



R. L. TAWDE FOUNDATIONS
SAROJINI COLLEGE OF PHARMACY,
KOLHAPUR
ENVIRONMENTAL AUDIT 2022-23



Prepared by
Department of Environmental Science,
Shivaji University, Kolhapur- 416004
2022-23



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Date: 18/5/2023

Certificate

This is to certify that the Department of Environmental Science, Shivaji University Kolhapur has conducted detailed "Environmental Audit" of "R. L. Tawde Foundations Sarojini College of Pharmacy, Kolhapur" during the academic year 2022-2023. 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. Eventhough there is more improvement needed with respect to sustainable Green practices in case of water resource management and Solid waste 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.



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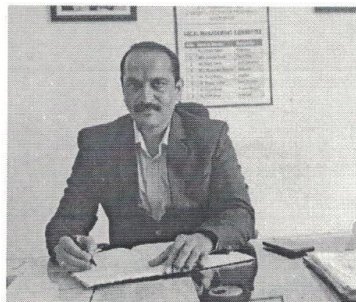


R. L. TAWDE FOUNDATION'S
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Principal Message

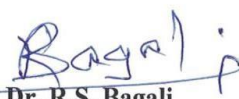
Today the universe is facing problem like global warming, deforestation. There are several aspects responsible for climate change. Safe drinking water scarcity, drought, flood are hot cake now a days. All these environmental issues are only discussed, at the global level but the true fact is that regional and local activities are responsible to make such issues global.



In the dire need to protect our planet from environmental pollution, it is the responsibility of everyone not to contribute activities which may harm the environment. College is the entity where students, faculty and staff gather every day to run teaching and learning process. This process require use of infrastructure, energy, water, chemical and support facilities. College has to look after optimum and economical use of these things. It is necessary to conserve the energy by non-traditional source also it is necessary to avoid entry of monoxide and other gaseous pollutants in the environment. Scarcity of water and its pollution are the hot topics. We must save the available water and keep it free from pollution. The waste generated through laboratories, kitchen of hostel must be properly treated and disposed off. Campus must be clean and green to have pleasant atmosphere for the teaching learning process. We must take maximum efforts towards carbon neutrality. In this direction along with plantation, origination of other of other nature related activities and creation of awareness among the peoples is necessary.

In this direction to be environmentally conscious, it is necessary that every college must undertake green audit of the premises and facilities. I am very happy to state that department of environmental science, Shivaji University Kolhapur under the guidance of green audit team and they have conducted the green audit of our college vey keenly. their suggestions are certainly helpful for us for the improvement.



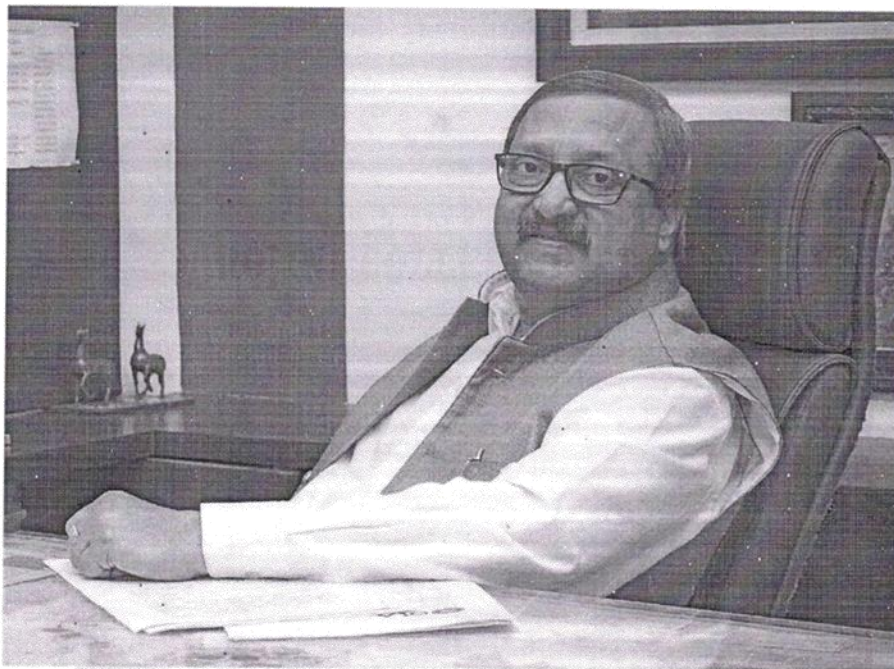

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Chairman's Desk



Shri. Kishore R. Tawde
Hon. Chairman

Our aim is not to just provide just higher education, but one that is value based. The world has become a very competitive place but our aim is not to prepare students to merely compete with others but to discover themselves first. True to the Indian philosophy the more one knows about oneself the better one can compete with others. We lay a substantial stress on the development of physical and mental skills and the enhancement of the power of concentration. Emphasis is laid on the building of strong characters to withstand the inevitable pressures of tomorrow's world. We have always aimed high and have achieved our goals without sparing any efforts. Our highly reputed institution has already instilled confidence in the parents community.

Moreover we are open to take suggestions from parents and experts through regular interaction with the faculty members, and strive to improve with an effective system of self assessment. Our record spells out that for our mission the sky is the limit.

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 2022-23, 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.

