

GREEN AUDIT REPORT

(2019)



JC Bose University of Science & Technology YMCA

Faridabad

NAAC Accredited 'A' Grade State Govt. University
Sector-6, NH-2, Mathura Road,
Faridabad-121006 (Haryana)

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Executive Summary

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 have a concern about environmental degradation and realization of values of environment for sustainable development.

In its pursuit for improving environmental quality and to maintain a pristine environment in the campus, JC Bose University of Science and Technology, YMCA, Faridabad has made a self-inquiry on environmental quality of the campus in the form of Green audit. Being a premier institution of higher learning, the university has also initiated 'The Green Campus' program this year that will actively promote various projects for the environment protection and sustainability.

The purpose of green audit was to ensure that the practices followed in the campus are in accordance with the green policy framework. As there was no standard model for such an environment/green audit of campuses in the state, the committee brainstormed and evolved a methodology which included: physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. It works on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, Alternative Energy and Mapping of Biodiversity.

With this in mind, the specific objectives of the audit are 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. It can make a tremendous impact on student health and the environment.



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1. INTRODUCTION

Green audit is defined as an official examination of the effects an organization has on the environment. It is also widely known as Environmental Audit. The 'Green Audit' aims to analyze environmental practices within and outside the university campus, which will have an impact on the eco-friendly ambience. Through Green Audit, one gets a direction as how to improve the condition of environment and there are various factors that have determined the growth of carrying out Green Audit.

1. ABOUT THE UNIVERSITY: The JC Bose University of Science and Technology YMCA, Faridabad earlier YMCA University of Science and Technology, Faridabad erstwhile YMCA Institute of Engineering, Faridabad located in the Faridabad district of Haryana, was established in the year 1969, as a joint venture of the National Council of YMCAs of India, Gov. of Haryana, and the Central Agencies for Development Aid, Bonn, Germany. It started as an Indo-German project with an aim to impart technical education to a developing India on German pattern. The YMCAUST was established by the Act XX1, of 2009 as a state University on 1-12-2009. The Haryana State Govt. University is approved under 2f and 12(B) of UGC act. The University is situated on National Highway-2, Mathura Road, 30 km from National Capital, Delhi. The University campus is located in the sprawling Faridabad-Ballabgarh Industrial complex.

With a sprawling campus spread across 20.0 acres, the college has a fine infrastructure and adequate state-of-the-art physical facilities which include teaching classrooms, a Central Library, A/c auditorium, Multimedia hall, central mechanical workshop, canteen, ATM facility, Wi-Fi facility, campus healthcare facilities such as dispensary, RO plant for drinking water facility, football and basketball courts and other sports and games facilities. In addition, there are well-equipped computer labs and a fully-fledged animation lab. The College also provides separate hostel and mess facilities for boys and girls with power backup. The labs & workshops have been setup with the assistance of German expertise. State Govt. of Haryana took complete control of the Institute and upgraded it to University status in Dec. 2009.

The college has a well-defined decentralized and participatory organizational structure to coordinate the academic and administrative functions. The dedication of the management and the college community, combined with excellent infrastructural and teaching facilities help maintain high standards in curricular and co-curricular spheres of the institution. It offers an ideal vision of education that is aware of, and responsive to, the challenges of an emerging India in a globalized world, by bringing in a positive difference in the socioeconomic-educational status of the state and the nation.

NAAC Grading in Assessments: YMCA University of Science and Technology, Faridabad has been accredited by National Assessment and Accreditation Council (NAAC) with 'A' Grade and a CGPA of 3.08 in the First Cycle of Accreditation.

2. Scope and Goals of Green Auditing

The purpose of organizing Green Audit is to upgrade the environmental condition in and around the institutes, colleges, companies and other organizations. It is carried out with the aid of performing tasks like waste management, energy saving and others to turn into a better environmental friendly institute. The objective of carrying out Green Audit is:

1. To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus.
2. To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.
3. To introduce and aware students to real concerns of environment and its sustainability
4. To bring out a status report on environmental compliance.

3. Methodology

In order to perform green audit, the methodology included different tools such as physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following areas to summarise the present status of environment management in the campus:

- 1) Water Management**
- 2) Solid Waste Management**
- 3) Energy use and Conservation**
- 4) Air Quality**
- 5) Tree Plantation and Mapping of biodiversity**
- 6) Environmental Awareness**

2. Water Management

Water management includes quantifying water flows and quality in simple or complex systems, with a view to reduce water usage and often saving money on otherwise unnecessary water use. It is a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water. It is essential that any environmentally responsible institution examine its water use practices.

