



**ASHOKRAO MANE COLLEGE OF PHARMACY, PETH VADGAON**

**Tal – Hatkanangale, Dist – Kolhapur**

## **Clean and Green Campus Initiatives**



**Prepared by**

**Department of Environmental Science,**

**Shivaji University, Kolhapur- 416004**

**2023- 24**

# **Ashokrao Mane College of Pharmacy, Peth-Vadgaon**



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Date: 05/04/2024

## Certificate

This is to certify that the Department of Environmental Science, Shivaji University, Kolhapur has assessed detailed "Clean and Green Campus Initiatives" of "Ashokrao Mane College of Pharmacy, Peth-Vadgaon" during the academic year 2023-2024. This report was evaluated in accordance with the applicable standards prescribed by the Indian Institute of Remote Sensing, Dehradun, India, Ministry of Environment, Forest and Climate Change, New Delhi and Intergovernmental Panel on Climate Change (IPCC) and Central Pollution Control Board (CPCB), New Delhi. The report involves Solid waste generation, safe waste disposal practices, green inventory, biomass estimation, carbon sequestration potential of the campus. 'Environmental Management Plan', is also included in the report which can be followed to minimize environmental impacts. The performance of college was found to have good quality with respect to sustainable Clean and Green Practices. Even though ample amount of work can be done in this area.

The opportunities of sustainable green practices and well consideration of suggested Environmental Management Plan can make the college role model to other institutions as well. In an opinion and to the best of our information and according to the information given to us, said Clean and Green Initiatives gives a true and fair view in conformity with environmental auditing principles accepted in India.



  
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Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap  
**ASHOKRAO MANE COLLEGE OF PHARMACY**

Approved by PCI, New Delhi, Government of Maharashtra, DTE, Mumbai

Affiliated to Shivaji University, Kolhapur & MSBTE, Mumbai

Estd. 2006 | Accredited 'A' Grade by NAAC (CGPA: 3.18)

Founder President: LATE SHRI. ASHOKRAO MANE | President: SHRI. VIJAYSINH MANE

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**Ref:**

**Date: 22-03-2024**

**Principal's Message:**



As we stand at the crossroads of a rapidly evolving world, it is imperative that we, as future healthcare professionals, recognize the profound connection between the environment, energy, and health.

The need for sustainable practices and green energy solutions is no longer just a global challenge—it is a responsibility that we must embrace for the sake of future generations.

Pharmacy professionals play a vital role in not only advancing medical knowledge but also in shaping healthier communities through the promotion of sustainability. The role of green chemistry, eco-friendly practices in pharmaceutical production, and energy-efficient healthcare systems cannot be overstated. It is our duty to incorporate these principles into our daily practices, research, and the way we educate our students.

Let us champion the use of renewable resources, reduce waste, and ensure that our methods of dispensing care are aligned with the preservation of the environment. By doing so, we will contribute to a healthier, greener planet, where both people and the environment thrive in harmony.

I am very thankful to the audit committee of Shivaji University, Kolhapur who Visited to our institute and produced a systematic Green, Energy and Environment report. This will help us in producing and encourage all members of our college and community to continue innovating and thinking sustainably, for it is through collective efforts that we will pave the way for a brighter, greener future.

**Thanking You**

**Place: Peth-Vadgaon**

**Dr. A. P Gadad**



Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap  
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Ref:

Date: 22-03-2024

**Chairman's Message**



It is with great pride and a deep sense of responsibility that I address you through this souvenir. As we continue to navigate the complexities of the modern world, the role of pharmacy professionals has never been more crucial—not only in advancing healthcare but also in safeguarding the future of our planet.

In today's age, we must recognize that the health of individuals and the health of our environment are deeply interconnected. As a pharmacy college, we have the unique opportunity to integrate sustainable practices into our academic programs, research, and community outreach. By focusing on eco-friendly pharmaceutical practices, promoting green chemistry, and exploring energy-efficient healthcare solutions, we can contribute to a healthier and more sustainable world.

I urge all our students, faculty, and staff to remain committed to fostering a culture of innovation that supports both human health and environmental well-being. Together, we can lead the charge in developing solutions that reduce our ecological footprint while enhancing the quality of life for all. Let us embrace sustainability, not as a challenge, but as an opportunity to make a lasting impact. May we continue to inspire each other to think green, act responsibly, and build a future where both health and the environment flourish.

I encourage everyone to continue supporting and engaging in sustainable practices, for the environment is not just a subject of study but a legacy we must protect for future generations. Let us use this report as both a reflection of our progress and an inspiration to continue our green journey.

**Thanking You**

**Place: Peth-Vadgaon**

**Shri Vijaysinh Mane Saheb**

President,

Ashokrao Mane Group of Institutions (AMGOI)

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## 1.1 Green Campus Initiatives of Ashokrao Mane College of Pharmacy

The area exhibits a variety of tree species with distinct purposes though the campus is small. A significant number of these trees have become integral to the campus environment, having been planted at different times through various initiatives overseen by the authority. These trees have positively influenced the quality of life for both the college community and nearby residents. They contribute to enhanced air quality, climate change mitigation, water conservation, soil preservation, wildlife support, and climate regulation by mitigating the impact of rain and wind.

Additionally, the leaves of these trees play a vital role in maintaining a cool environment during the summer by absorbing and filtering the sun's radiant radiation. Furthermore, the trees provide shelter and sustenance for a diverse range of birds and other creatures. Birds and insects find nourishment in the nectar of flowers, while the leaf-covered branches offer protection for creatures like birds and squirrels from predators. The variety of tree species on the campus showcases diverse shapes, forms, textures, and vibrant colours, with individual trees changing their appearance with the shifting seasons.

Moreover, the enduring, consistent, and majestic nature of the trees imparts a monument-like quality, serving as a reminder of the institution's prestigious history. Research indicates that a belt of shaded trees within or around the college's perimeter has a positive impact, reducing noise, dust, and storms. As a result, the institution has played a crucial role in preserving the overall environment of the Ashokrao Mane College of Pharmacy and its surroundings.

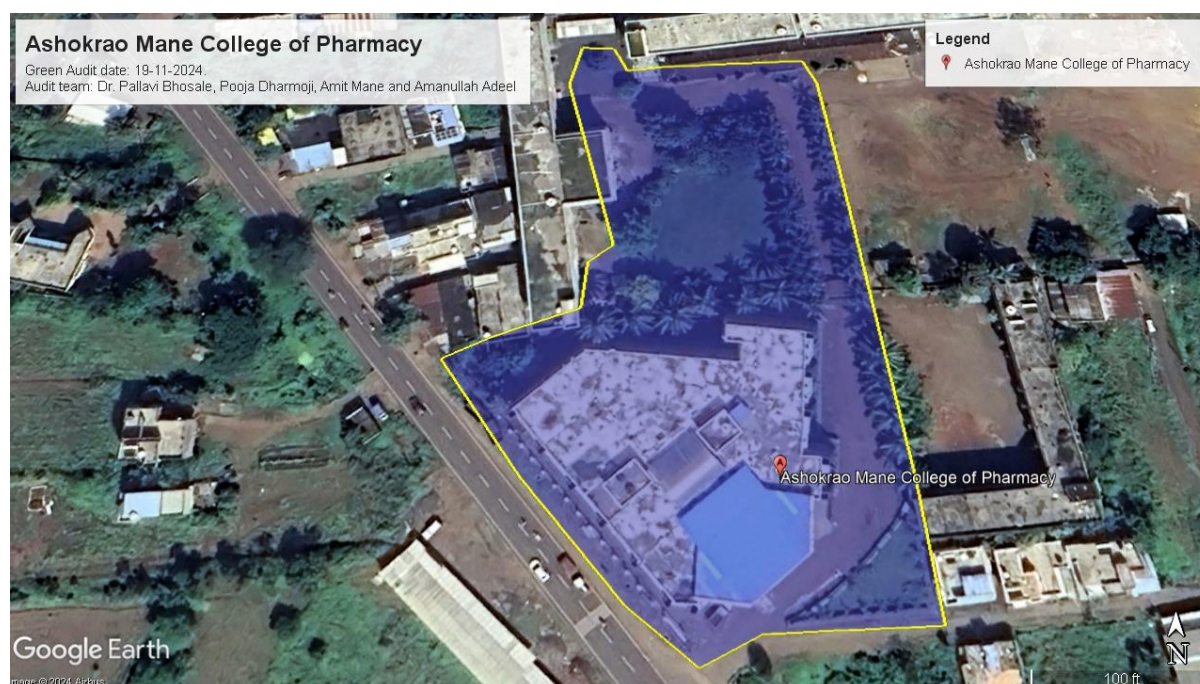


Figure 2.1. Google Earth map of the Ashokrao Mane College of Pharmacy

The college is located at longitude  $74^{\circ} 05'82''$  E and latitude  $17^{\circ}24'73''$  N. The climate in the area is ideal for the cultivation of a wide variety of plants.

In case of green inventory, a total of 86 trees were counted, each having a girth of more than 10cm and a height of more than 4 ft. Based on data provided by the Institution, a total of 16 species of woody trees were recognised during the visit. The campus has a higher concentration of native woody tree species, which is the sign of a rich biodiversity.

## 1.2 Species with highest population

Table No. 2.1.2- Species with Highest population

No.	Botanical name	common name	Number of trees
1	<i>Sabal palmetto</i>	Palms	26
2	<i>Polyalthia Longifolia</i>	Ashok	24
3	<i>Cocos nucifera</i>	Coconut	15

During the inventory, Sabal palmetto was discovered with the highest population on campus (Table 2.1 and Fig. 2.1). The college has planted trees that have a better capability for carbon sequestration. The Institute took the initiative to grow native plants, which is the best way to protect the area's biodiversity. The trend is followed by *Polyalthia Longifoli* and *Cocos nucifera*.



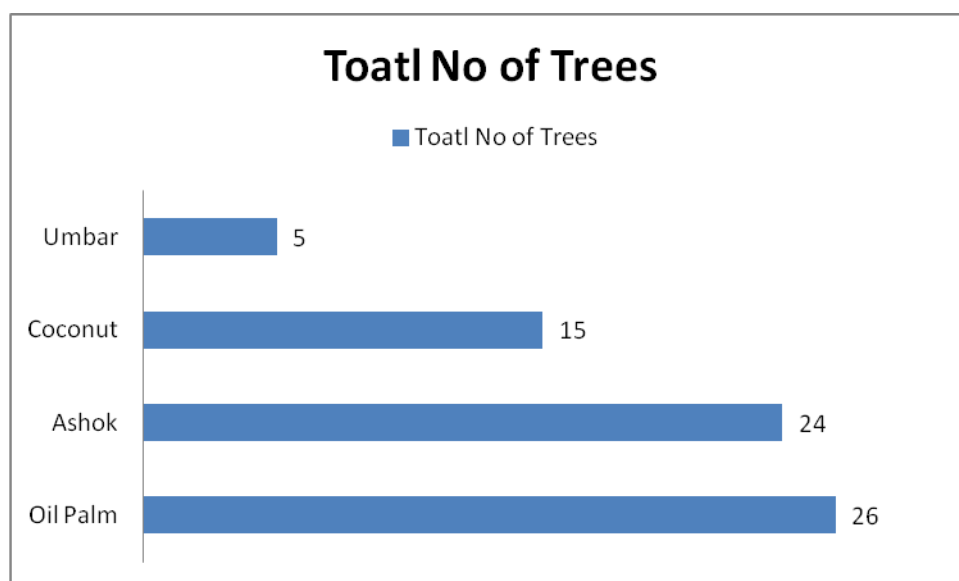


Figure 2.1.2. Trees with highest population in the campus.

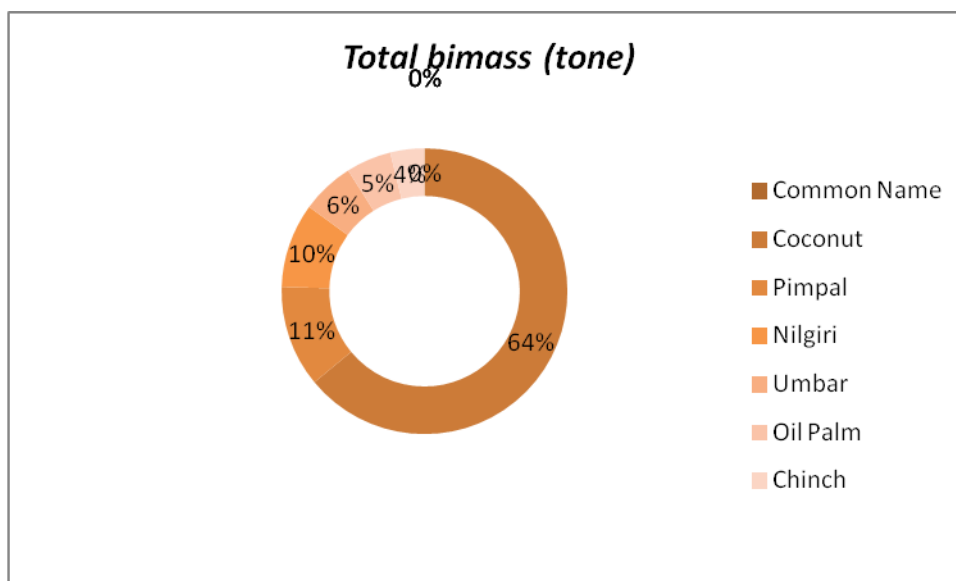
### 1.2.1 Total biomass

In the field of ecology, biomass refers to the amount of living organisms present in a specific location or ecosystem at a given time. The term "species biomass" is used to indicate the combined mass of one or more species, while "community biomass" encompasses the total mass of all species within a community, including animals, plants, and microorganisms. This measurement of mass can be expressed as either the overall mass of the community or the average mass per unit area. The biomass of an individual tree includes its branches, stem, fruits, roots, and flowers. The latest tree census conducted on the Ashokrao Mane College of Pharmacy campus reports a total biomass of woody vegetation at 30.43 tones.

**Table No. 2.1.3-** Total Biomass of trees in tons on the campus

Botanical Name	Common Name	Total Biomass (Tones)
Cocos nucifera	Coconut	17.83088
Ficus religiosa	Pimpal	3.198947
Eucalyptus obliqua	Nilgiri	2.661205
Ficus racemosa	Umbar	1.666749
Elaeis guineensis	Oil Palm	1.426534
Tamarindus indica	Chinch	1.074841

*Palms* recorded highest biomass on the campus. Followed *Ficus religiosa* and *Eucalyptus obliqua* (Table 2.2. and Fig. 2.2).



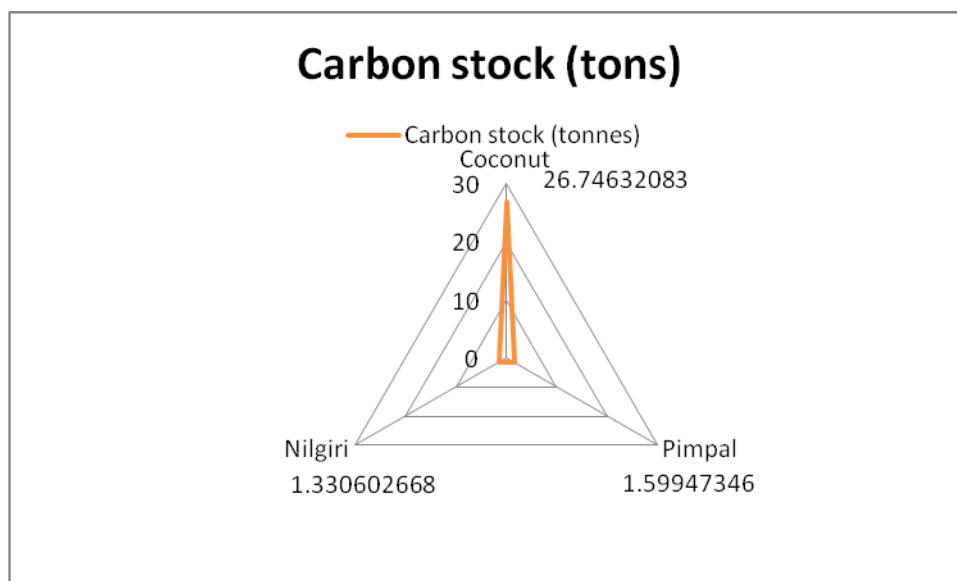
**Figure 2.1.3.** Highest Total Biomass in tones in the campus.