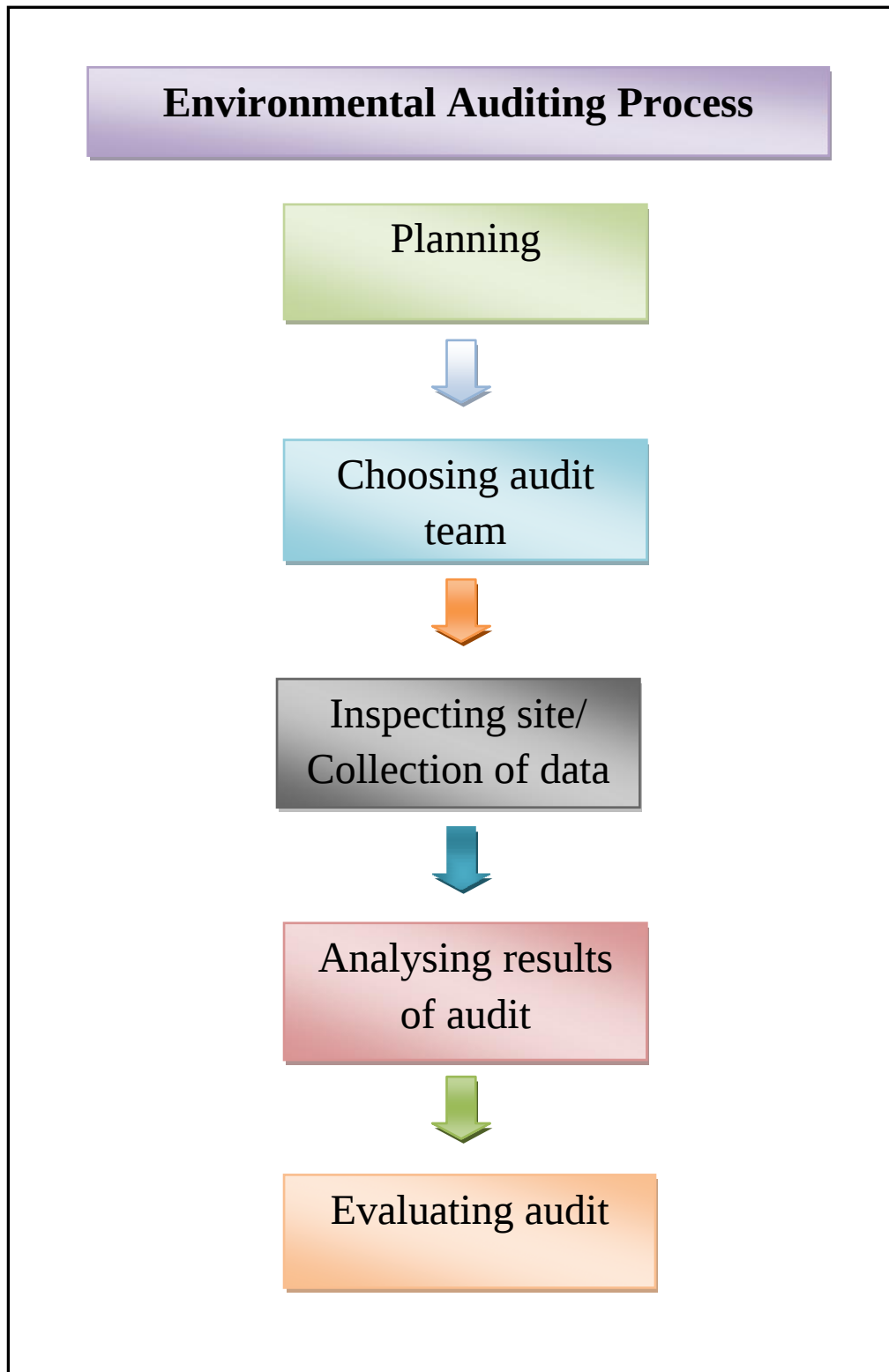
2. 2 Onsite visit and observations:

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 reviews related to each environmental factor were taken by the Environment Audit team. 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.

