



Green Audit Report

Barkatullah University, Bhopal



Feb 2022

Prepared by:

Department of Environmental Sciences and Limnology

Green Audit Report of Barkatullah University, Bhopal has been prepared by **Department of Environmental Sciences and Limnology** of the university based on the review and findings of internal audit, review of documents/records, virtual tour of the university campus and interviews of faculty, non-teaching staff and students.

The audit was conducted in **February-March 2022**

The Green Audit Report presents green initiatives that are followed and taken up by the university and provides suggestions and recommendations to improve environmental sustainability.

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Summary

The Department of Environmental Science and Limnology, Barkatullah University, Bhopal conducted “Green Audit” for Barkatullah University, Bhopal during February-March, 2022. Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. The main objective to carry out green audit is to check green practices followed by university and to conduct a well formulated audit report to understand where we stand on a scale of environmental soundness. This is first time Barkatullah University to conduct green audit of university campus. Questionnaires prepared to conduct the green audit were based on the guidelines, rules, acts and formats set by Government of India, Ministry of Environment and Forest, New Delhi and Central Pollution Control Board, New Delhi. Questionnaires were prepared for solid waste, energy, water, hazardous waste and e-waste. For audit purpose and suitability analysis of data the study area is grouped as Building Block A including administrative buildings, Building Block B including Science and Technology Departments, Building Block C including Language and Humanities departments and Building Block D including Support Services. The audit was carried for solid waste, electricity and energy, water and wastewater, hazardous waste, air quality and green inventory including carbon sequestration and carbon foot prints. It also lists green initiatives taken by university to save environmental resources. The “Green Audit” also serves as “Environmental Management Plan”.

1. Introduction

The university is spread over 320 acres. The university is easily accessible by road and metro; nearest metro station is Rani Kamalapati railway station which is 900 m away. Indira Gandhi International Airport is 21.4 km away from the College.

The campus is located in green belt including gardens, lawns and an herbal garden has considerably reduced noise pollution in the campus. The campus has academic building, an under-construction multipurpose block and green operations/ infrastructures including roof-top solar PV system, rainwater harvesting system and vermicomposting unit.

Green Audit

Green Audit Report addresses green initiatives taken/ under implementation by management, the outreach of the College, suggestions & recommendations to improve overall environmental sustainability of the campus.

- Enhance awareness levels on environment management and sustainability.
- Prepare an environment management plan and promote sustainability through efficient resource management resulting in cost reduction.
- Benchmarking process in terms of resource utilization.
- Develop outreach programs in environment management and sustainability.

2. Green Audit Findings

For Green Audit following major areas (including their sub-sections) were included and compliance/initiatives under these areas were verified/validated

- Good Daylight Design and Ventilation
- Water Efficiency
- Energy Efficiency
- Solid Waste Management
- Transportation
- Carbon Sequestration/Green Belt/ Landscaping
- Green Initiatives

Good Daylight Design and Ventilation

- a) Classrooms, laboratories, offices, library have high ceiling, wide doors and large windows.
- b) Building is designed in such a way that corridors and classrooms receive ample sunlight. Curtains are provided for laboratory windows to avoid glare.
- c) Ventilation in classrooms is facilitated by windows and fans. Cross ventilation is facilitated due to large windows. Air conditioners are used in offices, computer laboratories and computer server rooms.
- d) Exhaust fans are installed.

Water Efficiency

- a. **Surface Run Off Management:** The university campus has two major nallah which are arts of natural drainage systems and drains the surface water in rainy season. Run off has been trapped at three places in the campus in cascading manner. As a first step, a pond has been excavated in the campus in front of Indira Girls Hostel which is filled with surface run off. After overflowing of this pond, the overflowing water is flown through a natural drainage and after about 500 meters another small stop dam has been created which stops water. Overflow of this stop dam is again stopped after a distance of 300 meters. These three structures capture the natural drainage and allow water to stay for a longer period. This helps in percolation to ground water and available surface water in the first pond is used for irrigation of parks and provides good habitat for migratory and local birds.

- b. Aquaculture Ponds:** There are fifteen earthen ponds in the campus of different dimensions. These ponds are filled up with rainwater and surface runoff from the campus and retain water for about 3 to 9 months. These ponds are used by the Department of Zoology and Applied Aquaculture for experiments of aquaculture.
- c. Roof Top Harvesting:** A model of roof top harvesting system has been installed in the Department of Zoology and Applied Aquaculture where a roof of about 200 sq. M. Is joined with a collection system and this water is collected in tanks of about 3 meter depth. These 70 sq m area tanks are used for experiments in aquaculture. We are planning to increase the area of roof top harvesting this year.



