



Rayat Shikshan Sanstha's

Arts and Commerce College, Madha

Indira Gandhi Chowk, Madha, Tal- Madha, Dist- Solapur, Pin- 413209

Campus Environment Audit Report

Prepared by

Taluka Agriculture Office, Madha, Tal- Madha,

Dist- Solapur, pin- 413209

2018-19





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➤ **Profile of Rayat Shikshan Sanstha, Satara:**

Dr. Karmaveer Bhaurao Patil was born on 22 September, 1887 at Kumbhoj, in the Kolhapur district of Maharashtra. He realized that the social ills could be remedied through the education of the masses alone and so laid the foundation of the Rayat Shikshan Sanstha by opening a Boarding House at Kale (Tal-Karad, Dist-Satara) in 1919. Soon, however, in 1924 he shifted the head-quarters of his educational institution to Satara. In his view, education is the means to empower the masses to enjoy the fruits of freedom and to emancipate them from social, economic and cultural slavery. The value of its contribution to education in general is enormously great as it has, from the very beginning, tried all its best to lay emphasis on the education of the down-trodden, the poor and the ignorant who really form the major bulk of the society.

The Rayat Shikshan Sanstha, is one of the leading educational institutions in Asia. The institution works with a noble mission, and a noble cause with 'Education through self help' as its motto. 'Earn and Learn' scheme introduced by Karmaveer Bhaurao Patil has been widely accepted by other educational institutions. This scheme has supported many economically weaker students to pursue education. Today, Sanstha runs 709 branches involving 42 Colleges, 438 secondary schools, 8 training colleges, 42 primary schools (English medium-20), 31 pre-primary schools (English medium- 18), 80 cosmopolitan hostels, 7 administrative offices, 8 Ashramshalas, and 57 ancillary Branches. It has spread over 15 districts of Maharashtra and 1 district of Karnataka with 14990 (female 3717) employees belonging to 170 castes and communities and 4 lakh 59 thousand 729 students (female 2, 13,474). The statistics speak of the phenomenal progress and achievement of the Rayat Shikshan Sanstha as dream by the Karmaveer. Considering the contribution made by the sanstha in uplifting of the society especially rural, downtrodden and economically weaker strata through education, many GO's and NGO's have honoured the sanstha with prestigious awards.

(Establishment: 1919)



➤ **College profile:**

This college came in existence in 1970 as an outcome of visionary educational mission of Padmabhushan Dr. Karmveer Bhaurao Patil alias Anna. His life was the saga of unprecedented struggle for social reformation. His philosophy was nurtured on the teachings of Chh. Shivaji Maharaj, the seventeenth century reformative king through Mahatma Jotiba Phule, Rajarshi Chh. Shahu Maharaj, Maharshi Vitthal Ramaji Shinde, Sant Gadage Baba and Dr. Babasaheb Ambedkar.

Arts and Commerce College, Madha is affiliated to Punyashlok Ahilyadevi Holkar Solapur University, Solapur (Maharashtra). It is governed by Rayat Shikshan Sanstha, Satara, prominent educational institutions in Maharashtra established by late Padmabhushan Dr. Karmveer Bhaurao Patil. The motto of sanstha is "Education Through Self-Help". Dr. Karmveer Bhaurao Patil regulated "Earn and Learn" Scheme for the needy students. The College is established in June 1970 & today it is one of the leading colleges in Punyashlok Ahilyadevi

The College providing under graduate (UG) educational programme. It has the streams of Arts and Commerce. The college strives for empowerment of women through quality education and to succeed in this task is working in conformity with the objectives and goal with 'equity access & excellence' in higher education. The College aims giving more stress on advanced studies, new programs through innovative teaching learning methods, while providing enriched academic environment for women students through advanced studies in higher education for tomorrow's better society. To ensure quality, equity, access and social justice in higher education to the down trodden and deprived sections of the society i.e. SC, ST, OBC, SBC, female students under the various schemes of UGC. In order to provide excellent academic environment & facilities in the college, we proposed extension of existing building for new programs at UG/PG level the proposed extension of the building as per UGC norms.

Environmental Auditing Process

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Planning

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Choosing Audit Team

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Inspecting Site/Collection
Of Data

↓

Analyzing Results of Audit

↓

Evaluating Audit

Overview of Green Audit

➤ Arts and Commerce College, Madha, Solapur at a glance:

Arts and Commerce College, Madha, is situated at South-East of Maharashtra at $18^{\circ}01'27''$ N and $75^{\circ}31'07''$ E, in the Solapur district and it is at altitude of 501m above mean sea level. It covers an area of about 7.95 ha.

