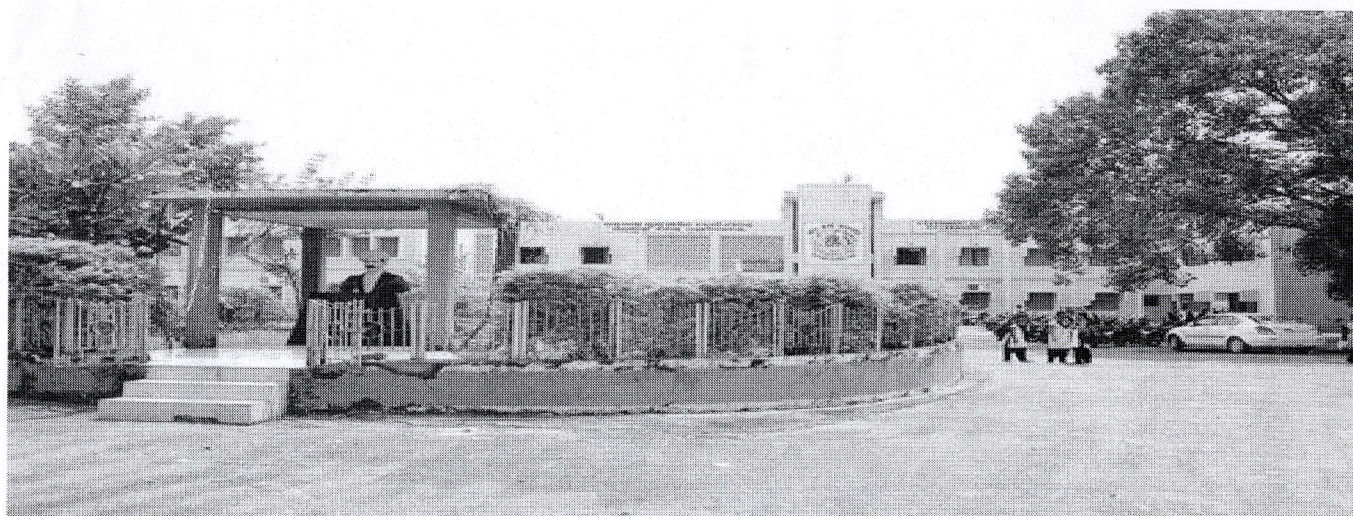


GREEN AUDIT REPORT

(2018-2019)



GOVERNMENT AUTONOMOUS COLLEGE ROURKELA



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ACKNOWLEDGEMENT

The green audit conducted by the Government Autonomous College, Rourkela is an internal audit that aims towards looking after a healthy environment. The initiative is taken up to foster the concept of environmental sustainability.

Sincere thanks to all for providing us necessary amenities and co-operation during the audit that helped in making the audit, a success.

THE AUDIT TEAM:

- | | |
|---------------------------------|---|
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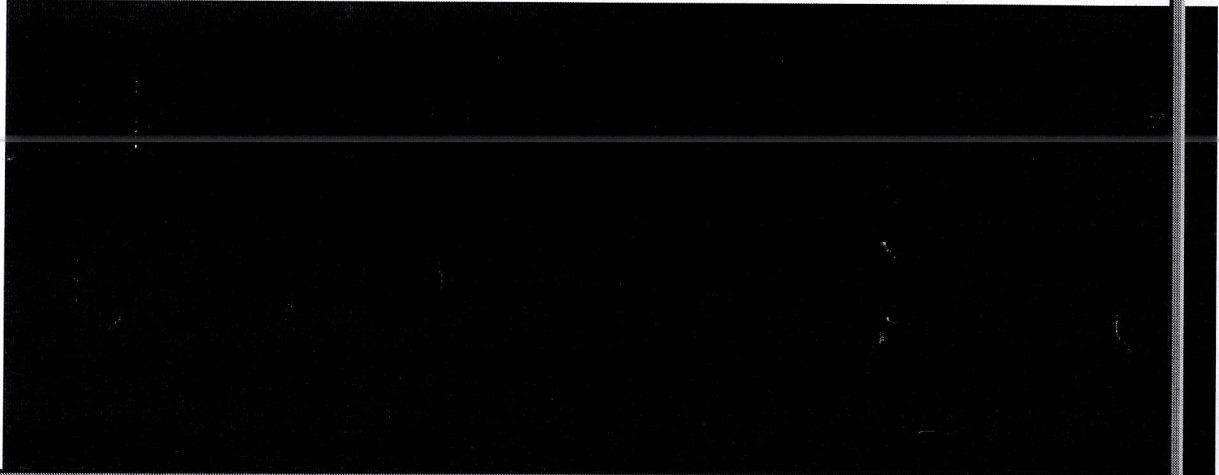
And all the faculties as well as Students of Botany and Computer Science.