Energy Efficiency

- a) Common electricity meter is provided for the entire campus. Electricity is provided by Madhya Kshetra Vidyut Vitaran Company Limited, Bhopal (MPEB) Urban Electric Supply. University is producing 1750 unit electricity per day, hence saving Rs. 25 lac per annum.
- b) The maximum percentage of power requirement of the University is met by the renewable energy sources. Rooftop solar panels are installed to provide electricity in the entire department. Since rooftop solar panels harness the power of the sun to generate electricity they are ecofriendly. They offer cost savings and at the same time is an effort towards sustainable development. The University is using 470KW from Sustainability/ alternate energy source. Solar panels have been already installed in

some departments (UIT, Administrative block, Pharmacy, Microbiology and Indira Gandhi Girls Hostel) and are under process at other places. The percentage of power requirement of the University met by the renewable energy sources Street lights have been changed 100% to LED.

- c) Energy efficient tube lights, LEDs and fans are installed in offices, classrooms, laboratories and library. For efficient energy consumption and saving on electric bill, university has initiated the process of replacing incandescent bulbs and tube lights with LEDs.
- d) Uninterruptible Power Supply (UPS) system is provided in many departments and laboratories.
- e) LED computers are used in the campus.
- f) Instructions regarding switching off the electrical appliance were seen in laboratory notice boards.

Category	Quantity
LEDs	100% LEDs on street lights
LEDs in buildings	60% buildings have LEDs
Solar panels installed	1450
Lighting	6084
Outdoor lighting	295
Fans (ceiling fans & wall fans)	3317
Heating and cooling (including ACs)	1201
Computer peripherals	772
Pumps	21
Miscellaneous	100



Rooftop Solar PV System

Solid Waste Management

Solid waste generated from campus includes mainly paper waste, wet (food/ organic) waste, metallic waste and E-waste. Barkatullah University is aware of impact of waste on mother nature/earth. University is keen to work on the principle of 3-R (Reduce, Reuse and Recycle) wherever it can to reduce the environmental impact and contribute to mission of “Zero Waste”. The notable contribution toward waste management include:

- a) Reduce Stationery: All the important circulars & information are made available on e-mail to reduce paper wastage.
- b) Recycle Stationery: Blank/other side of printed-paper is routinely used second time to save stationery/paper and in turn trees.

- c) Plastic Free Campus: The University is making all attempts to make the campus plastic free. One time use plastic is ban in the campus.
- d) Dustbins: University placed dustbins throughout the campus for collecting different types of wastes
- e) The students and staff members regularly participate in Swachhata Abhiyan under Swachha Bharat. As a mark of Unity, University celebrates Gandhi Jayanti with various programs in campus majorly cleanliness of campus.
- f) E waste management- Listing for all the outdated electronic items has been made by all the departments of the University and measures are being taken to discard these items.
- g) Blue and Green covered/pedal-pushed dustbins are placed in the campus. Waste bins are provided on each floor, in staff rooms, laboratories, washrooms, kitchen and in campus area.
- h) Bio-degradable waste is generated in the campus which includes horticultural and sent to vermicomposting unit for the compost making.
- i) Segregation of wet and dry waste is practiced within the campus, there are signage for promoting segregation of wet and dry waste.

Paper Waste Management

Being an academic institution, waste paper is one of the main solid wastes generated in the campus. Barkatullah University has taken steps to minimize and avoid paper usage.

- a) Prints and photocopies are taken on both sides.
- b) Digitalization (scanning) is practiced.
- c) Internal notices and communications are through e-mail/SMS.
- d) Exam results and other exam related activities are executed digitally.
- e) Paper Recycling Unit is operated and maintained as and when required.
- f) The university encourages students to use eco-friendly material and recycle old papers/ scrap for various purpose.

E- Waste Management

- a) E- waste is broadly comprised of discarded computer monitors, motherboards, computer accessories, compact discs, mobile phones and chargers etc.
- b) The university has 500 computers, 50 projectors in various departments.

Plastic Waste

- a) The use of single use plastic e.g. carry-bags, glasses, spoons etc. is prohibited in the campus.

Transportation

- a) The majority of the students in the campus rely on public transport, indicating lesser carbon foot print of the student community. There are two employee buses which reduces usage of personal vehicles. The University is connected to highway NH-12 which has connectivity from all the areas of the city. The dedicated BRTS corridor

also means of transport both for students as well as employees. In future metro line also at the one end of BU which is connected to AIIMS. The University has given 4-acre land to the state government for metro depot.

- b) Good road within the campus reduces air pollution. Plantation at both the sides of the roads reduces air pollution. Separate parking in every block.
- c) The university encourages students and staff to use the public transport system to reduce carbon emissions.

Universal access to the campus

- a) Campus is easily accessible by bus services.
- b) Staircases and classrooms have wide windows, which can allow safe evacuation during emergency. Handrails are provided on staircases.
- c) Ramps/lifts for easy access to classrooms and centers.
- d) Disabled-friendly washrooms
- e) Signage including tactile path lights, display boards and signposts
- f) Assistive technology and facilities for persons with disabilities: accessible website, screen-reading software, mechanized equipment, etc.
- g) The University has health center where primary health facilities are available.

