Green Audit Report
of
St. Aloysius College (Autonomous)
Jabalpur, M.P.
www.staloysiuscollege.ac.in

"GREEN LIVING - CLEAN AND HEALTHY LIVING"

PREAMBLE: The most important aspect in life is environment and the wellness of the environment is directly related to the wellness and health in human beings and every other species. The environment is so important because we get all the natural resources from mother Earth, the environment is also a source of natural beauty and it is our responsibility to protect and conserve its resources. The deterioration of the environment, often referred to as environmental degradation threatens the earth's natural resources. But unfortunately, the various elements of environment such as, air, water, land, etc., are polluted and contaminated. Urbanisation, industrialisation and overcrowded living have primarily been responsible for this menace. Pollution is also caused by vehicles, supersonic jets, smoke-producing factories, radio-active elements, etc. The careless dumping of solid wastes by households, factories, markets, commercial centers, etc., in the open places, streets and in the rivers have further aggravated the problem.

We need a clean environment so we can live healthy lives and leave future generations a healthy Earth. But today on the name of technology and development human beings are creating a lot of damage to the environment. The only way we are going to achieve a clean environment is if everyone works together to take care of our planet. It is important to create awareness about the fragility of our environment and the importance of its protection. Promoting environmental awareness is an easy way to create a brighter future. The young generation of today should be educated to respect, protect and preserve the nature.

It is easy to take small steps to create a clean environment. If everyone makes a few small changes, it will have a big impact on our environment. We all need to be focused on creating a clean environment.

Keeping in view the global and national interest about environmental issues, St. Aloysius' College (Auto.), Jabalpur has formulated and defined its Environmental Policy and Mission

ENVIRONMENTAL MISSION

St. Aloysius' College (Auto.) focus on the monitoring, management and maintenance of the campus to create awareness not only within the Aloysian family but also in the contiguous locality for safe environment.

Green Audit Team prepares Green Audit report under three broad aspects –

- *Green and Clean Campus*
- *Reduce, Reuse and Recycle*
- *Health and Hygiene*

These three aspects were accomplished under following features -

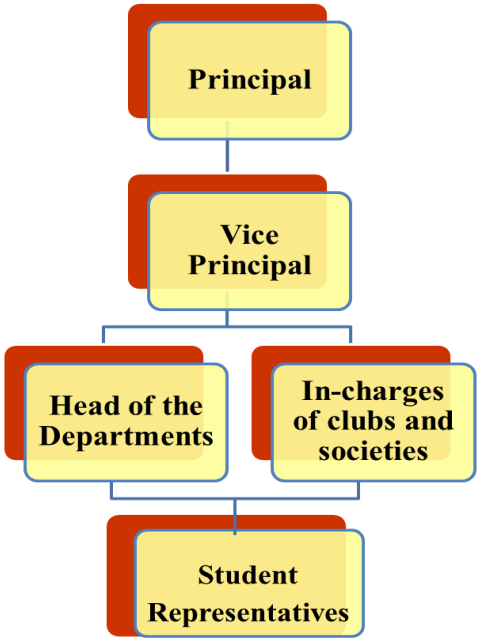
- Green campus
- Clean campus
- Energy Conservation
- Efforts for Carbon Neutrality
- Water Harvesting
- Quality of Water, Air and Sound
- Hazardous Waste Management
- e-Waste Management
- Best out of waste to Reduce, Reuse and Recycle
- Health and Hygiene
- Use of Renewable Energy

Green Audit Team provides research output for the welfare of the society by conducting dissertation, minor and major projects, internship, add on courses, etc. on environment pertinent topics. The team is steadfast to educate and disseminate awareness about various environmental issues by organizing lectures, workshops, road shows, campaigns, value education, mentoring, training programmes to the entire Aloysian family and proximate society.

The members of Eco Conservation Monitoring Team are as follows:

- Dr. (Mrs.) Shikha Bansal, Head, Dept. of Botany & Microbiology; In charge Nature Club.
- Dr. (Mrs.) Caroline Saini, Head, Dept. of Hindi, NSS officer
- Dr. Ms. Parnashree Mukherjee Head, Dept. of Zoology,
- Mrs. Sonali Nigam, Dept. of Botany & Microbiology; Member Nature Club.
- Dr. (Mrs.) Mamta Gokhale, Dept. of Botany & Microbiology; Member Nature Club.
- Mrs. Femina Sobin, Dept. of Botany & Microbiology

For effective implementation of the Environmental Policy, The Institute has constituted Eco Conservation Monitoring Team under the Chairmanship of Principal. The members of Eco Conservation Monitoring Team are as follows- Vice-Principal, Heads of the department, In-charges of clubs and societies and Student Representatives. The structure of the cell is given below:



The Scope of the Green Audit is defined in terms of:

- Geographical Location of the Institute
- Its Environmental Aspects

1. Geographical Location :

The College is situated in one of the major cities of Madhya Pradesh i.e. Jabalpur, well known for its natural beauty and tribal inhabitants. Students from all over the state come here for education. The College being one of the best in disciplines like Science, Arts and Commerce in M.P. lures many students from neighboring states as well. Greenery of the College portraits a miniature Jabalpur, an exemplary for the students to get inspiration to conserve and preserve the environment. Thus ensuring that the message of eco conservation will find its way to a long distance.

Name and Address of the Institute:

Name	St. Aloysius' College (Autonomous)	
Address	1, Ahilya Bai Marg, Sadar Cantt, Jabalpur	
City	Pin :482001	State: Madhya Pradesh
Website	www.staloysiuscollege.ac.in	

Location: The Institute is situated on Devi Ahilya Bai Marg, Sadar Cantt, Jabalpur on 10.52 acres of land.

