The New Miraj Education Society's

Kanya Mahavidyalaya, Miraj

Environment Audit Report

Prepared by

Department of Environmental Science,

Shivaji University, Kolhapur- 416004

2022-23

Chief Editor

Dr. (Mrs.) Aasawari S. Jadhav

Editorial Team

Mr. Chetan S. Bhosale
Ms. Prajkta S. Sarkale
Ms. Priya R. Vasagadekar
Ms. Sanjivani T. Chougale
Dr. (Mrs.) Pallavi R. Bhosale

Field Team

Dr. (Mrs.) Aasawari S. Jadhav
Dr.(Mrs.) Pallavi R. Bhosale
Ms. Priya R. Vasagadekar
Mr. Chetan S. Bhosale
Ms. Sanjivani T. Chougale
Ms. Prajakta S. Sarkale

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

SHIVAJI UNIVERSITY, KOLHAPUR
DEPARTMENT OF ENVIRONMENTAL SCIENCE
Vidyanagar, KOLHAPUR - 416 004, Maharashtra, India
Tel. : 0231-2609333 / 9304, Gram:"UNISHIVAJI"
Fax : 0091-0231-2691533/2333
E-mail : envsc@unishivaji.ac.in

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with CGPA 3.52

Ref. No./SUK/ENV

Date: 16/05/2023

Certificate

This is to certify that the Department of Environmental Science, Shivaji University, Kolhapur has conducted detailed "Environmental Audit" of "The New Miraj Education Society's Kanya Mahavidyalaya, Miraj" during the academic year 2022-2023. The Environmental audit was conducted in accordance with the applicable standards prescribed by Central Pollution Control Board, New Delhi and Ministry of Environment, Forest and Climate Change, New Delhi. The audit involves water, wastewater, energy, air, green inventory, solid waste etc and gives an 'Environmental Management Plan', which the institute can follow to minimize impact on the institutional working framework. The performance of college was found to have good quality. Eventhough there is more improvement needed with respect to sustainable Green practices in case of water resource management and Solid waste management. In an opinion and to the best of our information and according to the information given to us, said Environmental audit gives a true and fair view in conformity with environmental auditing principles accepted in India.

Head
Department of Environmental Science,
Shivaji University, Kolhapur

Department of Environmental Science, Shivaji University, Kolhapur

The New Miraj Education Society, Miraj
Affiliated to Shivaji University, Kolhapur
☎ Ph. (0233) 2223347

KANYA MAHAVIDYALAYA, MIRAJ

Post Box No. 29, Shivaji Road, Miraj - 416 410. (Dist. Sangli)
Email : kanyamahavidyalayamiraj@gmail.com **Website :** kmmiraj.org

Ref. No. : Date :

Principal's Message

The Institute realizing the need of Green, Energy and Environment Audit for Environment friendly campus is serious for the assessment of the campus for such audits. In the Globalized world, many environmental issues have to face and it has become our prime duty to protect the earth from all types pollutions.

Our institute has framed the 'Eco-Friendly Campus Cell' which takes initiatives to keep the environment of the campus clean and green. Under the guidance of this cell our departments of N.S.S. and N.C.C. organize cleanliness drive regularly. Similarly, various programmes are organized for our students to increase awareness about environment protection and sustainability. The institute has set up Rain-Harvesting and Compost Fertilizer project for waste management.

The roll of HEI institutes in Environment Sustainability is crucial today. Hence our institute not only takes efforts inside the campus but also outside the campus for eco-friendly activities. The collection of e-waste is also done to increase the awareness of society about the dangers of e-waste and plastic.

Along with this programmes, the record is maintained to assess the environmental performance of our institution and to find out solutions for eco-friendly campus. All the programmes are in relation to the objectives to improve the environmental conditions in and around the institute.

So, I am happy that our institution is conducting these audits very keenly under the guidance of a team from the Shivaji University, Kolhapur. It certainly helps us to act in response to the environmental issues in future.

Thank you,

KANYA MAHAVIDYALAYA MIRAJ

Principal
Kanya Mahavidyalaya, Miraj.
Dr. U.M.Malkar

Place: Miraj

Date: **16/05/2023**

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Chapter - I
Introduction

1.1 Environment Audit, a Tool for Environmental Protection:

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

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

1.2 Benefits of Environment Audit:

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

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

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

1.3 NAAC Criteria VII Environmental Consciousness:

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

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

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

Chapter II

Methodology

The College has conducted Environment Audit in the year 2022-23, on a yearly basis. The audit was carried out in three phases.