### 1.2.2 Carbon stock

Forests and trees serve as natural carbon storage systems, naturally capturing and storing carbon. Consequently, carbon is released when trees are cut down, and areas experience deforestation. The amount of carbon stored in a particular land area is influenced by the extent of plant coverage. The term "carbon sock" signifies the quantity of carbon that accumulates in a tree during the photosynthetic process. The total carbon stock on the campus is recorded at 33.04 tones.

**Table No. 2.1.4.** Carbon stock of trees in tones on the Campus

<i>Botanical Name</i>	Common Name	Carbon stock (tons)
<i>Cocos nucifera</i>	Coconut	26.74632
<i>Ficus religiosa</i>	Pimpal	1.599473
<i>Eucalyptus obliqua</i>	Nilgiri	1.330603



**Figure No. 2.1.4.** Highest carbon stock in tone

The highest carbon stock is recorded in Coconut followed by *Ficus religiosa* and *Eucalyptus obliqua* respectively on the institute campus.

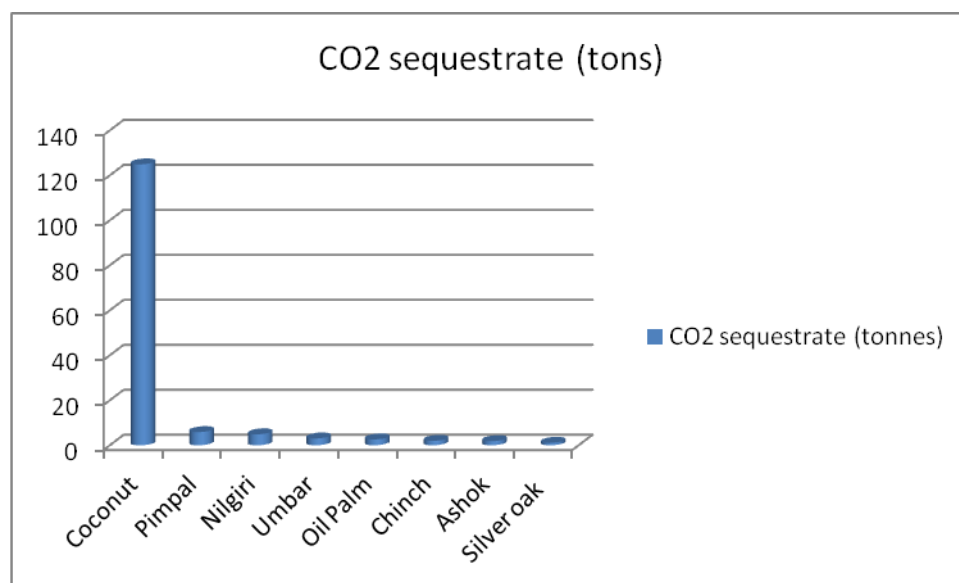
### 1.2.3 Carbon Sequestration

Carbon sequestration involves the prolonged retention of carbon dioxide or other carbon forms with the goal of preventing or delaying harmful climate change. This strategy has been proposed as a way to mitigate the buildup of greenhouse gases in the atmosphere and oceans resulting from the combustion of fossil fuels. The global plant carbon pool has the capacity to store 560 petagrams (Pg, where a petagram is a billion tons) of carbon. In the ongoing study at Ashokrao Mane College of Pharmacy, the objective is to assess the current carbon stock present in the form of woody vegetation by documenting each tree species. The woody plants on the college campus have captured and stored a total of 148.03 tons of CO<sub>2</sub>. On an annual basis, a single tree releases approximately 0.0218 tons of CO<sub>2</sub>.

**Table No. 2.1.5.** Carbon sequestrates of trees in tones on the campus

Botanical Name	Common Name	CO <sub>2</sub> sequestrate (tonnes)
<i>Cocos nucifera</i>	Coconut	124.9053
<i>Ficus religiosa</i>	Pimpal	5.870068
<i>Eucalyptus obliqua</i>	Nilgiri	4.883312
<i>Ficus racemosa</i>	Umbar	3.058484
<i>Elaeis guineensis</i>	Oil Palm	2.61769
<i>Tamarindus indica</i>	Chinch	1.972333
<i>Polyalthia Longifolia</i>	Ashok	1.82436

Grevillea robusta	Silver oak	1.102441
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**Figure No. 2.1.5.** Highest carbon sequestration in tons

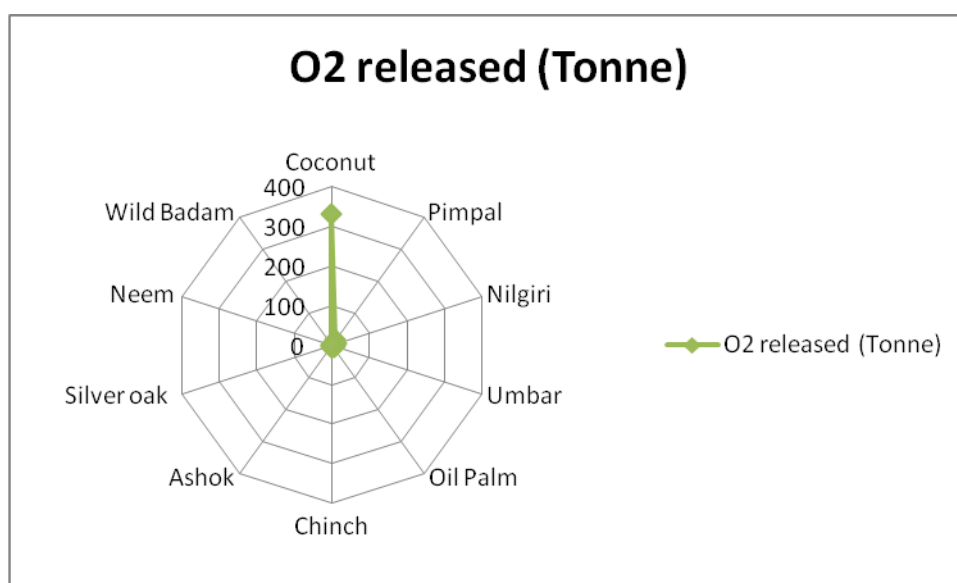
Cocos nucifera is the highest tree species in the campus to sequester carbon over 124 tons per year.

#### 1.2.4 Oxygen released

As of now, the woody vegetation on the Ashokrao Mane College of Pharmacy has produced a total of 394.7 tons of oxygen. The released oxygen is directly linked to carbon dioxide sequestration in a ratio of 32 to 12. It is believed that a single tree has the capacity to fulfil the oxygen requirements of two individuals for their entire lifetimes.

**Table No. 2.1.6.** Oxygen release of trees in tones on the campus

Botanical Name	Common Name	O2 released (Tons)
Cocos nucifera	Coconut	333.0808
Ficus religiosa	Pimpal	15.65351
Eucalyptus obliqua	Nilgiri	13.02216
Ficus racemosa	Umbar	8.155957
Elaeis guineensis	Oil Palm	6.980507
Tamarindus indica	Chinch	5.259554
Polyalthia Longifolia	Ashok	4.86496
Grevillea robusta	Silver oak	2.939842
Azadirachta indica	Neem	1.949021
Terminalia catappa	Wild Badam	1.348238



**Figure No. 2.1.6.** Highest oxygen release in tons

#### Key Observation:

- Absence of fire lines can cause fire disaster on the Campus.
- The Institute take good initiative for green cover by planting fruiting.
- Weekly indoor awareness program for the students.
- Fire events near woody vegetation will be threat to vegetation on the campus as well as direct anthropogenic source of CO<sub>2</sub> emission.
- Roof of the college is the best place to practice some flower nursery or medicinal plants for the student.
- Nothing has been done for roof management though water is available.

#### CONCLUSION AND RECOMMENDATIONS

In the academic year 2023–2024, the Department of Environmental Science, Shivaji University, Kolhapur, conducted a green audit Ashokrao Mane College of Pharmacy. Green audits are methodologies employed to evaluate whether institutional policies align with ecological responsibility and sustainability. The primary goals of the college's green audit include evaluating the environmentally friendly practices in place and conducting a thorough assessment to determine the institution's position on the environmental sustainability scale.

**Conclusions:**

The following are some findings from the team's green audit that can be used to improve the college campus and make it more environmentally friendly:

1. The campus's tree biodiversity is particularly strong.
2. The institute has made attempts to keep the campus green.

• **Recommendations:**

The primary recommendations for enhancing the campus environment are listed below.

1. The institute needs to put up a report on flora.
2. It is possible to start plant and flower nursery on the roof of the college.
3. In order to prevent fire occurrences on campus, fire lines should be getting ready.

## 2.1 Solid waste audit of the college:

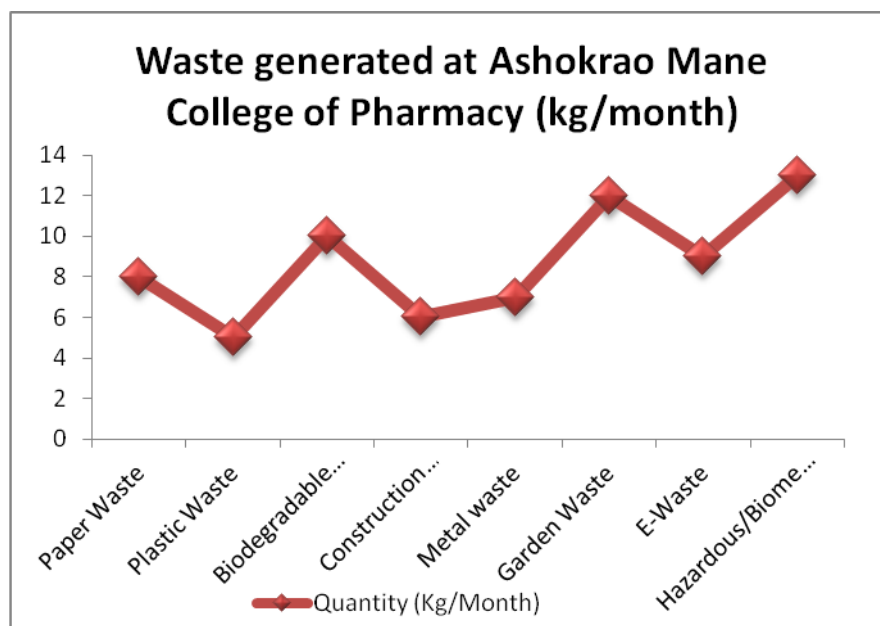
Solid waste management is a term that refers to the process of collecting and treating solid wastes. As long as people have been living in settlements, garbage and solid waste has been an issue. In recent years, it is observed that per capita waste generation has increased due to the changing life style. Improper disposal of solid waste is responsible for pollution of air, water and soil. Disposal of solid waste on open area leads to develop bad odour in the surrounding also it may develop unhygienic conditions. Improper waste disposal is root cause for spreading the infectious diseases among the human and animal. So, it is important to take some steps for the proper management of solid waste followed by reduce, reuse and recycle 3R principle. The intention of this inventory is to find out the quantity of waste generation and disposal methods, which are currently followed at Ashokrao Mane College of Pharmacy, Peth-Vadgaon

Solid waste audit of Ashokrao Mane College of Pharmacy was conducted by grouping the college into Main building, Library, Laboratories from different departments of pharmacy, waste from operation theaters and garden premises of college. Different types of waste are generated in the college campus. College has given yearly contract to private sanitary contractor to maintain cleanliness and hygiene conditions at indoor. Also, dustbins are fixed in the administrative building which is used for collection of waste. Solid waste includes biodegradable components like Food Waste, Vegetable peels, leaves, etc. which are collected in separate bins and biomedical waste which is produce in Laboratory are disposed in color coded bins which is disposed by as per the Biomedical Waste Management and Handling Rule 2016 . The organic compost used as manure for gardening in the premises. Other non-biodegradable waste is frequently collected by Kolhapur Municipal Corporation.

### 2.1.1 Generation of solid waste in college:

*Table No. 2.1.1: Category wise solid waste generation in college (kg/month)*

Department	Paper Waste	Plastic Waste	Biodegradable Waste (Canteen, Hostel mess)	Construction Waste	Metal waste	Garden Waste	E-Waste	Hazardous/ Biomedical Waste
Quantity (Kg/Month)	8	5	10	6	7	12	9	13
Quantity (Kg/ Year)	64	40	80	48	56	96	72	104



*Graph No. 2.1.1: Category wise solid waste generation in college (kg/month)*

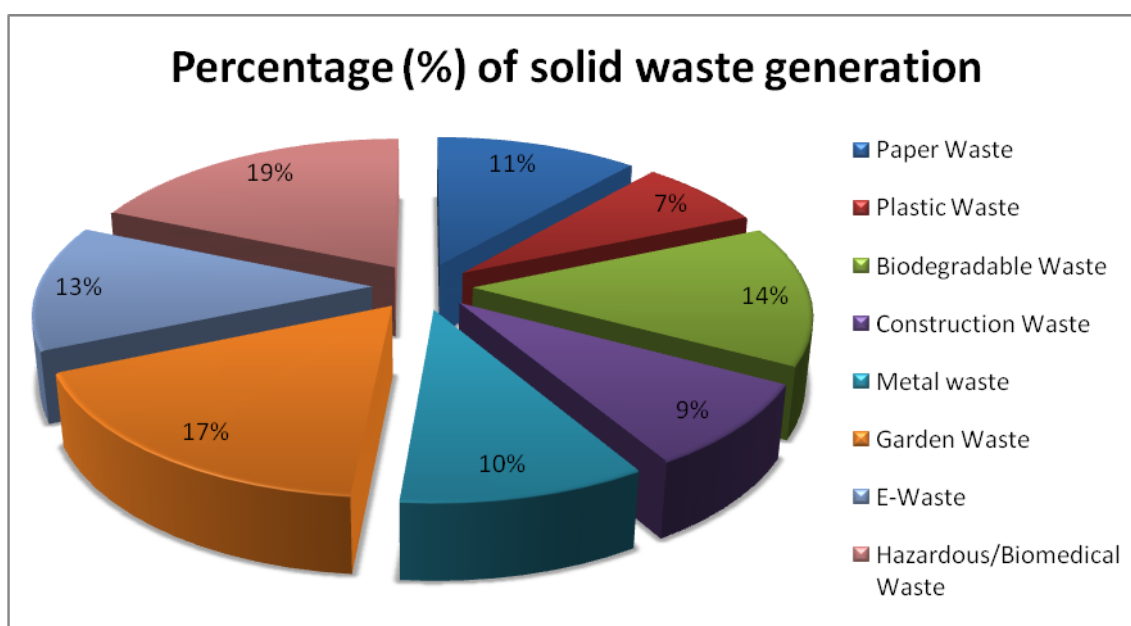
Total amount of waste generated in the campus is 70 kg/month. The average amount of paper waste generated per month in Ashokrao Mane College of Pharmacy is approximately 8 kg/month. Based on observations the highest quantity of solid waste generated is Hazardous/Biomedical waste, which is about 13 kg/month. This waste is produced from Laboratory, Operation theatre and research center. The leaf litter produced in the garden and premises is 12 kg/month. The biodegradable waste from college is given to the municipality while the waste release from laboratory is disposed in color coded bag and also before disposal it is disinfected with Autoclave process and then final waste is given to SS Services Ichalkaranji .

