NAAC Accreditation : 16 February 2004
NAAC Reaccrediration : 08 January 2011
NAAC Reaccrediration : 28 March 2017

Estd. : June 1964
NAAC : 'A' (CGPA : 3.01)

UGC (2F) dt. 20-03-1967,
Perm. Affi.No.-Affi./t.2/F.35/8275,dt.31-12-2002
Jr. College No. J 23.10.001

Shree Warana Vibhag Shikshan Mandal's

Yashwantrao Chavan Warana Mahavidyalaya

WARANANAGAR - 416 113, DIST. KOLHAPUR (MAHARASHTRA)
Affiliated to Shivaji University, Kolhapur

अनंत आयुषी प्रेरणास्त्री...!

I/C Principal
Prof. Dr. Prakash S. Chikurdekar
M.A.B.Ed.,M.Phil.,Ph.D.

Office : 02328 - 224041
Principal : 02328 - (O) 222820
Fax : 02328 - 224031
Website : www.ycwm.ac.in
E-Mail : ycwcwarana@yahoo.co.in

Founder Chairman : Late Shri V. A. Alias Tatyasaheb Kore
Chairman : Dr. Vinay V. Kore M.L.A.

7.1: Institutional Values and Social Responsibilities

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

- Green audit / Environment audit
- Energy audit
- Clean and green campus initiatives
- Beyond the campus environmental promotion activities

Green audit/environmental audit report from recognized bodies

Green Audit Report with Certificate

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar.

GREEN AUDIT REPORT

2021-22

Prepared by :-

Mr.Vilas. S. Patil - Coordinator

Green Audit Committee (2021-22)

Assistant Professor, Department of Physics,

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar.

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Yashwantrao Chavan Warana Mahavidyalaya, Warananagar.

GREEN AUDIT REPORT

2021-22

Green Audit Committee (2021-22) of

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar

- **Mr.Vilas S. Patil - Coordinator, Green Audit.**

Committee-

Dr. S. Y. Jadhav-	Member	Dr. S.S.Khot-	Member
Prof. U.D.Kadam-	Member	Prof. U.G.Jambhore-	Member
Dr. R.P.Kavane-	Member	Prof. S.M.Arde-	Member
Prof. C.R.Jadhav-	Member	Prof. M.N.Patil	Member

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Coordinator, Green Audit.

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Prof.U.D.Kadam
Prof.S.M.Arde
Prof.C.R.Jadhav
Prof.U.G.Jambhore
Prof. N.RChopade
Prof. M.N.Patil.
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Shree Subhash B. Shirgave

Special Assistance:- Dr. Prashant Banne,
Director,
SAITECH Research and Development Organization.

Photo Assistance Shubham K. Kumbhar. (Alumni)

Hon. Dr. Vinayravgi Kore., M.L.A (Savkarsaheb)
Chairman, Shree Warana Vibhag shikshan Mandal,Warananagar.

Green Message

Preserve Nature,

And Nature will preserve Us,

Simplify Life,

And make the Nature thrive,

Plant Trees,

And make our planet Green.

(Hon. Dr. Vinayravgi V. Kore)
Chairman, Shree Warana Vibhag Shikshan Mandal,
Warananagar.

Problems cannot be solved at the same level of awareness that created them. - **Albert Einstein**

Plans to protect air and water, wilderness and wildlife are in fact plans to protect man.
-Stewart Udall.

Conservation is a state of harmony between men and land. **- Aldo Leopold.**

Hon. Prof. Dr. Vasanti Rasam.
Administrative Officer,
Shree. Warana Vibhag Shikshan Mandal, Warananagar.

Message

As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent. Hence sustainability is the need of the hour for our country to provide our future generation a cleaner, safer environment. To achieve it there are many paths, one should be able to identify the best path related to their educational organization to achieve sustainability. Various models and tools are already developed by researchers working on this domain which helps them to identify the focus areas where the optimization is possible to improve the environmental performance of the educational institutes. Education is one of the key solutions for this situation. Sustainability had become the key word of developing nation and it's evident in many issues, the growing economy is facing nowadays. Ecology is being associated with the growth of any industry, organization.