Location	**Urban**
Campus area	10.52 acres (Shared between College and School)
Built up area	8211.52 sq. mts 88387.98 sq. ft.

Coordinates: The geographical coordinates of Jabalpur district is:

23˚10′0″ North

79˚57′0″ East

The geographical coordinates of Institute is:

23.153422 North

79.951997 East

The Google Earth map of the area

2. Scope of Green Audit in terms of Environmental Aspects:

- Green Campus
- Clean Campus
- Energy Conservation
- Efforts for Carbon Neutrality
- Water Harvesting and
- Quality of Water , Air and noise
- Hazardous Waste Management
- e-Waste Management
- Best out of Waste to Reduce, Reuse and Recycle
- Health and Hygiene
- Use of Renewable Energy

Green Campus

One of the way through which green and clean campus is accomplished in the college is by plantation. Awareness for plantation is spread among students through departmental and club activities by plantation of saplings. Plantation was carried out in the campus and off the campus. To spread the concept of “Each One Plant One”, saplings are given as a token to the guests. Training on bonsai making and hydroponics, encourages students to use the available space

efficiently to grow plants. Details of some plantation on campus with respect to their local name and botanical name are given below:

Local Name	Botanical Name
Trees	
Cycas	Cycas sp.
Amaltas	Cassia fistula
Kachnar	Bauhinia sp.
Ashok	Polyalthea longifolia
Neem	Azadirachta indica
Amla	Emblica officinalis
Gulmohar	Delonixregia regia
Peacock Flower	Caesalpinia sp.
Christmas tree	Araucaria sp.
Guava	Psidum guajava
Sitaphal	**Annona squamosa**
Anar	**Punica granatum**
Perennial shrubs	
Jason	Hibiscus rosa sinensis
Nagar motha	Cyperus scariosus
Lal Kaner	Nerium indicum
Rose	Rosa sp.
Bougainville	Bougainville sp.
Jasmine	Jasminum sp.
Croton	Croton bonaplandium
Tulsi	Ocimum santalum
Coleus	Solenostemon scutellaroides
Harsingar	Nyctanthes arbor tritis
Yellow Kaner	Thevetia nerifolium
Gwar patha	Aloe sp.
Mehandi	Clerodendron sp.
Ajooba	Bryophyllum sp.
Cactus	Opuntia sp.
Sarpgandha	Rauwolfia serpentina
snake plant	Sansevieria sp.

Marigold	Tagetes erecta
Petunia	Petunia sp.
Phlox	Phlox sp.
Carona	Dianthus sp.
Patton ki send	Euphorbia splendens
poinsettia	Euphorbia pulcherima
Chrysanthemum	Chrysanthemum morifolium
Sada Suhagan	Catharanthus roseus
Canna Lily	Canna generalis
Pansy	Viola tricolor
Blue Sage	Salvia farinacea
Garden nasturtium	Tropaeolum majus
Dahlia	Dahlia sp.
Calendula	Calendulasp.
Verbena	Verbena sp.
Lark spur	Delphinium ajacis
Candy tuft	Iberis amara
Gul mehandi	Balsamina sp.
Gulkhera	Hollyhock sp.
Poppy	Papaver somniferum
Sun flower	Helianthus annus
Aquatic plants	
Hydrilla	Hydrilla sp.
Kamal	Nelumbo sp.
Kumudini	Nymphea sp.
Climbers	
Madhu malti	Combretum indicum
Aparajita	Clitoria ternatea
Satawar	Asparagus resimosus
Money plant	Pothos sp.
Morning glory	Ipomea tricolor
Golden shower	Bignonia venesta

Following are the activities conducted in the institute to make the campus green and spread the message of significance of plantation:

- Department of Botany and Microbiology organized Bonsai Making a training programme by Mrs. Manisha Dubey on 1st February 2014.
- Department of Botany and Microbiology organized Eco Fest on 15th February 2014 in which plantation was done in the college premises.
- Department of Education planted saplings in the campus on 5th June 2014 on World Environment Day.
- NSS organized camp for girls unit in Mohaniya village, Ranjhi were plantation was done (2013-14).
- Department of Botany and Microbiology organized Eco fest on 25th February 2015. On this occasion Dr. Sanjay Singh delivered a lecture on biodiversity. Tree plantation was organized during this event.
- Department of Botany and Microbiology with Nature Club celebrated Science Day on 28th February 2015 by organizing Bonsai Making training programme in which expert Mrs. Manisha Dubey gave practical demonstration and explained the techniques of developing Bonsai.
- The Department of Botany and Microbiology organized Eco-fest on 30th January, 2016, under which various competitions like Slogan, Poster, Quiz, Bio rangoli were held. Dr. S. K. Khare scientist, MPPCB was chief guest on this occasion. This program encouraged the students to clean and save environment. Saplings were also planted in the campus.
- The Department of Botany and Microbiology organized Guest lecture by Dr. A. K. Bhatacharya (I.F.S., M.D. M.P. Bamboo Mission) on Bamboo cultivation in M.P. on 14th August, 2015.
- The Department of Botany and Microbiology organized a Guest lecture by Dr. Ajay Singh Thakur, (Scientist, Ministry of Agriculture, Ministry of Home Affairs, Government of India), on 8th September, 2015. He gave his presentation on "Organic Farming and Soil Health Card and on Future Prospects of Job for Life Science students in Government sector".
- NSS Unit organized a plantation programme for clean environment at Tripuri Ward, Sastrinagar, Jabalpur on 25th July, 2015. The total number of plantation done was 100.