2.1 Questionnaire survey:

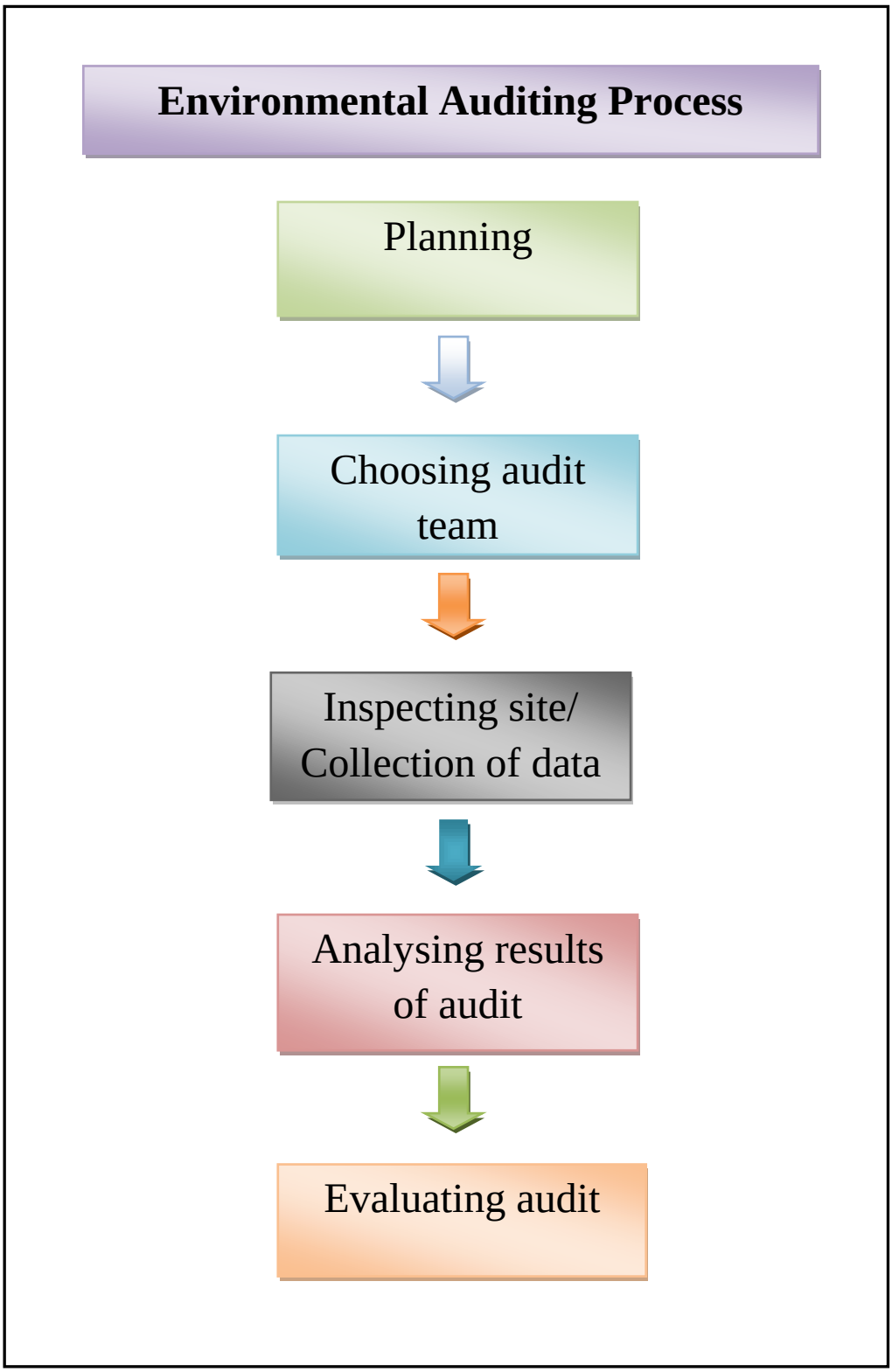
It includes administrative issues associated with the planning of audit, selecting the personnel for the audit team, preparing the audit protocol used by organization, obtaining background information, etc. The scope of the audit was defined at this step. It was decided that the information related to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

2. 2 Onsite visit and observations:

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

2.3 Data analysis:

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


Environmental Auditing Process
Planning
Choosing audit team
Inspecting site/ Collection of data
Analysing results of audit
Evaluating audit

Chapter III
Overview of Environment Audit

3.1 Kanya Mahavidyalaya, Miraj a glance:

Kanya Mahavidyalaya, Miraj college is one of the leading college to provide the opportunity of higher education to economically and socially disadvantaged students. Kolhapur Municipal Corporation established Kanya Mahavidyalaya, Miraj College to dispel this deficiency to develop college education. The College has huge campus with many classrooms, Arts and Commerce section, canteens, library facility, Auditorium, Gymkhana etc. Enormous manpower including students, administrative faculty, teaching and nonteaching faculty, workers use this huge premises for various purposes.

