



Maratha Vidya Prasarak Samaj's

Arts, Commerce and Science College, Nandgaon
Tal – Nandgaon, District Nashik – 423106 (M.S.) India.

Certified 2 (f) & 12 b of UGC Act

Affiliated to Savitribai Phule Pune University

(Id. No. PU/NS/ASC/021?1972)

College Code-116 Exam Centre Code -064

E-mail: prinnandgaon@yahoo.com

Website: www.nandgaoncollege.com

Mobile No. 8766876955

Best College Award of Savitribai Phule Pune University (2012)
NAAC Reaccredited with 'A' Grade 3rd Cycle

7.1.3. Quality audits on the environment and energy are regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following

1. *Green audit / Environment audit*
2. *Energy audit*
3. *Clean and green campus initiatives*
4. *Beyond the campus environmental promotion activities*

Answer to All the above

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Principal
Arts, Commerce & Science College
Nandgaon, Dist. Nashik (M.H.)

Policy Documents on Environment and Energy Usage



The Environment and Energy usage Policy of MVP'S Art, Commerce and Science College Nandgaon is to accomplish energy in such a systematic way so as to minimize its impact on the environment. The policy implies to explore the renewable energy resources to reduce the burden of the government and to find out alternate resources as solutions to the energy crisis.


This environment and energy policy is binding for all the components of the institution and applies to all its stakeholders and to the various activities undertaken by the institution. It will help us to embed efficiency and environmental awareness into our everyday activities, thus helping us to realize our responsibilities and commitment to conservation of natural resources and to limit its usage. Green Campus Committee is devoted to the cause of environmental awareness, to undertake green initiatives, and to conduct green literacy programmes to save energy and to protect environments.

Policies:

- To assess our energy usage and measure its impact on the environment.
- To install photovoltaic solar panels for the generation of alternate energy.
- To install LED bulbs in the campus to save energy.
- To develop systematic waste management unit.
- To develop rain water harvesting unit.
- To undertake tree plantation initiative.
- To ensure the availability of necessary resources to achieve our objectives.
- To offer opportunities for students to engage in initiatives which contribute to environment protection.


Coordinator

Campus Devolvement


Principal
Principal
Arts, Commerce & Science College
Nandgaon, Dist. Nashik (M.H.)

Maratha Vidya Prasarak Samaj's
ARTS, COMMERCE AND SCIENCE COLLEGE,
NANDGAON- 423106 (MAHARASHTRA)

NAAC Re-accredited "A" grade

Internal Quality Assurance Cell(IQAC)

Energy Audit Report
(2020-21)



Report By



SOLASTA

Energy Solutions, Services & Maintenance

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Date: 16/06/2021

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Preface

Data collection for energy audit of the **MVP'S ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON** was approved by team for the period of July 2020 to June 2021.

Energy audit survey was completed by the firm **SOLASTA Energy Solutions, Services & Maintenance** with the help of faculty members of Physics Department. Data was collected for each classroom, laboratory, office, library and of the campus at previous years and updated year by year. The work is completed by considering how many tubes, fan, A.C.'s, electronic instruments, etc. installed in every room.

We really appreciate the effort put by MVP'S management for creating awareness of Energy Audit, Use of renewable energy such as solar energy and its roll in energy saving amongst all of us. We really appreciate Hon. Management of the college for encouraging us by providing this opportunity to do the energy audit and participate in the energy saving program. Through this, we have been cleared the vision of Institution towards the Green campus and save our nature. We really appreciate for various efforts taken by the college.



Main Building

Acknowledgement

We are very much thankful to **Principal Dr. Sanjay A. Marathe Sir** for motivating us and giving us the opportunity for energy audit. We would like to express our thanks to Head of Department Physics and all respected staff, faculty members and students who have taken part in this audit survey etc. of MVP'S ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON. We tried our best to present this energy report as per requirements of college and our expertise work.



Annex Building

Energy Audit Committee

Sr. No.	Name Of Faculty	Designation
1	Dr. A.N. Madhane	Chairmen
2	Dr. V.B. Sonawane	Member
3	Mr. K.M. Nikam	Member
4	Mr. S.P. Dond	Member
5	Mr. S.P. Bhosale	Member
6	Mr. R.L. Diwate	Member

Summary

The objective of the audit was to study the energy consumption pattern of the college, identify the areas where potential for energy/cost saving exists and prepare proposals for energy/cost saving along with investment and payback periods.

The salient observations and recommendations are given below:

1. MVP'S ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON uses energy in the following forms:
 - a. **From MSEDCL**
 - b. **Electricity SOLAR Grid connected solar plant (15.3kw)**
 - c. **High Speed Diesel Generator (HSDG)**

Electrical energy is used for various applications, like: Computers, Lighting, Air-Conditioning, Fans, Laboratory Equipment, Printers, Xerox machines, CCTV, UPS, LCD Projector, Router system, Flood light, Pumping motor, Exhaust fan. etc.

2. The average cost of energy is around Rs. **12000 / Month.**

After the measurement and analysis, we propose herewith following aspect regarding the efficient use of energy:

Abbreviations

AHU	Air handling unit
APFC	Automatic Power Factor Controller
DG	Diesel generator
ECP	Energy Conservation Proposal
GCV	Gross Calorific Value
HVAC	Heating, Ventilation and Air Conditioning
HSDG	High speed diesel Generator
PF	Power Factor
SEC	Specific Energy Consumption
TR	Tons of Refrigeration
UOM	Unit of Measurement
MAHADISCO	Maharashtra State Electricity Distribution Company

Chapter: 1

Introduction to Energy Audit

- **General:**

The MVP'S **ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON** entrusted the work of conducting a walk through Energy Audit of campus with the main objectives as given below:

- ✓ To study the present pattern of energy consumption
- ✓ To identify potential areas for energy optimization
- ✓ To recommend energy conservation proposals with cost benefit analysis.

- **Scope of Work, Methodology and Approach:**

Scope of work and methodology were as per the proposal. While undertaking data collection, analysis, due care was always taken to avoid abnormal situations so as to generate normal/representative pattern of energy consumption at the facility.

- **Approach to Energy Audit:**

We focused our attention on energy management and optimization of energy efficiency of the systems, sub systems and equipments. The key to such performance evaluation lies in the sound knowledge of performance of equipments and system as a whole.

- **Energy Audit:**

The objective of Energy Audit is to balance the total energy inputs with its use and to identify the energy conservation opportunities in the stream. Energy Audit also gives focused attention to energy cost and cost involved in achieving higher performance with technical and financial analysis. The best alternative is selected on financial analysis basis.

Energy Audit Methodology: Energy Audit Study is divided into following steps:

- 1. Historical Data Analysis:**

The historical data analysis involves establishment of energy consumption pattern to the established base line data on energy consumption and its variation with change in production volumes.

- 2. Actual data analysis:**

This step involves actual trials measurement It also involves input to output analysis to establish actual operating equipment efficiency and finding out losses in the system.

- 3. Identification and evaluation of Energy Conservation Opportunities:**

This step involves evaluation of energy conservation opportunities identified during the energy audit. It gives potential of energy saving and investment required to implement the proposed modifications with payback period.

Chapter: 2

About Institute

Sr. No.	Particulars	Details
1	Name of the Institute:	Maratha Vidya Prasarak Samaj's ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON
2	Address:	Nandgaon, Tal. Nandgaon, Dist. Nashik Maharashtra State, India
3	Affiliation:	Affiliated to Savitribai Phule, Pune University, Pune-07 ID No. PU/NS/ASC/021/1972
4	Year of Establishment:	1972
5	NAAC Accreditation:	NAAC REACCREDITED "A" GRADE (3rd Cycle)
6	Contact:	Phone : 02552-242362, Email : prinnandgaon@yahoo.com Website : www.nandgaoncollege.com
7	Courses Offered:	XI th and XII th Arts, Commerce & Science B. A./B.Com./B.Sc. BSc - Botany, Chemistry, Maths , Physics, Zoology Commerce- Arts- English, Hindi, Geography, Politics, Library, Physical Educator , Sports, Economics, Marathi

Chapter: 3

Energy Consumption Profile

3.1 Source of Energy:

MVP'S ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON uses Energy in following forms:

A. Electricity from MSEDCL :

MVP'S ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON receives Electricity from Nashik (R) Circle: 600 Of MALEGAON RURAL DIVI -602. NANDGAON-259

B. High Speed Diesel Generator 15 KW (HSDG) :

HSD is used as a fuel for Diesel Generator which is run whenever power supply from MSEDCL is not available.



Kirloskar Diesel Generator (15KVA)

C. Electricity SOLAR Grid connected solar plant (15.3kw):



**Solar - On Grid Inverter System
(15.3KW)**

3.2 Following are the major consumers of electricity in the facility:

- Computers
- Lighting
- Air-Conditioning systems
- Fans
- Laboratory Equipment
- Printers
- CCTV
- UPS
- LCD Projector
- Router system
- Flood light
- Pumping motor



I.T. Lab



Exam Section



Admin. Office



UPS



Principal Office



Chemistry Lab.



Physics Lab.



Seminar Hall

Chapter: 4

Data Analysis

4.1. Study of Variation of Monthly Units consumption & Power Factor:

In this Chapter, we study the details of the 12 month Electricity Bills.

TABLE 1: Variation in Units Consumption:

Sr. No.	Month	No. Units kWh
1.	June 21	2109
2.	May 21	2227
3.	April 21	1794
4.	Mar 21	1840
5.	Feb 21	1422
6.	Jan 21	1352
7.	Dec 20	1313
8.	Nov 20	827
9.	Oct 20	1417
10.	Sept 20	2149
11.	Aug 20	1386
12.	July 20	899
	Total Units	18735

4.2 Conclusion : Variation of PF/ load Factor

For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor; the effective incentive will amount to 7% (seven percent) reduction in the energy bill

Load factor variation affects the power factor simultaneously, and should maintain constant load profile.

As per the MSEDCL tariff, whenever average power factor in a month, is less/more than 0.95, incentives/penalty are offered which we need to have taken into consideration:

Similarly for improvement/ to constant maintain power factor, if we more focus on averaging power factor to 0.95, we will get the incentives instead of penalty.

Check for **power factor correction/improvement panel using capacitor bank Or APFC panel feasibility** with experts opinion.

4.3 Study of Month wise Electricity Bill Variation:

TABLE 2: Variation in Electricity Bill:

Sr. No.	Month	Electricity Bill Amount (Rs.)
1	June 21	15659
2	May 21	16511
3	April 21	13385
4	Mar 21	14238
5	Feb 21	11099
6	Jan 21	10573
7	Dec 20	10295
8	Nov 20	6630
9	Oct 20	11061
10	Sept 20	16558
11	Aug 20	10828
12	July 20	7171
	Total Annual Bill=	1,44,0058
	Average Monthly Bill=	12000.66

Conclusion: Slightly Variation in Monthly Electricity Bill has been identified.

4.4 General Observations based on Electricity Bill:

1. Average Monthly bill is Rs. 12000 /-
2. Power factor should be monitored and need to maintain close to unity on priority.

Chapter: 5
Actual Measurements and its
Analysis

5.1 Load Consumption:

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	22	880	6	5280
2	Fan	80	146	11680	6	70080
3	PC	60	69	4140	6	24840
4	Printer: Standby mode: 30-50w/	printing mode:300- 500w	21	6300	2	12600
5	LED 18 W	18	134	2412	6	14472
	LED 22 W	22	8	176	6	1056
6	CFL	20	2	40	6	240
7	Xerox machine	650	2	1300	2	2600
8	Fax machine	30	1	30	2	60
9	AC	3500	1	3500	4	14000
10	CCTV	10	8	80	24	1920
11	UPS	5KVA, 24 batteries of 80 Amp-hr	2	10	6	60
12	Water Cooler	2.8kwh/day	2	5.6	2	11.2
13	TV LED	80	2	160	4	640

14	Hot air oven	3000	2	6000	2	12000
15	LCD Projector	282	3	846	2	1692
16	Internet Box with wifi router W/Hr	850	2	1700	6	10200
17	Charging socket	25	18	450	2	900
18	W. Light Chamber	100w/day	1	100	1	100
19	P.A. System	560	1	560	1	560
20	Exhaust fan	60	3	180	6	1080
21	Electric bell	5	1	5	1	5
22	Refrigerator	2kwhr/day	2	4000	12	48000
23	Flood light	100	6	600	11	6600
24	Incubator	600	1	600	6	3600
25	Research Microscope	100	1	100	6	600
26	Lamination Machine	240	1	240	2	480
27	Compressor	3300	2	6600	2	13200
28	Lab Equip. for practical	2000 autoclave	1	2000	3	6000
29	Pumping motor	1.0 HP	1	746	2	1492
30	DG Gen set	15KVA	1	AS PER USE		AS PER USE
31	Grid connected solar plant	15.36kw	15.36	15.36kw		15.36kw
It is expected to generate 60 units/day, 1800 units per month Aprox. through Solar Rooftop On grid System 15.3kWp.						

**** This is total load consumption considered approximately. Actual load consumption might be different according to actual use of power for particular time period.***

5.2 Department wise load Distribution:

A) Main Building:

Sr. No.	Premises	Existing Load During (2019-20) in Watt	Additional Load during (2020-21) in Watt	Remark (Name Of Appliances)
1	Principal Office	4375		
2	Administration Office:	4590	300	Printer
3	Passage and premises	960	40	CCTV
4	YCMOU/Dept. Of Politics& Store Room:	680		
5	Classrooms:(1,2,3,4,5,6)	1200		
6	Exam Dept:	1170		
7	Department OF IT(Lab), Comp. Centre.:	2540		
8	Gymkhana	500		
9	Solar On Grid (15.3kW)	15300		
B)	NEW BUILDING			
15	Dept. Of Chemistry, Store Room, Common Room:	10286		
16	Dept. Of Physics, Dark Room:	5252		
17	Dept. Of Botany & Zoology:	9560		
18	Dept., Of Arts: Hindi, English, Economics	1710		
19	Dept. Of Commerce:	2542		
20	Library, Ladies Room, Seminar Hall, Guest Room:	7120		
21	Ladies Hostel:	2400		

5.3 Additional Load During (2020 - 21):

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	Printer	300	1	300	8	2400
2	CCTV	10	4	40	24	960
					Total:	3360

*** This is total load consumption considered approximately. Actual load consumption might be different according to actual use of power for particular time period.**

5.4 College Campus Photos:



Library



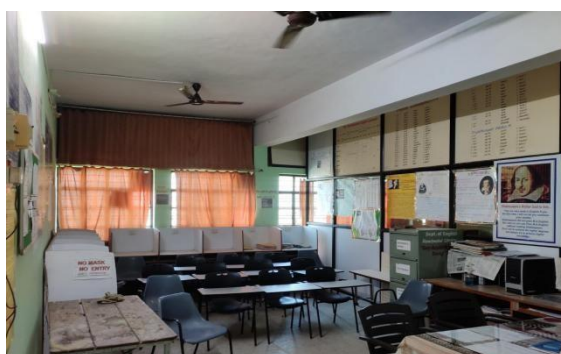
Class Room



Botany Lab



Dept. Of Commerce



Dept. Of English

Chapter: 6

Study of Electrical Systems

6.1 Electrical Supply Details:

The electrical supply to MVP'S ARTS, COMMERCE AND SCIENCE COLLEGE, NANDGAON comes from MSEDCL supply at 11 kV, which is stepped down to 415 V by a transformer.

6.2 Study of Electrical Demand:

There is a single meter installed in the premises. The details of meters are as under:

Energy Meter Details:

Sr. No.	Details of Electricity Demand	Tariff	73 LT-VII B I
	Meter No:	077621025557	
1	Sanctioned Load	20.00	kW
2	Contract Demand	10.00	kVA
3	Recorded Maximum Demand	NA	kVA

6.3 Lighting System:

Observations and suggestions:

- It is found that FTL, Bulbs, CFLs are installed and replacing with LEDS
- light or electric gadget left ON when not needed which is wasting energy and money, causing pollution that is totally unnecessary, we can surely avoid this.
- **Stand-by power can use up to 8% of a household's total electricity.**

For most homes a 10% reduction in electricity consumption can save 15000 a more a year off our electricity bill and nearly $\frac{3}{4}$ of a tone of CO₂ pollution. A 20% reduction on average consumption will save over Approximately 30,000 and over 1.5 tones of CO₂.

6.4 Don't forget to power down these things when not in use:

- Lights
- Projectors
- Air Conditions
- Exhaust and ceiling or table fan
- Printers and scanners
- Battery and phone chargers
- Computers
- TV
- PA Systems
- Pantry /Canteen gadgets such as blenders, kettles, toasters , Induction etc.

Chapter: 7

Study of Air Conditioners

In the facility for air conditioning there is no centralized system with AHU (air handling unit), mostly split air conditioners are installed.

7.1 Observations and suggestions:

1. Normal air conditioning temperature should be kept as high as possible (I.e.24 Deg.cels.). By thumb rule, increase in 3 degrees in indoor air temperatures can save 1% of electricity.
2. The ventilation in area can be provided with installation of natural ventilation. Natural ventilation will also minimize the requirement of exhaust fans.

7.2 Carbon Di-Oxide Emission Initiative:

- * College initiated appreciable activity for Energy Saving Awareness like use of LED and replacing old light sources with new LED.
- * College has initiated for tree plantation & energy Saving Awareness generation by using signboards, banners among the campus , laboratories, offices, Classrooms Etc.
- * Need to Create other energy efficiency / renewable more energy awareness among the college campus for i.e. solar, wind, Biogas energy.
- * College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff for general awareness.

Chapter: 8

Energy Conservation Proposals

8.1 Providing Energy Efficient Solution for the Air Conditioners:

The energy saver circuits / inverter Based Air Conditioners for the air conditioners, intelligently reduces the operating hours of the compressors either by timing or temperature difference logic without affecting the human comfort. This can save around 15% to 30% of the electricity depending on the weather conditions and temperature settings.

There are total split type air conditioners. It is Recommended that the old air conditioners can be replaced with new energy efficient BEE STAR labeled (3 Star and above) air conditioners whenever possible.

TABLE 7 : Energy Efficiency Improvement:

Sr. No.	Recommendations	Annual Saving Potential (Rs.)	Estimated Investment (Rs.)	Pay Back period (Years)	Remarks (Feasibility)
1	Auto power factor correction panel	As per requirement	20000	1.55	Mid Term
2	Solar Street Light, Solar High mast, Solar Garden Light.	As Per Requirement	30000	2.2	Mid Term
	Total Amount		Rs. 50000/-	3.75 Years	Mid Term

- The total energy cost with an overall payback period of 3.75 Years for technical and economical feasibility.

CHAPTER: 9

Energy Saving Recommendations

General Recommendations:

- Care should be taken to keep lights in classroom off and keep ON whenever necessary.
- Try to get the benefit of TOD time slot (Refer Pt.6.4) i.e. -01.50 rate at night in addition to actual rate for per unit consumption for **electric motor pumping purpose during 2200 – 0600 Hrs.**
- Use Solar Street Light, Solar High mast, Solar Garden Light in Premises.

Executive Recommendations:

1. Form Institute level student community that keeps track of the energy consumption Parameters of the various departments, class rooms, halls, areas, energy meters etc.
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to departments for create awareness.

*** Energy Saving Initiative Among college campus:**



10. References

- 1) “Energy Management, Audit and Conservation” by Barun Kumar De
- 2) “Guide to Energy Management” by Barney L
- 3) “Energy Audits: A Workbook for Energy Management in Buildings” by Tarik Al-Shemmeri
- 4) “Fundamentals of Energy Conservation and Audit” by Agarkar Santosh
Vyankatro and Mateti Naresh Kumar
- 5) “Industrial Energy Conservation (UNESCO Energy Engineering)” by Charles MGottschalk
- 6) Msedcl Energy Bills/ CPL



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SOLAR Rooftop Energy, Energy Auditing.

WORK COMPLETION REPORT

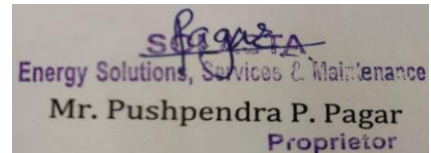
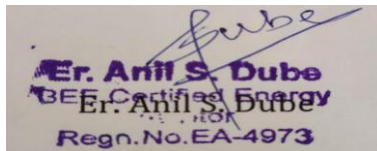
- Name of Work Project : Energy Audit of MVP'S Arts, Commerce and Science college, Nandgaon. Dist. Nashik
- Work Order Number : 2020-21
- Work Period : From 02/06/2021 To 15/06/2021

This is to Certify that SOLASTA Energy Solutions, Services & Maintenance has successfully completed Energy audit at MVP'S Arts, Commerce and Science college, Nandgaon. The work of energy audit is Completed on 16/06/2021 for year 2020-21.

Thanking you and assuring you for our best service always.

Audit Report BY,

FOR SOLASTA,



Date: 16/06/2021

Place: Nashik

Regn. No. EA-4973

No. 2487



National Productivity Council
(National Certifying Agency)
PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. **Anil Siddhanarayan Dube**
son / daughter of Mr. **Siddhanarayan Dube**

has passed the National Certification Examination for Energy Auditors in 2006, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India

Date : 30th April 2007


Controller of Examination



GREEN AUDIT



2020-2021



Maratha Vidya Prasarak Samaj's
Arts, Commerce and Science College,
Nandgaon

Dist. Nashik (MH) 4231006

Affiliation ID: PU/NS/ACS/021/ (1972)

Reaccredited with 'A' Grade by NAAC in 3rd Cycle (3.06)

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1. INTRODUCTION AND PROFILE OF THE INSTITUTE

Maratha Vidya Prasarak Semaj's Nashik, the parent institution was established in 1914 for the sole cause of education for the deprived classes. The Institution has got the legacy of movement keeping the view of leading the masses from darkness of ignorance to the light of knowledge. The MVP Samaj's in 1972 started Arts, Commerce and Science College in Nandgaon Tehsil of Nashik district.

Since its inception, the college has looked back. It had started with Arts and Commerce faculties but in 1992 started Science faculty. The college was accredited with B grade in its first cycle and in 2011, it received A grade from NAAC, Bangalore. The college is now trying its best to be at the forefront of becoming the pioneering institution of the area in the education process. In the year 2012, the college received the prestigious 'Best College Award' conferred by Savitribai Phule Pune University (SPPU), Pune.

Spread in an area of 6.5 acres, the college imparts both UG and PG level education in various subjects of Arts, Commerce and Science streams. The college is located in drought affected area, which is a remote place the district place too. The campus of college has seven buildings i.e., Main building, Science building, Library building, Girl's hostel, ladies' toilet, canteen and a well furnished Gymnasium.

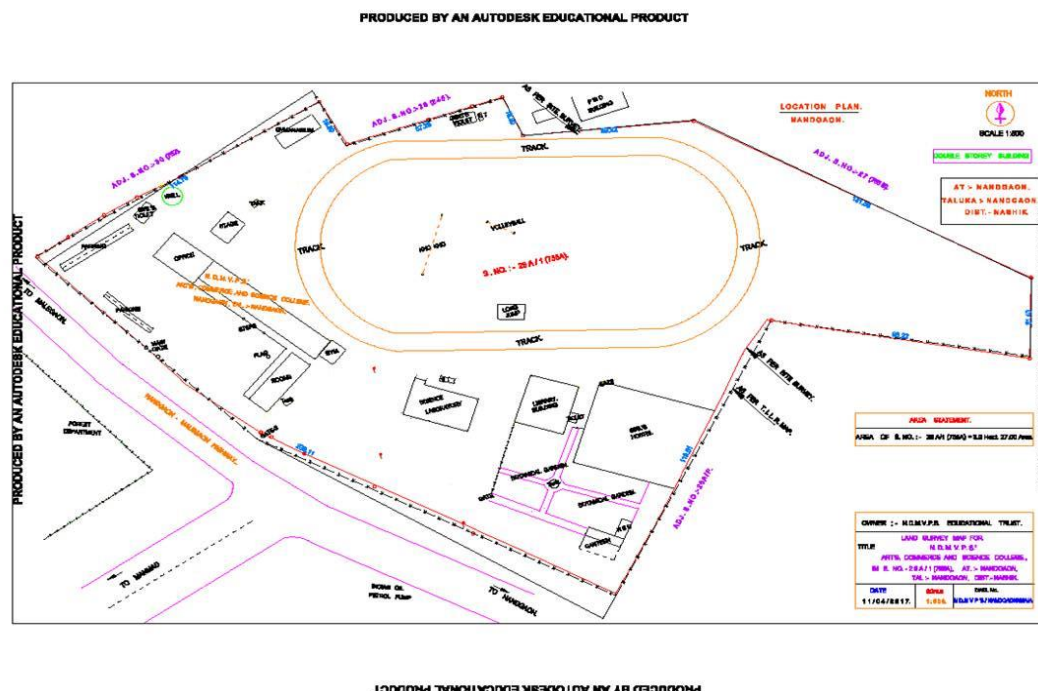


Fig. 1: Campus Map

Table 1: Campus Departments and courses

Sr. No	Faculty of Science
1	Botany
2	Chemistry
3	Mathematics
4	Physics
5	Zoology
	Faculty of Arts
6	English
7	Geography
8	Hindi
9	Marathi
	Faculty of Mental Moral and Social Sciences
10	Economics
11	Political Sciences
	Faculty of Commerce
12	B. Com
13	M.Com

2. ENVIRONMENT CONSERVATION COMMITTEE

Sr. No.	Name of Member	Designation	Title in Committee
1	Dr. S.I. Patel	Principal	Chairman
2	Dr. A. N. Madane	Assistant Pro. Dep, of Botany	Coordinator
3	Dr. V. B. Sonawane	Assistant Pro. Dep, of Botany	Member
4	Mr. K. M. Nikam	Assistant Pro. Dep, of Chemistry	Member
5	Mr. R. L. Diwate	Assistant Pro. Dep, of Hindi	Member
6	Mr. S. P. Dond	Assistant Pro. Dep, of English	Member
7	Mr. S. P. Bhosale	Assistant Pro. Dep, of Commerce	Member

Table 2: Environment Conservation Committee

Table 3: External Peer Teem Committee

Sr. No.	Name of Member	Designation	Title in Committee
1.	Dr. V. B. Gaikwad	Principal, KTHM College, Nashik	Chairman
2.	Dr. P. M. Nalawade	Head, Dept of Environmental Science, KTHM College, Nashik	Coordinator
3.	Dr. N. D. Gaikwad	Associate Professor	Member
4.	Dr. B. L. Gadakh	Assistant Professor	Member

3. FUNCTIONS OF ENVIRONMENT CONSERVATION COMMITTEE

- To improve the environment of the college campus.
- To make awareness in students and society about the environment conservation.
- To make efforts for management of solid waste, liquid waste, and e-waste of the college campus.
- To implement the regulations to reduce sound pollution.
- To make efforts to reduce water pollution.
- To make efforts for water conservation.
- To plant more trees and ensure their survival.
- To maintain paperless office.
- To maintain soil management at the college campus.
- To maintain plastic free college campus.
- To provide compost fertilizers with the help of vermicompost project.