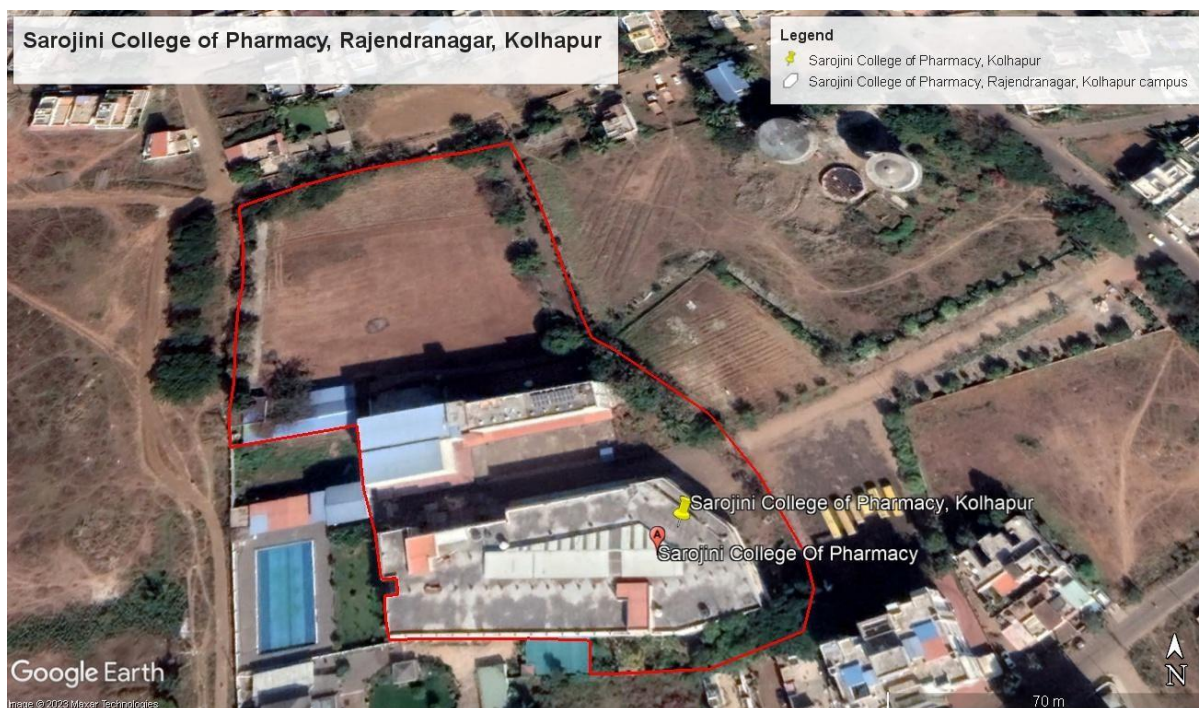


Chapter III

Overview of Environment Audit

R. L. Tawde foundations Sarojini College of Pharmacy is one of the leading college to provide the opportunity of higher education to Pharmacy students. Sarojini College of Pharmacy College to dispel this deficiency to develop college education. The College has huge campus with many classrooms, Diploma and degree section, Laboratory, library facility, Auditorium, Gymkhana etc. Enormous manpower including students, administrative faculty, teaching and nonteaching faculty, workers use this huge premises for various purposes.

Sarojini College of Pharmacy Rajendranagar, Kolhapur is situated in Kolhapur district Maharashtra at longitude 74°14'48.71"E and latitude 16°40'3.41"N the elevation of the institute from the sea level is 620 m. The Institute's campus is 1.27 acres in size.



Google Earth Image

College Profile In Brief	
Name of The College:	Sarojini College of Pharmacy
Establishment:	R. L Tawde foundation in 2017
Pioneers:	Shri Kishor R. Tawde, Hon.Chairman
No. of Students:	605
Faculty And Non-Teaching Staff:	50
Facilities:	College conducts different courses for the excellence of Diploma and U.G Degree
Research And Extension Activity	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:	1.27 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 inefficiencies 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.

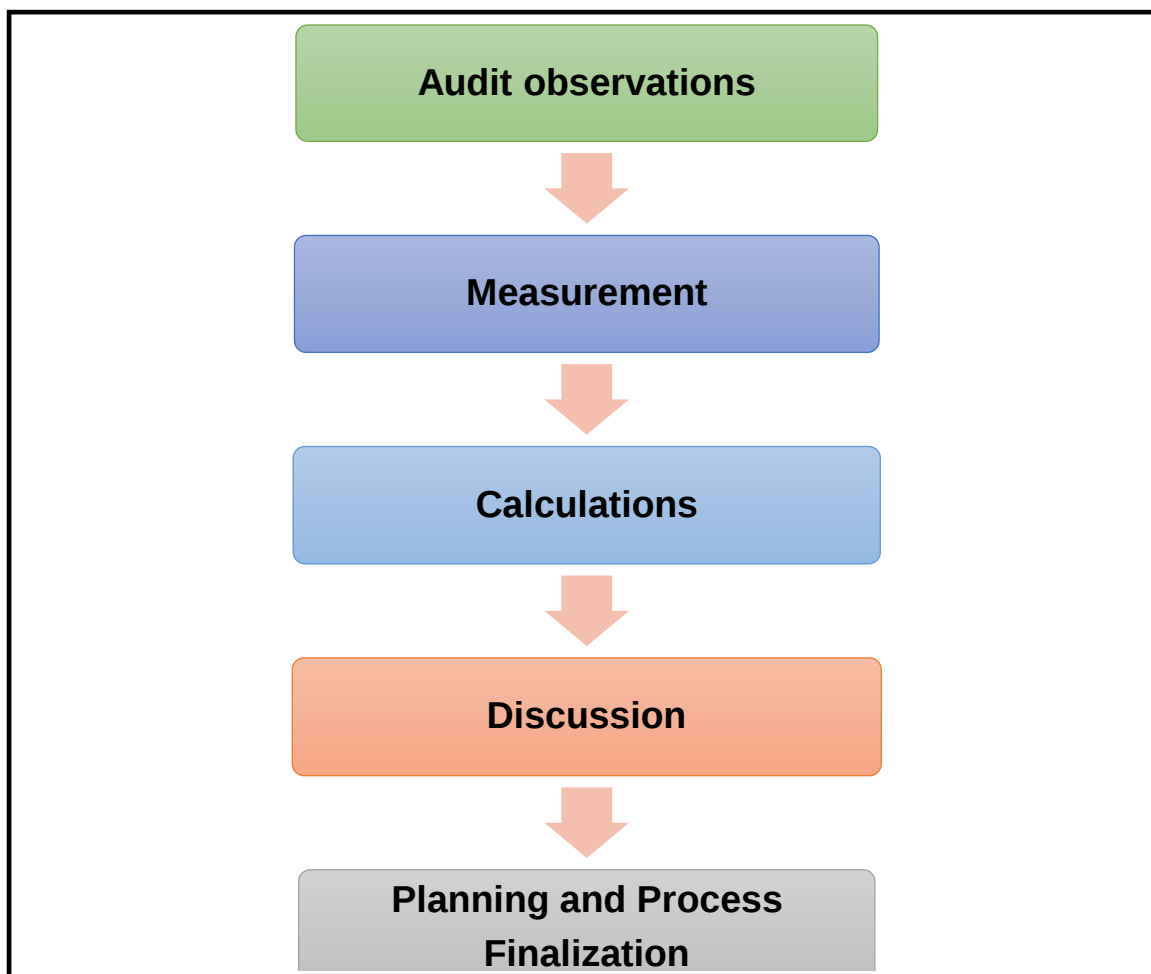
Importance of Water Audit:

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 1, 00, 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) 50 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



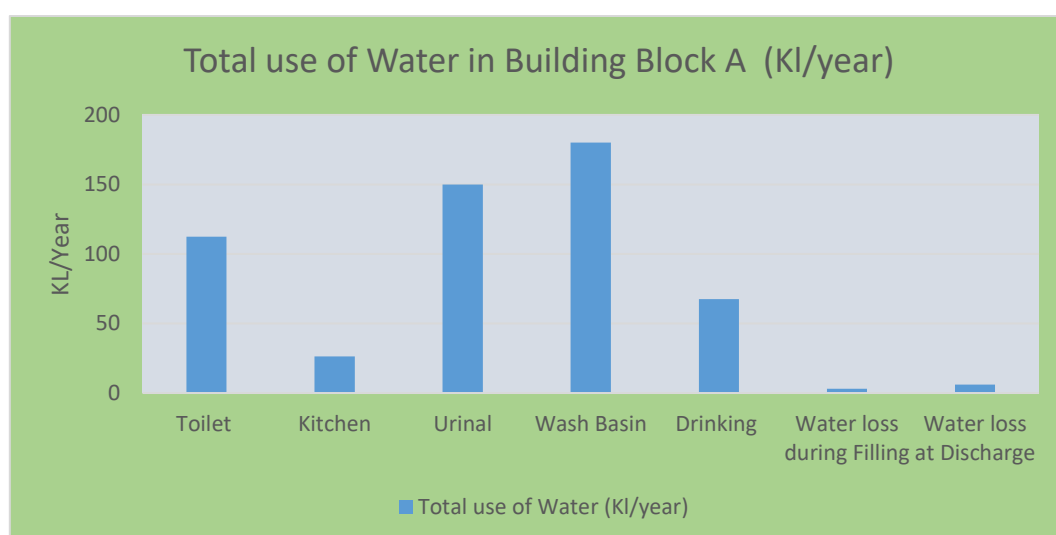
3.2.2 Water consumption in college:

From the data collected for water audit of Sarojini College of Pharmacy, Kolhapur the water distribution and water consumption pattern is noticed. The college is divided in different sectors such as administration section and other departments. and support services For the water audit purpose, the college campus area categorised into three building namely Building Block A as Administrative, Building Block B as all department and Building Block C as support services .Building Block A as Administration including ground floor of college building having Main Building includes Office, Principle office, IQAC section, Cash counter, Board room, Exam section Office, Library, Staff Room. In Building B includes different department such as diploma in pharmacy and degree in pharmacy with laboratories. In Building C includes support services Garden and sports ground.

3.2.2. Water consumption at Building Block ‘A’:

Table No. 3.2.1: Sector wise calculated use of water in Building Block A

Sr. No.	Sector	Total daily use (Kl/day)	Total yearly use (Kl/year)	Percentage %
1	Toilet	0.900	112.50	18.36
2	Kitchen	0.210	026.25	4.28
3	Urinal	1.200	150.00	24.48
4	Wash Basin	1.440	180.00	29.38
5	Drinking	0.540	67.50	11.02
6	Water loss during Filling	0.024	3.00	0.49
7	Water loss at Discharge	0.048	6.00	0.98
Total		4.902	612.75	100



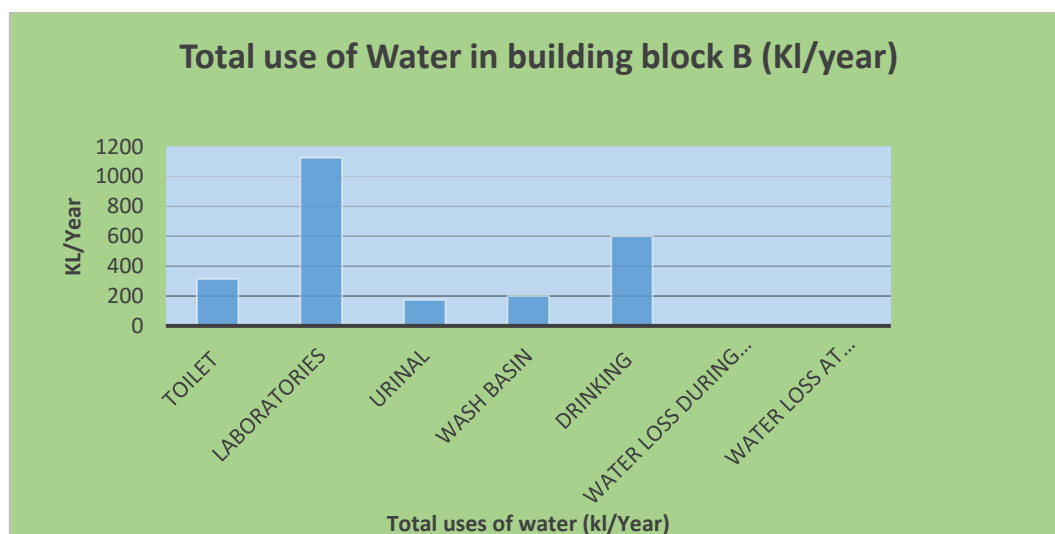
Graph No. 3.2.1 Total water consumption yearly by Building block 'A'

