Maratha Vidya Prasarak Samaj's

Arts Science and Commerce College, Ozar (Mig)

Ta: Niphad Dist: Nashik Pincode: 422206

Green Audit Report

Academic Year 2023-24

Prepared by

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We Care Our Environment

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1.0 Introduction

The twentieth century it brought modernization and industrialization, making life more comfortable and causing severe environmental damage. This includes overuse of natural resources, deforestation, wildlife exploitation, solid waste production, and water pollution, leaving our planet in a poor state. With growing awareness of issues like global warming, the greenhouse effect, ozone depletion, and climate change, it's clear that urgent action is needed. People must come together to fight for a sustainable environment.

Green audits are a vital tool in tackling these issues. First introduced in the late 1970s, they evaluate the environmental impact of institutions. By identifying, measuring, and analyzing various ecological aspects, green audits provide valuable insights and recommendations for improving environmental practices. This systematic approach helps guide efforts to create a more sustainable future.

1.1 Green Audit

Green Audit assists colleges in determining whether they are overusing or underusing various environmental resources such as water and energy. It also helps assess the college's impact on numerous environmental factors. Green auditing raises health awareness while also raising environmental awareness. The green audit aims to improve understanding of green impacts on college campuses and encourage resource sustainability. Suppose self-assessment is a natural and necessary part of a good education. In that case, institutional self-assessment may be considered a natural and essential part of an excellent educational institution. Thus, the college must evaluate its contributions toward a sustainable future. As environmental sustainability is becoming increasingly crucial for the nation, higher education institutions' role in environmental sustainability is becoming more prevalent.

People have recently been observed to be unconcerned about the environment. Human actions directly or indirectly negatively impact the environment, resulting in various environmental challenges. The increase in world population, significant advances in science and technology, and globalization are all contributing to changes in the ecosystem. Global warming, ozone depletion, air pollution, and water pollution are some issues that develop due to this. 'Environmental Audit' is another name for 'Green Audit.' It is the most environmentally friendly method of resolving environmental issues.

Furthermore, a clean and healthy environment is a desirable prerequisite in any educational institution. To achieve this, our institution strongly emphasizes implementing green practices and raising environmental awareness among all its stakeholders. This process of making the campus eco-friendly is made more accessible by the active participation of stakeholders. Adopting energy-saving methods, proper waste management, wastewater treatment, and tree plantation are some strategies to make the campus environmentally friendly. Rainwater harvesting, solar street lamps, solid and liquid waste, greening the campus, and no vehicle day are all green practices. Furthermore, the college has an active Eco club that organizes numerous activities to raise student awareness, such as awareness rallies and competitions. Further, academic activities such as study tours/visits. Cleaning of campus and the nearby villages on different occasions and projects are also arranged by Green policy.

1.2 Benefits of Green Audit:

In recent years, an institution's Green Audit has become increasingly significant for self-assessment, representing the organization's participation in addressing current environmental issues. Since its establishment, the institution has worked to keep our surroundings clean. As a result, the current green audit's goal is to identify, quantify, explain, and prioritize a framework for environmental sustainability that complies with applicable rules, policies, and standards.

The Government of India issued the National Environment Policy 2006 in 2006, making green auditing essential for all industries. According to the policy, it is a reaction to India's national commitment to a clean environment, as enshrined in Articles 48 A and 51 A (g) of the Constitution (DPSP) and bolstered by judicial interpretation of Article 21. (National Environmental Policy 2006). It is acknowledged that maintaining a healthy environment is not just the government's responsibility. Every citizen bears responsibility, and a spirit of partnership will be established via the country's environmental management.

The Supreme Audit Institution (SAI) formalized the environmental audit process by following the rules outlined in the Manual of Standard Orders (MSO) released by the Authority of the Controller and Auditor General of India in 2002. The Supreme Audit Institution of India is the country's highest national auditing institution. Because of the

necessity for environmental accountability, NAAC, an autonomous agency under the UGC, has included environmental audits in university and college accreditation processes. Furthermore, it is part of the Higher Educational Institutions' corporate social responsibility to ensure they contribute to decreasing global warming through carbon footprint reduction methods.

- It would aid in the preservation of the ecosystem on and around campus.
- Recognize cost-cutting strategies such as waste reduction and energy conservation.
- Determine the current and upcoming difficulties.
- Give the organization the tools it needs to improve its environmental performance.
- It promotes a positive image of the university by maintaining a clean and green campus.
- Finally, it will create a favorable impression for future NAAC visits.

1.3 Requirements of NAAC Accreditations

When asked why environmental audits, which are required for industries, are also needed for educational institutions, the only answer that comes to mind is that the possibility of environmental conservation and growth in educational institutions is the only response that appears at that moment.

According to NAAC Criterion VII, regarding institutional values and best practices, a college must respond to various questions about environmental sustainability and be concise. The questions include whether the institution has facilities for alternate sources of energy and energy conservation measures. Describe the facilities in the Institution for the management of the following types of degradable and non-degradable waste. Water conservation facilities are available in the institution, and the college implements green campus initiatives. In this regard, every college runs various activities throughout the year. Colleges prepare various policies to maintain and support the environment.

Under Criterion VII sub-point 7.1.3, every college needs to conduct a Green Audit, Energy Audit, Environmental Audit, etc., and upload the reports in every year's AQAR. The goal of making all of these audits mandatory through NAAC is to help universities become more environmentally friendly and sustainable. NAC has included these

challenges in its assessment of the need of the hour, recognizing that schools can better achieve the United Nations' Sustainable Development Goals.

1.4 Profile of Maratha Vidya Prasarak Samaj's

The Maratha Vidya Prasarak Samaj is one of the most prestigious learning centers in the State of Maharashtra. It has been over 109 years that it has stood the test of time to become a legend of unparalleled stature. History says that the credit for the birth of M.V.P. Samaj goes to the young, enthusiastic, and devoted team of social workers and educationists who were inspired by the lives of Mahatma Jyotiba Phule, Savitribai Phule and Rajashri Shahu Maharaj of Kolhapur. These young leading lights include Karmaveer Raosaheb Thorat, Bhausaheb Hire, Kakasaheb Wagh, Annasaheb Murkute, Ganpat Dada More, D. R. Bhonsale, Kirtiwanrao Nimbalkar and Vithoba Patil Khandalaskar, who laid the foundation of the Samaj. They were the men who envisioned a culture and knowledge-centric society.

The Institute began as a boarding school in 1914, with five students and a grant of Rs. 1000/- from Rajarshi Shahu Maharaj, the then Chatrapti of Kolhapur. This 100-year-old renowned educational institute is in the jurisdiction of the University of Pune. The total number of students in its 350 academic and professional institutions is nearly 180000, with

approximately 7,500 staff. The budget for the year is Rs. 990 crores. The spectrum of educational institutions encompasses Primary Schools, Secondary Schools, Graduate & Postgraduate Colleges, and Professional & Vocational Colleges. It was one of the most significant milestones in Nashik's pre-independence history. General well-being and education were considered the sole things human beings were concerned with.

Table No. 1.1 List of Branches in Higher Education

Sr. No.	Institution Category	Total Units
1.	D.Ed. College	4
2.	B.Ed. College	1
3.	Arts, Commerce and Science College	23
4.	College of Pharmacy	1
5.	Institute of Pharmaceutical Sciences	1
6.	College of Architecture	1
7.	Bachelor of Design	1
8.	Nursing College	1
9.	Management Institutes (IMRT)	1
10.	Training and Skills Development Centre	1
11.	Competitive Exam Guidance Centre	1
12.	Medical College Hospital and Research Centre	1
13.	College of Engineering	1
14.	College of Agriculture	1
15.	College of Physiotherapy	1
16.	Law College	1
17.	College of Social Work	1
18.	College of Fine Arts,	
19.	Polytechnic	2

1.5 Profile of MVP's Arts, Science and Commerce College:

MVP Samaj has a branch in Ozar (Mig) called Arts, Science and Commerce College, Ozar (Mig), Tal. Niphad, Dist. Nashik. The college was established by Maratha Vidya Prasarak Samaj, Nashik in 1984 and affiliated to Savitribai Phule Pune University, Pune, India. The college has been accredited in the third phase with a 'B++' Grade in 2018-2019.

