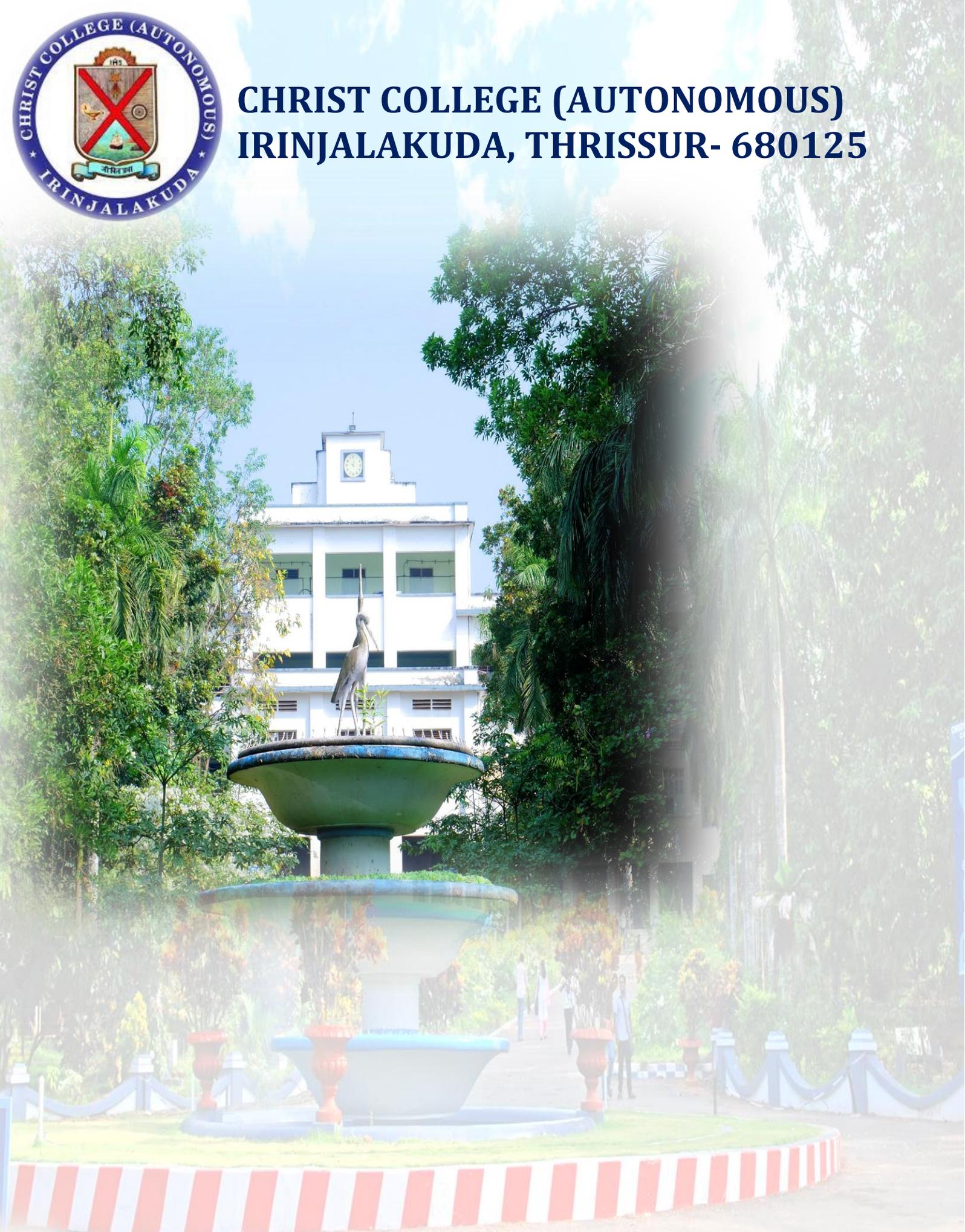




**CHRIST COLLEGE (AUTONOMOUS)
IRINJALAKUDA, THRISSUR- 680125**



GREEN AUDIT 2018

What is a Green Audit?

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. It aims to analyse environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience.

Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric carbon-di-oxide from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

In recent time, the Green Audit of an institution has been becoming a paramount important for self-assessment of the institution which reflects the role of the institution in mitigating the present environmental problems. Many institutions undertake lot of good measures to resolve these problems but are not documented due to lack of green documentation awareness. All this non-scholastic effort of the administrations plays an important role in ensuring the green quotient of the campus is intact.

Therefore, the purpose of the present green audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards.

Main Objective of Green Audit:

- Geographical Location
- Floral and Faunal diversity
- Meteorological parameter
- Energy Consumptions
- Waste disposal system
- Ambient Environmental Condition
- Awareness & Training on Sustainability for Students

About the institution

Christ College, nurtured and nourished by the collective will of the people of Irinjalakuda, has its origin in 1956 at Mangadikunnu, then a forlorn hill on the outskirts of Irinjalakuda Municipality. Christ College was started in 1956, by the Devamatha Province of the Carmelites of Mary Immaculate (CMI). The college was formally inaugurated by Sri. B. Ramakrishna Rao, Governor of Kerala on October 13th, 1957. The College started with 240 students and 14 members on the teaching staff. At present it has 22 departments of study, 21 UG programme, 15 PG programmes, managed by 160 teachers and 60 members of the non-teaching staff. About 4100 students are currently enrolled in the college both in the aided and unaided stream. Our vision of college is 'Moulding an enlightened generation by developing the potential of individuals through quality higher education and moral value inculcation'. The vast area of these 49 -acre campus of the college is full of greenery and it acts as the lungs of Irinjalakuda Municipality. The water table in the municipal area has been raised due to the mass level campaign conducted by us for ground water recharging and also due to the support services given by us for the same. The energy utilized from KSEB is nil and we have made our campus as carbon neutral and no municipal water usage. Our Christ College is well known in all aspects of education, arts and sports fields in

Kerala. There are facilities for Physical Education without door and indoor stadiums for volley ball, badminton and basketball etc. Our College is one of the best colleges in Kerala when it comes to Environment – protection, conservation activities and all its related programmes. (Base Management, Rain water harvesting, Energy Conservation, Solar Power Generation, Eco-friendly, Green Campus activities, etc.). Christ College bagged the following awards for the same.

Energy conservation award	2011
Kerala state biodiversity award	2012
Calicut university green campus award	2014
Kerala state biodiversity club award	2015
Malayala Manorama palathully peruvellam award	2016
Best biodiversity researcher award	2016
Best environmentally friendly award	2019



INNOVATIONS AND BEST PRACTICES

Apart from the usual academic programmes and those associated with day-to-day student activities, the College gives due importance to certain programmes which are relevant in the present scenario and will develop the social awareness of the students. These activities are spearheaded by various clubs functioning in the College, with the active participation of students, under the guidance of the faculty and the Principal. Among these, Adventure Club, Biodiversity Club, Tourism Club and *Bhoomithrasena* Club require special mention.

Environment Consciousness

Christ College is the only College that offers M.Sc. Environmental Science Course under the affiliated University. The innovative PG Diploma programme in *Sustainable and Green Energy Technologies* was started by the College during the academic year 2013-14. The important days like Earth day, World Environment day, International Biodiversity day, World Wetland day, Ozone day and World Bamboo day are celebrated in the College by conducting seminars and awareness talks by eminent and renowned personalities. Nature and wildlife photography exhibitions are conducted in the College jointly with recognized photographers of Kerala. Among the various activities initiated, the Forest and Nature Study Camps conducted by

the Adventure Club and *Bhoomithrasena* Club at Parambikulam Wildlife Sanctuary, Chimmony Wildlife Sanctuary, Silent Valley National Park, Athirappilly forest and Wayanad Wildlife Sanctuary deserve special mention.