Satellite image of Arts and Commerce College, Madha, Solapur Campus



Source: Google Earth

COLLEGE PROFILE IN BRIEF

NAME OF THE COLLEGE:	Arts and Commerce college, Madha, Solapur.
ESTABLISHMENT:	June 1970
PIONEERS:	Padmabhushan Dr. Karmveer Bhaurao Patil (Anna)
No. OF STUDENTS:	471
FACULTY:	20
FACILITIES:	A well-equipped campus with a good infrastructure, with modern classrooms, good indoor Gymkhana, playground facilities and qualified staff. National Child Labour Project, NSS Office, Spoken English Course, Fashion Design And Tailoring Beauty Parlor Bank Recruitment Exam. Arts and Commerce College's Library has a long tradition since 1970 having the collection of 33324+ print books, 23+ print journal & magazines, various subscribed online-books & e-journals.
RESEARCH AND EXTENSION	
ACTIVITY:	College conducts 22 courses under the guidance of Rayat Kshikshan Sanstha for the excellence of students. The college has a good number of extension activity like plantation of trees, river cleanliness, cleaning of public places and Village, Govern, River cleanliness seminars, Environmental awareness campaigns, No Vehicle Day etc.
AREA OF COLLEGE:	7.95 hectares.

➤ **Water and Waste water 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 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. Manmohan Singh in 2003 and appealed to all citizens to collectively address the problem of water shortage, by conserving every drop of water and suggested for conducting water audit for all sectors of water use.

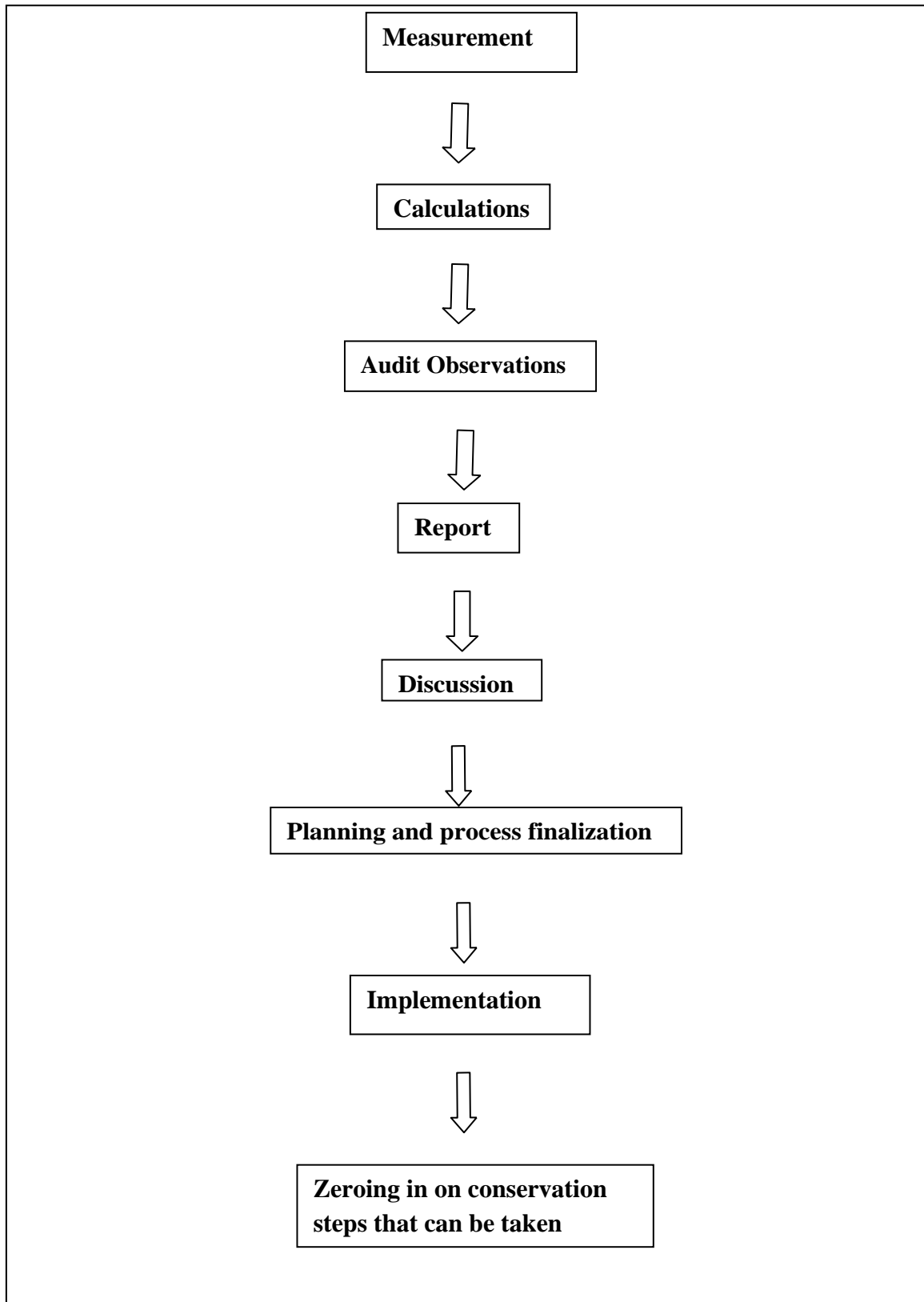
Water audit can be defined as a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water.

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

➤ **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 residence 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 waste water from chemical and biological laboratories which ultimately going down in sink or drainage system.