In college, where a dynamic campus life combines with academic brilliance! The College is committed to creating a vibrant learning atmosphere that promotes intellectual curiosity, individual development, and career advancement. With graduate and undergraduate

programs, cutting-edge facilities, and helpful staff, we give students what they need to succeed in their chosen disciplines. Our campus is a hive of activity with many clubs, organizations, and events catering to various interests and fostering a strong sense of community. Here, students develop the networks and abilities necessary for success throughout their lives and preparation for careers. Come with us as we set off on an innovative, transformative, and discovering trip.

Figure No. 1: Google Image of Arts, Science and Commerce College, Ozar (Mig)

The college boasts well-furnished and ventilated classrooms, well-equipped laboratories, a rich library, internet access, numerous clean toilet blocks, playgrounds, a health center, well-preserved trees, lawns, and landscapes. It also has experienced, qualified, and dedicated teaching and support staff.

Approximately 50% of the students are female, and nearly 50% come from backward castes and classes. The college is a microcosm of India, attracting students from across the country due to employment opportunities in HAL, the Indian Air Force, Railways, state and central government offices, and nearby industries.

The college employs roughly 86 people, including teachers and nine non-teaching personnel. In the current academic year, there are 1146 students (2023-24). The College is on 3.80 acres of land, with a precious building with a built-up area of 2200 sq. m. and suitable educational infrastructure. Students offered undergraduate programs in the Faculty

of Arts, Commerce, and Science and postgraduate programs in Commerce and Science faculty. The college employs highly skilled teaching and non-teaching staff who are efficient and dedicated. The institution contributes to national development by giving educational opportunities to students who are socially and economically disadvantaged.

On July 19 and 20, 2019, the NAAC Bengaluru team visited the college. Based on several seven criteria, an expert panel evaluates colleges. In recognition of the college's efforts to foster student development, the NAAC peer team awarded it a 'B++' grade with a 2.77 CGPA.

Table No. 1.2 Courses Offered by College

Sr.NO.	Name of Faculty	Name of Program	Name of Subject
1.	Arts	BA	English, Economics, Geography, Hindi, History, Marathi, Political Science, Psychology,
		MA	Hindi
2.	Commerce	B.Com	Business Administration, Marketing, Management
		M.Com.	Business Administration
3.	Science	B.Sc.	Botany, Chemistry, Mathematics, Physics, Statistics, Zoology
		M.Sc.	Chemistry, Physics
4.	Vocational	B.Voc.	Electrical Technology
5.	Any other	Certificate Course	Medicinal Plant and Nursery Technique, Student Solar Ambassador Electrical Vehicles

2.0 Methodology Used for Green Audit

With the importance of Green audits in mind, the current study examines the environmental audit process and the essential steps that academic institutions may take to help the environment. The green audit is done through various stages.

2.1 Pre-Audit Stage:

Implementing a College Green Audit/ Environmental Conservation Committee (ECC) by an organization is the first and most essential part of a green audit. The ECC is the backbone of the auditing process, with a wide range of responsibilities. This system keeps track of every facet of the green audit. The following table shows the details of college ECC.

Table No. 2.1 College Green Audit/ Environmental Conservation Committee

Sr. No.	Name of Member	Designation	Title in Committee
1.	Dr. S.R. Gadakh	Principal	Chairman
2	Dr. R.K. Patil	Assistant Professor	Coordinator
3.	Dr. D.S. Borade	Assistant Professor	Member
4.	Dr. P.R. Bhadane	Assistant Professor	Member
5.	Dr. Y.P. Jadhav	Assistant Professor	Member
6.	Mr. V. D. Dethe	Assistant Professor	Member

The ECC should declare an organization's "Environmental Policy" and communicate it to all teachers, non-teaching staff, and students. The policy reflects the organization's environmental sustainability goals, objectives, scope, and priorities. ECC should provide all the necessary baseline data to external auditing agencies.

The declared environmental policy states that the ECC shall organize its programs and operations thoroughly and systematically. Before such operations are planned, the environmental issues of the organization, as well as their legal obligations, should be evaluated.

ECC members must define key personnel's roles, responsibilities, and authorities during the implementation and operation processes, commit to staff training, maintain effective communication channels, adopt adequate documentation and operational controls, and maintain sufficient emergency preparedness awareness among the staff. All implemented

programs and processes should be evaluated by the ECC and then modified by the environmental policy.

2.2 Onsite Audit Stage

Higher education institutions must conduct and verify their Audit through external auditing organizations. The ECC of the college plans the visit of auditors from external agencies and executes the audit process. During the visit, the auditor thoroughly examines the documentation and makes any required comments. The auditor audits the environmental policy by evaluating documents and personal interviews with stakeholders' representatives. The auditor also assesses all planned and implemented programs or activities through document evaluation and individual interviews with stakeholders' representatives.

2.3 Post Audit Stage:

An auditor's role at the post-audit stage is to analyze and interpret the provided baseline data and onsite observations and prepare a detailed audit report. The auditor evaluates the audit's facts and observations about the higher education institute. The auditor must determine all the findings as per the available standard norms. In consultation with the ECC, the auditor creates a brief report of the audit, including recommendations. External auditors must provide detailed recommendations to the ECC of the higher educational institution. According to an auditor's suggestions, the ECC should devise an action plan and carry it out successfully. The auditor monitors the programs or activities regularly. An organization will be awarded a certificate if the audit is completed successfully.

3.0 Environmental Aspects Covered under Green Audit

3.1 WATER ENVIRONMENT:

3.1.1 WATER AUDIT:

Water conservation is not only good for Society and the environment; it's also an excellent practice. Water conservation can help you save money on your water, wastewater, and energy bills and reduce on-site treatment expenses. Every company is different, but a water audit is an excellent place to start.

Water audits allow you to inventory your facility's water uses and suggest strategies to improve water efficiency. The findings can assist you in prioritizing actions to take to adopt cost-effective water-saving measures. A water audit might help you save money by lowering your water bill at home (and sewer bill if you are connected to a public sewer system). Applying easy conservation measures without dramatically altering your lifestyle may reduce your water usage by up to 30%.

Table No. 3.1 Total Population of the Campus and Water Quantity Requirement

Sr. No.	Particulars	Total number	Required Water Supply (lpcd)	Water Requirement (lpcd)
1.	College Staff - Teaching and Non-Teaching	86	45	3870
2.	College Students (Girls and Boys)	1146	45	51570
3.	Floating Population (Visitors)	60	45	2700
	Total	1292		58140

Water demand for various institutions and home consumption is also analyzed for a town or city. Hospitals, schools, restaurants, hotels, railway stations, bus terminals, and offices of various departments are all found in a well-developed city or town. Additional per capita demand for these units ranges from 20 to 60 liters per head per day (lpcd), depending on the village, town, or city. As per the standard guidelines given in the National Dirking Water Mission, the service level benchmark is to provide 150 lpcd water supply for metro cities, 135 lpcd for other cities/towns with sewage systems, and 45 lpcd without sewage

systems city/town. According to the World Health Organization (WHO), the minimum water demand is 20 liters per person daily.

3.1.2 Water Storage Capacity:

The college receives its water supply primarily from Ozar (Mig) Nagarparishad, with needs other than drinking met through well water. The college has two 7000-liter underground storage tanks and multiple overhead tanks with 12500 liters, providing a combined storage capacity of 19500 liters. This infrastructure supports the institution's daily operations, ensuring adequate water is available for all its needs.

With a daily water requirement of 58,140 liters, the college refills the tanks 3 to 4 times daily to meet this demand. This frequent refilling is crucial for maintaining the water supply needed for various activities and facilities on campus.

Table No. 3.2 shows the physicochemical and microbiological properties of drinking water.