Awareness Display Boards are exhibited in the campus to generate environment consciousness among the student community. The College maintains a Mini-biodiversity Reserve with a number of domesticated wild animals in the campus abiding by strict rules and with the consent of Department of Forest, Government of Kerala. A total of 489 species of diverse plants are found in this campus, which bagged the first Green Campus Award instituted by the University of Calicut during 2013-14. This lush green campus acts as a tourist centre and is visited by a number of people, especially kids and school children from the nearby community. The flora and fauna of the College give an unparalleled experience to any passerby who steps into the campus. The Museums, attached to the Departments of Zoology and Geology, are centres of attraction of students in and out of the campus. In a joint venture, the faculty, students and the Forest Department cleaned the area between the well-known tourist places Thumburmuzhy and Athirappilly, which was later declared as a plastic free zone. The College conducts energy audit, water audit, waste audit and vegetation/ecological audit of the campus under the leadership of the

Department of Environmental Science in. The details are as follows.

Energy Audit

- ⊙ Two months' average energy consumption of Christ College is 10,232 units.
- ⊙ Two months' average solar energy production is 1034 units.
- ⊙ The highest energy consuming units are the Physics lab, the Library and the College Administrative Office.
- ⊙ The College Administrative Office, the Principal's Office, IQAC Office, Exam coordination room, Seminar Hall and five classrooms are working exclusively on solar energy.
- ⊙ Energy efficient LED and CFL lamps are used in the campus.

Water Audit

- ⊙ Average per day water consumption in the College is 3200 litres.
- ⊙ During monsoon season, 70% of the total water consumption is from rainwater, which helps to save energy and power.
- ⊙ The Department of Chemistry uses rainwater instead of distilled water to a great extent.
- ⊙ The highest consumer of water is the Chemistry UG lab. The other top consumers are the PG and research labs.
- ⊙ Weekly water consumption of Chemistry lab is about 1256 litres.

- ⊙ Annual rainwater harvesting is approximately 10.86 lakh litres.

Waste Audit

- ⊙ Waste generated from the College is classified in to four groups namely, biodegradable waste, non-biodegradable waste, hazardous liquid waste and non-hazardous liquid waste.
- ⊙ Solid waste generation per month is about 750 kg, of which about 79% is biodegradable waste.
- ⊙ Liquid waste generation per month is approximately about 5000 litres.

Vegetation/Ecological Audit

- ⊙ Annual Vegetation Cover Analysis reveals that total vegetation cover of the College in the current year is 48 acres.
- ⊙ The vegetation area is increased by 1.39 acres,
- ⊙ Around 300 new seedlings have emerged in the current year
- ⊙ 24 new species have been established in the current year.
- ⊙ Annual loss due to natural and anthropogenic activities in the current year: 16 trees.
- ⊙ 600 ecologically and economically important plants have been planted in this year.

Major Energy Conservation Activities

Our institution always looks for sustainable energy conservation in the campus to motivate the younger generation to overcome the present environmental issues. With this the students along with the society can avail the positive outcomes of green energy. They can come out with new ideas that can lead to save and serve the mother Earth. The traditional ways of tapping energy resources that lead to serious environmental issues that can be irradiated by using natural way of creating renewable energy sources. By this we can propose an innovative solution for global warming and problems related with climate change. Eco friendly energy sources are essential for the existence of life especially human existence. Nature is gifted with all source of clean and green energy. It is our responsibility to make use of these forms of energy so that the life can be sustained in an intelligible way. We know that sun is the central source of all energy as well as a special gift for humankind. More than its economic benefits, the energy that we produced through solar power is a renewable, harmless, zero wastage and nature friendly energy. Through these practices we mould a community for future, which can pass this batten to their future generation. It was one of our objectives to reduce the impacts associated with high energy demand and consumption and decided to go for more sustainable options like the use of solar energy instead of the non-renewable sources of energy.

Solar Energy Harvesting

Utilizing the financial support from UGC and the Management, solar panels have been installed in the campus.



Off Grid Solar System

Total output	Output/panel	No. of panels
10kW	250 watts	40
10kW	325 watts	30
10kW	325 watts	30
5kW	135 watts	37

On Grid Solar System

Total Output	Output/panel	No. of panels
100kW	325 watts	308
70kW	335 watts	224

Walk ways are constructed all around the solar system. Proper cleaning of solar panels is done for maintaining the performance of the solar energy. The power from solar sources is harnessed into 12V, 150 AH tubular batteries (10 numbers) and is effectively used in the Office and in the Principal's chamber. As a result, the College has saved approximately Rs. 10000/- per month by way of electricity charges.