EXECUTIVE SUMMERY

In accordance with the Green Campus Evaluation Plan, as suggested by the Internal Quality Assessment Cell (IQAC) of the college, Government Autonomous College, Rourkela planned for conducting a green audit of the college in November 2018. After the field work and other formalities, the report was finally sent for approval to the authority (Principal and IQAC) in January 2019.

The purpose of the audit was to make sure that the practices followed in the campus are healthy and environment friendly. With this in mind, the specific objectives of the audit were to evaluate the degree to which the Departments are in compliance with the applicable regulations, policies and standards and to ensure that the development of the college aims at sustainable development and green campus.

The methodology used included physical inspection of the campus and review of the relevant documentation.



STATEMENT OF ASSURANCE

This audit is been conducted for the first time in the college. The audit procedure tried to meet the terms of International Standards of Internal Auditing.

In our decision, sufficient and appropriate audit procedures were completed and evidence gathered to support the precision of the conclusions reached and contained in this report. The conclusions are based on a comparison of the situations as they existed at the time of the audit.

OBJECTIVE

Green Audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of the environment and environmental diversity. The "Green Audit" aims to analyze environmental practices within and outside (not in our purview) the college campus, which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment. Later on, it is implemented as a measure to enhance a healthy environment to almost all the organizations. 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. Green audit is assigned to the criteria 7 of NAAC, National Assessment and Accreditation Council which is a self governing organization of India which declares the institutions as Grade A, B or C according to the scores assigned during the accreditation.

The present Audit is conducted in view of assessing all necessary environmental components of Government Autonomous College, Rourkela.

ABOUT THE COLLEGE

The College started as Rourkela Science College from 16th August, 1961 and was taken over by Government Odisha on 1st July 1963. With the vertical academic growth of the College was conferred with autonomous status in 2002. In the year 2006 the College was accredited by NACC with Grade-B.

At present the college holds its heads high and stands as one of the front ranking institution in Odisha. It serves the backward region the best to keep the eternal flame of the learning ablaze so that the young aspiring minds of this area can prepare themselves to serve the country.

The College offer variety of Courses at different levels. Besides Arts, Science and Commerce at Degree level the College also offers M.A. in 09 subjects *i.e.* Economics, Education, English, History, Hindi, Odia, Political Science, Psychology, Sociology and M. Sc. in 07 subjects *i.e.* Botany, Chemistry, Mathematics, Computer Science, Physics, Zoology and Statistics. The college is also imparting Post Graduation Course in Commerce also.

The College also offers a variety of self-financing Degree Courses in Computer Science, Electronics and Tele- Communication (ETC), Mathematics with Computer (MTC).

The college also imparts M.Phil. programmes in Odia, English and Botany.

Various Degree and Post graduate level Courses under Odisha State Open University (OSOU) and Indira Gandhi National Open University (IGNOU) are also running in the college as per the Circular of the Department of Higher Education Government of Odisha.

Ironically the number of staff, both teaching and non-teaching have gone-down with respect to the current student strength. So the Classes are being engaged by Guest faculty who are engaged time to time. The College has not received any UGC grant for last three years. Remuneration for non-teaching is being paid from the fee collected from the Self-finance students and as well as from Government PL fund with the approval of Govt. as

there is no special grant for the Government for this purpose. This has been a hindrance in achieving our mission of academic excellence to make to make this premier Institute, a centre of quality learning by training the students to be creative and competitive enough to face the challenges of the new millennium.

The college is situated on a beautiful campus of 38.6 acres. The college building is located in an urban backdrop with many numbers of factories nearby at the very entrance of the city, out of which Rourkela Steel Plant is the major one. The river Brahmani is originated nearby. The college has one academic buildings and four hostel buildings out of which two are for boys and two are for girls. One new hostel for Girls' and one for Minority Students are being constructed in full swing. With many upcoming modifications in the campus the college has an intention to adopt the "Green Campus" system for environmental sustainability and conservation. The goal is to reduce CO₂ emission, energy and water usage, while creating an environmentally literate campus where students can learn the idea of protection of environment and stay healthy. The term "Green Campus" though a very new concept is being adopted by this college. The college administration is still working on several factors of "Green Campus" which includes Water Conservation, Tree Plantation, Waste Management, Paperless Work, reduction in carbon footprints and use of Alternative Energy resources.