Table No. 3.2 Drinking Water (Well Water) Analysis Results

Sr. No.	Parameter	Unit(s)	Well Water	Limits as per IS 10500: 2012 (Acceptable /Permissible)	Analysis Method
1.	pH	--	7.22	6-7.5	Instrumentation
2.	Conductivity	dSm-1	0.672	0.1-1	Instrumentation
3.	Calcium as Ca	mg/lit	58.7	75-200	Titration
4.	Magnesium as Mg	mg/lit	44.30	30-100	Titration
5.	Sodium as Na	mg/lit	27.13	4.5-60	AAS
6.	Potassium as K	mg/lit	1.2	2.0-5.0	AAS
7.	Carbonates as CO_3^{2-}	mg/lit	43.00	3.0-45	Titration
8.	Bicarbonates as HCO_3	mg/lit	328.12	10-610	Titration
9.	Chlorides as Cl^-	mg/lit	108.9	250-1000	Titration
10.	Total Hardness as $CaCO_3$	mg/lit	290.25	300-600	Titration
11.	TDS	mg/lit	545.68	500-2000	Gravimetric

12.	Sulphates as SO_4	mg/lit	57.16	<200	Spectrophotometer
13.	Iron as Fe	mg/lit	0.00	<5.0	AAS
14.	Total Coli form	No./100ml	Present (Non-fecal contaminant)	Absent	IS: 1622 (Rev.1,R.A : 2014)
15.	E. coli Bacteria (Fecal Coli form)	No./100ml	Absent	Absent	
16.	MPN/100 mL	No./100ml	44 MPN/100 mL	<2.1 MPN/ 100mL	

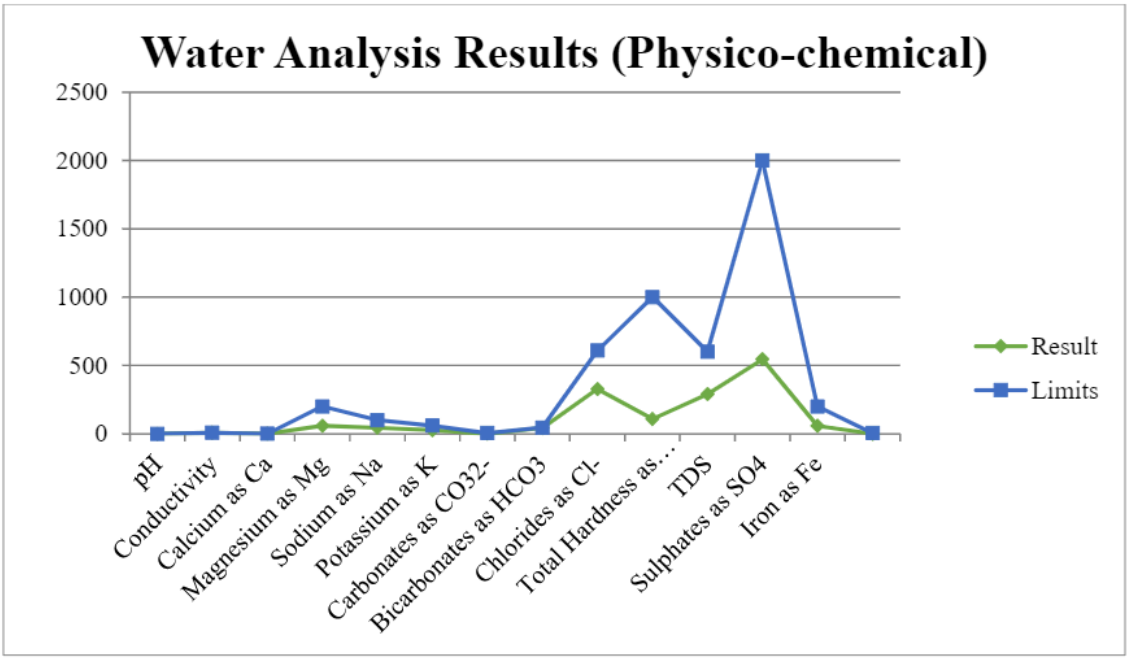


Figure No. 2 Physico-chemical Assessment of Drinking Water

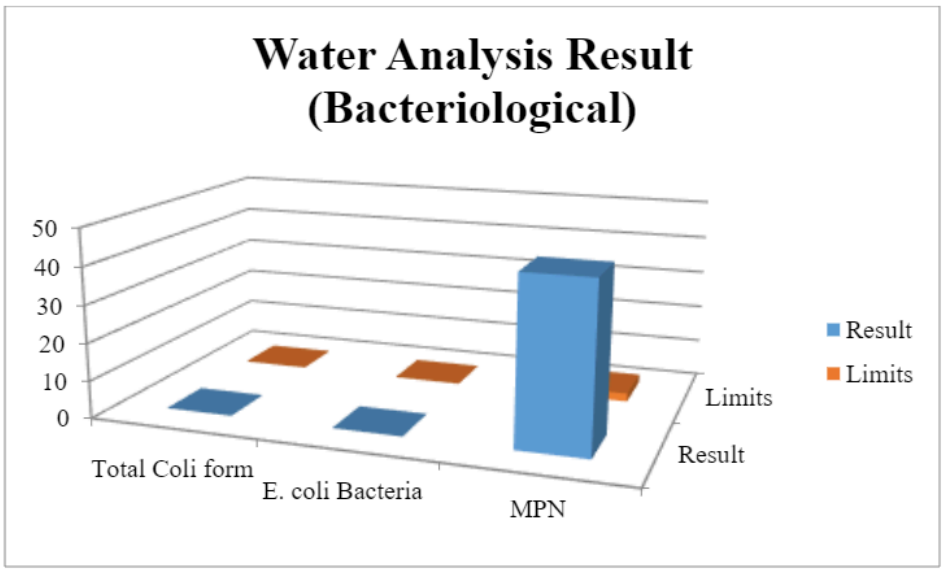


Figure No. 4 Bacteriological Assessment of Drinking Water

The water quality analysis for the college reveals several parameters and their respective results compared to standard limits. The pH level of the water is 7.22, slightly below the limit of 7.5, indicating a neutral pH level suitable for use. Conductivity is measured at 0.672, well within the acceptable limit of 1. Calcium and magnesium concentrations are 58.7 mg/L and 44.3 mg/L, respectively, comfortably below their 200 mg/L and 100 mg/L limits. Sodium and potassium levels are 27.13 mg/L and 1.2 mg/L, within the permissible limits of 60 mg/L and 5 mg/L, respectively. Carbonates and bicarbonates are present at 43 mg/L and 328.12 mg/L, both under their respective limits of 45 mg/L and 610 mg/L. Chlorides are at 108.9 mg/L, far below the limit of 1000 mg/L, and the total hardness as CaCO3 is 290.25 mg/L, which is within the acceptable range of 600 mg/L.

Total Dissolved Solids (TDS) in the water are measured at 545.68 mg/L, which is well within the limit of 2000 mg/L, ensuring that the water is safe from excessive mineral content. Sulphates are present at 57.16 mg/L, under the 200 mg/L limit. Iron content is zero, well below the limit of 5 mg/L, indicating no contamination from iron. However, total coliform bacteria are present. While E. coli bacteria are not detected, the Most Probable Number (MPN) of bacteria is 22, significantly surpassing the limit of 2.2. This highlights a critical area that needs immediate attention to ensure the water is safe for consumption and use.

3.1.3 Quantification of Wastewater:

Table No. 3.3 Quantification of wastewater generation on a college campus

Sr. No.	Particulars	Total number	Required Water Supply (lpcd)	Water Requirement (lpcd)	Total Wastewater Generated (lpcd)
1.	College Staff - Teaching and Non-Teaching	86	45	3870	3096
2.	College Students (Girls and Boys)	1146	45	51570	41256
3.	Floating Population (Visitors)	60	45	2700	2160
	Total	1292		58140	46512

According to the Central Public Health and Environmental Engineering Organization (CPHEEO), wastewater accounts for 70-80 percent of total water supplied. The Arts, Science, and Commerce College, Ozar (Mig), generates roughly 46512 liters of wastewater per day, based on the number of users and per capita water used. In rural areas, the average person uses ten lpcd of water for sanitation (toilet/ablution). This means 12920 lpcd of water is generated in a college's toilets and bathrooms. The college has already built a septic system and a soak pit for improved treatment. The septic tank has a capacity of roughly 15000 lpcd and a three-day detention time. Other maintenance activities and 50000-liter drinking water tanks generate the remaining 9 to 11 thousand liters of wastewater, which can be directly redirected and used to irrigate plants on the college campus.

The college's water supply and wastewater generation needs are outlined for three main groups: staff, students, and visitors. There are 86 teaching and non-teaching staff members, each requiring 45 liters per capita per day (lpcd), resulting in a total water requirement of 3,870 liters per day and generating 3,096 liters of wastewater daily. The student body, comprising 1,146 individuals, also requires 45 lpcd, leading to a significant water demand of 51,570 liters per day and producing 41,256 liters of wastewater.

Additionally, the college accommodates a floating population of 60 visitors daily, with the same water requirement of 45 lpcd, amounting to 2,700 liters per day and 2,160 liters of wastewater. The college needs 58,140 liters of water daily, generating 46,512 liters of wastewater. This comprehensive overview highlights the substantial daily water

consumption and wastewater production, emphasizing the college's need for efficient water management practices.