INNOVATION START-UP: SOLAR DRYER

The Chemistry department of our college initiated a start-up for students. The first start-up is to develop a solar dryer. The solar dryer is used to dry fresh agricultural products. The first solar dryer was given to Dr. V.P. Joseph. We initiated lot of other start-ups in the college after the successful completion of this work.

Biogas Plant

A 25m³ Biogas plant is constructed behind our mess of boys' hostel. This reduces our consumption of LPG. The kitchen wastes from canteen and mess is fed into the Biogas plant. Approximately 10 Kg of LPG to reduce per day by the installation of this Biogas plant.



Reduction in LPG	:	3000 Kg
Annual financial savings by the installation of Biogas plant	:	Rs. 1,65,000
Project cost	:	Rs. 6,75,000
Requirement of LPG/ day in hostel mess before installation of LPG	=	24 Kg
Requirement of LPG/ day after installation	=	14 Kg

By installing biogas plant, we can keep the campus clean. Our hostel accommodates around 600 students. The problem that we face related to food wastage from the Mess as well as from the canteen is very serious. Even though it's a serious issue, we have converted this situation into a mode of producing natural energy. This mode of scientific way of managing waste helps us to keep our campus clean and healthy. The slurry (manure) from the biogas plant is used in our campus for agricultural purpose. The economic benefits associated with the reduction in consumption of LPG, the aesthetic values and moreover the positive impacts on environment in the form of mitigation of global warming and greenhouse effect were the main attractions for moving towards such a greener option for the management of degradable waste. We are also aware of the Solid waste management rules 2016 which specifies the mandatory scientific management of waste.

Replacement of FTLs with LEDs

Particulars	Details of FTLs replaced	Details of LEDs
246 Hostel Rooms	246 nos (60 watts)	09 watts (bulbs)
122 Class rooms	244 nos (60 watts)	15 watts (tubes)
Common area	180 nos (60 watts)	15 watts (tubes)
Mess Hall	60 nos (60 watts)	15 watts (tubes)
Conference hall	30 nos (60 watts)	09 watts (bulbs)
Laboratories	120 nos (60 watts)	15 watts (tubes)

Rainwater Harvesting

The total rainwater harvesting capacity of the institution is 4 lakh litres. This much of water is collected and utilized on every rainy day (Per month around 1.4 crore litres). This fulfils the complete need of all the students and staff of the institution. All the concrete buildings in the campus, which together have a roof area of 50,000 square feet have the capacity to collect water in cement tanks. There is one large ferro-cement tank with a capacity of 80,000 litres. Only water collected in such tanks is used in the laboratories and hostels of the institution. Excess water from the collection is utilized for watering plants of the college garden and cultivation of vegetables within the campus. Thus, not a drop of rainwater that falls in the campus is wasted. The pressure of water built up in these tanks helps maintain a steady flow of water, without any need to use motor pumps. This also helps in energy conservation. The Biodiversity Club of the institution maintains a garden of

481 species of plants in 60 acres of the campus and surrounding area. Besides providing shelter to the local biodiversity, the trees help maintain structure of the soil and prevent the fast outflow of water. This helps in recharging the groundwater. Three large ponds have been dug in the campus to augment the water-holding capacity and water availability in the campus. The 20-hectare campus of Christ College functions as an effective catchment area of the region. The Mangadikunnu region where the institution is located used to face water scarcity in the dry months, but now the local residents of four wards, namely 12, 23, 32 and 36 of the Irinjalakuda municipality have attested that these efforts made by the institution have increased the water availability in their well.

The Department of Geology and Environmental Science of Christ College also tests the quality of water for a nominal price. People from far and near have made use of this facility for testing the quality of well water. The demand for such a facility increased after the back-to-back floods faced by Kerala in the years 2018 and 2019. The lab offered free testing of water quality for 2 months after the floods and the operating staff worked tirelessly in those months for meeting the demands of local residents.