4. SCOPE OF WORK

The following Environmental Issues were studied for the above-mentioned campus area.

1. Water audit
2. Landscaping and tree plantation.
3. Energy audit
4. Noise Environment.
5. Solid Waste Management Practices.

Air Environment.

Based on the available data, sampling and information provided by the KTHM officials this report has been prepared and recommendations for betterment of campus environment are provided.

Baseline Data

The most of the baseline data relating population, water supply, has been collected from the management of the college. The data / samples for drinking water, noise, floral diversity, and solid waste generation were collected by visiting the campus area by the expert teams.

Table 4: Total Population of the campus.

Sr. No.	Department	Total population of institute (incl. Students, Permanent, Temporary staff & visitors)
1	Institute (staff)	100
2	Institute - students	1107
3	Girls Hostel	00
4	Canteen (floating population)	195
	Total	1402

5. WATER AUDIT

Introduction:

Water is life

Water is very important thing for every living being, we can't imagine our life without water. At every educational institute need a good water source for campus. Our college situated in city Nandgaon; district Nashik Nandgaon region is dry & water level is very low because of that we faced a serious water issue in our campus. To come over that problem our institute work on water security for campus, we do all needful things to save water and stop water wastage. Simple actions can be adopted to reduce the wastage of water and use it wisely.

Definition:

Water Audit is a qualitative and quantitative analysis of water consumption to identify means of Reducing, Reusing and Recycling of water at college Water usage in campus can be defined as water used for all activities which are carried out in campus from different water sources which are available in college, this includes usage in all residential halls, academic buildings, and girl & boys washrooms, Hostel, in all college campus Wastewater is referred as the water which is transported off the campus. The wastewater includes sewerage, residence, hall water used in cooking, showering, clothes washing as well and wastewater from chemical and biological laboratories which ultimately going down in sink or drainage system.

The total amount of water that can be collected from this roof is not enough to fulfil the total water demand.

However, it might still be worthwhile to construct a rainwater harvesting system. With a storage reservoir of **306300 liters** (306.3 m³) a rainwater harvesting system could provide 1953 liters of water per day, which is 6% of the total demand.

Details on the results and calculations can be found below.

Location

Location: 8J8X+39J, Nandgaon, Maharashtra 423106, India

Latitude: 20.31578759840601 degrees

Longitude: 74.64868180453777 degrees

Roof size: 2250 square meters

Roof type: flat

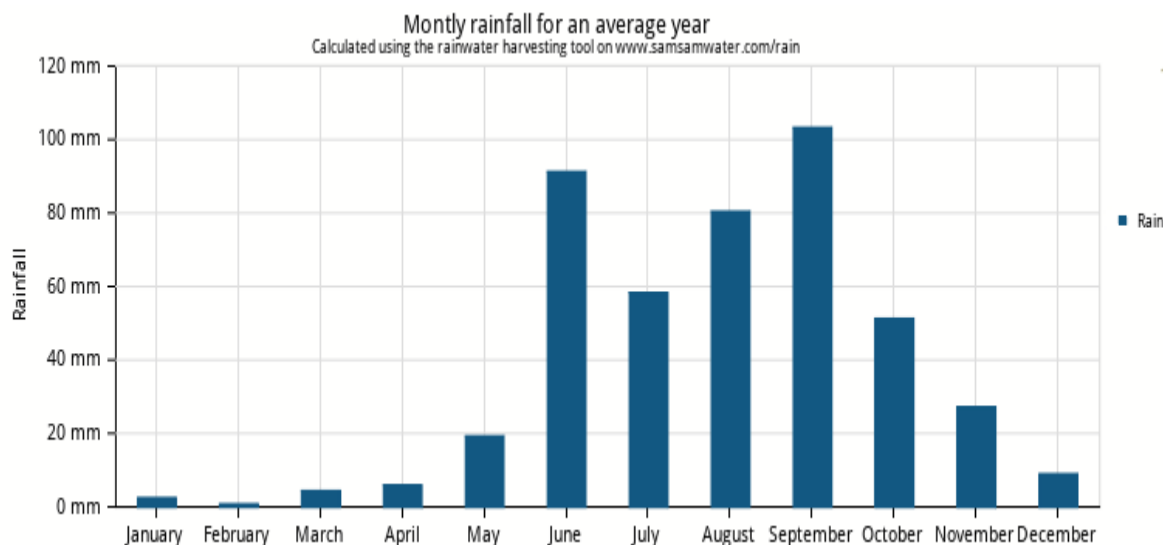
Runoff coefficient: 0.7

Water demand: 30155 liters per day

<https://goo.gl/maps/Q9y32bxaxWJqEW8R6>

Rainfall

The average rainfall at this location varies between 0.7 mm in the driest month (February) and 103.2 mm in the wettest month (September). The total annual rainfall in an average year is 453 mm.



Water availability

A flat roof has a runoff coefficient of 0.7, which means that 70% of the rain can be harvested.

Based on this runoff coefficient and a roof area of 2250 square meters a volume of 1103 liters (0.7

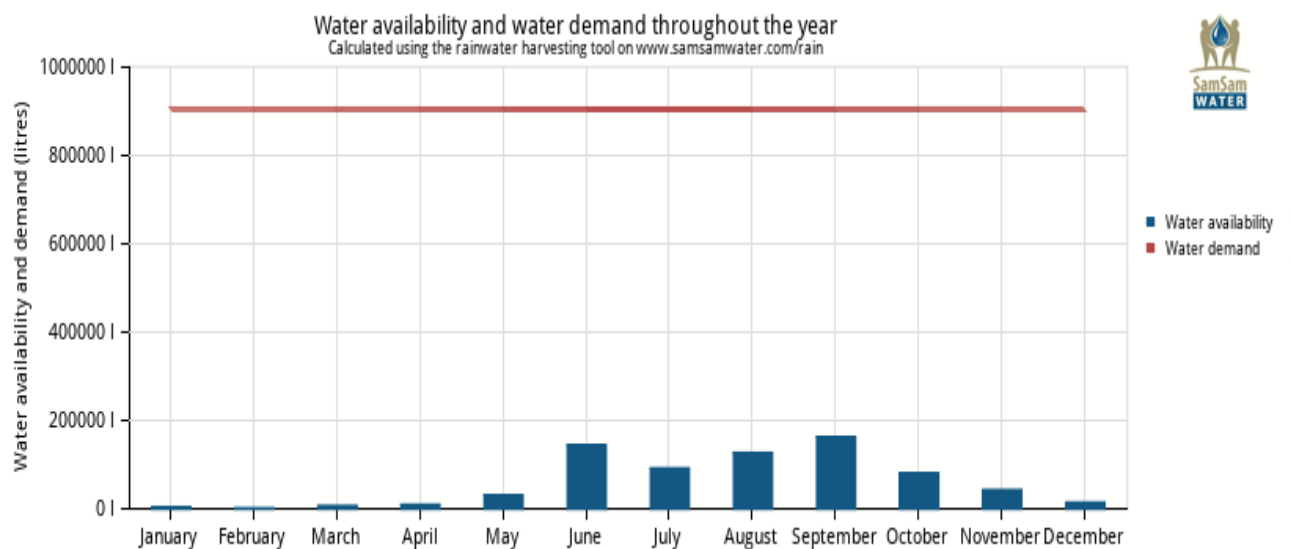
mm x 2250 m x 0.7) of water can be collected in the driest month (February) and 162540 liters (103.2 mm x 30 m x 0.7) in the wettest month (September).

The total yearly amount of water that can be collected from the roof is 712800 liters (713m) in an average year.

Water demand

The water demand is 30155 liters per day, which equals to about 904650 liters per month. The total water demand is 11006600 liters (11006.575 m) per year.

The amount of water that can be collected from the roof (713m) is less than the water demand (11006.575 m). Only a part of the water demand can be fulfilled using a rainwater harvesting system.

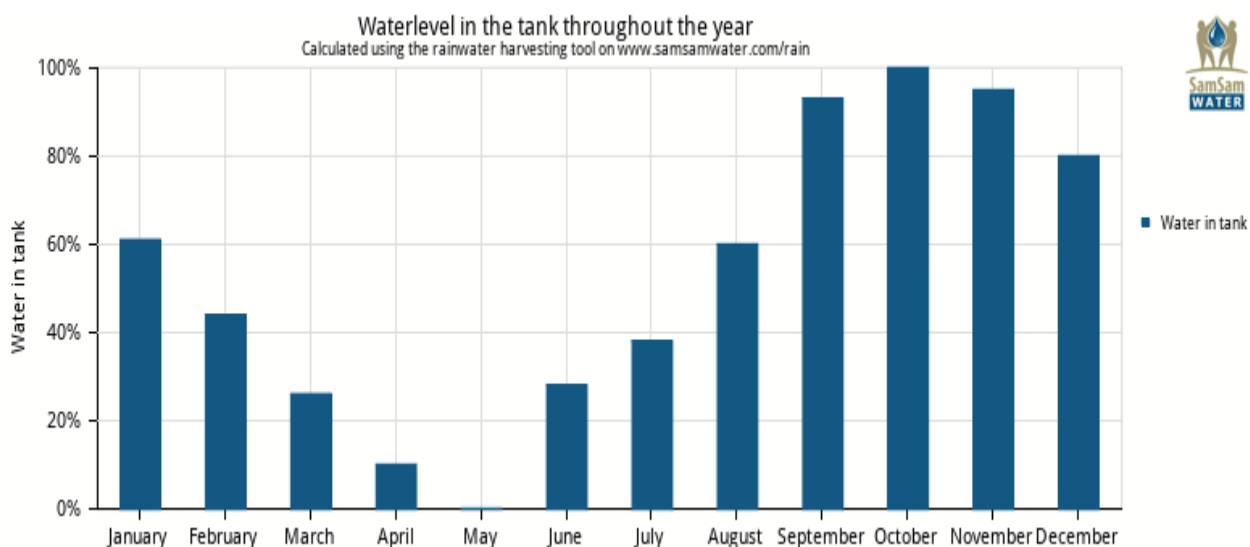


Required storage

The total amount of water that can be collected from this roof, 712800 liters, is not enough to fulfil the total yearly water demand of 11006600 liters.

However, it might still be worthwhile to construct a rainwater harvesting system. With a storage reservoir of 306300 liters (306.3 m) a rainwater harvesting system could provide 1953 liters of water per day, which is 6% of the total demand.

The storage reservoir will be full in and then slowly drain until it is (almost) empty at the end of May.



Dry and wet years

This calculation is based on the average monthly rainfall. The actual rainfall differs from month to month and year to year. The amount of available water and filling of the tank might therefore be different and change from year to year.

When constructing a rainwater harvesting system it is important to take this into account. Below is a description of the situation in a dry year (20% chance) and a wet year (20% chance).

Situation in a dry year: during a dry year, there is less rain to fill the system. The system can provide a smaller amount of water compared to an average year. All rain is stored, so constructing a larger reservoir won't help.

Situation in a wet year: during a wet year there is more water available and constructing a larger tank will increase the water availability in this situation. With a storage reservoir of 459700 liters (459.7 m) a rainwater harvesting system could provide 10% of the total demand.

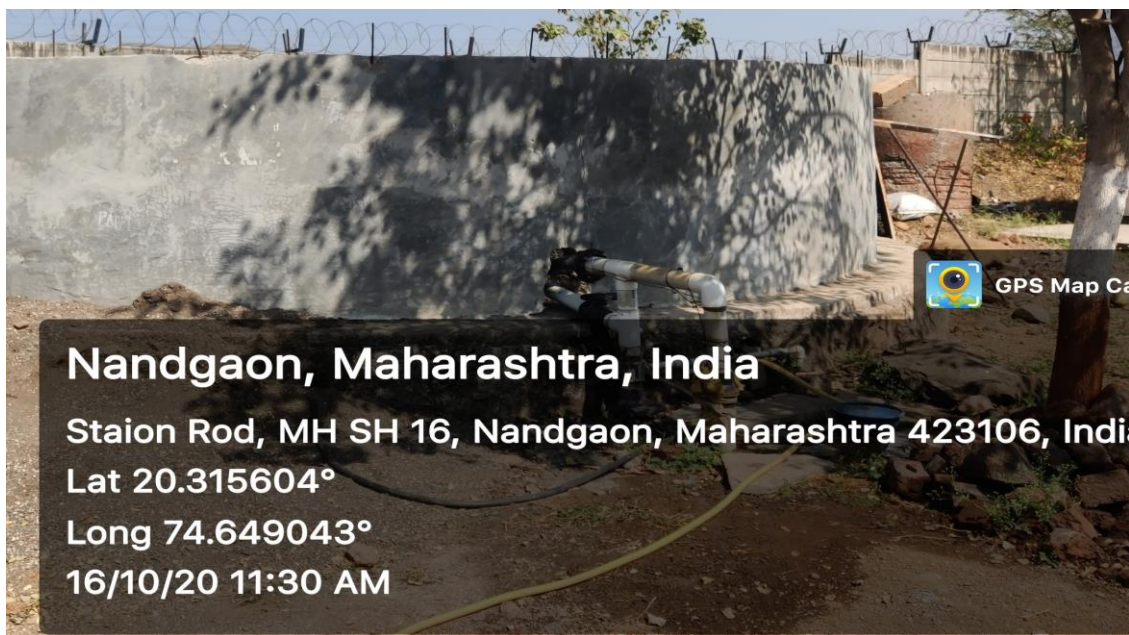
Data source

The rainfall data used for this calculation is based on the [CRU CL 2.0](#) dataset which is described in [New, M., Lister, D., Hulme, M. and Makin, I., 2002: A high-resolution data set of surface climate over global land areas. Climate Research 21:1-25](#).

College water resources

1. Well

In our college campus near main building college has One Well, this well is the main source of water for college. The work of de-sedimentation and rejuvenation was done after studying the underground water resources of well to activate ground water resources. After the de-sedimentation water level increase that help to fulfill college water need. The well is fulfilling 50% need of water for college.



2. Bore well

To complete water, need of college one well is not enough to come over that college. campus has 2 bore well. That helps to complete college water need Both bore wells are in our college campus one is near to college canteen, and another is near to college girl hostel. These two bores well provide water to library building and girl hostel.



3) Nagar Parishad water connection

The college has one water connection from local water supplier, Municipal Corporation of Nandgaon provide water connection to college. That water connection is specially attached to the girl hostel. The water from Nagar parishad is store in 50000-liter tank in girl hostel. This store water is used for the girl hostel and the botanical garden of the college.

4) Water tanker

The college is situated in Nandgaon Taluka and this Taluka having very less rain in rainy season because that the ground water level is very less. Water sources are no enough to fulfill water need of campus, to complete water need in summer season we called a local water provider The Santha Maratha Vidya Prasarak samaj's is providing water tanker every year to full fill water need of college.

6. RAIN WATER HARVESTING MANAGEMENT



When we are talking on water saving then rainwater is most important, we see every year we have enough rain but still water level is decreasing every year. We must save that rainwater and help to increase water level. College takes a good stand over that and creates a rainwater harvesting model in college campus. Roof top rainwater harvesting is carried out at Main Administrative building, Additional water collected is diverted to the college constructed tanks and well. The rain harvesting water from the tank is used for science laboratory and garden plants

Water demand

The water demand is 30155 liters per day, which equals to about 904650 liters per month. The total water demand is 11006600 liters (11006.575 m²) per year. The amount of water that can be collected from the roof (713m²) is less than the water demand (11006.575 m²). Only a part of the water demand can be fulfilled using a rainwater harvesting system.

Water Consumption in the College:

The data collected for Water Audit of MVP Samaj's Arts, Commerce and Science College Nandgaon Dist-Nashik, the water distribution and water consumption pattern is noticed as follows:

The College departments are placed in different groups they are as follow

- a) Main Building Block- A (Administrative Facilities and Classroom)
- b) Science laboratory Building Block B (Science Laboratory)
- e) Library Building Block- C (library, Commerce, Humanities and Social science) and Girls Hostel Building Block D (Girl Hostel)

Science Building Block B (Science Laboratory):

Sr. No	Sector	No of Presence	Total Daily Use (Liter)	Total yearly use (KL)
1	Toilet	06	100	6.34
2	Laboratories	04	500	31.7
3	Urinals	15	200	12.68
4	Drinking	01	150	9.51
5	Wash Basin	37	100	6.34

On the terrace of the science laboratory building block B, the water is store in one 5000-liter tank and the storage capacity of the science laboratory building is 5000 liters. This water is only used for science building for practical and others uses. These 4500 liters of water supply to the building lasts for 5 days



The water consumption at main Building Block A:

Sr.no	Sector	No. of Presence	Total Daily Use (Liter)	Total yearly Use (kl)
1	Bathroom	03	100	15.85
2	Toilet	05	1000	158
3	Garden	01		125
4	Urinals	09	1500	237.75
5	Drinking	02	1000	158.5
6	Wash Basin	04	200	31.7

On Terrace of the main building block A the water is store in three 1000 liters tanks and two 1500 liters tanks. The storage capacity of main building is 4500 liters. These 4500 liters of water supply to the building lasts for 2 days.



Girls Hostel Building Block D (Girl Hostel)

Sr.no	Sector	No. of Presence	Total Daily Use (Liter)	Total yearly Use (kl)
1	Toilet	06	1000	365
2	Bathroom	06	2000	730
3	Drinking	02	1000	365
4	Wash Basin	04	1000	365

On the terrace of the girl hostel building the water is store in three 1500 liters tanks and another one 1000 tanks is used for solar heater. The total capacity of the girl hostel terrace is 5500 liters. One 50000 liters tank is present in girls hostel area and in this tanks the water is store from Nagar parishad water connection, from two bore well and from well. From this tanks water is supply to girl's hostels, library building and college garden. This

water supply to the building lasts for 2 days. The water from storage tanks is supply to library building, science laboratory and main building when it needs.

Library Building Block C (library, Commerce, Humanities and Social science)

Sr.no	Sector	No. of Presence	Total Daily Use (Liter)	Total yearly Use (kl)
1	Toilet	04	200	36.5
2	Bathroom	02	50	9.125
3	Urinals	03	200	36.5
4	Drinking	01	250	45.625
5	Wash Basin	03	100	18.25



On the terrace of the library building the water is store in one 1000-liter tank and another 1000-liter tank is on the guest house. The total storage capacity of library building is 2000 liters. These 4500 liters water supply to the building lasts for 5 days. College has huge green campus. Efforts have been made on to bring part of land.

Drip Irrigation and Sprinkler Irrigation:

The college has some area under cultivation of medicinal plants as well as other productive plants through NSS and students of Botany departments. Drip irrigation and sprinkler irrigation system have been installed at college gardens which helps 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.



Precautionary measures:

College should consider following precautionary measures for improving campus

- 1) Non-teaching staff or peons in the concerned section should take responsibility of monitoring the overflow of water tanks.
- 2) Producing distilled water in the laboratories required large amount of water to distillate. To produce 1 liter of distilled water required more than 33 liters of water. To avoid more wastage college is using rain harvesting water as distilled water.
- 3) Reduce chemical waste formation in Chemistry laboratory; adopt the principles of green chemistry to reduce chemical waste.
- 4) Pipes, overhead tanks and plumbing system should be maintained properly to reduce leakages and wastages of water.

7. WASTE MANAGEMENT

The committee constituted by the Union Ministry of Urban Development (1998 - 2000) had reported that “Solid Waste Management has been one of the neglected areas of urban management activities in India. By and large, in cities and towns, hardly 50% of the solid waste generated is collected, transported and disposed off, giving rise to unhygienic conditions and diseases, especially amongst the urban poor who constitute about 35% of the urban population.” Even after 15 years of this report, the solid waste management systems in India are still the same.

World Health Organization (**WHO**) has observed that 22 types of diseases can be prevented/ controlled in India by improving Municipal Solid Waste Management (MSWM) system. The Planning Commission Task Force (2014) identifies that “principal reasons for the prevailing unhygienic conditions in our cities is the casual attitude of the citizens as well as the municipal authorities towards managing solid waste, lack of priority to this essential service, inadequate and inappropriate institutional structure, lack of technical knowledge and paucity of financial resources”.

Table 5: MSW generated on the campus per day

Sr. No.	Area Type	Population	Organic Waste (kg)/day	Dry waste (kg)/day
1	Girls Hostel for Covid-patients	25	5	1.2
2	Library	10	2	1.0
3	Canteen	195	35	8
4	All Campus (Students)	50	20	05
5	All Campus (Staff)	54	25	2
	Total Population	1514		
			112	24.02
		Total Waste (kg)/day	136.02	

Observations:

- The campus has huge potential for incorporating biogas plant of composting for organic / biodegradable wastes.

- The campus has small pilot scale vermin composting plant viz. Girl's hostel (intermittently functional), however a common biogas plant if installed, then cooking gas can be obtained for one of the hostel messes, which in turn will give long term savings on the cooking fuel.

Other Observations:

No segregation of the common garbage in the campus.

Most of the times the horticulture waste and other common garbage from the campus is burnt near the parking lot which pose a threat to the environment and the human health.

The segregated waste from the canteen is directly dumped into the open space of the campus

Chemical / other hazardous waste (liquid & solid) needs to be disposed as per government norms.

Recyclables viz. paper, metal scrap etc. is disposed off / sold out to scrap dealers a tender procedure, however no information is available on the recyclables.

Nearly everything humans do leave behind waste. Arts and Commerce College, Nandgaon also generates a variety of wastes such as electronic wastes, degradable and non-degradable waste. The college does a good job of ensuring that hazardous waste materials are disposed of properly. So, the college has given its top priority to dispose of the waste material.

First the solid waste generated in college campus is collected in separate bins 1) Degradable solid waste (Wet Waste) and 2) Non degradable solid waste (Dry Waste). The garbage management always tries to make the college campus Eco- friendly.

Manure Preparation:

Manure is prepared from plant litter of the college campus. This manure is used for plants of college garden. Manure is a key ingredient in organic farming. At the simplest level, the process of composting simply requires making a heap of wet organic matter and waiting for the materials to break down into humus after a period of three months. Manure is rich in nutrients. The manure itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids, and as a natural pesticide for soil.

In ecosystem, manure is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover. The decomposition process is done by shredding the plant matter, adding water, and ensuring proper aeration by regularly turning the mixture.

Worms and fungi further break up the material. Aerobic bacteria manage the chemical process by converting the inputs into heat, carbon dioxide and ammonium. The ammonium is further converted by bacteria into plant-nourishing nitrites and nitrates through the process of nitrification



Fig: Vermi Composting Photos

Vermi Composting Unit: Earthworms are considered as friends. Newly developed earthworm species like *Eisenia foetida* are voracious feeders. They consume large quantities of organic waste material. The college produces Vermicompost from the mulches of leaves of trees and cow dung which are scattered in the campus. The produced vermicompost is being used as fertilizers for trees. This Vermicompost fertilizers project has been proved very useful for the college.

The volume of a Vermicompost pit is found by multiplying the length \times the width \times the height.

II. E-Waste:

- E-Waste materials are kept in a separate storeroom with a dead stock register.
- Drives, Monitors, Keyboards, Cartridges, etc. is disposed through outside agencies as a scrap.
- UPS batteries are recharged / repaired / exchanged by the suppliers.
- The cartridge of laser printers is refilled outside the college campus.

8. SOUND POLLUTION MANAGEMENT

Noise pollution is one of the major environmental issues in India today and most of us are unaware of the hazards it can cause. In India, we all are subjected to some form of loud noises for a considerable amount of time on daily basis as well across the year based on the festive seasons.

Being located on the highway, the faces regular noise problem in the forms of Unwarranted sounds such as honking, other vehicular noise; the loudspeakers on daily basis are inevitable. In our country it's a major perception that happiness can only be expressed by creating loud noises. Table No. 6 shows implications of Noise on Human Body. Exposure to high levels of noise may cause permanent hearing loss. The repeated exposures to loud noise can lead to permanent tinnitus and/or hearing loss. Furthermore, it may create physical and psychological stress, reduce productivity, and interfere with communication and concentration. The effects of noise induced hearing loss can be profound & can be limiting your ability to hear high frequency sounds, understand speech, and seriously impairing your ability to communicate

Table 6: Considerable Implications of Noise on the Human Body. The observations show that all the locations monitored show high level of noise pollution.

Sr. No.	Noise Levels in HB	Health Hazards
1	80	Annoying
2	90	Hearing Damage
3	95	Very Annoying
4	110	Stimulation of Skin
5	120	Pain Threshold
6	130 – 135	Dizziness, Vomiting
7	140	Pain in Ear
8	150	Significant change in Heart Pulse

SOUND (NOISE) POLLUTION MANAGMENT:

To avoid sound pollution in the college campus, or to avoid causing noise, the college has tried various means to prevent sound pollution.

a. Silent Zone:

The campus has been declared as Silent Zone and the students have been instructed with the help of boards of silence zone.



b. Use of Mobile phone in Silent Mode:

An instruction has been given to students to operate mobile phones in silent mode, especially at the library and auditorium hall.



9. ENVIRONMENTAL CONSRVATION

Landscaping and plantation of trees:

Various manmade activities have wide range of impacts on the surrounding ecosphere, both negative as well as positive. Over the years, the College has undertaken various activities like plantation and beautification of campus through various drives. The campus has good plantation along with a well-developed Botanical Garden, and landscaping. It's a positive step to reduce its environmental impact. This section provides a detailed list of plant species observed within the campus.

The campus attempts to maintain ecofriendly atmosphere on the campus; the number and variety of plant species helps to maintain eco-friendly ambience. Further, to create eco-friendly awareness among the student's college arranges special programmes through which the students get clear idea and importance of trees in life. There are more than 60 perennial plant species have been observed.