Green Belt/ Landscaping

The 380 acres of land of BU is committed to achieve greenery across the entire campus. More than 100 varieties of rare plants having aesthetic and medicinal properties can be seen in the lush green campus of the campus. To sustain and maintain the green cover, plantation drive is carried out at periodic intervals. The University is making all attempt to make the campus plastic free. Furthermore, there are 15 earthen ponds in the campus for retaining rain water for about three to nine months. In the same continuation a model of roof top harvesting system has been installed in the department of Zoology and Applied Aquaculture. The conservation of endangered flora and fauna like *Flucortia indica* and *Gmlina arborea* attempted by the university. For reducing water footprints attempt is made to print the documents on both side of the paper. All the important circulars and information are made available on e mail to reduce paper wastage. Recently, on the initiative of Alumni of Microbiology department at a pilot



scale a vermi-composting unit of two tons capacity has been started. Biodegradable waste is collected from the household and disposed here for vermicomposting.

2.1 Green Initiatives

Green campus initiatives include

Use of bicycles/ Battery-powered vehicles

Pedestrian-friendly pathways

Partial on use of plastic

Landscaping

Ramp

Carbon sequestration in university campus

Battery operated rickshaw to be designed by BUIT students

- a) CRIM is delighted to be part of BU, which is spread in its lush green campus measuring 380 acres of land and it shows the Institutions commitment towards to maintain greenery across the entire campus....To sustain and maintain the green cover Plantation drive is carried out at periodic intervals.
- b) Dept. of **CRIM** is environmentally sensitive too... CRIM is making all attempt to make the campus plastic free....CRIM also trying 3-R (Reduce, Reuse and Recycle) principle wherever it can to reduce the environmental impact...from re-using used stationery (other/blank side) -to- circulars/information on e-mail/web-site -to- placing dustbins for collection and proper treatment of different waste are notable programmes/activities towards the mission of "Zero Waste"
- c) The **Department of Earth Sciences** initiated the program on Remote Sensing and GIS based curriculum for the first time in 1994. This programme is running successfully and the students are benefitted by the applicability of this course. Now Department of Earth Sciences initiated the process to establish a well develop Remote Sensing Centre in the University so that the students from other Universities may also take the advantage of the Remote Sensing Centre.
- d) The **Department of Environmental Sciences and Limnology** aims to conserve nature and environment by disseminating knowledge in the field of environment. It is abide to provide proper guidance to each and every individual of the society. Its priority also lies in spreading knowledge among the students and makes them self-dependent as they qualify from the department and to instill energy in them to make them a good citizen. To develop collaborations with environmental agencies and institutes to provide platform to students immediately after having degree. To develop lab for research scholars and students by providing them sophisticated equipments and conducting workshops
- e) The Institute has a vision to emerge as a center of Excellence in continuous pursuit of Quality by providing internationally compliant higher education, especially in the field of Pharmaceutical Sciences. We work with the vision to evolve according to the changing needs of time and place with the focus to serve the society including rural and tribal population. Department do have separate girls common room which symbolize that we have concerned for the gender sensitivity issue.