OBJECTIVE OF THE STUDY

The main objective of the green audit is to promote the Environment Management and Conservation of the college campus. The purpose of the audit is to maintain Sustainability of the environment in compliance with the applicable regulations, policies and standards.

The main objectives of the audit are:-

- To create a green campus.
- To introduce and aware the students to real concerns of environment and its sustainability.
- More efficient resource management.
- To enable waste management through reduction of waste generation, solid- waste and water recycling.
- To create a plastic free campus.
- Recognize the cost saving methods through waste minimizing and managing point out the prevailing and forthcoming complications.
- Imparting environmental education through systematic environmental management approach and Benchmarking for environmental protection.
- Curriculum enhancement through practical experience.
- Financial savings through a reduction in resource use.
- Enhancement of college profile.
- To bring out a status report on environment compliance.

METHODOLOGY

The Green Audit taken up by the Government Autonomous College had been divided into two stages:

The Audit Stage:

The Audit Stage encompasses of the field works performed. Looking after the unique structure, location and ambiance of the college, the Green Audit Team focused on Material Issues pertaining to college which have the highest influence on the Green Attributes of the College. The Audit stage also focused on the Methodology adopted. Various approaches are adopted for transparent evaluation of the topics and increase readability for independent reader.

The Post Audit Stage:

The post-audit stage ensures formulation of findings and sent to college authority's response. Since the audit is done internally, it was important to ensure authority's approval. After getting approval, the audit team went for final report formulation.

The study mainly covered the following areas to summarize the present status of environment management in the campus:

- Water management.
- Energy conservation.
- Waste management.
- E-waste management.
- Green area management.
- Carbon footprint.

OBSERVATIONS AND RECOMMENDATIONS

WATER USE

This indicator shows water sources, water consumption of the college as well as hostel and residential area inside the college campus. This parameter of audit is an onsite survey and assessment to determine the water use and hence to improve the efficiency of water use.

a. Observation

This study observed that, the main source of water in college, hostel and residential area is Municipal Water Supply System. The water is mainly used for drinking purposes, toilets and gardening. The supply water is mainly stored in overhead tanks located on the top of the college building, hostel building as well as roofs of residential area. During survey it is found that water loss is found from college building as well as hostel buildings as overflow from storage tanks as some of the ball cocks are not functioning. It is also found that some of the taps are leaking and for that some of the water is also being wasted. The data from different departments shows that the average water use in the college is 22,000 L/day in college, 20,000 L/day in Hostel and 18,000 L/day in residential area which include the water use for domestic purpose, use in lavatories, gardening and other use such as use in laboratory. As this college is an old one there is no provision for rain water harvesting.

b. Recommendations

- In the campus small scale/ medium scale reuse and recycle of water system is necessary.
- For water purification, electronic systems *i.e.* Aquaguard are to be installed to avoid water loss.
- Installation of rain water harvesting system should be done.
- Ensure that all cleaning products used in college, hostel as well as residential area of the college should be of biodegradable in nature which has less detrimental effect on the aquatic environment.
- Gardens should be watered with dripping water system/ sprinklers to minimize water loss.

- Fixation of ball cock in the water tanks should be done to reduce/ stop the loss of water as overflow.
- Leaking taps are to be repaired/ replaced with new one as and when necessary.
- Electronics sensors should be fixed in the lavatory to reduce over use/wastage of water.

ENERGY USE AND CONSERVATION

The main source of energy in college, hostel and residential are inside the college campus is electricity only. The total electricity supply to college, hostel and residential area is done by Western Electricity Supply Company (WESCO). This parameter shows the energy consumption and utilization which is an important aspect of campus sustainability.

a. Observation

The average energy consumption in shape of electricity is determined as 60 KWH/month in winter and 115KWH/month in summer with an average of 85KWH/month for the college. In winter the main use of electricity is for lighting purpose, running of computers, photocopiers and other scientific instruments. In summers in addition to the above the use of fans, air conditioners, and water coolers the consumption of electricity increases. The entire campus along with the college building is equipped with LED lamps, CFL Bulbs and LED Tube lights except at a few locations. Neither the college nor the hostels have solar water heating system installed. The college and the hostels have no Photovoltaic Cell panels installed. All the computers, photocopiers machines are set to automatic power saving mode when not in use to reduce the energy consumption. All the teachers, staff and students are advised to switch off the fans and lights when not in use especially after a lecture is completed.

Along with electricity, Chemistry Department also uses gas for burners which are used for laboratory practical.