The Biodiversity Club and the Department of Geology and Environmental Science of the College continuously engage students, research scholars and laymen in talks, seminars and other activities for raising awareness about

environmental conservation and judicious use of natural resources. The institution has received numerous accolades mentioned before, in recognition of these activities. The Biodiversity Club of the college joined hands with National Service Scheme (NSS) volunteers and cleaned two large ponds in Irinjalakuda municipality within a week as part of Gandhi Jayanti celebrations. Aquatic weeds like water hyacinth and waste dumped in the ponds were completely removed. A whole day was dedicated for door to door awareness campaign in the wards in which the ponds were located to stop further dumping of waste. The two rejuvenated ponds have started acting as effective water sinks. They provide a continuous supply of water to the local residents.

Mazhakuzhi (Rain pits)- Small

1 x 1 x 0.3 (250 nos) = 75m³

Mazhakuzhi (Rain pits)- Large

Dimension (metres)	Volume (m³)
3 x 3 x 2 (length, width, depth)	18
3 x 3 x 2	18
3 x 2.5 x 1.5	11.2
3 x 2 x 1	06
2 x 2 x 1	04

Rain water collection near main building



Rain water collection near Gents Hostel



Behind the hostel canteen Rainwater collection pond for ground water feeding.



Check Dam Construction

- ⊙ Check dams are constructed in the major rainwater run-off ways within the campus.
- ⊙ Water harvesting arrangements are made in the College garden. *Thadayanas* are constructed to prevent erosion and allow water to drain down in the garden itself.

Efforts for Carbon Neutrality

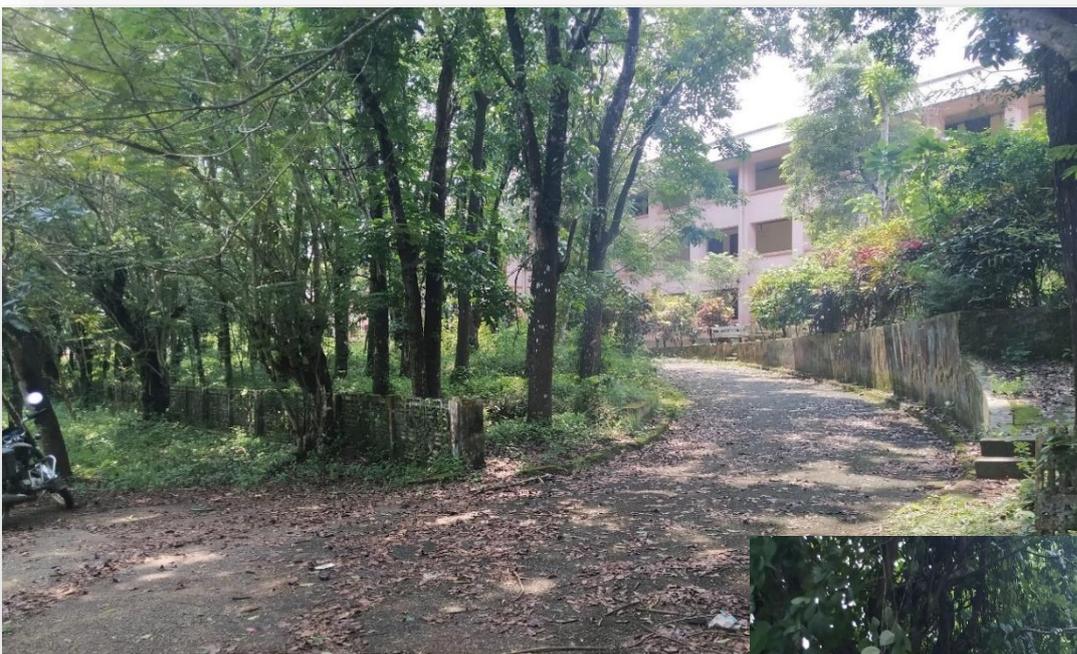
- ⊙ The College maintains a beautiful garden that spans a considerable area of the College premises and consists of several rare species of plants.
- ⊙ In order to participate in the world-wide drive for neutralizing the adverse effects of carbon emission, the NSS units have made commendable efforts by planting trees in the *Green Valley*
- ⊙ The jackfruit and gooseberry orchard and bamboo and teak plantations are also maintained in the campus in order to promote the drive for carbon neutralization, thereby maintaining oxygen in the campus
- ⊙ The programmes 'One Goal One Tree' and 'One Prior Mango Sapling for One House' were initiated by the Biodiversity Club with the objective of reducing carbon footprint.
- ⊙ The Department of Botany prepared a flora of the campus and the vernacular, scientific and family names of trees are displayed. A total of

489 species of plants (480 Angiosperms, 4 Gymnosperms, 5 Pteridophytes) have been identified which includes 197 species of trees. The plant biodiversity of the campus is documented with photographs.