It is revealed from the data in Table No. 3.1 and Graph No. 3.2.1 that total 4.902 Kiloliter daily and yearly 612.75 Kiloliter water is used. In the Building block 'A' which is Main Building, includes Office, Principle office, IQAC section, Cash counter, Board room, Ante Chamber, Exam section use of water is seen for bathrooms, toilet, kitchen, drinking, wash basin, and urinal purpose for daily and also calculated yearly. From above data, it is observed that the maximum water consumption was for Wash Basin which is 1.44 Kilolitre/day i.e. 180 Kilolitre/year. Water loss during filling of water in tank was noted as 0.024 Kilolitre/day i.e. 3 Kilolitre/year and water losses at discharge were found to be 0.048 Kilolitre/day i.e. 6 Kilolitre/year.

3.2.2. b. Water consumption by Building Block 'B':

Table No. 3.2.2: Sector wise calculated use of water in Building Block 'B'

Sr. No.	Sector	Total daily use (Kl/day)	Total yearly use (Kl/year)	Percentage %
1	Toilet	2.50	312.50	19.19
2	Laboratories	9.00	1125.00	21.93
3	Urinal	1.40	175.00	16.45
4	Drinking	4.80	600.00	10.96
5	Wash Basin	1.60	200.00	17.82
6	Water loss during Filling	0.050	6.25	1.37
7	Water loss at Discharge	0.048	6.00	1.32
Total		19.38	2424.75	100



Graph No. 3.2.2 Total water consumption yearly by Building block 'B'

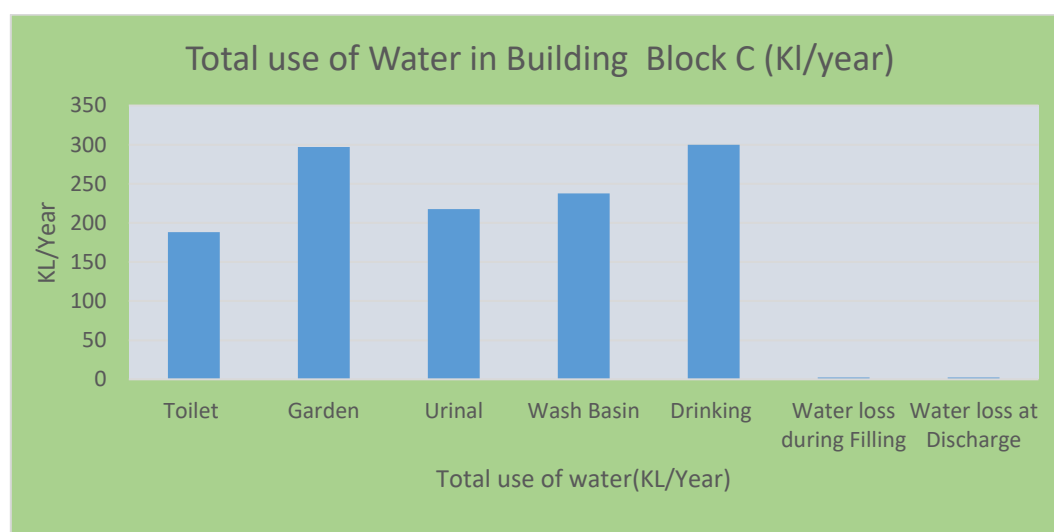
It is shown from the data in Table No. 3.2 and Graph No. 3.2.2 that total 19.38 Kiloliter water is used daily in Building block 'B' i.e. Degree and diploma all the department and laboratories like chemistry, Pharmaceuticals, Pharmacology, Pharmacognosy. In this Block, use of water is done occurs for Toilets, Laboratories, Drinking, Wash Basin, Urinal purpose (is calculated for daily and yearly). From the above data, it is observed that the maximum water consumption was for Laboratories, which is 9.00 Kiloliter / day i.e. 1125 Kiloliter /year. For Drinking and Toilet purpose, 4.80 Kiloliter/ day and 2.50 Kiloliter/ day of water

required daily while yearly it is 600 Kiloliter /year 312.50 Kiloliter /year respectively. Water loss during filling of water in tank was noted as 6.25 Kiloliter /year and water losses at discharge were found to be 6.00 Kilolitre /year.