Kanya Mahavidyalaya, Miraj is situated in Maharashtra at 74°38´36.56´´E and 16°49´27.65´´N, in the Kolhapur District. It covers an area of about 1.27 acre.

Satellite image of Campus Kanya Mahavidyalaya, Miraj.

Source: Google Earth

COLLEGE PROFILE IN BRIEF

NAME OF THE COLLEGE:	The New Miraj Education Society's Kanya Mahavidyalaya, Miraj.
ESTABLISHMENT:	1983
PIONEERS:	Hon.Arvindrao Govindrao Marathe
No. OF STUDENTS:	975
FACULTY:	13
NON-TEACHING STAFF:	17
FACILITIES:	A spacious, green campus with a strong well ventilated building with good infrastructure, 15 classrooms, Library, Gymkhana, Canteen , Computer lab etc.. The institute provides basic facilities of washrooms, common room, water purifying system, vending machine. The campus is surrounded by various trees.
RESEARCH AND EXTENSION ACTIVITY:	College conducts different courses for the excellence of U.G.& P.G Degree and Certificate courses. The college has a good number of extension activities like plantation of trees, cleanliness drive, cleaning of public places and village, seminars, workshops, environmental awareness campaigns, etc. The college has compost fertilizer project which helps for waste management. In addition to it the college has rain harvesting system.
AREA OF COLLEGE:	1.27 acres.

3.2 Water and Wastewater Audit:

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

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

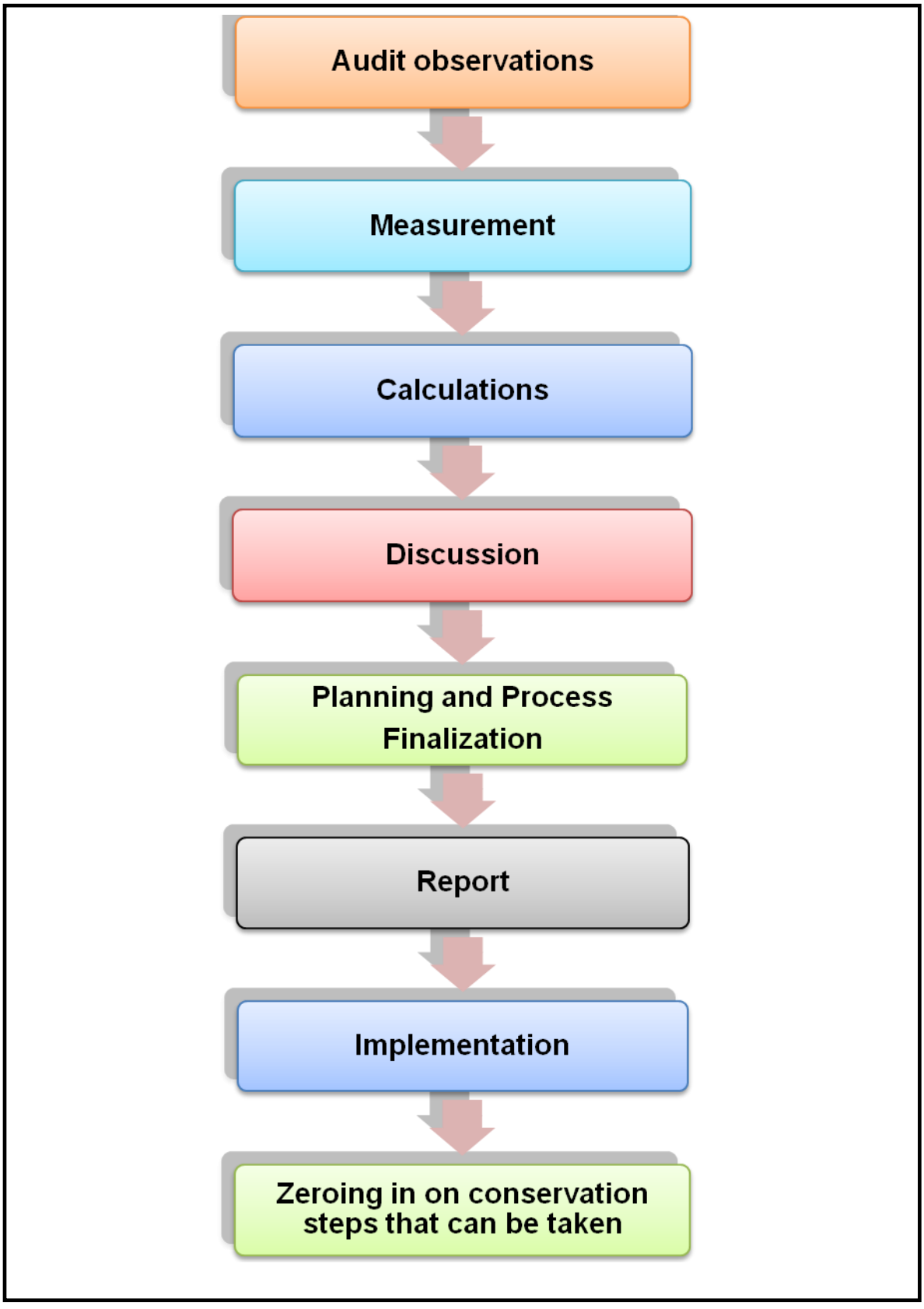
Importance of Water Audit:

It is observed that a number of factors like climate, culture, food habits, work and working conditions, level and type of development, and physiology determine the requirement of water. The community which has a population between 20,000 to 100,000 requires 100 to 150 liters per person (capita) per day. As per the standards provided by WHO Regional office for South East Asia Schools require 2 liters per student for drinking; 10-15 liters per student if water-flushed toilets, Administration requires (Staff accommodation not included) 50 liters per person per day, Staff accommodation requires 30 liters per person per day and for sanitation purposes it depends on technology.

3.2.1 Water Audit:

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

Water Audit Process



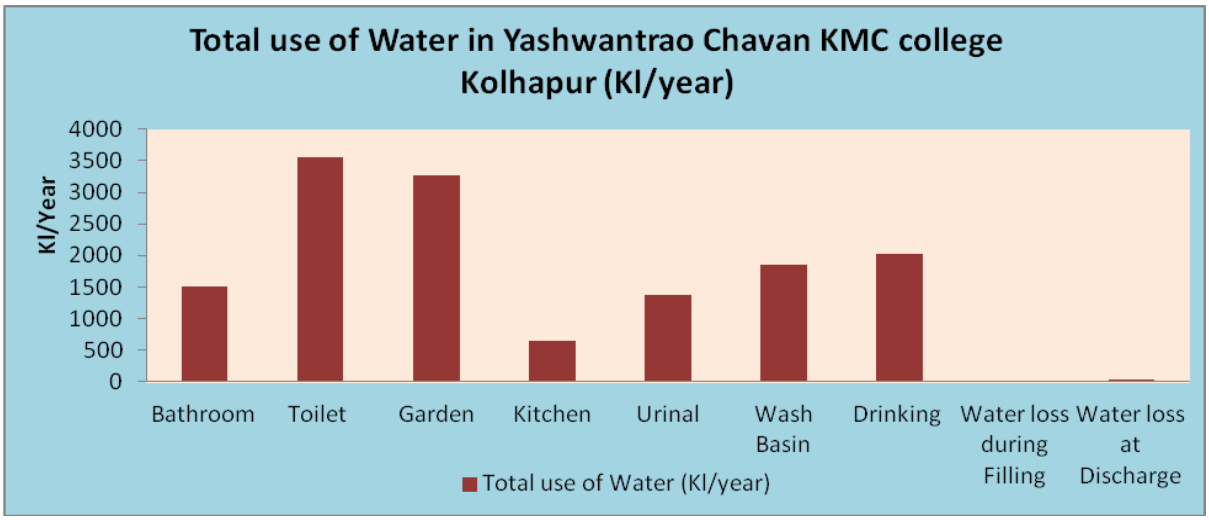
3.2.2 Water consumption in College:

From the data collected for water audit of Kanya Mahavidyalaya, Miraj the water distribution and water consumption pattern is noticed. The College includes Main Building with Staff room and Principal room, Exam section and Ladies room. Also, all Departments of Arts and Commerce including language. College has support services like Gymkhana, Auditorium, Garden, library, ICT room and NCC section etc.