3.1.4 Rainwater Harvesting.

Higher education institutions (HEIs) have significant autonomy in managing their natural resources. They are virtually self-governing and internally regulated, whereas people, businesses, industries, and others are subjected to strict external oversight and accountability. With their university presidents presiding over their resource management system as the final authority, this ability to self-regulate can serve as a springboard for water conservation. Every individual and system must have water conservation embedded not only in their minds but also in their actions.

a. Rooftop Rainwater Harvesting:

The average rainfall at this location varies between 10 mm in the driest month (December) and 220 mm in the wettest month (July). The total annual rainfall in an average year is 1040 mm. The Arts, Science, and Commerce College, Ozar (Mig), is spread over 3.80 acres (15378 sq. meters) of land. Out of these buildings, over 2125 sq. meters of the area are constructed. The remaining available land is unpaved areas, comprising about 3.28 acres (13273 sq. meters) for surface water harvesting.

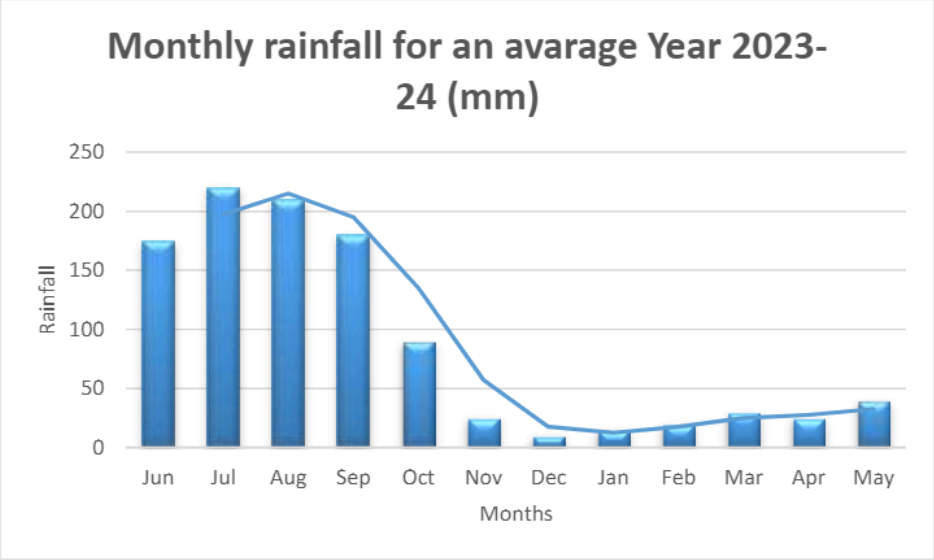


Figure No. 4 Monthly Rainfall for Ozar (Mig) Village (Niphad Tehsil)

Table No. 3.4 Rooftop Rainwater Harvesting Potential of College

Sr. No.	Months	Total Rooftop area (Sq. meters)	Relief Coefficient for unpaved area	Rainfall (mm)	Total Water Available for Harvesting (Litres)	Percent Water Demand fulfilled by Rooftop Rainwater Harvesting
1	Jun	2125	0.70	175	260313	16.83
2	Jul	2125	0.70	220	327250	21.15
3	Aug	2125	0.70	210	312375	20.19
4	Sep	2125	0.70	180	267750	17.31
5	Oct	2125	0.70	90	133875	8.65
6	Nov	2125	0.70	25	37187.5	2.40
7	Dec	2125	0.70	10	14875	0.96
8	Jan	2125	0.70	15	22312.5	1.44
9	Feb	2125	0.70	20	29750	1.92
10	Mar	2125	0.70	30	44625	2.88
11	Apr	2125	0.70	25	37187.5	2.40
12	May	2125	0.70	40	59500	3.85

The runoff coefficient of a flat roof is 0.7, which suggests that 70% of the rain can be collected. Based on this runoff coefficient with a roof area of 2125 square meters, 14875 liters of water can be collected in the driest month (December) and 327250 liters in the

wettest month (July). In an average year, the total amount of water that may be collected from the roof is 1547000 liters (1547 m^3). The water demand is 58140 liters per day, which equals about 1744200 liters per month. The total water demand is 21221100 liters (21221.1 m^3) per year. The amount of rainwater the college roof can gather is insufficient to meet the whole water demand. However, constructing a rainwater collection system may still be helpful. A rainwater collecting system with a storage capacity of 19.40 lakh liters could provide 4238 liters per day or 7.29 percent of total consumption.

In January, February, and May, the percentage of water demand met by a rooftop rainwater harvesting system is minimal. The calculations showed that the rainwater harvesting system could meet 2 percent and 4.46 percent of the college's water consumption in March and April, respectively. Rooftop rainwater collecting meets 16.83%, 21.15%, 20.19%, and 17.31% of water demand, respectively, during the monsoon months of June to September, depending on available rainfall.

b. Surface Rainwater Harvesting of Unpaved Area:

Rainwater is the primary natural source of water. Depending on the geography of the campus, water can be harvested. This can include both paved and unpaved areas. Paved water captures and offers more water for location-specific groundwater recharge and harvesting efficiency. Rainwater is also a universal trash carrier throughout its path. Keeping the rainwater route clean is critical to maintaining a free flow of clean water and greater rainwater recharging. Per the guidelines from the Mahatma Gandhi National Council of Rural Education (MGNCRE), the following computations and data are necessary.

a. Area of the Campus Land: 3.80 Acres

b. Institution's Paved Area: Nil

c. Institution's Unpaved Area: 3.28 Acers

Annual Rainfall (mm) = Area of the Institution's Land x Annual rainfall in meters. Rainwater that can be harvested in an area can be arrived at by the following calculations:

$i. Paved\ Area =$

$Paved\ Area\ (m^2)\ x\ Vol. of\ Rain\ (mm)\ x\ 0.85\ (Runoff\ Coeefficient)$

$$ii. Unpaved\ Area$$

$$= Paved\ Area\ (m^2)\ x\ Vol.of\ Rain\ (mm)\ x\ 0.35\ (Runoff\ Coeeficient)$$

$$Quanitiy\ of\ Rain\ Water\ harvested\ \left(\frac{liter}{annum}\right) = i\ +\ ii$$

Table No. 3.5 Area for surface water harvesting potential of College

Sr.No.	Type of Area	Area in Sq.M.	Rainwater harvesting potential (liters)	Total rainwater harvesting Potential
1.	Total Paved Area	-	Nil	52007155 liters
2.	Total Unpaved Area	142877	52007155	

Table No. 3.6 Surface Water Harvesting Potential of College

Sr. No.	Months	Total Unpaved Area (Sq. meters)	Relief Coefficient for unpaved area	Rainfall (mm)	Total Water Available for Harvesting (Litres)
1	Jun	142877	0.35	175	8751204
2	Jul	142877	0.35	220	11001514
3	Aug	142877	0.35	210	10501445
4	Sep	142877	0.35	180	9001238
5	Oct	142877	0.35	90	4500619
6	Nov	142877	0.35	25	1250172
7	Dec	142877	0.35	10	500069
8	Jan	142877	0.35	15	750103
9	Feb	142877	0.35	20	1000138
10	Mar	142877	0.35	30	1500206
11	Apr	142877	0.35	25	1250172
12	May	142877	0.35	40	2000275

The table above displays possibilities for rainwater collection on the unpaved surface area of the college campus per month. Because the campus has a flat, unpaved surface area, the drainage coefficient of rainwater is 0.35, allowing for 35% of it to be harvested. Based on this runoff coefficient and a surface area of 142877 square meters, a volume of 52007155 liters of water per year can be available for groundwater recharge.

A suitable filtration system is necessary for better recharge. The classic sand bed filter uses coarse riverbed sand, pebbles, and rocks stacked one on top of the other in a limited masonry construction. Rainwater from one end is allowed at the top, while filtered water is retrieved from the other.