Water Audit Process:

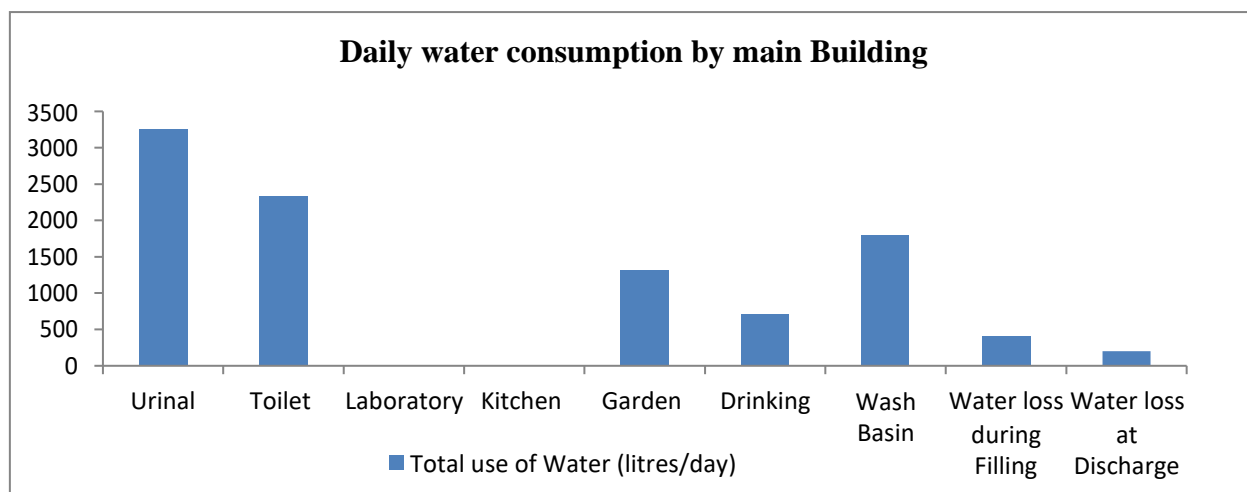


➤ **Overall water consumption in Arts and Commerce College, Madha, Solapur**

From the data collected for water audit of Arts and Commerce College, Madha, Solapur, the water distribution and water consumption pattern is noticed as follow. The college is having the main building for the administrative work and for teaching work (Labeled A building). Daily water consumption by Main Building is as follow.

Table: Daily water consumption by Main Building:

Daily water consumption by A Building										
Site	Urinal	Toilet	Laboratory	Kitchen	Garden	Drinking	Wash Basin	Water loss during Filling	Water loss at Discharge	Total
Total use of Water (liters/day)	3250	2330	0	0	1310	700	1800	410	200	10000
Percentage	32.5	23.3	0	0	13.1	7	18	4.1	2	100

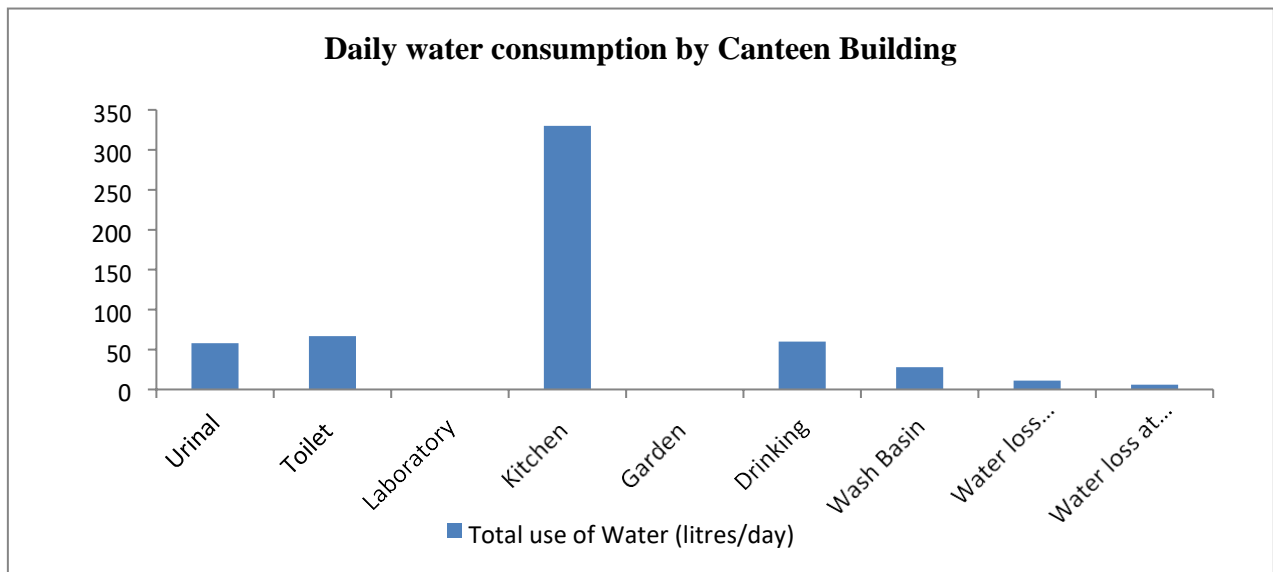


Graph: Daily water consumption by main building

It is revealed from the data that total 10,000 lit/day water is used in the Building A for the Urinals, toilet, drinking, wash basin, garden etc purpose. From above data it is observed that the maximum water consumption was observed for urinal purpose which is found to be 3250 lit/Day i.e. (32. 5%). Water loss during Filling of water in tank was noted as 410 lit/Day (4.1 %) and water losses at discharge were found to be 200 lit/day (2. 0%).