The college has two eco-friendly diesel generators to cope up with the need of power during power failure. Along with that the college has many numbers of Invertors fitted in different sections *e.g.* Principal's office, SAMS, Autonomous Section, Examination Section, College Office and Accounts Section so that short time electrical failure will not affect the day to day activity.

a. Recommendations

- All the CFL bulbs to be replaced by LED bulbs/tubes.
- Photovoltaic cell should be installed on the roof of the college building as well as on the hostel building to reduce the intake of electricity from grid.
- 5star rated electrical & electronic appliances are to be installed to reduce energy consumption.
- CRT monitors of the computers are to be replaced with LED monitors.
- All the fans, lights and other electrical & electronics appliances are to be switched off when they are not in use.
- The tube lights and LED bulbs are to be cleaned periodically to remove dust and to make them brighter.
- Burners in the laboratory should be kept off when not in use to reduce gas consumption.

WASTE GENERATION

This indicator shows the waste production and disposal which include plastic, paper, food which are either bio-degradable or non-biodegradable. Municipal solid waste has a number of adverse effects on the environment which are well known to all and no need of elaboration. Waste can be divided in two categories: General waste and Hazardous waste. General waste include those wastes which are generally throw away from Office, Hostel and residential area of the campus *e.g.* paper, plastic, glass and left out food. But the hazardous waste is generally generated from chemistry laboratory which could be a threat to one's health and also to the environment.

a. Observations

In the office and all most all the departments single sided papers reused for writing and rough work. Now with the availability of both side printing facility, all most all the documents are printed both side. In office and departments the important official paper are kept for future reference. In the college very less plastic waste is generated. With the initiative of "Plastic Free Rourkela", the plastic carry bag and Plastic cups for tea and liquid beverages is not available in market and hence in the residential are the generation of

plastic waste also reduced. So the plastic waste is neither categorized at point source nor sent for recycling. Metal waste and wooden waste are stored and are auctioned from time to time to scrap agents. Very few glass bottles are reused in the laboratories.

The food waste from hostels, canteen and residential are thrown away as their quantity is very less.

b. Recommendations

- Reduce the absolute amount of waste generation by a process of reuse.
- Paperless office system should be introduced, all the notification, communication to staff and students should be made by college website, e-mail, whatsapp and other suitable social media.
- No use of plastic where ever possible.
- Make full use of recycling facility of City Municipality and other third parties for glass, plastic, can and other recyclable waste.
- Vermicomposting practice should be adopted in hostels, canteen and residential area. For that four to five vermicomposting pits should be dug as per the need.
- For handling hazardous chemical waste separate pits should be made with appropriate safety standards.
- Incinerator is used for napkin burning.

E-WASTE GENERATION

e- waste or Electronic waste, , is a term for electronic products that have become unwanted, non-working or obsolete, and have essentially reached the end of their useful life. Because technology advances at such a high rate, many electronic devices become “trash” after a few short years of use. In fact, whole categories of old electronic items contribute to e-waste.

Solving the e- waste problem starts with education, and habit changes as a result of knowledge. Most people are trained to recycle a newspaper, bottles, and cans. Almost anything electronic in nature can be recycled properly with effort.

Obsolete electronic devices are rapidly filling the landfills of the globe. This makes up to 05% of all municipal solid waste but is much more hazardous than other waste as they contain Lead, Mercury, Cadmium and Polychlorinated Biphenyls (PCBs) that are mainly responsible for environment degradation and human health.

a. Observations

E-waste generated in the college and campus is very low. The cartridges used in laser printer are refilled outside of the college. The e-waste and defective items of the college and departments are stored and disposed as per Government Norms. College administration has instructed all the departments along with office for proper handling of e-waste and safe disposal.

b. Recommendations

- Recycle and safe disposal of all obsolete electronics items to be done as per local guidelines.
- Use of reusable resources and containers to be practiced to avoid unnecessary packing material dumping.
- Use of recycled and refurbished goods whenever possible.

GREEN AREA

Green area includes all the flora and fauna that are available in the college campus. It mainly includes the plants that are found in the area for greenery and sustainability. The college is situated in the vicinity of NH-143(A) and also the Rourkela Steel Plant is not so far. So air pollution in shape of dust, toxic gas is a common factor for the college. For that maintenance of green area and green belt is very much necessary for the college.

All plant and animal species - including humans - are linked together in a complex web of life; we depend upon biodiversity for our survival. Biodiversity is the key to healthy ecosystems and ultimately a healthy planet. It keeps the air and water clean, regulates our climate and provides us food, shelter, clothing, medicine and other useful products. Each part within this complex web diminishes a little when one part weakens or disappears.