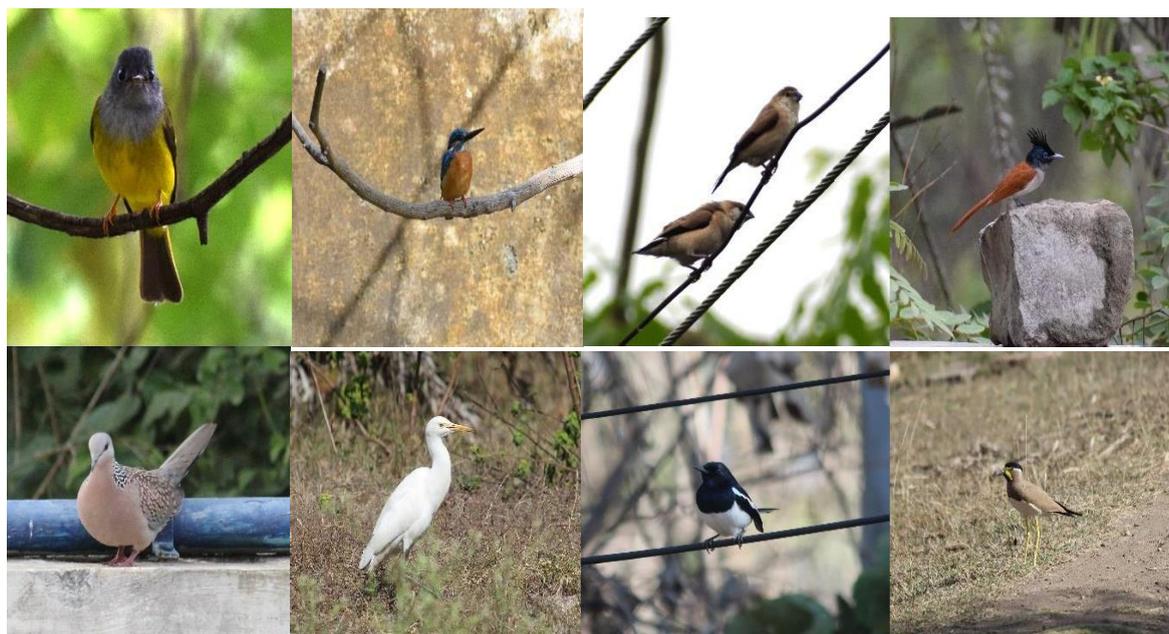
- f) Department has post-graduation courses in Pharmaceutics and Pharmacognosy and our effort is to provide quality education to the students who take admission from all over the country in this department .Department of Pharmacy is the only government graduate course running institute of the capital of Madhya Pradesh ,Bhopal.
- g) Institute promotes the value based education and research driven health care. We also focus on holistic development of the students.
- h) The main focus of the Institute is to strengthen the notion of skill development under the shadow of well-established education system of Guru Shishya Parampara. We believe the philosophy of empowering the generation with the support and guidance from all the dimensions. The research laboratory of the department is equipped with UV Spectroscope , HPLC, Atomic absorption spectroscope ,Lyophilized and Gaschromatography
- i) Institute has vision to update the knowledge of the students by providing them MOOCS courses which also enable them to lean and practice the concept of modern pharmaceutical formulation and their development techniques .Students of the department have been trained for new vital subjects like Pharmacovigilance, Computer aided drug designing and pharmacogenomics.
- j) The institute also have adopted the process of training of the students by conducting different lectures by the resource person of Academics, Industries, Hospitals and scientist from Pharmaco vigilance Department. The mission of the institute is to create an ambience in which new ideas, research and scholarship flourish, and from which the leaders and innovators of tomorrow emerge.
- k) The Institution conducts regular training programmes to develop competencies of teachers. The training needs of the faculties are identified through a competency skill matrix and trainers are arranged for the training programmes. Seminars, workshops, conferences etc. are organized by the Institution every year. The library of the Institution has an excellent collection of reference books and journals which are available to the faculty members and students. WIFI facility is also provided.
- l) The Institution facilitates financial grant for research. This is done to encourage scholars to take up research. The institute regularly conducts research workshops to familiarize the new teachers with the research process and sharpen the skills of the senior teachers. The management encourage the teaching staff to take up Minor and Major research projects. Any help needed in this direction is extended by the Management. Faculty members are regularly sent for Orientation/Refresher/Short Term Courses as per their requirements. No stone is left unturned in order to develop the competency of teacher.

Birds

The university campus is situated in urban area, covering approximately 360 acres of land. The campus is known for its peaceful and green environment. For the documentation of biodiversity of the campus we do the surveys and seasonal walks, and the findings reflect that it has a very rich biodiversity due to varied habitats present in it. Till now 85 species of birds have been recorded in campus. It includes variety of birds starting from the passerine birds to kingfishers, herons and raptors etc. We have recorded some migratory birds as well along with the local resident birds. This avian diversity is a reflection of mosaic habitat the campus has. It provides different kind of habitats like forest, scrubland, wetlands, grassland, woodland, and garden etc. as the species diversity is associated with the habitat available. The avian diversity reflects good environment and habitat condition in the university campus.

