

GREEN/ENVIRONMENTAL AUDIT

Certificate by

ADYA ENVIRONMENTAL SERVICES

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This Certificate is presented to: Rayat Shikshan Sanstha's Savitribai Phule Mahila Mahavidyalaya, Satara for successfully completing the Green/Environmental Audit. An Audit was performed in March-April 2025.

Adya Environmental Services


Proprietor



Awarded on: 21/4/2025

GREEN/ENVIRONMENTAL AUDIT REPORT 2024 - 2025

Prepared for
Rayat Shikshan Sansta's
Savitribai Phule Mahila Mahavidyalaya, Satara

Prepared by
Adya Environmental services, Baramati

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Submitted on 21st April 2025





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We dare to walk thin green line

Date: 21st April 2025

To,

The Principal

Rayat Shikshan Sanstha's

Savitribai Phule Mahila Mahavidyalaya

Subject: Detailed Green/Environmental and Energy Audit at your College.


Respected Sir,

Based on field visit, Environmental baseline data collection, field study and our discussion, we are pleased to submit herewith Combined Green/Environmental and Energy Audit Report. We are thankful for your timely help and contribution towards making this Report.

Thanking you

Rupali A More

Adya Environmental Services


Proprietor



AUDITS 1. SOLID WASTE AUDIT

INTRODUCTION

Urbanization and industrialization have resulted in increasing amounts of municipal, industrial and health care waste in the country. Central pollution control board (CPCB) has estimated current quantum of solid waste generation in India to the tune of 48 million tons per annum. Each year everyone in India throws away more than 0.4 tons of waste. Management of such high quantum of waste puts enormous pressure on solid waste management system. Throwing thing away is waste of natural resources and energy which have been used to make the product. Waste has to put somewhere. Most of it is sent to landfill sites or incinerated (burnt), using up land and releasing greenhouse gasses. On an average in India 12% of waste is recycled/composted, 79% is sent to landfill site and 9% is incinerated (burnt)

SOLID WASTE GENERATION

VISUAL ANALYSIS OF MONTHLY SOLID WASTE GENERATION

Garden waste is the main contributor of campus solid waste by volume. Every week near about 7000 gm of Garden waste is removed from college campus. Variation in Garden waste quantity is also found due to the seasonal variation. Paper waste also contributes a lot to solid waste volume. As an educational institute, college's paper and hard paper waste like cardboard, paper covering, printing paper is recognizable. It accounts for 15% by volume.

SOLID WASTE ACCOUNTING BY WEIGHT

TABLE 1 WEEKLY NON BUILDING AREA SOLID WASTE GENERATION IN GM APX

Place	Paper	Hard paper	Polythene	Hard Plastic	Glass	Chalks	Vegetable and Garden waste	
Solid Waste of non built-up area	50	100	2	100	10	NEG	8000 (depends on the season)	-

TABLE 2 WEEKLY WASTE OF OFFICES, CLASSROOMS, HOSTEL, MESS & LIBRARY IN GM APX

<i>Place</i>	Paper	Hard paper	Polythene	Hard Plastic	Glass	Chalks	E-waste	Food waste	Sanitary pads
<i>Library</i>	80	70	1	50	5	NEG	100	-	-
<i>Main office</i>	300	80	2	120	5	NEG	200	NEG	-
<i>Classrooms related waste</i>	850	30	3	330	20	50	150	NEG	1200
<i>Labs and departments and IQAC</i>	170	170	2	100	10	100	350	NEG	-
<i>Mess/ Canteen</i>	150	400	5	400	10	-	100	7 500	-
<i>Hostel</i>	500	700	25	750	40	-	150	200	3100
Total	2050	1450	38	1750	90	150	1050	7700	

TOTAL WEEKLY WASTE GENERATION OF CAMPUS

Here we can see that Garden waste is the main contributor of campus solid waste by weight. Paper comes after that. Hard Paper & Sanitary pads are the third and fourth main contributors. If we differentiate between degradable & non biodegradable waste biodegradable waste shows a very large figure compare to Non – degradable waste (glass, electronic, waste, and plastic, sanitary pads). Sanitary pads contain both biodegradable and non-biodegradable part in it, but the waste is included in non-biodegradable waste.