Some glimpse of activities carried out to create a green campus is enclosed in **Annexure – I**

Clean Campus

A clean environment is obligatory to live a peaceful and healthy life. But our environment is getting unclean day by day because of the negligence of human beings. It is an issue which everyone must know about, especially the youth .Not only intellectuals but even the ordinary

men and women are becoming aware of the need to have a clean environment. As a result, what is detrimental to environment is opposed today. Efforts made by the institute to keep the campus and surrounding clean and disseminate awareness about clean surrounding are as follows:

- Five days training programme on "drinking water and environmental pollution" was sponsored by department of P. G. studies and research in rural development RDVV Jabalpur from 6th to 11th February 2014.
- Guest lecture was given by Dr. Archana Singhal (Department of Education) on human rights and environment which was organized by department of Political Science on 22nd March 2013.
- Nature club organized Shram dan in which campus was cleaned and composting bins were placed in garden and campus etc (2013-14).
- An awareness programme was organized by Department of Education on 29th October 2014 on 'Cleanliness and Significance of Being Literate' at Government Girl's Higher Secondary School.
- To create awareness about cleanliness, education and environment conservation, educational tour to Bacchiya village was arranged on 8th October 2014 by the Department of Education.
- Department of Zoology and Department of Biotechnology organized a road show on "Conservation of Nature and waste Management" at Pentinaka, Sadar and made the public aware about the importance of various conservation methods on 30th August 2014.
- Department of Zoology visited Dumna Nature Reserve, Jabalpur to Study Biodiversity of fauna, 13th September 2014.
- Educational trip to Katav, near Majholi, M.P. was arranged on 18th February 2015 by the Department of Zoology. This develops a sense of concern towards clean environment among students.
- The NSS unit in St. Aloysius College organized awareness rallies on "Swatchata Abhiyan" with the aim of spreading awareness for Clean India and Clean Rivers.
- The Department of Botany and Microbiology in collaboration with Aloysian Nature Club had organized an Environmental Awareness Programme to industrial area, Ricchhai, Jabalpur. The students of B.Sc IV semester with posters and slogans made people aware about the role of biotechnology and microbes in Swach Bharat Abhiyan.
- On the occasion of Gandhi Jayanti, Swachch Bharat Abhiyyan Campaign was conducted by army wing girl cadets. In which they cleaned roads of Sadar area and the college premises.
- NSS wings organized a Swachata Abhiyan on 5th March, 2016 and cleaned the college campus.

- The Department of Botany and Microbiology celebrated Science Day on 1st March, 2016. Extempore, Quiz and Debate competitions were held for the students of UG and PG. The theme of the competitions was 'Biotechnology in Swachha Bharat'.
- A self-financed add on course on Water Quality Monitoring is conducted by the Department of Botany and Microbiology.
- NSS wings organized a rally entitled "Polythene Free Zone" on 22nd August, 2015. Rally started from St. Aloysius' college and ended at Gorakhpur. Hundred students participated in rally program.
- Nature club encouraged students to spend some time in cleaning of the college campus and surroundings.
- To explain the benefits of maintaining hygienic conditions, composting bins were placed at respective sites of the college such as garden, campus, etc. (2015-16).

Some glimpse of activities carried out to create a clean campus is enclosed in **Annexure – II.**

Some of the action taken for cleaning campus is given below:

- The Institute targets to make the campus plastic-free by avoiding non-biodegradable products such as plastic glasses, cups, plates and straws in the Institute canteen and instructing students to avoid bringing plastic materials.
- The Institute aims for an eco-friendly campus and to make this a reality, the use of eco-friendly bags and files are encouraged.
- Bins are placed in different parts of the campus for the collection of plastic, paper and food waste.
- The staff and students have taken the initiative to take up campus cleaning programme through clubs and society.
- The campus is also declared tobacco free and smoking free zone.

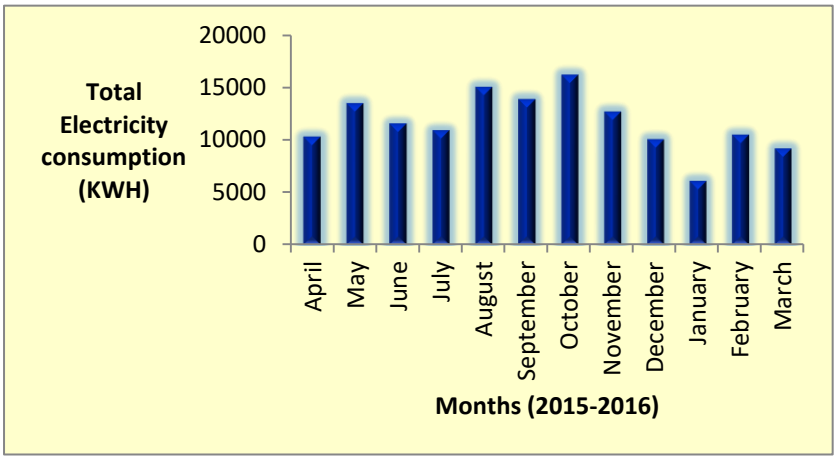
Energy Conservation

Electricity supplied from the Madhya Pradesh Electricity Board is the main source energy for the activities on the campus. In addition to the regular supply Institute has its own 45 KVA generator for power back-up. The institute also has six UPS of 1.1 KV each and 12 UPS of 3 KV each. Electricity is used for illuminating all the class rooms, fans, ACs, computer and laboratories equipment. Average consumption during 2015 to 2016 is about 11708.17 Kwatt / month. The energy consumption during 2015-2106 is given below:

Electrical Energy Consumption Pattern in St. Aloysius College (Auto.), Jabalpur

Month	Unit Consumed (KWH)
Apr-15	10347

May	13540
June	11613
July	10980
Aug	15120
Sep	13928
Oct	16287
Nov	12737
Dec	10093
Jan	6110
Feb	10536
Mar	9207
Average	**11708.17**



Energy Consumption during 2015-2106

At St. Aloysius College (Auto.), Jabalpur, the energy conservation measures taken up are:

- Use of Compact fluorescent lamp (CFL)
- Use of Light Emitting Diode (LED)
- Energy Conservation Awareness was carried out amongst students by means of lectures during Value Education, Mentoring and Morning Assemblies. The students are advised to switch off the electrical appliances when leaving the class rooms.
- The institute encourages paperless communication in the form of e-mail instead of sending notices and faxing documents.
- Most of the air conditioners, refrigerators and other electrical appliances carry three to five stars rating.
- CRT monitors are replaced by flat-screen LCD monitor

Efforts for Carbon neutrality

Thinking about carbon footprints is a simple way of thinking about ways to reduce environmental pollution. By reducing our carbon footprints, each one of us can contribute to making the earth a safer, better place to live.

Carbon footprint is the amount of Greenhouse gases like carbon dioxide, methane, nitrous oxide emissions. It relates to the amount of greenhouse gases produced in our day-to-day lives through burning fossil fuels, for electricity, heating, transportation, etc.

At St. Aloysius College (Auto.), carbon footprint for college building is considered. The performance of the building can be increased by using LED lights and it will also reduce the carbon foot print. The carbon foot print is being calculated for-

- Incandescent Light
- Compact Fluorescent Light
- LED Light

Electricity:

By and large, half of our carbon footprint is due to electricity and 17 % is due to lighting alone. Electricity in turn can be produced by coal, natural gas, petroleum, and other. Electricity is produced from different sources and how much GHG released is shown in the table below:

Source	**Million metric tons of CO_2 emission for 1 year**	**Electricity generation (Billion kWh) for 1 year**
Coal	1788	1882
Petroleum	106	119
Natural gas	337	562
Other	14	22
Non fossil fuels	none	1106
Total	2245	3621

CO_2 emitted by total electricity generation per year is close to 2245 million metric tons. Thus, single kilowatt-hour of electricity will generate 619 grams of CO_2 emissions.

a. Incandescent Light

Incandescent lamp is a source of light which produce light when the filament is being heated. It can release 80% electrical energy converted into heat energy. We can calculate how much CO_2 will be emitted by 60 watt incandescent bulb.

- Power Consumption- 60 watts
- Operation per day- 10 hours
- Power Consumption per annum-219000 watt

- Electricity per hour (KWh) – 0.06 (1 KWh=619g CO_2 can be released)
- Lighting Carbon Emission per year/lamp (219*619g) = 135.5 kg.
- A single 60 watts incandescent bulb will generate 135.5 kilograms of CO_2 per annum.

b. Compact Fluorescent Light

CFL produce less heat and more visible light compared to incandescent lamp. We can calculate how much CO_2 will be emitted by 11 watt CFL bulb

- Power Consumption- 11 watts
- Operation per day- 10 hours
- Power Consumption per annum-40150 watt
- Electricity per hour (kwh) – 0.011 (1 kWh=619 g CO2 can be released)
- Lighting Carbon Emission per year/lamp - (40.15*619g) = 24.8 kg.
- A single 11 watts CFL lamp will generate 24.8 kilograms of CO_2 for every year.

The reduction of carbon footprint is negligible with this lamp. CFL contains harmful mercury. LED lights only will reduce our carbon foot print as compared to other lights.

c. LED Lights

LED lights consume low power and energy efficient as compared to other lights. CO_2 emission by 9 watt LED lamp can be calculated as follows-

- Power Consumption- 9 watts
- Operation per day- 10 hours
- Power Consumption per annum-32850 watt
- Electricity per hour (kwh) – 0.009 (1 kWh=619 g CO2 can be released)
- Lighting Carbon Emission per year/lamp - (32.8 *619g) = 20.3 kg.

The building's carbon footprint from led lighting can be reduced by 85%.

- Reduction in Carbon Footprint (tons)-1.1 (115 kg)
- The 9 watt LED equivalent will only be responsible for 20.3 kilograms of CO_2 over the same time span.

Parameters Studied	**Incandescent Bulb**	**CFL**	**LED Light**
Power Consumption(watt)	60	11	9
Electricity(kwh)	0.06	0.011	0.009
Hours of Operation Per Day	10	10	10
Carbon Emissions (tons) per year/lamp	1.35	0.24	0.20
Reduction in Carbon Footprint (tons) / lamp	--	--	1.1

- LED light can reduce our carbon footprint by 1.1 tons per year.
- Led light does not contain mercury; it is a big benefit of this lamp.
- CFL contain 3-5 mg of Mercury per bulb which is poisonous.
- The 9 watt LED equivalent will only be responsible for 20.3 kilograms of CO_2 over the same time span.
- Based on above comparisons, LED emerges as the BEST option to reduce carbon footprint.
- At St. Aloysius' College (Autonomous), Jabalpur there was 76 tube lights of 40 watt capacity.

CO2 emitted from these lights is given below:

No. of tube lights	**CO_2 emitted per lamp / year**	**Total CO_2 emitted per year**
76	90.3 kg @ 10 hrs /day	6862 kg

Considering the need of the time and cost, the 23 tube lights were replaced with LED bulbs of 9 W. CO_2 emitted from these lights is given below:

No. of LED bulbs	**CO_2 emitted per lamp / year**	**Total CO_2 emitted per year**
23	20.3 kg @ 10 hrs /day	466.9 kg

Total reduction in CO_2 emission = 1610 kg / year.