3.2.2. a The water consumption at Kanya Mahavidyalaya, Miraj:

Table No. 3.2.1: Sector wise calculated use of water in Kanya Mahavidyalaya, Miraj

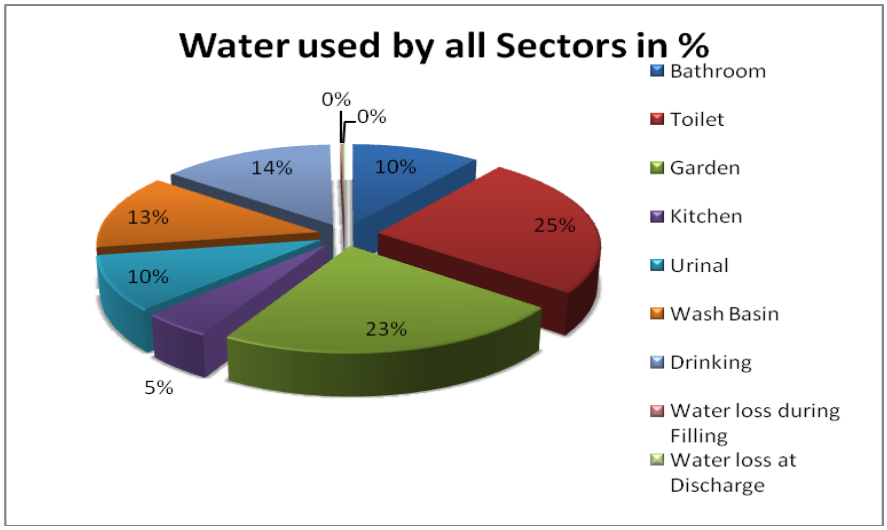
Sr. No.	Sector	Total daily use (Kl/day)	Total yearly use (Kl/year)	Percentage %
1	Bathroom	12	1500	10.50
2	Toilet	28.5	3562.5	24.94
3	Garden	20.4	3264	22.85
4	Kitchen	4.05	648	4.54
5	Urinal	10.95	1368.7	9.58
6	Wash Basin	14.88	1860.5	13.02
7	Drinking	16.264	2033	14.23
8	Water loss during Filling	0.14	18	0.13
9	Water loss at Discharge	0.24	30.00	0.21
Total		**107.43**	**14284.75**	**100**



Graph No. 3.2.1 Total water consumption yearly by Kanya Mahavidyalaya, Miraj.

It is revealed from the data given in Table No. 3.2.1 and Graph No. 3.2.1 that total 107.43 Kiloliter daily and yearly 14284.75 Kiloliter water is used. College includes Main Building, having Staff room and Principal room, Exam section and Ladies room. Also all Departments of Arts and Commerce including languages. College has support services like Gymkhana, Auditorium, Garden, library, ICT and NCC, NSS section using water is seen for bathrooms, toilet, drinking, washbasin, kitchen, and urinal purpose for daily and calculated yearly. From above data, it is observed that the maximum water consumption was for Toilet which is 28.5 Kilolitre/day i.e. 3562.50 Kilolitre/year and for Garden purpose 20.4 Kilolitre/day and yearly 3264 Kilolitre/year. Water loss during filling of water in tank was noted as 0.14 Kilolitre/day i.e. 18 Kilolitre/year and water losses at discharge were found to be 0.24 Kilolitre/day i.e. 30 Kilolitre/year.

3.2.2. Average daily water consumption by Kanya Mahavidyalaya, Miraj.



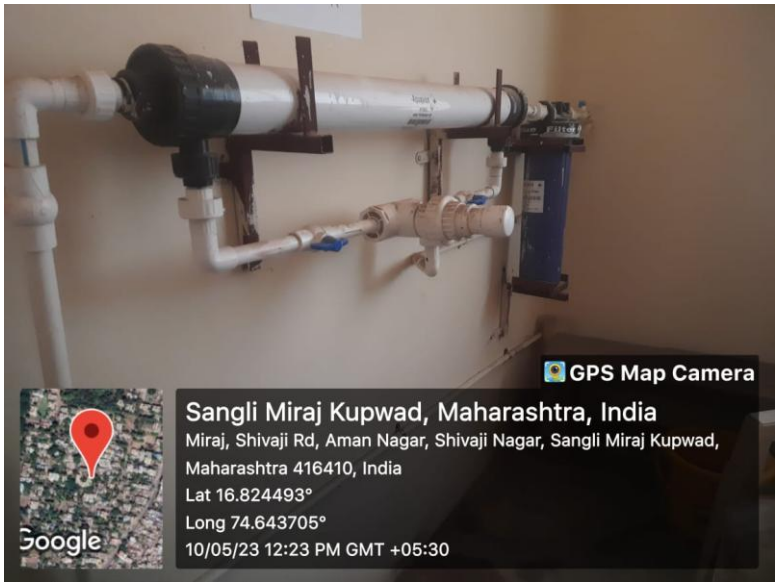
Graph No. 3.2.2 Average Daily Water consumption by Kanya Mahavidyalaya, Miraj.

