

Govt. Kamla Nehru Girls College, Damoh

Green Audit Report



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Executive Summary

The Environmental sustainability is essential for humans and other organisms of earth. It depends on mainly ability to change our lifestyles and prevention of higher rate of consumption of earth resources.

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment. The College believes that there is an urgent need to address these fundamental environmental problems and reverse the trends. The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution.

Green Auditing of a Higher Education Institution is required as a part of Criterion VII (of the 7 criteria prescribed) under the Guidelines for Submission of the mandatory annual Internal Quality Assurance Report (IQAR) by Accredited Institutions.

It works on the several facets of Green Campus including Water Conservation, Tree Plantation, Waste Management and Paperless Work. With this in mind, the specific objectives of the audit was to evaluate the adequacy of the management control framework of environment sustainability as well as the degree to which the Departments are in compliance with the applicable regulations, policies and standards.

Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staff in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analyzed for its parameters. Collected data was grouped, tabulated and analyzed. Finally a report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of campus is documented.

Introduction

Environmental audit or Green audit reflects evaluations that help us to identify environmental compliance and management system, implementation gaps, along with related corrective actions. Green audit is a useful tool to determine how and where the most energy or water resources are being used, the type and volume of waste generated and can then considerations be given on how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. Overall, it plays a vital role in imparting a better understanding of Green impact on campus to staff and students.

Need for green audit

As environmental sustainability is becoming an increasingly important issue for the nation and worldwide. The higher educational institutions can play an important role to increase awareness associated with environmental sustainability. So it is essential to adopt the system of the Green Campus for the Institutes which will lead to sustainable development. Green Audit is assigned to the Criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India that accredits the institution according to the scores assigned at the time of accreditation. NAAC has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Foot print reduction measures.

Objectives of the audit

To upgrading practices of sustainability with regard to the use of water and energy, management of wastes, transportation, purchase of goods, etc

To increase awareness among staff and students concerning environmental issues and its sustainability;

The documentation of baseline data of good practices and prepares a strategy for the provide strategy towards improving environmental quality for future. Institute has a lush green campus Institute has adequate Infrastructure and physical facilities for teaching and learning viz., classrooms, laboratories, well equipped with ICT facilities and learning resources.

Energy and waste management

With the help of Teaching, Non-teaching staff, students, and electrical Supervisor, the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

The study covered the following are as to summarize the present status of environment management in the campus:

- Water management
- Energy Conservation
- Waste management
- Green area management
- Environmental Monitoring

S.No.	Parameter	
1	Sourceof water	Wells, Borewells
2	No of Wells	02
2	No of bore Wells	02
4	No of motors used	02
5	Water level	50 to 200 feet
6	Any water wastage/ why?	No
7	Water usage for gardening	2000L/ day
8.	Water usage for domestic purpose	2000L/ day
9	Water usage for drinking purpose	1500L/day

Observations and Recommendations

Water Management

Observations

The study observed that the main source of water for the institute is received from two bore wells. Water is used for drinking purpose, toilets and gardening. During the survey, no loss of water is observed, neither by any leakages, or by over flow of water from overhead tanks. The data collected from all the departments is examined and verified. On an average the total use of water in the college is around 5500L/ day, which include 2000L/day for domestic, 2000L/day for gardening purposes and 1500L/day for drinking purpose.

Drinking water

There are two bore wells in the college. There are 3 water coolers in the college.

Water Quality Assessment

Water samples from the college were collected and analyzed for its quality parameters. The major parameters analyzed include colour, odour, turbidity, dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity.

Recommendations

- There is a need for monitoring and controlling overflow and periodically supervision drills should be arranged.
- Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment, i.e. they are biodegradable and non-toxic, even when this exceeds the Control of Substances Hazardous to Health (COSHH) regulations.

Minimize wastage of water and use of electricity during the reverse osmosis process and ensure that the equipments used are regularly serviced and in good condition.

Energy Management

This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliance, natural gas and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. The study carried out also analyzed the use of alternate energy resources that are eco-friendly.