The glass waste is produced in minimum quantity i.e. 1 kg/month that is generally in the form of broken glassware, cups and glasses used in laboratory. Besides, the above-mentioned waste, plastic waste is generated is very less. The college campus is plastic free campus. Approximately 8 kg/ month paper waste is generated in the institution and that is given to the vendor.



Table No. 2.1.2: Percentage of category wise solid waste in the college (kg/year)

Department	Paper Waste	Plastic Waste	Biodegradable Waste	Construction Waste	Glass Waste	Metal waste	Garden Waste	E-Waste	Hazardous/ Waste
% waste generated	11.43	7.14	14.29	8.57	10	17.14	12.86	18.57	11.43



Graph No. 2.1.2: Percentage of solid waste generation in the college (kg/year)

Percentage wise distribution of different sources of solid waste is shown in the above graph. The maximum percentage of solid waste generated is of Hazardous/Biomedical waste, which is 19 %. The waste is produced mostly through Laboratory, canteens, Library and garden litter in the campus. The minimum percentage of plastic waste generated is about 7 %.

### 2.2.1 Status of solid waste generation in various departments and campus (kg /month):

For solid waste audit, the college campus and buildings are grouped into different areas and the data was collected using questionnaire, actual site visit and discussion with the concern faculty members.

### **2.3.1 Plastic Waste:**

Plastic waste in the form of packaged food wrappers, old broken chairs, old broken water tanks, carry bags, water bottles and packaged food items in canteens etc and plastic water bottles is approximately 7 kg/ month. Plastic wastes are difficult to dispose because it is non-biodegradable waste or it takes many years to degrade naturally. It can cause adverse impacts on environment.

### **2.3.2 Hazardous/Biomedical waste audit of the college:**

Hazardous/Biomedical waste is waste that has substantial or potential threats to public health or environment. The sources of hazardous waste in the Ashokrao Mane college of Pharmacy are most of the laboratory work. The amount of waste generated in the college is 13 kg/month. The major source of hazardous waste in campus is the Laboratory waste mainly the animals used during practical, infected cotton, Media preparation, and chemical used for formation of Medicine. Improper disposal of such waste can cause serious health effects. The college has good disposal facility. They Autoclave the waste before dumped and also put in to the colour coded dustbin. Also they follow the Biomedical waste management Handling rule 2016 before disposal.

### **2.3.3 E-waste generation in the college:**

Generation of e-waste is found in every educational institute. All discarded electronic appliances are called as E-waste. E-waste requires special treatment for disposal so it is also called as special waste. It is observed that the e-waste generated at Ashokrao Mane college of Pharmacy is of Schedule II category. Computers, printers, scanners, internet routers, CPU's, UPS, fused bulbs, tubes are used for administrative, and laboratory work. The wire required for the connectivity also gets included in the E-waste. The college has its own computer laboratory. Besides this computer lab, each department and administration use computers for their routine work.

For e waste management college makes circular for collection of e waste to be disposed. As per the circular college examines the status of electronic equipment's considering its working condition and decides its further disposal. The damaged computers, printers, UPS and other electronics devices should be given to e waste recycling to an authorised dealer.

### 2.3.5 Construction waste:

Construction waste is generated from construction of new buildings and demolition activities consisting of concrete, tiles, bricks, drywall, asphalt, plastics, metals, wood, rock and more. These construction waste materials are often inert and non-biodegradable, heavy, bulky and responsible for overload landfills. About 6 kg of construction waste which is generated in the college premises as no construction activity only some renovation activity.

### 2.3.6 Metal waste

Metal waste is generated through various activities. The good thing about metal is they can be recycled repeatedly without changing its properties. Metal waste includes scrap of benches, table, cupboard, cots and other things, which are made up of metals. The college generated 56 kg/year of metal waste which was given to scrap dealer for recycling purpose.

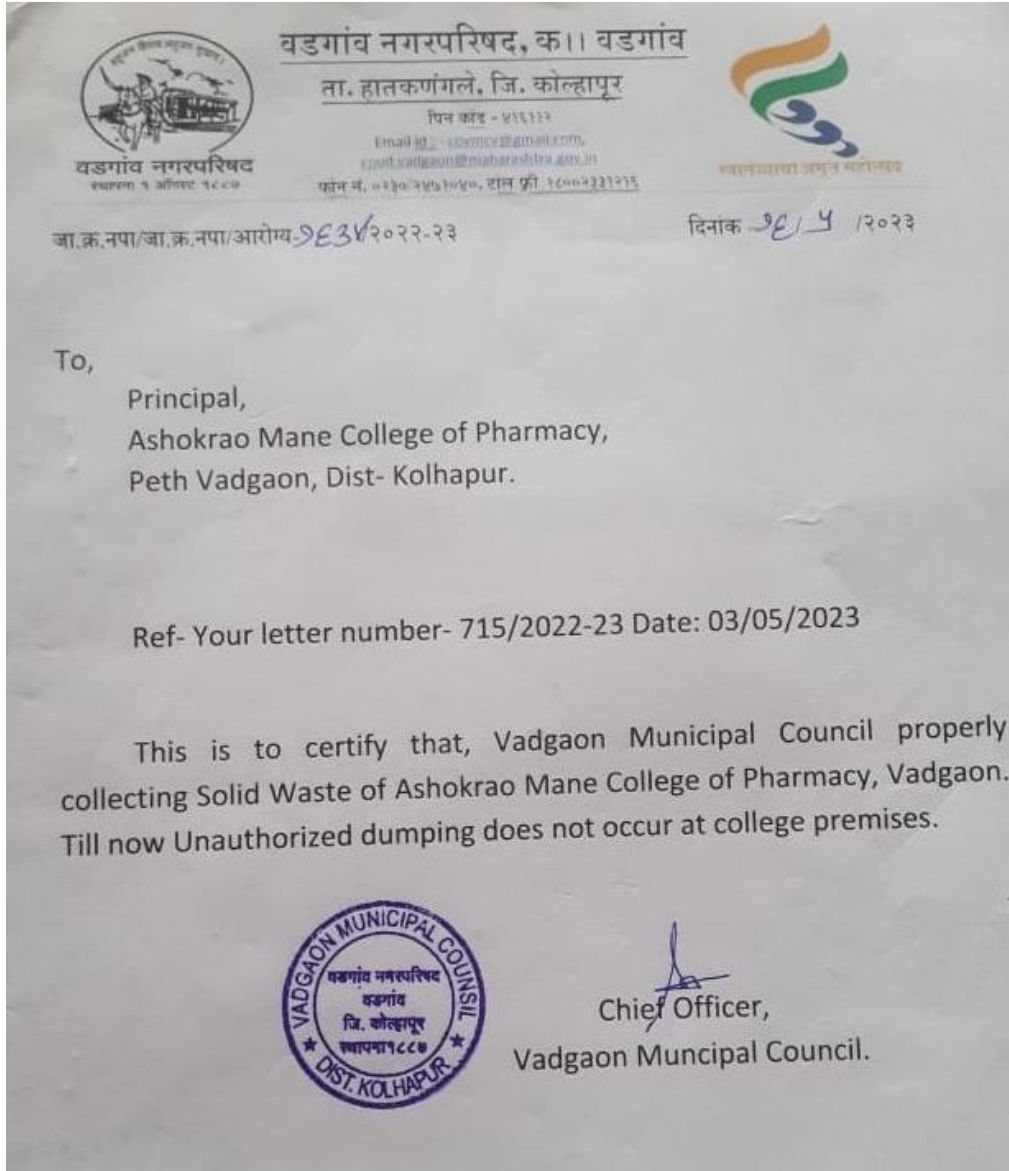
### 2.3.7 Eco-friendly solid waste management practices:

The college follows following eco friendly solid waste management practices.

#### 1. Segregation Unit

The collage has Degradable and Non Degradable units where the waste which is release from college is segregated and dumped.






## 2. Paper waste recycling:

Paper waste is handed over to the scrap dealer. Plastic Grinding and Scrap for recycling. This waste includes newspapers as well as office work paper.

॥ श्री गणेश प्रसन्न ॥



# लावण्य ट्रेडर्स

सरकारमान्य वेस्ट पेपर डिलर्स अँड सप्लायर्स  
६०८ वी वॉर्ड, साळोखे पार्क, नविन वसाहत, कोल्हापूर.

प्रोग्रा : नागेश दत्ता मस्तूद - ९५०३१७०३८०

नं. दि. 30/12/2022

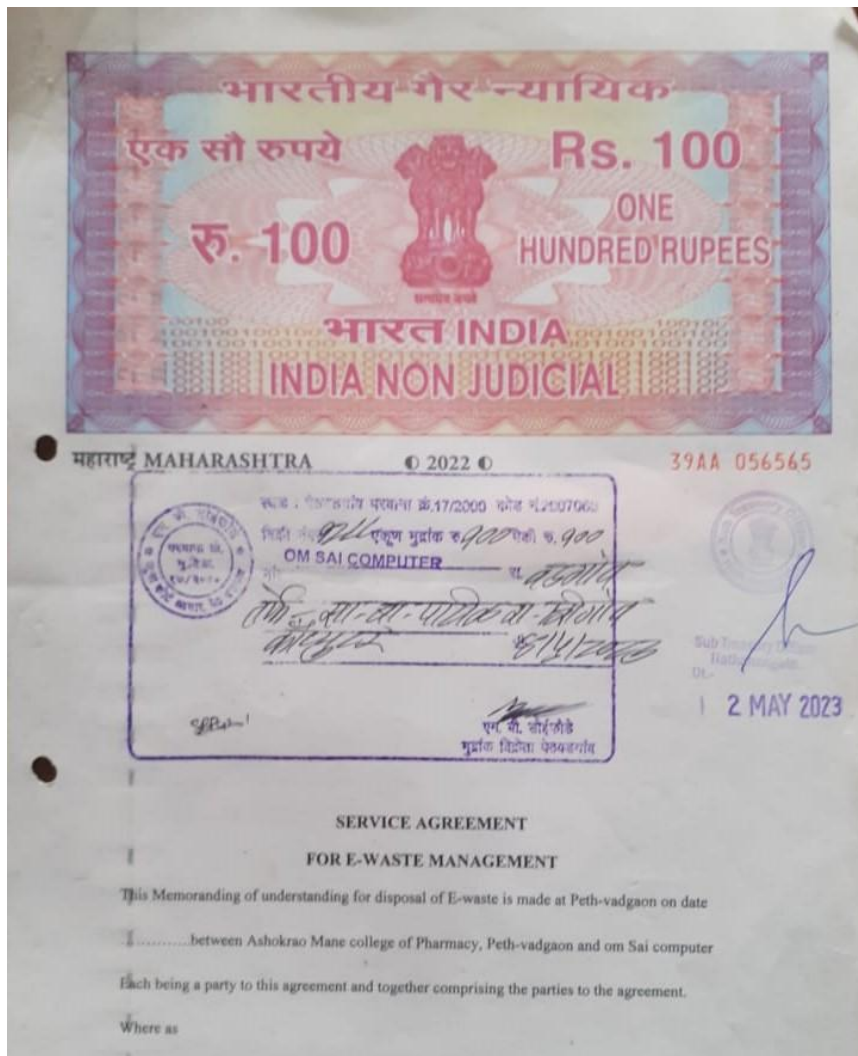
नांव : अशोकदास माने कॉलेज ऑफ फार्मसी, वडगांव

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२	वर्तमानपत्रे इंग्रजी		
३	उत्तरपत्रिका हाफ साईज		
४	वर्तमानपत्रे मराठी	50	600
५	घटक चाचणी/वही रद्दी		
६	पुस्तक/ मासिक रद्दी		
७	ऑफिस रेकॉर्ड	300	3000
८	फायली पुस्तके		
९	इतर कचरा		
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लावण्य ट्रेडर्स करिता

### 3 .E waste recycling:

Ashokrao Mane College of Pharmacy has done contract between Sai Traders for E waste disposal.

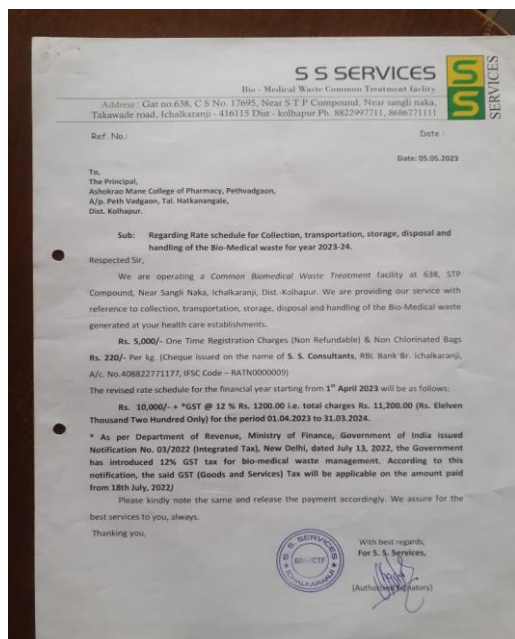


### 4. Disposal of Biomedical/hazardous waste:

The major source of Biomedical/hazardous waste in campus is the Laboratory waste. The college follow biomedical waste management and Handling rule. As per this rule college disposed their waste in color coded dustbin and also autoclave the infected waste. Then the waste is handover to the SS Services. College made contract with SS Services, Ichalkaranji for the collection, transportation, storage, disposal and handling of the biomedical waste for year 2023-24.

The college has provided the facility of incinerator in washrooms for sanitary pads disposal. Also college maintained safety rules and precautions for storage of Hazardous chemical and Acids.





### Key Observations:

- The average waste generated in the college is app. 70 kg/month
- Highest quantity of solid waste is biomedical waste around 13 kg/month.
- Biomedical waste is utilized properly as per the Biomedical waste management and Handling rule 2016.
- Plastic waste is generated very less in the college campus.
- Segregation according to the categories of waste is to be done at source of waste generation.
- The E- waste generated from damaged computers is given to the dealer for recycling.
- Cleanliness and hygienic conditions were maintained in the campus.

### Recommendation

- Vermicomposting or composting unit should be implemented in the campus for sustainable practice



**ENVIRONMENT MANAGEMENT PLAN:**

For the Ashokrao Mane College of Pharmacy we have developed an Environment Management Plan (EMP) by understanding the dynamics of the current scenario of resource usage and current practises of green inventory. This plan will prioritise the areas where the institution needs to make more environmental improvements while outlining the benefits, drawbacks, and solutions for maintaining a clean, green campus.

**Environment Management Plan 2023-24**

<b>Sector</b>	<b>Strengths</b>	<b>Weakness</b>	<b>Suggestions</b>	<b>Priority</b>
<b>Tree Vegetation</b>	There is lots of space for plantation	-	Avoid monoculture, variety of species should be planted in campus area	Medium
<b>Solid waste Managment</b>	Solid waste Segregation and Disposal method	Composting Unit	Construction of Vermicomposting Unit	Medium





**ASHOKRAO MANE COLLEGE OF PHARMACY, PETH VADGAON**

**Tal – Hatkanangale, Dist – Kolhapur**

## **Energy Audit**



**Prepared by**

**Department of Environmental Science,**

**Shivaji University, Kolhapur- 416004**

**2023- 24**

# Ashokrao Mane College of Pharmacy, Peth-Vadgaon



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**Prepared by**  
**Department of Environmental Science,**  
**Shivaji University, Kolhapur.**



Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap  
**ASHOKRAO MANE COLLEGE OF PHARMACY**

Approved by PCI, New Delhi, Government of Maharashtra, DTE, Mumbai

Affiliated to Shivaji University, Kolhapur & MSBTE, Mumbai

Estd. 2006 | Accredited 'A' Grade by NAAC (CGPA: 3.18)

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**Ref:**

**Date: 22-03-2024**

**Principal's Message:**



As we stand at the crossroads of a rapidly evolving world, it is imperative that we, as future healthcare professionals, recognize the profound connection between the environment, energy, and health.