Water Management mainly includes evaluating the facilities for raw water intake and determining the facilities for water treatment. The following observations were made during the study:

1) Water Supply and consumption:

- The main source of water is Groundwater from the tube wells (8 no.) installed at the university premises.
- The total water supply in the university is 3.0 lacs L/day and whole amount of water is used in different activities, viz., for drinking purpose, canteen, toilets, laboratory, gardening, etc.
- During the survey, no loss of water was observed, neither by any leakages nor by over flow of water from overhead tanks.
- Total no. of people in the university including students (day scholars, hostlers), staff and residents is approximately 3500. Therefore, the average water use per capita per day of the university is found to be 85L/capita/day which is less as compared to National average water use per capita per day for Urban uses, i.e., 135 L/capita/day as given by The Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Govt. of India.

2) Water conservation:

- Five rainwater harvesting systems have been installed at different locations, viz., near main gate, opposite computer block, near MBA block, near canteen and opposite 350 sft. houses with a capacity of 40,000 L/24 hrs. The locations of all the five harvesting systems have been earmarked by the display boards.

3) Drinking water quality:

- The RO water is supplied for drinking purposes in the university. The RO systems (4 no.) have been installed at Main Teaching block, Mechanical Engg. Block, Boys' hostel and Girls' hostel with their respective capacity of 3500L/hr.
- The drinking water quality is checked from time to time in the Environmental Sciences Laboratory of the University as well as by maintenance department for different water quality parameters (viz., pH, Electrical Conductivity, TDS, Total Hardness, Ca, Mg, Alkalinity, Chloride, Nitrate, Fluoride, Sulphates, etc.). All the parameters of drinking water are found to be well within the prescribed limits as per Indian Standards:10500:2012 given by Bureau of Indian Standards, New Delhi. The detailed report of drinking water quality of water sample taken from university campus is attached.
- The RO water is used for drinking purpose only and untreated groundwater (having high TDS content) is used for other activities, such as washrooms, flushing, horticulture and others.

4) Wastewater generation and Treatment:

The wastewater generation is about 2.25 Lacs L/Day of the university. The wastewater is disposed directly in trunk sewage of the city at present. But university is planning to install a Sewage Treatment Plant (STP) very soon.

Table 1: Drinking Water Quality Analysis of Water sample
(as per IS:10500:2012)

Lab: Environmental Sciences Lab, YMCAUST, Faridabad

Location of water sample: Drinking water from water cooler, MBA, YMCAUST

Date of sample collection: 20.3.2019

S. No.	Parameter	Result	Desirable Limits	Maximum Permissible Limit
1	pH	6.8	6.5 to 8.5	No relaxation
2	Total Dissolved Solids (mg/l)	170	500	2000
3	Total Alkalinity (as CaCO ₃) (mg/l)	30	200	600
4	Total Hardness (as CaCO ₃) (mg/l)	90	200	600
5	Calcium (mg/l)	70	75	200
6	Magnesium (mg/l)	20	30	100
7	Chloride (mg/l)	100	250	1000
8	Sulphate (mg/l)	8.5	200	400
9	Nitrate (mg/l)	8.1	45	45
10	Fluoride (mg/l)	0.13	1	1.5

Result: All the drinking water parameters are well within the limits prescribed by IS:10500:2012 given by Bureau of Indian Standards, New Delhi.



Rainwater Harvesting System at JCBUST, YMCA



Environmental Sciences Lab

3. Solid Waste Management

Human activities generate solid waste which is not of any use at the point of its generation. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone. Furthermore, solid waste often includes waste material resources that could otherwise be channeled into better utilization through recycling and reuse. This indicator addresses generation and disposal of different wastes like paper, food, plastic, e-waste, biodegradable, etc and their recycling. The survey focused on type and current management practice of solid waste generated in the campus.

The following observations related to solid waste management were made during the study:

1. Paper Waste

- a) As per the information provided by COE office, the answer sheets for final examination are to be sold to Govt. approved vendors who will recycle it for further use as approved by the competent authorities.
- b) The soiled paper, cardboards and torn off paper waste generated from various offices and departments are disposed off in the dustbins and collected with the main solid waste stream.
- c) The old newspapers and magazines in university library are sold to junk dealer from time to time for their reuse.
- d) University has adopted the concept of 'Save paper and go digital'. It has adopted paperless work system. The notices and information are circulated via email by majority of offices.