This indicates that 23.4% CO_2 emission is reduced at St. Aloysius' College (Autonomous), Jabalpur. Considering the benefit of LED bulbs it is recommended to replace all the conventional bulbs with LED in phase manner by the end of 2016-2017.

Energy Conservation carried out by the college is depicted in **Annexure- III**

Water Harvesting

At St. Aloysius College (Auto.), water is required for drinking, laboratory works, lavatory and gardening purpose. Total number students in the campus for a period of seven hours per day is given below:

Year	**Under Graduate**	**Post Graduate**	**Total**
2015-2016	4064	259	4323

Water requirement per person is assumed to be 3 lit / per person during their stay in the campus. Hence, water requirement for per day would be 4323 x 3 lit = 12969 lit. water requirement is met through the supply made by the bore well. The institute has two bore wells. Overhead storage tanks are fitted for storage and round the clock water supply.

Jabalpur has almost 391 mm average annual rainfall. Considering 20% as evaporation loss, actual water available for harvesting would be 312.8 mm. The campus has huge potential for rainwater harvesting. Institute has utilized this opportunity and has been constructed in such a way that the rain water collected is used for recharging underground water. The lawn in the college campus is made at lower level for water conservation. With same perseverance, landscaping with small ponds and fountains were also constructed.

Department of Chemistry and Biochemistry has a rainwater harvesting system in the roof top. The water harvesting system was planned by the faculty of the department. The water thus being harvested is used for laboratory purpose.

To make the students aware about importance of water conservation, guest lectures was organized on the topic “Preventive Measures and Protection of Water Sources” , by Dr. A. K. Shrivastava, Senior Scientist, Pollution Control Board, Jabalpur.

A photograph showing Water harvesting system, water conservation structures and borewell is enclosed as **Annexure-IV**

Quality of Water, Air and Noise

The college has seven water filters in the campus and two water purifiers in the girls’ hostel to fulfill the potable water requirement of the stakeholders.

Add on course entitled “Water Quality Monitoring” is being conducted for students. This course caters to the global requirement of consumable water, detection of undesirable substances from water and methods of water treatment. As a part of Add on course “Water Quality Monitoring” students complete a project of analysing Water Quality of samples collected from various locations with reference to following parameters –

a. Chemical Parameters

- pH
- DO
- COD
- BOD

b. Physical Parameters

- Colour
- TDS
- Odour

- Taste

c. Microbiological Parameters

- Presence of Pathogenic microbes
- Presence of Coliforms
- Total bacterial count

As a project under add on course, students also analyse potable water of the college campus. Water Quality Report of potable water of the campus as estimated by the students

Chemical Parameters	
pH	6.5
DO	8.2 mg/l
Physical Parameters	
Colour	No noticeable color deposits
TDS	70 ppm
Odour	Agreeable
Taste	Agreeable
Microbiological Parameters	
Presence of Pathogenic microbes	Pathogenic microbes absent
Presence of Coliforms	Coliforms absent
Total bacterial count	20 cfu/ml

To create awareness among students about water conservation a training programme was organized entitled “Drinking Water and Environment pollution” funded by Department of P.G. Studies and Research in Rural Development, Rani Durgavati Vishwavidyalaya, Jabalpur organized by Department of Botany and Microbiology on 6th - 11th February 2014. During this event a guest lecture was also organized on the topic “Monitoring and Analysing Potable Water on Different Parameters”, by Dr. S. K. Khare, Senior Scientist, Pollution Control Board, Jabalpur.

In the research conducted by Srivastava R.K. and Sarkar R. (In the year 2010 in Jr. of Industrial Pollution Control. 26 (2): 193-198) on pollution detection in high traffic zones of Jabalpur city by means of air quality index, it has been stated that the heavy traffic areas of Jabalpur are very close to the limits of medium pollution. The college is not located in such high traffic zone. Class rooms are well ventilated for proper air circulations. Ample plantation in the campus ensures fresh air. The campus is Tobacco free. Students are encouraged to use public transport to reduce air pollution and traffic.

Communities with more trees are quieter than those without them, since large, leafy trees can help absorb noise. College campus has sufficient plantation and the surroundings also have plenty of plantation and this is a good way to moderate some of the noise pollution in the area.

Hazardous Waste management

Biohazardous waste is any waste generated from working in biological or biomedical laboratories that may contain infectious or potentially infectious substances or any agents or substances that are an environmental release risk (i.e., recombinant DNA). This includes materials that may present an actual or perceived biological risk to others on site.

Few biohazardous wastes generated in the institutional laboratories may include microbiological cultures or stocks (including bacterial, viral, parasitic, fungal, etc.), synthetic nucleic acid molecules, Cell/tissue cultures, Human clinical specimens (blood or any other body fluid), Labware potentially contaminated with biohazardous agents (flasks, plates, pipets, tubing, etc.).

a. **Disposal of microbial cultures**

   A laminar hood is used to reduce exposure to pathogens that might become airborne during handling of the cultures. A nose mask is worn to reduce inhalation of spores and apron and gloves are used while handling with microbes.

   After performing various experiments with microbial cultures it is mandatory to dispose it safely, as these microbes may be harmful. Microbial cultures and glassware including culture tubes, flasks, Petri plates and pipettes used to handle the microbial cultures are autoclaved at 121°C for 30 minutes at 15 Ibs pressure. The contents of the glassware are then drained off under running tap water and soaked in 2.0 % savlon solution. Then washed with 0.1 % Teepol solution and rinsed with tap water, finally rinsed with purified water and dried. An empty autoclave sterilization cycle is run at 15 Ibs for 15 minutes after sterilization of the used media.