3.2.3. The water consumption at Building Block ‘C’:

Table No. 3.2.3: Sector wise calculated use of water in Building Block C

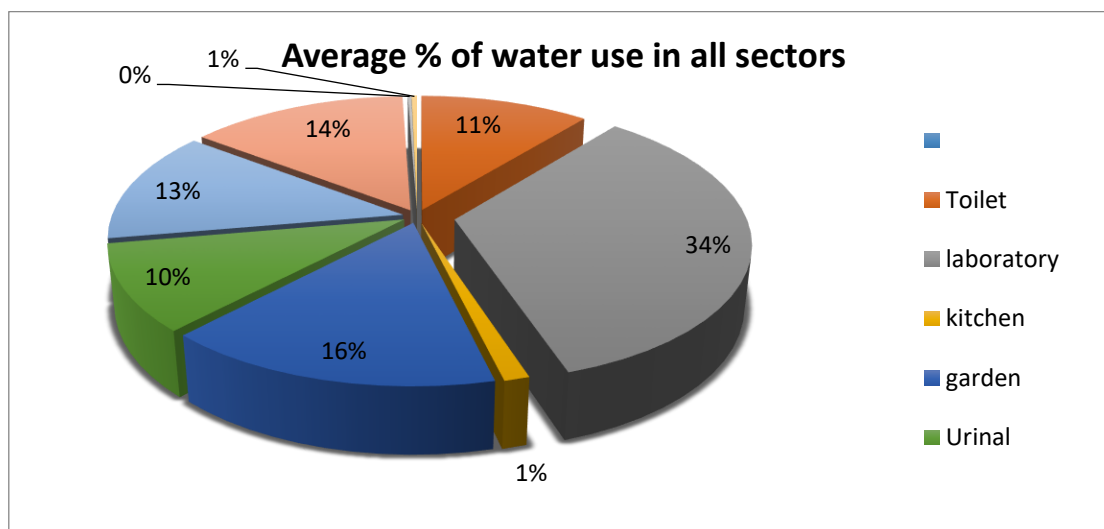
Sr. No.	Sector	Total daily use (Kl/day)	Total yearly use (Kl/year)	Percentage %
1	Toilet	1.14	188.10	13.99
2	Garden	1.80	297.00	22.09
3	Urinal	1.32	217.80	16.20
4	Wash Basin	1.44	237.60	17.67
5	Drinking	2.40	300.00	22.31
6	Water loss during Filling	0.02	2.500	0.19
7	Water loss at Discharge	0.02	2.500	0.19
Total		8.14	1245.5	100



It is revealed from the data given in Table No. 3.2.3 and Graph No. 3.2.3 that total 8.14 Kiloliter daily and yearly 1245.5 Kiloliter water is used. In the Building block ‘C’ which includes Gymkhana, Ladies & Boys room, Central store, Seminar Hall, Pantry, Sick room,

Record room, Campus, NSS etc. Garden and Support services as use of water is seen for Toilet, Drinking, wash Basin, garden, and urinal purpose for daily and also calculated yearly. From above data, it is observed that the maximum water consumption was for drinking which is 2.40 Kilolitre/day i.e. 300 Kilolitre/year. Water loss during filling of water in tank was noted as 0.02 Kilolitre/day i.e. 2.5 Kilolitre/year and water losses at discharge were found to be 0.02 Kilolitre/day i.e. 2.5 Kilolitre/year.

3.2.4. Average daily water consumption by Sarojini college of Pharmacy Kolhapur



Graph No. 3.2.4 Average Daily Water consumption by Sarojini College of Pharmacy Kolhapur.

Graph No. 3.2.4 shows the total percent of water consumed by Sarojini College of Pharmacy, Kolhapur in 2022-23. As per the graph Laboratory, Garden, Washbasins, Drinking, are the major sources of utilization comprising, 32 %, 15 %, 13% and 13 % respectively. The other uses namely kitchen purpose consume relatively less water with daily water requirement of 1.6 % in the year 2022-23.

3.2.3. Sewage Treatment Facility at college:

Sarojini College of Pharmacy College has wastewater treated in this STP plant which used for laboratory work, garden, cleaning toilets, cleaning washroom it helps in saving water. Water supply to college form Kolhapur Municipal Corporation and underground well water. Water management is very good in college .College followed 3 R principal as reduce, recycle and reuse of water.

STP Plant of Sarojini College of Pharmacy



Fig. No. 1 STP plant



Fig. No. 2 STP plant



Fig. No. 3 STP plant

Key Observations:

- The calculation revealed that highest water use sector is Laboratory which consumes average 34% water and remaining 66 % water consumption further divided into other sectors in such Washbasins, Urinals, Toilet, Drinking, kitchen and garden etc.
- The college has done Water conservation.
- College has sustainable water practices Rainwater recharging, and water collection tank for different water use, which are all in working condition.
- To enhance the operating efficiency and reduce the water wastage, College should include more sustainable water practices (SWP) such as STP plant for whole college, Green chemistry practices for laboratory to minimize water use and Water sub metering. Teaching and nonteaching staff and students are aware about water value.



Fig. No. 4 Safe Drinking Water Facility at College.



