Green Audit Report for 2019-2020

1.0 Introduction

The two primary outputs of the twentieth century, modernization and industrialization, have made human life more luxurious and comfortable. They are, on the other hand, responsible for the indiscriminate use of natural resources, the exploitation of forests and wildlife, the production of substantial solid waste, the pollution of limited and sacred water supplies, and, ultimately, the unsightly and bleak state of our mother, Earth. People are becoming more aware of global issues such as global warming, the greenhouse effect, ozone depletion, and climate change. Mother Earth is now thought to have made her final decision. It is time for people to wake up, unite, and fight for a more sustainable environment.

Green Audit is the most influential ecological instrument for resolving such issues. This type of audit was created in the late 1970s to inspect the work being done within the institution. It systematically identifies, quantifies, records, reports, and analyzes ecological diversity components and their financial or social expression. A green audit guides how to improve environmental conditions.

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 is 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.

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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.

Colleges have a significant environmental footprint due to their operations, including energy consumption, waste generation, and resource usage. Conducting green audits helps colleges identify areas where they can reduce their environmental impact and become more sustainable, aligning with their responsibility to protect the environment. Implementing sustainable practices identified through green audits can lead to college cost savings. Energy-efficient measures, waste reduction strategies, and water conservation initiatives can all contribute to lowering operational expenses over time.Colleges are increasingly judged not only on their academic achievements but also on their commitment to sustainability. By conducting green audits and implementing environmentally friendly practices, colleges can enhance their reputation and appeal to environmentally conscious students, faculty, staff, and donors.

Green audits provide educational opportunities for students, faculty, and staff. Involving the campus community in the audit process can raise awareness about environmental issues and sustainability practices, fostering a culture of environmental stewardship. As concerns about climate change and environmental degradation grow, ensuring the long-term sustainability of college campuses is crucial. Green audits help colleges assess their sustainability performance and develop strategies for continuous improvement, contributing to a more sustainable future for the institution and the planet.

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.

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, throughout the year, every college runs various types of activities. Colleges prepare various policies to maintain and support the environment.

Under Criterion VII sub-point 7.1.6, every college needs to conduct a Green Audit, Energy Audits, Environmental Audits, 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 Sahyadri Shikshan Mandal, Dindori

Sahyadri Shikshan Mandal, Dindori, is a renowned educational institution in Maharashtra.MahantJamnadas Maharaj Arts, Commerce, and Science College, Karanjali, is an essential college of Sahyadri Shikshan Mandal. The college offers education opportunities to students from rural, tribal, and economically weaker Peth and Dindori

Tehsil sections. Sahyadri Shikshan Mandal provides a range of academic programs across various disciplines. These institutions often play a crucial role in providing educational opportunities to students in their respective regions, contributing to the local community's development and academic advancement. During that period, Peth Tehsil did not have a college that provided education in a science discipline. For science education, students from the region had to travel to towns like Nashik. To resolve this problem, the organization began its first senior college on July 11, 2009, according to the fantastic vision of social worker and political leader Shri. Narahariji Sitaram Zirwal.

1.5 Profile of College:

Sahyadri Shkshan Mandal's Dindori established the Mahant Jamnadas Maharaj Arts, Commerce, and Science College, Karanjali Tal: Peth, Dist: Nashik, on July 11, 2009. The college offers undergraduate degrees in Science, Commerce, and Arts. The college provides access to educational resources to tribal, rural, hilly, and economically disadvantaged students. The main goal of this college is to inspire and drive these students to pursue higher education while fostering their intellectual, moral, and social development. The college administration takes extreme caution and makes every effort to uphold the academic standards of rural students. The college grounds are covered in beautiful plants and trees in every direction. It's got the most charming ambiance.

The College, which is affiliated with Savitribai Phule Pune University, Pune, provides courses in Marathi, Geography, Political Science History, English, and Economics for undergraduate students in the Arts Faculty, Business Administration for students in the Commerce Faculty, and Chemistry, Botany, Zoology, Physics and Mathematics for students in the Science Faculty.