Graph No. 3.2.2 shows the total percent of water consumed by Kanya Mahavidyalaya, Miraj in the 2022-23. As per the graph Toilets, Garden, Drinking, Washbasin, Urinal, and Bathroom are the major sources of utilization comprising 25%, 23 %, 14%, 13%,10 and 10% respectively. The other uses namely Kitchen consume relatively less water with daily water requirement of 5% respectively in the year 2022-23.

3.2.3 Sustainable Water Practices (SWP):

3.2.3.a. **3.2.3. Water filter Unit:**

Kanya Mahavidyalaya, Miraj has water filter unit in the campus. The plant has 1000 liter capacity, which helps to get pure water for drinking to all members of college. It will help to minimize the water born disease occurrence.



Advanced water filter unit

3.2.3. b. Rainwater harvesting project :

Kanya Mahavidyalaya,Miraj having rainwater harvesting project having collection tank having capacity …. This helps to collect rainwater from roof top area of college, collected water stored in tank and for ground water recharging and recharging of bore well.

Rainwater collection tank for rain water harvesting

3.2.3.c. Drip Irrigation in Kanya Mahavidyalaya college Garden

College has green campus. Drip irrigation system has been installed at gardens, which help to save water, and nutrients by allowing water to drip slowly to the roots of plants. The goal is to place water directly into the root zone and minimize evaporation to save water.

Drip irrigation in Kanya Mahavidyalaya garden

Key Observations:

- The calculation revealed that highest water use sectors are Toilets, which consumes average 25 % water, and remaining 75 % water consumption further divided into other sectors in such garden, urinals, washbasin bathroom and kitchen etc.

- College follows some water conservation practices such as Rainwater harvesting, Advanced water filter, Drip irrigation and water collection pipe.
- The college cleans the water tanks regularly. They have maintained the cleaning report of water tank. It is only necessary to reduce the force of tap water, so that water is not wasted.
- To enhance the operating efficiency and reduce the water wastage, College should include more sustainable water practices (SWP) such as to set goals to improve your water usage. Installation of small wastewater treatment plant and reuse of treated water, Water sub metering etc.

3.3. Air Quality Status:

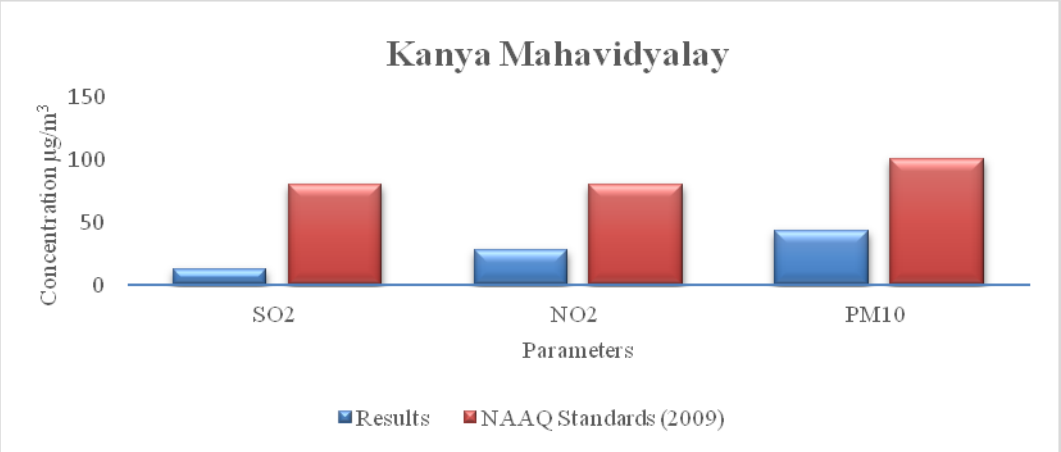
Ambient air pollutants monitoring is an important part of environmental monitoring. Particulate matter and trace gases sampling were carried out on the college campus. The sampling was carried out using calibrated Handy Dust Sampler APM 821 with flow rate 1 lit/min equipped with glass fibre filter paper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

Sulphur dioxide (SO_2) and Oxides of Nitrogen (NO_2) in the air were estimated with West and Gaeke method and Jacob and Hochheiser modified method respectively. Particulate matter (PM_{10}) was measured gravimetrically. The samples were collected and analyzed in the laboratory of Department of Environmental Science, Shivaji University, Kolhapur. The details of air quality status in the college are given in the Table No. 3.5.1and Graph No. 3.5.1

Table No. 3.3.1. Ambient air quality status in Kanya Mahavidyalay, Miraj.