Fig. No. 5 Water Storage Tank at Terrace

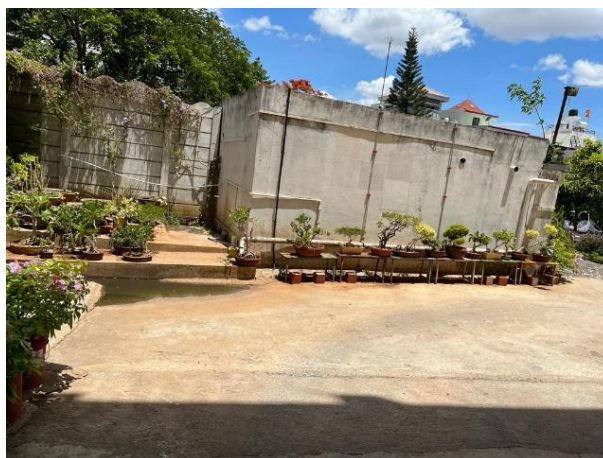


Fig. No. 6 Cement Water Storage Tank



Fig. No.7 Washroom



Fig. No.8 Drinking Water (Students)

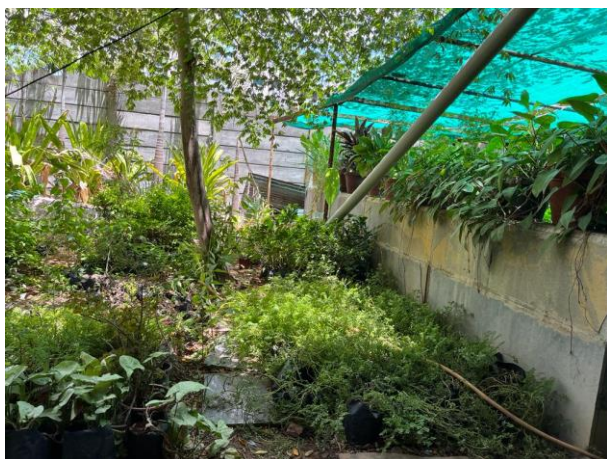


Fig. No.9 STP plant treated water
used for gardening



Fig. No. 10 Rain Water Recharging collection pipeline



Fig No. 11 Laboratory



Fig No. 12 Laboratory

3.5. Air Quality Status:

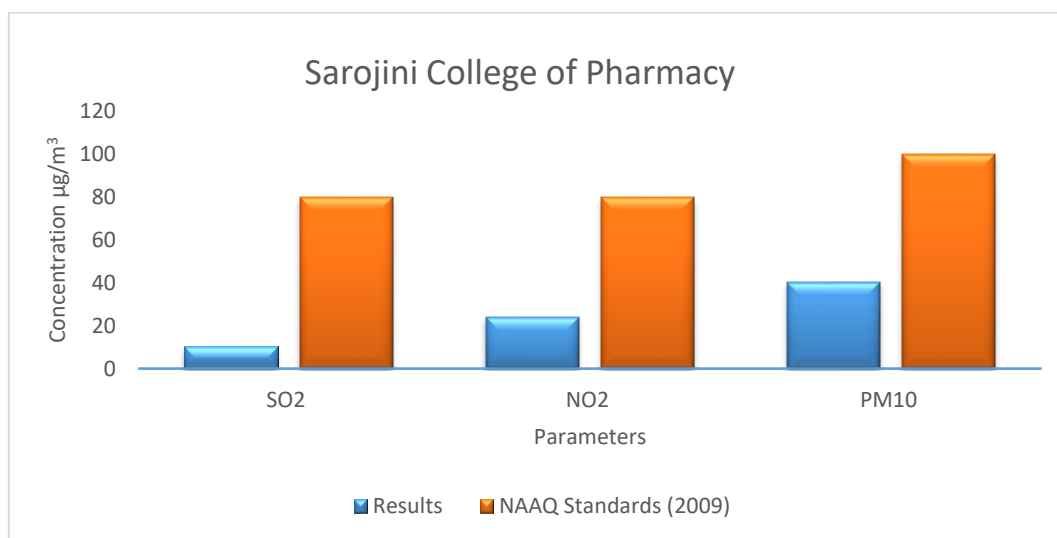
Ambient air pollution monitoring is an important part of environmental monitoring. Particulate matter and trace gases sampling were carried out on the college campus. The sampling was carried out using calibrated Handy Dust Sampler APM 821 with flow rate 1 lit/min equipped with glass fibre filter paper (size 25 mm). The sampling period was 4 hrs.

Sulphur dioxide (SO₂) and Oxides of Nitrogen (NO₂) in the air was estimated with West and Gaeke method and Jacob and Hochheiser modified method respectively. Particulate matter (PM₁₀) was measured gravimetrically. The samples were collected and analyzed in the laboratory of Department of Environmental Science, Shivaji University, Kolhapur. The details of air quality status in the college are given in the Table No. 3.5.1 and Graph No. 3.5.1

Table No. 3.5.1. Ambient Air Quality Status in Sarojini College of Pharmacy.

(All values in µg/m³)

Sr. No	Parameters	Results	NAAQ Standards (2009)
1	SO ₂	10.19	80
2	NO ₂	24.09	80
3	PM ₁₀	40.34	100



Graph No. 3.5.1 Ambient Air Quality Status in Sarojini College of Pharmacy.

The graph shows the SO₂, NO₂ and PM₁₀ concentration. The concentrations of air pollutants are below the CPCB standards. It was observed that very few activities in the campus are responsible for air pollution.