	Waste Type (Volume wise)	Percentage
1	Paper	15%
2	Hard paper	5 %
3	Garden and food waste	55 %
4	Hard plastic	5 %
5	Polythene	3%
6	Glass	2 %
7	Electronic waste	2%
8	Sanitary Pads	10
9	Miscellaneous	3%

	Waste (Weight wise)	Weight (gm)
1	Paper	2100
2	Hard paper	1650
3	Polythene	40
4	Hard Plastic	1850
5	E – Waste	1050
6	Glass	100
7	Chalks	150
8	Garden waste	8000
9	Food waste	7700
10	Miscellaneous	300
11	Sanitary pads	4300

SPMM campus produces near about 27 kg of waste per week. Garden waste is the main contributor of college waste i.e 8000gm. Weekly Biodegradable waste of college is 20 kg while non biodegradable waste of campus comparatively small and is approx 7.4 kg.

But these are non-biodegradable substances and disturb natural processes. College has already started taking steps towards waste reduction, reuse and recycling to make its campus more eco-friendly. This detailed solid waste audit will provide necessary inputs for waste and management reduction.

CONTRIBUTORS OF CAMPUS SOLID WASTE

PAPER AND HARD PAPER:

College produces Approx 3750gm of paper and hard paper waste goes to dustbin every week. Out of that paper share is near about 2100gm while hard paper is about 1650gm.

Around the world we use more than 1 million tons of paper every day and 93% of paper comes from trees alone which we can call as virgin paper. Paper also accounts for half of municipal solid waste. The pulp and paper industry is the third largest consumer of energy and uses more water to produce a ton of product than any other industry and is one of the world's major greenhouse gas emitters.

Producing one ton of paper requires 2-3 times its weight in trees. Making paper from recycled content rather than virgin fiber creates 74 percent less air pollution and 35 percent less water pollution.

Anything we can do to save paper will help reduce the amount of trash going into landfills, and it will also reduce energy use and pollution associated with manufacturing, transporting, and recycling new paper products. Perhaps most importantly, when we save paper, we reduce the need to cut down trees to make new paper.

College has started following action plan to minimize paper waste:

- Follow the golden rule. "Think before you print".
- Use both sides of the paper for printing.
- Check your draft 2-3 times on screen before you actually hit the print button.
- Use what technology has provided you, send emails, scan documents and send electronically rather than scanning copies and sending.
- Use the print range feature, print current page etc to print only what you need.
- Don't throw away misprints instead use them as drafts or print on the other side.
- Change / Minimize on every document you print. It can save a lot of paper by simply changing the margin settings.

College gives its reusable/recyclable waste to Mahesh Traders Kolhapur.

CHALK WASTE

Chalk waste is an important contributor of College's Solid waste. Chalk dust is also an allergic irritant for many students and teachers. Chalk is mostly made up of limestone or gypsum. It can be reused or recycled. In recent years college has started the use of smart boards. This has significantly reduced the chalk waste.

GLASS, PLASTIC AND HARD PLASTIC

On an average 1890g of hard plastic and plastic is weekly disposed of by campus. On an average 100 gm of glass goes to waste. There should be a separate storage bin for these waste types.

Separate storage bins should be provided for three categories of waste (at one place). And it should be given to waste recycler after possible reuse of waste. Currently Satara Municipal Corporation's garbage picking vehicle collects this non- biodegradable waste from College.

Challenge for students and staff:

Ask students to last a whole semester with one pair of refillable pens OR ink pens.

ORGANIC WASTE

Organic waste of this college mainly includes garden waste. Garden maintenance is done once in a three month. College converts some of its waste to vermi compost. College converts some of its food waste to Biogas.



Biogas unit



Vermicompost unit

USE AND THROW TYPE PENS


Nowadays many people use ‘use and throw’ type pens. Nobody goes to refill the pen with ink. This adds more plastic to our dustbin. Same picture can be found at this College campus. 98% of students of SPMM use ‘use and throw’ type pens. This adds near about 4 kg hard plastic to solid waste per year. College is thinking of creating awareness among students to stop the use of such pens. College will make guidelines about good alternatives i.e the use of Ink-pens. This awareness is needed to be done at every faculty level of college. This can be done by arranging workshops on ‘waste minimization’ and personal observation of students by staff of the college

ELECTRONIC WASTE

College gives its E-waste to a vendor company.

SANITARY PADS:

Menstrual Hygiene Management (MHM) is an integral part of the Swachh Bharat Mission Guidelines (SBM-G). The MHM Guideline (Dec 2015) is issued by the Ministry of Drinking Water and Sanitation to support all adolescent girls and women. It outlines what needs to be done by state governments, district administrations, engineers and technical experts in line departments; and school head teachers and teachers.