Table: Daily water consumption by canteen Building

Daily water consumption by canteen Building										
Site	Urinal	Toilet	Laborator	Kitchen	Garden	Drinking	Wash	Water loss	Water loss	Total
Total use of Water (liters/day)	58	67	0	330	0	60	28	11	6	560
Percentage	10.2	12	–	59	–	10.8	5	2	1	100



Graph: Daily water consumption by canteen Building

From the above collected data it was observed that the total use of water for the canteen building was noted as 560 lit/day. The maximum water utilization for canteen building is for the kitchen purpose which was noted as 330 lit/day (59.0%). After that the water utilization for

urinal and toilet purpose was notable to be 58 lit/day (10.2 %) and 67 lit/day (12.00 %) respectively. Water loss during filling of water in tank was noted as 11 lit/Day (2.0 %) and water losses at discharge were found to be 6 lit/Day (1.0%).

➤ **Solid waste audit:**

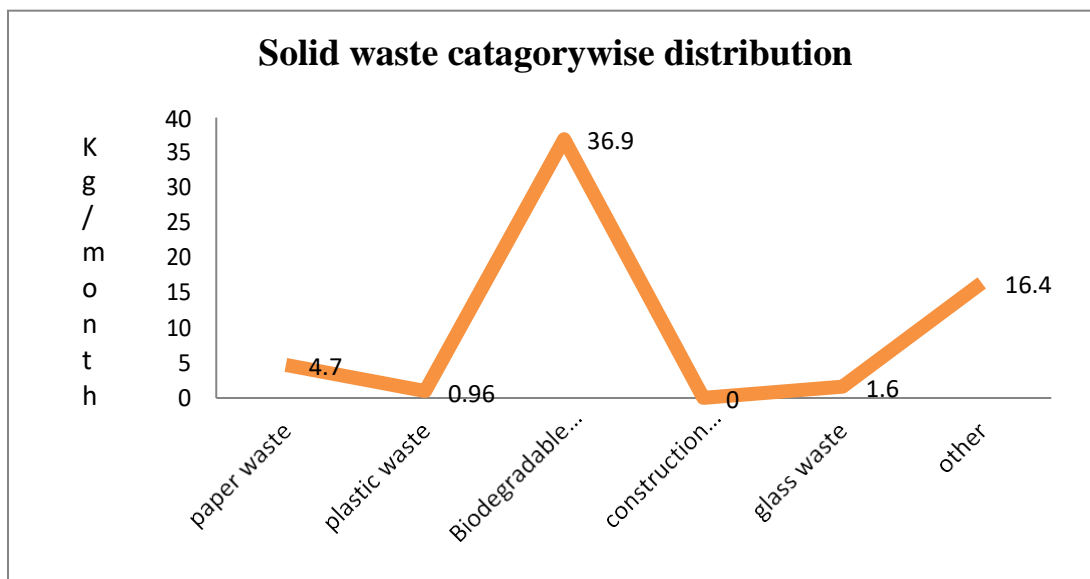
Solid waste generation and its management is a flaming problem in the all over world. Rate of generation of solid waste is very high and however, we do not have satisfactory technology to manage the generated waste. Solid waste refers to all non liquid waste. Solid waste can create significant health problems and a very unpleasant living environment if not disposed of safely and appropriately. Thus, it is essential to manage the solid waste appropriately to reduce the load on waste management system. The intention of this inventory is to find out the quantity, volume, type and current management practice of solid waste generation in the Arts and Commerce College, Madha, Solapur. This report will help for further solid waste management and to go for green campus development.

Generation of solid waste in Arts and Commerce College, Madha, Solapur:

Table No: Category wise solid waste generation at Arts and Commerce College, Madha, Solapur (kg/month)

Category of waste	Paper waste	Plastic	Biodegradable-waste	Construction waste	Glass waste	Other	Total solid waste
Quantity kg/month	4.7	0.96	36.9	0	0.8	16.4	59.76
Percentage (%)	7.75	2.52	59.55	0	2.42	27.76	100

Graph No: Category wise solid waste generation at at Arts and Commerce College, Madha, Solapur (kg/month)