The need for sustainable practices and green energy solutions is no longer just a global challenge—it is a responsibility that we must embrace for the sake of future generations.

Pharmacy professionals play a vital role in not only advancing medical knowledge but also in shaping healthier communities through the promotion of sustainability. The role of green chemistry, eco-friendly practices in pharmaceutical production, and energy-efficient healthcare systems cannot be overstated. It is our duty to incorporate these principles into our daily practices, research, and the way we educate our students.

Let us champion the use of renewable resources, reduce waste, and ensure that our methods of dispensing care are aligned with the preservation of the environment. By doing so, we will contribute to a healthier, greener planet, where both people and the environment thrive in harmony.

I am very thankful to the audit committee of Shivaji University, Kolhapur who Visited to our institute and produced a systematic Green, Energy and Environment report. This will help us in producing and encourage all members of our college and community to continue innovating and thinking sustainably, for it is through collective efforts that we will pave the way for a brighter, greener future.

**Thanking You**

**Place: Peth-Vadgaon**

**Dr. A. P Gadad**



Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap  
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Ref:

Date: 22-03-2024

**Chairman's Message**



It is with great pride and a deep sense of responsibility that I address you through this souvenir. As we continue to navigate the complexities of the modern world, the role of pharmacy professionals has never been more crucial—not only in advancing healthcare but also in safeguarding the future of our planet.

In today's age, we must recognize that the health of individuals and the health of our environment are deeply interconnected. As a pharmacy college, we have the unique opportunity to integrate sustainable practices into our academic programs, research, and community outreach. By focusing on eco-friendly pharmaceutical practices, promoting green chemistry, and exploring energy-efficient healthcare solutions, we can contribute to a healthier and more sustainable world.

I urge all our students, faculty, and staff to remain committed to fostering a culture of innovation that supports both human health and environmental well-being. Together, we can lead the charge in developing solutions that reduce our ecological footprint while enhancing the quality of life for all. Let us embrace sustainability, not as a challenge, but as an opportunity to make a lasting impact. May we continue to inspire each other to think green, act responsibly, and build a future where both health and the environment flourish.

I encourage everyone to continue supporting and engaging in sustainable practices, for the environment is not just a subject of study but a legacy we must protect for future generations. Let us use this report as both a reflection of our progress and an inspiration to continue our green journey.

**Thanking You**

**Place: Peth-Vadgaon**

**Shri Vijaysinh Mane Saheb**

President,

Ashokrao Mane Group of Institutions (AMGOI)



**SHIVAJI UNIVERSITY, KOLHAPUR**  
**DEPARTMENT OF ENVIRONMENTAL SCIENCE**

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Ref. No./SUK/ENV

Date: 05/04/2024

## Certificate

This is to certify that the Department of Environmental Science, Shivaji University, Kolhapur has conducted detailed "Energy Audit" of "Ashokrao Mane College of Pharmacy, Peth-Vadgaon" during the academic year 2023-2024. The Energy audit was conducted in accordance with the applicable standards prescribed by 'Bureau of Energy Efficiency, Government of India'. Their audit involves code compliance, operations, maintenance, occupancy, and building systems etc. and gives an 'Energy Management Plan', which the institute can follow to minimize impact on the institutional working framework. The analysis was based on a review of the rules governing energy efficiency and conservation, on data analysis, and on the findings of survey with key personnel in the campus's administrative management. The performance of college was found to have good quality even though some important aspects like increasing the use of solar energy and energy efficient equipment's are to be considered seriously. In an opinion and to the best of our information and according to the information given to us, said Energy audit gives a true and fair view in conformity with energy auditing principles accepted in India.

Head

**Dr. (Mrs.) Aasawari Jadhav**  
**i/c. Head & Assistant Professor**  
Department of Environmental Science  
Shivaji University, Kolhapur



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### Chapter I Introduction

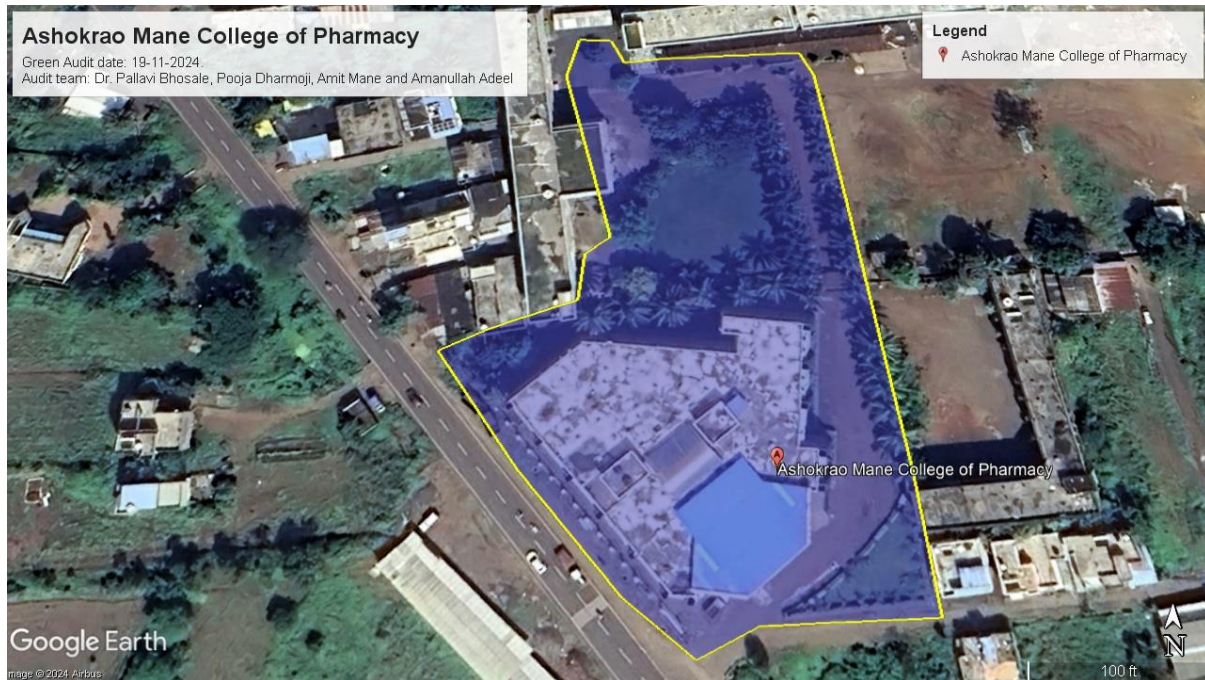
#### 1.1 Energy Audit, a Tool for Environmental Protection and Conservation

An energy audit is a survey that looks at how an organization uses its energy and looks for ways to conserve it. It refers to a method or system designed to lower the organization's energy consumption without lowering output. The audit offers recommendations for additional strategies and techniques for maximizing energy savings. Traditionally, fossil fuels, water, and wind have been used to produce electrical energy. The abundance of fossil fuels and their rates of depletion reinforce the need for alternative energy sources and electric energy conservation. Offering goods or services at the lowest cost and with the least degree of environmental damage is often the main goal of an energy audit and the control of energy consumption (Backlund and Thollander, 2015). Energy audits are required to identify areas for improvement, cost-saving opportunities, understand how fuel is used, where waste occurs, and identify potential savings.

The Energy Conservation Building Code (ECBC), introduced in 2017, establishes minimal standards for the design and construction of energy-efficient buildings throughout India. Additionally, it offers two extra sets of incremental specifications that buildings must meet in order to reach higher than necessary levels of energy efficiency (Gnanamangai *et al.*, 2021). In an effort to adopt energy-saving procedures in an organisation, the Bureau of Energy Efficiency (BEE) was established in 2002. Affixed to manufactured goods, energy-efficiency labels provide information on the products' energy efficiency (Ingle, 2014). In order to speed up energy efficiency efforts, BEE has created a system for labelling buildings' energy efficiency that corresponds with their star ratings. The BEE Star Rating Scheme is based on the real performance of the building and equipment in terms of specific energy usage, or "Energy Performance Indicator," by using star ratings to designate products that will be helpful for energy savings in a sustainable manner (Mishra and Patel, 2016).

## Chapter II Methodology

### 2.1 Background of Ashokrao Mane College of Pharmacy, Peth Vadgaon Energy Audit preparation:



#### Satellite image of Ashokrao Mane College of Pharmacy, Peth Vadgaon (Source: Google Earth)

Considering all this situation and adding national holidays in the total days, the audit process was carried out in three phases. For preparation of audit, the earlier data was compared with the present. At first, all the secondary data required for the study was collected from various sources, like concerned departments. A broad reference work was carried out to clear the idea of Energy Auditing. Different case studies and methodologies were studied and the following methodology was adopted for present audit. The methodology of present study is based on onsite visits, the personal observations and questionnaires survey tool. Initially, based on data requirement, sets of questionnaires were prepared. The surveyors then visited all the departments of the college and the questionnaires were filled. The generated data is subsequently gathered through various sections of college and used for further analysis. From the outcome of the overall study, a final report is prepared

- Energy Auditing Process
- Planning

## Energy Audit 2023-24

- Choosing audit team
- Inspecting site/ Collection of data
- Analyzing results of audit
- Evaluating audit

### 2.2 Survey by Questionnaire:

Baseline data for Energy Audit report preparation was collected by questionnaire survey method. Questionnaires prepared to conduct the Energy Audit in the college campus is based on the guidelines, rules, acts and formats prepared by Ministry of Environment, Forest and Climate Change, New Delhi, Central Pollution Control Board and other statutory organizations. Most of the guidelines and formats are based on broad aspects and some of the issues or formats were not applicable for college campus. Therefore, using these guidelines and formats, combinations, modifications and restructuring was done and sets of questionnaires were prepared for energy audit. All the questionnaires comprise of group of modules. The first module is related to the general information of the concerned department, which broadly includes name of the department, month and year, total number of students and employees, visitors of the department, average working days and office timings etc. The next module is related to the present consumption of resources energy. There are possibilities of loss of resources like water, energy due to improper maintenances and assessment of this kind of probability is necessary in Energy Audit. One separate module is based on the questions related to this aspect. Another module is related to maintaining records, like records energy bill, equipment warranty specification, etc. For better convenience of the surveyor, some statistics like, basic energy consumption characteristics for electrical equipment etc. was provided with the questionnaires itself.

### Chapter III

#### Observation and Result

##### 3.1 Electricity and energy audit:

Energy auditing is a tool for identifying energy efficiency potential and measures. Proper management of energy efficient systems can lead to significant cost savings and energy savings as well as increased comfort, lower repair costs, and extended machine life. An effective energy management program begins with a thorough energy audit. Energy audit evaluates the efficiency of all building and process systems that use energy. The auditor of the power starts at the meter used, finding all the energy sources that go into space. The auditor then identifies the streams of energy in each fuel, balances the distribution of energy into different functions, evaluates the efficiency of each of those functions, and identifies energy efficiency and cost-effectiveness.

- ❖ Audit activities, in general order, include:
  - Identify all energy systems
  - Check system status
  - Analyze the impact of improvements to those systems
  - Write up an energy audit report

The report documents the use and occupancy of the building and building systems equipment. The report also recommends ways to improve efficiency through improvements in operation and maintenance items, and through installation of energy conservation measures.

An energy source utilized by all the departments, of Ashokrao Mane College of Pharmacy, Peth Vadgaon campus includes use of electricity. Major use of the energy is at office, Seminar hall, Principal cabin, library, laboratories, classrooms, and various departments for lighting. Electricity is supplied to the college campus by Maharashtra State Electricity Board. The college has only one building with one ground floor.

##### 3.2 Energy consumption at building:

The college building includes old building, admin building, labs, library, classrooms, washrooms, hostels and canteen. The calculations are based on the data provided by the college and actual observations taken at the site.

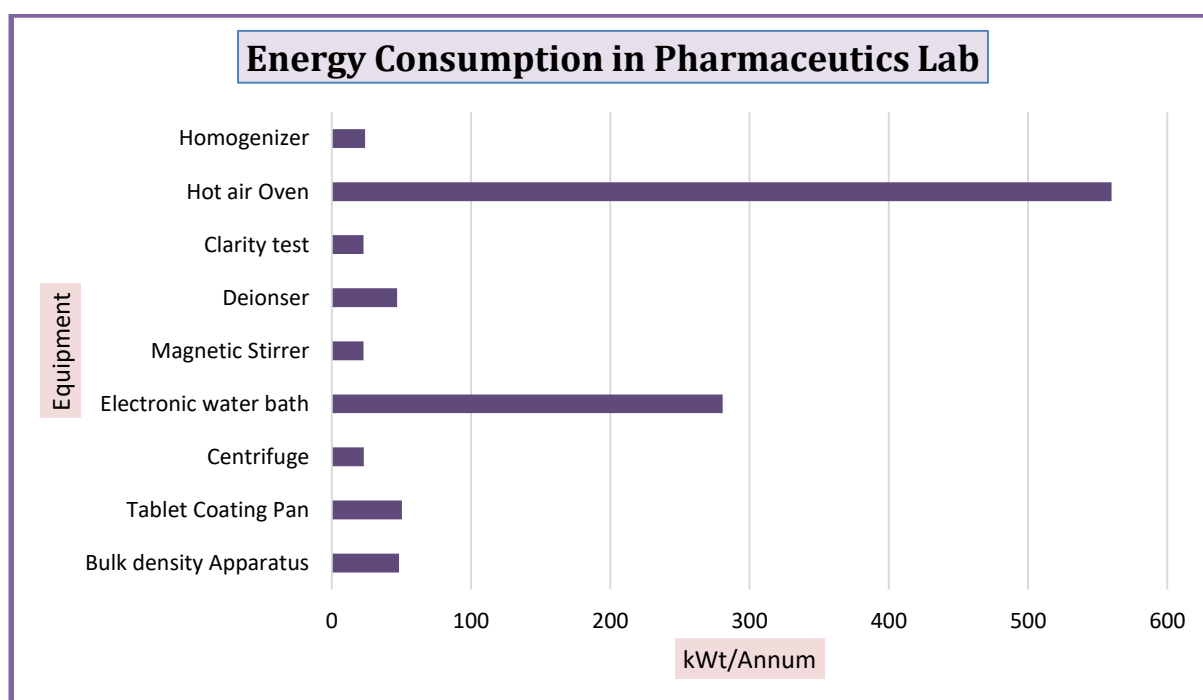
## Energy Audit 2023-24

The collected data of the college shows the energy consumption is approximate **45954.086 kWh/ Annum**. The consumption of energy is as follows-

### 3.2.1 Energy Consumption in Pharmaceuticals Lab:

**Table No.3.1: Energy consumed per annum by equipment in Pharmaceuticals Lab**

Sr. No.	Equipment	kWt/Annum
1	Bulk density Apparatus	48.4
2	Tablet Coating Pan	50.388
3	Centrifuge	23
4	Electronic water bath	280.8
5	Magnetic Stirrer	22.7
6	Deionser	47
7	Clarity test	22.8
8	Hot air Oven	560
9	Homogenizer	24
	<b>Total</b>	<b>1079.088</b>



**Graph No.3.1: Energy consumed per annum by equipment in Pharmaceuticals Lab**

In a pharmaceuticals lab, efficient energy consumption is crucial for both operational effectiveness and cost management. The energy usage for various equipment reflects the lab's

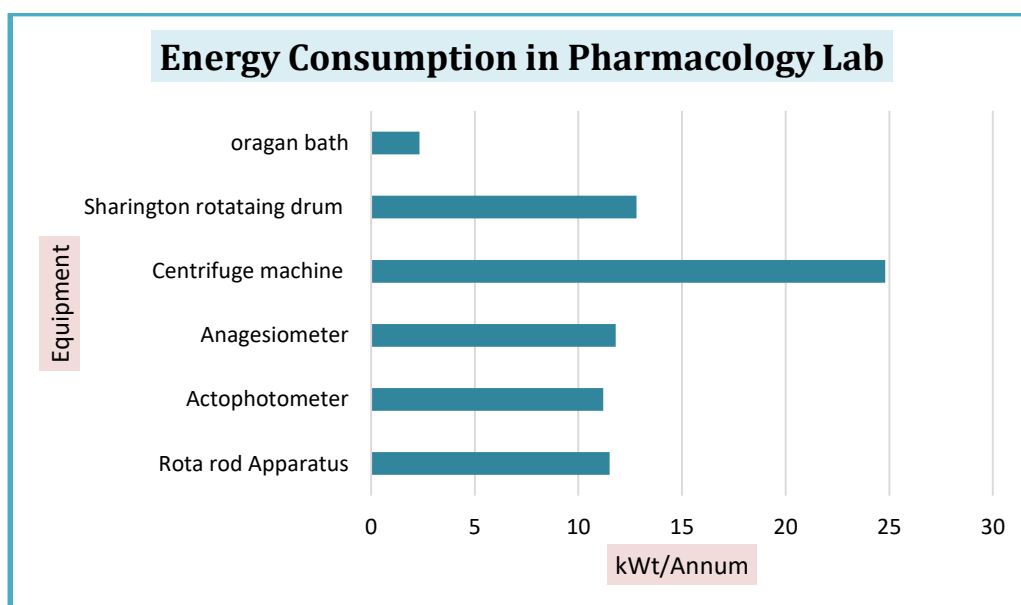
## Energy Audit 2023-24

demand for precision and reliability in its processes. Notably, the hot air oven consumes the most energy at 560 kW per annum, underscoring its vital role in drying and sterilization tasks. The electronic water bath, essential for temperature-controlled procedures, follows with 280.8 kW annually. Other equipment, such as the tablet coating pan and centrifuge, contribute significantly to overall consumption, with values of 50.388 kW and 23 kW, respectively. Lesser contributors like the magnetic stirrer, clarity test apparatus, and bulk density apparatus highlight the diverse energy profiles of lab tools. In total, the lab consumes approximately 1079.088 kW per annum, emphasizing the importance of monitoring and optimizing energy use to enhance sustainability while maintaining operational integrity.