Unsafe  Safe	<i>Common practices</i>
	Throw them unwrapped into fields, roads
	Wrap them in paper/ plastic bag and throw
	Drying, wrap in paper/plastic bag and throw
	Bury them for de-composting
	Throw them in latrine / toilets
	Burn it (rural areas and peri-urban areas)
	Use small scale incinerators (community)
Municipal waste management / burning	

As the usage of sanitary napkins is increasing, the amount of sanitary waste generated every day is also increasing. It is equally important to address the issue of efficient disposal of this infectious waste. Currently as we see, a major part of this waste is dumped into landfills leading to tremendous land



pollution. Sanitary napkins are flushed down the toilet under the name of convenience. All the drains ultimately meet the rivers in the city and thus water pollution increases.

Weekly sanitary pad waste generation of college is near about 4300gm. So if we see the chart of UNSAFE to SAFE practices i.e burning and use of small incinerators is comparatively safe option. College is using incinerators to burn Sanitary pads.

RECOMMENDATIONS

SPMM should improve its Waste Management Plan on the basis of '4R' solution (Refuse, Reuse, Recycle, and Recover) to achieve its goal of Carbon neutral campus.

2. WATER AUDIT

INTRODUCTION

A water audit is a systematic review of a site that identifies the quantities and characteristics of all the water uses. The site may vary from a public water utility, facility (institutional or commercial properties like malls, office, schools etc.) or a household. The overall objective of conducting a water audit is to identify opportunities to make system or building water use more efficient.

Current Water Status of the region:

Almost entire district is underlying by Deccan trap basalt. Also the isolated and small parts adjoining the hilly areas have low ground water development potential. Such areas occur in almost entire Mahabaleshwar taluka and part of Madha, Patan , Wai and Man taluka. The major part of the district is occupied by areas with medium ground water development potential. Depth to water level in Satara district during may 2011 ranges from 0.09 m bgl (Shendri) to 16.2 (Mahabaleshwar) Depth to water level during premonsoon (May 2011) has been depicted in the following figure. The perusal figure 3 indicates that most prominent range of water level is 5-10 m bgl which is seen almost entire district. The overall stage of ground water development in the district is 69.5% hence it is necessary to adopt water conservation and artificial recharge techniques to increase sustenance of this precious resource. Drought areas has been observed in major parts of the district in the entire eastern, north eastern and south eastern parts comprising almost entire Khandala, Phantlan, Khatav, Mhaswad talukas and parts of Koregaon and Karad talukas. Deeper water levels of more than 10 m bgl are also seen in northern part around Mahabaleshwar, Khandala and Wai and in south eastern part of the district in the parts of Man and Khatav talukas. These are the areas where the ground water scarcity is quite common when the rainfall is deficient. The stage of ground water development in 5 talukas (Karad, Khatav, Koregaon, Phaltan and Wai) has already crossed 70%. Most of these talukas fall in rain shadow zone of Western Ghats, where rainfall is low. Hence special attention is required in above mentioned areas and immediate steps like ground water augmentation by artificial recharge practice and water conservation should be adopted before further ground water development is planned in these areas.

WATER SUPPLY OF SPMM CAMPUS

The primary source of water for SPMM is Municipal Corporations water. The College building receives all of its water supply from this source. The pipeline from bore well is connected to 6 water storage tanks; Out of these 6 tanks three are located on ladies hostel of the college.

As per the daily pumping observations to overhead three water tanks SPMM. College daily uses about 10700 liters of potable and non potable water. Based on flow rate measurement the average amount of potable water that is pumped to storage tanks. Although on certain days there is a sudden jump & increase in the amount of water which is generally attribute to increase in certain water uses like gardening, different events etc