Liquid waste management

Water conservation is a key activity as water availability affects on the development of the campus as well as on all area of development such as farming, industries, etc. Keeping this view water conservation activity carried out.

The waste water generated is disposed off into the underground sewage tanks through waste water drainage system. Sewage tanks are maintained properly and cleaned by municipality as required. The source of wastewater is domestic waste water i.e., sewage water. The sewage water mainly comes from toilets of college, and laboratories.

Green Area Management

This includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards. This also helps in ensuring that the Environmental Policy enacted, enforced and reviewed using various environmental awareness programmes.

List of Plants in the campus

Sr. No	Botanical name	Family	Local name	Number
1	<i>Bombax ceiba</i>	Malvaceae	Semal (Cotton tree)	2
2	<i>Roystonea regia</i>	Arecaceae	Royal Palm Tree	4
3	<i>Thuja occidentalis</i>	Cupressaceae	Vidhya	2
4	<i>Ficus benghalensis</i>	Moraceae	Bargad	1
5	<i>Pongamia pinnata</i>	Fabaceae	Karanj	2
6	<i>Hibiscus sps</i>	Malvaceae	Gurhal	3
7	<i>Citrus limon</i>	Rutaceae	Nimbu	1
8	<i>Calliandra haematocephala</i>	Fabacea	Powder Puff	1
9	<i>Murraya paniculata</i>	Rutaceae	Kamini	1
10	<i>Polyalthia longifolia</i>	Annonaceae	False Ashok	3
11	<i>Cycas revolta</i>	Cycadaceae	Sago Palm	1
12	<i>Psidium guajava</i>	Myrtaceae	Amrood	2
13	<i>Ficus religiosa</i>	Moraceae	Pipal	3
14	<i>Mangifera indica</i>	Anacardiaceae	Aam	2
15	<i>Neolamarckia cadamba</i>	Rubiaceae	Kadamb	6
16	<i>Thevetia peruviana</i>	Apocynaceae	Pili Kaner	1
17	<i>Dalbergia sissoo</i>	Fabaceae	Shisham	2
18	<i>Eucalyptus obliqua</i>	Myrtaceae	Eucalyptus	1
19	<i>Pithecellobium dulce</i>	Fabaceae	Jangal jalebi	1
20	<i>Aegle marmelos</i>	Rutaceae	Belpatra	1
21	<i>Tamarindus indica</i>	Fabaceae	Imli	1
22	<i>Azadirachta indica</i>	Meliaceae	Neem	2
23	<i>Acacia nilotica</i>	Fabaceae	Babul	1
24	<i>Leucaena leucocephala</i>	Fabaceae	Subabul	1
26	<i>Moringa oleifera</i>	Moringaceae	Drumstick	1
27	<i>Lawsonia inermis</i>	Lythraceae	Henna	1
28	<i>Peltophorum pterocarpum</i>	Fabaceae	Peela Gulmohar	5
29	<i>Delonix regia</i>	Fabaceae	Lal Gulmohar	5

30	<i>Ziziphus mauritiana</i>	Rhamnaceae	Ber	2
31	<i>Millettia pinnata</i>	Fabaceae	Karanj	2
32	<i>Swietenia macrophylla</i>	Meliaceae	Mahogany	2
33	<i>Holoptelea integrifolia</i>	Ulmaceae	Chirol	3
34	<i>Samanea saman</i>	Fabaceae	Monkey-pod	1
Total Number				67

Description of few Plants of college campus

Bombax ceiba

Bombax ceiba, like other trees of the genus *Bombax*, is commonly known as cotton tree. More specifically, it is sometimes known as Malabar silk-cotton tree; red silk-cotton; red cotton tree; or ambiguously as silk-cotton or kapok, both of which may also refer to *Ceiba pentandra*.



This Asian tropical tree has a straight tall trunk and its leaves are deciduous in winter. Red flowers with 5 petals appear in the spring before the new foliage. It produces a capsule which, when ripe, contains white fibers like cotton. Its trunk bears spikes to deter attacks by animals. Although it's stout trunk suggests that it is useful for timber, its wood is too soft to be very useful.