List of Birds

S.No.	Name	S.No.	Name	S.No.	Name
1.	Gray Francolin	30.	Oriental Magpie-Robin	59.	Bronze Winged Jacana
2.	Little Grebe	31.	Tickell's Blue Flycatcher	60.	Godwit
3.	Rock Pigeon	32.	Verditer Flycatcher	61.	Garganey
4.	Laughing Dove	33.	Small Minivet	62.	Common Babbler
5.	Greater Coucal	34.	Brahminy Myna	63.	Eurasian Wryneck
6.	Asian Koel	35.	Red-breasted Flycatcher	64.	Red Breasted Flycatcher
7.	Eurasian Moorhen	36.	Siberian Stonechat	65.	Ashy Drongo
8.	White-breasted Waterhen	37.	Purple-rumped Sunbird	66.	White Bellied Drongo
9.	Black-winged Stilt	38.	Purple Sunbird	67.	Black Kite
10.	Red-wattled Lapwing	39.	White-browed Wagtail	68.	Yellow Wattled Lapwing
11.	Little Stint	40.	Western Yellow Wagtail	69.	Rufous Treepie
12.	Little Cormorant	41.	Indian Silverbill	70.	House Sparrow
13.	Great Cormorant	42.	Indian Peafowl	71.	Hume's Warbler
14.	Great Egret	43.	Common Sandpiper	72.	Oriental skylark
15.	Little Egret	44.	Green Sandpiper	73.	Red Avadavat
16.	Indian Pond-Heron	45.	Indian Gray Hornbill	74.	Scaly-breasted Munia
17.	Oriental Honey-buzzard	46.	Rose-ringed Parakeet	75.	Paradise Flycatcher
18.	Shikra	47.	Oriental White-eye	76.	Red Collared-Dove
19.	Common Kingfisher	48.	Chestnut-shouldered Petronia	77.	Spot-billed Duck
20.	White-throated Kingfisher	49.	Common Woodshrike	78.	Common Hoopoe
21.	Green Bee-eater	50.	Common Iora	79.	Wire-tailed Swallow
22.	Coppersmith Barbet	51.	Lesser Whitethroat	80.	Intermediate Egret
23.	Red-rumped Swallow	52.	Black Redstart	81.	Cattle Egret
24.	Cinereous Tit	53.	Greenish Warbler	82.	Gray-headed Canary-Flycatcher
25.	Red-vented Bulbul	54.	River Tern	83.	Pied Starling
26.	Ashy Prinia	55.	Common Hawk Cuckoo	84.	Baya Weaver
27.	Plain Prinia	56.	Taiga Flycatcher	85.	Red crested Pochard
28.	Jungle Babbler	57.	Bay Backed Shrike		
29.	Indian Robin	58.	Lesser Whistling Duck		





Odonates

Odonata is an order which consists of three suborders namely Anisoptera (Dragonflies, Zygoptera (Damselflies) and Anisozygoptera. Commonly they can be defined as the most beautiful insects containing various colours and most successful hunters and flyers of the insect world. They act as bioindicator as well. Bioindicators are living organisms that are utilized to screen the health of the natural ecosystem. Odonates being aquatic in the larval stage and terrestrial during adulthood, work as a good bioindicator for any aquatic ecosystem. In university campus there are more than 15 ponds, some seasonal and some perennial. We have recorded 28 odonate species (both Anisoptera and Zygoptera) from the campus. They are very sensitive towards any change in the environment. These ponds provide habitat to such large no. of species due to presence of aquatic vegetation, suitable perches, and the perches have proper exposure to sunlight. They also play an important role in pest control. The campus provides suitable niche to various species of dragonflies and damselflies.

List of Odonates

S.No.	Common Name	Scientific Name
1.	Golden Dartlet	<i>Ischnura rubilio</i>
2.	Coromandel Marsh Dart	<i>Ceriagrion coromandelinum</i>
3.	Senegal Golden Dartlet	<i>Ischnura senegalensis</i>
4.	Pygmy Dartlet	<i>Agriocnemis pygmaea</i>
5.	Yellow Bush Dart	<i>Copera marginipes</i>
6.	Saffron Faced Blue Dart	<i>Pseudagrion rubriceps</i>
7.	Three Stripped Blue Dart	<i>Pseudagrion decorum</i>
8.	Brown Spreadwing	<i>Lestes umbrinus</i>
9.	Lesser Green Emperor	<i>Anax indicus</i>
10.	Common Picture Wing	<i>Rhyothemis variegata</i>
11.	Coral Tailed Cloudwing	<i>Thyolemia tillagra</i>

12.	Crimson Marsh Glider	<i>Trithemis aurora</i>
13.	Crimson Tailed Marsh Hawk	<i>Orthetrum pruinosum</i>
14.	Ditch Jewel	<i>Brachythemis contaminata</i>
15.	Granite Ghost	<i>Bradinopyga geminata</i>
16.	Green Marsh Hawk	<i>Orthetrum sabina</i>
17.	Ground Skimmer	<i>Diplacodes trivialis</i>
18.	Wandering Glider	<i>Pantala flavescens</i>
19.	Ruddy Marsh Skimmer	<i>Crocothemis servilia</i>
20.	Yellow Tailed Aishy Skimmer	<i>Potamarcha congener</i>
21.	Black Marsh Skimmer/ Light Tipped Demon	<i>Indothemis carnatica</i>
22.	Asiatic Blood Tail	<i>Lathrecista asiatica</i>
23.	Brown Dusk Hawk	<i>Zyxomma petiolatum</i>
24.	Small Skimmer	<i>Orthetrum taeniolatum</i>
25.	Trumpet Tail	<i>Acisoma panorpoides</i>
26.	Pied Paddy Skimmer	<i>Neurothemis tullia</i>
27.	Red Marsh Trotter	<i>Tramea basilaris</i>
28.	Small Skimmer	<i>Orthetrum taeniolatum</i>
29.	Black Marsh Trotter	<i>Tramea limbata</i>



Butterfly

University campus has a variety of ground flora and large trees. So it provides a good habitat for butterflies in larval and adult stage. There are many butterfly host plants, on which the butterflies lay their eggs and the caterpillars feed on the leaves of the same plant. In campus we have many flowering plants which provide nectar to the adults.