Figure 5 Rainwater harvesting well with pipe discharging water

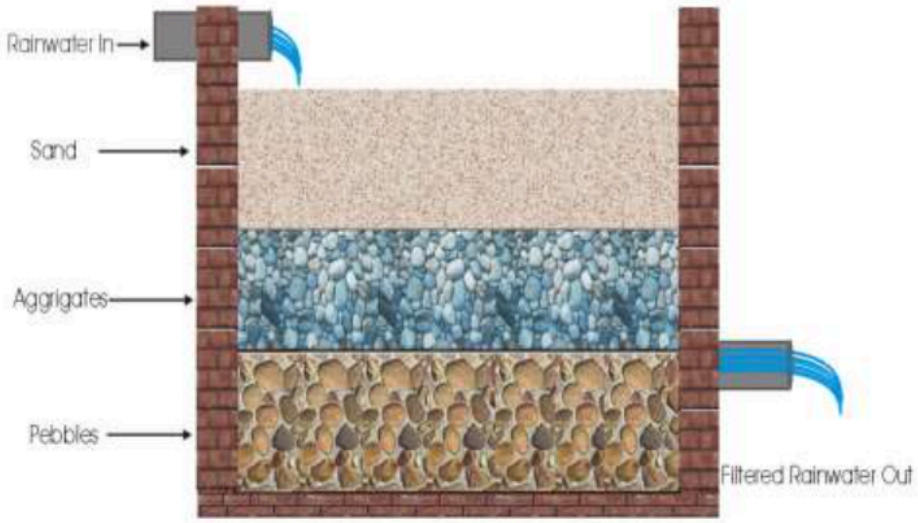


Figure 6 Design of Rainwater Harvesting Pit

3.2 AIR ENVIRONMENT:

Air pollution has long-term and short-term impacts on the biotic and abiotic components of the environment. Air pollution sources in rural areas are vehicular activities such as burning domestic firewood and fuel. The major pollutants released in the atmosphere are PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, etc.

PM_{10} are inhalable pollutant particles with a diameter of less than 10 µm but more significant than 2.5 µm, which may deposit in the air and cause health issues like eye and throat irritation, coughing or difficulty breathing, and aggravated asthma. At the same time, $PM_{2.5}$ are inhalable pollutant particles with a diameter of less than 2.5 µm that can enter the lungs and circulatory system, which may cause severe impacts on the lungs and heart. SO_2 can irritate the throat and eyes and worsen asthma and chronic bronchitis. Significant quantities of NO_x in the air increase the risk of respiratory illnesses. CO is a colorless gas that can trigger migraines, nausea, consciousness, and vomiting when inhaled in excessive quantities. As per the data from the IMD department, the air quality status of Ozar (Mig) is shown in Table No. 3.5

Table No. 3.7 Air Quality Status of Ozar (Mig)

Sr. No.	Parameter	Result	NAAQS Standards
1.	PM_{10}	8	100 µg/m3
2.	$PM_{2.5}$	3	60 µg/m3
3.	SO_X	4	80 µg/m3
4.	NO_X	4	80 µg/m3
5.	CO	98	4.0 mg/m^3
6.	O_3	14	100 µg/m3

*All parameters are shown in µg/m^3

All of the air quality parameters were found to be within NAAQS standards except carbon monoxide. Carbon monoxide found beyond the limit may be because of the increased use of vehicles by staff, students, and the population living in nearby areas. CO found in ambient air may also be due to increased construction activities in the surrounding regions. The air quality is good in nearby areas of the college because the surrounding area of the college campus is a rural zone and mostly a farm field.

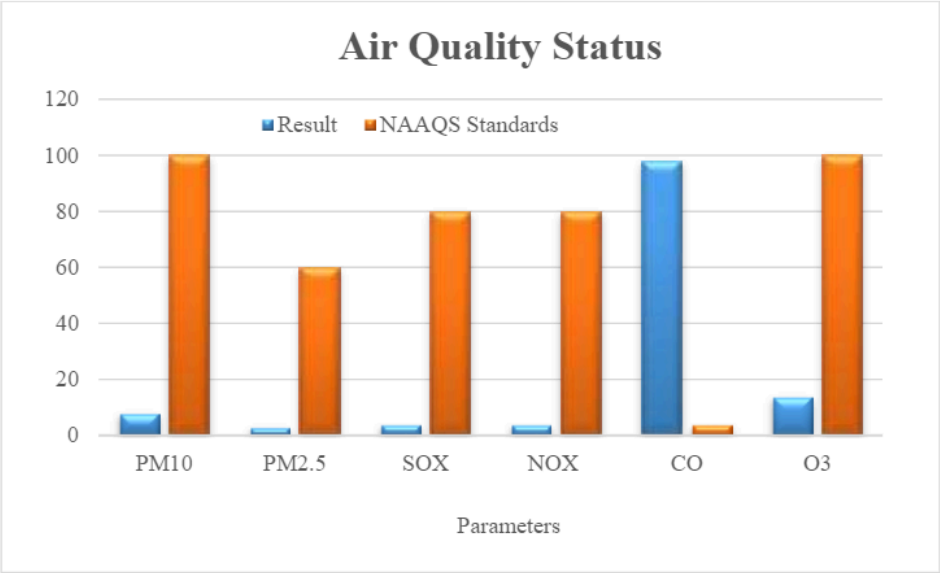


Figure No. 7 Air Quality Status of Ozar (Mig)

3.2 NOISE ENVIRONMENT:

Table No. 3.8 Noise Monitoring Results on the College Campus

Locations	Leq dB(A) Minimum	Leq dB(A) Maximum	Leq dB(A) Average	Limit dB(A)
Main gate	59	75	70	50
Campus	62	69	65	50
Corridor	61	81	67	50
Admin Office	54	70	60	50
Staff Room	54	62	58	50
First Floor Classroom	53	61	57	50
Laboratory	54	64	59	50
Seminar Hall	55	61	58	50
Library	50	58	54	50

Sound pressure level (SPL) measurements were automatically recorded with the help of an Integrated Sound Level Meter. The noise level measurements were carried out using a noise level meter. The primary noise sources identified in the study area are vehicular movement and transportation activities. There is no industrial or commercial zone near the college. Therefore, a noise level survey was carried out at seven college campuses.

Table no. 3.8 shows the noise monitoring result conducted during on-site visits to the college campus. The noise monitoring is initially conducted in nine different places. The noise levels at all nine locations were above the noise level limit. The lowest average noise level, 54 dB(A), is recorded in the library, while the highest average noise level, 70 dB(A), is recorded in the main gate. Noise levels exceed the limit at many places in the college due to the reverberation of sound from the same place. A large amount of sound reverberates in the college's seminar hall, IQAC room, English seminar hall, etc., so the noise level exceeds the given limit at many places in the college.

Figure No. 8 Noise Monitoring Photographs

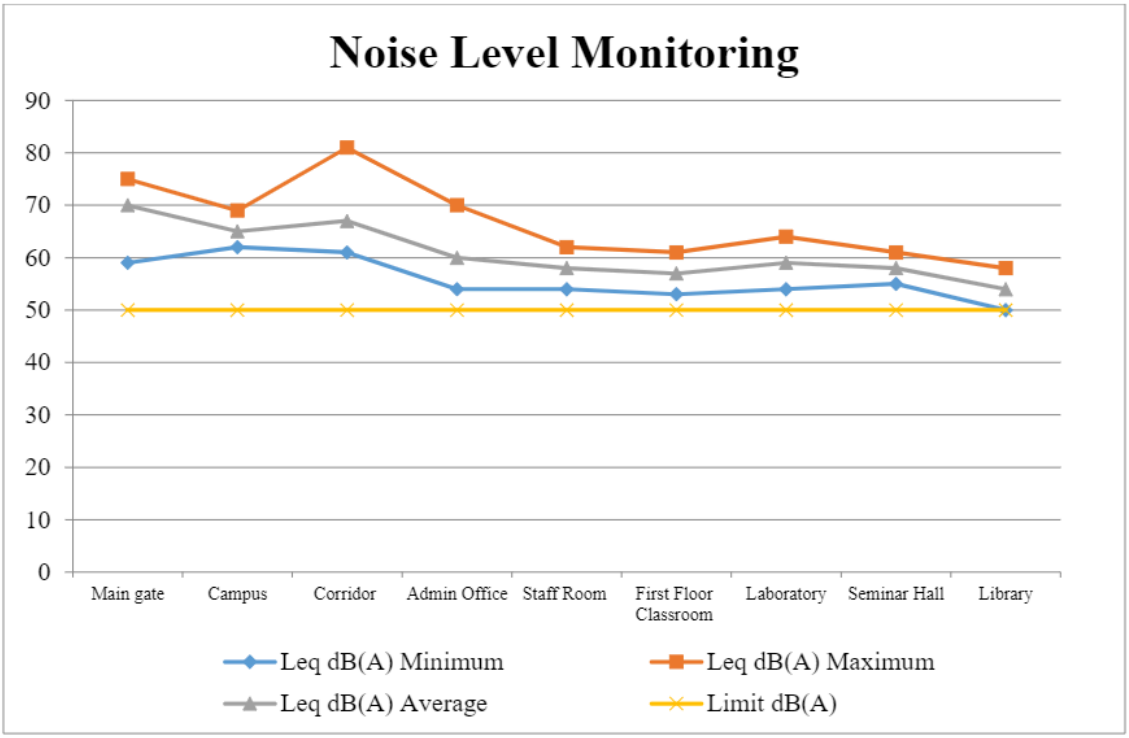


Figure No. 10 Noise Level Monitoring

3.4 SOLID WASTE MANAGEMENT:

Solid waste generation and management have become emerging issues in recent years. The solid waste generation rate is highly significant, and more adequate technologies must be used to manage the garbage generated. All garbage other than liquid waste is classified as solid waste. If solid trash is not properly disposed of, it can cause serious health problems and an unpleasant living environment. As a result, it is critical to properly manage solid waste to lessen the pressure on waste management systems. This inventory aims to determine the amount, volume, type, and present management practice of solid waste generated in MVP's Arts, Commerce, and Science College at Ozar (Mig). This study will aid in the continued management of solid waste and enhance the beauty of the campus in terms of green cover.