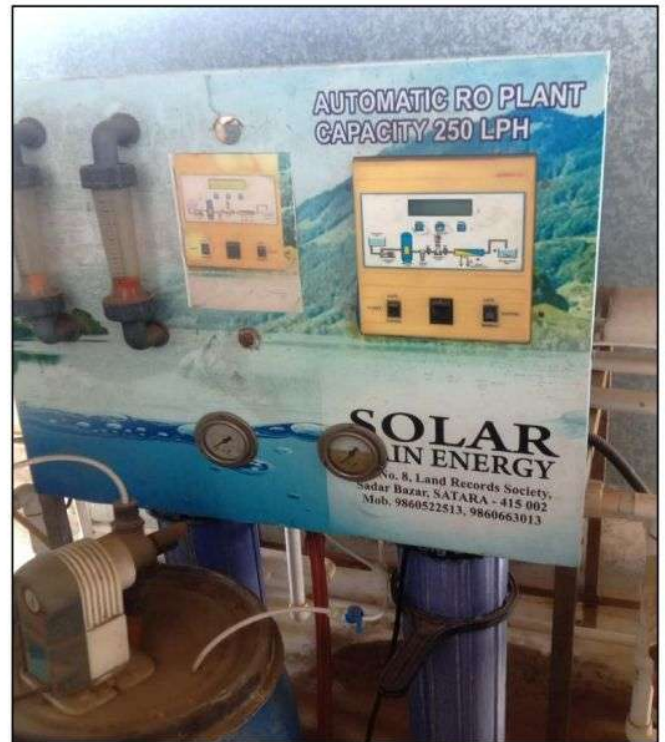
Locations of some water storage tanks of campus

WATER USAGE

SPMM building has three floors. To conduct a building water audit water consumption data for all the users were required to be monitored and recorded. Toilet water use including flushing and face/hand washing along with drinking was clubbed under personal water use. In order to collect primary data and to ensure accuracy, a brief questionnaire format was prepared and survey conducted for students.

Water users	Number
Students	1220
Teaching Staff and Non teaching staff	49
Avg of daily visitors	3
Total	1272

Total water users of the SPMM campus



SPMM has drinking water line on every floor

The total personal water use was calculated from flow rates, questionnaire and total water users (occupancy of the building). We measured the flow rates of taps and pumping lines.

	Use	Flow
1	Drinking	20s/liter
2	Toilet	10s/liter
3	Basin	15s/liter

WATER CONSUMPTION CALCULATION

Total daily water Intake of water,
= 10700 litres

*Calculated from flow rate and daily water pumping operation to overhead tanks

I. POTABLE WATER CONSUMPTION (DAILY)

College uses filtered Corporation's water for potable water use

CALCULATION ON THE BASIS OF QUESTIONNAIRES AND FLOW RATES

1. POTABLE WATER CONSUMPTION

i. Daily potable water consumption by staff and students: $1 \times 1272 = 1272$ liters/day

Total water use of drinking water is = 1272 liters/day

2. NON POTABLE WATER CONSUMPTION

College uses corporation's water for non potable water use

CALCULATION ON THE BASIS OF QUESTIONNAIRES AND FLOW RATES

- i. Water used for flushing by students 1272×2 liters = 2544 liters/day
- ii. Water use for cleaning and Mopping and mess = 900 liters/day,
- iii. Water used for hand and face washing = Average time the tap left open \times Number of times the hand and face washed) \times Average flow rate of taps per second
- iv.

$$= 10 \text{ seconds} \times 1 \text{ times} \times 0.12 = 1.2 \text{ liters per capita}$$

So, Total non potable water use by students and staff for hand and face washing = 1.2 liters \times 1272 = 1526.4 liters.

So, the total water use for flushing and washing = 2544 + 900 + 1526.4 = 4970 liters/day

HOSTEL WATER CONSUMPTION

Number of water users \times Average water use = 71 \times 135 = 9585 liters per day

OVERALL WATER CONSUMPTION

Therefore based on the above recordings, monitoring and calculation, the total potable water consumption for SPMM College is 1272 lit/day and non potable water consumption is 14253 liters/day. Overall water consumption is 1272 + 4970 + 9183 = 15425 liters per day.

	Heads	Water use (in liters)
1	Average daily water supply, to the overhead tanks from the underground tank	10700
2	Total calculated water consumption from the water audit	15425
3	Difference between water consumption from overhead tanks and actual water use for various purposes	4725

Total water supply and use at SPMM College

DATA COMPARISON AND ANALYSIS

There is a wide variation in the average amount of water that is pumped to the overhead tanks every day for various purposes and the average water consumption calculation. The average water supply (quantity) was based on time taken to overhead the tanks, flow rates and monitoring. The amount of water based on questionnaire, flow rate and water users is 15425 liters per day while the daily water need to overhead all the tanks is 10700. The calculated water amount is 1.4 times greater than the amount of water which is used pumped in the tanks.