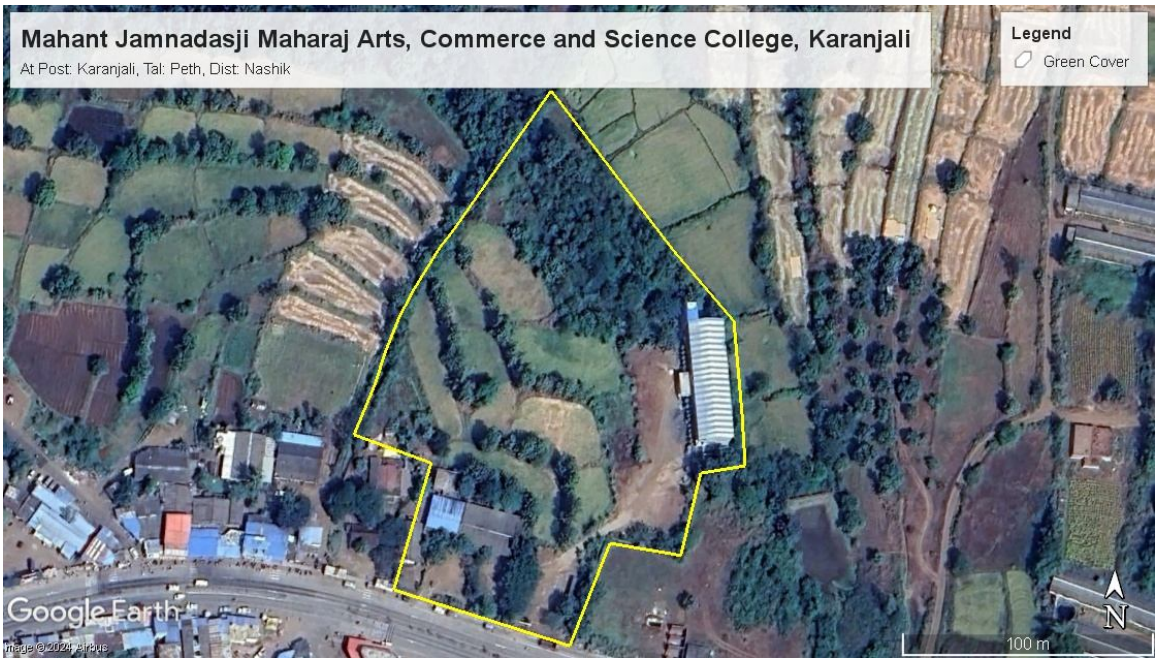


Photo No. 1.1: Google Image of Mahant Jamnadas Maharaj Arts, Commerce and Science College, Karanjali

The college employs roughly 39 people, including 29 teachers and 10 non-teaching personnel. In the current academic year, there are 708 students in total (2019-20). The College is on 5.00 acres of land, with a precious building with a built-up area of 20000 sq. feet. and suitable educational infrastructure. Students offered undergraduate programs in the Faculty of Arts, Science, and Commerce. 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.

Table No. 1.1 Courses Offered by College

Sr.NO.	Name of Faculty	Name of Program	Name of Subject

1.	Arts	BA	Marathi, History, English, Economics, Geography, Political Science
2.	Commerce	B.Com	Business Administration
3.	Science	B.Sc.	Chemistry, Physics, Botany, Zoology, Mathematics, Environmental Studies

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 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. R.Y. Borse	Principal	Chairman
2	Dr. N.R. Giri	Assistant Professor	Coordinator
3.	Dr. S.M. Chavan	Assistant Professor	Member
4.	Dr. A.S. Jondhale	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 in accordance with 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 in the higher education institute evaluates the audit's facts and observations together. 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	39	20	820
2.	College Students (Girls and Boys)	708	25	9456
	Residential Staff	04	55	220
3.	Floating Population (Visitors)	18	19	400
	Total	769		10896

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. Per the standard guidelines in the World Health

Organization, the service level benchmark is to provide 20 lpcd water supply for institutions in rural areas.

3.1.2 Water Storage Capacity:

On the roof of the college has two water storage tanks with 5000 liters capacity. The bore well is the only source of water for the college. Only that will provide the appropriate amount of water to the college regularly.

Photo No.3.1 Shows Borewell used for water supply.

Table No.3.2 Shows information on the water source and quantity of water provided

Sr. No.	Source of water	Number of times the water is uplifted from the source	The average amount of water uplifted. (Lit)
1	Bore Well	Twice a day	4 to 5 thousand liter/hr

According to the discussion with ECC, the college uses water filters and an RO system to treat water. The two 5000-liter overhead water tanks were filled twice a day. Based on

available data and water supply benchmarks per the National Building Code (NBC),. The college population has been steadily expanding in recent years, necessitating the installation of a new 5000-liter water tank on the roof of the college building. Table No. 3.2 shows the physicochemical and microbiological properties of drinking water.

Table No. 3.3 Drinking Water (Well Water) Analysis Results

	Parameter	**Unit(s)**	**Bore Well Water**	**Limits as per IS 10500: 2012 (Acceptable /Permissible)**	**Analysis Method**
1.	pH	--	7.45	6.5 to 8.5	Instrumentation
2.	Conductivity	dSm-1	1.123	0.1-1	Instrumentation
3.	Calcium as Ca	mg/lit	90.2	200	Titration
4.	Magnesium as Mg	mg/lit	87.9	200	Titration
5.	Sodium as Na	mg/lit	51.2	60	AAS
6.	Potassium as K	mg/lit	3.2	5	AAS
9.	Chlorides as Cl^-	mg/lit	110.1	250	Titration
10.	Total Hardness as $CaCO_3$	mg/lit	281.2	300	Titration
11.	TDS	mg/lit	410	200	Gravimetric
12.	Sulphates as SO_4	mg/lit	62.01	<200	Spectrophotometer
13.	Iron as Fe	mg/lit	00	<5.0	AAS
14.	Total Coli form	No./100ml	Absent	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	Absent	<2.2 MPN/ 100mL	

Some physicochemical parameters, such as EC, Hardness, and TDS, are over the acceptable limit. Before drinking water, it must be treated appropriately. Water is free from other bacteriological parameters.

3.1.3 Quantification of Wastewater:

Table No. 3.4 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	39	20	820	656
2.	College Students (Girls and Boys)	708	25	9456	7742
3.	Residential Staff	04	55	220	176
3.	Floating Population (Visitors)	18	19	400	386
	Total	769		10896	8960