   Spills from leaking autoclave bags or other containers are cleaned immediately with a suitable disinfectant (fresh 1:10 dilution of bleach).

b. **Disposal of human clinical specimens**

   Human clinical specimens (blood or any other body fluids) are chemically decontaminated prior to disposal. For each 100 milliliters of blood or body fluid, 10 milliliters of sodium hypochlorite (bleach) is used for decontamination. The mixture is Mixed and allowed to stand for 30 minutes, followed by pouring the mixture down a lab sink with a ten-fold excess of water.

c. **Disposal of chemicals**

   Concentrated and dilute acids and alkalis, harmless soluble inorganic salts (including all drying agents such as $CaCl_2$, $MgSO_4$, Na_2SO_4), alcohols containing salts, fine (TLC grade)

silica and alumina are washed down the drains with excess water. Chemicals are used in minimum possible quantities, non-hazardous alternate chemicals are preferred, so that the waste generated can be disposed down the drains with excess water.

d. Disposal of Ethidium Bromide treated gel

Ethidium Bromide (Etbr) is a potent carcinogen that causes mutation via base transition. It is being used in Molecular Biology laboratory work whenever there is a need to run the isolated DNA in gel electrophoresis. Thus it becomes important to dispose them off carefully. The gel treated with EtBr is treated with strong oxidizing agent like sodium hypochlorite which deactivates EtBr. and pour the aqueous phase down the sink.

A research project entitled "Bio-sorption of hazardous ions: An ecofriendly and promising approach" was carried out by Department of Chemistry and Biochemistry.

e-Waste Management

Unused computers and their peripherals are the only source of electronic waste in the campus. There are about 322 computers and 58 laptops under use for teaching-learning and office work. Every effort is made to repair and use electronic and electrical devices. Piling up of e-waste is discouraged in the campus.

College actively aware about electronic waste and motivate students for implementing innovative ideas using these unused stuffs. Students have created below mentioned devices using scrap materials of many devices not in use. These devices are useful and are being used in the departments.

List of component reused:

Name of Reused Device	Quantity Reused
RAM	30
SMPS	10
LED Light	20
Printer Bottles	5
CPU Fan	10
CPU cabinet	5
Mouse	50
Mobile Battery	5
Empty Bottle	5
Wires	10
Mobile Pins	5
USB Slots	3

Switch	1
Audio Board	2
IC 6283	2
B3 Slot	2
Network Cable (Meter)	10

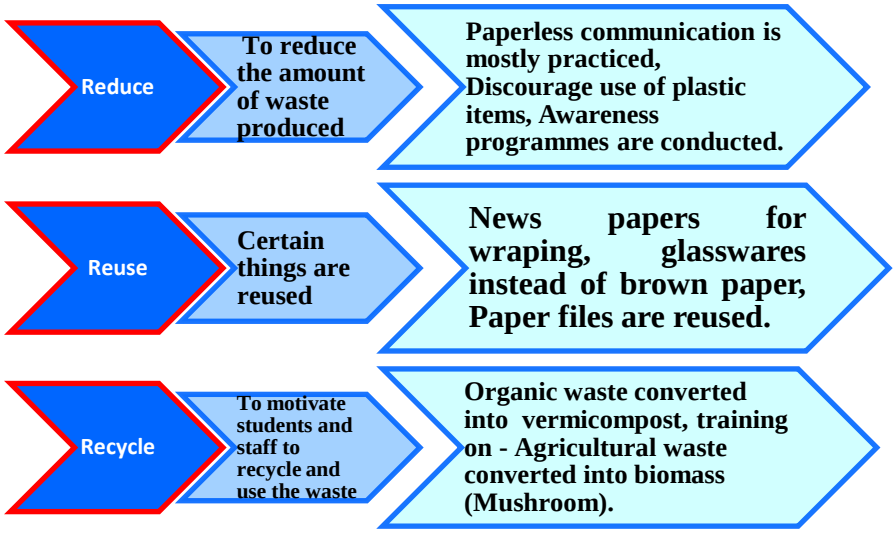
Devices created using E-Waste:

- Cooling Pad: Device that cools the laptop created by heavy metallic material of good quality.
- LED Torch: A torch was made with 16 LED from discarded mouse and old mobile battery.
- Universal Charger: Multiple connector charger was made with SMPS to charge the mobile phones.
- Amplifier: Sound amplifier that amplifies the sound with IC 6283, Audio Board and B3 Slot.
- Assembling computers: 3 PCs have been created from components of 7 discarded computers.
- Lab Bench Power Supply: Lab bench power supply providing multiple dc voltages was prepared from old computer components.
- Flash Light: 12 V. DC Flash light was made form old disposed electronic items.
- Reconfiguring Mouse: damaged connectors and faulty cables of mouse were replaced with working cables and connectors of old devices.

Best out of Waste to Reduce, Reuse and Recycle

Waste production cannot be stopped entirely, but everyone can make a significant contribution to reduce the waste production. The three R's of the environment are Reduce, Reuse and Recycle. Sustainable waste management strategies can be planned. It saves energy and natural resources, helps to reduce pollution and reduces the need for landfill. Some of the practices of the college for sustainable waste management includes:

- Broken furniture is repaired rather than buying new ones.
- Re-useable Labware instead of disposable ones are preferred.
- Scrap paper is used to take notes and messages.
- Old assignments and paper bits are used for writing notices and decorating notice board.
- Refillable printer cartridges are preferred.
- Vermicomposting pits have been set up were Green waste is converted to vermicompost, which is then used as biofertilizer for plants in college campus.