THIS DIFFERENCE COULD BE ATTRIBUTED TO THE FOLLOWING FACTS

- The staff and students present per day in the college were assumed to be 100 % present. In real this percentage varies.
- The observations from questionnaire for personal water use were a representative observations and not a complete study.
- Along with this staff and students living in nearby areas and college hostel, they don't use the college washrooms. Some of them bring drinking water from home.

WASTE WATER GENERATION BY SPMM

Every building generates waste water amounting to almost 80% of total water consumed. The major source of SPMM waste water includes grey water from wash basins and black water from toilets. Out of that Black water of SPMM toilets goes to sewer line

ESTIMATION OF WASTE WATER GENERATED BY SPMM

Waste water generated = 80% of water used

So, waste water generated by SPMM based on water audit

$$= 80\% \text{ of } 15425 \text{ liters per day} = \mathbf{12340 \text{ liters/day}}$$

Waste water generated by SPMM based on pumped quantity

$$= 80\% \text{ of } 10700 \text{ liter per day} = \mathbf{8560 \text{ liters/day}}$$

CONCLUSION AND RECOMMENDATIONS

1. Plants in the garden area should be watered after 4.30 pm in the evening to reduce evaporation losses. College has drip irrigation system and it has minimized unnecessary water loss.
2. Suitable innovative infrastructure to wash the moppers should be developed. That will minimize water use and will also maintain hygiene, cleanliness in college. At present no single institute has this infrastructure. It can be possible through little innovation, efforts and problem solving approach.
3. College has rooftop rainwater harvesting system. Currently college stores its collected rainwater in water tanks. To store large quantity of harvested rainwater large capacity tanks are needed. SPMMM also has area to create passive rainwater harvesting structures like contour bunds and field bunds in campus for infiltration of rain water.
4. It is suggested to check the water quality of water.



DRIP Irrigation System



Rooftop Rain water harvesting System

3. NOISE AUDIT

Actual noise monitoring is carried out with the help of sound level meter on various locations shown in figure. We have taken the samples within the free field. The comprehensive study was done inside the campus to calculate the noise level at various important locations such as class room areas, playground, parking area, library location and the data is interpreted for solutions.

Noise level readings (dB) were taken using noise meter.

The readings were taken in certain period of interval and specific timings such as mornings, evenings, afternoon.



SPMM – Peaceful location for teaching and learning

DISCUSSIONS

Out of 10 average noise recordings at SITE I near college entrance, 2 noise level recordings exceeds noise standard. The laid down noise monitoring standard for Silence zone is 50 dB (A) for a day time this site is close to the road. So it shows the impact of road rush. But It doesn't have any impact on learning process. Because Classrooms are at a distant place from college entrance

Site II is in the open space in front of the building. noise levels observations falls within standards. All noise level observations falls within standards. SITE III location is on the ground. Out of 10 observation, 1 exceeds the noise standard.

At some places we can find that the noise levels exceed the standard of CPCB for silence zone i.e. 50 db. But we have taken the samples in free field where there are no reflected sound waves. So this satisfies that the high Noise level (above 50 db) decreases towards classroom areas.

COMMENTS

- Silence is an important factor in education. SPMM campus is an ideal place for education as it nearly follows the standards of SPMM.
- As per CPCB guidelines silence zone is referred as areas up to 100 meters around such premises as hospitals, educational institutions and courts. The campus is at a distance of from crowdie and noisy area of City. This college is surrounded by Silent areas.
- The survey shows that, the plantation of hedge and dense tree cover in campus do acoustic buffering of outside noise and acts as noise barriers for road.

4. BIODIVERSITY AUDIT

Types of Plants in campus

Sr. No	Plant Name	Type	Quantity	Growth Method
1	<i>Santalum album</i>	Tree	Innumerable	Grown naturally
2	<i>Diospyros oocarpa</i>	Tree	Innumerable	Grown naturally
3	<i>Delonix regia</i>	Tree	Innumerable	Grown naturally
4	<i>Senna siamea</i>	Tree	Innumerable	Grown naturally
5	<i>Cassia siamea</i>	Tree	Innumerable	Grown naturally
6	<i>Caesalpinia mimosoides</i>	Tree	Innumerable	Grown naturally
7	<i>Bombax sp.</i>		Innumerable	Grown naturally
8	<i>Crotalaria hebecarpa</i>	Herb	Innumerable	Grown naturally
9	<i>Clerodendrum serratum</i>	Shrub	Innumerable	Grown naturally
10	<i>Cassia tora</i>	Shrub	Innumerable	Grown naturally
11	<i>Euphorbia geniculata</i>	Shrub	Innumerable	Grown naturally
12	<i>Indigofera sp</i>	Shrub	Innumerable	Grown naturally
13	<i>Jatropha curcas</i>	Shrub	Innumerable	Grown naturally
14	<i>Emblica officinalis</i>	Herb	Innumerable	Grown naturally
15	<i>Tecoma stans</i>	Herb	Innumerable	Grown naturally
16	<i>Tectona grandis</i>	Tree	Innumerable	Grown naturally
17	<i>Cassia fistula</i>	Tree	6	Planted by staff
18	Spanish cherry	Tree	6	Planted by staff
19	Palm	Tree	8	Planted by staff
20	<i>Lagerstroemia speciosa</i>	Tree	5	Planted by staff