### 3.2.2 Energy Consumption in Pharmacology Lab:

**Table No.3.2: Energy consumed per annum by equipment in Pharmacology Lab**

Sr. No.	Equipment	kWt/Annum
1	Rota rod Apparatus	11.5
2	Actophotometer	11.2
3	Anagesiometer	11.8
4	Centrifuge machine	24.8
5	Sharington rotataing drum	12.8
6	Oragan bath	2.34
	<b>Total</b>	<b>74.44</b>



**Graph No.3.2: Energy consumed per annum by equipment in Pharmacology Lab**

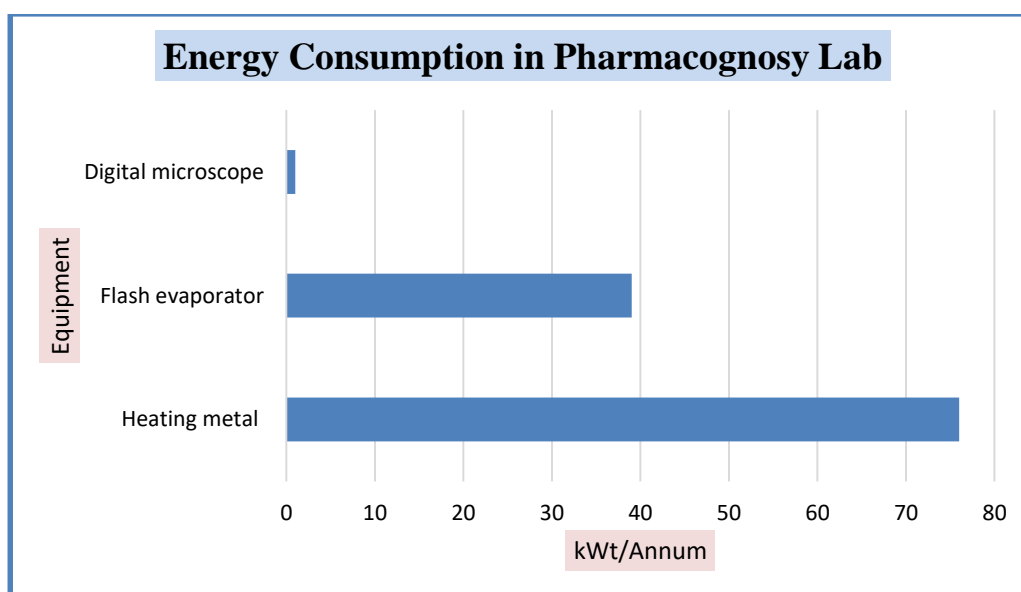
## Energy Audit 2023-24

The energy consumption data from the Pharmacology Lab provides a detailed overview of the energy usage of various equipment over the course of a year, measured in kilowatt-hours per annum (kWt/Annum). The Rota Rod Apparatus draws 11.5 kWt, while the Actophotometer consumes slightly less at 11.2 kWt. The Anagesiometer has an energy requirement of 11.8 kWt, and the Centrifuge Machine is significantly higher at 24.8 kWt. Additionally, the Sharington Rotating Drum uses 12.8 kWt, and the Oragan Bath has a minimal consumption of 2.34 kWt. When summed, the total energy consumption for all equipment in the lab amounts to 74.44 kWt per annum. This information is crucial for understanding and managing the energy efficiency of laboratory operations.

### 3.2.3 Energy Consumption in Pharmacognosy Lab:

**Table No.3.3: Energy consumed per annum by equipment in Pharmacognosy Lab**

Sr. No.	Equipment	kWt/Annum
1	Heating metal	76
2	Flash evaporator	39
3	Digital microscope	1
	<b>Total</b>	<b>116</b>



**Graph No.3.3: Energy consumed per annum by equipment in Pharmacognosy Lab**

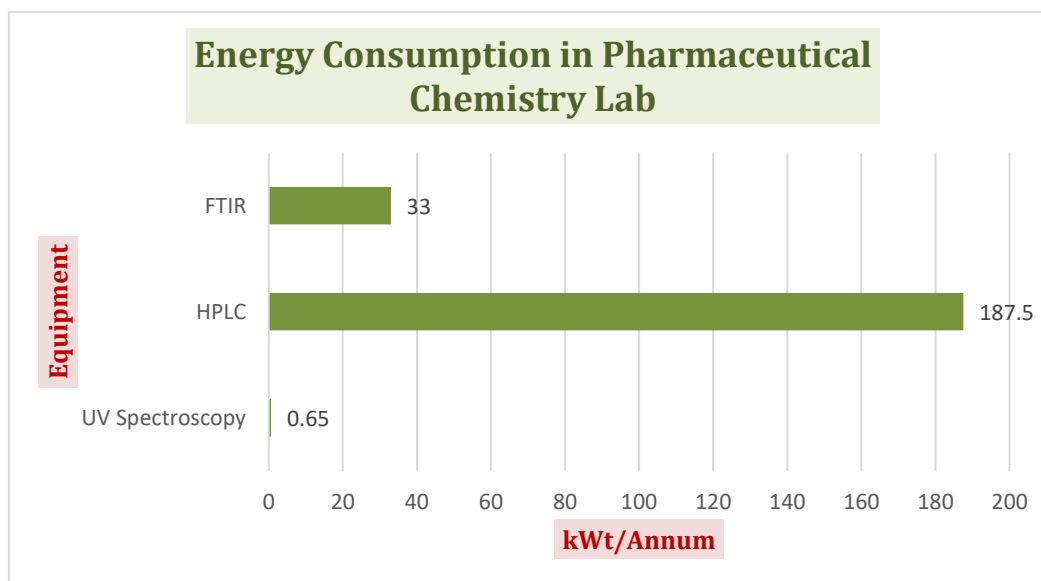
## Energy Audit 2023-24

In the Pharmacognosy Lab, the energy consumption for the year is categorized by equipment type, measuring in kilowatt hours (kW/annum). The most significant contributor is the heating metal, which accounts for 76 kW/annum. Following this, the flash evaporator consumes 39 kW/annum, while the digital microscope utilizes a minimal amount of energy at just 1 kW/annum. Collectively, the total energy consumption for the lab amounts to 116 kW/annum, highlighting the varying energy demands of different laboratory equipment.

### 3.2.4 Energy Consumption in Pharmaceutical Chemistry Lab:

**Table No.3.4: Energy consumed per annum by equipment in Pharmaceutical Chemistry Lab**

Sr. No.	Equipment	kWt/Annum
1	UV Spectroscopy	0.65
2	HPLC	187.5
3	FTIR	33
	<b>Total</b>	<b>221.15</b>



**Graph No.3.4: Energy consumed per annum by equipment in Pharmaceutical Chemistry Lab**

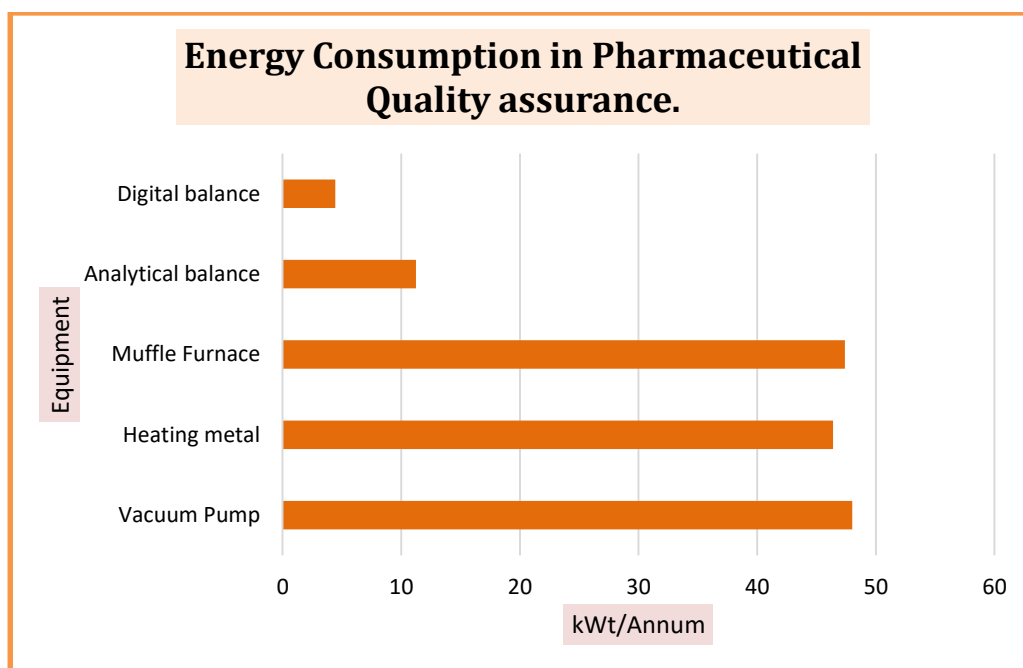
The energy consumption in a pharmaceutical chemistry lab is analyzed based on the equipment used. UV Spectroscopy consumes the least energy at 0.65 kWt/annum, while HPLC (High-Performance Liquid Chromatography) has the highest energy consumption at 187.5 kWt/annum. FTIR (Fourier-Transform Infrared Spectroscopy) uses 33 kWt/annum. The total annual energy consumption for all the equipment in the lab sums up to 221.15 kWt.



**3.2.5 Energy Consumption in Pharmaceutical Quality assurance:**

**Table No.3.5: Energy consumed per annum by Pharmaceutical Quality assurance**

Sr. No.	Equipment	kWt/Annum
1	Vacuum Pump	48
2	Heating metal	46.4
3	Muffle Furnace	47.4
4	Analytical balance	11.25
5	Digital balance	4.44
	<b>Total</b>	<b>157.49</b>



**Graph No.3.5: Energy consumed per annum by Pharmaceutical Quality assurance**

The table presents energy consumption data for various equipment used in pharmaceutical quality assurance, measured in kilowatt-hours per annum (kWh/Annum). The vacuum pump exhibits the highest energy usage at 48 kWh/Annum, closely followed by the muffle furnace at 47.4 kWh/Annum and the heating metal equipment at 46.4 kWh/Annum. Analytical balances consume a significantly lower amount of energy, at 11.25 kWh/Annum, while digital balances have the least energy usage, at 4.44 kWh/Annum. Collectively, these devices

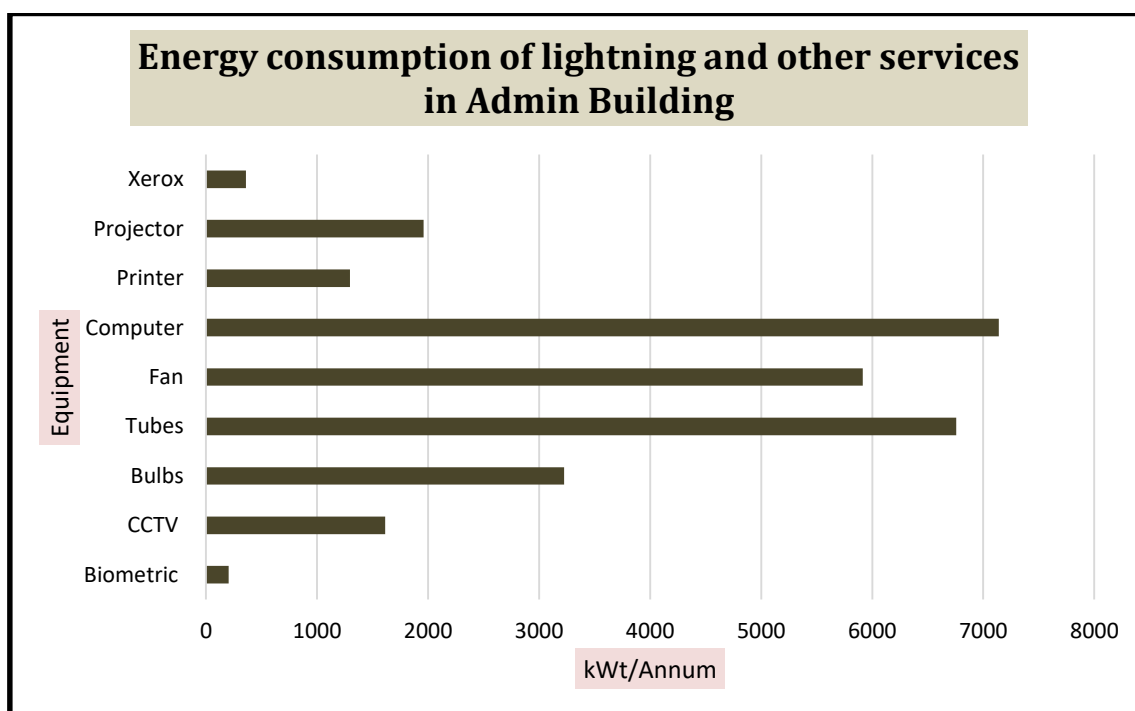
## Energy Audit 2023-24

account for a total energy consumption of 157.49 kWh/Annum. This data highlights the energy demands of specific equipment in quality assurance processes, providing insights for potential energy optimization efforts.