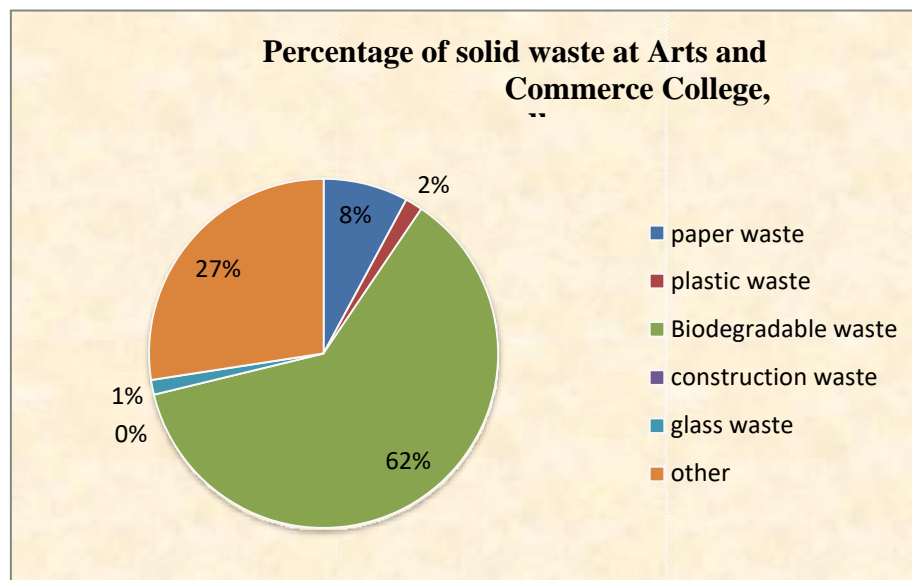


Throughout the study period 59.76 kg/month of solid waste was generated. On the basis of obtained results in which highest quantity of solid waste is Paper waste is about 4.7 kg/month and Biodegradable-waste and is about 36.9 kg/month which is at second place. Plastic waste is just about 0.96 kg/month because they have already taken initiative for remove plastic from the college campus.

Table No: Percentage of category wise solid waste generation at Arts and Commerce College, Madha, Solapur (kg / month)

Category	Paper waste	Plastic	Biodegradable-waste	Construction waste	Glass waste	Other	Total solid waste
Percentage (%)	7.75	2.52	59.55	0	2.42	27.76	100

Graph No: Percentage of solid waste generation at Arts and Commerce College, Madha, Solapur (kg/month)



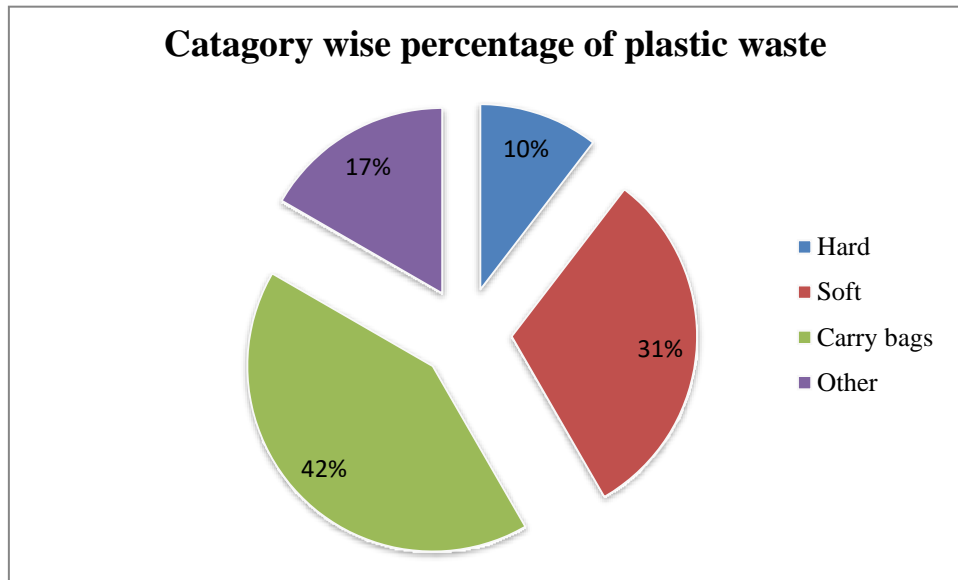
Percentage wise distribution of different sources of solid waste is given in the above graph. Here, maximum percentage of solid waste is generated of biodegradable waste which is 62 % and minimum of plastic waste is about 8 %. and other waste is about 27%.

In the various buildings of college 59.76 kg of total solid waste is generated in a month. Among the total waste ground floor is with 2.85 kg/month. First floor is having generation around 2.71 kg/ month

Table No: Plastic waste generation and its distribution in college campus:

Category	Plastic kg/ month				Total
	Hard	Soft	Carry bags	Other	
Quantity(kg/month)	0.1	0.3	0.4	0.16	0.96
Percentage	10.42	31.25	41.67	16.67	100

Graph: Categorization of plastic waste at Arts and Commerce College, Madha, Solapur (kg / month):



Within the plastic waste soft plastic and carry bags comprises maximum amount than other type of plastic. Carry bags around 41% of total plastic at campus. Soft plastic is 31% and other amounts 17% of the total.



Container for collection of dry solid and liquid waste at college campus



Container for collection of dry solid and liquid waste at college campus

➤ **Hazardous waste audit:**

Arts and Commerce College, Madha which is having only Arts and Commerce faculty in their college campus. So that, there is no question came regarding the chemical usage and hazardous things into the college campus. College campus is free from hazardous waste.