A nation's growth starts from its educational institutions, where the ecology is thought as a prime factor of development associated with environment. Educational institutions nowadays are becoming more sensitive to environmental factors and more concepts are being introduced to make them eco-friendly. To preserve the environment within the campus, various viewpoints are applied by the several educational institutes to solve their environmental problems such as promotion of the energy savings, recycle of waste, water reduction, water harvesting etc. Educational institutions must play an active role in creating and modeling solution for such environmental problems. 'Green audit' is one such concept or principle introduced to make the educational institute environmentally sustainable. Our college has implemented eco-friendly practices to manage the available resources and has taken steps in environmental conservation and protection. As a part of such practice, internal environmental audit (Green Audit) is conducted to evaluate the actual scenario on the campus.

Our expert of 'Green Audit Committee-2014-15' already made a keen survey of YCWM Warananagar campus, prepared and published the 'Green Audit Report' in which these experts

identify and determined eco-friendly and sustainable institutional practices with wide Environmental Management plan.

I am very happy to forward this 'Green Audit Report 2021-22' of YCWM, Warananagar campus. I must congratulate Principal, IQAC Coordinator, Mr. Vilas.S.Patil, Coordinator ,Green Audit committee and team of our college for taking efforts for the completion of such brief report. I hope the report will be helpful to all concerned in the YCWM Warananagar campus and will motivate for Greening our educational institutions.

Hon. Prof. Dr. Vasanti Rasam.
Administrative Officer,
Shree Warana Vibhag Shikshan Mandal,
Warananagar.

"Only when the last tree has been cut down,
Only when the last river has been poisoned,
Only when the last fish has been caught,
Only then will you find that money cannot be eaten."
-Lester Brown

Sustainability is about ecology, economy and equity. - **Ralph Bicknese**

Hon. Principal, Dr. A.M. Shaikh.
Y.C. W. M. Warananagar.

Foreword

Today, the human society is facing severe environmental problems like climate change, greenhouse effect, energy crisis, depletion of natural resources, biodiversity loss, pollution of air, water, soil, etc. The ever-increasing population and changing life styles are increasing the severity of the environmental problems. The time has come to protect the natural environment through precise efforts. At the same time sustainable development through higher education provides a pivotal role in nations building. Sustainable development remains barely a significant social, economic or environmental challenge for any country.

Though teaching and learning must begin to reflect environmental issues, there is an emerging consensus that institutions must also model sustainable practices. Such education contributes strongly to sustainable development by training and expanding young minds in researching solutions to the environmental challenges.

After graduation the students become leaders of tomorrow and get dispersed from the world of higher education into their specific career. In doing so, they take with them the green practices and approaches they were involved with at their institution.

The meaning of eco-campus has been expressed in its targets and objectives. By all means, eco-campus means “environmental sustainability within the school / colleges”. College is a center for generating education; Moreover, it is also a research center where the students and teachers are attempting to develop the best strategy for achieving their purposes. Due to this reason, the development of eco-campus has been pointed out and established recently. Eco-campus concept mainly focuses on the efficient uses of energy and water; minimize waste generation or pollution and also economic efficiency.

All these indicators are assessed in process of ‘Green Auditing of educational institute’. Eco-campus focuses on the reduction of the educational institute contribution for emissions of green policy, procure a cost effective and secure supply of energy, encourages and enhance staff and student energy issues, also promotes personal action, reduce the institute energy and water consumption, reduce wastes to landfill and integrate environmental considerations into all contracts

and services considered to have significant environmental impacts. While these various measures are promoted synthetically and systematically, an "Environmental Management System" is introduced, in order to realize certainly the "Eco-[campus". Green audit of our college was already carried out in 2014-15, in which we find out areas of strengths and weaknesses in environmental management within the institution. Findings of the published audit report 2014 -15 showed the institution could conserve paper, electricity and water easily, if best environmental awareness was created. Canopy of trees, number of garden and greenery in campus beautify the campus and automatically neutralize carbon footprint and use of solar energy was highly accelerated in institution. College has already taken some steps like Plantation of local and endemic plant species, arranges special programmes by inviting the eminent personalities for environmental consciousness of staff as well as student, cleaning and beautification of YCWM campus by various activities through NSS and NCC units. Some activities pursued by colleges can create a variety of adverse environmental impacts.