3.5.1 Ambient noise monitoring status:

Ambient noise monitoring was carried out in different areas of college campus like

classrooms, labs 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 college campus and calculated. The details of noise status in Sarojini college of Pharmacy are given Table No. 3.13 and Graph No. 3.12.

Table no 3.13 Ambient Noise Levels in Sarojini college of Pharmacy.

Sarojini College of Pharmacy			
Sr. No	Site Name	dB (A)	Noise Std Day time
Ground floor			
1	Office	71.10	50
2	Corridor.	74.20	50
3	Computer Lab	73.90	50
4	Seminar hall	67.10	50
First floor			
5	Pharmaceutical Chemistry lab	70.80	50
6	Pharmaceutics	67.40	50
7	Pharmacology	68.20	50
8	Pharmacognosy lab	67.10	50
9	Pharmaceutics lab III	67.20	50
10	Pharmaceutics lab II	65.10	50
11	Pharmaceutics lab I	66.20	50
12	Pharmaceutical chemisty lab III	67.25	50
13	Pharmaceutical chemisty lab II	65.40	50
14	Pharmaceutical chemisty lab I	66.30	50
15	Pharmacology lab	55.70	50
16	Library	60.20	50
Second floor			
15	Classroom -2	57.20	50
16	Pharamacognosy lab	55.70	50
17	Auditorium	52.80	50
18	Classroom -3	53.40	50

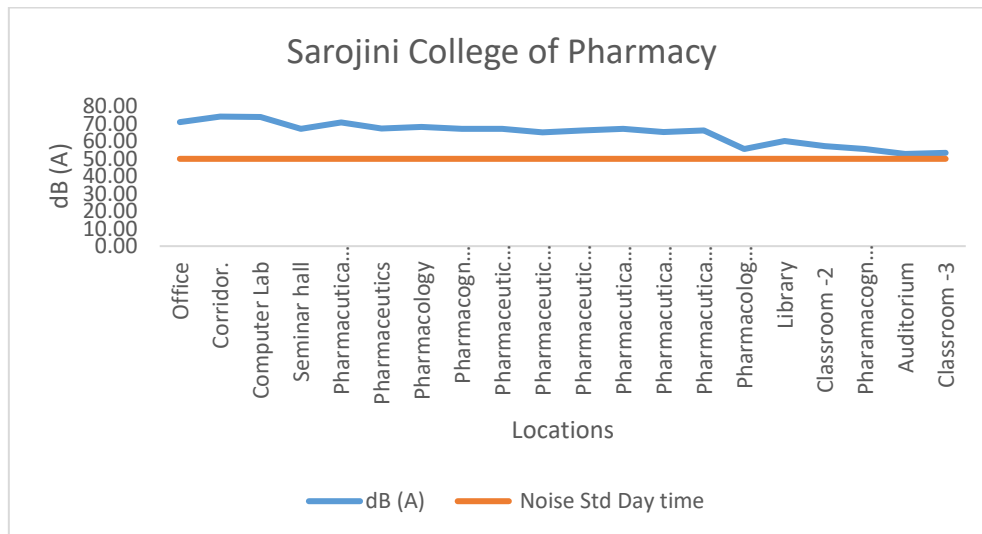
Note: - 1. All Parameters are in dB(A) Leq.

2. All Results are day time.

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

It was observed the ambient noise levels in the Sarojini college of Pharmacy are on higher side as compared to the standards of Central Pollution Control Board for day time. This may be due to human communication in high sound in the college premises. Vehicles are generating

the high-level sound. Echo generation in corridors is also a reason to monitor high levels of noise.



Graph No.3.12 Ambient Noise Levels in Sarojini College of Pharmacy.

The graph shows that ambient noise levels in Sarojini college of Pharmacy. Ambient noise levels in college campus are higher side.

Ambient Indoor Noise Monitoring in Sarojini College of Pharmacy.





Fig. No. 14. Indoor noise monitoring at laboratories



Fig. No. 15 Ambient air monitoring at college campus

Conclusion

- Ambient air quality status of Sarojini college of Pharmacy is good.
- Indoor noise levels in college campus are higher than the day time noise standards of CPCB.

Chapter IV

Conclusion and Management Plan

The Department of Environmental Science, Shivaji University, Kolhapur has conducted a Environment Audit of Sarojini College of Pharmacy in the academic year 2022-23.

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. Waste water from laboratory is major issue that need to work on.
2. Water Audit helps to quantify all forms of losses and helps in reducing the non- revenue water.
3. Water consumption is more in laboratory area.
4. Roof top rainwater in college which is useful for filling up of tanks on campus.
5. College can conduct more seminars, group discussions and eco-friendly activities on environmental education and awareness
6. College should maintain hygienic conditions and cleanliness in their premises
7. Air quality on the campus is good.

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
 5. To meet EPA standards for safe drinking, water samples should be tested by a certified laboratory.
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Environment Management Plan:

By understanding the dynamics of present situation of resource utilization and current practices of waste disposal, we have prepared an Environment Management Plan (EMP) for the Sarojini college of pharmacy, Kolhapur 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 2022-23

Sector	Strengths	Weakness	Suggestions	Priority
Water				
Water utilization	• College has STP plant .	• Over use of Water in laboratory • Overuse of water at in toilets	• Installation of automatic water pumps to avoid overflowing losses	Medium
Air and Noise				
Air and Noise	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



Visit of Shivaji University audit team to Sarojini College of Pharmacy

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