### 3.2.6 Energy consumption of lightning and other services in Admin Building:

**Table No.3.6: Energy consumed per annum by lightning and other services in Admin Building**

Sr. No.	Equipment	Numbers	kWt/Annum
1	Biometric	1	204.8
2	CCTV	32	1612.8
3	Bulbs	131	3225.22
4	Tubes	115	6756.25
5	Fan	88	5913.6
6	Computer	85	7140
7	Printer	9	1296
8	Projector	12	1958.4
9	Xerox	2	360
	<b>Total</b>		<b>28467.07</b>



**Graph No.3.6: Energy consumed per annum by lightning and other services in Admin Building**

The energy consumption data for lighting and other services in the Admin Building is summarized as follows: The total annual energy consumption is 28,467.07 kWt. Key

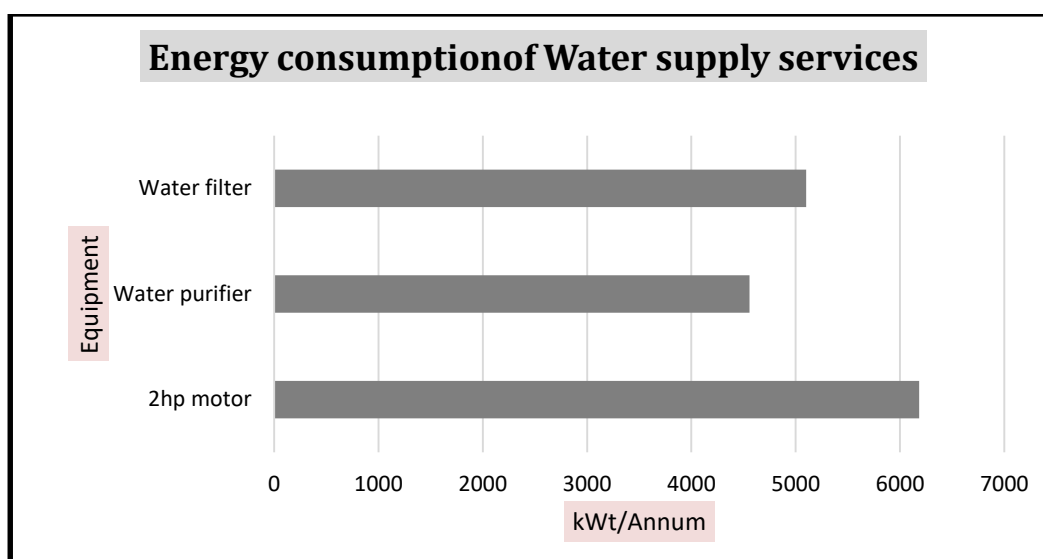
## Energy Audit 2023-24

contributors include computers, consuming 7,140 kWt annually across 85 units, and tubes, which use 6,756.25 kWt annually across 115 units. Fans consume 5,913.6 kWt with 88 units in operation, while bulbs contribute 3,225.22 kWt with 131 units. Other equipment includes CCTV systems consuming 1,612.8 kWt across 32 units, projectors at 1,958.4 kWt for 12 units, printers at 1,296 kWt across 9 units, a biometric system consuming 204.8 kWt for a single unit, and two Xerox machines using 360 kWt. This comprehensive breakdown provides insights into energy usage distribution within the building.

### 3.2.7 Energy consumption of Water supply services:

**Table No.3.7: Energy consumed per annum by Water supply services**

Sr. No.	Equipment	Numbers	kWt/Annum
1	2hp motor	2	6182.848
2	Water purifier	3	4556
3	Water filter	1	5100
	<b>Total</b>		<b>15838.848</b>



**Graph No.3.7: Energy consumed per annum by Water supply services**

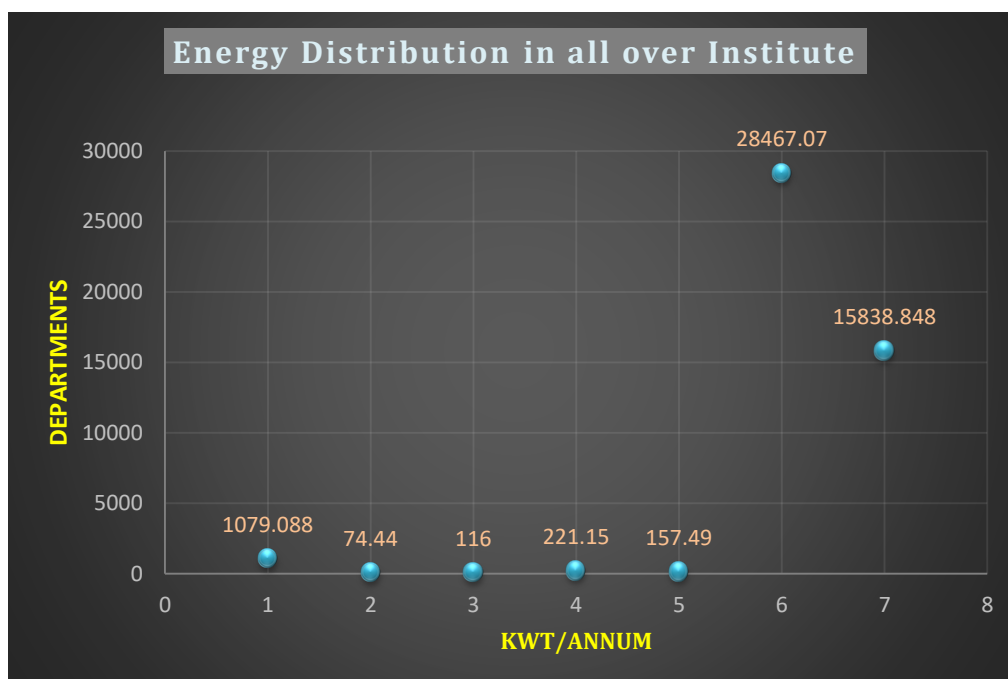
The energy consumption for water supply services totals 15,838.848 kWt annually. The primary contributor is the 2hp motor, consuming 6,182.848 kWt annually across two units. A single water filter accounts for 5,100 kWt annually, while three water purifiers collectively consume 4,556 kWt annually. This breakdown highlights the distribution of energy usage across different equipment in the water supply system.

## Energy Audit 2023-24

### 3.2.8 Energy Distribution in all over Institute:

**Table No.3.8: Energy consumed per annum in all over Institute**

Sr. No.	Departments	kWt/Annum
1	Pharmaceutics Lab	1079.088
2	Pharmacology Lab	74.44
3	Pharmacognosy Lab	116
4	Pharmaceutical Chemistry Lab	221.15
5	Pharmaceutical Quality assurance	157.49
6	Lightening & other services in Admin building	28467.07
7	Water supply services	15838.848
	<b>Total</b>	<b>45954.086</b>



**Graph No.3.8: Energy consumed per annum in all over Institute**

The total annual energy consumption across the institute is approximately 45,954.086 kWt. The majority of energy usage is attributed to lighting and other services in the Admin Building, which consume 28,467.07 kWt annually. Water supply services are the second-largest contributor, with an annual consumption of 15,838.848 kWt. Among the laboratories, the Pharmaceutics Lab consumes the most energy, at 1,079.088 kWt annually. The Pharmaceutical Chemistry Lab follows, using 221.15 kWt annually, while the Pharmaceutical Quality Assurance and Pharmacognosy Labs consume 157.49 kWt and 116 kWt,

## Energy Audit 2023-24

respectively. The Pharmacology Lab has the lowest energy consumption, at 74.44 kWt annually. This breakdown provides a clear overview of energy distribution within the institute.

### 3.3 Key Observations:

- Approximate total energy consumption of college is 45,954.086 kWt/Annum
- Highest consumption of energy is for lightning of building i.e. tubs and bulbs.
- Installation of sensor-based electrification items like fans, lights, etc. can save electricity.
- Solar lamps are installed on roadside of campus which will help to conserve energy.
- Unnecessary use of lights, fans and computers are observed at few places when no one is using.

**Chapter IV**  
**Summary and Conclusion**

**4.1 Summary:**

Energy Audit is one of the important tools to check the balance of natural resources and its judicious use. Energy auditing is the process of identifying and determining whether institutional practices which are eco-friendly and sustainable. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area.

The Department of Environmental Science, Shivaji University, Kolhapur has conducted an “Energy Audit” of Ashokrao Mane College of Pharmacy, Peth Vadgaon in the academic year 2023-24. The main objective to carry out energy audit is to check the Energy Audit practices followed by college and to conduct a well-defined audit report to understand whether the college is on the track of sustainable development.

After completing the audit procedure of college for Energy Audit practices, there are following conclusions, recommendations and Energy Management Plan (EMP) which can be followed by college in future for keeping campus environment friendly.

**4.2 Conclusion:**

From the Energy Audit, following are some of the conclusions which can be taken for improvement in the campus.

1. Installation of solar panels provides ample amount of electricity. Solar modules are installed wherever possible in the campus.
2. Sensor based electrification should be encouraged.

**Chapter V**  
**Recommendations**

Following are some of the key recommendation for improving campus environment:

1. An environmental policy document has to be prepared with all the recommendations and current practice carried by college.
2. The college should develop internal procedures to ensure its compliances with environmental legislation and responsibility should be fixed to carry out it in practice.
3. Electrification of lights by solar power should be encouraged.
4. Installation of sensor based electrification items like fans, lights, etc. can save electricity.
5. Installation of solar panels and rain water harvesting system to building will be useful in conserving the natural resources.
6. Regular checkups and maintenance of wire, and Electricity meter system should be done by engineering section to reduce over use, short circuit.
7. Science laboratories and support services using large amount of energy consumption; the system should develop energy conservation practices.

Chapter VI

Energy Management Plan (EMP):

By understanding the dynamics of present situation of resource utilization and current Energy Audit practices, the Department of Environmental Science has prepared an "Energy Management Plan" for the Ashokrao Mane College of Pharmacy, Peth Vadgaon. This plan will reveal the strengths and weaknesses and suggests remedies to develop Energy Audit campus. The EMP also gives suggestion for the priority of work to carry out.

Energy Management Plan

Energy Management Plan Sector	Strengths	Weakness	Suggestions	Priority
1. Electricity	<p>Different types of the instrument are available in laboratories.</p> <p>Sufficient use of solar energy for roadside lightning</p>	<p>Insufficient use of solar energy for electricity generation.</p> <p>Unnecessary use of lights, fans and computers at few places when no one is using.</p>	<p>Electrification of lights in institute by solar power.</p> <p>Installation of sensor based electrification for fans, lights, etc. Use of solar pumps for water tanks.</p> <p>Workshops and awareness campaigns to teach faculty, staff, and students about basic energy-saving techniques</p>	Medium





**ASHOKRAO MANE COLLEGE OF PHARMACY, PETH VADGAON**

**Tal – Hatkanangale, Dist – Kolhapur**

## **Environment Audit**



**Prepared by**

**Department of Environmental Science,**

**Shivaji University, Kolhapur- 416004**

**2023- 24**

# **Ashokrao Mane College of Pharmacy, Peth-Vadgaon**



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Ref. No./SUK/ENV

Date: 05/04/2024

## Certificate

This is to certify that the Department of Environmental Science, Shivaji University, Kolhapur has conducted detailed "Environmental Audit" of "Ashokrao Mane College of Pharmacy, Peth-Vadgaon" during the academic year 2023-2024. The Environmental audit was conducted in accordance with the applicable standards prescribed by Central Pollution Control Board, New Delhi and Ministry of Environment, Forest and Climate Change, New Delhi. The audit involves water, wastewater, energy, air, green inventory, solid waste etc and gives an 'Environmental Management Plan', which the institute can follow to minimize impact on the institutional working framework. The performance of college was found to have good quality. Even though there is more improvement needed with respect to sustainable Green practices in case of water resource management. In an opinion and to the best of our information and according to the information given to us, said Environmental audit gives a true and fair view in conformity with environmental auditing principles accepted in India.



*Aadhav*

Head

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Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap  
**ASHOKRAO MANE COLLEGE OF PHARMACY**

Approved by PCI, New Delhi, Government of Maharashtra, DTE, Mumbai

Affiliated to Shivaji University, Kolhapur & MSBTE, Mumbai

Estd. 2006 | Accredited 'A' Grade by NAAC (CGPA: 3.18)

Founder President: LATE SHRI. ASHOKRAO MANE | President: SHRI. VIJAYSINH MANE

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**Ref:**

**Date: 22-03-2024**

**Principal's Message:**



As we stand at the crossroads of a rapidly evolving world, it is imperative that we, as future healthcare professionals, recognize the profound connection between the environment, energy, and health.

The need for sustainable practices and green energy solutions is no longer just a global challenge—it is a responsibility that we must embrace for the sake of future generations.

Pharmacy professionals play a vital role in not only advancing medical knowledge but also in shaping healthier communities through the promotion of sustainability. The role of green chemistry, eco-friendly practices in pharmaceutical production, and energy-efficient healthcare systems cannot be overstated. It is our duty to incorporate these principles into our daily practices, research, and the way we educate our students.

Let us champion the use of renewable resources, reduce waste, and ensure that our methods of dispensing care are aligned with the preservation of the environment. By doing so, we will contribute to a healthier, greener planet, where both people and the environment thrive in harmony.

I am very thankful to the audit committee of Shivaji University, Kolhapur who Visited to our institute and produced a systematic Green, Energy and Environment report. This will help us in producing and encourage all members of our college and community to continue innovating and thinking sustainably, for it is through collective efforts that we will pave the way for a brighter, greener future.

**Thanking You**

**Place: Peth-Vadgaon**

**Dr. A. P Gadad**



Shri Balasaheb Mane Shikshan Prasarak Mandal, Ambap  
**ASHOKRAO MANE COLLEGE OF PHARMACY**

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---

Ref:

Date: 22-03-2024

**Chairman's Message**



It is with great pride and a deep sense of responsibility that I address you through this souvenir. As we continue to navigate the complexities of the modern world, the role of pharmacy professionals has never been more crucial—not only in advancing healthcare but also in safeguarding the future of our planet.

In today's age, we must recognize that the health of individuals and the health of our environment are deeply interconnected. As a pharmacy college, we have the unique opportunity to integrate sustainable practices into our academic programs, research, and community outreach. By focusing on eco-friendly pharmaceutical practices, promoting green chemistry, and exploring energy-efficient healthcare solutions, we can contribute to a healthier and more sustainable world.

I urge all our students, faculty, and staff to remain committed to fostering a culture of innovation that supports both human health and environmental well-being. Together, we can lead the charge in developing solutions that reduce our ecological footprint while enhancing the quality of life for all. Let us embrace sustainability, not as a challenge, but as an opportunity to make a lasting impact. May we continue to inspire each other to think green, act responsibly, and build a future where both health and the environment flourish.

I encourage everyone to continue supporting and engaging in sustainable practices, for the environment is not just a subject of study but a legacy we must protect for future generations. Let us use this report as both a reflection of our progress and an inspiration to continue our green journey.

**Thanking You**

**Place: Peth-Vadgaon**

**Shri Vijaysinh Mane Saheb**

President,

Ashokrao Mane Group of Institutions (AMGOI)

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# **Chapter - I**

## **Introduction**

### **1.1 Environment Audit, a Tool for Environmental Protection:**

The modernization and industrialization are the two important outputs of twentieth century, which have made human life more luxurious and comfortable. On the other hand, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change and so on. Now, it is considered that this is the final call by mother Earth. The time has come to wake up, unite and combat together for sustainable environment.

Environment Audit is the most efficient ecological tool to solve such environmental problems. Such audit was invented in late 1970s with the motive for inspecting the work conducted within the organization. It is systematic identification, quantification, recording, reporting and analysis of components of ecological diversity and expressing the same in financial or social terms. Through Environment Audit one gets a direction as how to improve the condition of environment.

### **1.2 Benefits of Environment Audit:**

There are many advantages of Environment Audit if is implemented properly:

- It would help to protect the environment in and around the campus.
- Recognize the cost saving methods through waste minimization and energy conservation.
- Find out the prevailing and forthcoming complications.
- Empower the organization to frame a better environmental performance.
- It portrays good image of institution through its clean and green campus.

Finally, it will help to build positive impression for the upcoming NAAC visit.