2. Food Waste

The food waste is generated from boys hostel and girls hostel in the campus. As per the information provided by CHW office, about 100 gm/student on daily basis during lunch and dinner schedules in the mess. The food wastage is approximately 70 Kg/day in boys hostel mess. This waste is given to dairies/farms nearby the mess to be used as piggery feed. As such there is no food waste generation from the hostels.

3. e-Waste

The e-Waste generated in the campus is very less in quantity. The departments and offices don't dispose off e-waste including old computers, cartridge, etc. at

departmental level. The same is sent to main store and will be disposed off by the store and purchase section as per the e-Waste policy adopted by the university. The University has adopted Haryana State Govt. Policy regarding e-waste disposal.

4. Garden Waste

The Garden waste mainly includes the grass trimmings and leaf litter. The environmental sciences department is planning to add some infrastructure to do composting of this waste in every lawn of university. The main purpose of this is to reduce the amount of disposable waste in the university campus.

5. Bio-medical waste

The university health centre segregates the waste as per the guidelines for colour coding of dustbins given by Biomedical Waste Management Rules, 2016. Three coloured dustbins are used: Green Dustbin- for general waste like paper, medicine wrappers, cardboards, metal containers, etc.; Blue Dustbin- Sharp needles, any glass item; Red Dustbin- Dressing material, gloves, catheters, tubings, syringes, infected IV sets, canula, etc. Yellow dustbins are not used as it is used for human tissues and organs, etc. and no such waste is generated at university. The waste generated is picked up by the authorized outsourcing agency for collection of such waste.

6. Plastic Waste

The university has banned the use of single use plastic in the campus area. Further, very less plastic waste is generated by some departments, office, garden etc but it is neither categorized at point source nor sent for recycling.

7. Open burning of solid waste is not allowed at university premises. The overall waste generated is segregated at source by providing separate dustbins for dry and wet waste. The segregated waste generated from various part of the university is collected at earmarked places from where NGO deployed for the purpose lift and dump the garbage to MCF sites.

4. Air Quality

YMCA University is mainly teaching and research organization. So no air pollutants are generated due to any activity in the university. The only sources that generate air pollutants are due to vehicles used by faculty and students and generators. All the vehicles are parked near the university gate. As electricity is available most of the time, so generators are rarely used. Therefore, whatever air pollutants are present in the campus air are due to various activities in the surrounding area.

Air Quality Monitoring

The ambient air quality is monitored for PM_{2.5} periodically in the campus at different locations by the Environmental Sciences Department of the University. The PM_{2.5} concentration in ambient air of University campus as determined by using Fine Particulate Sampler (Envirotech APM 550) is found to be 85 µg PM_{2.5}/m³ of air which is comparable to PM_{2.5} values in NCR region given by CPCB, New Delhi. The report is attached as Table 2.

Noise is not generated by any routine activity of the university.

Enhancement of Green Cover

As the trees are helpful in reducing the good absorbers of air pollutants and University is planning to increase green cover which will help to reduce the particulate matter.

Table 2: Air Quality Analysis

Lab: Environmental Sciences Lab, JCBUST, YMCA, Faridabad

Location of Air sample: Top floor, Main Teaching Block, JCBUST, YMCA, Faridabad

Date of sample collection: 22.4.2019

Breakpoints of PM_{2.5} (µg/m³)		
S. No.	Air Quality Category	Breakpoint concentration
1	Good	30
2	Satisfactory	60
3	Moderately Polluted	90
4	Poor	150
5	Very Poor	250
6	Severe	250+

Source: CPCB, New Delhi

Result: The PM_{2.5} concentration in ambient air of University campus as determined by using Fine Particulate Sampler (Envirotech APM 550) is found to be 85 µg PM_{2.5}/ m³ of air which is comparable to PM_{2.5} values in NCR region.

5. Tree Plantation and Mapping of biodiversity

Plant diversity in campus:

The total no. of trees in the university are 202 no. of >6" periphery and 300 no. below 6" periphery as entered in Tree register by maintenance department. The mapping of biodiversity at campus has been done by Environmental Sciences department of University. In this, identification, nomenclature (scientific and common) and importance of the flora has been listed and will be displayed very soon. (Table 3)

Various tree plantation programs are being organized all throughout the year at university campus which help in encouraging eco-friendly environment.

Green Belt Development:

In a plantation drive held on 4th August, 2017, as many as 400 saplings of fruit-bearing trees were planted by the students and officials of in the green belt area of university.

Green Campus Programme:

Under its Green Campus Programme, the University is planning to add more and more green cover and lots of trees in order to create an eco-friendly environment by lowering the greenhouse gas emissions in the atmosphere and reducing the carbon footprints.