S.No.	Common Name	Scientific Name
1.	Common Mormon	<i>Papilio polytes</i>
2.	Common leopard	<i>Phalanta phalanta</i>
3.	Common emigrant	<i>Catopsilia pomona</i>
4.	Pea blue	<i>Lampides boeticus</i>
5.	Common grass yellow	<i>Terias hecabe simulata</i>
6.	Yellow pansy	<i>Junonia hierta hierta</i>
7.	Blue pansy	<i>Junonia orithya</i>
8.	Lime butterfly	<i>Papilio demoleus</i>
9.	Common tiger	<i>Danaus chrysippus</i>
10.	Grey pansy	<i>Junonia atlites</i>
11.	Mottled emigrant	<i>Catopsilia pyranthe</i>
12.	Lemon pansy	<i>Junonia lemonias</i>
13.	Blue moon butterfly	<i>Hypermestra bolina</i>
14.	White butterfly	<i>Pieris rapae</i>
15.	Red admiral	<i>Vanessa atalanta</i>
16.	Common pierrot	<i>Castalius rosimum</i>
17.	White orange tip	<i>Ixias marianne</i>
18.	Peacock pansy	<i>Junonia almana</i>
19.	Common Jay	<i>Graphium doson</i>
20.	Tailed Jay	<i>Graphium agammon</i>
21.	Common Baron	<i>Euthalia aconthea</i>
22.	Chocolate Pansy	<i>Junonia iphita</i>
23.	Common Crow	<i>Euploea core</i>
24.	Common Evening Brown	<i>Melanitis leda</i>
25.	Psyche	<i>Leptosia nina</i>
26.	Danaid Eggfly	<i>Hypolimnas misippus</i>
27.	Common Sailor	<i>Neptis hylas</i>
28.	Red Pierrot	<i>Talicauda nyseus</i>
29.	Gram Blue	<i>Tirumala limniace</i>
30.	Dark Grass Blue	<i>Zizeeria karsandra</i>
31.	Zebra Blue	<i>Lampides boeticus</i>
32.	Common Lineblue	<i>Prosotas nora</i>
33.	Common Wanderer	<i>Pareronia valeria</i>
34.	Indian Palm Bob	<i>Suastus greminus</i>



Ground Flora

S.No.	Hindi Name	Botanical Name
1	Aibika	<i>Abelmoschus manihot</i>
2	Caesarweed	<i>Urena lobata</i>
3	Sickle pod	<i>Cassia tora</i>
4	Lilac tasselflower	<i>Emilia sonchifolia</i>
5	Silk leaf	<i>Lagascea mollis</i>
6	Paddy Clove	<i>Ludwigia parviflora</i>
7	Plumed cockscomb	<i>Celosia argentea</i>
8	White moneywort	<i>Alysicarpus vaginalis</i>

9	Balsam	<i>Impatiens balsamina</i>
10	Dabra	<i>Uraria picta</i>
11	Flannel weed	<i>Sida cordata</i>
12	Coat buttons	<i>Tridax procumbens</i>

List of Trees

S. No	Hindi Name	Botanical name	Family
1.	Arjuna	<i>Terminalia arjuna</i>	Combretaceae
2.	Kadamb	<i>Anthocephalus cadamba</i>	Rubiaceae
3.	Bakayan	<i>Melia azedarch</i>	Meliaceae
4.	Chirol	<i>Holoptelea integrifolia</i>	Ulmaceae
5.	Neem	<i>Azadirachta indica</i>	Meliaceae
6.	Jharfanus	<i>Kigelia pinnata</i>	Bignoniaceae
7.	Reunjha	<i>Acacia leucophloea</i>	Mimosaceae
8.	Saptarni	<i>Alstonia scholaris</i>	Apocynaceae
9.	Saja	<i>Terminalia tomentosa</i>	Combrataceae
10.	Babool	<i>Acacia nilotica</i>	Mimosaceae
11.	Imali	<i>Tamarindus indica</i>	Caesalpinaceae
12.	Bila, Bilva	<i>Aegle marmelos</i>	Rutaceae
13.	khirani	<i>Manilkara hexandra</i>	Sapotaceae
14.	Safed siras	<i>Albizia procera</i>	Mimosaceae
15.	Kala siras	<i>Albizia lebbec</i>	Mimosaceae
16.	Gulmohar	<i>Delonix regia</i>	Leguminosae
17.	Jamun	<i>Syzygium cumini</i>	Myrtaceae
18.	Semla	<i>Bombax ceiba</i>	Bombacaceae
19.	Palash	<i>Butea monosperma</i>	Fabaceae
20.	Baheda	<i>Terminalia bellirica</i>	Combretaceae
21.	Tinsa	<i>Ougenia oojeinesis</i>	Fabaceae
22.	Sahajan	<i>Moringa oleifera</i>	Moringaceae
23.	Amaltas	<i>Cassia fistula</i>	Leguminosae