### **1.3 NAAC Criteria VII Environmental Consciousness:**

Environment Audit is assigned to Eco-club. The criterion VII of NAAC. National Assessment and Accreditation Council that is a self-governing organization that declares the institutions as Grade A, Grade B or Grade C according to the scores assigned at the time of

accreditation of the institution. The intention of Environment Audit is to upgrade the environmental condition in and around the institution. It is performed by considering some environmental parameters like water and wastewater management, energy conservation, waste management, air monitoring, etc. for making the institution eco-friendlier.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring nature in students. Many environmental activities like plantation and nurturing saplings and trees, cleanliness drives, bird watching camp, no vehicle day, rain water harvesting visits to ecologically important places through Eco clubs will make the student a good citizen of country.



## **Chapter II**

### **Methodology**

The College has conducted Environment Audit in the year 2023-24, on a yearly basis. The audit was carried out in three phases.

#### **2.1 Questionnaire survey:**

It includes administrative issues associated with the planning of audit, selecting the personnel for the audit team, preparing the audit protocol used by organization, obtaining background information, etc. The scope of the audit was defined at this step. It was decided that the information related to Water and Wastewater management, Energy conservation, Green belt, Carbon inventory, Solid waste management, Hazardous waste management, Air and noise quality status, activities of nature club, etc. should be gathered for the audit purpose. For collecting data related to these different areas, specific questionnaires were prepared.

#### **2. 2 Onsite visit and observations:**

The data related to above mentioned areas was collected by visiting each and every facility of College campus. The questionnaires were filled up according to the present situation. Photographic documentation was also done with the help of sophisticated camera.

#### **2.3 Data analysis:**

After collection of secondary data, the Environment Audit team took the reviews related to each environmental factor. The data was tabulated, analyzed and graphs were prepared using computer. Depending upon the observations and data collected, interpretations were made. The lacunas and good practices were documented. The Environmental Management Plan (EMP) was prepared for the next academic year in order to have better environmental sensitization. Finally, all the information was compiled in the form of Environment Audit Report.

## Environmental Auditing Process

Planning



Choosing audit  
team



Inspecting site/  
Collection of data



Analysing results  
of audit



Evaluating audit

## Chapter III

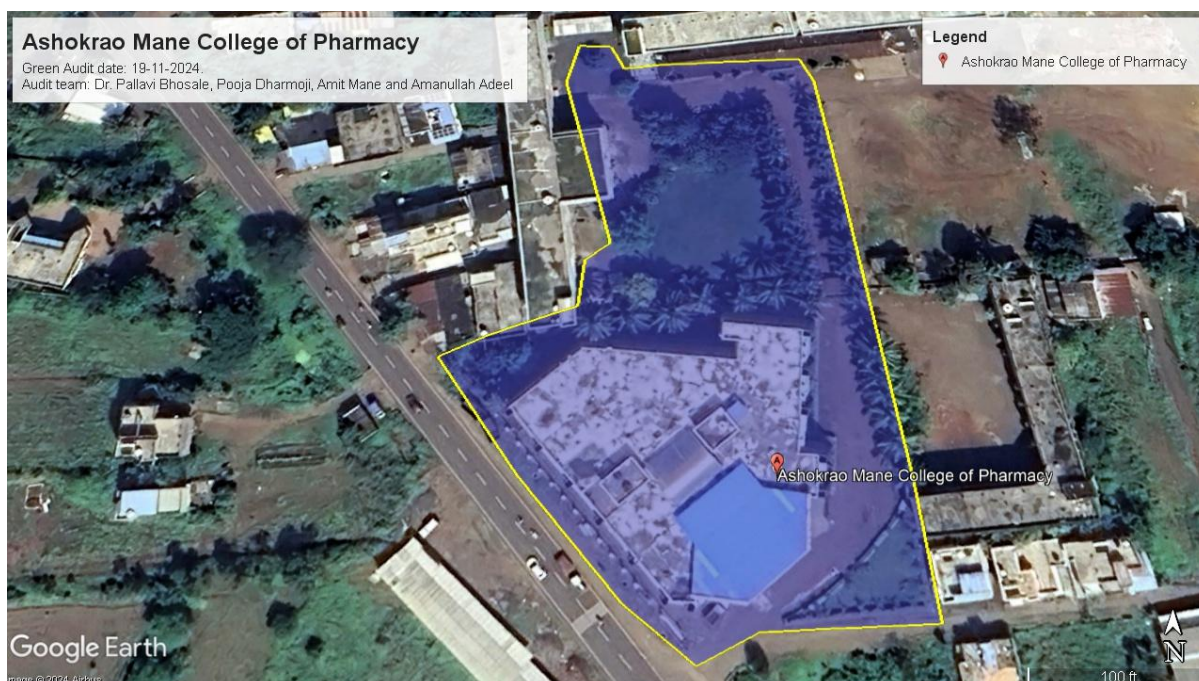
### Overview of Environment Audit

#### 3.1 Ashokrao Mane College of Pharmacy, Peth Vadgaon a glance:

The Ashokrao Mane College of Pharmacy (AMCP) Peth Vadgaon is one of the premier Pharmacy colleges in Western Maharashtra particularly in the rural belt of Kolhapur district. The college is one of the 'Rural and semi-urban-society-cantered focused educational institute. The college is having well Qualified and experienced staff and well-equipped Laboratories and a resourceful library. Recently the College received an NAAC 'A' grade in the Academic Audit of Shivaji University, Kolhapur. Currently, the college is running D. Pharm, B. Pharm, M. Pharm in Pharmaceutics. Pharmacology, Pharmacognosy & Pharmaceutical Quality Assurance, and Ph.D. in Pharmacy.

Ashokrao Mane College of Pharmacy, Peth Vadgaon is situated in Maharashtra at longitude  $74^{\circ}05'82''$  E and latitude  $17^{\circ}24'73''$  N in the Kolhapur District. It covers an area of about 2 acre.

**Satellite image of Campus** Ashokrao Mane College of Pharmacy, Peth Vadgaon.



Source: Google Earth

## **COLLEGE PROFILE IN BRIEF**

---

NAME OF THE COLLEGE:	<b>Ashokrao Mane College of Pharmacy, Peth-Vadgaon</b>
ESTABLISHMENT:	<b>2006</b>
PIONEERS:	<b>Late Shri. Ashokrao Mane Saheb, Ambap</b>
No. OF STUDENTS:	<b>556</b>
FACULTY:	<b>34</b>
NON-TEACHING STAFF:	<b>36</b>
STRENGTH OF CAMPUS:	<b>820</b>

### **FACILITIES:**

- 1. Modern Lecture Halls and Classrooms**
- 2. Pharmaceutical Sciences Laboratories**
- 3. Herbal and Green Garden**
- 4. Library and Learning Resources**
- 5. Simulation Experiment software and Clinical Skills Lab**
- 6. Green Campus and Eco-Friendly Initiatives**
- 7. Industry Collaboration and Internship Facilities other**
- 8. Boys Hostel, ladies hostel and Canteen**

### **RESEARCH AND EXTENSION ACTIVITY:**

- 1. Research in Pharmaceutical Sciences**
- 2. Collaborative Research with Industry and Academia.**
- 3. Student Research Initiatives**
- 4. Research Publications and Conferences**
- 5. Sustainable Practices and Green Initiatives**
- 6. Continuing Education and Professional Development**
- 7. The college has a good number of extension activities like plantation of trees, cleanliness drive, cleaning of public places and village, seminars, workshops, environmental awareness campaigns, etc.**

**AREA OF COLLEGE: 2 acres.**

### **3.2 Water and Wastewater Audit:**

Water which is precious natural national resource available with fixed quantum. The availability of water is decreasing due to increasing population of nation, as per capita availability of utilizable water is going down. Due to ever rising standard of living of people, industrialization, urbanization, demand of fresh water is increasing day by day. The unabated discharge of industrial effluent in the available water bodies is reducing the quality of these ample sources of water continuously. Hence, the National Mission on Water Conservation was declared by the then Prime Minister Hon. Dr. Manmohan Singh in 2003 and appealed to all citizens to collectively address the problem of water shortage, by conserving every drop of water and suggested for conducting water audit for all sectors of water use.

Water audit can be defined as a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water. Water Audit is nothing but an effective measure for minimizing losses, optimizing various uses and thus enabling considerable conservation of water in irrigation sector, domestic, power and industrial as well. A water audit is a technique or method, which makes possible to identify ways of conserving water by determining any inefficiency in the system of water distribution. The measurement of water losses due to different uses in the system or any utility is essential to implement water conservation measures in such an establishment.

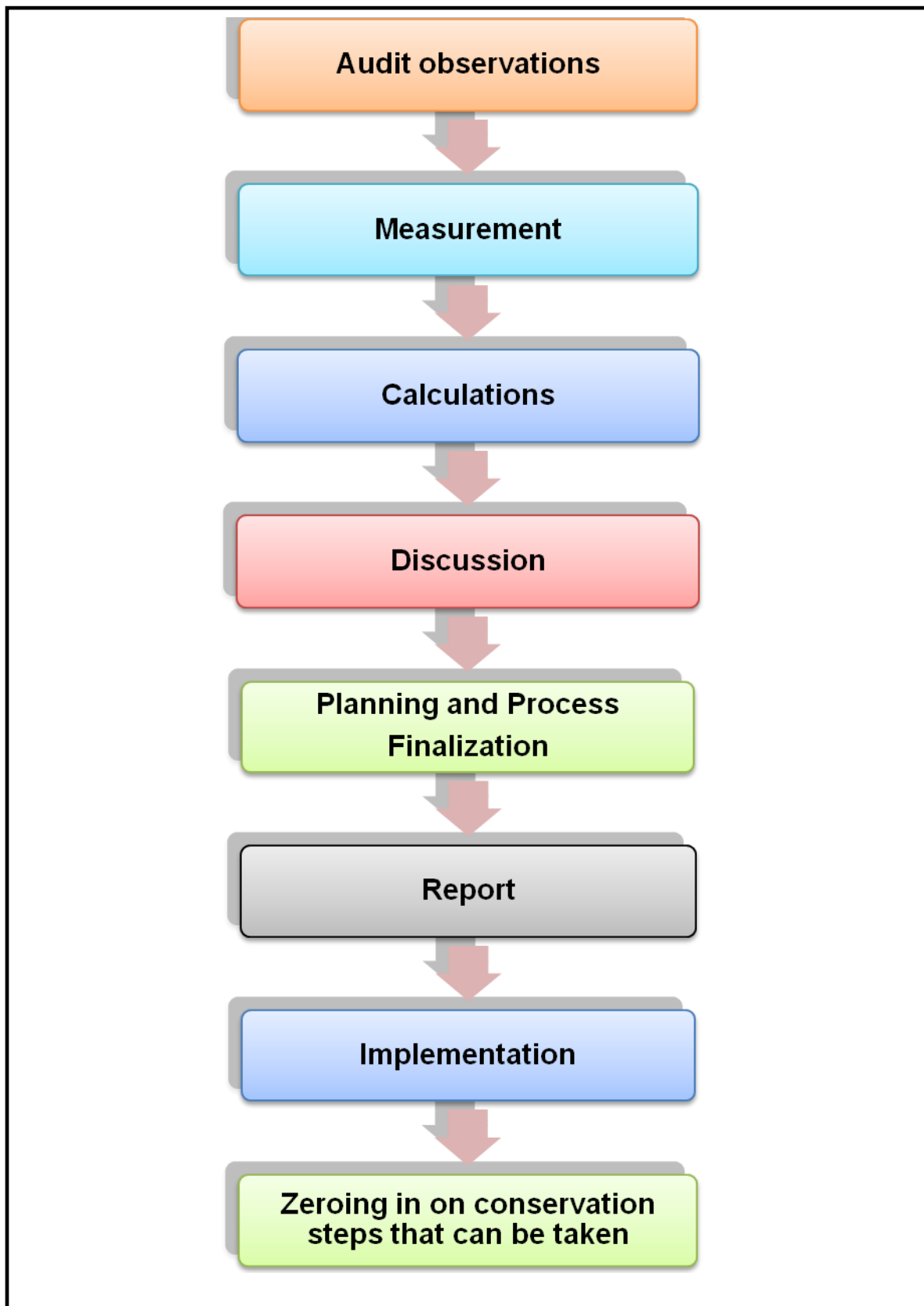
#### **Importance of Water Audit:**

It is observed that a number of factors like climate, culture, food habits, work and working conditions, level and type of development, and physiology determine the requirement of water. The community, which has a population between 20,000 to 100,000, requires 100 to 150 liters per person (capita) per day. As per the standards provided by WHO Regional office for South East Asia Schools require 2 liters per student for drinking; 10-15 liters per student if water-flushed toilets, Administration requires (Staff accommodation not included) 15 liters per person per day, Staff accommodation requires 30 liters per person per day and for sanitation purposes it depends on technology.

#### **3.2.1 Water Audit:**

Water usage can be defined as water used for all activities which are carried out on campus from different water sources. This includes usage in all residential halls, academic buildings, on campus and on grounds. Wastewater is referred as the water which is transported off the campus. The wastewater includes sewerage, residence, hall waters used in cooking, showering, clothes washing as well as wastewater from chemical and biological laboratories which ultimately going down in sink or drainage system

## Water Audit Process



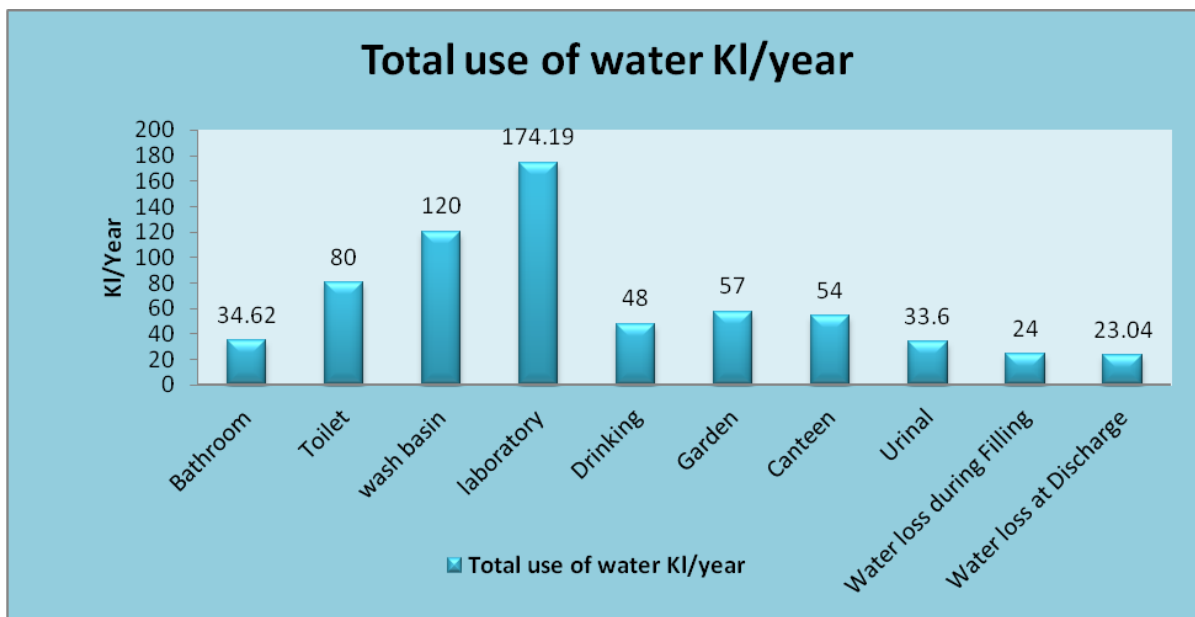
### 3.2.2 Water consumption in College:

From the data collected for water audit Ashokrao Mane College of Pharmacy, Peth-Vadgaon the water distribution and water consumption pattern is noticed. The College includes Main Building with Staff room and Principal room, Exam section and Ladies room. In addition, all Departments of pharmacy subject with well-equipped laboratory are included . College has support services like Auditorium, Garden, library, ICT room and Operation Theatre, Research lab, Chemical Store room etc.