Collage campus is very particular about maintaining the rich flora of the campus by planting a variety of saplings in the college premises. NSS team initiated "Harithaharam" plantation around the campus with the coordination of faculty members, students, and Management. Green Peace Eco Club conducted various activities to grow plants in the campus as well as nearby villages. All the campus of the college are equipped with a drip method for watering the plants to reduce the usage of potable water.

Though, the college campus represents good plant diversity, there is large scope to plant more trees, particularly along the fence line of main road where high to very high traffic was noticed.



Fig. 3: Botanical Garden of the college

Table 1: List of plant species observed in the campus during the field visit

Sr. No.	Botanical Name of the Plant	मराठी नाव	Family	Habit	Total Number of plants
1.	<i>Acacia auriculiformis</i>	ऑस्ट्रेलियन बाभूळ	Mimosaceae	Tree	1
2.	<i>Acacia nilotica</i>	बाभूळ	Mimosaceae	Tree	5
3.	<i>Adhatoda vasaka</i>	अडुलसा	Acanthaceae	Shrub	10
4.	<i>Adiantum pedatum</i>	अँडिअंटम	Adiantaceae	Herb	2
5.	<i>Aegle marmelos</i>	बेल	Rutaceae	Tree	1
6.	<i>Aglaonema crispum</i>	अँग्लॉनेमा	Aracaceae	Shrub	1
7.	<i>Alamanda nerifolia</i>	आलमांडा	<i>Apocynaceae</i>	Climber	4
8.	<i>Albizia lebback</i>	शिरीस	Mimosaceae	Tree	4
9.	<i>Aloe barbadensis</i>	कोरफड	Liliaceae	Herb	10
10.	<i>Alstonia scholaris</i>	सातवीन	Bignoniaceae	Tree	38
11.	<i>Annona squamosa</i>	सीताफळ	Annonaceae	Shrub	15

12.	<i>Anthurium andreanum</i>	नागफनी	Araceae	Shrub	1
13.	<i>Araucaria cookii</i>	खिसमस ट्री	Auracariaceae	Tree	1
14.	<i>Argyria nevousa</i>	समुद्रशोक	Apocynaceae	Climber	2
15.	<i>Artabotrys hexapetalus</i>	हिरवा चाफा	Annonaceae	Shrub	2
16.	<i>Asparagus racemosus</i>	शतावरी	Liliaceae	Climber	5
17.	<i>Azadirachta indica</i>	कडुनीम	Meliaceae	Tree	125
18.	<i>Bambusa Vulgaris</i>	बांबू	Poaceae	Tree	150
19.	<i>Barleria prionitis</i>	काटेकोरंटी	Acanthaceae	Shrub	5
20.	<i>Bauhinia racemosa</i>	आपटा	Caesalpiniaceae	Tree	5
21.	<i>Bauhinia variegata</i>	रक्तचंदन	Caesalpiniaceae	Tree	2
22.	<i>Bombax ceiba</i>	काटेसावर	Bombacaceae	Tree	2
23.	<i>Bougainvillea spectabilis</i>	बोगनवेल	Nyctaginaceae	Climber	52
24.	<i>Butea monosperma</i>	पळस	Fabaceae	Tree	2
25.	<i>Caesalipinia pulcherrima</i>	शंखासुर	Caesalpiniaceae	Shrub	3
26.	<i>Callindra emerginata</i>	पावडर पफ	Mimosaceae	Shrub	2
27.	<i>Callistemon acuminatus</i>	बाटली ब्रश	Myrtaceae	Tree	2
28.	<i>Calotropis procera</i>	रुई	Asclepiadaceae	Shrub	5
29.	<i>Canna indica</i>	कर्दळ	Cannaceae	Shrub	2
30.	<i>Carrisa carandus</i>	करवंद	Solanaceae	Shrub	2
31.	<i>Cassia fistula</i>	बहावा	Caesalapiaceae	Tree	2
32.	<i>Cassia siamia</i>	तरवट	Caesalpiniaceae	Shrub	25
33.	<i>Centella asiatica</i>	ब्राह्मी	Apiaceae	Herb	1
34.	<i>Cestrum nocturnum</i>	रातराणी	Solanaceae	Climber	1
35.	<i>Clematis triloba</i>	रानजाई	Ranunculaceae	Climber	1
36.	<i>Clitoria ternatea</i>	गोकर्ण	Pappilionaceae	Climber	10
37.	<i>Cocos nucifera</i>	नारळ	Arecaceae	Tree	1

38.	<i>Codiaeum variegatum</i>	क्रोटन	Euphorbiaceae	Shrub	2
39.	<i>Coleus blumei</i>	कोलियस	Lamiaceae	Herb	2
40.	<i>Couroupita guianensis</i>	कैलासपती	Lecythidaceae	Tree	2
41.	<i>Cuphea hyssopifolia</i>	कुफिया	Lythraceae	Herb	1
42.	<i>Cycus revoluta</i>	सायकस	Cycadaceae	Shrub	2
43.	<i>Delbergia sisso</i>	शिसम	Papilionaceae	Tree	20
44.	<i>Delonix regia</i>	गुलमोहर	Caesalpiniaceae	Tree	25
45.	<i>Dieffenbachia amoena</i>	डिफेनबाचिया	Areceae	Shrub	1
46.	<i>Dracaena marginata</i> 'Tricolor'	ड्रॅसेना	Asparagaceae	Shrub	2
47.	<i>Dracaena reflexa</i>	सॉग्स ऑफ इंडिया	Asparagaceae	Shrub	2
48.	<i>Dracaena sanderiana</i>	ड्रॅकेना	Asparagaceae	Shrub	2
49.	<i>Dyopsis lutescens</i>	अरेका पाम	Arecaceae	Shrub	5
50.	<i>Elaeocarpus ganitrus</i>	रुद्राक्ष	Elaeocarpaceae	Tree	1
51.	<i>Eucalyptus globulus</i>	नीलगिरी	Myrtaceae	Tree	5
52.	<i>Eugenia caryophyllus</i>	लवंग	Myrtaceae	Tree	1
53.	<i>Ficus benghalensis</i>	वड	Moraceae	Tree	25
54.	<i>Ficus benjamina</i>	फिकस	Moraceae	Tree	2
55.	<i>Ficus elastica</i>	रबराचे झाड	Moraceae	Tree	3
56.	<i>Ficus religiosa</i>	पिंपळ	Moraceae	Tree	20
57.	<i>Ficus rumphii</i>	पायरी	Moraceae	Tree	2
58.	<i>Gardenia jasminoides</i>	अनंत	Rubiaceae	Tree	1
59.	<i>Grevillia robusta</i>	सिल्व्हर ओक	Proteaceae	Tree	1
60.	<i>Hardwickia binata</i>	अंजन	Caesalpiniaceae	Tree	25
61.	<i>Hibiscus rosa-sinensis</i>	जासवंद	Malvaceae	Shrub	6
62.	<i>Hyophorbe lagenicaulis</i>	बाटली पाम	Arecaceae	Tree	1
63.	<i>Ixora coccinia</i>	एक्झॉरा	Rubiaceae	Shrub	2

64.	<i>Jacrandra mimosifolia</i>	निली गुलमोहर	Bignoniaceae	Tree	2
65.	<i>Jasminum auriculatum</i>	जाई	Oleaceae	Climber	2
66.	<i>Jasminum sambac</i>	मोगरा	Oleaceae	Herb	5
67.	<i>Juniperus chinensis</i>	जुनिपर	Cupressaceae	Shrub	2
68.	<i>Lantana camera</i>	लांटांना	Verbenaceae	Shrub	2
69.	<i>Leucaena leucocephala</i>	सुबाभूळ	Mimosaceae	Tree	23
70.	<i>Limonia acidissima</i>	कवठ	Rutaceae	Tree	2
71.	<i>Madhuca indica</i>	मोहा	Sapotaceae	Tree	2
72.	<i>Metroxylon sagu</i>	सागो पाम	Arecaceae	Tree	1
73.	<i>Millingtonia hortensis</i>	कावळ निंब	Bignoniaceae	Tree	10
74.	<i>Mimusops elengi</i>	बकुल	Sapotaceae	Tree	2
75.	<i>Moringa oleifera</i>	शेवगा	Moringaceae	Tree	2
76.	<i>Murraya koinigii</i>	कढीपत्ता	Rutaceae	Shrub	5
77.	<i>Mussaenda erythrophylla</i>	मुसेंडा	Rubiaceae	Shrub	2
78.	<i>Nephrolepis exaltata</i>	फर्न	Nephrolepidaceae	Herb	2
79.	<i>Nerium indicum</i>	कन्हेर	Apocynaceae	Shrub	5
80.	<i>Nyactanthus arbor-tristis</i>	पारिजातक	Oleaceae	Tree	2
81.	<i>Ocimum sanctum</i>	तुळशी	Lamiaceae	Herb	5
82.	<i>Passiflora edulis</i>	कृष्णकमल	Passifloraceae	Climber	1
83.	<i>Peltoforum pterocarpum</i>	पिवळी गुलमोहर	Fabaceae	Tree	2
84.	<i>Phyllanthus emblica</i>	आवळा	Euphorbiaceae	Tree	2
85.	<i>Pimenta dioica</i>	ऑलस्पाईस	Myrtaceae	Tree	1
86.	<i>Pinus longifolia</i>	पायनस	Pinaceae	Tree	1
87.	<i>Plumeria rubra</i>	चाफा	Apocynaceae	Shrub	5
88.	<i>Polyalthia longifolia</i>	अशोक	Annonaceae	Tree	30
89.	<i>Pongamia pinnata</i>	करंज	Papilionaceae	Tree	40

90.	<i>Prunus amygdalis</i>	बदाम	Rosaceae	Tree	6
91.	<i>Punica granatum</i>	डालिंब	Punicaceae	Shrub	1
92.	<i>Quisqualis indica</i>	रंगून वेल	Combretaceae	Climber	2
93.	<i>Rhoeo spathacea</i>	रिओ	Commelinaceae	Herb	25
94.	<i>Rosa demascena</i>	गुलाब	Rosaceae	Herb	10
95.	<i>Russelia juncea</i>	गणेशवेल	Plantaginaceae	Climber	2
96.	<i>Saraca indica</i>	सीता अशोक	Caesalpiniaceae	Tree	2
97.	<i>Spathodea campanulata</i>	स्पॅथोडिया	Bignoniaceae	Tree	3
98.	<i>Sterculia foetida</i>	जंगली बादाम	Malvaceae	Tree	3
99.	<i>Syzygium samarangense</i>	पांढरा जामुन	Myrataceae	Tree	1
100	<i>Tabernaemontana coronaria</i>	चांदणी	Apocynaceae	Shrub	2
101	<i>Tabernaemontana Valeriana</i>	डबल टगर	Apocynaceae	Shrub	2
102	<i>Tamarindus indica</i>	चिंच	Caesalpiniaceae	Tree	10
103	<i>Tecoma stans</i>	टेकोमा	Bignoniaceae	Shrub	2
104	<i>Tecomaria capensis</i>	टेकोमेरिया	Bignoniaceae	Shrub	2
105	<i>Terminalia arjuna</i>	अर्जुन	Combretaceae	Tree	1
106	<i>Terminalia bellerica</i>	बेहडा	Combretaceae	Tree	1
107	<i>Terminalia chebula</i>	हिरडा	Combretaceae	Tree	1
108	<i>Thevetia peruviana</i>	पिवळी कन्हेर	Apocynaceae	Shrub	10
109	<i>Thuja occidentalis</i>	मोरपंखी	Cupressaceae	Shrub	10
110	<i>Vitex negundo</i>	निरगुडी	Verbenaceae	Shrub	1
111	<i>Withania somnifera</i>	अश्वगंधा	Solanaceae	Shrub	2
Total					920

Table 8: Insect birds and mammals:

Sr. No.	Type	Local Name	Scientific Name
1	Amphibians	Indian Toad	<i>Bufo melanostictus</i>
2	Amphibians	Indian Bull Frog	<i>Hoplobatrachus tigerinus</i>
3	Annelids	Earthworm	<i>Lumbricus terrestris</i>
4	Mollusk	Snail	<i>Cornu aspersum</i>

Table 9: Amphibians Birds

Sr.no	Type	Local Name	Scientific Name
1	Bird	Bird dove	<i>Columba livia</i>
2	Bird	Coucal	<i>Centropus sinensis</i>
3	Bird	Indian Black koel	<i>Eudynamys orientalis</i>
4	Bird	Coppersmith Barbet	<i>Megalaimahaemacephala</i>
5	Bird	Myna	<i>Acridotheres tristis</i>
6	Bird	Cattle Egret	<i>Bubulcus ibis</i>
7	Bird	Pond Heron	<i>Ardeola grayii</i>
8	Bird	White breasted water hen	<i>Amaurornis phoenicurus</i>
9	Bird	Black winged Kite	<i>Elanus caeruleus</i>
10	Bird	Lesser Golden backer	<i>Chrysocolaptes</i>
11	Bird	Indian Roller	<i>Coracias benghalensis</i>
12	Bird	Little Cormorant	<i>Microcarbo niger</i>
13	Bird	Grey Heron	<i>Ardea cinerea</i>
14	Bird	Crow	<i>Corvus splendens</i>
15	Bird	White Heron	<i>Amaurornis phoenicurus L.</i>
16	Bird	Sparrow	<i>Passeridae</i>
17	Bird	Indian Peacock	<i>Pavo cristatus</i>

Table 10: Butterflies

Sr.no	Type	Local Name	Scientific Name
1	Butterfly	Crimson Rose	<i>Pachliopta hector Linnaeus</i>
2	Butterfly	Common Mormon	<i>Papilio polytes Linnaeus</i>
3	Butterfly	Common Emigrant	<i>Catopsilia pomona Fabricius</i>
4	Butterfly	Common Grass Yellow	<i>Eurema hecabe Linnaeus</i>
5	Butterfly	Common Wanderer	<i>Pareronia valeria</i>
6	Butterfly	Common Fivering	<i>Ypthima baldus</i>

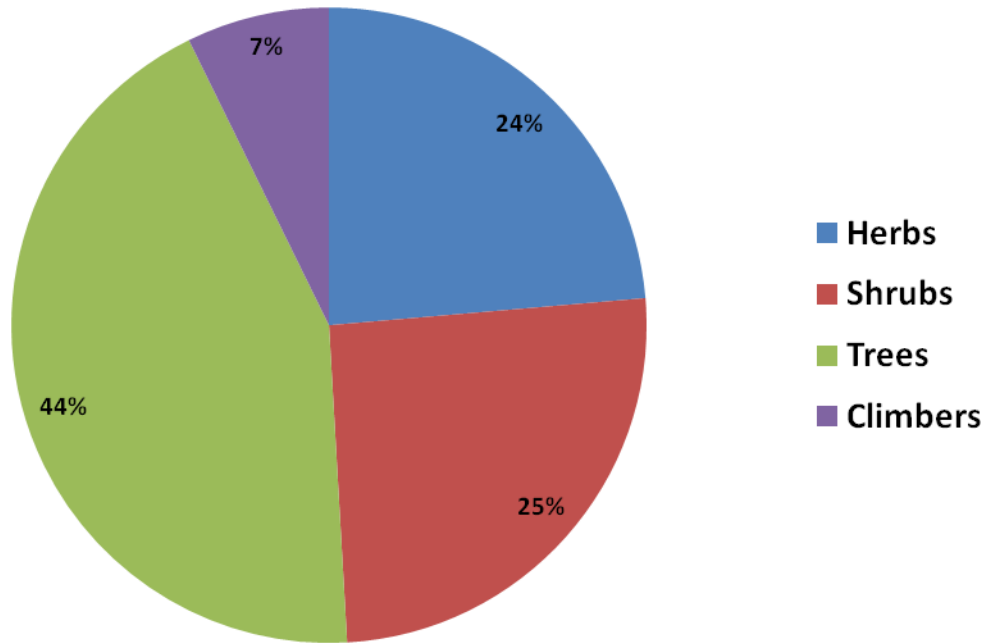
Table 11. Mammals

Sr.no	Type	Local Name	Scientific Name
1	Mammal	Ruddy Mongoose	<i>Herpestes smithii</i>
2	Mammal	Indian Hare	<i>Lepus nigricollis</i>
3	Mammal	Indian Gerbil	<i>Tatera indica</i>
4	Mammal	Indian Bush Rat	<i>Golunda ellioti</i>
5	Mammal	Monkey	Cercopithecidae

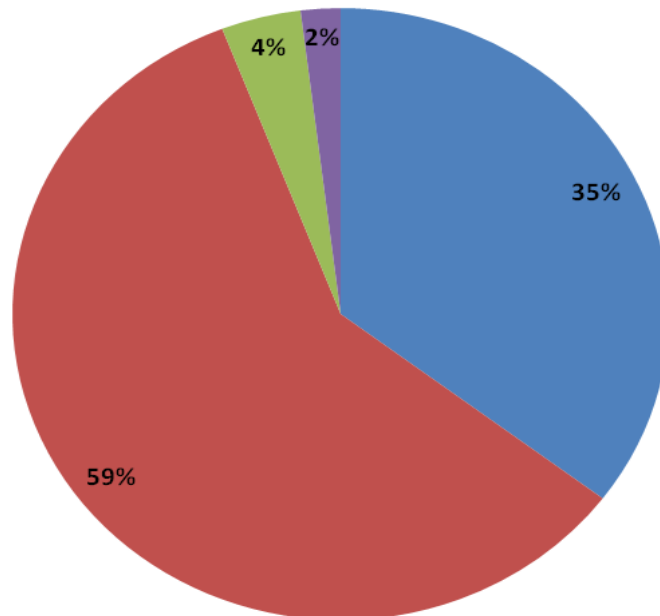
Table 12. Reptiles

Sr.no	Type	Local Name	Scientific Name
1	Reptile	Common house gecko	<i>Hemidactylus frenatus</i>
2	Reptiles	Common Garden Lizard	<i>Calotes versicolor</i>
3	Reptiles	Fan-throated Lizard	<i>Sitana ponticeriana</i>
4	Reptiles	Common smooth-scaled s water Snake	<i>Enhydri enhydri</i>
5	Reptiles	Buff striped keel back	<i>Amphiesma stolata</i>

Plant Diversity Arround College Campus



Animal Diversity Around Collage Campus



10. AIR POLLUTION MANAGEMENT

Air pollution has also become a critical issue in India. Most of the urban conglomerations in India are highly polluted with recent case of Delhi air pollution. In 2014, the World Health Organization (WHO) had assessed 1,622 cities worldwide for PM_{2.5} and found that 13 of the 20 cities in India that WHO assessed are with the most polluted air.

The air pollution is mainly caused by vehicle emissions, fuel, industrial activities, and coal fired power plants. The WHO further suggests that most Indians breathe unsafe air. Air pollution causes asthma, which is now soaring, even amongst the children. PM_{2.5} contributes to cancer, and it kills by triggering heart attacks and strokes.

Air quality in the academic institute is very important for health of the students, faculty, and staff of the institute. The air pollution sources in the college campus are windstorm, pollen grains, natural dust, vehicular emissions, generators, fires and laboratory fumes etc. The air pollutants monitored on regular basis are Sulphur dioxide (SO₂), Oxides of Nitrogen as NO₂, Suspended Particulate Matter (SPM) and Repairable Suspended Particulate Matter (RSPM) etc.

The chief sources of air pollution in the study area are mainly due to continuous vehicular activities and domestic firewood burning, fuel burning etc and natural dust. The major pollutants released in the atmosphere will be PM₁₀, PM_{2.5}. SO₂ NO_x and CO etc. All the air quality parameters are within standard limits of CPCB, New Delhi, which suggests ambient air quality at ACS College, Nandgaon campus. College has green campus of 6.5 acres efforts have been made on to planting more trees on the peripheral boundary of the campus through NSS, senior students, teaching and nonteaching staff in college. Hence, the greenery around the institute helps to neutralize whatever carbon and its byproducts generated. The campus has total 138 plant species which includes trees, shrubs, herbs, and climbers.

Observations:

- The campus is located on Aurangabad- Malegaon Highway.
- The campus population (student, staff and others) mostly prefers public transport facilities, which minimizes the air pollution.
- Table no. 15 shows air pollution levels within and around the campus. This sampling was carried out on different dates through two weeks' time.
- The observations show all the parameters in the campus are within the NAAQ Standards.

11. RECOMMENDATIONS

Water Environment

The college campus with more than 5 buildings has a high potential for the Rainwater Harvesting due to large terrace areas as well as the open surfaces (paved & unpaved areas).

Based on the geotechnical survey of the campus area, the college should emphasize on recharging the ground water table with the rainwater. The college has already placed a tank for the storage of rainwater. This would satisfy part requirement of the campus in the monsoon season (i.e., about 80 – 90 days in a year) and thus reducing freshwater intake during rainy days.

It is recommended to install water efficient faucets and flushing systems across the campus which would reduce the freshwater requirement of the campus.

Even though all the drain lines of the campus are connected to the common sewer line, it is suggested that if the management is looking forward to overall environmental sustainability, then an Effluent Treatment Plant (ETP) may be installed. This would treat & recycle the wastewater within the campus and this treated wastewater can further be used either for flushing or landscaping, thus further reducing freshwater requirement of the campus by 50 – 60 % of the total. Such modular treatment plant can be used for environmental science student's practical course as well.

To use the treated wastewater for flushing a separate plumbing system is required.

It is recommended that liquid chemical waste from the laboratories should not be disposed of without any treatment.

Noise Environment

1. In order make campus friendly for educational purposes, the noise levels need to be reduced as directed by Noise Pollution (Regulation and Control) amendment rules, 2000 and certain disciplinary measures need to be taken.
2. It is observed that due to the proximity of the campus to the main road, the noise pollution is high. It ranges from minimum of 50.0 dB (A) to maximum 73.6 dB (A) which is 23.6 dB (A) over the stipulated standard. This would mean students are getting exposed to high noise pollution levels within the campus due to either internal

activities or external activities. This would create hurdle in learning and their overall health.

3. It is recommended that the campus to have noise barriers along the fence line either in terms of natural barriers such as trees or artificial barriers such as acoustic fence. A combination of both can also be used at appropriate locations.

Fig. 4: Types of noise barriers



Acoustic Fence

Biological noise barrier structure - trees

3. It is recommended that parking lots within the campus to be made strictly as no honking zones and vehicles with unwarranted vehicle silencers (mufflers) not be allowed.

Plant diversity

To maintain the college campus green and eco-friendly, more trees need to be planted. A thick green belt (of *Ficus benjamina*) development along the fence is strongly recommended. The plant diversity shall be maintained by avoiding the plantation of exotic plant species. A tree monitoring committee is to be established, if not present currently. The college authorities should ensure frequent meetings with the tree monitoring committee.

Carbon neutrality can be maintained on the campus by developing more greenery. The plant species that are found suitable are suggested for plantation and greenbelt development. In addition to above some flowering plants, shrubs, herbs, and climber plants species will also be planted for beautification in the campus.

Criteria for selection of tree species:

The choice of species is based on the adaptability to the site, early returns, multiple uses, complimentary role to the system and its possible role during the lean/critical periods. The key factor contributing to the success of tree planting is selection of suitable tree species. Some of the considerations for selection of tree species are:

- Adaptation to local soil and agro-climate condition.
- Drought resistant species that can survive long dry periods.
- Multipurpose use species.
- Species that can serve for soil and water conservation.
- Species that help in building up soil fertility.
- Species that have good coppicing ability.

For the purpose of landscaping, following eight categories are recommended.

1. Avenues – Trees to shade roads or create avenues within property.
2. Parking - Shade giving trees for open parking lots.
3. Ornamentals – the purpose indicates:
 - a. Thicket – To be grown in groups to form a thick vegetated corner, centre or pocket.
 - b. Isolation - To be planted singly either in corners or as central attraction.
 - c. Scattered - To be planted at random to be able to appreciate its ornamental nature.
 - d. Groups – To be grown in groups of 3 to 4.
4. Hedges/Edges/Screens. –
 - a. Hedges for property hedges, for demarcating areas etc.
 - b. Edges for edging of small flower patches, for setting boundaries, for layering etc.
 - c. Screens - Provide privacy, as screens from pollution from adjoining road or to provide shadow from south sun.
5. Ground covers – These include native lawn varieties and plant species that spread laterally and can be used to cover soil below trees etc.
6. Temple plants – Trees normally associated with religious areas.
7. Climbers – Plants that can be used for forming trellis, etc.
8. Aquatic plants – For ponds or water bodies. Some of these plants need to be maintained by regular pruning to prevent excessive growth.

The plant species suggested for green belt development in addition to the present one layer of vegetation on the boundary would be helpful for mitigating gases and particulate matter. It can also help in reducing noise from the heavy traffic road close to the campus will serve for long time.



Fig. 5: The native plant species suggested for plantation in the college campus.