Table 3: List of some tree species found in university campus

<p>1.</p>	<p>Medicinal trees</p> <ul style="list-style-type: none"> • <i>Azadirachtha indica</i>(neem) • <i>Fernandoa adenophyla</i>(maror phali) • Eucalyptus
<p>2.</p>	<p>Ornamental plants</p> <ul style="list-style-type: none"> • <i>Cleodendron inerme</i> • <i>Hamilia patens</i> • <i>Ixora</i> • <i>Oreodoxa regia</i> • <i>Sansevieria trifasciata</i> • <i>Drypetes roxburghii</i> • <i>Mangifera indica</i>(mango)
<p>3.</p>	<p>Fruit trees</p> <ul style="list-style-type: none"> • <i>Syzygiun cumini</i> (jamun) • <i>Psidium guajava</i> (guava) • <i>Morus alba</i>(mulberry tree)
<p>4.</p>	<p>Other trees in the campus</p> <ul style="list-style-type: none"> • <i>Cassia fistula</i>(amaltas) • <i>Delonix regia</i>(gulmohar), • <i>Ficus religiosa</i> (peepal) • <i>Ficus benghalensis</i>(bargad) • <i>Ficus virens</i> • <i>Ficus elastica</i>(indian ruber tree) • <i>Alstonia scholaris</i>(devil's tree) • <i>Milletia pinnata</i>(biodiesel plant) • <i>Polyalthia longifolia</i> (ashoka) • <i>Dalbergia sisso</i> (sheesham) • <i>Senna siameae</i> • <i>Grevillea robusta</i> (silk oak) • <i>Callistemon viminalis</i> (bottlebrush) • <i>Moringa oleifera</i> (drumstick tree) • <i>Terminalia arjuna</i> (arjun tree) • <i>Aegle marmelos</i> (belpatra)

6. Energy Use and Conservation

The university has initiated a variety of measures for promoting energy conservation and gradually increasing dependence upon renewable and clean energy resources from time to time. All the existing tube lights and incandescent light bulbs are planned to be replaced by energy efficient LEDs in a phased manner at various locations. Posters/stickers are placed at different points in the departments and labs for energy saving measures. To conduct an energy audit in the university is in pipeline.

7. Community Services

Cleanliness drives:

Cleanliness drives are organised by the students from time to time in the university campus and in surrounding areas.



Cleanliness Drive by YMCA students



Celebrating Swachhata Week

Tree Plantation Campaign

Tree Plantation is one of the most cost-effective means of helping to clean our air and water, reduce our energy usage, and improve the quality of our lives. The Vasundhara- Environmental Society of YMCA University took a unique initiative through [#AdoptATree](#) Campaign to make our City - A Green City. Through this

campaign, free saplings were provided to the students and residents who voluntarily registered for the campaign and to take the full responsibility of the sapling till it turned into a Tree, because taking care of a sapling until it grows is as important as its plantation. It inculcated a sense of responsibility among them.

वाईएमसीए की ओर से अभियान के तहत लोग पौधों के संरक्षण की लगे जिम्मेदारी, देखरेख करने पर संस्थान लोगों का सम्मानित करेगा