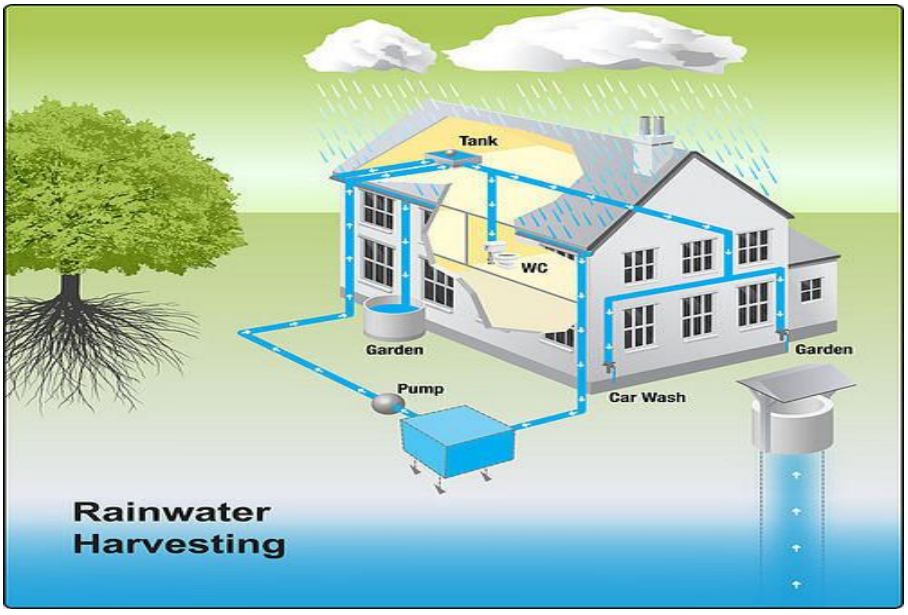
The quality of freshwater has degraded as a result of widespread consumption by college students and staff. As a result, a water purification system is required. Cleaning water tanks regularly is also very important.

According to the Central Public Health and Environmental Engineering Organization (CPHEEO), wastewater accounts for 70-80 percent of total water supplied. The Mahant Jamnadas Maharaj Arts, Commerce and Science College, Karanjali, generates roughly 8960 liters of wastewater per day, based on the number of users and per capita water used. In rural areas, the average person uses 11lpcd of water for sanitation (toilet/ablution). This means 4950 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 20000 lpcd and a four-day detention time. Other maintenance activities generate the remaining 2936 liters of wastewater, which can be directly redirected and used to irrigate plants on the college campus.

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 0.4 mm in the driest month (February) and 514.9 mm in the wettest month (July). The total annual rainfall in an average year is 1480 mm. Mahant Jamnadas Maharaj Arts, Commerce, and Science

College, Karanjali, is spread over 5.00 acres (20234 sq. meters) of land. Out of these buildings, over 2200 sq. meters of the area are constructed. The remaining available land is unpaved areas, comprising about 4.46 acres (18034 sq. meters) for surface water harvesting.

Table No. 3.5 Rooftop Rainwater Harvesting Potential of Mahant Jamnadas Maharaj Arts, Commerce and Science College, Karanjali (2022-23)

Sr. No.	Months	Total Roof 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	June	732	0.90	162.61	115729	39.21
2	July	732	0.90	146.72	107562	31.72
3	Aug	732	0.90	140.25	95214	30.41
4	Sept	732	0.90	142.05	99826	31.08
5	Oct	732	0.90	133.91	88220	27.42
6	Nov	732	0.90	0	0	0.00
7	Dec	732	0.90	2.03	1429	0.85
8	Jan	732	0.90	0	0	0.00
9	Feb	732	0.90	0	0	0.00
10	Mar	732	0.90	0	0	0.00
11	Apr	732	0.90	0	0	0.00
12	May	732	0.90	0	0	0.00

A metal roof has a runoff coefficient of 0.9, which means that 90% of the rain can be harvested. Based on this runoff coefficient and a roof area of 732 square meters a volume of 264 liters (0.4 mm) of water can be collected in the driest month (February) and 339216 liters (514.9 mm) in the wettest month (July).The water demand is 3500 liters per day, which equals to about 105000 liters per month. The total water demand is 1277500 liters (1277.5peryear.

The amount of water that can be collected from the roof (975m) is less than the water demand (1277.5 m). Only a part of the water demand can be fulfilled using a rainwater harvesting system.The total amount of water that can be collected from this roof, 974900 liters, is not enough to fulfil the total yearly water demand of 1277500 liters. However, it might still be worthwhile to construct a rainwater harvesting system. With a storage reservoir of 575400 liters(575.4 m) a rainwater harvesting system could provide 2671 liters of water per day, which is 76% of the total demand. However, it might still be worthwhile to construct a rainwater harvesting system. With a storage reservoir of 600,000 liters (600.0 m3), a rainwater harvesting system could provide 1534 liters daily, 15.39% of the total demand.

From November to May, the percentage of water demand met by a rooftop rainwater harvesting system is minimal. Following the calculations, it was discovered that the monsoon season shows high water harvesting potential. The months such as June (39.21%), July (31.72%), August (35.41%), September (52.08%), will have the potential to collect 541145 liters of rainwater.

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: 5.00 Acres

b. Institution's Paved Area: Nil

c. Institution's Unpaved Area: 4.46 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:

$$i. Paved\ Area =$$

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

$$ii. Unpaved\ Area$$

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

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

Table No. 3.6 Surface water harvesting potential of Mahant Jamnadas Maharaj College of Arts, Commerce and Science, Karanjali

Sr.No.	Type of Area	Area in Sq.M.	Rainwater harvesting potential (liters)	Total rainwater harvesting Potential
1.	Total Paved Area	-	Nil	5370191 liters
2.	Total Unpaved Area	18050	5370191	

The table above displays the possibilities for rainwater collection on the unpaved surface area of the college campus. Because the campus has a sloppy, 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 18050 square meters, it can collect 5370191 liters per year. According to the slope of the land, the college must construct a stormwater drain that will transport rainfall to a rainwater harvesting pit.

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 No. 3.3 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, and NO_2, CO etc.