➤ **E-waste:**

E-waste generated in the College is of Schedule II. Generation of e-waste is apparent at every educational institute. Especially, at the college level there is less number of equipments and instruments running for administrative as well as for scientific execution. Computers, Printers, laptops, scanners, internet routers and Xerox machines are must in the administrative work. The wire required for the connectivity also gets included in the e waste. E-waste from Arts and Commerce College, Madha, Solapur is disposed by Rayat Shikshan Sanstha. E-waste from the different colleges of Rayat Shikshann Sanstha ware collected centrally at one place and get disposed.

➤ **Key Observations:**

3.5.1.1 Throughout the study period 59.76 kg of solid waste was generated.

3.5.1.2 Highest quantity of solid waste is biodegradable waste and is about 36.9 kg/month.

3.5.1.3 The total waste 8 % is paper waste which is around 4.7 kg/month.

3.5.1.4 There are only Arts and Commerce faculty departments were present that leads to campus free from hazardous waste.

3.5.1.5 Some of the classrooms were found without paper solid waste baskets.

3.5.1.6 There is need some improvements into the collection of solid waste.

3.5.1.7 Solid waste is to be segregated at the source.

➤ **Ambient Air Quality Status:**

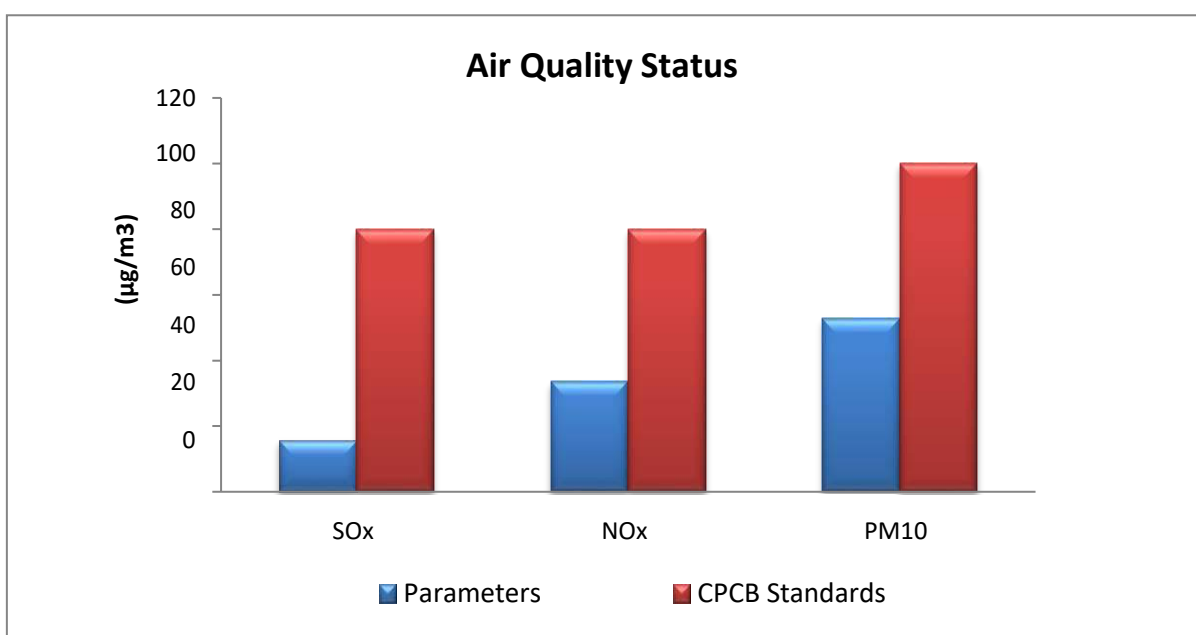
Ambient air sampling is important part of environmental monitoring. Particulate matter and trace gases sampling were carried out in the college campus. The sampling was done using calibrated Handy dust sampler APM 821 with flow rate 1 lit/min equipped with glass fiber filter paper (size 47 mm). The sampling period was 4 hrs.

Sulphur dioxide (SO₂) and Oxides of Nitrogen (NO_x) in air were estimated with Waste and Gaeke method and Jacob and Hochheiser method respectively. Particulate matter (PM₁₀) was measured gravimetrically.

Table no: Ambient Air Quality Status of Arts and Commerce College, Madha,

Sr. No.	Parameter	Results ($\mu\text{g}/\text{m}^3$)	CPCB Standards
1	SO _x	15.75	80
2	NO _x	33.48	80
3	PM ₁₀	52.87	100

It was observed that all the air quality parameters analyzed were within the Ambient Air Quality Standards of Central Pollution Control Board, India. The air quality is good in college campus.