Table 11: List of suggested plants (an appropriate few plants can be used)

Botanical Name	Local Name	Family	Habit	Flower Color
First Row-trees (outermost)				
<i>Drypetes roxburghii</i>	Putranjiva	Euphorbiaceae	Tree	Greenish Yellow
<i>Holoptelea integrifolia</i>	Wavli	Ulmaceae	Tree	Greenish
<i>Terminalia cuneata</i>	Arjun	Combrataceae	Tree	Yellow
<i>Terminalia paniculata</i>	Kinjal	Combrataceae	Tree	Greenish white
<i>Terminalia tomentosa</i>	Ain	Combrataceae	Tree	White
<i>Bambusa arundinacea</i>	Bamboo	Poaceae	Bamboo	White, greenish
<i>Dendrocalamus strictus</i>	Velu	Poaceae	Bamboo	Blackish
<i>Cordia dichotoma</i>	Bhokar	Boraginaceae	Tree	White
<i>Dalbergia latifolia</i>	Shisam	Fabaceae	Tree	White
<i>Diospyros peregrine</i>	Tembhurni	Ebenaceae	Tree	White creamy
<i>Garcinia indica</i>	Kokam	Clusiaceae	Tree	Yellowish
<i>Haldina cordifolia</i>	Hedu	Rubiaceae	Tree	Red yellowish

Botanical Name	Local Name	Family	Habit	Flower Color
Shrub Layer				
<i>Gardenia gummifera</i>	Dikemali	Rubiaceae	Shrub	White
<i>Ixora coccinea</i>	Bakara	Rubiaceae	Shrub	Orange / Red
<i>Ixora nigricans</i>	Kat-kuda	Rubiaceae	Shrub	White
<i>Justicia adhatoda</i>	Adulsa	Acanthaceae	Shrub	White
<i>Helicteres isora</i>	Murudseng	Sterculiaceae	Shrub	Red bright
<i>Murraya koenigii</i>	Kadhipatta	Rutaceae	Shrub	Greenish White
<i>Murraya paniculata</i>	Kunti	Rutaceae	Shrub	White
<i>Hiptage benghalensis</i>	Madhvilata	Malpighiaceae	Climber	White
<i>Ehretia laevis</i>	Ajan	Ehretiaceae	Tree	White
<i>Vitex negundo</i>	Nirgudi	Verbenaceae	Shrub	Bluish - Purple
<i>Woodfordia fruticosa</i>	Dhyati	Lythraceae	Shrub	Red
<i>Gardenia resinifera</i>	Dikemali	Rubiaceae	Shrub	White
<i>Cassia auriculata</i>	Tarwad	Caesalpiniaceae	Shrub	Yellow
Second Row (from outside)				
<i>Artocarpus heterophyllus</i>	Phanas	Moraceae	Tree	Green
<i>Azadirachta indica</i>	Neem	Meliaceae	Tree	White
<i>Bauhinia recemosa</i>	Apta	Caesalpiniaceae	Tree	White
<i>Butea monosperma</i>	Palas	Fabaceae	Tree	Orange red
<i>Lagerstroemia microcarpa</i>	Nana-bondara	Lythraceae	Tree	White
<i>Lagerstroemia reginae</i>	Taman	Lythraceae	Tree	Pink
<i>Kydia calycina</i>	Warung	Malvaceae	Tree	White
<i>Mangifera india</i>	Amba	Anacardiaceae	Tree	Green
Along the paths				
<i>Caryota urens</i>	Bherali mad	Areaceae	Tree	Red & green
<i>Cassia fistula</i>	Bava	Caesalpiniaceae	Tree	Yellow
<i>Mammea surgia</i>	Surungi	Clusiaceae	Tree	White
<i>Phoenix sylvestris</i>	Shindi	Areaceae	Tree	White
<i>Nyctanthes arbor-tristis</i>	Parijatak	Oleaceae	Tree	White
Other Suggested Plants				
<i>Madhuca latifolia</i>	Moha	Sapotaceae	Tree	White
<i>Mallotus philippensis</i>	Kumkum	Euphorbiaceae	Tree	Yellow

Botanical Name	Local Name	Family	Habit	Flower Color
<i>Manilkara hexandra</i>	Khirni	Sapotaceae	Tree	White
<i>Memecylon umbellatum</i>	Anjani	Melastamaceae	Tree	Bluish - Purple
<i>Michelia champaca</i>	Sonchafa	Magnoliaceae	Tree	Yellow
<i>Mimusops elengi</i>	Bakul	Sapotaceae	Tree	White
<i>Mitragyna parvifolia</i>	Kadam	Rubiaceae	Tree	Red, yellow
<i>Morinda pubescens</i>	Bartondi	Rubiaceae	Tree	White
<i>Neolamarckia cadamba</i>	Kadamb	Rubiaceae	Tree	White creamy
<i>Pandanus odoratissimus</i>	Kewada	Pandanceae	Tree	Yellow golden
<i>Pongamia pinnata</i>	Karanj	Fabaceae	Tree	Pinkish white
<i>Santalum album</i>	Chandan	Santalaceae	Tree	Brownish red
<i>Sapindus laurifolius</i>	Ritha	Sapindaceae	Tree	White
<i>Semecarpus anacardium</i>	Bibba	Anacardiaceae	Tree	Greenish white
<i>Syzygium cumini</i>	Jambhul	Myrtaceae	Tree	White
<i>Thespesia populnea</i>	ParasBhendi	Malvaceae	Tree	Yellow
<i>Trema orientalis</i>	Gol	Ulmaceae	Tree	White creamy

Waste Management

1. E - waste to be segregated and handed over only to the dealer / facility authorized by Maharashtra Pollution Control Board (MPCB);
2. Batteries' waste to be segregated and handed over only to the dealer authorized by Maharashtra Pollution Control Board.
3. It is recommended that the wet garbage to be segregated appropriately which further can be processed and treated within the campus either by using vermicomposting or bio methanation processes.
4. The fertilizer from either of the methods can further be used as manure for the landscaping within the campus. If the bio methanation is to be used to treat the wet garbage, the biogas generated from the process can be used for the canteen either for common canteen / hostel canteens.
5. Chemical waste (solid/ semisolid) from the laboratories not to be disposed in municipal solid waste. Based on the physico-chemical properties of the waste, it should be handed over to the MPCB authorized chemical/ hazardous waste management facility only.

6. Recycling of papers to be used for day today printing and other activities.

Air Environment

It is recommended that only Pollution Under Control (PUC) certificate holding vehicles to be allowed in the campus.

Trees tolerant to air pollution to be planted along the fence line.

It is suggested that a detailed air pollution study of the institute campus to be carried out to identify the exact source of the air pollution and appropriate measures to be taken.

Safety Aspects

Teaching and non teaching staff to be trained for emergency situations.

Emergency exits to be established for the spaces including laboratories.

Eye wash systems to be installed in chemistry laboratory Periodic mock drills to be conducted.

Personal Protective Equipments (PPEs) to be used at locations including chemistry laboratories to avoid any accident.

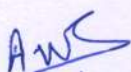
Parking safety to be followed.

Special safety features to be followed at Day school and primary school.

14 Conclusion

Considering the fact that the institution is predominantly an undergraduate college, there is significant environmental research both by faculty and students. The environmental awareness initiatives are substantial. The Vermin Compost plant and paperless work system practices are noteworthy. Besides, Tree Plantation Programs initiated by the administration shows how the campus is going green. Few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques.

prosperous future in context of Green Campus & thus sustainable environment and community development. As part of green audit of campus, we carried out the environmental monitoring of campus includes Illumination, Ventilation and Indoor Air quality of the class room. It was observed that Illumination and Ventilation is adequate considering natural light and air velocity present. Being located outside the residential and market area of the city, the college gets fresh and pure air in the classrooms.



Dr. Atul N. Madane
Co-ordinator
Internal Green Audit

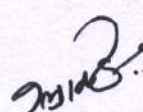


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Acknowledgment

We acknowledge support from Dr. S. I. Patel (Principal), Dr. V.B. Sonawane, Mr. S. A. Marathe.

Audit & Reporting by



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Energy Audit Report (2021-2022)

for

MVP'S

ARTS, COMMERCE AND SCIENCE COLLEGE NANDGAON,
NASHIK (M.S.)



Prepared by

**Department of Physics, Arts, Commerce and
Science College Nandgaon**

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Preface

Data collection for energy audit of the **MVP'S Arts, Commerce & Science College, Nandgaon, Nashik** was conceded by team for the period of Jan 2022 to February 2022. This audit was over sighted to inquire about convenience to progress the energy competence of the campus. Energy audit survey was completed by Department of Physics

All data collected from each classroom, laboratory, Principal office, Main Office, Staff room, wash room, & Porch. The work is completed by considering how many tubes, fan, A.Cs, electronic instruments, etc in each room. How much was participation of each component in total electricity consumption.

We really appreciate the effort put by MVP'S management for creating awareness of Energy Audit, Use renewable energy such as solar energy and their significance use for efficient energy saving and our nature among the all of us. We really appreciate Hon. Management of the college for encouraging us by providing this wonderful opportunity to do the energy audit. Through this, we have been cleared the vision of Institution towards the Green campus and save our green nature.

Acknowledgement

We are very much thankful to principal Dr. S.N. Shinde Sir for motivating us and giving this energy audit opportunity .We would like to express our sincere thanks to Dr. S.A. Marathe Sir. I am also thankful to all Science teaching nonteaching Staff of the college for who have taken part in this audit survey for each department, lab, office & class room etc. of MVP'S Arts, Commence and Science College Nandgaon. We tried our best to present this energy report as per requirements of college.

Summary

The objective of the audit was to study the energy consumption pattern of the facility, identify the areas where potential for energy/cost saving exists and prepare proposals for energy/cost saving along with investment and payback periods.

The salient observations and recommendations are given below.

1. MVP'S Arts, Commerce & Science College, Nandgaon, Nashik uses energy in the following forms:

a. From MSEDCL

b. Electricity SOLAR Grid connected solar plant (15.36kW)

c. High Speed Diesel Generator (HSDG)

Electrical energy is used for various applications, like: Computers, Lighting, Air-Conditioning,

Fans Other Laboratory Equipment, Printers, Xerox machines, CCTV, UPS, LCD Projector, Router system, External light, Pumping motor etc.

2. The average cost of energy is around **Rs. 17423.15/Month.**

3. After the measurement and analysis, we propose herewith following Energy Efficiency Improvement measures.

Table: Energy Efficiency Improvement

Sr. No.	Recommendations	Annual Saving Potential (Rs.)	Estimated Investment (Rs.)	Pay Back period (Years)	Remarks (Feasibility)
1	Replacing Normal Tube(FTL) with energy saving LED tube	59616	115*180=20700	0.34	Mid/Short Term
2	Providing Energy Saver Circuit to the Air Conditioners	9333*2=18666	Total Cost=4500*2=9000	0.48	Mid/Short Term
3	Use of motion sensor in corridors, passage and toilets	6000	8000	1.33	Mid Term
	Total Amount	84282/-	37700/-	0.71 years	

- Note:- Total savings during the energy audit is estimated at **Rs. 84282/-**
- The total energy cost with an overall payback period of **0.71 Years** for technical and economic feasibility.

Abbreviations

MAHADISCO	Maharashtra State Electricity Distribution Company
UOM	Unit of Measurement
SEC	Specific Energy Consumption
PF	Power Factor
DG	Diesel Generator
DC	Direct current
AC	Alternating Current
GCV	Gross Calorific Value

Chapter: 1

Introduction to Energy Audit

General:

The MVP'S Arts, Commerce & Science College, Nandgaon, Nashik entrusted the work of conducting a detailed Energy Audit of campus with the main objectives are as bellows:

- To study the present pattern of energy consumption.
- To identify potential areas for energy optimization.
- To recommend energy conservation proposals with cost benefit analysis.

Scope of Work, Methodology and Approach:

Scope of work and methodology were as per the proposal .While undertaking data collection, field trials and their analysis, due care was always taken to avoid abnormal situations so as to generate normal/representative pattern of energy consumption at the facility.

Approach to Energy Audit:

We focused our attention on energy management and optimization of energy efficiency of the systems, sub systems and equipment. The key to such performance evaluation lies in the sound knowledge of performance of equipment's and system as a whole.

Energy Audit:

The objective of Energy Audit is to balance the total energy inputs with its use and to identify the energy conservation opportunities in the stream. Energy Audit also gives focused attention to energy cost and cost involved in achieving higher performance with technical and financial analysis. The best alternative is selected on financial analysis basis.

Energy Audit Methodology: Energy Audit Study is divided into following steps

1. Historical Data Analysis:

The historical data analysis involves establishment of energy consumption pattern to the established base line data on energy consumption and its variation with change in production volumes.

2. Actual measurement and data analysis:

This step involves actual site measurement and field trials using various portable measurement instruments. It also involves input to output analysis to establish actual operating equipment efficiency and finding out losses in the system.

3. Identification and evaluation of Energy Conservation Opportunities:

This step involves evaluation of energy conservation opportunities identified during the energy audit. It gives potential of energy saving and investment required to implement the proposed modifications with payback period.

Chapter: 2

General Details

Sr. No.	Particulars	Details
1	Name of the Institute	MVP'S Arts, Commerce and Science College Nandgaon
	Address	MVP'S Arts, Commerce and Science College Nandgaon, Malegaon Road, Tal Nandgaon, District Nashik-423106
2	Year of Establishment	
3	Courses offered	XIth and XIIth Arts , Commerce & Science B. A./B.Com./B.Sc. M.A. (Marathi) (Political Science) M.Com. (Master in Commerce) C.C. Community College
4	Affiliation	Savitribai Phule Pune University,Pune-07

Energy Consumption Profile

Source of Energy:

MVP'S Arts, Commerce & Science College, Nandgaon, Nashik, uses

Energy in following forms:

a. Electricity from MSEDCL : MVP'S Arts, Commerce & Science College, Nandgaon, receives Electricity from Nandgaon Circle.

b. High Speed Diesel Generator (HSDG) :

HSD is used as a fuel for **Diesel** Generator which is run whenever power supply from MSEDCL. It is used when electric power is not available.

Chapter: 3 Historical Data Analysis



Photo 1 Solar Panels

Maratha Vidya Prasarak Samaj's
Arts, Commerce and Science College - Nandgaon, Nashik

15.36 Kw Roof Top Solar Power Plant

Name of Component with Specification	Make	Qty
Solar Panels (320W)	Waree	48 Nos.
Inverter - 15 Kw	Delta	1 Nos.
AC Cables	Polycab	

Capacity of Generation	60 Units/ Day
Name of the contractor	Seven Greens Solar Systems Pvt. Ltd. 33-34/1, Shree Ram CHS, Ram Mandir Road, Kher nagar Bandra (east), Mumbai - 400051.
Funded by	Savitribai Phule Pune University, Pune
Funded Amount	Rs. 5,00,000/-
Sanction Year	2017 - 18

1 Solar array converts energy from sunlight into electricity.

2 The energy is used in your homes, school or business.

3 The bidirectional meter indicates energy usage and excess energy produced.

4 The inverter converts the electricity produced by the solar array from direct current (DC) to alternating current (AC) for use in your home, school or business and measures the energy produced by the solar array.

5 Excess energy not used by your home that goes back to the electrical grid.

6 Energy used by your home from the electrical grid.

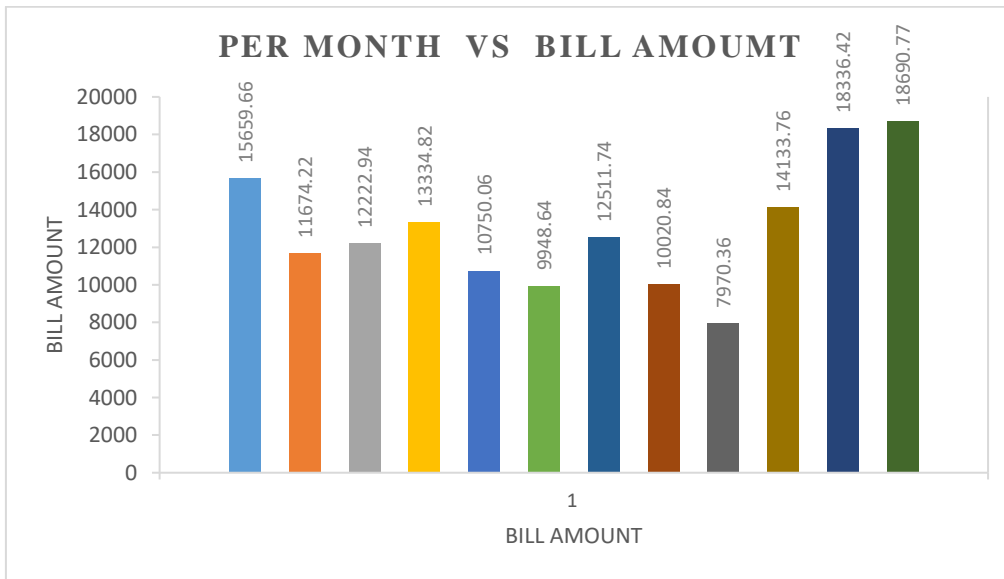
Utility pole/distribution line

SINGLE LINE DIAGRAM

Photo 2 Solar panels Chart

4.1 Study of Month wise Electricity Bill Variation: Table No 4.1 Variation in Electricity Bill

Sr. No.	Month	No. Units kWh	Electricity Bill Amount (Rs.)
1	Jun 2021	2109	15659.66
2	July 2021	1557	11674.22
3	Aug 2021	1633	12222.94
4	Sep 2021	1787	13334.82
5	Oct 2021	1429	10750.06
6	Nov 2021	1318	9948.64
7	Dec 2021	1673	12511.74
8	Jan 2022	1328	10020.84
9	Feb 2022	1044	7970.36
10	March 2022	1853	14133.76
11	April 2022	2474	18336.42
12	May 2022	2523	18690.77
			Average=12937.85



Conclusion: Monthly Electricity Bill Variation has been identified.

Roof Top PV Solar System (15.36KW) installed on terrace of Main Building

- **Before Installation Average Monthly Bill = Rs. 25090/-**
- **After Installation Average Monthly Bill = Rs. 12937.85 /-**
- **Savings in Bill due to Installation (per month) = Rs. 12152.15 /-**
- **Annual Savings in Bill (One Year) = Rs. 145825.8 /-**

Chapter: 4

Actual Measurements and its Analysis

College Campus:

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	$E = C \times D$	F	$G = E \times F$
1	LED tube	20	122	2440	3	7320
2	Normal Tube(FTL)	40	141	5640	3	16920
3	FAN	80	152	1216	6	7296
4	Exhaust fan	60	4	240	6	1440
5	PC	60	68	4080	6	24480
6	AC	3500	2	7000	3	21000
7	Printer	300	23	6900	1	6900
8	LCD Projector	280	5	1400	2	2800
9	TV	80	1	80	5	400
10	CFL	25	3	75	6	450
11	Xerox machine	650	5	3250	1	3250
12	Water Cooler	250	3	750	6	4500
13	Refrigerator	2000	3	6000	6	36000
14	Flood light	400	14	5600	10	56000
15	Electric bell	5	2	10	1	10
16	Incubator	1500	1	1500	1	1500
17	Internet Box with wifi router W/Hr	5	6	30	8	240
18	Vacuum Cleaner	1400	1	1400	0.5	700
19	CCTV	10	33	330	24	7920
20	Water filter	4	6	24	2	48
21	Hot air oven	1400	1	1400	1	1400
22	Lab Equip. for Practical	250	15	3750	1	3750
23	Furnace	600	2	1200	0.5	600
24	DG Gen set	15KVA	as per use			
25	Pumping motor	746	3	2238	1	2238
26	UPS	2-5KVA, 36 batteries of 80 Amp-hr	3	8653	5	43265

27	On Grid connected solar Planet	15.36KW	1	15.36	12	184.32
It is expected to generate 60 units/day, 1800 units per month. In our case In June only 216 units are generated through solar. Other months also get affected for optimum power generation.						

*** This is total load consumption considered approximately. Actual load consumption might be different according to actual use of power for particular time period.**

Department wise load consumption:

A) Main Building:

(Principal, Vice Principal, Staff room, YCMO, Examination department, Computer lab, 12 class Rooms, Store, Geography Department and Passage)

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (watt)	Usage Per Hr.	Power consumption /day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	LED tube	20	55	1100	3	3300
2	Normal Tube(FTL)	40	23	920	3	2760
3	FAN	80	68	5440	6	32640
4	Exhust fan	60	5	300	6	1800
5	PC	60	37	2220	6	13320
6	AC	3500	2	7000	3	21000
7	Printer	300	17	5100	1	5100
8	LCD Projector	280	1	280	2	560
9	TV	80	1	80	5	400
10	CFL	25	16	400	6	2400
11	Xerox machine	650	3	1950	1	1950
12	Water Cooler	250	1	250	6	1500
13	Refrigerator	2000	1	2000	6	12000
14	Flood light	400	7	2800	10	28000
15	Electric bell	5	2	10	1	10
16	Internet Box with wifi router W/Hr	5	6	30	7	210
17	Vacuum Cleaner	1400	1	1400	0.5	700
18	CCTV	10	12	120	24	2880

19	Water filter	4	1	4		0
20	Pumping motor	746	1	746	1	746
21	UPS	2-5KVA, 36 batteries of 80 Amp-hr	1	8653	5	43265
22	On Grid connected solar Planet	15.36KW	1	15.36	12	184.32

B) Gymkhana 1 & 2:

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (watt)	Usage Per Hr.	Power consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	LED tube	20	3	60	2	120
1	Tube (FTL)	40	1	40	2	80
2	FAN	80	2	160	6	960
3	PC	60	1	60	6	360
4	Printer	300	1	300	1	300

C) Science lab (Chemistry/Physics/Botany/ Zoology/ Mathematics):

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (watt)	Usage Per Hr.	Power consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	Normal Tube(FTL)	40	27	1080	2	2160
2	LED tube	20	40	800	2	1600
3	FAN	80	42	3360	3	10080
4	Exhust fan	60	4	240	6	1440
5	PC (CPU/MONITOR)	95/45	10/22	950/990	3	5820
6	Printer	300	4	600	1	600
7	LCD Projector	280	3	840	1	840

8	CFL	25	3	75	6	450
9	Water Cooler	250	1	250	6	1500
10	Refrigerator	2000	2	4000	6	24000
11	Flood light	400	4	1600	10	16000
12	Incubator	1500	1	1500	1	1500
13	Internet Box with wifi router W/Hr	5	1	5	6	30
14	CCTV	10	10	100	24	2400
15	Water filter	4	2	8	3	24
16	Hot air oven	1400	1	1400	1	1400
17	Lab Equip. for Practical	250	15	3750	1	3750
18	Furnace	600	2	1200	0.5	600
19	UPS	2-5KVA, 36 batteries of 80 Amp-hr	1	2884.56	5	14422.8

D) Library Building (Seminar hall, Marathi, English, Hindi, Commence, Economics, Reading Room, Ladies Room wash room & Porch):

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (watt)	Usage Per Hr.	Power consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	Normal Tube(FTL)	40	50	2000	6	12000
2	LED tube	20	5	100	6	600
3	FAN	80	26	2080	3	6240
5	PC	60	31	1860	3	5580
6	Printer	300	4	1200	1	1200
7	LCD Projector	280	1	280	1	280
8	Water Cooler	250	1	250	6	1500
9	Flood light	400	2	800	10	8000
10	CCTV	10	10	100	24	2400
11	Water filter	4	1	4	3	12
12	UPS	2-5KVA, 36 batteries of 80 Amp-hr	1	2884.56	5	14422.8

E) Ladies hostel:

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (watt)	Usage Per Hr.	Power consumption/day (Watt)
A	B	C	D	$E = C \times D$	F	$G = E \times F$
1	Normal Tube (FTL)	40	42	1680	6	10080
2	LED tube	20	22	440	6	2640
3	FAN	80	16	1280	9	11520
4	Water Cooler	250	1	250	6	1500
5	Flood light	400	1	400	10	4000
7	Water filter	4	1	4	3	12
8	water pump	746	1	746	2	1492

Remarks:

- It has been observed that in old and new building majority of electrical power consumption is through light load such as fan, FTL and power load such as refrigerator, ups, etc. unnecessary use of electrical equipment must be avoided.
- As per individual dept. level load consumption, we understand the scope for improvement of energy saving. Hence our electricity bill will be reduced by proper load management techniques along with optimum utilization of resources.



Photo 3 Solar meter

Chapter: 5 Light Intensity Analysis

Sr. No.	Department\class room	Luxmeter readings (Lux)
1	Principal office	500
2	Staff room	400
3	Vice principle office	28
4	Political science & SYBSc classroom	190
5	Exam Dept.	300
6	IT Dept.	100
7	Administration office N7	114
8	N1,N2,N3,N4,N5, N6 classroom	250
9	N8,N9,N10,N11,N13,N14	225
10	N12	50
11	Chemistry	103.50
12	Physics	300
13	Botany	310
14	Library	24
15	Reading room	200
16	Marathi	276
17	English	190
18	Commerce	150
19	Geography	100
20	Gymkhana	250

Observation:

Most of the departments having good exposure of sunlight. So, it reduces the light consumption of institute.

Chapter: 6 Study of Electrical Systems

6.1: Electrical Supply Details:

The electrical supply to MVP'S Arts Commerce and Science College, Nandgaon comes from MSEDCL supply at 11 kV, which is stepped down to 415 V by a transformer.

6.1.2 Study of Electrical Demand:

There is a single meters installed in the premises. The details of meters are as under

Table No 6.1: Meter Details:

Consumer No: 077621025557 & Meter No: 077621025557			
Sr. No.	Details of Electricity Demand	Tariff	LT-X B II (88)
1	Sanctioned Demand	20	kVA
2	Contract Demand	20	kVA
3	Recorded Maximum Demand	11	kVA

Thus we observe that:

Total Sanctioned Demand is **20 kVA** while the recorded Maximum Demand is **10 kVA**.

Electrical Energy Cost Analysis

The electrical bills from MSEDCL for 12 months from January 2020 to December 2020 have been studied.

Lighting System

Observations and suggestions:

- It is found that FTL, Bulbs, CFLs is installed in the facility.
- It is recommended that some tube lights in this area be switched off when sufficient daylight is available.
- Presently there are no reflectors installed for tube lights.
- Every light or electric gadget left on when not needed is wasting energy and money and is causing pollution that is totally unnecessary.

Chapter: 7 Carbon Di-Oxide Emission

In this Chapter we compute the CO₂ emissions. For consumption of 1 Unit (1 kWh) of Electricity, the CO₂ emitted is 0.8 Kg. OR the Emission is 0.8 Kg/kWh. In the following Table we present the total units consumed and CO₂ emitted as under:

Sr. No.	Month	kWh	Bill amount	CO ₂ Emission in Tons
1	Jun 2021	2109	15659.66	1.687
2	July 2021	1557	11674.22	1.245
3	Aug 2021	1633	12222.94	1.306
4	Sep 2021	1787	13334.82	1.429
5	Oct 2021	1429	10750.06	1.143
6	Nov 2021	1318	9948.64	1.054
7	Dec 2021	1673	12511.74	1.338
8	Jan 2022	1328	10020.84	1.062
9	Feb 2022	1044	7970.36	8.35
10	March 2022	1853	14133.76	1.482
11	April 2022	2474	18336.42	1.979
12	May 2022	2523	18690.77	2.018
			Mean Bill=12937.85	Mean=1.381.

Merits/Existing Features for Energy Savings.