The trees work hard to keep the air we breathe clean and healthy. They are like sponges. Their leaves take in much of the poisonous unwanted carbon dioxide in the air, and replace it with the oxygen we need for healthy living. This system of absorbing gases on which all plants rely for their food is called photosynthesis. In this process, the plants with the help of sunlight, water, minerals and the green material called Chlorophyll within the leaves change the carbon-dioxide into food for themselves. When doing this they release oxygen into the air which is vital for all life on earth. At night when there is no sunlight the plant no longer makes food, so it does not release the same amount of oxygen. One is often told not to sleep with plants in one's room, as they will use up all the oxygen. However, at night although photosynthesis does take place the plants also rest, so that little oxygen is absorbed from the air and very little harm can be done to the sleeper.

The roots of trees dig deep into the earth and hold it together so that the rain and wind cannot wash or blow it away. This is very important as the earth has only a very thin layer (seldom more than one foot) of fertile soil covering it. If this is washed, blown or worn away leaving rock or sand on which no plants can grow then the earth would become a desert. The removal of this top-soil is called soil erosion. Scientists, all over the world are trying to find ways to prevent soil erosion. One of the most important ways is creating by planting more trees.

Trees send up water vapour into the atmosphere through their leaves. When this vapour meets the cool air above it turns into drops of water which then fall as rain. They give us beauty, colour and greenery. This is something which we often forget and fail to appreciate. They are the homes of many birds, animals and insects. Each of these is important in maintaining the balance of nature.

Trees give us food, and juice to drink. Ropes, medicines, wood, paper, and so many other things we use in our daily life, or which are necessary for our health, are made from trees.

a. Observations

College campus is located in the middle of many trees. Ladies hostel-1 and Boys Hostel-1 are also surrounded with many trees. But due to ongoing civil constructions *i.e.* construction of new departments and hostels many trees have been cut which affects the greenery and biodiversity of the college campus. College NSS team is doing their best to plant more trees. A new landscape is being designed by L&T for the beautification of the college.

b. Recommendations

- More plantations should be done every year in the month of July and August to increase the plant diversity.
- Promote environmental awareness as a part of course work.
- Emphasis should be given for indoor plantation which can increase the aesthetic value of the college.
- More pots should be placed in the college corridor with bonsai plantation.
- Different areas of the college campus may be divided among different departments for plantation which will create a bond between the students and nature.
- Plantation of medicinal plants should be done.
- A green library should be established with the help of the students, staff and HOD Botany as the Coordinator.

CARBON FOOTPRINT

A carbon footprint is defined as the total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO₂).

How we get around and commute to and from college each day has an impact on the environment through the emission of greenhouse gases into the atmosphere by the burning of fossil fuels (such as petrol & diesel). The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases,

carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions.

An important aspect of doing an audit is to be able to measure our impact so that we can determine better ways to manage the impact. In addition to the water, waste, energy and biodiversity audits we can also determine what our carbon footprint is, based on the amount of carbon emissions created. One aspect is to consider the distance and method traveled between your home and college every day.

a. Observations

During audit it is observed that about 35 percent students are using bicycle for their day to day activity. The students who are staying in hostel are coming to college by foot which comprises about 10 percent of the total students. From the day scholar students 10 percent students are using public transport system and the rest 45 percent student using their own vehicle for transport activity.

Near about all the staff members are using their own vehicles for transportation, which include two wheelers and four wheelers. Some one or two percent staff members are using bicycle or public transport system to travel between college and home every day.

b. Recommendations

- Students should be encouraged to use bicycle and public transport system as per their convenience to reduce green house gas emission by burning petrol.
- Car pool/bike pool by the staff should be encouraged.

CONCLUSION

Considering the above facts the institution is running with undergraduate, Postgraduate and M.Phil. courses. So introduction of environmental awareness among the students is very much essential. Besides environmental awareness the college authority should take initiative to make the campus green. To make the campus green and eco friendly few

recommendations are added here for waste management, plantation of trees with the help of eco-friendly and scientific technique.

As a part of green audit of the campus, the team carried out the environmental monitoring of the college building as well as college campus which includes illumination, Noise Level, ventilation and indoor air quality of the class room. It was observed that Illumination and Ventilation in the class rooms are adequate considering natural light and air velocity present except a few *e.g.* Room No- 07 and Room No-107 which are poorly lighted. The noise level in the campus is also within the prescribed limit *i.e.* below 50dB at day time.

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