(All values in µg/m^3)

Sr. No	Parameters	Concentration	NAAQ Standards (2009) (µg/m^3)
1	SO_2	12.33	**80**
2	NO_2	27.54	**80**
3	PM_{10}	43.50	**100**



Graph No. 3.3.1 ambient air quality status in Kanya Mahavidyalay, Miraj.

The graph shows the SO_2, NO_2 and PM_{10} concentration. The concentrations of the air pollutants are below the CPCB standards. It was observed that very few activities in the campus are responsible for air pollution.

Indoor air quality status of college campus

When contaminants are not present at unsafe concentrations and the majority of people report feeling satisfied, indoor air is deemed to be healthy. An average person breathes approximately 12,000 litres of air every day, which is essential for good health. Exposure to potentially cancer-causing airborne substances found in enclosed spaces has negative effects such as respiratory and cardiovascular disorders, allergies, and respiratory tract irritation.

The primary sources of indoor air pollution are outdoor air, indoor cooking (especially frying or cooking with biomass), tobacco use, contaminated ambient air, cleaning products, dust that is re-suspended during cleaning tasks, construction materials and paints, copier and printer use, and other human activities. Vehicle emissions, thermal power plants, biomass burning, construction activities, unattended waste, open sewage pipes, fossil fuel-based power production, numerous industrial processes, etc. are examples of sources of ambient air pollution.

In college campus, all lecture rooms have good ventilation. In Computer lab use of online battery operated inverter shows presence of carbon monoxide. This air pollutant is harmful to human being. Therefore, proper ventilation is necessary in this laboratory.

Table No. 3.3.2. Indoor air quality in Kanya Mahavidyalay, Miraj.

Sr. No.	Locations	CO_2 (%)	CH_4 (%)	O_2 (%)	H_2S (PPM)	CO (PPM)
1	Campus	0.04	2	20.9	BDL	BDL
2	Staffroom	0.04	2	20.9	BDL	BDL
3	B. A. I. B	0.04	2	20.9	BDL	BDL
4	B. A. I. A	0.05	2	20.9	BDL	BDL
5	Digital Classroom	0.05	1	20.9	BDL	BDL
6	Computer Lab	0.06	2	20.9	BDL	**14**

7	Room No. 5	0.07	2	20.9	BDL	BDL
8	Library	0.04	2	20.9	BDL	BDL
9	Auditorium	0.04	2	20.9	BDL	BDL
10	Room No. 15	0.04	2	20.9	BDL	BDL
11	Gymkhana room	0.05	1	20.9	BDL	BDL
12	B. Com. I	0.07	2	20.9	BDL	BDL
13	D. G. Set off	0.04	BDL	20.9	BDL	BDL
14	D. G. Set on	0.06	BDL	20.9	BDL	BDL

Key Observations:

1. Prohibit burning mulch in the open area.
2. Avoid using diesel generator.

3.4.1 Ambient noise monitoring status:

Ambient noise monitoring was carried out in different areas of college campus like at classrooms, labs, and campus. The sampling was done using calibrated Sound Level Meter (AZ 8921) by logarithmic scale in Decibels (dB). The noise readings were collected in the college campus and calculated. The details of noise status in Kannya Mahavidyaly, Miraj. are given Table No. 3.13 and Graph No. 3.12.

Table no 3.4 Ambient Noise levels in Kanya Mahavidyalay, Miraj.