Graph: Ambient Air Quality Status of Arts and Commerce College, Madha,

➤ **Ambient Noise Monitoring Status:**

Ambient noise monitoring was carried out in different areas of college campus like at classroom corridor and front gate. The monitoring was also done for Diesel generator in working i.e. on and off condition. 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 college campus are given below in the Table No. 3.8 and Graph No. 3.8

Table no: Ambient Noise levels in Arts and Commerce College, Madha

Sr. No.	Site Name	Results dB (A) Leq	Standards (Day Time) dB (A) Leq
1	Classroom Corridor	71.63	50
2	Front Gate	67.79	50
3	Diesel Generator On	72.52	75
4	Diesel Generator Off	66.13	75

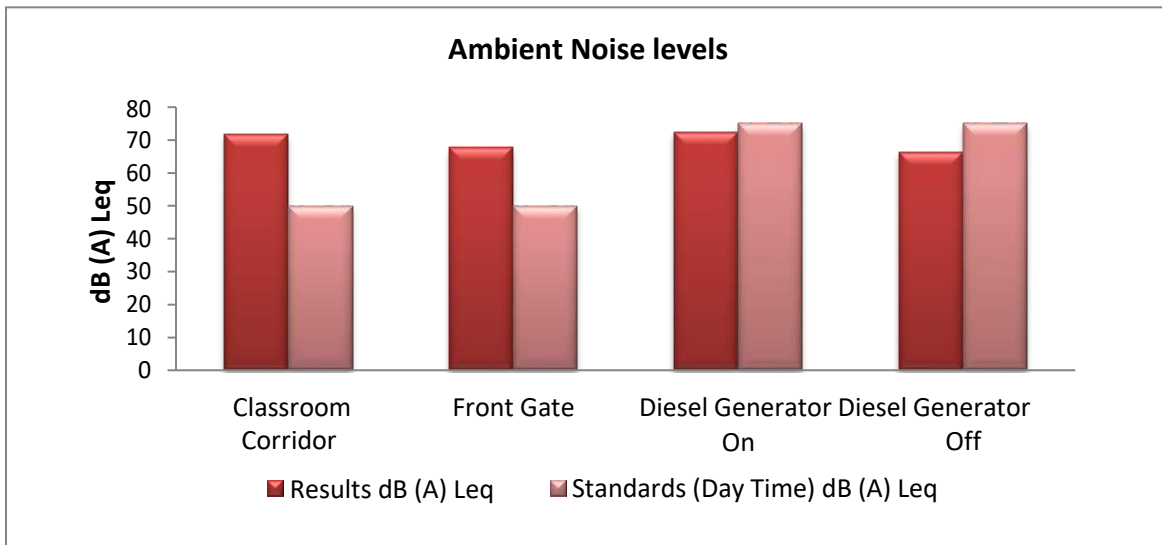
Note: - 1. All parameters shows in dB (A) Leq.

2. All Results are carried during day time.

3. Day time means from 6.00 a.m. to 10.00 p.m.

It is observed from the table that the Ambient Noise levels in classroom corridor and front gate is on higher side as compared to the standards of Central Pollution Control Board for day time. Classroom corridor noise levels higher because of sound echo.

Since the college is located near city main road and main entry road in colony situated around college, the major source of noise is automobile noise, rolling noise. Also, the railway station is located 1km. away from the college campus. The human communication and transportation are causing the high level sound. It is advisable to increase the green cover in the surrounding to avoid the noise. The diesel generator is installed outside of college campus, so its noise levels are below CPCB standards. It is used during emergency conditions of electricity cutoff.



Graph No.3.8 Ambient Noise levels in Arts and Commerce College, Madha

➤ **Details of tree census in College campus:**

The beginning of the 21st century brought growing concern about global warming, climate change, food security, poverty, and population growth. CO₂ is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40% from preindustrial levels to more than 390 parts per million CO₂.

The present status of tree cover and vegetation carbon storage assessment of area under Arts and Commerce College, Madha, Solapur Campus. In an era of global warming and climate change; carbon emission, carbon sequestration, mitigation, adaptation are the keywords in academia. Carbon sequestration is a phenomenon of converting atmospheric carbon i.e. CO₂ in to other pools of carbon such as vegetation, soil, etc. in various forms to mitigate global warming. It is one of the important clauses of Kyoto Protocol.

Current tree census methodology has adopted from the guidelines set by Indian Institute of Remote Sensing, Dheharadon, Govt. of India.

Total number of trees enumerated in Arts and Commerce College, Madha, Solapur campus:

All the collected data was tabulated and analyzed with the help of MS- Word document.

Table :Total number of trees enumerated in Arts and Commerce College, Madha, Solapur campus