24.	Chikoo	<i>Achras zapota</i>	Sapotaceae
25.	Mahaneem	<i>Ailanthus excelsa</i>	Simaroubaceae
26.	Sitaphal	<i>Annona squamosa</i>	Annonaceae
27.	Ramphal	<i>Annona 4eticulate</i>	Annonaceae
28.	Katahal	<i>Artocarpus heterophyllus</i>	Moraceae
29.	Kachnar	<i>Bauhinia purpurea</i>	Caesalpiniaceae
30.	Chironji	<i>Buchania lanzan</i>	Anacardiaceae
31.	Chandan	<i>Santatum album</i>	Santalaceae
32.	Khair	<i>Acacia catechu</i>	Mimosaceae
33.	Vilayati babool	<i>Acacia juliflora</i>	Mimosaceae
34.	Australia babool	<i>Acacia auriculiformis</i>	Mimosaceae
35.	Asopalav	<i>Polyalthea longifolia</i>	Annonaceae
36.	Amrud	<i>Psidium guajava</i>	Murtaceae
37.	Gadhapalash	<i>Euythrina indica</i>	Fabaceae
38.	Khamer	<i>Gmelina arborea</i>	Verbenacea
39.	Bas	<i>Bambusa arundinacea</i>	Poaceae
40.	Ber	<i>Ziziphus mauritiana</i>	Rhamnaceae
41.	Subakal	<i>Lencarea leucophloa</i>	Mimosaceae
42.	Kabit	<i>Feronia limonia</i>	Rutaceae
43.	Gundi	<i>Cordia dichotoma</i>	Boraginaceae
44.	Sheesham	<i>Dalbergia sissoo</i>	Fabaceae
45.	Bad, Vad	<i>Ficus benghalensis</i>	Moraceae
46.	Gular	<i>Ficus glomerata</i>	Moraceae
47.	Peepala	<i>Ficus religiosa</i>	Moraceae
48.	Aam	<i>Mangifera indica</i>	Anacardiacea
49.	Kaim	<i>Mitragyna parvifolia</i>	Rubiaceae

50.	Sahatoot	<i>Morus alba</i>	Moraceae
51.	Tamrphali	<i>Peltphorum ferrugineum</i>	Leguminoceae
52.	Jangli Jalebi	<i>Pithecellobium dulce (Roxb.) Benth.</i>	Mimosaceae
53.	Karanj	<i>Pongamia pinnata (L.) pierre</i>	Fabaceae
54.	Kasai	<i>Bridelia retusa Spr.</i>	Euphorbiaceae
55.	Semla	<i>Bombax ceiba Linn</i>	Bombacaceae

Recommendations

- 1) Should develop monitoring mechanism and generate & maintain the performance records of the green infrastructure.
- 2) Water consumption can be reduced further through various conservation methods. Replacement of old water faucets with water saving faucets such as pressmatic taps, aerator taps, jet sprays etc. can save water and help in minimising the water footprint.
- 3) Treated sanitary waste water can be recycled for toilet flushing by providing dual pumping system.
- 4) should test water quality at regular intervals, develop water conservation practice.
- 5) Records of pipe/ water taps leakage complaints should be maintained as a part of Standard Operating Procedures (SOPs).
- 6) Solid waste generated in campus includes paper waste, E-waste, plastic waste, food waste from canteens and dry recyclable waste from gardening. Paper waste and E-waste are given to approved agencies for recycle/ disposal. Inventories & management processes of all waste (including food and dry recyclable waste) should be well documented.
- 7) dry waste can be handed over to the aggregators appointed by the Municipal Corporation.
- 8) Signage regarding water conservation, reduction & segregation of plastic waste, reduction in food waste, waste segregation can be put up.
- 9) ensure switched on/ off and can save time & unnecessary operation.
- 10) SOPs should be prepared and followed for purchasing green equipment, equipment star rating and eco-friendly materials.
- 11) installed solar energy system capacity could be expanded to the remaining roof top area to generate more renewable energy.
- 12) It is recommended that indoor air quality, noise levels and water quality to be monitored.
- 13) There should be safety training, fire-fighting drills and mock drills.
- 14) Fire safety drills should be conducted at regular intervals.
- 15) Emergency escape route plans should be provided on each floor. Floor plan should be clearly visible with an emergency exit and assembly point.
- 16) Records of green and environmental initiatives conducted by university should be maintained properly.