The white fluffy fibres are carded into thread and woven into textiles in Nepal and India. In

North India, the fibers are also used in pillows.

***Roystonea regia*,**

Commonly known as the Cuban royal palm or Florida royal palm, is a species of palm native to Mexico, the Caribbean, Florida, and parts of Central America. A large and attractive palm, it has been planted throughout the tropics and subtropics as an ornamental tree. Although it is sometimes called *R. elata*, the conserved name *R. regia* is now the correct name for the species. The royal palm reaches heights from 50 to over 80 feet tall. Populations in Cuba and Florida were long seen as separate species, but are now considered a single species.



Roystonea regia is a large palm which reaches a height of 20–30 meters and a stem diameter of about 47 centimeters. The trunk is stout, very smooth and grey-white in colour with a characteristic bulge below a distinctive green crown shaft. Trees have about 15

leaves which can be up to 4 m long. The flowers are white with pinkish anthers. The fruit are spheroid to ellipsoid in shape, 8.9-15 millimeters long and 7-10.9 mm wide. They are green when immature, turning red and eventually purplish-black as they mature.

Roystonea regia has been planted throughout the tropics and subtropics as an ornamental. The seed is used as a source of oil and for livestock feed. Leaves are used for thatching and the wood for construction. The roots are used as a diuretic, and for that reason they are added to *tifey*, a Haitian drink, by Cubans of Haitian origin. They are also used as a treatment for diabetes.

Thuja occidentalis

It is also known as northern white-cedar, eastern white-cedar, or arborvitae, is an evergreen coniferous tree, in the cypress family Cupressaceae. It is widely cultivated as an ornamental plant.



Its additional common names include swamp cedar, American arborvitae and eastern arborvitae. The name arborvitae is particularly used in the horticultural trade in the United States; it is Latin for 'tree of life' due to the supposed medicinal properties of the sap, bark, and twigs. It is sometimes called white-cedar (hyphenated) or white cedar (one word) to distinguish it from *Cedrus*, the true cedars.

Ficus benghalensis

Ficus benghalensis, commonly known as the banyan, banyan fig and Indian banyan, is a tree native to the Indian Subcontinent. Specimens in India are among the largest trees in the world by canopy coverage. It is also known as the "strangler fig" because it starts out as epiphyte that is leaning on another tree that it ends up suffocating.

Ficus benghalensis is an evergreen, fast-growing tree found mainly in monsoon and rainforests that can reach a height of up to 30 meters. It is resistant to drought and mild frost. It produces propagating roots which grow downwards as aerial roots on the branches that grow downward like lianas. Once these roots reach the ground, they take root and become woody trunks and supportive.