21	<i>Platyclusus</i>	Tree	7	Planted by staff
22	Spanish chestnut	Tree	1	Planted by staff
23	<i>Saraca asoca</i>	Tree	8	Planted by staff
24	<i>Mangifera indica</i>	Tree	1	Planted by staff
25	<i>Duranta</i>	Shrub	250	Planted by staff
26	Christina Plant	Shrub	1	Planted by staff
27	<i>Ixora</i>	Shrub	4	Planted by staff
28	<i>Magnolia champaca</i>	Tree	2	Planted by staff
29	<i>Jasminum sambac</i>	Vine	1	Planted by staff
30	<i>Plumeria rubra</i>	Tree	2	Planted by staff
31	<i>Plumeria</i>	Tree	16	Planted by staff
32	Rose	Shrub	6	Planted by staff
33	<i>Terminalia catappa</i>	Shrub	4	Planted by staff
34	<i>Cocus nucifera</i>	Tree	4	Planted by staff
35	<i>Eucalyptus</i>	Tree	4	Planted by staff
36	<i>Albizia saman</i>	Tree	2	Planted by staff
37	<i>Delonix regia</i>	Tree	-	Planted by staff
38	<i>Banyan</i>	Tree	-	Planted by staff
39	<i>Ficus elastic</i>	Tree	-	Planted by staff

BIRD DIVERSITY

In nature birds occur in a variety of habitats – from deserts to the tropical rain forests; the short dry to the tall wet grasslands and on the alpine meadows in the high altitudes; from sea level to above 4000 meters above sea level; on rocks, cliffs in caves and mud banks; along fresh water estuaries, seas and shores. They also occur on man modified lands such as agricultural fields, airfields, along roadsides and hedgerows and gardens, among human habitations and dwellings.

SPMM College comes under habitat of man modified lands. 9 bird species were recorded from the campus

Above photographs show efforts by college for maintaining diversity of birds

C DAY AND TIME OF BIRD CENSUS

Date 22nd March 2025, Time of the observations – 7.30 am to 10.30am

List of birds reported at SPMM campus

Common Name	Scientific Name	SPMM campus
Red vented Bulbul	<i>Pycnonotus cafer</i>	4
Blue Rock Pigeon	<i>Columba livia</i>	3
Black- winged kite	<i>Eranus caeruleus</i>	1
House Crow	<i>Corvus splendens</i>	2
Common Myna	<i>Acridotheres tristis</i>	3
Blue rock thrush	<i>Monticola solitarius</i>	1
House Swift	<i>Apus nipalensis</i>	4
House Sparrow	<i>Passer domesticus</i>	5
Coppersmith barbet	<i>Megascops hemacephala</i>	1

BUTTERFLY DIVERSITY

India hosts 1501 species of butterflies (Gaonkar 1996), of which peninsular India hosts 350 and the Western Ghats, 331. The literature on biogeographic distribution and habitat preference indicates that the Satara district may harbor about 153 species. Remaining species are mostly forest dwellers and may not be found in the urban area. There is no specific literature available on Butterflies of Satara.