As per the data from the IMD department, the air quality status of Karanjali village is shown in Table No. 3.7

Table No. 3.7 Air Quality Status of Karanjali

Sr. No.	Parameter	Result	NAAQS Standards
1.	PM_{10}	25	100 mg/m^3/24 hour
2.	$PM_{2.5}$	42	60 mg/m^3/24 hour
3.	SO_2	11	80 mg/m^3/24 hour
4.	NO_2	08	80 mg/m^3/24 hour
5.	CO	21	4 mg/m^3/hour
6.	O_3	36	180 mg/m^3/hour

*All parameters are shown in $\mu g/m^3$ Source: IMD department

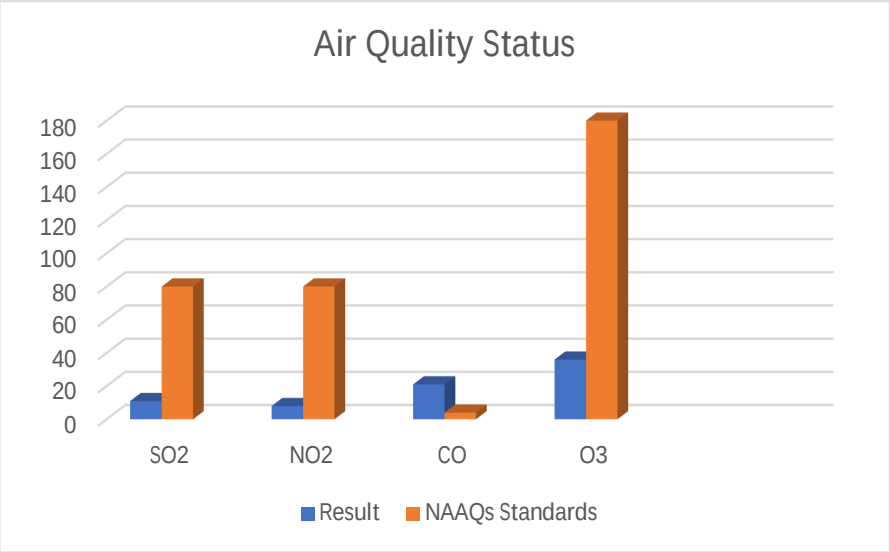


Figure No. 3.4 Air Quality Status of Karanjali

All of the air quality parameters were found within NAAQS standards except $PM_{2.5}$. 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.

The inhalable pollutant particles with a diameter of less than 2.5 micrometers can enter the lungs and bloodstream, resulting in serious health issues. The most severe impacts are on the lungs and heart. Exposure can result in coughing or difficulty breathing, aggravated asthma, and the development of chronic respiratory disease.

3.3 NOISE ENVIRONMENT:

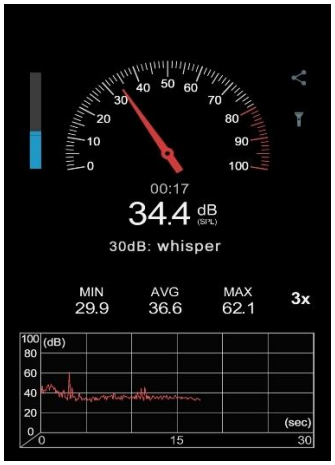
Sound pressure level (SPL) measurements were automatically recorded with the help of an Integrated Sound Level Meter. The noise level measurements were carried out using a noise level meter. The primary noise source identified in the study area has been predominantly vehicular movement and transportation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

Main Building

Building under Construction

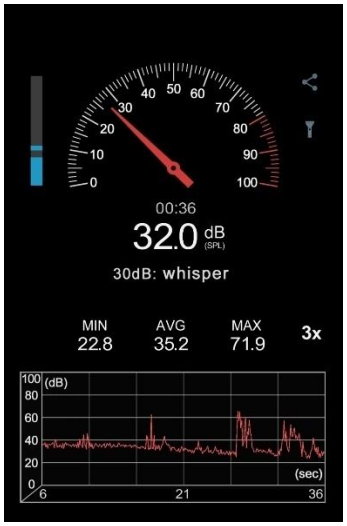
Principal Office

Lecture Hall

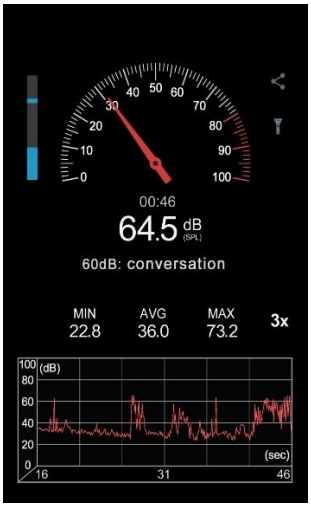


Staff Room

Laboratory



Library



Play Ground

Photo No. 3.3 Noise Monitoring Photographs

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 Building	22.8	79.0	36.9	50
Building Under Construction	22.8	79	36.7	50
Lecture Hall	22.8	79	36.9	50
Principal Office	35.1	56.9	43.4	50
Staff Room	29.9	62.1	36.6	50
Laboratory	0	70.1	43.0	50
Library	22.8	71.9	35.2	50
Play Ground	22.8	73.2	36.0	50