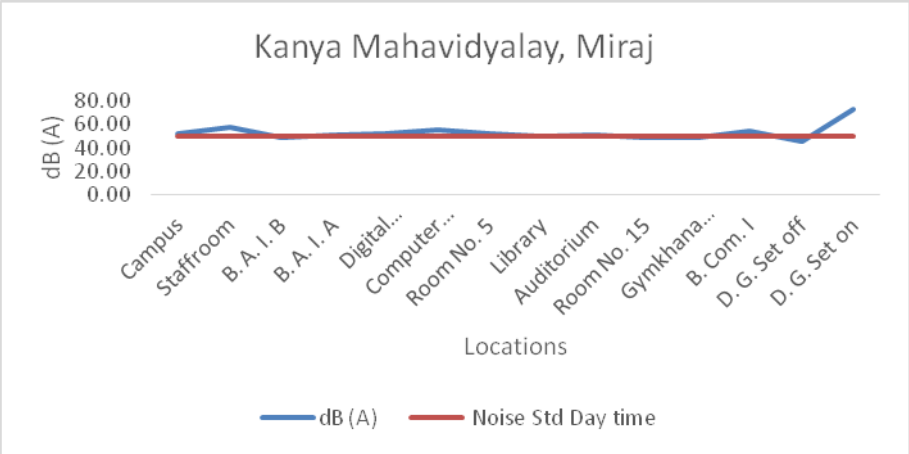
Kanya Mahavidyalay, Miraj			
Sr. No	**Site Name**	**dB(A)**	**Noise Std Day time**
1	Campus	**52.50**	50
2	Staffroom	**57.60**	50
3	B. A. I. B	48.30	50
4	B. A. I. A	**51.30**	50
5	Digital Classroom	**51.90**	50
6	Computer Lab	**55.40**	50
7	Room No. 5	**52.46**	50
8	Library	**50.21**	50
9	Auditorium	**51.19**	50
10	Room No. 15	48.36	50
11	Gymkhana room	49.02	50
12	B. Com. I	**54.30**	50
13	D. G. Set off	45.40	50
14	D. G. Set on	**72.60**	50

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

2. All Results are day time.

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

It is observed ambient noise levels in the Kanya Mahavidyaly, Miraj are campus, staff room, B. A. I. Div. A, digital classroom, computer lab, generator set, room no. 5, auditorium and B. Com. I classroom are on higher side as compared to the standards of Central Pollution Control Board for day time. This may be due to human communication in high sound in the college premises. Vehicles are generating the high-level sound. Echo generation in corridors is reason to monitor high levels of noise.



Graph No.3.4 Ambient Noise levels in Kanya Mahavidyalay, Miraj.

The graph shows that ambient noise levels in Kanya Mahavidalay, Miraj. Ambient noise levels in campus, staff room, B. A. I. Div. A, digital classroom, computer lab, generator set, room no. 5, auditorium and B. Com. I classroom are higher side.

Ambient air monitoring and Noise monitoring in Kanya Mahavidyalay, Miraj

Indoor air monitoring and Noise monitoring in Kanya Mahavidyalay, Miraj

Key observations:

1. Around the college is a residential area. Home appliances and human communication generate major source.
2. The echoes generated in classrooms

Chapter IV
CONCLUSION AND MANAGEMENT PLAN

The Department of Environmental Science, Shivaji University, Kolhapur has conducted a Environment Audit of Kanya Mahavidyalaya, Miraj in the academic year 2022-23. Environment Auditing is the process of identifying and determining whether college practices are eco-friendly and sustainable. The main objective of College to carry out Environment Audit is to check green practices followed by college and to conduct a well formulated audit to understand where we stand on a scale of environmental soundness.

Conclusions:

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

1. Availability of water is not the actual problem but efficient management of water is major issue that need to work on.
2. Water Audit helps to quantify all forms of losses and helps in reducing the non-revenue water.
3. Water consumption is more in Garden area.
4. Roof top rainwater harvesting project is present in college which is useful for filling up of tanks on campus.
5. College can conduct more seminars, group discussions and eco-friendly activities on environmental education and awareness
6. College should maintain hygienic conditions and cleanliness in their premises
7. Air quality on the campus is good.

Recommendations:

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

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

4. Rainwater harvesting facility must be expanded and should be improvising through sand filtration system for better quality.
5. To meet EPA standards for safe drinking, water samples should be tested by a certified laboratory.

ENVIRONMENT MANAGEMENT PLAN:

By understanding the dynamics of present situation of resource utilization and current practices of waste disposal, we have prepared an Environment Management Plan (EMP) for the Kanya Mahavidyalaya, Miraj. This plan not only will provide the strengths, weaknesses and remedies for the green and clean campus but also give priority of the sector where the College has to give more efforts to improve its environment.

Environment Management Plan 2022-23

Sector	Strengths	Weakness	Suggestions	Priority
Water				
Water utilization	• College has Rainwater harvesting project.	• Overflowing of tanks at some places • Overuse of water at in toilets and Gardening perpose.	• Installation of automatic water pumps to avoid overflowing losses • Proper and timely maintenance of plumbing at all departments • Installation of sand filter to rain water harvesting assembly.	Medium
Air and Noise				
Air and Noise	Air quality is still in good condition	Noise levels overall in college is on higher side	The plantation can be increased by vertical gardening	Medium

Visit of audit team of Shivaji University to The New Miraj Education Society's

Kanya Mahavidyalaya, Miraj

Prepared by
Department of Environmental Science,
Shivaji University, Kolhapur-416 004