#### 3.2.2. a The water consumption at Ashokrao Mane College of Pharmacy, Peth-Vadgaon:

**Table No. 3.2.1: Sector wise calculated use of water in Ashokrao Mane College of Pharmacy, Peth-Vadgaon**

Sr. No.	Sector	Total daily use (Kl/day)	Total yearly use (Kl/year)	Percentage %
1	Bathroom	02.50	34.62	05.33
2	Toilet	03.00	80.00	12.33
3	Laboratory	22.50	174.09	26.84
4	Wash Basin	07.00	120.00	18.49
5	Drinking	00.40	48.00	07.40
6	Garden	02.05	57.00	08.87
7	Canteen	01.20	54.00	08.32
8	Urinals	01.40	33.60	05.18
9	Water loss during Filling	00.10	24.00	03.70
10	Water loss at Discharge	00.09	23.04	03.55
<b>Total</b>		41.45	649.05	100

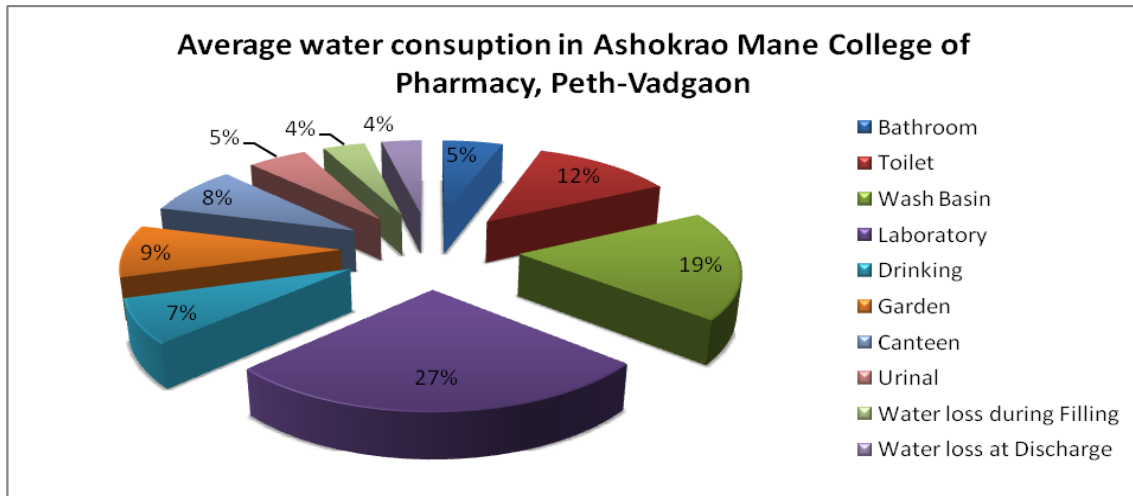


**Graph No. 3.2.1 Total water consumption yearly by Ashokrao Mane College of Pharmacy, Peth-Vadgaon.**

It is revealed from the data given in Table No. 3.2.1 and Graph No. 3.2.1 that total 41.45 Kiloliter daily and yearly 649.05-Kiloliter water is used. College includes Main Building, having Staff room and Principal room, Exam section, Ladies room and all Departments of Pharmacy. College has support services like Auditorium, Garden, library, ICT room and Operation Theatre, Research lab, Chemical Store room etc this sections using water are to be seen for bathrooms, toilet, drinking, washbasin, Canteen, urinal and Laboratory purpose for daily and calculated yearly. From above data, it is observed that the maximum water consumption was for Laboratory which is 22.50 Kilolitre/day i.e. 174.09 Kilolitre/year and for wash basin it is used 7.0 Kl/ day and year 120.00 Kl while for Toilet purpose 03 Kilolitre/day and yearly 80.00 Kilolitre/year respectively . Water loss during filling of water in tank was noted as 0.1 Kilolitre/day i.e. 24 Kilolitre/year and water losses at discharge were found to be 0.09 Kilolitre/day i.e. 23.04 Kilolitre/year.



**3.2.2. Average daily water consumption by Ashokrao Mane College of Pharmacy, Peth-Vadgaon.**



**Graph No. 3.2.2 Average Daily Water consumption by Ashokrao Mane College of Pharmacy, Peth-Vadgaon.**

Graph No. 3.2.2 shows the total percent of water consumed by Ashokrao Mane College of Pharmacy, Peth-Vadgaon in the 2023-24. As per the graph Laboratory, Wash basin, Toilet, Garden, Canteen, Drinking, Bathroom and Urinal etc are the major sources of utilization comprising 27%, 19 %,12%, 9%, 8%,7% and 5 % respectively.

### 3.2.3 Sustainable Water Practices (SWP):

#### 3.2.3.a. Rain water harvesting facility:

Ashokrao Mane College of Pharmacy, Peth-Vadgaon has Rainwater harvesting Plant in the campus constructed in last year. The plant has 1000-liter capacity, which helps to harvest rainwater. In rainy season, this water is purified in water filter unit and used for drinking and other laboratory work.



**Advanced water filter unit**

#### 3.2.3. b. R.O water filter unit for Clean and safe drinking water .

College has R.O water purification facility having capacity 500 lit for college students.



**R.O water filter Unit**

### 3.2.3.c R.O water filter and Waste water collection tank

College has R.O filter facility. After purification, the wasted water is collected in to tank and used for gardening purpose.



**Wastewater collection tank and water for gardening purpose**

### 3.2.3.d Rainwater collection pipe for Ground water recharging:

College is having rainwater collection pipe, which collect the water in tank helps to collect rainwater from roof top area of college, which helps for ground water recharging.



**Rainwater collection pipe for Ground water recharging:**

### Key Observations:

- The calculation revealed that highest water use sectors are Laboratory, which consumes average 27 % water, and remaining 77 % water consumption further divided into other sectors in such as toilets, urinals, bathroom and Canteen etc.
- College has some water conservation practices such as Rain water Harvesting plant, ground water recharging pipe, R.O water filter and Waste water collection tank and Drinking water facility.
- There is safe and hygienic drinking water facility in the college like water filters or water purification unit.
- To enhance the operating efficiency and reduce the water wastage, College should include more sustainable water practices (SWP) such as establish practices to monitor and maintain proper water usage, install wastewater treatment plant and water sub metering etc.

### 3.3. Ambient air quality status:

Collecting ambient air sample is a crucial aspect of environmental monitoring, and the college campus underwent sampling for the gases. The calibrated air quality sensors were utilized for a 2-hour sampling time.

**3.3.1 Table No 3.2.2 Ambient air quality status of Ashokrao Mane College of Pharmacy, Peth Vadgaon**

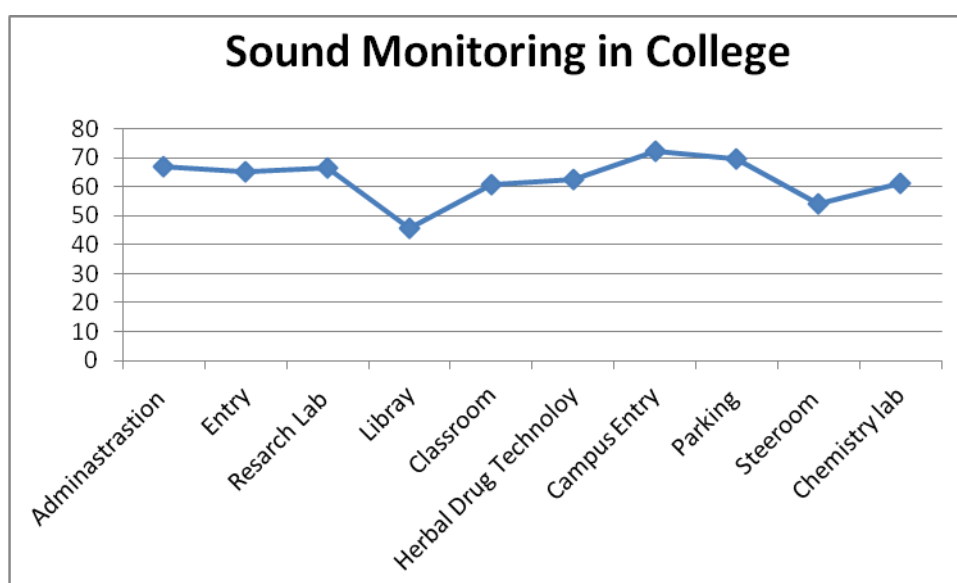
Location	HCHO	TVOC	PM <sub>2.5</sub>	PM <sub>1</sub>	PM <sub>10</sub>	Temp(°C)	Humidity	APL	Range
Administrative building	0.078	0.326	72	82	54	26	53	28	Normal
Entry	0.068	0.268	73	84	55	26	53	28	Normal
Research Lab	0.164	0.75	72	80	51	27	50	32	Poor
Library	0.064	0.254	63	71	46	29	57	24	Normal
Classroom	0.068	0.284	69	78	51	28	50	27	Normal
Herbal Drug Technology	0.091	0.394	71	82	53	28	50	28	Normal
Campus Entry	0.06	0.259	66	76	50	30	45	26	Normal
Parking	0.117	0.49	69	80	52	29	45	31	Poor
Storeroom	0.081	0.35	68	77	55	29	49	30	Normal
Chemistry lab	0.078	0.255	76	87	57	29	46	30	Poor

### 3.4.Ambient Noise Monitoring Status:

Ambient noise monitoring was carried out in different areas of Ashokrao Mane college of Pharmacy, Peth Vadgaon campus like classrooms, and outside campus. The sampling was done using calibrated Sound Level Meter (AZ 8921) by logarithmic scale in Decibels (dB). The noise readings were collected in the campus and calculated.

**Table No.3.2.3 Noise status in Ashokrao Mane college of Pharmacy, Peth Vadgaon**

Location	Leq Average	Leq Min	Noise Std Day time Decibels (dB)
Administration	67	41	50
Entry	65	40	50
Research Lab	66.7	53.6	50
Library	45.8	41.7	50
Classroom	60.7	54.2	50
Herbal Drug Technology	62.4	49	50
Campus Entry	72.1	67	50
Parking	69.8	57	50
Storeroom	54.2	47.8	50
Chemistry lab	61.4	51.7	50



Note: - 1. All Parameters are in dB(A) Leq.

2. All Results are day time.

3. Day time shall mean from 6.00 a.m. to 10.00 p.m.

**Key Observations:**

- It was observed the ambient noise levels in the Ashokrao Mane College of Pharmacy, Peth Vadgaon are on higher side as compared to the standards of Central Pollution Control Board for daytime. This may be due to human communication in high sound in college premises. Vehicles are generating high level sound at entry .Echo generation in carridors is also a reason to monitor high levels of noise.

### 3.5 Environmental protection through activities conducted in the year 2023-24.

#### 1. National Pollution Day: Date of Activity: Saturday, 02/12/2023



#### 2. National Energy Conservation Day: Date of Activity: Saturday, 2/12/2023



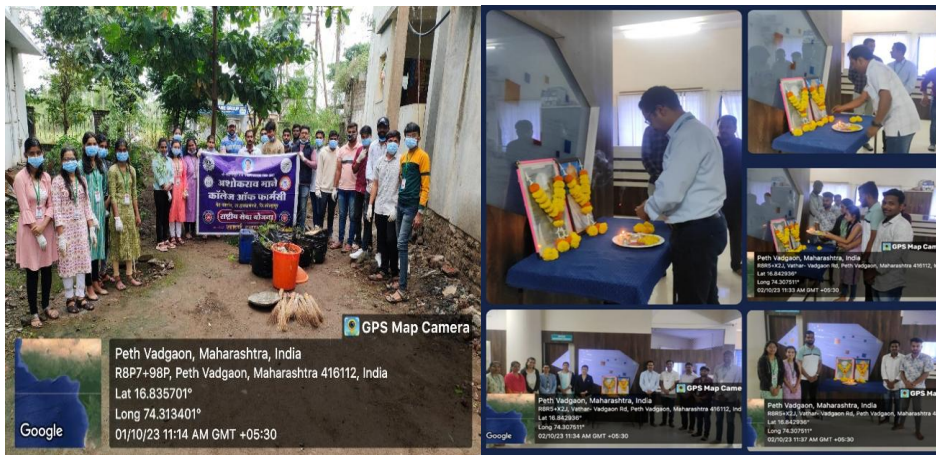
#### 3. Dr. Babasaheb Ambedkar Jayanti: Date of Activity: Sunday, 14/04/2024



**4.Pulse Polio Vaccination Campaign: Date of Activity: Sunday, 03/03/2024**



**5.Shram Daan For Swachh Bharat: Date of Activity: Sunday, 01/10/2023**



**6.World Environment Day: Date of Activity: 05/06/2024**





## **Chapter IV**

### **CONCLUSION AND ENVIRONMENTAL MANAGEMENT PLAN**

The Department of Environmental Science, Shivaji University, Kolhapur has conducted a Environment Audit Ahokrao Mane Pharmacy College, Peth Vadgaoin the academic year 2023-24. Environment Auditing is the process of identifying and determining whether college practices are eco-friendly and sustainable. The main objective of College to carry out Environment Audit is to check green practices followed by college and to conduct a well formulated audit to understand where we stand on a scale of environmental soundness.

#### **Conclusions:**

From the Environment Audit conducted by team following are some of the conclusions, which can be taken for improvement of the college campus to become environment friendly campus:

1. Availability of water is not the actual problem but efficient management of water is major issue that need to work on.
2. College has capacity to make Drip irrigation and sprinkling facilities in garden area
3. Water Audit helps to quantify all forms of losses and helps in reducing the non-revenue water.
4. Water consumption is more in Laboratory.
5. Roof top rainwater harvesting project is present in college, which is useful for filling up of tanks on campus.
6. College should maintain hygienic conditions and cleanliness in their premises
7. Ambient air quality status of Ashokrao Mane Pharmacy College is good.
8. Over all ambient noise levels in Ahokrao Mane Pharmacy College are higher than the noise standards.

#### **Recommendations:**

Following are some of the key recommendation for improving campus environment.

1. College should develop its own Environmental Policy by using guidelines given in Environment Audit document.
2. The data related to all measured environmental parameters should be monitored and recorded regularly and information be made available to administration.
3. The College should develop internal procedures to ensure its compliances with environmental legislation and responsibility be fixed to carry out it in practice.

4. Rainwater harvesting facility must be expanded and should be improvising through sand filtration system for better quality.
5. College should implement Drip irrigation and sprinkling facilities in garden area.
9. To meet EPA standards for safe drinking, water samples should be tested by a certified laboratory.
10. College can conduct more seminars, group discussions and eco-friendly activities on environmental education and awareness

#### **ENVIRONMENT MANAGEMENT PLAN:**

By understanding the dynamics of present situation of resource utilization and current practices for sustainable activities, we have prepared an Environment Management Plan (EMP) for the Ashokrao Mane College of Pharmacy, Peth-Vadgaon. This plan not only will provide the strengths, weaknesses and remedies for the green and clean campus but also give priority of the sector where the College has to give more efforts to improve its environment.

#### **Environment Management Plan 2023-24**

<b>Sector</b>	<b>Strengths</b>	<b>Weakness</b>	<b>Suggestions</b>	<b>Priority</b>
<b>Water</b>				
<b>Water utilization</b>	<ul style="list-style-type: none"> <li>• College has Rainwater harvesting project.</li> </ul>	<ul style="list-style-type: none"> <li>• Overflowing of tanks at some places</li> <li>• Overuse of water at in Laboratory perpose.</li> </ul>	<ul style="list-style-type: none"> <li>• Installation of automatic water pumps to avoid overflowing losses</li> <li>• Proper and timely maintenance of plumbing at all departments</li> <li>• Installation of sand filter to rain water harvesting assembly.</li> </ul>	Medium
<b>Air and Noise</b>				
<b>Air and Noise</b>	Air quality is still in good condition	Noise levels overall in college is on higher side	The plantation can be increased by vertical gardening	Medium



**Environmental Audit Team with Principal of Ashokrao Mane  
College of Pharmacy, Peth-Vadgaon.**

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