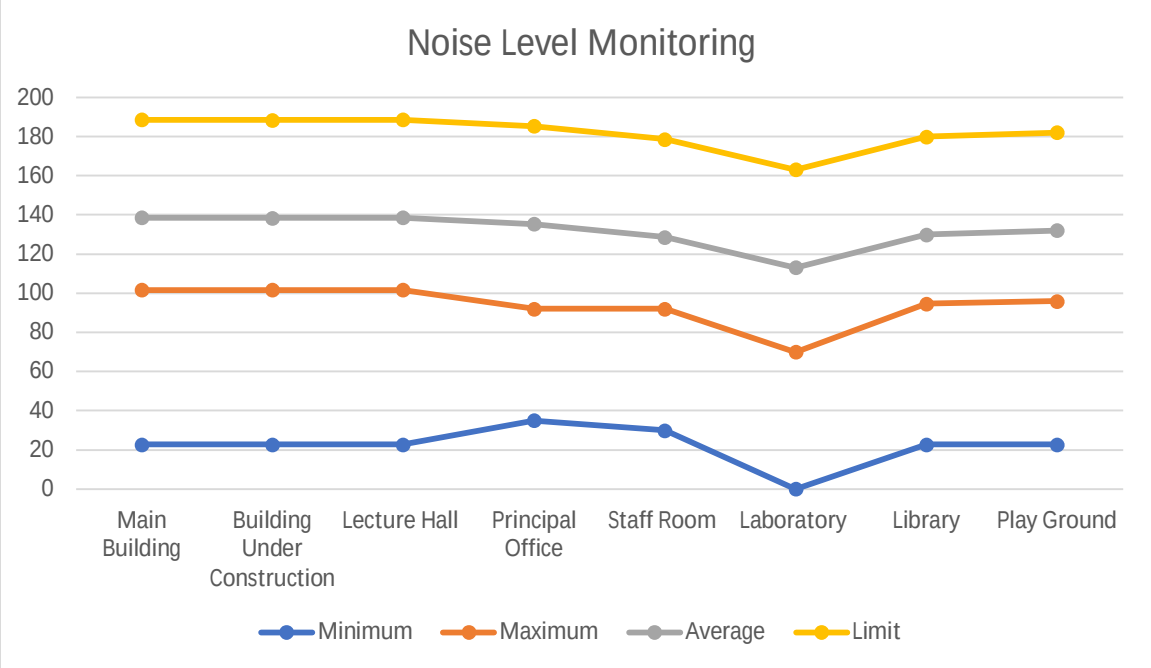


Figure No. 3.5 Noise Level Monitoring

From the noise monitoring survey, the noise levels were observed in the range of 31 - 78 dB (A). The observed average values of the noise levels in the different locality was found just above the prescribed standards.

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, while 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 Mahant Jamnadas Maharaj Arts, Commerce, and Science College, Karanjali. 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 (kg/day)	Construction waste (kg/day)	Quantity of Hazardous waste (kg/day)	Quantity of E-waste (kg/day)
1	Classroom	22	05	Approx. 200 kg/day only during the construction period	--	--
2	Laboratory	18	4		--	--
3	Lecture Halls	2	0		--	--
4	College campus	75 – 80	100 – 150		--	--
		117	**109**	**5**	--	--

(Solid waste quantification is calculated as per CPCB norms)

Green Audit Report for 2019-2020

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	4	Yes	Yes	--
2.	Cardboard	6	Yes	Yes	--
3.	Plastic	12	Yes	No	Handover to Grampanchayt
4.	Food waste	0	--	--	Currently, the canteen is under construction.
5.	E-Waste	--			The building is new, and no significant e-waste has been generated.
6.	Hazardous waste	--	--	--	No Hazardous waste generated
7.	Glass	3	Yes	No	Sold to authorized vendors
8.	Metals	08	Yes	No	Sold to authorized vendors
9.	Biodegradable waste	20	No	No	The building is new, the vermicomposting plan is proposed
10.	Construction waste	176	No	Yes	Only during construction period use for landfilling

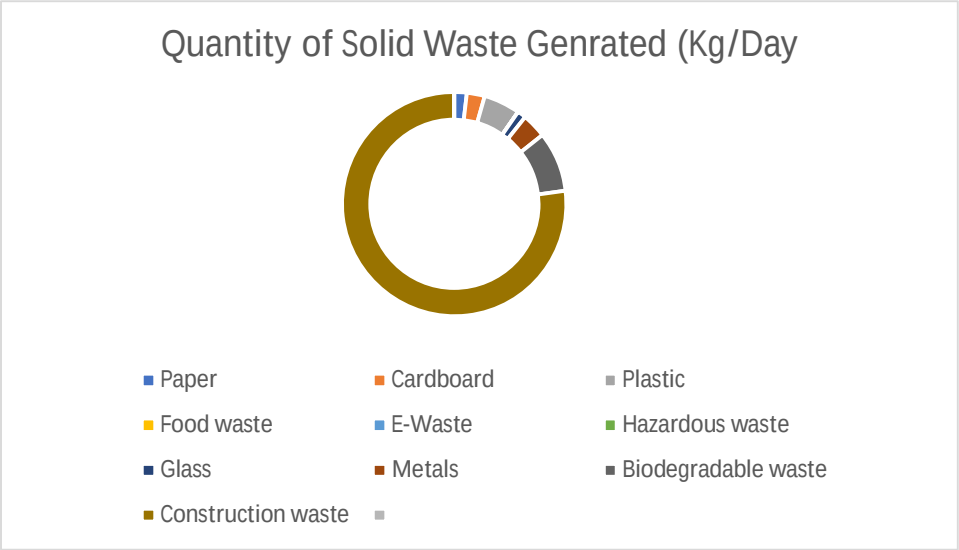


Figure No. 3.6 Chart for the classification of the solid waste generated

The above data analysis shows that the average solid waste generation within the college campus is 17 kg/day. The biodegradable solid waste of 20 kg/day is generated from the plant parts and dry leaves. At present, the college canteen is being constructed. After its completion, we will install the vermicomposting unit to dispose of biodegradable waste. So, at this stage, we are using the Grampanchayt solid waste disposal site facility to dispose of no degradable waste. About 27 kg/day of non-biodegradable solid waste is generated in plastic, glass, metal, etc. We reuse some of this waste and sell the rest to an authorized vendor. This year, college building renewals and construction activities are ongoing. Approximately 200 kg/day of construction waste is generated, which is used within the campus area to level the ground.