CONCEPT ENGINEERING
BHOPAL - MADHYA PRADESH
ENERGY AUDIT REPORT

BARKATULLAH UNIVERSITY
BHOPAL
ENERGY AUDIT REPORT



Prepared by:

Baravati



CONCEPT
ENERGY SAVERS

Sub:
Date:

F - 3, NEW INDUSTRIAL AREA PHASE - II,
MANDIDEEP DISTRICT RAISEN - 462046 (M.P)

D. Gupta

Prof. D. C. Gupta
Co-ordinator IQAC
Barkatullah University
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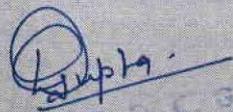
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EXECUTIVE SUMMARY

Sr. No.	Energy saving Measures/ Scheme	Estimated energy saving in KWh/year	Annual monetary saving in Rs.	Investment required in Rs.	Payback Period in months	Page No.
1	Energy saving by replacement of all the Conventional 20W X 4 NOS. FTL fitting by 40W LED Light	8339.52	70885.92	81600.00	11	58
2	Energy saving by replacement of all the conventional 18W X 2 NOS. CFL-PLL Fitting by 18 LED retrofit	7629.96	64854.66	56950.00	08	59
3	Energy Saving by replacement of all the conventional Ceiling Fans by the Energy Efficient Fans	366080.40	3111683.40	3343200.00	13	60
4	Energy saving by replacement of all the conventional 55W FTL by 20W LED Tube Light.	654284.40	5561417.40	981640.00	02	62
5	Energy saving by replacement of all the conventional 36W CFL-PLL by 18 LED retrofit.	145214.52	1234323.42	678150.00	05	63
6	Energy saving by replacement of all the conventional 70W HPSV Lamp by 30W LED Street Light	8672.40	73715.40	34650.00	05	64
7	Energy saving by replacement of all the conventional 250W HPSV Lamp by 100W LED Street Light	11826.00	100521.00	43500.00	05	65
8	Energy saving by replacement of all the conventional High Mast Light by 150W LED Flood Light	78840.00	670140.00	450000.00	07	66
9	Energy Saving by replacement of all the conventional Old Model Ceiling Fans by the Energy Efficient Fans	55188.00	469098.00	151200.00	04	67
	TOTAL	1336075.20	11356639.20	5820890.00	07	

Energy Saving of 1336075.20 KWhr/year is estimated after conducting Energy Audit. This will give Monetary Saving of Rs. 11356639.20.

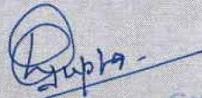
Investment of Rs. 5820890.00 is required to implement Energy Saving Measures with Payback period of 07 Months.



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Present Energy Consumption of Barkatullah University, Bhopal

SR.NO.	PLACE	CONNECTED LOAD (KW)	CONTRACT DEMAND (KVA)
1	BARKATULLAH UNIVERSITY CAMPUS	1984.048	300.00 (240 KW)
2	UIT ENGINEERING COLLEGE AND RESIDENTIAL	541.363	250.00 (200 KW)
	TOTAL	2525.411	550.00 (440 KW)


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BEYOND THE CAMPUS ACTIVITIES

Department of Environmental Sciences and Linnology Barkatullah University, Bhopal Activities (2023-24)





**Department of Environmental Science and Linnology
Barkatullah University, Bhopal
International Tiger Day
29 July, 2023**

The Department of Environmental Sciences and Linnology and Department of Zoology and Applied Aquaculture, Barkatullah University, Bhopal have jointly and in collaboration with Bhopal Birds Organization have organized program on the occasion of International Tiger Day on 28.07.2023 at Department of Applied Aquaculture and Zoology. Mr.R.K.Shrivastava, Retired IFS Officer was the Guest on the occasion of International Tiger Day .

The welcome address was given by Prof. Vipin Vyas, Dean, Faculty of Life Science and Dr. Abhilasha Bhawar, Head, Department of Environmental Sciences and Linnology. The vote of thanks was presented by Sabha Noor, Research Scholar, Department of Environmental Science and Linnology.

The program was attended by about 50 participants from different departments of the university. The prize distribution for essay competition and poster making were sponsored by Bhopal Birds. On this International Tiger Day pledge was taken to protect and conserve this majestic animal, tiger.

















NATIONAL SCIENCE DAY 2024

On the occasion of National Science day 2024 on 28.02.2024, River Walk was organized along the stretch of Betwa River, Ratapani WLS by the Department of Environmental Sciences and Linnology Barkatullah University Bhopal.

The activity was done under the aegis of Environment Education Program of Ministry of Environment, Forest & Climate Change, Government of India and the same is sponsored by EPCO, Bhopal. The students were taught about the origin and structure of the river and its watershed area.


















World wetlands day

On the occasion of World wetlands day 2024, Department of Environmental Sciences and Linnology Barkatullah University Bhopal has organized 'Know your wetland' program this Sunday in which people were made aware of wetlands, Ramsar Sites, Ramsar Convention and observed aquatic biodiversity under microscope. The volunteers made visitors aware about this year's wetlands day theme 'Wetlands and human wellbeing' . We are grateful to EPCO, Bhopal and MP Tourism for their collaboration and support to organize this event.