Table No. 3.9 Quantity of solid waste generation

Sr. No.	Location	Quantity of Biodegradable waste (kg/day)	Recyclable amount of waste	Construction waste (kg/day)	Quantity of Hazardous waste (kg/day)	Quantity of E-waste (kg/day)
1	Classrooms	--	5	NA	--	--
2	College Canteen	10	--		--	--
3	Lecture Halls	--	2		--	--
4	College Campus	40	5		--	--
		50	**12**	**0**	--	--

(Solid waste quantification is calculated as per CPCB norms)

Photo No. 10 Segregation of Solid Waste

A. Segregation of Solid Waste :

Table No. 3.10 Segregation of the Solid Waste

Sr. No.	Specification (Y/N)	Quantity generated (kg/day)	Recycled (Y/N)	Reuse (Y/N)	Other(specify)
1.	Paper	3	Yes	Yes	--
2.	Cardboard	2	Yes	Yes	--
3.	Plastic	1	Yes	No	Sold to authorized vendors
4.	Food waste	10	Yes	--	Vermicomposting

5.	E-Waste	--			The building is new; no significant E-waste is generated.
6.	Hazardous waste	--	--	--	No Laboratory, No chemicals used
7.	Glass	3	Yes	No	Sold to authorized vendors
8.	Metals	3	Yes	No	Sold to authorized vendors
9.	Biodegradable waste	40	No	No	The building is new, the vermicomposting plan is proposed
10.	Construction waste	Nil	No	No	No construction activity

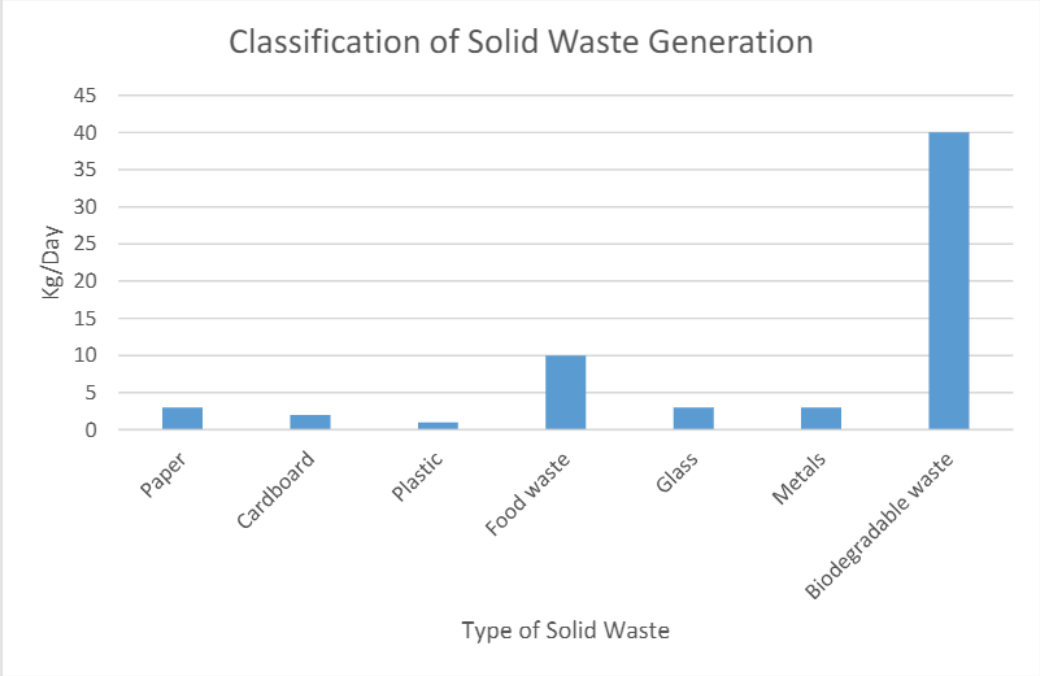


Figure No. 11 Chart for the classification of the solid waste generated

Photo No. 12 Shows the Vermicomposting Unit

The above data analysis shows that the average solid waste generation within the college campus is 45 kg/day. The biodegradable solid waste of 30 kg/day is generated from the plant parts, dry leaves, and food waste from the canteen. At present our canteen is under construction. After its completion, we will install the vermicomposting unit to dispose of biodegradable waste. So, at this stage, we are using the Ghantagadi facility as needed. About 25 kg/day of non-biodegradable solid waste is generated in paper, cardboard, plastic, glass, metal, etc. We reuse some of this waste and sell the rest to authorized vendors.

B. Hazardous Waste:

Hazardous waste is waste in any form with "Hazardous characteristics" or is officially "designated" as dangerous waste by name. Even though characteristic wastes are not specified by their chemical name, they are controlled as hazardous wastes because they exhibit one or more harmful features. Ignitability, Corrosivity, Reactivity, and Toxicity are the four traits.

The college provides education for students under the science faculty. With few students enrolled, the laboratory used minimum chemicals for practice. No hazardous chemicals are used in practice, so there is no dangerous waste. Also, the e-waste generation is insignificant at present.

C. E-Waste:

Schedule II e-waste is formed at the College. E-waste generation is visible in every educational establishment. Especially at the college level, fewer devices and instruments are used for administrative and technical reasons. In administration tasks, computers, printers, and Photocopier machines are essential. The wire used for interconnection is usually discarded with the e trash. Similarly, numerous scientific gadgets and equipment from science laboratories degrade over time. These, too, contribute to the e-waste issues.

3.5 Green Cover of College Campus:

Any area with grass, trees, or horticulture is considered green. Tree canopy analysis effectively estimates the amount of green cover in a specific area. The covering generated by the branches and crown of plants or trees is known as canopy cover (green cover). The proportion of a specified ground area covered by tree crowns is called green cover. According to the National Mission for Green India (GIM), one of eight missions under the National Action Plan on Climate Change (NAPCC) and previous national forest policy, 33 percent of total accessible land should be covered by vegetation. It will help reduce greenhouse gas emissions because plants and trees are the best carbon sinks. The green cover of the college campus is calculated by using the following formula

$$Green\ Cover\ (\%) = \frac{Total\ Green\ Cover\ in\ sq.meter}{Total\ area\ of\ campus\ in\ sq.meter}\ x\ 100$$

Table No. 3.11 Green Cover Calculations

Sr.NO.	Total Area of Campus (sq. meter)	Total Green Cover (sq. meter)	Percent Green Cover
1.	15380	8978	58.38%

According to information gathered during the location visit, the college campus has a total area of 15380 square meters. There are roughly 2200 square meters under construction and 13800 square meters of open space available out of the total available. Tree canopies are scanned, and the area of each tree canopy is determined using Google Earth Pro. The estimated tree canopy cover is 8978 square meters, accounting for 58.38 percent of the

open space. Compared with the 2022-23 green cover, green cover increased by 2.08% this year.