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, Corrosively, Reactivity, and Toxicity are the four traits.

The said college has a chemistry laboratory where most practicals are conducted. During the practical, no hazardous materials are used; hence, dangerous waste generation is negligible. 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, there are fewer devices and instruments for teaching 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

$$GreenCover(\%) = \frac{TotalGreenCoverinsq.meter}{Totalareaofcampusinsq.meter} x\ 100$$

Table No. 3.11 Green Cover Calculations

Sr.NO.	Total Area of Campus (sq. meter)	Total Green Cover (sq. meter)	Percent Green Cover
1.	20235	7968	39.37

According to information gathered during the location visit, the college campus has a total area of 20235 square meters. There are roughly 2185 square meters under construction and 18050 square meters of open space. Tree canopies are scanned, and the location of each tree canopy is determined using Google Earth Pro. The estimated tree canopy cover is 7968 square meters, accounting for 39.37 percent of the open space.

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Table No. 3.12 Shows a detailed count and name of trees planted on the college campus.

Sr. No	Botanical Name	Family	Local Name	Number of Species
1.	*Syzygiumcumini (L.) Skeels.*	Myrtaceae	Jambhul	03
2.	*Quisqualis indica L.*	Combretaceae	Madhumalti	04
3.	*Achras sapota L.*	Sapotaceae	Chikku	01
4.	*Santalum album L.*	Santalaceae	Chandan	01
5.	*Grevillea robusta A. Cunn*	Proteaceae	Silver Oak	15
6.	*Phyllanthus emblica L.*	Euphorbiaceae	Amla	01
7.	*Ficusbenghalensis L.*	Moraceae	Wad	01
8.	*Ficus religiosa L.*	Moraceae	Pimpal	01
9.	*Thujaorientalis L.*	Cupressaceae	Morpankhi	02
10.	*Ixora coccinea L.*	Rubiaceae	Bakora	06
11.	*Tinosporacordifolia (Willd.)Miers.*	Menispermaceae	Gulwel	01
12.	*Roystonea regia (H.B.&K.) Cook.*	Aracaceae	Bottle Palm	02
13.	*Cocos nucifera L.*	Aracaceae	Naral	04
14.	*Dracaena Marginata*	Asparagaceae	Dracaena	02
15.	*dracaena reflexa*	Asparagaceae	Dracaena	02
16.	*Cycas circinalis*	Cycadaceae	Cycas	01
17.	*Cycas revoluta*	Cycadaceae	Cycas	01
18.	*Azadirachtaindica*	Meliaceae	Kadulimb	04
19.	*Asparagus racemosus*	Liliaceae	Shatawari	02
20.	*Mangifera indica*	Anacardiaceae	Aamba	02
21.	*Adhatodavasica*	Acanthaceae	Adulsa	02
22.	*Tabernimontana alternifolia*	Apocynaceae	Tagar	07
23.	*Leucaena latisiliqua*	Mimosae	Subabhul	01
24.	*Cymbopogon citratus*	Poaceae	Gavtichaha	01
25.	*Annona reticulata*	Annonaceae	Ramphal	01
26.	*Polyalthialongifolia*	Annonaceae	Ubha Ashok	01
27.	*Micheliachampaka*	Magnoliaceae	Sonchafa	01
28.	*Plumeria alba*	Apocynaceae	Devchafa	02
29.	*Ficusbenjamina*	Moraceae	Jade	10
30.	*Canna indica*	Cannae	Kardal	01
31.	*Terminalia arjuna*	Combretaceae	Arjun	05
32.	*Frangula caroliniana*	Rhamnaceae	Indian Cherry	05
33.	*Phyllanthus emblica*	Euphorbiaceae	Amla	01
34.	*Terminalia chebula*	Combretaceae	Hirda	02

35.	*Nyctanthes arbor-tristis*	Oleaceae	Parijatak	01
36.	*Araucaria columnaris*	Araucariaceae	Christmas Tree	02
37.	*Neolamarckiacadamba*	Rubiaceae	Kadamba	01
38.	*Thuja compacta*	Casurinaceae	Morpankhi	04
39.	*Ocimum sanctum*	Lebiateae	Tulsi	02
40.	*Bryophyllumpinnatum*	Crassulaceae	Pan Futi	03
41.	*Anacardium occidentale*	Anacardiaceae	Cashew	02
42.	*Gliricidiasepium.*	Fabaceae	Gilsidi	05
43.	*Bambusa vulgaris*	Poaceae	Bamboo	10
44.	*Holopteleaintegrifolia*	Ulmaceae	Papdi	04
45.	*Hibiscus rosa-sinensis*	Malvaceae	China Rose	06
46.	*Portulaca grandiflora*	Portulacaceae	Mexican Rose	04
Total Plant Species = 46			***Total Number Of Plants = 140***	

Table No. 13 List of Ornamental Plants (Potted Plants)

Sr.No.	Name of the Species	Total Pots/Plants
1	Areca palm	2
2	Bottle palm	2
3	Ixora	6
4	Asparagus	1
5	Fern	1
6	Cycas	1
7	Centella	2
8	Aloe	1
9	Euphorbia species	2
10	Cactus	2
11	Rheo	2
Total= 22		
➢ Total Lawn area (area of green grass) =Sq.Feet.		