OBSERVATIONS

BUTERFLIES OF THE CAMPUS

Common Name	Scientific Name	Family
Common Jezebel	<i>Delia eucharis</i>	Pieridae
Common Egg fly	<i>Hypolimnas misippus</i>	Nymphalidae
Common Tiger	<i>Sapindasis vulcanus</i>	Lycaenidae

MAMMAL DIVERSITY

In Satara Districts animals like the Gray Langur *Semnopithecus hypoleucos*, Indian Hare *Lepus nigricollis*, Indian Grey Mongoose *Herpestes edwardsii* were sighted abundantly all over the district (covering both the northern Western Ghats and Deccan Plateau) followed by Wild Boar *Sus scrofa*, Asian Palm Civet *Paradoxurus hermaphroditus* and Indian Jackal *Canis aureus*. Mammals like Sahayadri Forest Rat *Rattus satarae*, Sloth Bear *Melurus ursinus* and Four-horned Antelope *Tetracerus quadricornis* were more or less restricted to Western Ghats mountain province of the district. Leopard *Panthera pardus* and Jungle Cat *Felis chaus* were noticed frequently to certain extent in the Western and middle part of the district. The Tiger *Panthera tigris tigris* was seen occasionally at Vasota Fort and Koyna area.

The mammals commonly seen on campus - Bandicoot Rat (*Bandicota indica*), House Rat (*Rattus rattus*). Monkeys are also found in the campus.

COMMENTS

1. SPMM has attractive has good tree cover.
2. The dense tree cover of the campus acts as filter to air pollution. Campus trees do acoustic buffering of outside noise and acts as noise barriers. Pure environment and silence zone are prime necessities of any educational institute.
3. Along with maintenance of greenery more focus should be given for mixed plantation. Plantings should include a diverse array of species, genera, and families, of different herbs shrubs and trees. This will provide protected habitat for different faunal species of nearby area.
4. We can replace some ornamental shrubs or herbs with native (native to study area) and useful one (i.e edible, medicinal species). Some areas should be reserved for plantations which attracts local butterfly species. Vines and bushes with long leave attract birds.
5. An integrated landscape approach can help to reconcile the sometimes-competing objectives of development and environmental sustainability.

Introduction

Knowledge of chemical and physical properties of soils has been assessed to understand the capacity of campus soil to support existing green cover. The concept of soil quality includes assessment of soil properties of campus as they relate to ability of soil to function effectively as a component of a Plant health at SPMM campus. In present study soil quality was assessed to know the capacity of a soil to produce biomass. As front campus is physically locked due to fencing of cement wall, so movement from **outside – campus – outside** is significantly restricted.

Status of soil in Maharashtra

The state of Maharashtra represents a mixed landscape with hill ranges, thick forest cover and coastline. The soils of Maharashtra are residual, derived from the underlying basalts. The land in the river basins of Godavari, Bhima, Krishna and Tapi has a deep layer of fertile black basalt soil rich in humus. The rest of the semi-dry plateau has a medium layer black regur soil which is clayey with high moisture retention capacity, rich in iron but poor in nitrogen and organic matter. The peaks of Sahayadri Mountains, the districts of Ratnagiri and the western regions of Kolhapur and Satara are composed of laterite soil. The Konkan coast has sandy loam soil. A variety of red soil and sandy soil is found in the Vidarbha region. Maharashtra's soils are highly deficient in nutrients when compared with the soils of other Indian states. They are lacking in Nitrogen (N), Phosphorous (P) and Potassium (K) and mainly because farmers in rain-fed areas use very little fertilizers. Further, excessive use of water for irrigation also leads to increasing salinity of soils.

Soil characteristics

In order to assess the soil quality SPMM educational campus, a collective soil samples were taken from different sites. Soil samples between 0-20 cm depths were collected. Collected soil samples are analyzed by using water soluble extract of soil samples.

pH	EC mhos/cm	Organic Carbon	Available N Kg/hect	Available P Kg/hect	Available K Kg/hect
7.2	0.28	0.31%	128	11	100

Table Physico-chemical analysis of soil samples collected from Campus

Soil characteristics

pH is an important parameter indicative of the alkaline or acidic nature of the soil. It greatly affects the microbial population as well as the solubility of metal ions and regulates nutrient availability. The pH of original soil of the campus is 7.9 and so is conducive for the growth of plants.

The concentration of ions determines the Electric conductivity of Soil. EC is used as a measure of soil salinity. EC of the soil is 0.25 mhos/cm. Hence soil is less saline.

As per the soil testing organic carbon is in moderate range. NPK content of the soil is not sufficient for plant growth.

Recommendations and conclusions

- Soil at different locations of the campus is varying in texture and having mixture of native and exotic soil. So soil sample is selected from original landscape area of the campus.
- The pH of the soil sample can be categorized as neutral and EC shows that campus soil is not saline.
- NPK content of the soil is not sufficient for plant growth. So it is suggested- To apply the organic matter, phosphate rich fertilizer, vermicompost manure as an important source of nutrient.
- Soil analysis shows that campus terrain fertility status has to be improved for gardening and cultivation.