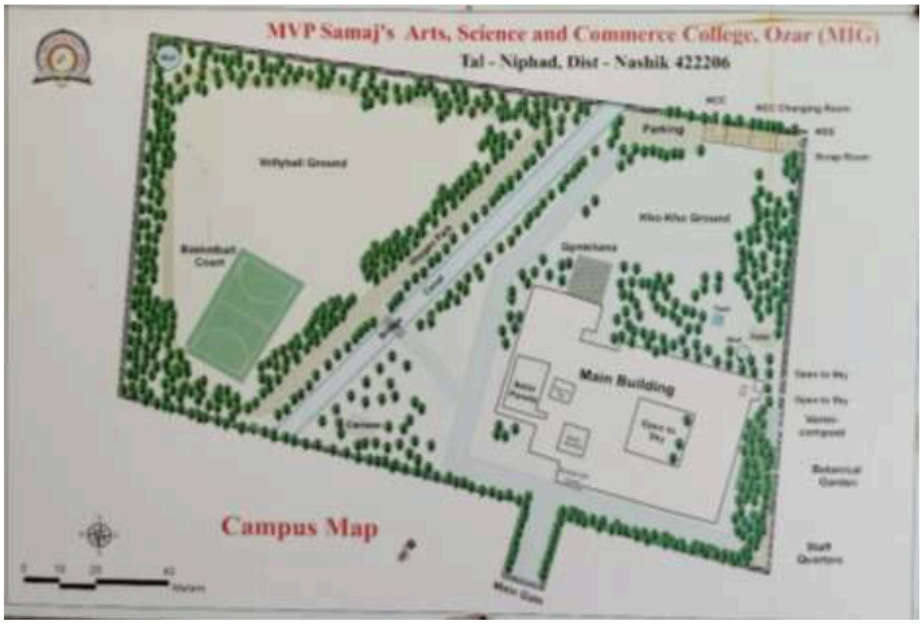


Photo. 13 Green Cover Map of College Campus

Photo no. 14 Shows Landscaping and Green Canopy on the College Campus.

Table No. 3.12 List Available trees on college campus

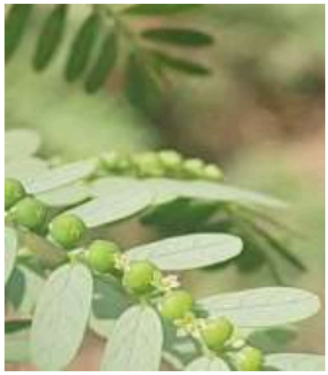
Sr. NO.	Local Name	Botanical Name	Family	No. of Trees/Plant
1	Neem	*Azadirachta indica*	Meliaceae	29
2	Gulmohar	*Delonix regia*	Caesalpiniaceae	8
3	Silk cotton tree	*Bombax ceiba L.*	Malvaceae	13
4	Pimpal	*Ficus populifolia*	Moraceae	5
5	Vad	*Ficus benghalensis L.*	Moraceae	6
6	Kanchan	*Bauhinia variegata L*	Fabaceae	5
7	Vahaba	*Cassia fistula*	Fabaceae	3
8	Silver oak	*Grevillea robusta*	Proteaceae	8
9	Akash Shevaga	*Spathodea campanulata*	Bignoniaceae	3
10	Balamkhira	*Kigelia africana*	Bignoniaceae	15
11	Bakul	*Mimusops elengi*	Sapotaceae	5
12	Bambu	*Bambusa vulgaris*	Poaceae	14
13	Life Plant	*Kalanchoe pinnata*	Crassulaceae	5
14	Rui	*Calotropis procera*	Apocynaceae	2
15	Saptparni	*Alstonia scholaris*	Apocynaceae	9
16	Sisam	*Dalbergia sissoo*	Fabaceae	3
17	Ashoka	*Monoon longifolium*	Annonaceae	5
18	Sitaphal	*Annona squamosa*	Annonaceae	6
19	Kashid	*Cassia siamea*	Fabaceae	10
20	Arjun	*Terminalia arjuna*	Combretaceae	1
21	Jambhul	*Syzygium cumini*	Myrtaceae	6
22	Amba	*Mangifera indica*	Moraceae	20
23	Avala	*Phyllanthus emblica*	Phyllantheceae	4
24	Peru	*Phymatidium delicatulum*	Myrtaceae	2
25	Subabhul	*Leucaena leucocephala*	Fabaceae	30
26	Bhui amla	*Phyllanthus niruri*	Phyllanthaceae	1
27	sweet basil	*Ocimum basilicum*	Jamiacene	01
28	Boganvel	*Bougainvillea glabra*	Nyctaginaceae	05
29	Papadi	*Holantele integrifolia*	Ulmaceae	05
30	Chinch	*Tamarindos judica*	Fabaceae	02
31	Cherry	*Mantingia calabura*	Muntingiacene	04
32	Badam	*Terminalia catappa*	Combretaceae	05
33	Sag	*Tectona grandis*	Verbinaceae	014
34	Pandhara Chafa	*Plumeria rubra*	Apocynaceae	10
35	Kadamb	*Neolamarckia cadamba*	Rubiaceae	03
36	Hiravachafa	*Artabotrys hexapetains*	Annonaceae	1

37	Gulvel	*Tinospora cordifolia*	Menispermacese	01
38	Dense flower Knotweed	*Persicaria glabra*	Ploygonaceae	01
39	Karanj	*Pongamia pinnata*	Fabaceae	07
40	Sonmohar	*Samanea saman*	Fabacenc	03
41	Royal palm	*Roystonea regia*	Arecaceae	08
42	Nilmohar	*Jacquemontia cuspidata*	Convolvulaceae	1
43	Chandan	*Santalum album*	Santalaceae	1
44	Hemelia	*Hamelia patens*	Rubiaceae	1
45	Chrisamus tree	*Araucaria columnants*	Arucariaceae	1
46	Chitrak	*Plumbago zeylanica*	Plumbaginaceae	01
47	Jaswand	*Phragmanthera capitata*	Loranthaceae	01
48	Cycus	*Cycas revolut*	Cycadaceae	01
49	Water lilies	*Wwwphaca odorata*	Nymphaeaceae	1
50	Monkey Bush	*Hutton indicom*	Malvaceae	1
51	jasmine	*Jasminum officinale*	Olencene	1
52	Bhingule	*Indigofera siangione*	Fabaceae	1
53	Lajalu	*Mimosa pudica*	Fabaceae	03
54	Rakta Kanchan	*Kaukinia purpurea*	Fabaceae	25

Abitulon indicum

Bryophylum pinnata

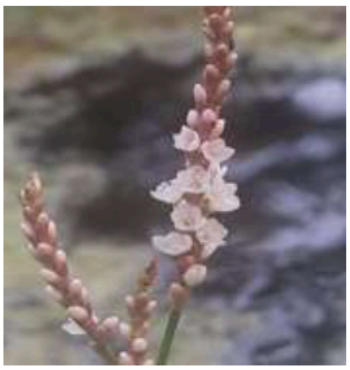
Calatropis procera



Phylantus niruri

Oscimum basilicum

Tinospora cordifolia



Persicaria glabra

Plumbago zeylanica

Hibiscus rosasinensis

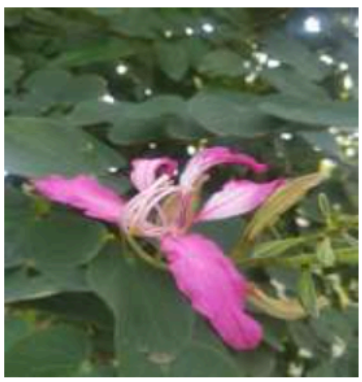
Jasminum officinale

Indigofera Linnaei

Nymphaea odorata

Mimosa pudica

Spathodia campanulata



Bauhinia purpurata

Photo 15 Shows plant diversity of college campus

4.0 Environment Awareness Programs and Related Facility:

Environmental awareness is a critical component of our daily life. Everyone must become more environmentally conscious to ensure the planet's long-term viability. As a result of the Supreme Court's decision, environmental education is now become compulsory for all students in all types of higher education institutions. Environmental education is a style of education that allows students to learn through hands-on experiences outside of the classroom. It will enable students to relate and apply what they've learned in the classroom to real-world environmental challenges. The Arts, Commerce, and Science College is one of them, and many environment-friendly programs are organized through the college.

Tree Plantation Activity:

Photo No. 18 Plantation Activities in and Around the College

Every year, many Indian plants are planted by the college on the college premises, in Ozar (Mig), and surrounding areas. Plantation activities are crucial in reducing global warming due to rising pollution and carbon dioxide emissions. So far, more than 150 trees have been planted on the college premises and are maintained by drip irrigation. Along with tree planting, colleges also planted many ornamental plants for beautification.

Celebration of Ozone Day:

World Ozone Day is celebrated on September 16th every year by Ozar (Mig) College. This Year, the College invites Dr. Sharad A. Dhat as a guest speaker. The main objective of this program is to gain knowledge about the formation process of the ozone layer in the atmosphere and where is the exact location of the ozone layer in the atmosphere. What activities of human beings are responsible for the depletion of the ozone layer in the atmosphere? Students get information about the importance of the ozone layer and the need for its conservation at the current time. Students also understand some easy-to-do ways by which they can protect the ozone depletion.