- Department of Zoology and Biotechnology organized road show on 14th August 2013 on Zero pollution by waste management in which 100 students participated.
- Five days training programme on "Mushroom Cultivation" was sponsored by department of P. G. studies and research in rural development RDVV Jabalpur from 6th to 11th February 2014.
- Department of Zoology organized road show on Waste Management on 30th August 2014.
- Department of Botany and Microbiology organized a guest lecture, delivered by Prof. R. P. Singh, BBAU, Lucknow on the topic 'Bioremediation' on 21st January 2015.
- The students of UG and PG (Microbiology) participated in National conference on 'Sustainable water resources management: Challenges & opportunities' held at RDVV, Jabalpur, during 20-21 January 2015.
- International Youth Day was celebrated under the aegis of Red Ribbon Club from 13th to 14th August, 2015. Best Out of Wastes Exhibition was held during the program which stimulated scholars to recycle the waste materials and use it for diverse purposes.
- Creating "Best out of Waste", competition was organized during Eco Fest organized by Department of Botany and Microbiology on 30th January, 2016.
- Road Show on Waste Management was organized on 29th January, 2016 by Department of Zoology.
- A Project on Vermicomposting has been undertaken from January- April 2016 by the Department of Zoology.

Activities carried out by the college to spread the concept of Best-Out-of-Waste is enclosed in **Annexure – V**

Health and Hygiene

The environment is important to all life on earth; humans depend on it for the very survival. The world has been reshaped to suit our comforts and as a result of these processes, many natural

environments have been compromised. It's true that civic agencies are responsible for taking care of our society but it's also important that we must realize our responsibilities to our society and environment; and do our share. This will help us to live healthy and better lives. Various activities conducted by the college to spread the message of health and hygiene are as follows:

- Department of Botany and Microbiology organized Disease Awareness Programme with the aim of awareness and home remedies on Hepatitis, AIDS, Typhoid, etc. on 19th October 2013.
- A Major Research Project on the topic "An investigation of genotoxicity as an occupational hazard among bidi rollers due to Tobacco dust", was undertaken by Department of Biotechnology (2011-14).
- Shakti Mahakoushal Vigyan Parishad and Department of Zoology and Biotechnology organized Women Health Awareness Campaign on 24th December 2013.
- Department of Zoology and Biotechnology organized AIDS Awareness Programme under Red Ribbon Club which was sponsored by M.P. State AIDS Control Society, Bhopal, 20th September 2014.
- Department of History organized rally about Nasha Mukti on 5th October 2013.
- Road show was held on World Tobacco Day on 31st march 2014 by Department of Education.
- NSS organized one week Camp in Jamtara, which was marked with participation of 35 students and two teachers. In the camp, free health checkup was organized for villagers.
- Medical Camp for free X-ray/blood test was held by NSS in collaboration with Suvidha hospital. General medicines were also distributed in the camp.
- In the camp for NSS girls unit in Mohaniya village, Ranjhi, programmes related to awareness on HIV/AIDS, female foeticide, save girl child were held.
- Women Cell organized Health Awareness Programme for the staff on different types of genital cancers. Dr. Kavita N. Singh (Gynecologist, Netaji Subhash Chandra Bose Medical College, MS, and Ph.D. in Gynecologic Oncology) was the chief guest in this event. The event was organized on 31st October 2013.
- Department of Botany and Microbiology received a Major Research Project by DST entitled 'Study of important flavonoids isolated from cell cultures of rare medicinal tree Sonpatha (Oroxylum indicum (L) Vent.) and their antioxidant effects' (2014-17).
- Department of Zoology and Biotechnology and Shakti Mahakoushal apprised women on importance of iron and calcium through series of guest lecture in Shiv Mandir premises near Govt. Model Science College to create awareness among women and school girls, 24th December 2013.

- The Department of Education created public awareness about AIDS by staging a street play on world AIDS day.
- Nature Club encouraged students to spend some time in cleaning college campus and surroundings to explain them the benefits of maintaining hygienic condition.
- A guest lecture held by Dr. Neeta S. Bhatia, consultant, Tata Memorial Hospital, Mumbai and National Hospital, Jabalpur on carcinogens on September 2014 in the Department of Zoology.
- The Department of Zoology organized AIDS awareness programme in Nathumal Girl's Higher Secondary School under Red Ribbon Club on 14th march 2015.
- A Guest lecture was organized by the Department of Botany and Microbiology on 23rd July 2014. The lecture was delivered by Dr. Stephan Mathew on 'Natural killer Cell' with special emphasis on its activity in curing cancer.
- Nature club organized a Disease Awareness Programme on seasonal diseases on 30th August 2014.
- A blood donation and free health checkup camp was organized by the NSS unit of the college.
- The Department of Botany and Microbiology conducted awareness programme on various seasonal disease and their preventive measures on 21st August, 2015 organized by M.Sc. I and III semester Microbiology students.
- A medical camp for girl students was held in the campus on 19th January, 2016 by the Department of Chemistry and Biochemistry.
- A medical camp was organized by Women's cell on 12th March, 2016. Four medical representatives checked the haemoglobin of the staff and students and more than 130 persons benefited.
- Yoga, Aerobics and Meditation courses were conducted for the holistic i.e. spiritual, emotional and physical development of the students.
- On 16th February, 2016 a Health awareness and AIDS related information to 9th class students were given by the Department of Biotechnology via Nukkad Natak and special instructions to girl students at a primary school of village Ghunsaur under ABS Community service program.
- The Nature Club organized Disease Awareness Programme on 21st August, 2015.The main objective was to create awareness about seasonal diseases and home remedies. Students of M.Sc I and III Semester Microbiology gave presentation on cure and remedies of seasonal diseases to students of different streams.