वाईएमसीए लोगों को पौधे गोद देकर स्मार्ट सिटी की फिजा सुधारेगा

<p>पहल</p> <p>फरीदाबाद शालिनी घटना</p> <p>अगर आप बढ़ते प्रदूषण को लेकर चिंतित हैं तो वाईएमसीए के साथ जुड़कर शहर की फिजा को सुधारने की कवायद में शामिल हो सकते हैं। दरअसल, प्रदूषण का स्तर कम करने और पर्यावरण संरक्षण के लिए वाईएमसीए विज्ञान एवं प्रौद्योगिकी विश्वविद्यालय 'एडोप्ट ए ट्री' अभियान शुरू करेगा। इसके तहत संस्थान ना सिर्फ शहरवासियों को पौधे गोद देगा, बल्कि उनको देखरेख करने वालों को ब्याकवयद सम्मानित भी करेगा।</p>	<p>ये है अभियान</p> <p>28 अगस्त तक आप कर सकते हैं पंजीकरण</p> <p>29 अगस्त को पौधों को बांटने का काम किया जाएगा</p> <p>12 से दो बजे तक परिसर में ले सफाई है पौधा</p> <p>01 हजार पौधे लगाने का रखा है लक्ष्य</p> <p>06 महीने बाद किया जाएगा सम्मानित</p> <p>इस लिंक पर पंजीकरण http://bit.ly/2ANoaCE</p>	<p>वसुंधरा से जुड़कर अभियान का हिस्सा बन सकेंगे</p> <p>विश्वविद्यालय में एम्प्रेसरी पर्यावरण साइंस की सोसायटी वसुंधरा के तहत कुलपति ने एक पौधा गोद लेकर अभियान की शुरुआत की है। शहरवासियों को अभियान से जुड़ने के लिए अनिच्छान पंजीकरण करना होगा। इसके बाद निर्धारित तिथि पर पौधे गोद दिए जाएंगे। अभियान से जुड़ने वालों को पौधों की देखरेख की शायद सनी होगी। वसुंधरा सोसायटी में फिलहाल संस्थान ही छात्र है। पंजीकरण के बाद आम लोग भी इससे जुड़ सकते हैं।</p> <p>एक हजार पौधे लगाने का है लक्ष्य</p> <p>अभियान के तहत पहले चरण में एक हजार पौधे लगाने का लक्ष्य रखा गया है। पंजीकृत लोग अपने घर या आस-पास के इलाके में पौधा लगेगा। इसके बाद उसकी देखरेख करनी होगी। छह महीने बाद पौधों की फोटो दौरे पर, इंटरग्राम व फेसबुक के हैशटैग 'एडोप्टएट्री' के साथ साझा करेंगे। वसुंधरा की टीम जाकर पौधे का निरीक्षण करेगी। जिन लोगों के पौधे विकसित और बेहतर होंगे उनका चयन सम्मान के लिए किया जाएगा।</p>	 <p>पौधों की फोटो साझा करने के लिंक इंस्टाग्राम @ymcaenvironmentalsociety ट्विटर @ymcaenvironment1 फेसबुक https://bit.ly/2LFGkKb</p> <p>वाईएमसीए में शनिवार को 'एडोप्ट ए ट्री' अभियान की शुरुआत की गई।</p> <p>शहर के लोगों को पौधागिरी अभियान से जोड़ने के लिए एडोप्ट ए ट्री अभियान शुरू करने का फैसला किया गया है। शहरवासी पौधे लगाए और साथ ही उनकी देखरेख भी करें यही मकसद है। पौधा लगाने को प्रेरित करने के लिए लोगों को सम्मानित भी करेंगे।</p> <p>-डॉ. दिनेश कुमार, कुलपति वाईएमसीए</p>
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Prof. BK Kuthiala, Chairman, State Council of Higher Education, Haryana alongwith Hon'ble Vice-Chancellor Prof Dinesh Kumar inaugurated the Tree Plantation Campaign by planting a tree in campus.



Chief Guests with students of Vasundhara – The Environment Society



Environmental Awareness Programs:

Various environmental awareness programmes including Enviro-quiz, poster gallery, slogan writing, etc. are organized by the Environmental Science Department of University in order to sensitize the students about various environmental issues.

On the spot poster making and slogan writing competition on the theme 'Water Conservation – Need and duty too' was organised by Vasundhara – The Environment Society, Department of Environmental Sciences at University premise in which students gave a message of water conservation for future generation.



**On the spot poster making and slogan writing competition on the theme
'Water Conservation – Need and duty too'**



Poster Making Competition - Jal hi Jeevan h



Poster making competition



Scientific Poster Gallery organized at Ozone day celebrations

Say No to Plastic Campaign

The department of Environment Science of the University initiated signature campaign to stop the plastic pollution for the same on World Earth Day, 2018. The students, staff members and visitors in the university took pledge not to use single use plastic and minimize the use of plastic items.

Conclusions and Recommendations

It is inferred from the survey that university is conscious about environmental conservation. The water conservation practices, paperless work system and ban on use of plastic practices are noteworthy. To be more efficient, following recommendations are given for water conservation and waste management at campus:

- 1.**Drip/Sprinkler irrigation systems may be used in lawns/gardens to save water.
- 2.**The wastewater coming from RO systems may be reused in toilet flushing systems at the university.
- 3.**Separate wastewater treatment facilities should be established for treatment of wastewater coming from chemistry lab, environmental sciences lab, etc. as the toxic chemicals in such wastewaters may reduce the efficiency of secondary treatment in sewage treatment plants for mainstream. The design and construction of new buildings at university may be done in such a way that the treated wastewater from STPs may be used in toilet flushing systems after its quality check.
- 4.**Water efficient flushing may be used in spite of traditional flushing systems consuming more water.
- 5.**Sensor-based faucets may be used in order to conserve water.
- 6.**There is a need to aware the sanitary workers about proper collection, transportation and disposal of waste so that they can effectively manage the solid waste generated at the university.