61	10.39
Annual Carbon Footprint-Diesel	TonCO2	0.48	0.48
Annual Carbon Footprint-LPG	TonCO2	0.19	0.19
Annual Specific Carbon Footprint	TonCO2/Student	0.0084	0.0076

Note: Unit conversions:

TOE = 10millionkCal(BEE energy audit manual)

MWh of electricity = 0.79TonofCO₂(www.cea.gov.in)

Kg of LPG = 10500 k Cal (BEE energy audit manual)

Liters of Diesel = 9500k Cal (BEE energy audit manual)

k Wh of electricity = 860 k Cal(BEE energy audit manual)

1	What is the energy management practices employed in the college?		SOLAR AND GRID		
2	Are there any alternative energy sources installed in the college?		Solar Energy, wheeling to the Grid		
3	How many units of electricity are consumed per month?				
Particulars	Unit	Quantity	Gross calorific value (k Cal)	Million k Cal (Toe)	Percentage of Distribution (%)
Electricity(KSEBL)	kWh	14692	860	1.26	80.97

II. Air Audit

Sl. No	Questions	Answers
1	Are the classrooms well ventilated?	yes
2	Window– floor ratio of the rooms	6 windows/4 windows
3	Provide the details of college - owned vehicles	No vehicles
	Bus	
	Car	16
	Van	
	Others	
4	Specify the types of fuels used in the college vehicles	
5	Air Quality Monitoring Programme if any	Nil

III. CARBON FOOT PRINT AUDITING

1. Total number of students and teachers in the college

Gender	No of students	No of teachers	No of Non-teaching staff
Male	608	33	13
Female	820	23	1
Transgender	0	0	0
Total	1428	56	14

2. Total number of vehicles used by the stakeholders of the college/day 80

3. No of cycles used in the campus/day

8

4.No of two wheelers used. (Average distance travelled, power of engine and quantity of fuel used/day) 65

5. No of cars used(average distance travelled, power of engine and quantity of fuel used/day)15

6. No of persons using public transport (average distance travelled) 1300

7. No.of persons using college conveyance (average distance travelled)

8. No of PTA meetings in year and the average no of participants.18, 60 average

9. Mention their mode of travel and the average distance travelled.

Cars, two wheelers and bus

10. No of visitors with vehicles/day

20

Sl. No.	ARE A	Measured CO ₂	Standard CO ₂ level(Range)	Remarks
Commerce Block				
1	Class room	600	300-500	Good
2	Corridor	425	300-500	Good
4	HOD room	650	300-500	Good
Language and Administrative Block				
1	Class room	560	300-500	Good
2	Corridor	450	300-500	Good
3	HOD Room	550	300-500	Good
4	Principal Office	550	300-500	Good
5	Office	360	300-500	Good
Miscellaneous and others				
1	Canteen	550	300-500	Good
2	Library	450	300-500	Good

TABLE 4: CARBONDIOXIDE LEVELS

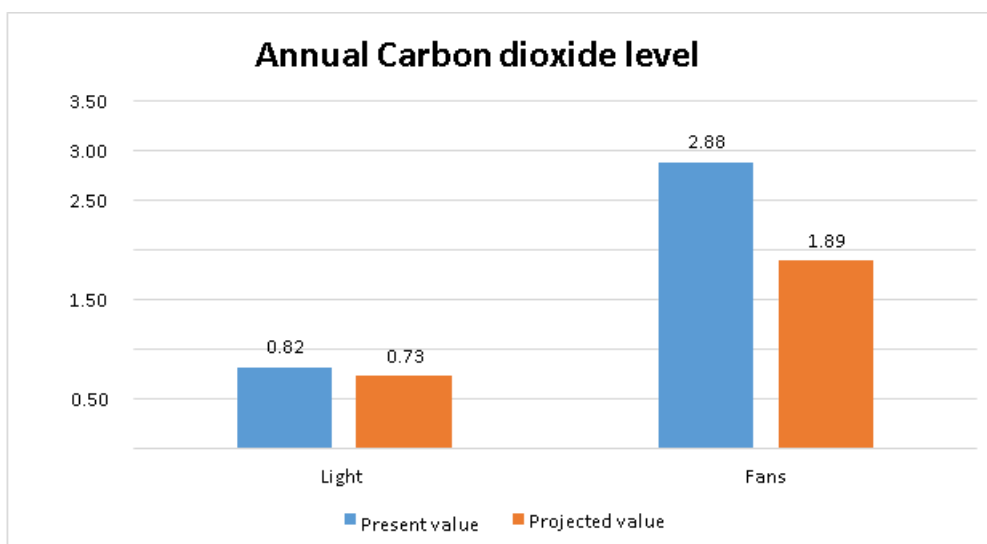
Particulars	Unit	Quantity	Gross calorific value (kCal)	Million kCal (Toe)	Percentage of distribution (%)
Electricity(KSEBL)	kWh	14692	860	1.26	80.97
Diesel(Approx.)	Litres	180	9500	0.17	10.96
LPG(Approx.)	Kg	120	10500	0.13	8.07
Total				1.56	100

DIESEL CONSUMPTION ANALYSIS

Annual consumption (L)	Calorific value (TOE)
180	0.17

TABLE9: LPG CONSUMPTION ANALYSIS

Annual consumption (Kg)	Calorific value (TOE)
120	0.13



11. What are the methods that can be adopted in future to reduce the quantity of fossil fuel used By students, teaches, on-teaching staff and other stakeholders of the college

- Cycles will be given to students
- Vehicle pooling will be introduced for teachers

12. What are the methods adopted to fix CO₂ to combat climate crisis

- Vehicles are banned inside the campus
- More pedestrian friendly footpaths are designed
- Planting more trees

- Vegetable and fruit garden

Best Practices of the College for Environmental Education

Sl.No	Programmes	Description	Remarks
1	Certificate courses	1) Certificate courses on Environmental studies 2) Ecology and literature	
2	Eco friendly soaps and detergents	College promotes production, exhibition and sale of eco friendly products through ACCA BAZAR and IEDC	Learning by doing
3	Fish pond	The pond is aimed for water conservation	
4	Herbal Garden/Butterfly garden	Herbal garden	
5	Vegetable garden	By Bhoomithra sena	
6	Organic farming/GAP promotion	NSS and Bhoomithra sena	
7	Water treating plant	Awareness classes are conducted	
8	Soil/Water/Biodiversity conservation	Soil day, water day and biodiversity days are commemorated with suitable programmes.	
9	Green land scaping	All the available spaces in the college are beautifully landscaped and plants are grown.	Green belts
10	Community Forest	Kuttivanam is a project of Amal College)	Kuttivanam
11	Value Education	Values are correlated from suitable topics from the syllabus.	Fruit gardens and vegetable gardens
12	Environmental Education	Certificate Courses	
13	Field visits	NSS	
14	Nature experience camps	Conducted by Nature Club, the camps are meant for nature club members and other students of Campus.	