4.0 Energy Conservation Practices:

Table No.4.1 Shows department-wise electrical equipment and quantities

Department	Instrument	Voltage	Quantity
Botany	Hot Air Oven	230V (Input 850W)	1
	Laminar airflow	220V	1
	Autoclave	220V	1
	Led Tube light	20 v	2
	Fan	240V	2
	Centrifuge	240V	1
Zoology	Hot Air Oven	230V (Input 850W)	1
	Led Tube light	20 v	2
	Fan	240V	2
Physics	Monitor	180-255V	1
	CPU	230V	1
	Led Tube light	20 v	2
	Fan	240V	2
Chemistry	pH meter	0.06V	1
	Electric balance	20V	1
	Tube Light	20V	2
Mathematics	Fan	240V	1
	Tube Light	20 V	2
Computer Lab	FAN	240V	1
	Printer	110V	1
Gymkhana	Led Tube light	20 v	3
	Monitor	180-255V	1
	CPU	230V	1
	Fan	240V	2
Office	CPU	650V (input 230 output 230)	3
	Monitor	180-255V	3
	Printer	110V (340w)	1
	Xerox machine	240V (385w)	1
	Table fan	240V (100w)	2
	Led Tube light	20 v	3
Principal Cabin	Fan	240V	1
	Led Tube light	20 v	3

Energy Conservation refers to techniques for lowering energy use by eliminating waste and increasing efficiency. We all know that due to the significant disparity between

demand and supply, much effort must be put into closing the gap and generating more power, necessitating a lot of capital expenditure and raising many environmental problems. The most crucial aspect of energy management is energy conservation. We may lower our energy usage by using various energy conservation strategies, such as making better use of technology, using energy-efficient devices, and minimizing energy wastage.

More energy use means more CO2 emission, the primary cause of global warming and climate change. Therefore, energy conservation and sustainability in college buildings are crucial and highly prioritized on the government agenda. It is vital to consider how we use energy, particularly for lighting and cooling in buildings. The Karanjali College is also doing excellent work in energy conservation. The college uses energy-efficient electrical devices.

Table No.4.2 Shows the monthly utilization of electricity

SR.NO	Month	Units
1	January	956
2	February	608
3	March	342
4	April	542
5	May	221
6	June	485
7	July	546
8	August	601
9	September	496
10	October	512
11	November	405
12	December	445

In a month, the average college student uses 545 units of electricity. The Karanjali College's energy use is avarage. The college is the most efficient in terms of reducing energy consumption.

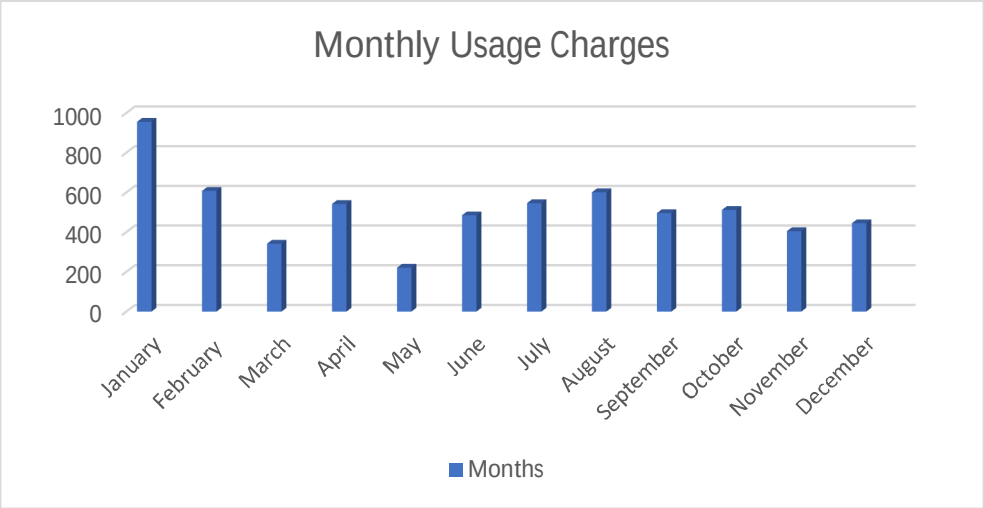

Figure No. 4.1 Electricity Usage Graph

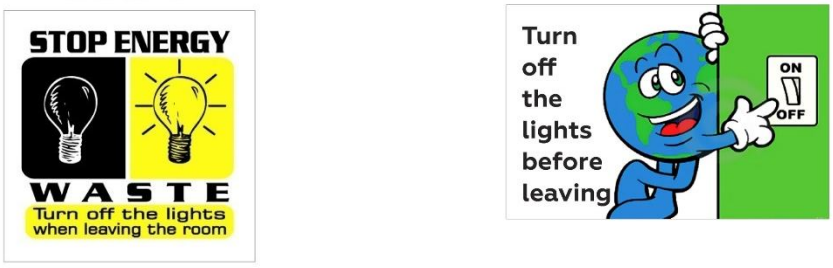

Photo No. 4.1 Energy conservation signage displayed on college campus.