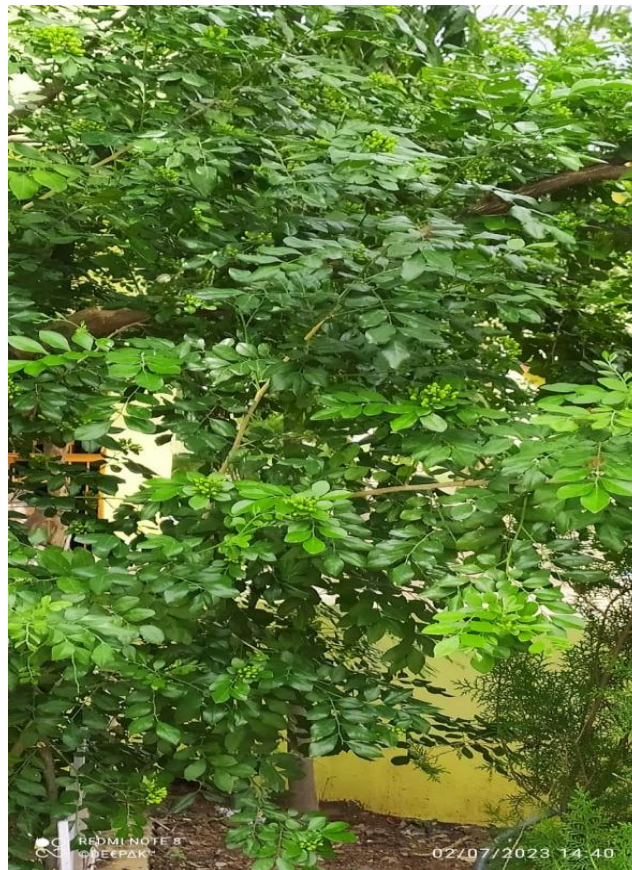


The figs produced by the tree are eaten by birds such as the Indian myna. Fig seeds that pass through the digestive system of birds are more likely to germinate and sprout earlier.

Ficus benghalensis is the national tree of India. The tree is considered sacred in India, and temples are often built nearby. Due to the large size of the tree's canopy, it provides useful shade in hot climates.

Murraya paniculata

Murraya paniculata also called as Orange Jasmine, Kamini, Kunti etc. Although *Murraya paniculata* are small shrubs or trees and are grown outdoors, they can also grow in indoor pots. Commonly found in South-East Asia and Australia, *Murraya paniculata* is called Kamini in India and can grow up to 7 metres.



Murraya paniculata is an easy-to-maintain plant is very useful. Its leaves, flowers, roots and root barks are widely used for various purposes. *Murraya paniculata* flowers are used as a tea agent for green teas. *Murraya paniculata* leaves are used as a spice to flavour curries. *Murraya paniculata* is used as an important ingredient in medicines to cure diarrhoea, swellings and snake bite. *Murraya paniculata* flowers are used for making perfumes and the wood is used for cosmetics.

Cycas revoluta

Cycas revoluta (sago palm, king sago, sago cycad, Japanese sago palm) is

a species of gymnosperm in the family Cycadaceae, native to southern Japan including the Ryukyu Islands. It is one of several species used for the production of sago, as well as an ornamental plant. The sago cycad can be distinguished by a thick coat of fibers on its trunk. The sago cycad is sometimes mistakenly thought to be a palm, although the only similarity between the two is that they look similar and both produce seeds. The leaves grow from the trunk and start out as small leaves near the centre of the plant.



This very symmetrical plant supports a crown of shiny, dark green leaves on a thick shaggy trunk that is typically about 20 cm in diameter, sometimes wider. The trunk is very low to subterranean in young plants, but lengthens above ground with age. It can grow into very old specimens with 6–7 m of trunk; however, the plant is very slow-growing and requires about 50–100 years to achieve this height. Trunks can branch several times, thus producing multiple heads of leaves.

Psidium guajava

Psidium guajava, the common guava, yellow guava, lemon guava, or apple guava is an evergreen shrub or small tree native to the Caribbean, Central America and South

America. It is easily pollinated by insects; when cultivated, it is pollinated mainly by the common honey bee, *Apis mellifera*.



The plant is used in many different shampoo products for its scent. It is also becoming a popular bonsai species and is currently quite popular in India and Eastern Asia.

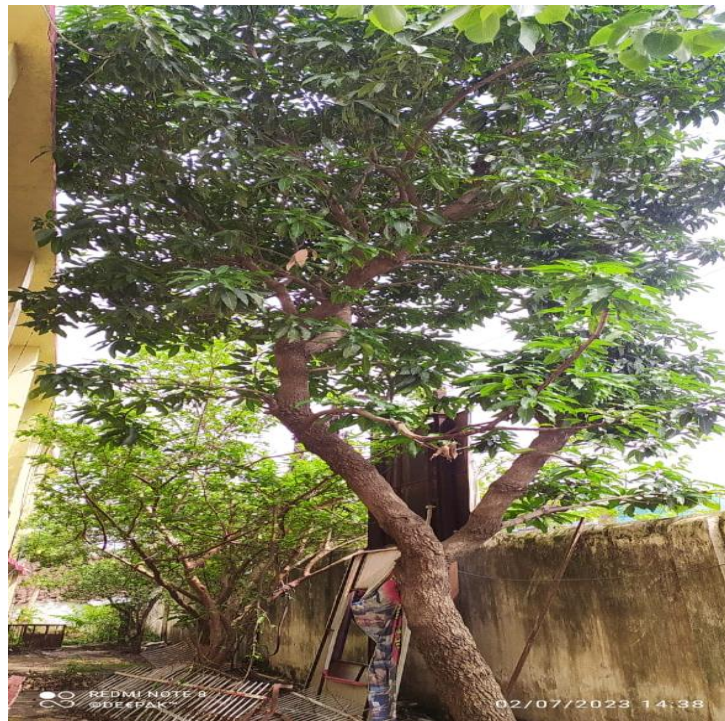
Widely cultivated in tropical and subtropical regions around the world, guava fruits can range in size from as small as an apricot to as large as a grapefruit. Various cultivars have white, pink, or red flesh; a few varieties feature red (instead of green or yellow) skin.