1. Staff awareness.
2. Computers are connected in LAN.
3. Printers are shared in LAN.
4. Screen savers facility implemented for every computer.
5. AC's used are of three STARS.
6. Refrigerators are of three STARS.
7. Incandescent Bulbs are now here used.
8. They are replaced by CFL tubes.
9. Maximum use of natural light.
10. Cross Ventilation is provided in laboratory & class rooms, which reduced number of fans.
11. Most of the practical's are scheduled in noon time where Billing Rate in normal.
12. Walls are painted with off white Colour to have sufficient brightness.
13. Solar powered street lamp is used.
14. LED flash light is used in Seminar hall.
15. PV solar system (15.36KW) is installed which is expected to generate 60 Unit/day. (60*365=21900 units/year) This saves Rs. 131400/Year. (21900*6 per unit bill=Rs.131400per year)

Chapter: 8

Energy Conservation Proposals

8.1 Providing Energy Saver Circuit to the Air Conditioners:

The **energy saver circuits for the air conditioners, intelligently reduces the operating hours** of the compressors either by timing or temperature difference logic without affecting the human comfort. This can save around 15% to 30% of the electricity depending on the weather conditions and temperature settings.

There are total 2 split type air conditioners. It is Recommended that the old air conditioners are being replaced with new energy efficient BEE STAR labeled (3 Star and above) air conditioners in a phased manner.

- Considering the average compressor ON Time = 5 h/day
- Power consumption by 2 TR compressor = 6.1 kW
- Average daily consumption = $6.1 \times 5 = 30.5$
- KWh/day/ air conditioner Yearly operating days = 300 days/year/ air conditioner.
- Yearly electricity consumption = 9150 kWh/year/ air conditioner
- Considering a saving of 15%, total annual savings = $15\% \times 9150 = 1372.5$ kWh/year/ air conditioner.
- Cost of electricity = Rs. 6.80 / kWh
- Yearly savings = $6.80 \times 1372.5 = \text{Rs. } 9333/\text{year/ air conditioner}$
- Total number of Air Conditioners = 2

Summary:

- **Total yearly Saving = $2 \times 9333/\text{year} = \text{Rs. } 18666/\text{year}$**
- **Total Cost of each energy saver circuit = $\text{Rs. } 4500 \times 2 = \text{Rs. } 9000/-$**

8.2 Replacing Fluorescent Tube Lights (FTL) with LED Tube Lights

The **115 W** FTLs can be replaced with the LED tube lights **16 W**. These changes can be made at the places where the life is higher. Usually minimum of 3 years warranty is given and approximate burning hours is 40 000. (15 years considering 8 hours per day running)

Following calculations are done for 8 hours working:

- Power consumption by 36 W FTL with conventional choke = 40 W/ Tube Light
- Equivalent LED tube light = 20 W/ Tube Light
- Savings in power = 20 W/ Tube Light
- Operating hours = 8 h/day x 300 = 2400 h/year
- Tube Light Yearly savings = 2400 x 20 W = 48.0 kWh/year/Tube Light
- Average Cost of electricity = Rs.6.80/ kWh
- Saving = 48.0 kWh x 6.80 = Rs.326 / year/ Tube light
- Approximate investment on single LED Tube lights = Rs. 180
- Number of Tube Lights to be replaced = 122

Summary:

- **Total Yearly Saving = 122 x 326 = Rs. 39772 /year**
- **Total Investment = 122 x Rs. 180 = Rs. 21960 /-**

8.3 General Recommendations

- All Class Rooms and labs to have **Display Messages** regarding optimum use of electrical appliances in the room like, lights, fans, computers and projectors. Save electricity. **Display the stickers of save electricity**, save nature everywhere in the campus. So that all stakeholders encouraged to save the electricity.
- Most of the time, all the tube lights in a class room are kept ON, even though, there is sufficient light level near the window opening. In such cases, the light row near the window may be kept OFF.
- Trying to get the benefit of -01.50 rate in addition to actual rate for per unit consumption of **electric motor pumping during 2200 – 0600 Hrs.**
- All projectors to be kept OFF or in idle mode if there will be no presentation slides.
- All computers to have power saving settings to turn off monitors and hard discs, say after 10 minutes/30 minutes.
- The comfort/Default air conditioning temperature to be set between 24°C to 26°C.
- Lights in toilet area may be kept OFF during daytime

- Use A UTOMATIC POWER FACTOR CORRECTION (APFC) Panel FOR P F improvement.
- Need to focus on existing solar plant which is generating power below the rated power.
- Need to use power saver circuits for AC.
- Need to replace FTL by smart LED Tube
- Need to replace ordinary bulb by LED bulb.
- Need to replace ordinary CRT monitor by LED.
- Need to replace ordinary refrigerator by BEE power saver refrigerator if possible.
- Recently govt. has declared the exemption on electricity duty charges for school and colleges trying to get the benefit of the same as soon as possible.

8.4. Executive Recommendations:

1. There has to be Institute level student community that keeps track of the energy consumption Parameters of the various departments, class rooms, halls, areas, meters, etc
2. Energy auditing inside the campus has to be done on a regular basis and report should be made public to generate awareness.
3. Need to Create energy efficiency/ renewable energy awareness among the college campus i.e. solar, wind, Biogas energy. College should take initiative to arrange seminars, lectures, paper presentation competition among students and staff for general awareness.



8.5. SWOT Analysis:

8.5.1. Strengths:-

- a) PV solar system (15.36KW) is installed which is expected to generate 60 Unit/day. ($60 \times 365 = 21900$ units/year) This saves
- b) We have replaced old tubes (40W) into energy saving LED Tube (20W).

c) Advantages of college is that lots of sun light comes into room, lecture halls and Practical labs.

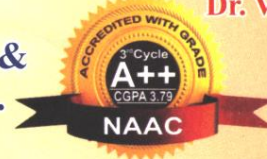
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Maratha Vidya Prasarak Samaj's
**K.R.T. Arts, B.H. Commerce &
A.M. Science College, Nashik.**
(KTHM College)



Dr. V. B. Gaikwad
M.Sc., M.Phil, Ph.D
Principal

Gangapur Road, Shivaji Nagar, Nashik - 422 002. (M.S.) India. Office : 0253-2571376, Fax : 2577341, (R) 2571502

- College with Potential for Excellence Status by UGC, New Delhi.
- Best College Award of Savitribai Phule Pune University.
- DBT Star College.
- UGC Sponsored B.Voc. Programme & Community College.
- Affiliated to SPP University [ID No. PU/NS//ASC/012(1969)]
- Junior College Index No. J-13.17.001
- DST-FIST Sponsored.

Ref.No. : 2021-2022


Date : 11-10-2022

Whom It May Concern

This is to certify that Maratha Vidya Prasarak Samaj's Arts, Commerce and Science College, Nandgaon, Tal: Nandgaon, Dist: Nashik – 423106 has successfully undergone Energy Audit on assessment of green initiative, planning and implementation of the college campus as per the guidelines laid down by the Energy Conservation Act 2001. We appreciate the efforts of the college and issue the certificate of Energy Audit.

Date: 11-10-2022

Place: Nashik

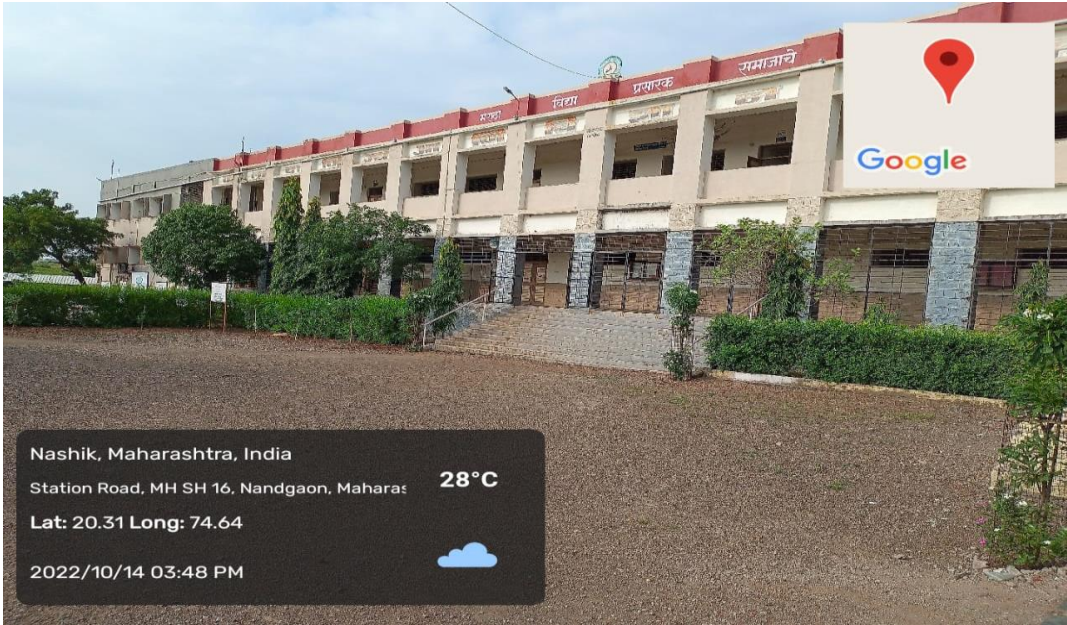

Dr. V.B Gaikwad
Principal

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GREEN AUDIT

2021-2022



Maratha Vidya Prasarak Samaj's

**Arts, Commerce and Science College,
Nandgaon**

Dist. Nashik (MH) 4231006

Affiliation ID: PU/NS/ACS/021/ (1972)

Reaccredited with 'A' Grade by NAAC in 3rd Cycle (3.06)

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INTRODUCTION AND PROFILE OF THE INSTITUTE

Maratha Vidya Prasarak Semaj's Nashik, the parent institution was established in 1914 for the sole cause of education for the deprived classes. The Institution has got the legacy of movement keeping the view of leading the masses from darkness of ignorance to the light of knowledge. The MVP Samaj's in 1972 started Arts, Commerce and Science College in Nandgaon Tehsil of Nashik district.

Since its inception, the college has looked back. It had started with Arts and Commerce faculties but in 1992 started Science faculty. The college was accredited with B grade in its first cycle and in 2011, it received A grade from NAAC, Bangalore. The college is now trying its best to be at the forefront of becoming the pioneering institution of the area in the education process. In the year 2012, the college received the prestigious 'Best College Award' conferred by Savitribai Phule Pune University (SPPU), Pune.

Spread in an area of 6.5 acres, the college imparts both UG and PG level education in various subjects of Arts, Commerce and Science streams. The college is located in drought affected area, which is a remote place the district place too. The campus of college has seven buildings i.e. Main building, Science building, Library building, Girls hostel, ladies toilet, canteen and a well-furnished Gymnasium.

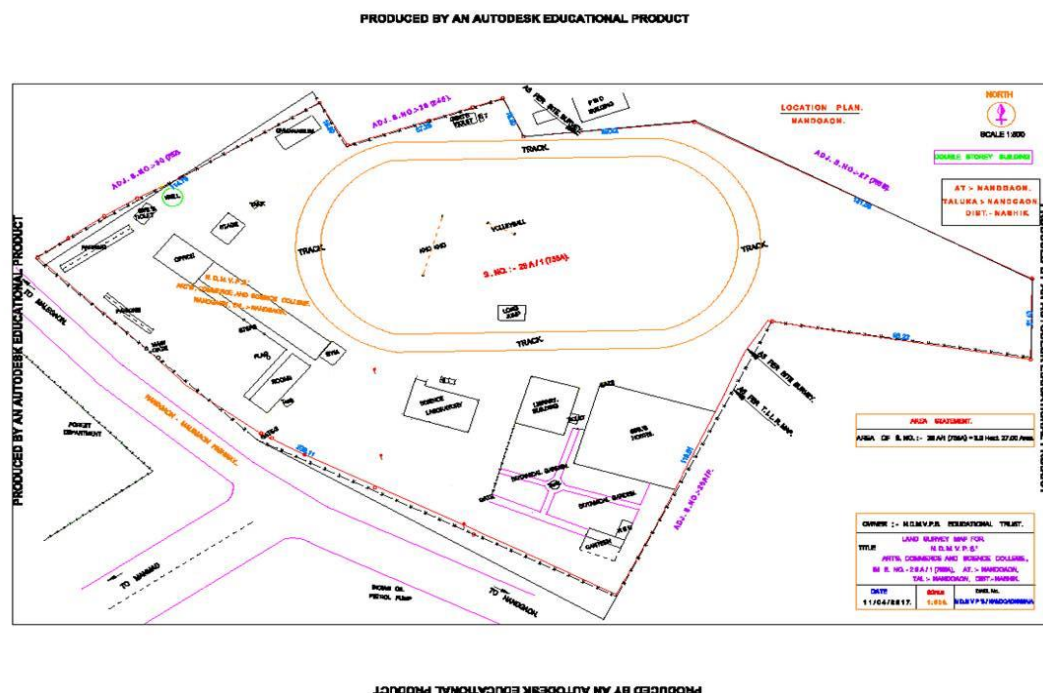


Fig. 1: Campus Map

Table 1: Campus Departments and courses

Sr. No	Faculty of Science
1	Botany
2	Chemistry
3	Mathematics
4	Physics
5	Zoology
	Faculty of Arts
6	English
7	Geography
8	Hindi
9	Marathi
	Faculty of Mental Moral and Social Sciences
10	Economics
11	Political Sciences
	Faculty of Commerce
12	B. Com
13	M.Com

2. ENVIRONMENT CONSERVATION COMMITTEE

Sr. No.	Name of Member	Designation	Title in Committee
1	Dr. S.N. Shinde	Principal	Chairman
2	Dr. A. N. Madane	Assistant Pro. Dep, of Botany	Coordinator
3	Dr. V. B. Sonawane	Assistant Pro. Dep, of Botany	Member
4	Mr. K. M. Nikam	Assistant Pro. Dep, of Chemistry	Member
5	Mr. S.S. Shinde	Assistant Pro. Dep, of Botany	Member
6	Mr. S. P. Dond	Assistant Pro. Dep, of English	Member
7	Mr. S. P. Bhosale	Assistant Pro. Dep, of Commerce	Member
8	Mr. S.D. Chavan	Assistant Pro. Dep, of Physics	Member

Table 2: Environment Conservation Committee

Table 3: External Peer Teem Committee

Sr. No.	Name of Member	Designation	Title in Committee
1.	Dr. V. B. Gaikwad	Principal, KTHM College, Nashik	Chairman
2.	Dr. P. M. Nalawade	Head, Dept of Environmental Science, KTHM College, Nashik	Coordinator
3.	Dr. N. D. Gaikwad	Associate Professor	Member
4.	Dr. B. L. Gadakh	Assistant Professor	Member

3. FUNCTIONS OF ENVIRONMENT CONSERVATION COMMITTEE

- To improve the environment of the college campus.
- To make awareness in students and society about the environment conservation.
- To make efforts for management of solid waste, liquid waste and e-waste of the college campus.
- To implement the regulations to reduce sound pollution.
- To make efforts to reduce water pollution.
- To make efforts for water conservation.
- To plant more trees and ensure their survival.
- To maintain paperless office.
- To maintain soil management at the college campus.
- To maintain plastic free college campus.
- To provide compost fertilizers with the help of vermicomposting project.

4. SCOPE OF WORK

The following Environmental Issues were studied for the above-mentioned campus area.

1. Water audit
2. Landscaping and tree plantation.
3. Energy audit
4. Noise Environment.
5. Solid Waste Management Practices.

Air Environment.

Based on the available data, sampling and information provided by the KTHM officials this report has been prepared and recommendations for betterment of campus environment are provided.

Baseline Data

The most of the baseline data relating population, water supply, has been collected from the management of the college. The data / samples for drinking water, noise, floral diversity and solid waste generation were collected by visiting the campus area by the expert teams.

Table 4: Total Population of the campus.

Sr. No.	Department	Total population of institute (incl. Students, Permanent, Temporary staff & visitors)
1	Institute (staff)	100
2	Institute - students	1107
3	Girls Hostel	14
4	Canteen (floating population)	195
	Total	1402

5. WATER AUDIT

Introduction:

Water is life

Water is very important thing for every living being, we can't imagine our life without water. At every educational institute need a good water source for campus. Our college situated in city Nandgaon; district Nashik Nandgaon region is dry & water level is very low because of that we faced a serious water issue in our campus. To come over that problem our institute work on water security for campus, we do all needful things to save water and stop water wastage. Simple actions can be adopted to reduce the wastage of water and use it wisely.

Definition:

Water Audit is a qualitative and quantitative analysis of water consumption to identify means of Reducing, Reusing and Recycling of water at college Water usage in campus can be defined as water used for all activities which are carried out in campus from different water sources which are available in college, this includes usage in all residential halls, academic buildings, and girl & boys washrooms, Hostel, in all college campus Wastewater is referred as the water which is transported off the campus. The wastewater includes sewerage, residence, hall water used in cooking, showering, clothes washing as well and wastewater from chemical and biological laboratories which ultimately going down in sink or drainage system.

The total amount of water that can be collected from this roof is not enough to fulfil the total water demand.

However, it might still be worthwhile to construct a rainwater harvesting system. With a storage reservoir of 4100 litres (4.1 m³) a rainwater

Harvesting system could provide 26 litres of water per day, which is 0% of the total demand.

Details on the results and calculations can be found below

Details on the results and calculations can be found below.

Location

Location: 8J8X+39J, Nandgaon, Maharashtra 423106, India

Latitude: 20.31578759840601 degrees

Longitude: 74.64868180453777 degrees

Roof size: 2250 square meters

Roof type: flat

Runoff coefficient: 0.7

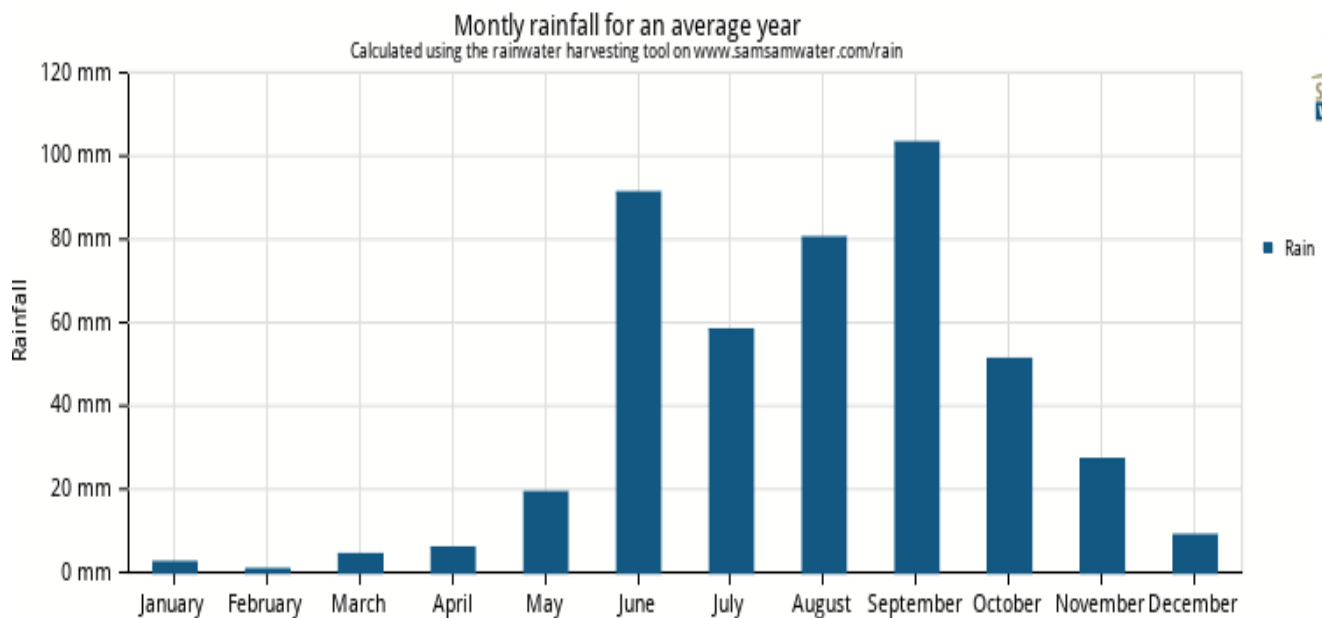
Water demand: 3000 liters per day



<https://goo.gl/maps/Q9y32bxaxWJqEW8R6>

Rainfall

The average rainfall at this location varies between 0.7 mm in the driest month (February) and 103.2 mm in the wettest month (September). The total annual rainfall in an average year is 453 mm



Water availability

A flat roof has a runoff coefficient of 0.7, which means that 70% of the rain can be harvested. Based on this runoff coefficient and a roof area of 30 square metres a volume of 15 litres

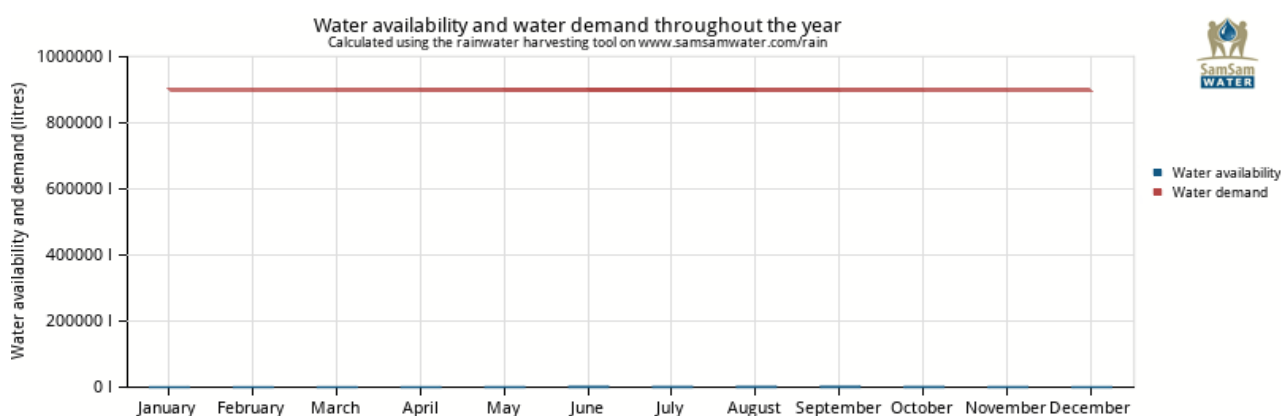
(0.7 mm x 30 m² x 0.7) of water can be collected in the driest month (February) and 2167 litres (103.2 mm x 30 m² x 0.7) in the wettest month (September).

The total yearly amount of water that can be collected from the roof is 9500 litres (10m³) in an average year.

Water demand

The water demand is 30000 litres per day, which equals to about 900000 litres per month. The total water demand is 10950000 litres (10950 m³) per year.

The amount of water that can be collected from the roof (10m³) is less than the water demand (10950 m³). Only a part of the water demand can be fulfilled using a rainwater harvesting system.

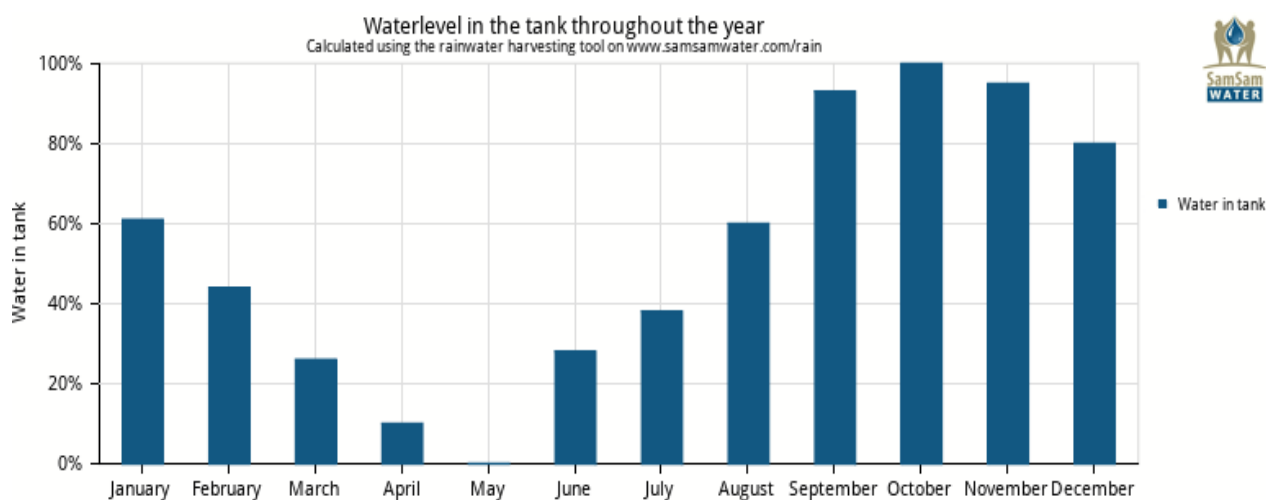


Required storage

The total amount of water that can be collected from this roof, 9500 litres, is not enough to fulfil the total yearly water demand of 10950000 litres.

However, it might still be worthwhile to construct a rainwater harvesting system. With a storage reservoir of 4100 litres (4.1 m³) a rainwater harvesting system could provide 26 litres of water per day, which is 0% of the total demand.

The storage reservoir will be full in and then slowly drain until it is (almost) empty at the end of May.



Dry and wet years

This calculation is based on the average monthly rainfall. The actual rainfall differs from month to month and year to year. The amount of available water and filling of the tank might therefore be different and change from year to year.

When constructing a rainwater harvesting system it is important to take this into account. Below is a description of the situation in a dry year (20% chance) and a wet year (20% chance).

Situation in a dry year: During a dry year, there is less rain to fill the system. The system can provide a smaller amount of water compared to an average year. All rain is stored, so constructing a larger reservoir won't help.