Introduction

Increasing levels of carbon dioxide in the atmosphere are of growing concern globally and locally, and urban forests have a role to play in the battle against climate change. Urban forests can reduce atmospheric carbon directly and indirectly. As long as trees are growing, they remove CO₂ from the air in a process called carbon sequestration, transforming CO₂ into carbon and making use of it to build living matter - leaves, stems, trunk, roots, etc. The Biomass carbon sequestration potential was measured for SPMM campus.

Height and Girth distribution of trees

Assessment of height apart from being one of the most important parameters for calculation in carbon inventory projects along with DBH was considered as a reliable parameter to find out the maturity of a natural or man-made forest for terrestrial sequestration projects.

Total biomass assessment

The assessment of above ground and belowground biomass of SPMM campus was carried out within campus

Biomass carbon = (aboveground biomass carbon + belowground biomass carbon)

Conclusion

Total 0.18 tons of carbon is locked in the study area of SPMM campus by trees.

7. Vehicular emissions

The emissions inventory is the foundation upon which the regulatory strategy can be formulated. There are many emission sources that contribute to the urban air pollution such as point sources, non-point or area sources, motor vehicles, non-road mobile and natural. Magnitude of contribution from each of the sources depends upon the individual emission rates and the activity level.

The on-road motor vehicle emission inventory can be summarized as the product of an emission rate (e.g., gram/km) and an associated vehicle activity (e.g., km/day).

Survey was conducted to count the vehicles used by SPMM 'ians . Survey was done for one week at 11am.

On an average number of 5 bicycles were counted per day. Around 20 two wheelers are used daily by SPMM students and staff. While 3 four wheelers daily come to the campus. Most of the college students come to college by S.T bus and walking.

Pollutants	Emissions Factor	Number of Vehicle/ day	Emissions (gm/km)	Average Travel (km)	Total Emissions per day
CO	1.4	20	28	7	196
HC	0.7	20	14	7	98
NO _x	0.3	20	6	7	42
PM	0.05	20	1	7	7
CO ₂	33.83	20	676.6	7	4736.2

Total emissions by two wheelers

If we consider CO₂ emissions only, we can see that 4736.2 gm/day of CO₂ is emitted by two wheelers of CAB campus. So the CO₂ emitted by two wheelers per year is,
= 1.13 tones/year



Pollutants	Emissions Factor	Number of Vehicle day	Emissions (gm/km)	Average Travel (km)	Total Emissions per day
CO	4.3	3	12.9	7	90.3
HC	2.05	3	6.15	7	43.05
NOx	0.11	3	0.33	7	2.31
PM	0.08	3	0.24	7	1.68
CO2	72.50	3	217.5	7	1522.5

Table Total emissions by Four wheelers

Emission factors by four wheelers are higher than two wheelers. So the emissions per vehicles are also high as compared to two wheelers. If we consider CO₂ emissions only, we can see that 1522.5 gm of CO₂ is emitted by two wheelers of SPM campus. So the CO₂ emitted by two wheelers per year is,

$$= 0.36 \text{ tones/year}$$

$$\text{Total Emissions by SPM vehicles per year} = 2W + 4W = 1.13 + 0.36 = 1.49 \text{ tones/year}$$

From above figure it can be analyzed that though the number of 4W are less as compared to 2W, they do notable contribution in total CO₂ emissions of the campus.

CARBON DIOXIDE EMISSIONS AND ITS ASSIMILATION BY CAMPUS TREES

In green audit college has also assessed carbon sequestration by campus trees. Study shows that 0.18 tons/year tones of carbon are sequestered by campus. This capacity gets increased by every year.

If we quantify CO₂ flux to carbon dioxide, 0.18 tons of Carbon =180 kg of carbon

To determine the amount of CO₂ that the trees removed from the atmosphere, we have to multiply the carbon value by 3.67. This value is the mass conversion factor for carbon to carbon dioxide.

$$180 \text{ kg of carbon} * 3.67 = 660 \text{ kg of CO}_2 = 0.6 \text{ tones CO}_2 \text{ per year}$$

So it can be concluded that campus trees has capacity to assimilate 0.6 tonnes of CO₂ per year.

While the vehicular emissions study showed that total emissions of SPMM vehicles is 1.49 tones/year.

This value is 2.4 times greater than Carbon dioxide assimilation capacity of campus trees.