Local Name	Common Name	Scientific Name	Family	Total
आंबा	Mango	Mangifera indica L.	Amacardiaceae	200
सुबाभूळ	River Tamarind	Leucaena Leucocephala L.	Fabaceae	08
चिच	Tamarind	Tamarindus indica L.	Fabaceae	05
नारळ	Coconut	Cocos nucifera L.	Arecaceae	27
वड	Bangan tree	Ficus benghalensis	Moraceae	02
करंज	Indian beech	Millettia pinnata L.	Fabaceae	06
कडुलिंब	Neem	Azadirachta Indica	Meliaceae	10
कागदे फुल		Bougainvilleae spectabilis	Nyctaginaceae	01
पाम	Royal palm	Roystonra rigia (kunth)	Arecaceae	08
नांदुक	Weeping Fig	Ficus benjamina L.	Moraceae	08
आवळा	Amla	Phyllanthus emblica	Phyllanthaceae	02
रबर	Rubber fig	Ficus elastic	Moraceae	04
बदाम	Almond	Terminalia catappa	Combretaceae	04
केळी	Banana	Musa Acuminata	Musaceae	02
लिंबू	Lemon	Citrus liman L.	Rutaceae	20
पपई	Papaya	Carica papaya L.	Caricaceae	01
चिक्कू	Sapota	Manilkara zapota	Sapotaceae	06
पेरू	Guava	Psidium guajava L.	Myrataceae	02
सिताफळ	Custard apple	Annona Reticulata L.	Annonaceae	02
मोगरा	Arabian Jasmine	Jasminum sambac L.	Oleaceae	02
जास्वंद	China Rose	Hibiscus Rosa-sinensis L.	Malvaceae	02
सदाफुली	Madagascar Periwinkle	Gatharanthus Roseus L.	Apacynaceae	01
अशोक	False Ashoka	Polualithia longifolia	Fabaceae	16
आपटा	Bidi leaf tree	Baluhinia racemasa Lam.	Fabaceae	01
शिरिष	Lebbek tree	Albizia lebbeck L.	Fabaceae	12
पाइनस	Foothill Pine	Pinus sabiniana	Pinaceae	01
Total=				453

➤ **Carbon Sequestration:**

Carbon sequestration describes long-term storage of carbon dioxide or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change. It has been proposed as a way to slow the atmospheric and marine accumulation of greenhouse gases, which are released by burning fossil fuels. Vegetation carbon pool having the potential of 560 Pg (Pg: Petagram= billion ton) of carbon storage globally. In the current study the focus is given on the assessment of existing carbon stock stored Arts and Commerce College, Madha, Solapur campus in the form of woody vegetation by enumerating every tree species. Overall **9.8754 tones of CO₂** has captured and stored by the woody plants present in the college campus. A single tree consumes **0.0218 tones** of CO₂ approximately annually consequently, as the campus possess **50** mature woody plants **1.09 tones** of CO₂ is consumed yearly by all woody vegetation on the college campus.

➤ **Oxygen released**

Woody vegetation in Arts and Commerce College, Madha, Solapur campus has released **27613.423 kg** of oxygen in their lifetime till date. Released oxygen is directly proportional to CO₂ sequestrate in the ratio of 32/12 thus it is supposed to release **0.912 kg** of oxygen annually. It is assumed that a single tree supports oxygen demand of two people for their life. Thus, the 50 woody vegetations in College campus are supporting 100 people around the campus.

➤ **Electricity and energy audit:**

Energy sources utilized by all the buildings, departments and services of college include electricity, liquid petroleum and LPG. Major use of the energy is at office, canteen, hostel and laboratories, for lighting, transportation, cooking. Electricity is supplied to the college campus by Maharashtra State Electricity Board. There is no provision of generating electricity on site.

Fuel consumption by vehicles on campus is also an important criterion for energy audit. Two two-wheelers and two four-wheelers were observed on the campus. “No Vehicle Day” was observed on Saturday during green audit visit.

➤ **Energy consumption of the college:**

It includes all Departments, office, classrooms and principal cabin. The collected data shows the Ground floor has maximum number of major energy consuming equipments. Environmental protection through activities conducted. Following data is taken from the energy audit prepared by Maharashtra State Electricity Board office, Madha.

Table No: Total Energy Consumption difference at Arts and Commerce College, Madha

Sr.no.	Year	Energy Consumption (in KWH)	Remark
1	2017-18	719	Energy consumption rate is seen noteworthy decreasing during the observation period.
2	2018-19	479	

The energy consumption is 719 KWH and 479 KWH for the years 2017-18 and 2018-19 respectively. Thus the observations show the noteworthy decrease in the electricity consumption during study period. This is because of the use of LED bulbs and methods adopted by the college to conserve the energy in the campus.

Chapter IV

CONCLUSION AND MANAGEMENT PLAN

Taluka Agriculture Office, Madha, Tal- Madha, Dist- Solapur has conducted a Green Audit of Arts and Commerce College, Madha, Solapur in the academic year 2018-19. Green auditing is the process of identifying and determining whether institution practices are eco-friendly and sustainable. The main objective of college to carry out green 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 green audit conducted by college following are some of the conclusions which can be taken for improvement of the college campus to become environmental friendly college campus.

1. College takes efforts to dispose majority waste by using proper methods.
2. Confidential paper waste is disposed properly.
3. Glass waste is to be disposed properly.
4. Electricity consumption is more at some departments.
5. Use of CFL lamps is minimum. Its use should to be encouraged and now converted to LED lights.
6. Toilets and bathrooms are consuming more water.
7. Roof top rain water harvesting should be initiated which is useful for filling up of tanks on campus.
8. Water filtration systems are functioning properly.
9. E-waste segregation, handling and disposal are properly done.
10. 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 the guidelines in Green 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. Wherever possible the waste should be reused or recycled.
5. All street lighting should be changed to LED lights to save electricity.