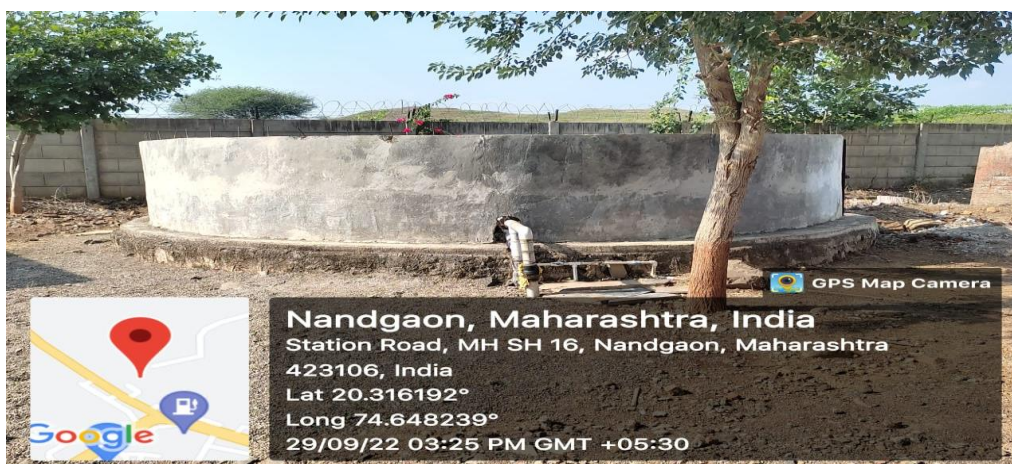
Data source

*The rainfall data used for this calculation is based on the CRU CL 2.0 dataset which is described in New, M., Lister, D., Hulme, M. and Makin, I., 2002: A high-resolution data set of surface climate over global land areas. *Climate Research* 21:1-25.*

College water resources

1. Well

In our college campus near main building college has One Well, this well is the main source of water for college. The work of de-sedimentation and rejuvenation was done after studying the underground water resources of well to activate ground water resources. After the de-sedimentation water level increase that help to fulfill college water need. The well is fulfilling 50% need of water for college.



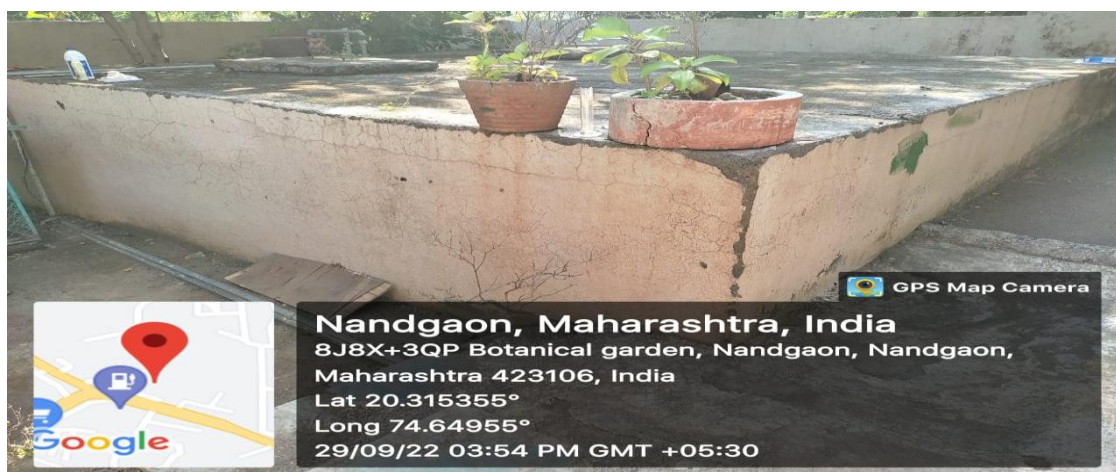
2. Bore well

To complete water, need of college one well is not enough to come over that college. campus has 2 bore well. That helps to complete college water need both bore wells are in our college campus one is near to college canteen, and another is near to college girl hostel. These two bores well provide water to library building and girl hostel.



3) Nagar Parishad water connection

The college has one water connection from local water supplier, Municipal Corporation of Nandgaon provide water connection to college. That water connection is specially attached to the girl hostel. The water from nagar parishad is store in 50000-liter tank in girl hostel. This store water is used for the girl hostel and the botanical garden of the college.



4) Water tanker

The college is situated in Nandgaon Taluka and this Taluka having very less rain in rainy season because that the ground water level is very less. Water sources are no enough to fulfill water need of campus, to complete water need in summer season we called a local water provider The Santha Maratha Vidya Prasarak samaj's is providing water tanker every year to full fill water need of college.

6. RAIN WATER HARVESTING MANAGEMENT



When we are talking on water saving then rainwater is most important, we see every year we have enough rain but still water level is decreasing every year. We must save that rainwater and help to increase water level. College takes a good stand over that and creates a rainwater harvesting model in college campus. Roof top rainwater harvesting is carried out at Main Administrative building, Additional water collected is diverted to the college constructed tanks and well. The rain harvesting water from the tank is used for science laboratory and garden plants

Water Consumption in the College:

The data collected for Water Audit of MVP Samaj's Arts, Commerce and Science College Nandgaon Dist-Nashik, the water distribution and water consumption pattern is noticed as follows:

The College departments are placed in different groups they are as follow

- a) Main Building Block- A (Administrative Facilities and Class room)
- b) Science laboratory Building Block B (Science Laboratory)
- e) Library Building Block- C (library, Commerce, Humanities and Social science) and Girls Hostel Building Block D (Girl Hostel)

Science Building Block B (Science Laboratory):

Sr. No	Sector	No of Presence	Total Daily Use (Liter)	Total yearly use (L)
1	Toilet	06	200	43200
2	Laboratories	04	1000	216000
3	Urinals	15	300	64800
4	Drinking	01	200	43200
5	Wash Basin	04	100	21600

On the terrace of the science laboratory building block B, the water is store in one 5000 liter tank and the storage capacity of the science laboratory building is 5000 liters. This water is only used for science building for practical and others uses. These 4500 liters of water supply to the building lasts for 5 days



The water consumption at main Building Block A:

Sr.no	Sector	No. of Presence	Total Daily Use (Liter)	Total yearly Use (L)
1	Bathroom	03	150	32400
2	Toilet	05	1300	280800
3	Garden	01	500	108000
4	Urinals	09	1700	367200
5	Drinking	02	1100	237600
6	Wash Basin	04	300	64800

On Terrace of the main building block A the water is store in three 1000 liters tanks and two 1500 liters tanks. The storage capacity of main building is 4500 liters..These 4500 liters of water supply to the building lasts for 2 days.



Nandgaon, Maharashtra, India

Station Rod, MH SH 16, Nandgaon, Maharashtra 423106, India

Lat 20.315604°

Long 74.649043°

16/10/20 11:27 AM

Girls Hostel Building Block D (Girl Hostel)

Sr.no	Sector	No. of Presence	Total Daily Use (Liter)	Total yearly Use (L)
1	Toilet	06	1200	259200
2	Bathroom	06	2000	432000
3	Drinking	02	1200	259200
4	Wash Basin	04	1000	216000

On the terrace of the girl hostel building the water is store in three 1500 liters tanks and another one 1000 tanks is used for solar heater. The total capacity of the girl hostel terrace is 5500 liters. One 50000 liters tank is present in girls hostel area and in this tanks the water is store from nagar parishad water connection, from two bore well and from well. From this tanks water is supply to girl's hostels, library building and college garden. This

water supply to the building lasts for 2 days. The water from storage tanks is supply to library building, science laboratory and main building when it needs.

Library Building Block C (library, Commerce, Humanities and Social science)

1	Toilet	04	300	64800
2	Bathroom	02	100	21600
3	Urinals	03	250	54000
4	Drinking	01	300	64800
5	Wash Basin	03	150	32400
1	Toilet	04	300	64800



On the terrace of the library building the water is store in one 1000-liter tank and another 1000-liter tank is on the guest house. The total storage capacity of library building is 2000 liters. These 4500 liters water supply to the building lasts for 5 days. College has huge green campus. Efforts have been made on to bring part of land.

Drip Irrigation and Sprinkler Irrigation:

The college has some area under cultivation of medicinal plants as well as other productive plants through NSS and students of Botany departments. Drip irrigation and sprinkler irrigation system have been installed at college gardens which helps 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.



Precautionary measures:

College should consider following precautionary measures for improving campus

- 1) Non-teaching staff or peons in the concerned section should take responsibility of monitoring the overflow of water tanks.
- 2) Producing distilled water in the laboratories required large amount of water to distillate. To produce 1 liter of distilled water required more than 33 liters of water. To avoid more wastage college is using rain harvesting water as distilled water.
- 3) Reduce chemical waste formation in Chemistry laboratory; adopt the principles of green chemistry to reduce chemical waste.
- 4) Pipes, overhead tanks and plumbing system should be maintained properly to reduce leakages and wastages of water.

7. WASTE MANAGEMENT

The committee constituted by the Union Ministry of Urban Development (1998 - 2000) had reported that “Solid Waste Management has been one of the neglected areas of urban management activities in India. By and large, in cities and towns; hardly 50% of the solid waste generated is collected, transported and disposed off, giving rise to unhygienic conditions and diseases, especially amongst the urban poor who constitute about 35% of

the urban population.” Even after 15 years of this report, the solid waste management systems in India are still the same.

World Health Organization (WHO) has observed that 22 types of diseases can be prevented/ controlled in India by improving Municipal Solid Waste Management (MSWM) system. The Planning Commission Task Force (2014) identifies that “principal reasons for the prevailing unhygienic conditions in our cities is the casual attitude of the citizens as well as the municipal authorities towards managing solid waste, lack of priority to this essential service, inadequate and inappropriate institutional structure, lack of technical knowledge and paucity of financial resources”.

Table 5: MSW generated on the campus per day

Sr. No.	Area Type	Population	Organic Waste (kg)/day	Dry waste (kg)/day
1	Girls Hostel for Covid-patients	25	5	1.2
2	Library	10	2	1.0
3	Canteen	195	35	8
4	All Campus (Students)	50	20	05
5	All Campus (Staff)	54	25	2
	Total Population	1514		
			112	24.02
		Total Waste (kg)/day	136.02	

Observations:

- The campus has huge potential for incorporating biogas plant of composting for organic / biodegradable wastes.
- The campus has small pilot scale vermin composting plant viz. Girl’s hostel (intermittently functional), however a common biogas plant if installed, then cooking gas can be obtained for one of the hostel messes, which in turn will give long term savings on the cooking fuel.

Other Observations:

No segregation of the common garbage in the campus.

Most of the times the horticulture waste and other common garbage from the campus is burnt near the parking lot which pose a threat to the environment and the human health.

The segregated waste from the canteen is directly dumped into the open space of the campus

Chemical / other hazardous waste (liquid & solid) needs to be disposed as per government norms.

Recyclables viz. paper, metal scrap etc. is disposed off / sold out to scrap dealers a tender procedure, however no information is available on the recyclables.

Nearly everything humans do leave behind waste. Arts and Commerce College, Nandgaon also generates a variety of wastes such as electronic wastes, degradable and non-degradable waste. The college does a good job of ensuring that hazardous waste materials are disposed of properly. So, the college has given its top priority to dispose of the waste material.

First the solid waste generated in college campus is collected in separate bins 1) Degradable solid waste (Wet Waste) and 2) Non degradable solid waste (Dry Waste). The garbage management always tries to make the college campus Eco- friendly.

Manure Preparation:

Manure is prepared from plant litter of the college campus. This manure is used for plants of college garden. Manure is a key ingredient in organic farming. At the simplest level, the process of composting simply requires making a heap of wet organic matter and waiting for the materials to break down into humus after a period of three months. Manure is rich in nutrients. The manure itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids, and as a natural pesticide for soil.

In ecosystem, manure is useful for erosion control, land and stream reclamation, wetland construction, and as landfill cover. The decomposition process is done by shredding the plant matter, adding water, and ensuring proper aeration by regularly turning the mixture. Worms and fungi further break up the material. Aerobic bacteria manage the chemical process by converting the inputs into heat, carbon dioxide and ammonium. The ammonium is further converted by bacteria into plant-nourishing nitrites and nitrates through the process of nitrification



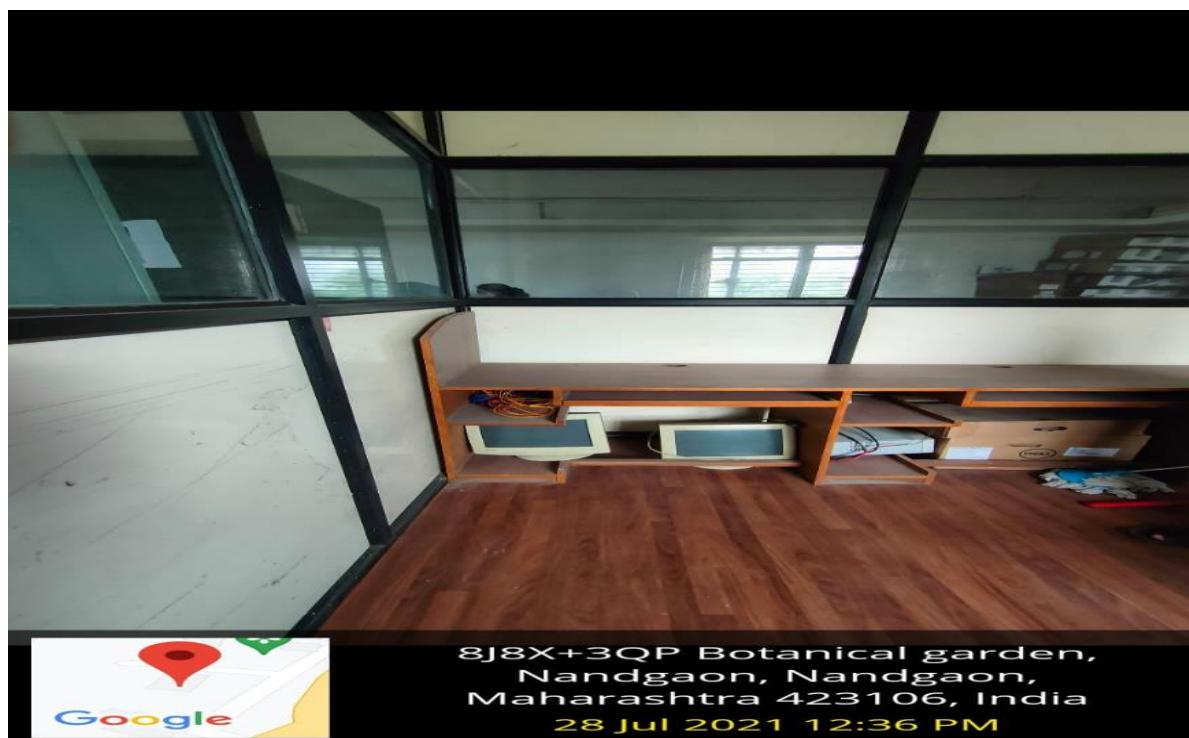
Fig: Vermi Composting Photos

Vermi Composting Unit: Earthworms are considered as friends. Newly develop earthworm species like and *Eisenia foetida* are voracious feeders. They consume large quantity of organic waste material. The college produces Vermi compost from the mulches of leaves of trees and cow dung which are scattered in the campus. The produced vermin compost is being used as fertilizers for trees. This Vermi compost fertilizers project has been proved very useful for the college.

The volume of a Verm pit is found by multiplying the length \times the width \times the height.

II. E-Waste:

- E-Waste materials are kept in a separate storeroom with a dead stock register.
- Drives, Monitors, Keyboards, Cartridges, etc. is disposed through outside agencies as a scrap.
- UPS batteries are recharged / repaired / exchanged by the suppliers.
- The cartridge of laser printers is refilled outside the college campus.



8. SOUND POLLUTION MANAGEMENT

Noise pollution is one of the major environmental issues in India today and most of us are unaware of the hazards it can cause. In India, we all are subjected to some form of loud noises for a considerable amount of time on daily basis as well across the year based on the festive seasons.

Being located on the highway, the faces regular noise problem in the forms of Unwarranted sounds such as honking, other vehicular noise; the loudspeakers on daily basis are inevitable. In our country it's a major perception that happiness can only be expressed by creating loud noises. Table No. 6 shows implications of Noise on Human Body. Exposure to high levels of noise may cause permanent hearing loss. The repeated exposures to loud noise can lead to permanent tinnitus and/or hearing loss. Furthermore, it may create physical and psychological stress, reduce productivity, and interfere with communication

and concentration. The effects of noise induced hearing loss can be profound & can be limiting your ability to hear high frequency sounds, understand speech, and seriously impairing your ability to communicate

Table 6: Considerable Implications of Noise on the Human Body. The observations show that all the locations monitored show high level of noise pollution.

Sr. No.	Noise Levels in HB	Health Hazards
1	80	Annoying
2	90	Hearing Damage
3	95	Very Annoying
4	110	Stimulation of Skin
5	120	Pain Threshold
6	130 – 135	Dizziness, Vomiting
7	140	Pain in Ear
8	150	Significant change in Heart Pulse

SOUND (NOISE) POLLUTION MANAGMENT:

To avoid sound pollution in the college campus, or to avoid causing noise, the college has tried various means to prevent sound pollution.

a. Silent Zone:

The campus has been declared as Silent Zone and the students have been instructed with the help of boards of silence zone.



b. Use of Mobile phone in Silent Mode:

An instruction has been given to students to operate mobile phones in silent mode, especially at the library and auditorium hall.



9. ENVIRONMENTAL CONSRVATION

Landscaping and plantation of trees:

Various manmade activities have wide range of impacts on the surrounding ecosphere, both negative as well as positive. Over the years, the College has undertaken various activities like plantation and beautification of campus through various drives. The campus has good plantation along with a well-developed Botanical garden, and landscaping. It's a positive step to reduce its environmental impact. This section provides a detailed list of plant species observed within the campus.

The campus attempts to maintain ecofriendly atmosphere on the campus; the number and variety of plant species helps to maintain eco-friendly ambience. Further, to create eco-friendly awareness among the student's college arranges special programmes through which the students get clear idea and importance of trees in life. There are more than 60 perennial plant species have been observed.

Collage campus is very particular about maintaining the rich flora of the campus by planting a variety of saplings in the college premises. NSS team initiated "Harithaharam" plantation around the campus with the coordination of faculty members, students, and Management. Green Peace Eco Club conducted various activities to grow plants in the campus as well as nearby villages. All the campus of the college are equipped with a drip method for watering the plants to reduce the usage of potable water.

Though, the college campus represents good plant diversity, there is large scope to plant more trees, particularly along the fence line of main road where high to very high traffic was noticed.



Fig. 3: Botanical Garden of the college**Table 1: List of plant species observed in the campus during the field visit**

Sr. No.	Botanical Name	Marathi Name	Family	Habit	No. of Plant Sp.
1	<i>Acacia auriculiformis</i>	ऑस्ट्रेलियन बाभूळ	Mimosaceae	Tree	2
2	<i>Acacia nilotica</i>	बाभूळ	Mimosaceae	Tree	6
3	<i>Adhatoda vasaka</i>	अडुलसा	Acanthaceae	Shrub	3
4	<i>Adiantum pedatum</i>	अँडिअंटम	Adiantaceae	Herb	1
5	<i>Aegle marmelos</i>	बेल	Rutaceae	Tree	1
6	<i>Aglaonema crispum</i>	अँग्लोनेमा	Aracaceae	Shrub	2
7	<i>Alamanda nerifolia</i>	आलमंडा	Apocynaceae	Climber	1
8	<i>Albizia lebback</i>	शिरीस	Mimosaceae	Tree	20
9	<i>Aloe barbadensis</i>	कोरफड	Liliaceae	Herb	20
10	<i>Alstonia scholaris</i>	सातवीन	Bignoniaceae	Tree	45
11	<i>Anacardium occidentale</i>	काजू	Anacardiaceae	Tree	1
12	<i>Annona squamosa</i>	सीताफळ	Annonaceae	Shrub	16
13	<i>Anthocephalus cadamba</i>	कदंब	Rubiaceae	Tree	1
14	<i>Anthurium andreanum</i>	नागफानी	Araceae	Shrub	2
15	<i>Araucaria cookii</i>	ख्रिसमस ट्री	Auracariaceae	Tree	1
16	<i>Areca catechu</i>	सुपारी	Arecaceae	Tree	1
17	<i>Argyria nevosa</i>	समुद्रशोक	Apocynaceae	Climber	1

18	<i>Artabotrys hexapetalus</i>	हिरवा चाफा	Annonaceae	Shrub	1
19	<i>Asparagus racemosus</i>	शतावरी	Liliaceae	Climber	1
20	<i>Azadirachta indica</i>	कडुनीम	Meliaceae	Tree	121
21	<i>Bambusa Vulgaris</i>	बांबू	Poaceae	Tree	10
22	<i>Barleria prionitis</i>	काटेकोरंटी	Acanthaceae	Shrub	2
23	<i>Bauhinia racemosa</i>	आपटा	Caesalpinia e	Tree	6
24	<i>Bauhinia variegata</i>	रक्तचंदन	Caesalpinia e	Tree	4
25	<i>Bombax ceiba</i>	काटेसावर	Bombacaceae	Tree	4
26	<i>Bougainvillea spectabilis</i>	बोगनवेल	Nyctaginaceae	Climber	59
27	<i>Butea monosperma</i>	पळस	Fabaceae	Tree	2
28	<i>Caesalpinia pulcherrima</i>	शंखासुर	Caesalpinia e	Shrub	1
29	<i>Callindra emerginata</i>	पावडर पफ	Mimosaceae	Shrub	1
30	<i>Callindra hybrida</i>	कॉलिन्र	Mimosaceae	Shrub	1
31	<i>Callistemon acuminatus</i>	बाटली ब्रश	Myrtaceae	Tree	4
32	<i>Calotropis procera</i>	रुई	Asclepiadace e	Shrub	6
33	<i>Canna indica</i>	कर्दळ	Cannaceae	Shrub	1
34	<i>Carrisa carandus</i>	करवंद	Solanaceae	Shrub	1
35	<i>Cassia fistula</i>	बहावा	Caesalpinia ae	Tree	1
36	<i>Cassia siamia</i>	तरवट	Caesalpinia e	Shrub	1

37	<i>Centella asiatica</i>	ब्राह्मी	Apiaceae	Herb	1
38	<i>Cestrum nocturnum</i>	रातराणी	Solanaceae	Climber	1
39	<i>Cinnamomum tamala</i>	तेजपान	Lauraceae	Herb	1
40	<i>Cinnamomum zeylanicum</i>	दालचिनी	Lauraceae	Shrub	1
41	<i>Clematis triloba</i>	रानजाई	Ranunculaceae	Climber	1
42	<i>Clitoria ternatea</i>	गोकर्ण	Pappilionaceae	Climber	4
43	<i>Cocos nucifera</i>	नारळ	Arecaceae	Tree	1
44	<i>Codiaeum variegatum</i>	क्रोटन	Euphorbiaceae	Shrub	2
45	<i>Coleus blumei</i>	कोलियस	Lamiaceae	Herb	1
46	<i>Couroupita guianensis</i>	कैलासपती	Lecythidaceae	Tree	1
47	<i>Cuphea hyssopifolia</i>	कुफिया	Lythraceae	Herb	1
48	<i>Cycus revoluta</i>	सायकस	Cycadaceae	Shrub	2
49	<i>Cyprus sp.</i>	नागरमोथा	Cyperaceae	Shrub	1
50	<i>Delbergia sisso</i>	शिसम	Papillionaceae	Tree	51
51	<i>Delonix regia</i>	गुलमोहर	Caesalpinia ceae	Tree	14
52	<i>Dieffenbachia amoena</i>	डिफेनबाचिया	Areceae	Shrub	1
53	<i>Dodonaea viscosa</i>	बाढ	Sapindaceae	Shrub	10
54	<i>Dypsis lutescens</i>	अरेका पाम	Arecaceae	Shrub	1
55	<i>Elaeocarpus ganitrus</i>	रुद्राक्ष	Elaeocarpacea e	Tree	1
56	<i>Eucalyptus globulus</i>	नीलगिरी	Myrtaceae	Tree	3

57	<i>Eugenia caryophyllus</i>	लवंग	Myrtaceae	Tree	1
58	<i>Euphorbia pulcherrima</i>	पॉइसेटिया	Euphorbiaceae	Shrub	1
59	<i>Ficus benghalensis</i>	वड	Moraceae	Tree	26
60	<i>Ficus religiosa</i>	पिंपळ	Moraceae	Tree	24
61	<i>Ficus recimosa</i>	उंबर	Moraceae	Tree	1
62	<i>Ficus benjamina</i>	नंदरुख	Moraceae	Tree	3
63	<i>Ficus rumphii</i>	पायरी	Moraceae	Tree	1
64	<i>Grevillia robusta</i>	सिल्व्हर ओक	Proteaceae	Tree	18
65	<i>Hardwickia binata</i>	अंजन	Caesalpiniaceae	Tree	48
66	<i>Heliconia rostrata</i>	हेलिकोनिया	Heliconiaceae	Shrub	1
67	<i>Hibiscus rosa-sinensis</i>	जासवंद	Malvaceae	Shrub	7
68	<i>Hyophorbe lagenicaulis</i>	बाटली पाम	Arecaceae	Tree	1
69	<i>Ixora coccinia</i>	एक्झॉरा	Rubiaceae	Shrub	1
70	<i>Jacranda mimosifolia</i>	निली गुलमोहर	Bignoniaceae	Tree	1
71	<i>Jasminum auriculatum</i>	जाई	Oleaceae	Climber	1
72	<i>Jasminum sambac</i>	मोगरा	Oleaceae	Herb	3
73	<i>Juniperus chinensis</i>	जुनिपर	Cupressaceae	Shrub	2
74	<i>Lantana camera</i>	घाणेरी	Verbenaceae	Shrub	12
75	<i>Leucaena leucocephala</i>	सुबाभूळ	Mimosaceae	Tree	28
76	<i>Limonia acidissima</i>	कवठ	Rutaceae	Tree	1
77	<i>Madhuca indica</i>	मोहा	Sapotaceae	Tree	1