Photo No.17 Showing Ozone Day Celebration Activity

Celebration of National Science Day:

National Science Day, celebrated in India on February 28th, is a great opportunity to showcase the wonders of science and its impact on our lives. The college organizes a science fair where students can showcase their scientific projects, experiments, and inventions. This allows students to learn from each other and share their passion for science. Students from various departments present their ideas in the form of posters.

Photo No. 18 Shows Science Day celebration activity

Health Checkup Camp:

College students often experience a shift in lifestyle habits. Stress, poor diet, lack of sleep, and increased social activities can contribute to health risks. Regular checkups can detect these issues early, allowing for preventative measures and treatment before they become serious problems. Early detection of chronic conditions like diabetes, high blood pressure, or mental health issues provides for better management and significantly improves a student's overall well-being and academic performance.

Photo No 20: Health Checkup activity organized by college

Promotion of Health and hygiene:


Photo No. 21 Sanitary Pad Wending Machine Installed in Girl's Rooms

Ozar (Mig) College's decision to install sanitary pad vending machines in girls' restrooms is a commendable step toward promoting menstrual hygiene and student well-being. Having sanitary pad vending machines installed in girls' restrooms on a college campus is a positive step towards promoting menstrual hygiene and addressing period poverty. Girls students can access sanitary pads discreetly and readily whenever needed, without having to leave campus or rely on others.

Awards and Achievement:

Ozar (Mig) College has been recognized for its outstanding commitment to environmental sustainability by the Social Forestry Department of the Maharashtra government in Pune. The college was awarded the prestigious "Chhatrapati Shivaji Maharaj Vanashri Puraskar" (Chhatrapati Shivaji Maharaj Tree Plantation Award) – first prize in the educational institution's category – for its extensive tree planting initiative on campus.

The college received a prize of 100,000 rupees in recognition of their achievement. This prize money can be used to support further environmental initiatives on campus, such as planting additional trees, establishing gardens, or conducting educational programs on environmental conservation. Planting numerous trees not only enhances the beauty of the

campus but also provides several environmental benefits. Trees help to improve air quality, reduce soil erosion, and provide habitat for wildlife.

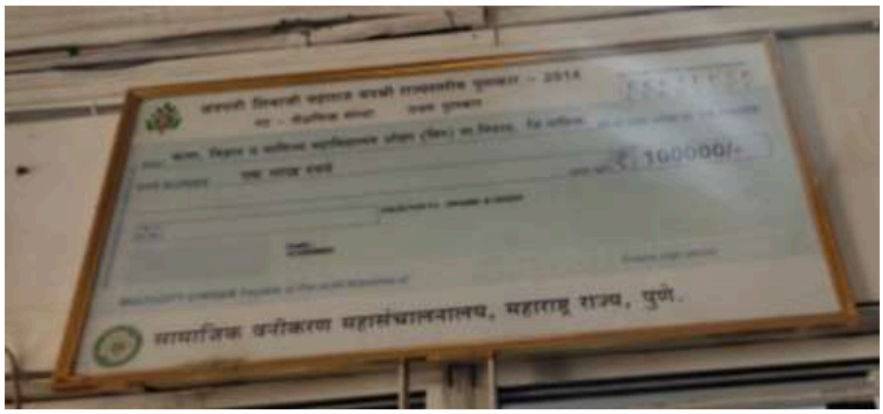


Photo No. 21 Shows Chh. Shivaji Maharaj Vanashri Puraskar

Signages Displayed on College Campus:

Photo No. 22 Shows Signages Displayed on College Campus

Various informative signboards related to trees have been installed on the college campus. The college has installed a plaque displaying the total number of plants planted on the campus. This includes building trees, fruit trees, ornamental trees, branches, grafted trees, and medicinal plants. In addition, a decree issued by Chhatrapati Shivaji Maharaj has been installed on the college premises. The main objective of this decree is tree conservation.

Fire Extinguisher Facility:

College campuses often have many people living and working nearby. This can increase the risk of fires starting from various sources like unattended cooking, electrical malfunctions, or arson. Having readily available fire extinguishers allows for early intervention in case of a small fire, potentially preventing it from growing into a major blaze. Ozar (Mig) College also has facility fire extinguishers that are clearly visible and easily accessible in the college building.

Photo No. 23 Shows a fire Extinguisher facility available on the college campus

5.0 Conclusion and Recommendations

The Green Audit of MVP's Arts, Commerce, and Science College, Ozar (Mig), is conducted in the Academic year 2023-2024 The process of discovering and determining if an institution's operations are environmentally friendly and sustainable is known as green audits. The key objective of the college's green audit is to evaluate the college's green initiatives and execute a well-structured audit to determine where we stand on a grade of environmental sanity.

6.1 Conclusion

During the process of green audit and from observations, some of the conclusions are made as follows:

1. The college's functional environmental conservation committee can lead the development of comprehensive environmental guidelines involving relevant stakeholders. This streamlined collaboration ensures alignment with environmental goals and tailors guidelines to the college's needs.
2. In the current academic year (2023-24), the college supports a staff of 86 individuals including teaching and non-teaching personnel. Serving a student body 1146, the college endeavors to provide quality education and support to its diverse community.
3. The college, situated on 3.80 acres of land, boasts a valuable building with a built-up area spanning 2200 sq. m. and equipped with suitable educational infrastructure.
4. The college's regular students, staff, and floating population, totaling 1292 individuals, require 58,140 liters of water daily. Physicochemical parameters like total hardness, TDS, carbonates, bicarbonates, calcium, magnesium as well as non-fecal coliform is also found in permissible limit. During bacteriological analysis it is found that Most Probable Number (MPN) of bacteria is significantly surpassing the limit.
5. The Arts, Commerce, and Science College in Ozar (Mig) produces approximately 13,833 liters of sewage daily, calculated based on the number of users and their per capita water usage.
6. With a 10-liter per capita rural sanitation standard per day (lpcd), the college's toilets and bathrooms contribute 3,840 lpcd to the sewage generation.
7. The college has constructed a septic system with a capacity of around 15,000 lpcd, providing three days of detention time. Maintenance activities and water tanks also contribute 9 to 11 thousand liters of wastewater, which can be repurposed for plant irrigation on campus.

8. A rainwater collecting system with a storage capacity of 19.40 Lakh liters could provide 4238 liters per day or 7.29 percent of total consumption.
9. The unpaved area comprises 142877 square meters, and the college collects 52,007,155 liters of water annually. This water may be used for groundwater recharge.
10. The air quality is good in nearby areas of the college because the surrounding area of the college campus is a rural zone and mostly a farm field.
11. The noise monitoring survey observed that the noise levels were 54 - 70 dB (A) range, indicating that the values conformed to the prescribed standards.
12. The college has a waste segregation system. Non-degradable waste is handed over to Nagarpanchayat, and degradable waste is converted into compost.
13. With only 58.38 percent green cover, the college must implement measures to increase it.
14. The college has 327 trees on campus, including different medicinal and ornamental plants.
15. The college conducts various environmental activities every year.

6.2 Recommendations

The following are some recommendations for improving environmentally friendly practices on campus.

1. The college should design environmental guidelines using the Green Audit document criteria.
2. Data on all measured environmental factors should be monitored and recorded regularly, and information should be made available to management.
3. The college should adopt internal procedures to guarantee compliance with environmental standards, and responsibility for implementing them into action should be appointed.
4. Regular cleaning (at least once every three months) of tanks used for water storage in the college is essential.
5. Properly maintained and serviced water filters must be present near all drinking water tanks.
6. Pipes carrying wastewater and septic tanks require cleaning twice a year.
7. Ozar College is already practicing rooftop rainwater harvesting. Rainwater collected within the college premises can be better utilized by storing it in the well located on the northeast side and using it for reuse or groundwater recharge.
8. Extensive tree plantation in the college helps maintain clean and fresh air within the campus. Planting native Indian trees should be prioritized in future plantation drives.
9. A natural barrier of Ashoka trees can be created on the western side wall compound of the college to mitigate noise pollution from the national highway.
10. Crowded areas within the college can lead to increased noise levels. Taking appropriate measures to reduce noise pollution is essential.
11. Non-biodegradable waste generated in the college should be disposed of by the Ozar Municipal Corporation as per regulations.
12. Biodegradable waste (such as leaves and twigs) should be properly composted and used for the college's vegetation.
13. Various programs and workshops on environmental issues should be organized within the college.