- The Women's Cell has undertaken a PROJECT sponsored by UGC (2014-2019) on "Mother and Child" in which the work has been initiated. Between June and August 2015 the faculty members of the Women Cell have been to 05 villages associated with the Primary Health (Govt.) Centre, Barela to meet pregnant women & nursing mothers. They also interacted with preschool children. A short talk was delivered by the Women cell co-coordinator on nutrition and wellbeing of pregnant women, nursing mothers and infants.
- Road Show on Aids Awareness was organized on 29th January, 2016 by Department of Zoology.
- A guest lecture was held on 'Meditation as Medication' for students on 4th March, 2016 by Department of Chemistry and Biochemistry.
- Faculty members and PG students of Department of Zoology organized a Health Awareness Programme in Nathumal Girl's Higher Secondary School on 1st August, 2015.
- Red Ribbon Club organized Guest Lecture by Dr Sharad Jain, Pathologist on 'HIV and AIDS' in the month of August, 2015.
- On 1st December 2015 Department of Education organized AIDS awareness rally on Worlds AIDS Day from college to Sadar market. Students displayed banners, slogan and also played Nukkad Natak.
- NSS wings organized Yoga classes for students held from 7th September, 2015 to 16th September, 2015. Two hundred students participated in the classes held.
- Group Discussion on Blood Donation was organized by Red Cross Society on 28th August 2015.
- The Blood Donation Camp was organized by Red Cross society and NCC units of the College in collaboration with Indian Red Cross Society on 23rd January, 2016. The technical staff of the blood bank units of Rani Durgawati Hospital, Jabalpur under the supervision of the medical officer Dr. Shishir Chinpuriya and Netaji Subhash Chandra Bose Medical College, Jabalpur under the supervision of the medical officer Dr. Sanjay Mishra were present for collecting blood. This camp was a great achievement with a total of 168 blood donors who donated blood for a noble service. Both teachers and students enthusiastically participated in this Blood Donation Camp.
- On 7th March the Women Cell members visited the Sarkari Mahila Evam Bal Vikas Kendra, Kanchanpur. A lecture was delivered by the faculty members on Health and Hygiene.
- On 8th March, International Women's Day a guest lecture was organized by the Women's cell. Dr. Swati Patel, an eminent gynaecologist of Jabalpur addressed the girl students on nutrition, general health and common gynaecological disorders.

- On 12th March a Health Awareness Programme was organized by the Aloysian Women Cell in collaboration with Gynaecological and Obstetric Society, Jabalpur. A team of seven doctors lead by Dr. Richa Behrani visited the college. Various lectures on Health, Hygiene, Wellbeing, Nutrition, Breast Cancer, Menstrual disorders, and Sexuality were delivered.
- Anti-Tobacco Day was observed by army senior division cadets on 31st May.
- On the occasion of Science Day Celebration, Department of Biotechnology organized guest lecture by Dr. Praveen Bharti, scientist, NIRTH (National Institute of Rural & Tribal Health) on "Molecular markers on antimalarial resistance", 20th-26th February 2015.

Some glimpse of activities carried out to create awareness on Health and Hygiene is enclosed in **Annexure – VI.**

Use of Renewable Energy

Institute has installed six solar street lights with 9 W LED outdoor luminary solar photovoltaic panels in open spaces. The girls' hostel is also equipped with a solar water heater. The college has planned to set up a solar water heater to cater the hot water requirements of laboratories. This will considerably reduce energy consumption. A photograph showing solar street light and solar water heater are shown in **Annexure-VII**

Concerns

- Green and Clean Campus
- Reduce, Reuse and Recycle
- Health and Hygiene
- Energy conservation

Suggestions

- Water, Air and Noise quality can be analysed from external agencies.
- Usage of recycled products can be preferred.
- Replacement of CFL and tube lights with LED.
- More Plantation

Green Campus **Annexure – I**






Plantation by Students and Faculty

Training on Bonsai Making by Department of Botany

Hydroponics set up

Seasonal Beds Maintained by Department of Botany

Clean Campus **Annexure - II**

Cleanliness drive at Gwari Ghat by NCC

Awareness programme on Water conservation and clean India in industrial area, Richhai by Nature club

Road show on Cleanliness by Department of Zoology

Cleanliness drive in village by NSS

Road Show on Wastes Management

Poster Competition on Plastic Free Campus

Energy Conservation **Annexure - III**

Generator

UPS

Water Harvesting **Annexure - IV**

Low lying lawn

Fountains

Small ponds

Water harvesting system

Bore wells

Best Out of Waste to Reduce, Reuse and Recycle **Annexure - V**

Mushroom Cultivation: Bioconversion of Agricultural Waste

Competition on Reuse of Waste Materials

Vermicomposting Pits

Health and Hygiene **Annexure - VI**

Swine Flu Awareness Drive for Villagers

Seasonal Disease Awareness Campaign

Gynecological Issues Awareness Drive l

AIDS Awareness Drive

Awareness Programme: Malnutrition by Women Cell

Interaction of Doctor with Students on Controlling Gynecological Problems with Proper Nutrition

Blood donation camp by Red Cross and NSS

Yoga Classes

Meditation Classes

Surya Namaskar in the college

Yoga in NSS Camp

Skit on Being Substance Free in village by NSS

Use of Renewable Energy **Annexure - VII**

Solar water heater system in girls hostel