78	<i>Magnolia grandiflora</i>	मॅग्नोलिया	Magnoliaceae	Tree	1
79	<i>Mesua ferrea</i>	नागकेशर	Calophyllaceae	Shrub	1
80	<i>Millingtonia hortensis</i>	कावळ निंब	Bignoniaceae	Tree	1
81	<i>Mimusops elengi</i>	बकुल	Sapotaceae	Tree	1
82	<i>Mimosa pudica</i>	लाजाळू	Fabaceae	Perennial creeper	1
83	<i>Moringa oleifera</i>	शवगा	Moringaceae,	Tree	4
84	<i>Murraya koinigii</i>	कढीपत्ता	Rutaceae	Shrub	2
85	<i>Murraya paniculata</i>	मधुकामिनी	Rutaceae	Shrub	10
86	<i>Mussaenda erythrophylla</i>	मुसेंडा	Rubiaceae	Shrub	1
87	<i>Nephrolepis exaltata</i>	फर्न	Nephrolepidaceae	Herb	4
88	<i>Nerium indicum</i>	कन्हेर	Apocynaceae	Shrub	2
89	<i>Nyactanthis arbor-tristis</i>	पारिजातक	Oleaceae	Tree	1
90	<i>Ocimum sanctum</i>	तुळशी	Lamiaceae	Herb	17
91	<i>Passiflora edulis</i>	कृष्णकमल	Passifloraceae	Climber	2
92	<i>Passiflora quadrangularis</i>	कृष्णकमल	Passifloraceae	Climber	1
93	<i>Peltoforum pterocarpum</i>	पिवळी गुलमोहर	Fabaceae	Tree	3
94	<i>Phyllanthus emblica</i>	आवळा	Euphorbiaceae	Tree	3
95	<i>Pinus longifolia</i>	पायनस	Pinaceae	Tree	1
96	<i>Plumeria rubra</i>	चाफा	Apocynaceae	Shrub	5
97	<i>Pongamia pinnata</i>	करंज	Fabaceae	Tree	40

98	<i>Polyalthia longifolia</i>	अशोक	Annonaceae	Tree	21
99	<i>Psidium guajava</i>	पेरू	Myrtaceae	Tree	1
100	<i>Prunus amygdalis</i>	बदाम	Rosaceae	Tree	13
101	<i>Punica granatum</i>	डालिंब	Punicaceae	Shrub	1
102	<i>Opuntia ficus-indica,</i>	फड्या निवडुंग	Cactaceae	Shrub	4
103	<i>Quamoclit coccinia</i>	विष्णुक्रांत	Convolvulaceae	Climber	4
104	<i>Quisqualis indica</i>	रंगून वेल	Combretaceae	Climber	1
105	<i>Ravenala madagascariensis</i>	प्रवासी पाम	Strelitziaceae	Shrub	1
106	<i>Rhoeo spathacea</i>	रिओ	Commelinaceae	Herb	7
107	<i>Rosa demascena</i>	गुलाब	Rosaceae	Herb	10
108	<i>Russelia juncea</i>	गणेशवेल	Plantaginaceae	Climber	5
109	<i>Saraca indica</i>	सीता अशोक	Caesalpiniaceae	Tree	1
110	<i>Spathodea campanulata</i>	स्पॅथोडिया	Bignonaceae	Tree	1
111	<i>Syzygium samarangense</i>	पांढरा जामुन	Myrtaceae	Tree	1
112	<i>Swietenia macrophylla</i>	महोगानी	Meliaceae	Tree	1
113	<i>Tabernaemontana coronaria</i>	चांदणी	Apocynaceae	Shrub	1
114	<i>Tabernaemontana Valeriana</i>	डबल टगर	Apocynaceae	Shrub	1
115	<i>Tagetes erecta</i>	झेंडू	Asteraceae	Herb	1
116	<i>Tamarindus indica</i>	चिंच	Caesalpiniaceae	Tree	5

117	<i>Tecoma stans</i>	टेकोमा	Bignoniaceae	Shrub	1
118	<i>Tecomaria capensis</i>	टेकोमेरिया	Bignoniaceae	Shrub	1
119	<i>Terminalia arjuna</i>	अर्जुन	Combretaceae	Tree	1
120	<i>Terminalia bellerica</i>	बेहडा	Combretaceae	Tree	1
121	<i>Terminalia chebula</i>	हिरडा	Combretaceae	Tree	1
122	<i>Thevetia peruviana</i>	पिवळी कन्हेर	Apocynaceae	Shrub	1
123	<i>Thuja occidentalis</i>	मोरपंखी	Cupressaceae	Shrub	4
124	<i>Tectona grandis</i>	सागवान	Verbenaceae	Tree	5
125	<i>Vinca rosea</i>	सदाफुली	Apocynaceae	Herb	5
126	<i>Vitex negundo</i>	निरगुडी	Verbenaceae	Shrub	10
127	<i>Withania somnifera</i>	अश्वगंधा	Solanaceae	Shrub	6
128	<i>Woodfordia fruticosa</i>	धायटी	Lythraceae	Shrub	1
129	<i>Ziziphus mauritiana</i>	बोर	Rhamnaceae	Tree	2

Table 8: Insect birds and mammals:

Sr. No.	Type	Local Name	Scientific Name
1	Amphibians	Indian Toad	<i>Bufo melanostictus</i>
2	Amphibians	Indian Bull Frog	<i>Hoplobatrachus tigerinus</i>
3	Annelids	Earthworm	<i>Lumbricus terrestris</i>
4	Mollusk	Snail	<i>Cornu aspersum</i>

Table 9: Amphibians Birds

Sr.no	Type	Local Name	Scientific Name
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1	Bird	Bird dove	<i>Columba livia</i>
2	Bird	Coucal	<i>Centropus sinensis</i>
3	Bird	Indian Black koel	<i>Eudynamys orientalis</i>
4	Bird	Coppersmith Barbet	<i>Megalaimahaemacephala</i>
5	Bird	Myna	<i>Acridotheres tristis</i>
6	Bird	Cattle Egret	<i>Bubulcus ibis</i>
7	Bird	Pond Heron	<i>Ardeola grayii</i>
8	Bird	White breasted water hen	<i>Amaurornis phoenicurus</i>
9	Bird	Black winged Kite	<i>Elanus caeruleus</i>
10	Bird	Lesser Golden backer	<i>Chrysocolaptes</i>
11	Bird	Indian Roller	<i>Coracias benghalensis</i>
12	Bird	Little Cormorant	<i>Microcarbo niger</i>
13	Bird	Grey Heron	<i>Ardea cinerea</i>
14	Bird	Crow	<i>Corvus splendens</i>
15	Bird	White Heron	<i>Amaurornis phoenicurus L.</i>
16	Bird	Sparrow	<i>Passeridae</i>
17	Bird	Indian Peacock	<i>Pavo cristatus</i>

Table 10: Butterflies

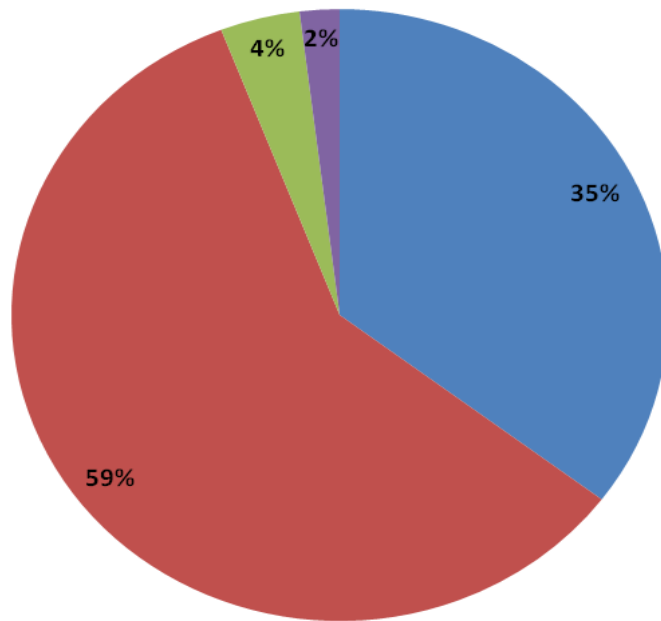
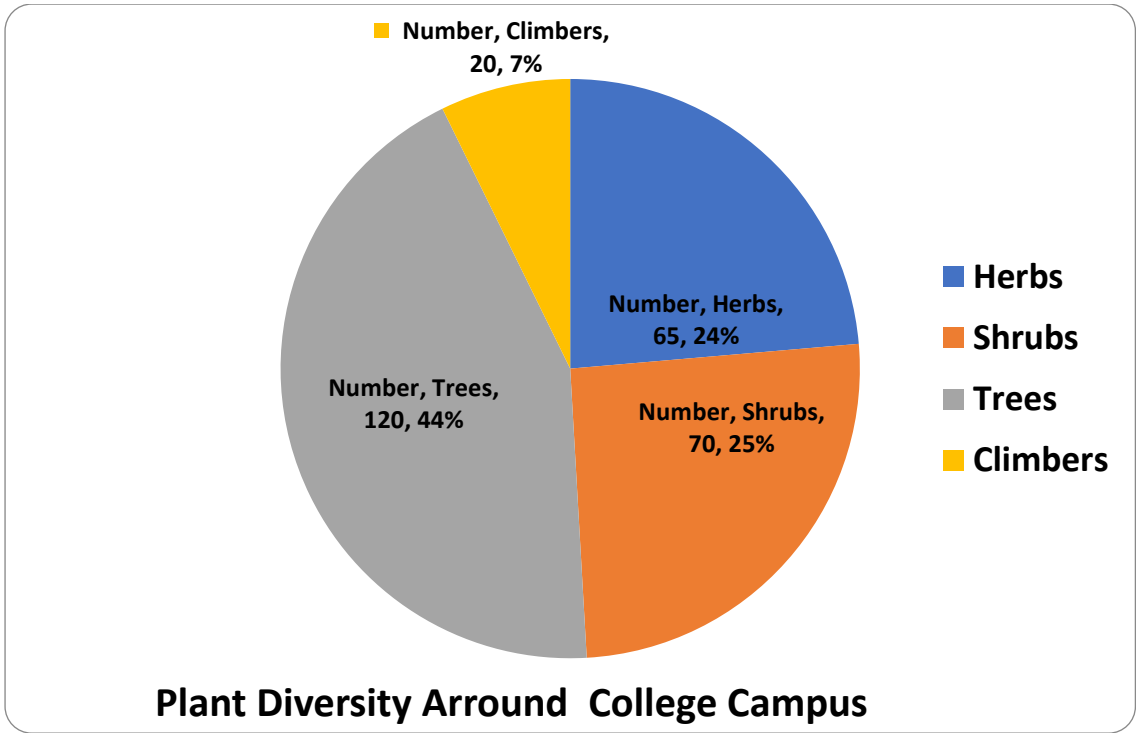
Sr.no	Type	Local Name	Scientific Name
1	Butterfly	Crimson Rose	<i>Pachliopta hector Linnaeus</i>
2	Butterfly	Common Mormon	<i>Papilio polytes Linnaeus</i>
3	Butterfly	Common Emigrant	<i>Catopsilia pomona Fabricius</i>
4	Butterfly	Common Grass Yellow	<i>Eurema hecabe Linnaeus</i>
5	Butterfly	Common Wanderer	<i>Pareronia valeria</i>
6	Butterfly	Common Fivering	<i>Ypthima baldus</i>

Table 11. Mammals

Sr.no	Type	Local Name	Scientific Name
1	Mammal	Ruddy Mongoose	<i>Herpestes smithii</i>
2	Mammal	Indian Hare	<i>Lepus nigricollis</i>
3	Mammal	Indian Gerbil	<i>Tatera indica</i>
4	Mammal	Indian Bush Rat	<i>Golunda ellioti</i>
5	Mammal	Monkey	Cercopithecidae

Table 12. Reptiles

Sr.no	Type	Local Name	Scientific Name
1	Reptile	Common house gecko	<i>Hemidactylus frenatus</i>
2	Reptiles	Common Garden Lizard	<i>Calotes versicolor</i>
3	Reptiles	Fan-throated Lizard	<i>Sitana ponticeriana</i>
4	Reptiles	Common smooth-scaled s water Snake	<i>Enhydriis enhydri</i>
5	Reptiles	Buff striped keel back	<i>Amphiesma stolata</i>



Animal Diversity Around Collage Campus

10. AIR POLLUTION MANAGEMENT

Air pollution has also become a critical issue in India. Most of the urban conglomerations in India are highly polluted with recent case of Delhi air pollution. In 2014, the World Health Organisation (WHO) had assessed 1,622 cities worldwide for PM_{2.5} and found that 13 of the 20 cities in India that WHO assessed are with the most polluted air.

The air pollution is mainly caused by vehicle emissions, fuel, industrial activities, and coal fired power plants. The WHO further suggests that most Indians breathe unsafe air. Air pollution causes asthma, which is now soaring, even amongst the children. PM_{2.5} contributes to cancer, and it kills by triggering heart attacks and strokes.

Air quality in the academic institute is very important for health of the students, faculty, and staff of the institute. The air pollution sources in the college campus are windstorm, pollen grains, natural dust, vehicular emissions, generators, fires and laboratory fumes etc. The air pollutants monitored on regular basis are Sulphur dioxide (SO₂), Oxides of Nitrogen as NO₂, Suspended Particulate Matter (SPM) and Repairable Suspended Particulate Matter (RSPM) etc.

The chief sources of air pollution in the study area are mainly due to continuous vehicular activities and domestic firewood burning, fuel burning etc and natural dust. The major pollutants released in the atmosphere will be PM₁₀, PM_{2.5}, SO₂, NO_x and CO etc. All the air quality parameters are within standard limits of CPCB, New Delhi, which suggests ambient air quality at ACS College, Nandgaon campus. College has green campus of 6.5 acres efforts have been made on to planting more trees on the peripheral boundary of the campus through NSS, senior students, teaching and nonteaching staff in college. Hence, the greenery around the institute helps to neutralize whatever carbon and its byproducts generated. The campus has total 138 plant species which includes trees, shrubs, herbs, and climbers.

Observations:

- The campus is located on Aurangabad- Malegaon Highway.
- The campus population (student, staff and others) mostly prefers public transport facilities, which minimizes the air pollution.
- Table no. 15 shows air pollution levels within and around the campus. This sampling was carried out on different dates through two weeks' time.
- The observations show all the parameters in the campus are within the NAAQ Standards.

11. RECOMMENDATIONS

Water Environment

The college campus with more than 5 buildings has a high potential for the Rainwater Harvesting due to large terrace areas as well as the open surfaces (paved & unpaved areas).

Based on the geotechnical survey of the campus area, the college should emphasize on recharging the ground water table with the rainwater. The college has already placed a tank for the storage of rainwater. This would satisfy part requirement of the campus in the monsoon season (i.e., about 80 – 90 days in a year) and thus reducing freshwater intake during rainy days.

It is recommended to install water efficient faucets and flushing systems across the campus which would reduce the freshwater requirement of the campus.

Even though all the drain lines of the campus are connected to the common sewer line, it is suggested that if the management is looking forward to overall environmental sustainability, then an Effluent Treatment Plant (ETP) may be installed. This would treat & recycle the wastewater within the campus and this treated wastewater can further be used either for flushing or landscaping, thus further reducing freshwater requirement of the campus by 50 – 60 % of the total. Such modular treatment plant can be used for environmental science student's practical course as well.

To use the treated wastewater for flushing a separate plumbing system is required.

It is recommended that liquid chemical waste from the laboratories should not be disposed of without any treatment.

Noise Environment

1. In order make campus friendly for educational purposes, the noise levels need to be reduced as directed by Noise Pollution (Regulation and Control) amendment rules, 2000 and certain disciplinary measures need to be taken.
2. It is observed that due to the proximity of the campus to the main road, the noise pollution is high. It ranges from minimum of 50.0 dB (A) to maximum 73.6 dB (A) which is 23.6 dB (A) over the stipulated standard. This would mean students are getting exposed to high noise pollution levels within the campus due to either internal activities or external activities. This would create hurdle in learning and their overall health.

3. It is recommended that the campus to have noise barriers along the fence line either in terms of natural barriers such as trees or artificial barriers such as acoustic fence. A combination of both can also be used at appropriate locations.

Fig. 4: Types of noise barriers



Acoustic Fence

Biological noise barrier structure - trees

3. It is recommended that parking lots within the campus to be made strictly as no honking zones and vehicles with unwarranted vehicle silencers (mufflers) not be allowed.

Plant diversity

To maintain the college campus green and eco-friendly, more trees need to be planted. A thick green belt (of *Ficus benjamina*) development along the fence is strongly recommended. The plant diversity shall be maintained by avoiding the plantation of exotic plant species. A tree monitoring committee is to be established; if not present currently. The college authorities should ensure frequent meetings with the tree monitoring committee.

Carbon neutrality can be maintained on the campus by developing more greenery. The plant species that are found suitable are suggested for plantation and greenbelt development. In addition to above some flowering plants, shrubs, herbs, and climber plants species will also be planted for beautification in the campus.

Criteria for selection of tree species:

The choice of species is based on the adaptability to the site, early returns, multiple uses, complimentary role to the system and its possible role during the lean/critical periods. The key factor contributing to the success of tree planting is selection of suitable tree species. Some of the considerations for selection of tree species are:

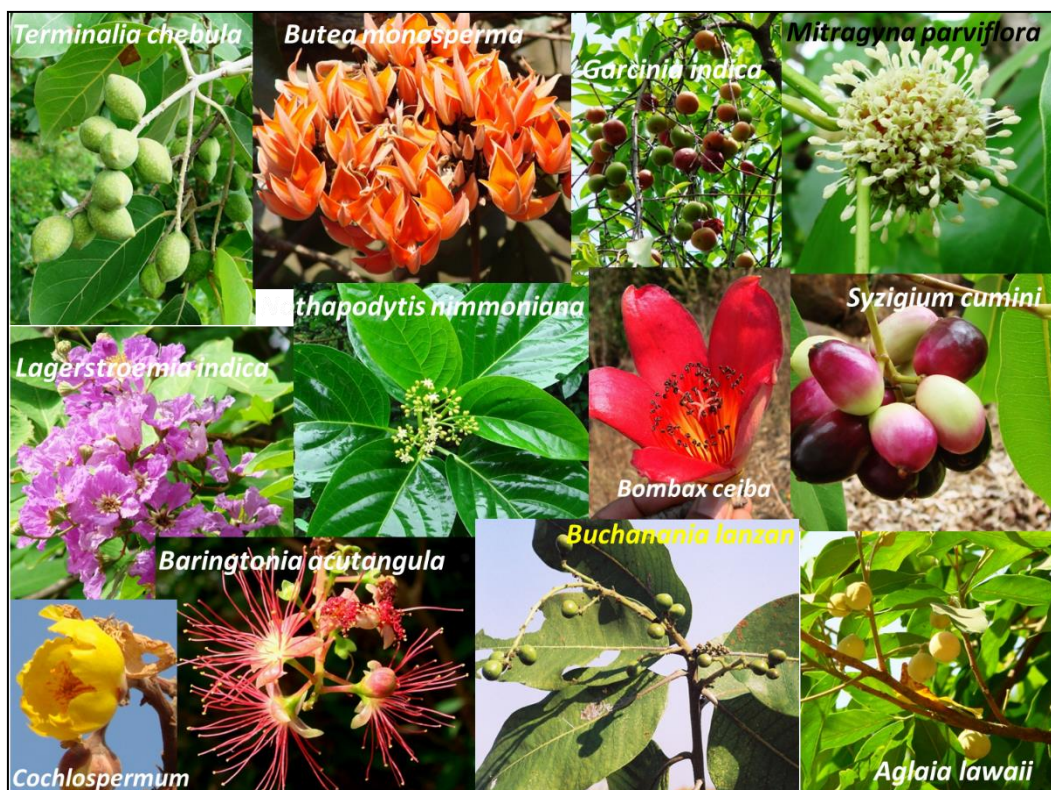
- Adaptation to local soil and agro-climate condition.
- Drought resistant species that can survive long dry periods.

- Multipurpose use species.
- Species that can serve for soil and water conservation.
- Species that help in building up soil fertility.
- Species that have good coppicing ability.

For the purpose of landscaping, following eight categories are recommended.

1. Avenues – Trees to shade roads or create avenues within property.
2. Parking - Shade giving trees for open parking lots.
3. Ornamentals – the purpose indicates:
 - a. Thicket – To be grown in groups to form a thick vegetated corner, centre or pocket.
 - b. Isolation - To be planted singly either in corners or as central attraction.
 - c. Scattered - To be planted at random to be able to appreciate its ornamental nature.
 - d. Groups – To be grown in groups of 3 to 4.
4. Hedges/Edges/Screens. –
 - a. Hedges for property hedges, for demarcating areas etc.
 - b. Edges for edging of small flower patches, for setting boundaries, for layering etc.
 - c. Screens - Provide privacy, as screens from pollution from adjoining road or to provide shadow from south sun.
5. Ground covers – These include native lawn varieties and plant species that spread laterally and can be used to cover soil below trees etc.
6. Temple plants – Trees normally associated with religious areas.
7. Climbers – Plants that can be used for forming trellis, etc.
8. Aquatic plants – For ponds or water bodies. Some of these plants need to be maintained by regular pruning to prevent excessive growth.

The plant species suggested for green belt development in addition to the present one layer of vegetation on the boundary would be helpful for mitigating gases and particulate matter.



It can also help in reducing noise from the heavy traffic road close to the campus will serve for long time.

Fig. 5: The native plant species suggested for plantation in the college campus.

Table 11: List of suggested plants (an appropriate few plants can be used)

Botanical Name	Local Name	Family	Habit	Flower Color
First Row-trees (outermost)				
<i>Drypetes roxburghii</i>	Putranjiva	Euphorbiaceae	Tree	Greenish Yellow
<i>Holoptelea integrifolia</i>	Wavli	Ulmaceae	Tree	Greenish
<i>Terminalia cuneata</i>	Arjun	Combrataceae	Tree	Yellow
<i>Terminalia paniculata</i>	Kinjal	Combrataceae	Tree	Greenish-white
<i>Terminalia tomentosa</i>	Ain	Combrataceae	Tree	White
<i>Bambusa arundinacea</i>	Bamboo	Poaceae	Bamboo	White, greenish
<i>Dendrocalamus strictus</i>	Velu	Poaceae	Bamboo	Blackish
<i>Cordia dichotoma</i>	Bhokar	Boraginaceae	Tree	White

Botanical Name	Local Name	Family	Habit	Flower Color
<i>Dalbergia latifolia</i>	Shisam	Fabaceae	Tree	White
<i>Diospyros peregrine</i>	Tembhurni	Ebenaceae	Tree	White creamy
<i>Garcinia indica</i>	Kokam	Clusiaceae	Tree	Yellowish
<i>Haldina cordifolia</i>	Hedu	Rubiaceae	Tree	Red yellowish
Shrub Layer				
<i>Gardenia gummifera</i>	Dikemali	Rubiaceae	Shrub	White
<i>Ixora coccinea</i>	Bakara	Rubiaceae	Shrub	Orange / Red
<i>Ixora nigricans</i>	Kat-kuda	Rubiaceae	Shrub	White
<i>Justicia adhatoda</i>	Adulsa	Acanthaceae	Shrub	White
<i>Helicteres isora</i>	Murudseng	Sterculiaceae	Shrub	Red bright
<i>Murraya koenigii</i>	Kadhipatta	Rutaceae	Shrub	Greenish White
<i>Murraya paniculata</i>	Kunti	Rutaceae	Shrub	White
<i>Hiptage benghalensis</i>	Madhvilata	Malpighiaceae	Climber	White
<i>Ehretia laevis</i>	Ajan	Ehratiaceae	Tree	White
<i>Vitex negundo</i>	Nirgudi	Verbenaceae	Shrub	Bluish - Purple
<i>Woodfordia fruticosa</i>	Dhyati	Lythraceae	Shrub	Red
<i>Gardenia resinifera</i>	Dikemali	Rubiaceae	Shrub	White
<i>Cassia auriculata</i>	Tarwad	Caesalpiniaceae	Shrub	Yellow
Second Row (from outside)				
<i>Artocarpus heterophyllus</i>	Phanas	Moraceae	Tree	Green
<i>Azadirachta indica</i>	Neem	Meliaceae	Tree	White
<i>Bauhinia recemosa</i>	Apta	Caesalpiniaceae	Tree	White
<i>Butea monosperma</i>	Palas	Fabaceae	Tree	Orange-red
<i>Lagerstroemia microcarpa</i>	Nana-bondara	Lythraceae	Tree	White
<i>Lagerstroemia reginae</i>	Taman	Lythraceae	Tree	Pink
<i>Kydia calycina</i>	Warung	Malvaceae	Tree	White
<i>Mangifera india</i>	Amba	Anacardiaceae	Tree	Green
Along the paths				
<i>Caryota urens</i>	Bherali mad	Arecaceae	Tree	Red & green
<i>Cassia fistula</i>	Bava	Caesalpiniaceae	Tree	Yellow
<i>Mammea surgia</i>	Surungi	Clusiaceae	Tree	White
<i>Phoenix sylvestris</i>	Shindi	Arecaceae	Tree	White

Botanical Name	Local Name	Family	Habit	Flower Color
<i>Nyctanthes arbor-tristis</i>	Parijatak	Oleaceae	Tree	White
Other Suggested Plants				
<i>Madhuca latifolia</i>	Moha	Sapotaceae	Tree	White
<i>Mallotus philippensis</i>	Kumkum	Euphorbiaceae	Tree	Yellow
<i>Manilkara hexandra</i>	Khirmi	Sapotaceae	Tree	White
<i>Memecylon umbellatum</i>	Anjani	Melastamaceae	Tree	Bluish - Purple
<i>Michelia champaca</i>	Sonchafa	Magnoliaceae	Tree	Yellow
<i>Mimusops elengi</i>	Bakul	Sapotaceae	Tree	White
<i>Mitragyna parvifolia</i>	Kadam	Rubiaceae	Tree	Red yellow
<i>Morinda pubescens</i>	Bartondi	Rubiaceae	Tree	White
<i>Neolamarckia cadamba</i>	Kadamb	Rubiaceae	Tree	White creamy
<i>Pandanus odoratissimus</i>	Kewada	Pandanceae	Tree	Yellow golden
<i>Pongamia pinnata</i>	Karanj	Fabaceae	Tree	Pinkish white
<i>Santalum album</i>	Chandan	Santalaceae	Tree	Brownish red
<i>Sapindus laurifolius</i>	Ritha	Sapindaceae	Tree	White
<i>Semecarpus anacardium</i>	Bibba	Anacardiaceae	Tree	Greenish white
<i>Syzygium cumini</i>	Jambhul	Myrtaceae	Tree	White
<i>Thespesia populnea</i>	ParasBhendi	Malvaceae	Tree	Yellow
<i>Trema orientalis</i>	Gol	Ulmaceae	Tree	White cremy

Waste Management

1. E - waste to be segregated and handed over only to the dealer / facility authorized by Maharashtra Pollution Control Board (MPCB);
2. Batteries' waste to be segregated and handed over only to the dealer authorized by Maharashtra Pollution Control Board.