5.0 Environment Awareness Programs:

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 and Commerce College is one of them, and many environment-friendly programs are organized through the college. These include tree plantation, Lectures on AIDS Awareness, a Plastic Eradication program, seed collection, a workshop on wild vegetables, a Health Checkup Camp, a Nature Visit, etc.

a. Tree Plantation Activity:

Photo No. 5.1 Plantation Activities in and Around the College

Every year, many Indian plants are planted by the college on the college premises, in Karanjali, and surrounding areas. Plantation activities are crucial in reducing global warming due to rising pollution and carbon dioxide emissions. So far, more than 300 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.

b. Swachh Bharat Abhiyan:

As per the directives of Savitribai Phule Pune University, Pune, M. J. M Art's Science and Commerce College organized regular N.S.S activity of swachataabhiyaan/Cleanliness Campaign at college campus on Thursday dated 11 July 2019. Students clean the botanical garden and other surrounding area.

Photo No. 5.2 Participation of students and teachers in Swatch Bharat Abhiyan

c. Pollution Awarness Rally:

As per the directives of Pune university, NSS department of MJM college have organized regular activity. In pollution awareness rally 45 students have participated dated 22 July 2019. Students has prepared a slogan on pollution control. Students have made effective contribution of program successful.Pollution awareness can help people understand the negative effects of pollution on the environment and human health, and how to reduce it.

Photo No. 5.3 Participation of students and teachers in Pollution Awarness Rally

d.Construction of Check Dam for Water Conservation:

With the help of the NSS unit of Karanjali College, a Vanrai Bandara(Check Dam) has been constructed on a small river flowing near Devgaon. The dam is helping to reduce soil erosion to a large extent. This dam also recharges the groundwater.

Photo No. 5.4 shows the construction of the Check Dam on the river at Devgaon Village.

e.Celebration of Yoga Day:

On the occasion of 5th international yoga day, M. J. M College have celebrated yoga day on 21/06/2019 at 7.00 am on behalf of National service scheme and Department of physical education. 45 students were participated. All professors and students actively participated for this programme. Dr. Jundre demonstrated many *Asans* to all and one by one every person have completed it. *Asans* like *shavasan, padmasan, alom-vilom* have perfomed.

Photo No. 5.5 Shows celebration of International Yoga Day

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f.Seed Conservation Workshop:

Karanjali College is located in a hilly and tribal area. Many food crops and wild species of plants are found in this area. Seed conservation workshops are organized annually by the college for seed conservation of these species. Many farmers and students from surrounding areas participate in this program.

Photo No. 5.6 shows the participation of Local people and students in the seed conservation workshop.

g.Disaster Management Workshop:

Disaster Management Workshop is organized for students annually through the Board of Student Development. In this workshop, students are informed about how to prepare for different types of natural disasters.

Photo No. 5.7 Shows Participation of Students in Disaster Preparedness Workshop

h. Medical Camp:

Medical camp was organized dated 20 December 2019 for the peoples of Devgoan village including citizens, old peoples, children and women. In this health check-up Haemoglobin, Blood sugar, Blood Pressure checked by Peth rural hospital. A team peth RH members including Dr. Pagar, Dr.Pawar, Dr.Nigvekar were present. More than 40 villagers were present.

Photo no. 5.8 Shows student participation in Medical Camp

6.0 Conclusion and Recommendation

The Green Audit of SanhadriShikshan Mandal's Dhindori, Mahant Jamnadas Maharaj Arts, Commerce and Science College, Karanjali, 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 observation, some of the conclusions are made as follows.

1. The college, with 29 staff members and 708 students in diverse undergraduate programs, has a 5.00-acre campus and a 20,000-square-foot building.
2. The faculty is highly skilled, dedicated, and committed to academic excellence.
3. Additionally, the institution prioritizes providing educational opportunities to socially and economically disadvantaged students, contributing to national development.
4. The ECC establishes and shares the organization's Environmental Policy with all members, detailing its sustainability goals, objectives, scope, and priorities. Furthermore, it provides essential baseline data to external auditing agencies.
5. The college employs water filters and an RO system for water treatment. The two 5000-liter overhead water tanks are refilled twice daily.
6. Specific physicochemical parameters like EC, Hardness, and TDS exceed acceptable limits, requiring treatment before consumption. However, other bacteriological parameters meet standards.

7. Karanjali College produces 7696 liters of wastewater daily, primarily from sanitation needs. It has a septic system with a capacity of 20000 lpcd and a four-day detention time. The remaining sewage, about 2936 liters, can be used for campus plant irrigation.
8. Rainwater harvesting system could provide 2671 liters daily, 76% of the total demand.
9. With a runoff coefficient and a surface area of 18050 square meters, the college has the potential to collect approximately 5370191 liters annually.
10. Most campus locations meet the 50 dB(A) noise limit, though the Lecture Hall and Laboratory slightly exceed it. Continuous monitoring and noise reduction strategies may be needed to maintain a conducive environment for learning and work.
11. The campus boasts a substantial green cover, comprising approximately 39.37% of the total area, contributing to environmental sustainability and enhancing the premises' aesthetics and ecological balance.
12. Regarding electricity consumption, there is fluctuation in energy usage throughout the year, with higher consumption during months such as January, June, July, August, September, and October, and lower consumption is observed in months like March, May, and November. The college utilized around 550 units/per month on average.

6.2 Recommendations

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

Rewritten Content:

1.Ordinary monitoring and recording of environmental facts are important, with records accessible to control.

2.Internal approaches making sure compliance with environmental requirements should

be set up, with particular responsibility for implementation.Emphasis need to be placed on organizing environmental activities by numerous departments within the college.

four. Plans include expanding a vermicomposting facility, biodegradable waste management, and emphasizing waste reuse or recycling. Installation of solar panels is suggested for energy conservation efforts.

3.Considering the land slope, it is really useful to assemble a stormwater drain to effectively control rainfall runoff and channel it to a designated rainwater harvesting pit.