Plantation

- ⊙ *Harithavalkaranam* Project: In June 2011, 800 trees were planted in the College campus by the staff and students and in 2013, 100 mango saplings were planted.
- ⊙ *Vanamaholsavam, 2014*: In the 'One Goal One Tree' and 'One Prior Mango Sapling for One House' programmes initiated by the Biodiversity Club, saplings were planted.
- ⊙ The '*Nakshthraavanam*' is a plantation drive initiated by '*Bhoomithrasena*' Club and the Department of Botany in the campus. Their saplings are exhibited in the College garden.
- ⊙ One acre of the campus land, called the *Green valley* is maintained by NSS volunteers. World Environment Day (5th June) is celebrated every year by planting saplings.
- ⊙ The Biodiversity Club and the Department of Botany maintain 20 cents as "*Santhisthal*", where the saplings of RET are planted and nursed.
- ⊙ The celebrities and renowned persons who visit the campus are requested to plant saplings.

- ⊙ Saplings of gooseberry, jack fruit, ficus, teak and several rare plants are planted on the sides of the inner roads of the campus.
- ⊙ Students studying animal sciences get extra ordinary opportunities chances to study the behaviour and diversity of birds, butterflies and spiders inside the campus.
- ⊙ The Department of Botany has conducted a thorough study of flora of the campus and has documented several medicinal plants and a rare ground orchid.
- ⊙ The campus has medicinal plant garden and 110 medicinal plants.



Front side of Boys
Hostel



On the way to LADIES Hostel



Management of hazardous waste

The College has not dealt with hazardous wastes such as radioactive ones or explosives till now. It takes utmost care not to generate hazardous wastes in the campus. The wastewater and chemical and biological wastes as a result of routine practical/research works in UG/PG/Research labs are pipelined into pits, which are pre-filled with charcoal and bricks, to facilitate absorption of hazardous chemicals, if any. The Department of Chemistry has now adopted micro level analysis to reduce the hazardous chemicals.

E-waste management

The campus has not yet faced any serious issues regarding e-waste management.

- ⊙ Some of the computer parts and components are reused (mother board, processor, chip, capacitor etc.)
- ⊙ Hardware is given to students for study purpose.
- ⊙ Some of them are used to present in IT exhibitions
- ⊙ Refurbishment of computer peripherals –the old devices are returned to the authorized company to reduce e-waste
- ⊙ As far as possible some of the old computers, printers and scanners are auctioned through suitable agencies.

- ⊖ Special dust bin (Floppies, pen drives, spare parts etc.) is provided for the e-waste management, but such wastes are not common in the College.

Water Analysis Lab

The service of the Water Analysis Lab of the College is available for the public also. Water samples are tested to identify Chemical, Physical and Biological parameters. The facility is also available for project and research work.

Promoting biodiversity research and publications:

The College promotes biodiversity research and the Department of Zoology has documented various rare species of spiders from different parts of Kerala and published them in various national and international research journals. Biodiversity projects, done by M.Sc. Environmental Science students, include the plant biodiversity of sacred groves and wetlands of Thrissur district. The algal biodiversity of community and temple ponds, rivers, canals, paddy fields and backwater areas in Thrissur district are surveyed and published. Researchers and students are engaged in developing various conservation measures that can be implemented for *in situ* or *ex situ* conservation of threatened species of fishes. Some of the research students are involved in describing the effects of various pollutants in biological systems. The College has maintained a repository of natural history, with several rare and exotic specimens of animals and aquariums, in which many of the threatened fish species are kept live to enable their identification by students.

As part of a research project on the conservation of threatened fish species through induced breeding and reintroduction of laboratory bred indigenous fish species, it is possible to reintroduce thousands of fish fingerlings into their natural habitats. These include some of the endangered fish species.