Guava is an edible fruit, and can be eaten raw or cooked. The processing of the fruits yields by-products that can be fed to livestock. The leaves can also be used as fodder. *Psidium guajava* has been used in traditional medicine by many cultures throughout Central America, the Caribbean, Africa, and Asia. It is used for inflammation, diabetes, hypertension, caries, wounds, pain

relief, fever, diarrhea, rheumatism, lung diseases, and ulcers

Mangifera indica

Mangifera indica, commonly known as mango, is a species of flowering plant in the family Anacardiaceae. It is a large fruit tree, capable of growing to a height of 30 metres. There are two distinct genetic populations in modern mangoes – the "Indian type" and the "Southeast Asian type".



It is a large green tree, valued mainly for its fruits, both green and ripe. Approximately 500 varieties have been reported in India. It can grow up to 15–30 meters (50–100 feet) tall with a similar crown width and a trunk circumference of more than 3.7 m (12 ft). The leaves are simple, shiny and dark green. The mango is an irregular, egg-shaped fruit which is a fleshy drupe. Mangos are typically 8–12 centimeters (3–5 inches) long and greenish yellow in color. The fruits can be round, oval, heart, or kidney shaped. Mango fruits are green when they are unripe. The interior flesh is bright orange and soft with a large, flat pit in the middle. Mangos are mature in April and May. Raw mangos can be used in the making of pickles and chutneys. Ripe mangos are a popular fruit throughout the world. The skin and pulp account for 85% of the mango's weight, and the remaining 15%

comes from the stone (seed).

The tree is more known for its fruit rather than for its timber. However, mango trees can be converted to lumber once their fruit-bearing lifespan has finished. The wood is susceptible to damage from fungi and insects. The wood is used for musical instruments such as ukuleles, plywood and low-cost furniture.

Dalbergia sissoo

Dalbergia sissoo, known commonly as North Indian rosewood or *shisham*, is a fast-growing, hardy, deciduous rosewood tree native to the Indian subcontinent and southern Iran. *D. sissoo* is a large, crooked tree with long, leathery leaves and whitish or pink flowers.



Dalbergia sissoo is a medium to large deciduous tree with a light crown, which reproduces by seeds and suckers. It can grow up to 25 m in height and 2 to 3 m in diameter, but is usually smaller. Trunks are often crooked when grown in the open. Leaves are leathery,

alternate, pinnately compound, and about 15 cm long. Flowers are whitish to pink, fragrant, nearly sessile, up to 1.5 cm long, and in dense clusters 5 to 10 cm in length. Pods are oblong, flat, thin, strap-like, 4 to 8 cm long, 1 cm wide, and light brown. They contain one to five flat, bean-shaped seeds, 8 to 10 mm long. They have a long taproot and numerous surface roots that produce suckers. Young shoots are downy and drooping; established stems have light brown to dark gray bark, up to 2.5 cm thick, shed in narrow strips; large upper branches support a spreading crown.

It is the best known economic timber species of the rosewood genus sold internationally, but it is also used as fuel wood and for shade and shelter. After teak, it is the most important cultivated timber.