3. It is recommended that the wet garbage to be segregated appropriately which further can be processed and treated within the campus either by using vermicomposting or bio methanation process s.
4. The fertilizer from either of the methods can further be used as manure for the landscaping within the campus. If the bio methanation is to be used to treat the wet garbage, the biogas generated from the process can be used for the canteen either for common canteen / hostel canteens.
5. Chemical waste (solid/ semisolid) from the laboratories not to be disposed in municipal solid waste. Based on the physic-chemical properties of the waste, it should be handed over to the MPCB authorized chemical/ hazardous waste management facility only.
6. Recycling of papers to be used for day today printing and other activities.

Air Environment

It is recommended that only Pollution Under Control (PUC) certificate holding vehicles to be allowed in the campus.

Trees tolerant to air pollution to be planted along the fence line.

It is suggested that a detailed air pollution study of the institute campus to be carried out to identify the exact source of the air pollution and appropriate measures to be taken.

Safety Aspects

Teaching and non-teaching staff to be trained for emergency situations.

Emergency exits to be established for the spaces including laboratories.

Eye wash systems to be installed in chemistry laboratory Periodic mock drills to be conducted.

Personal Protective Equipment (PPEs) to be used at locations including chemistry laboratories to avoid any accident.

Parking safety to be followed.

Special safety features to be followed at Day school and primary school.

14 Conclusion

Conclusions

Considering the fact that the institution is predominantly an undergraduate college, there is significant environmental research both by faculty and students. The environmental awareness initiatives are substantial. The Vermin Compost plant and paperless work system practices are noteworthy. Besides, Tree Plantation Programs initiated by the administration shows how the campus is going green. Few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus & thus sustainable environment and community development. As part of green audit of campus, we carried out the environmental monitoring of campus includes Illumination, Ventilation and Indoor Air quality of the class room. It was observed that Illumination and Ventilation is adequate considering natural light and air velocity present. Being located outside the residential and market area of the city, the college gets fresh and pure air in the classrooms.



Acknowledgment

We acknowledge support from Dr. S. N. Shinde (Principal), Dr. V.B. Sonawane, Mr. S. A. Marathe.

Audit & Reporting by

Dr. P. M. Nalawade
M.Sc., SET, Ph. D. (Environmental Science)
Head,
Dept. of Environmental Science,
KTHM College, Nashik.



Maratha Vidya Prasarak Samaj's
K.R.T. Arts, B.H. Commerce &
A.M. Science College, Nashik.
(KTHM College)



Dr. V. B. Gaikwad
M.Sc., M.Phil, Ph.D
Principal

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- DST-FIST Sponsored.

Ref.No. : 2021-2022


Date : 11-10-2022

Whom It May Concern

This is to certify that Maratha Vidya Prasarak Samaj's Arts, Commerce and Science College, Nandgaon, Tal: Nandgaon, Dist: Nashik – 423106 has successfully undergone Environmental Status Audit focusing on water quality, solid waste management, green cover, rain water harvesting etc. the college has demonstrated some good practices beneficial for environment

Date: 11-10-2022

Place: Nashik


Dr. V.B Gaikwad
Principal

E-mail : dr.gaikwadvb@rediffmail.com / contact@kthmcollege.com / website : www.kthmcollege.ac.in



Maratha Vidya Prasarak Samaj's
ARTS, COMMERCE AND SCIENCE COLLEGE
NANDGAON

Green Campus Initiatives

2021-2022

Green Campus Initiatives

The Green Campus Policy

Scope:

The Green Campus Policy will develop exciting new co-curricular and extra-curricular practices that encourage students to take the lead in creating positive change. These initiatives call for a thorough review of all infrastructural and administrative functions from the standpoints of energy efficiency, sustainability, and the environment. The focus areas of this policy are:

- **Promote Bicycles/ Battery Powered Vehicles**
- **Plastic-Free Campus**
- **Landscaping Initiatives**

Objectives:

- To protect and conserve ecological systems and resources within the campus.
- To reduce the pollution on the campus.
- To integrate environmental concerns into policies, plans, and programs for social development and outreach activities.
- To work with all stakeholders and the local community to raise awareness and seek the adoption of environmental good practices and the reduction of any adverse effects on the environment.
- To continuously improve our contribution to climate protection and adaptation to climate change and to the conservation of global resources.

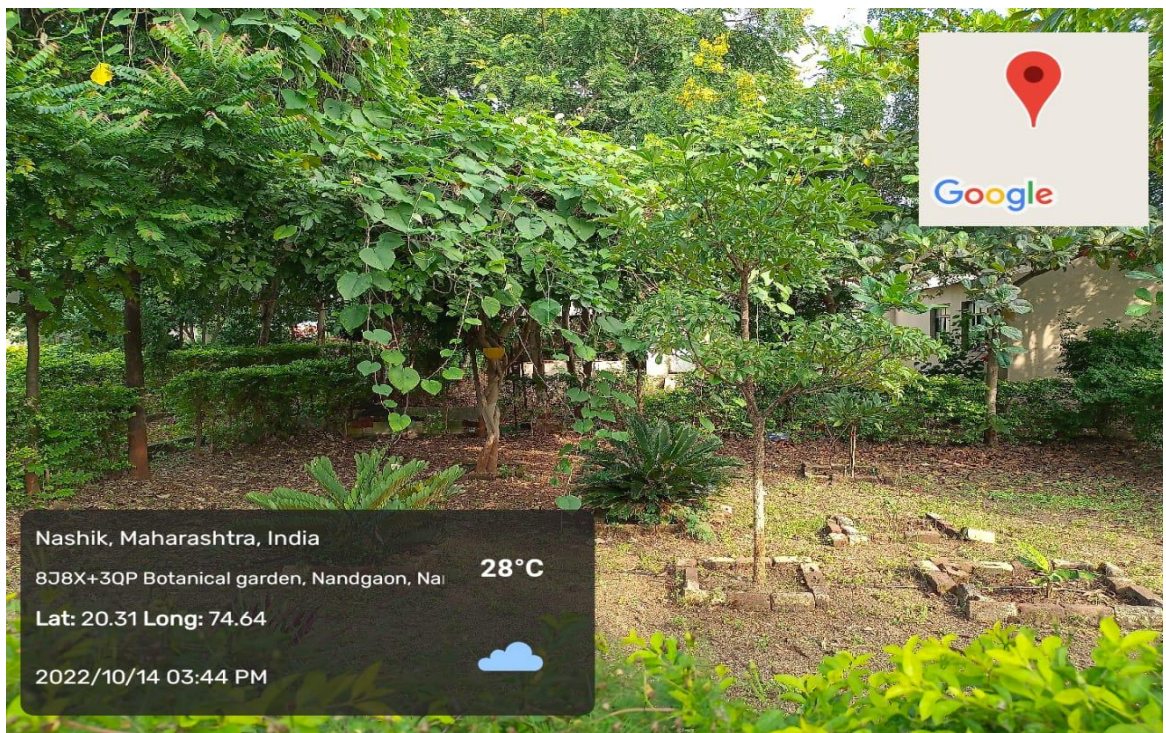
- To continuously improve the efficient use of all resources, including energy and water, and to reduce consumption and the amount of waste produced, recovering and recycling waste where possible.
- To make the campus plastic free.

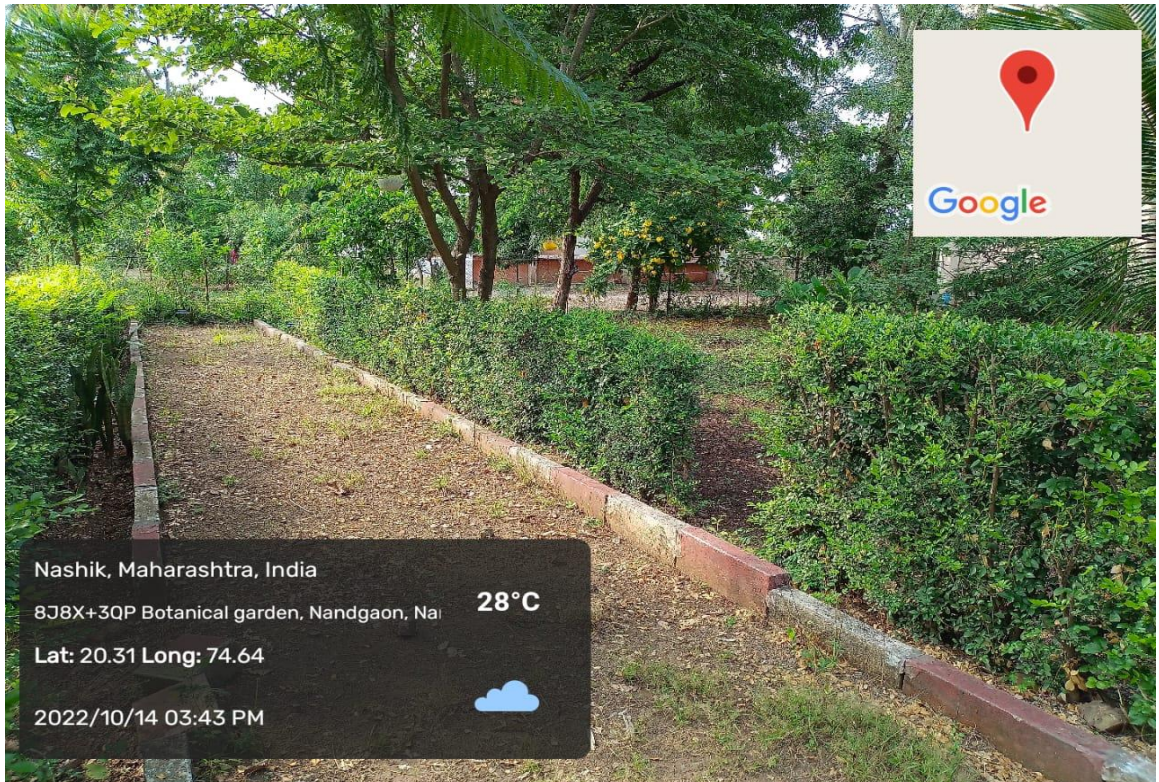
This document contains information regarding:

- **Plastic-Free Campus**
- **Landscaping with Trees and Plants**

❖ Green Campus

Institutes have planted a variety of Herbal, Medicinal, Fruit, Ornamental, and other value-added trees for making the campus green. The responsibility for its maintenance and gradation lies with the Department of Agriculture. The description of plants has also been added so as to make an impact on the visitors about green bodies.





Plastic Free Campus

The institutes have made a policy to limit the use of non-recyclable plastic on campus. As such the use of plastic disposable cups, glasses, and plates, etc. in the canteen and at other places has been banned.



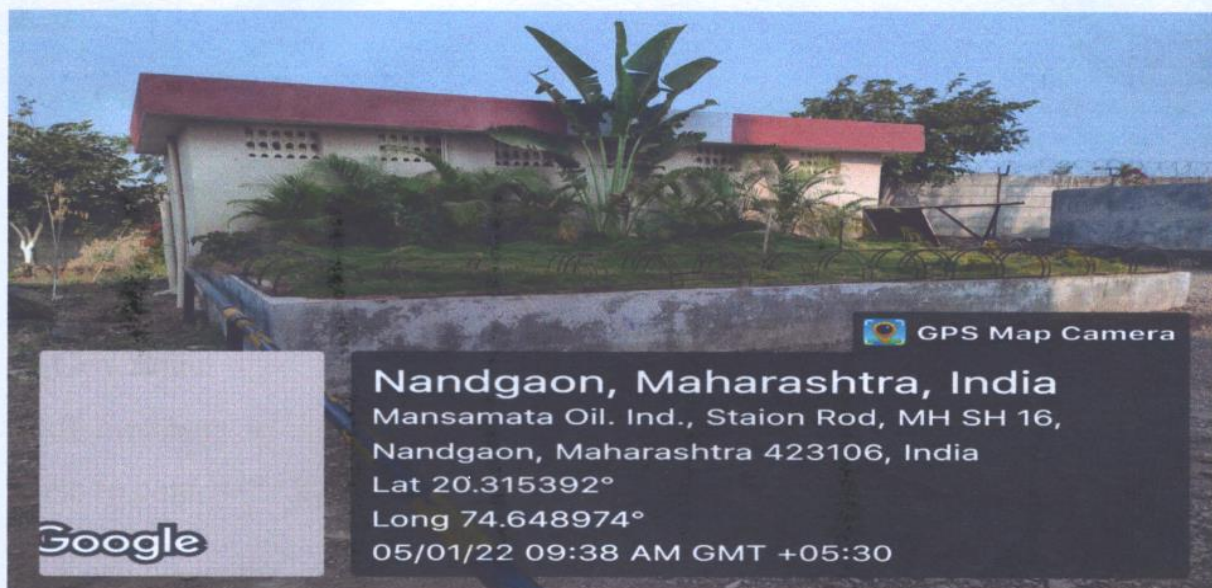
❖ Landscaping with Trees and Plants

Various manmade activities have a wide range of impacts on the surrounding ecosphere, both negative as well as positive. Over the years, the College has undertaken various activities like plantation and beautification of campus through various drives. The campus has a good plantation along with a well-developed Botanical garden, and landscaping. It's a positive step to reduce its environmental impact. This section provides a detailed list of plant species observed within the campus.

The campus attempts to maintain an eco-friendly atmosphere on the campus; the number and variety of plant species help to maintain an eco-friendly ambiance. Further, to create eco-friendly awareness among the student's college arranges special programs through which the students get a clear idea of and importance of trees in life. There are more than 60 perennial plant species have been observed.

The college campus is very particular about maintaining the rich flora of the campus by planting a variety of saplings on the college premises. The NSS team initiated the "Harithaharam" plantation around the campus with the coordination of faculty members, students, and Management. Green Peace Eco Club conducted various activities to grow plants on the campus as well as in nearby villages. All of the campuses of the college is equipped with a drip method for watering the plants to reduce the usage of potable water. Though the college campus represents good plant diversity, there is large scope to plant more trees, particularly along the fence line of the main road where high to very high traffic was noticed.





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Coordinator
Internal Quality Assurance Cell
Arts, Com. & Science College
Nandgaon, PIN-422 006.

Amr
Principal
Arts, Commerce & Science College
Nandgaon, Dist. Nashik (M.H.)



Policy:

For Clean Campus Initiatives, GGI has pledged to actively coordinate cleanliness activities in the Institute and beyond the campus in accordance with the vision of Green campus. It commits to continue with this Programme. The broad vision is as follows:

1. Generating mass awareness on cleanliness and hygiene amongst students and staff members by holding regular cleanliness drives. The idea is to motivate them to contribute in a proactive manner.
2. Keeping in the view of the environment policy, the institute has taken the initiative to use bicycles/battery powered vehicles.
3. Encouraging Staff Members to participate for the cleanliness drive in the campus of the institute.
4. To remove all kinds of waste material like broken furniture, unusable equipment etc.
5. To administer the pledge by students and staff members for maintaining cleanliness of the institute's campus and its surrounding areas on an annual basis.
6. Share images of reducing, reusing and recycling of waste on wall building in campus.
7. Commit to manage waste and maintain clean campus especially during institute's events.

Dr. A.N. Madane

Campus Development officer

Dr. V.B. Sonawane

IQAC Co- Ordinator

Dr. S.A. Marathe

Principal



Maratha Vidya Prasarak Samaj's
**ARTS, COMMERCE AND SCIENCE
COLLEGE
NANDGAON**

**7.1.3. BEYOND THE CAMPUS
ENVIRONMENTAL
PROMOTIONAL ACTIVITIES**

ELIMINATION OF SINGLE-USE PLASTICS:

Nandgaon organized an awareness program on “ELIMINATION OF SINGLE-USE PLASTICS” on 19th October 2022 from 8:00 am to 10:30 am and a rally from the College to the River bank of Girananagar village to create awareness among people about the importance of waste management and reduce single-use plastic for Pollution free air and water. These include, among other items, grocery bags, food packaging, bottles, straws, containers, cups, and cutlery. The objective of this program is to give awareness among the student community about the hazards of single-use plastics in the event volunteers were supported by the NSS of the College.

After the cleaning Nagar parishad of Nandgaon has taken away the garbage and a part of the garbage was taken by an organization for recycling. A total of 150 students participated in the drive. The Principal of the College Dr. S. N. Shinde inaugurated and lead the active participation of all in the cleanliness drive. Vice Principal, Dr. S.A. Marathe. The Program officer, NSS Mr. B.P. More, Mr. S. P. Dond, and Mrs. K.T. Bagul were taking an effort to carry out this program.



Vrikshmitra Abhiyan:

Introduction:

Continuing with its tradition of preserving the environment and having eco-friendly activities, the “Vrikshmitra Abhiyan Event” was conducted on the campus of MVP Samaj’ Arts, Commerce & Science College, Nandgaon on Tree Plantation Event, 24th June 2022. Understanding the importance of nature for our existence and conserving nature in all manner, is our moral responsibility. It's not too hard to believe that without trees we, humans would not exist on this beautiful planet. Also, we have felt the change of purity in nature and reduction in pollution effect during this pandemic situation. While the latest technology has provided us with many comforts, the consequent urbanization and industrialization also have some undesirable side effects; Global Warming is one of those. This event is a positive step towards achieving a healthy environment to reconnect humans to nature and foster environmental stewardship.

Program Details: The event began with welcoming the Director, heads of all departments, all faculties, staff, and student participants at 3:30 PM. More than 50 students, faculties, and staff members participated in the event. Dr. B.W. Chavre sir delivered a speech wishing “Tree plantation” as well as the why important implementation of “Vrikshmitra Abhiyanday”, He shared the importance of nature and how we can protect it for the betterment of our future. The outlook towards nature must be changed from Utility to Divinity. Trees are the most important part of natural resources. It is our moral responsibility to conserve it with the highest priority. Dr. S. N Shinde, Principle of the institute, added, “We should not only save the trees but should put our equal efforts in planting as well nurturing the trees at least for next 4/5 years”. He also explained the importance of such an event to develop a good virtue in one's life.

All the participants have planted more than 10 saplings around the campus and nearby their homes. At the plantation of saplings, all have recited a shloka to maintain the divinity between humans and nature. It was the dedication and enthusiasm of the coordinators' Dr. V.B. Sonawane, Dr. M.P. Dushing, Dr. A. L. Tidar, Mr. M.B. Atole, and NSS Coordinators Mr. B.P. More and Mr. R.V. Wagh, Mr. S. S. Shinde successfully completed the whole event under the support and guidance of Dr. S.N. Shinde and the Management. Also, thanks to the vice principal of the institute Dr. S.A. Marathe, Junior college Head Prof. Deore and college campus coordinator Dr. A.N. Madane who have given their extra effort till the end of the event voluntarily. Above and beyond, let's not forget the backbone of this event – Faculties, Staff, Student participants, Admin staff, and Gardeners.

Plantation program



Field Survey and Plantation:

The Department of Botany organized a Field survey on the surrounding hills near the College. In this field visit students of Botany studied various plants

wildly grown on hills. Teachers made students about plant and animal diversity. Students were guided with botanical and common names of the plants with their medicinal values. During *this survey students and teachers could observe various plants including Caralluma fimbriata, Encostema axillare, Tephrotia peruviana, Tridax procumbens, Echinops echinatus, Butea monosperma, Tinospora cordifolia, Cocculus hirsutus, Prosopis cineraria, Boerhavia diffusa, Aristolochia sp., Drimia indica,* and different Mimosaceae members. Students took photographs of observed plants. Students could also observe some wild animals including, *Pavo cristatus* (Peacock), *Cervidae* (Deer), *Vulpes velpes* (Fox), Different species of Lizards, *Vulpes velpes* (Rain bug), and other insect species. Students were informed beforehand about not disturbing plants and animals. Students were also informed to make a survey report of the field survey.

Simultaneously, students under the guidance of teachers made seed balls of different plants like *Butea monosperma* (Palas), *Tamarindus indica* (Tamarind), *Acacia nilotica* (Babhul), *Azadirachta indica* (Neem), *Terminalia bellarica* (Behda), etc. All these seed balls were planted by digging land with a hoe. It was taken care of a selection of spots for planting that should get abundant water from rain. Also, while planting land had adequate moisture due to prior rain. Students, collected seeds of the *Butea monosperma* (Palas) on the same day and made them with seed balls, and planted them on the pre-prepared Continuous Contour Trenches (CCT's) made on hills. Students and teachers also planted some plants of *Butea monosperma* (Palas) on the hillsides.

This field visit was organized with the following aims.

1. To make students well acquainted with local biodiversity.
2. To make students aware of plantations and their importance.
3. To teach students about seed ball formation and its cultivation.
4. To make students aware of local plants.
5. Students will become well acquainted with field surveys.

6. To collect information on plants in the study area and report the need for the plantation of suitable plants.

During this field visit and plantation teachers of the Botany department including the Head of the Department, Dr. B.W. Chavre, and other teachers, Dr. V.B. Sonawane, Dr. A. N. Madane, and Dr. S.S. Shinde were present. All teachers guided students regarding the survey, plantation, seed collection, seed ball formation, and report writing. For this activity students and teachers got guidance from Principal Dr. S.N. Shinde.



Dr. Sonawane
Coordinator
Internal Quality Assurance Cell
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Nandgaon, PIN-422 506.



S.N. Shinde
Principal
Arts, Commerce & Science College
Nandgaon, Dist. Nashik (M.H.)

Maratha Vidya Prasarak Samaj's
ARTS, COMMERCE AND SCIENCE COLLEGE,
NANDGAON- 423106 (MAHARASHTRA)

NAAC Re-accredited "A" grade

Internal Quality Assurance Cell(IQAC)

Energy Audit Report

(2020-21)



Report By



SOLASTA

Energy Solutions, Services & Maintenance

Website : www.solasta.in

Contact: +91 8007552123

Email: solastasustain@gmail.com

Address: 7, Dattakunj , Anand Nagar , Gangapur Road, Nashik-13

Date: **16/06/2021**



SOLASTA

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Address: 7, Dattakunj Appt., Anand Nagar, Gangapur Road, Nashik-422013

SOLAR Rooftop Energy, Energy Auditing.

WORK COMPLETION REPORT

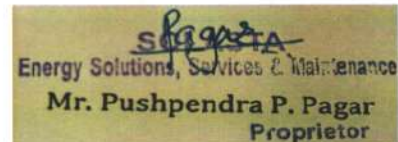
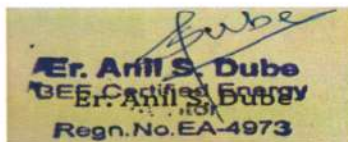
- Name of Work Project : Energy Audit of MVP'S Arts, Commerce and Science college, Nandgaon. Dist. Nashik
- Work Order Number : 2020-21
- Work Period : From 02/06/2021 To 15/06/2021

This is to Certify that SOLASTA Energy Solutions, Services & Maintenance has successfully completed Energy audit at MVP'S Arts, Commerce and Science college, Nandgaon. The work of energy audit is Completed on 16/06/2021 for year 2020-21.

Thanking you and assuring you for our best service always.

Audit Report BY,

FOR SOLASTA,



Date: 16/06/2021

Place: Nashik

Regn. No. EA-4973



No. 2487

National Productivity Council
(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. *Anil Siddhanarayan Dube*
son / daughter of Mr. *Siddhanarayan Dube*
has passed the National Certification Examination for Energy Auditors in 2006, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

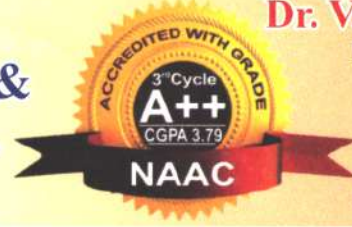
Place : Chennai, India

Date : 30th April 2007

Ilajichidamban
Controller of Examination



Maratha Vidya Prasarak Samaj's
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A.M. Science College, Nashik.**
(KTHM College)



Dr. V. B. Gaikwad
M.Sc., M.Phil, Ph.D
Principal

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- Junior College Index No. J-13.17.001
- DST-FIST Sponsored.

Ref.No. 219/20/21


Date : 10-3-2021

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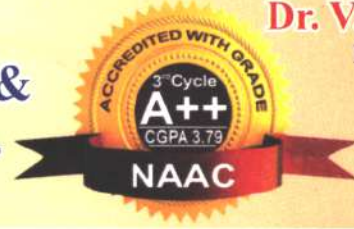
Date: 10-03-2021

Place: Nashik


Dr. V.B Gaikwad
Principal



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Date : 11-10-2022

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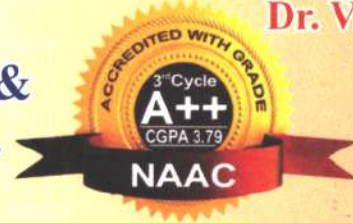
Date: 11-10-2022

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Dr. V.B Gaikwad
Principal



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**K.R.T. Arts, B.H. Commerce &
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Dr. V.B Gaikwad
Principal



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Tal – Nandgaon, District Nashik – 423106 (M.S.) India.

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Mobile No. 8766876955


Certified 2 (f) & 12 b of UGC Act
Affiliated to Savitribai Phule Pune University
(Id. No. PU/NS/ASC/021?1972)
College Code-116 Exam Centre Code -064

Best College Award of Savitribai Phule Pune University (2012)
NAAC Reaccredited with 'A' Grade 3rd Cycle

Action taken and Achievement Report for Clean and Green Campus Initiatives

The college has prepared a Plan of Action for Clear and Green campus and action taken based on the proposed plan given as under.

Sr. No.	Plan of Action / Initiatives	Action Taken / Achievements
1	Green Audit	A Green Audit of the College campus was done by a professional agency.
2	Energy Audit	Energy Audit of the College campus was done by a professional agency
3	To create environmental awareness through guest lectures, tree plantation drives, etc	Tree plantation drives are conducted Every year. Environment protection initiatives such as river conservation, fort conservation, awareness drives, etc are conducted. Environment Day is also Celebrated.
4	To implement practices that will Minimize plastic usage.	The use of disposable water bottles is avoided and traditional containers are used.
5	To recharge the borewell using rainwater harvesting	Rainwater collected through the rainwater harvesting system is directed to recharge wells
6	To maintain tree plantation management year to year	Chhatrapati Shivaji Maharaj Vanashree- State level 1st Award and Divisional 1st Award for the year 2018-2019. Awarded for green campus


Principal
Arts, Commerce & Science College
Nandgaon, Dist. Nashik (M.H.)