This second 'Green Audit Report' report made a number of recommendations, including the design of an Environmental Management Plan (EMP) for institutions which must be enforced after designing the Green Policy for whole campus. Now College recognizes the need to function all year round in a manner which minimizes its harmful environmental impact by designing a Green policy. Implementation of Green policy provides chance to exploitation of opportunities for better performance in the future. I know that sharing of this reports widely generate greater awareness with in campus community, hence I am very glad to make public this report.

For this auditing our Hon. Dr. Vinayravgi V. Kore.(M.L.A.) Chairman of SWVSM, Warananagar and Hon. Prof. Dr. Vasanti Rasam madam, Administrative office of SWVSM, Warananagar, encouraged us with full support. I express my sincere gratitude to Prof. (Dr.) P. D. Raut, Professor and Head Department of Environmental Science Shivaji University, Kolhapur and alumni of our college Dr. Prashant Banne, Director and Environment Consultant for SAITECH, Research and Development Organization for giving guidance and taking efforts for completion of Audit. All Heads of the departments, Professors, Non-Teaching staff, officers in-charge of the common facility centers of college also gave full co-operation. I must also thank students of our college for circulating and submitting questionnaires in time.

I specially appreciate the work of Mr. Vilas .S.Patil, Coordinator of Green Audit Committee and his team for taking sincere efforts and hard work for the completion of such case study report.

I hope the report will be helpful to society, staff, student and all concerned in the YCWM, Warananagar campus and will motivate for Greening aspect through green practices.

Hon. Principal, Dr. A.M. Shaikh.
Y.C. W. M. Warananagar.

Dr. S. S. Khot.
IQAC Coordinator.
Associate Professor,
Department of Botany, Y.C.W.M. Warananagar.

Acknowledgement

The National Assessment and Accreditation Council, New Delhi (NAAC) has made Green Auditing mandatory for all Higher Educational Institutions, should submit an annual Green, Environment and Energy Audit Reports. Green Audit is assigned to the Criteria VII of NAAC, moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of environmental pollution, global warming through Carbon Footprint reduction measures.

In view of the NAAC regarding Green auditing, the colleges have to conduct an external environment assessment study by a competent auditor. The green audit aims to examine environmental practices within campus, which impact directly or indirectly on the atmosphere. Green audit can be defined as systematic identification, quantification, recording, reporting and analysis of components of college environment. This audit focuses on the Green Campus, Waste Management, Water Management, Air Pollution, Energy Management, Energy conservation, Waste recycle, Noise pollution, water quality, E-waste, Chemical hazardous waste & Carbon Footprint etc. being implemented by the institution. The concepts, structure, objectives, methodology, tools of analysis, objectives, recommendations and management plans of our college given here.

Our becoming college more thoughtful towards the environmental aspects and as a result new Green practices are being introduced to make them sustainable and ecofriendly. To preserve and improve the environment within the institution, a number of viewpoints are applied by college such as promotion of the saving the energy, Solar energy pack plant, waste recycle, water consumption reduction, water harvesting, Water recycle and many more...

In year 2021-22 Green Audit is conducted to evaluate the actual scenario at the institution campus. It can also be used to determine the nature and volume of waste, which can be used for a recycling and to improve waste minimization plan. It can also result in health awareness and promote the environmental awareness, values and beliefs. This audit provides a better understanding to staff

and students about the Green impact on institution. Green auditing also upholds financial savings through reduction of resource usage. It gives an opportunity to stakeholders for the development of ownership of the personal and social responsibility.

For this auditing our Hon. Chairman of SWVSM, Warananagar, Hon. Administrative office of SWVSM, Warananagar and Hon. Principal of our college encouraged us with full support. All Heads of the departments, Professors, Non-Teaching staff, officers in-charge of the common facility centers of college also gave full co-operation. I am also thankful to co-coordinators, committee members for supporting this Green auditing. As IQAC Co-ordinator I must also thank students of our college for circulating and submitting questionnaires in time.I hope the efforts made will be helpful for YCWM campus to take one step ahead for greening purpose by publishing this second Green Audit Report- 2021-22.

Dr. S. S. Khot.
IQAC Coordinator.
Associate Professor,
Department of Botany, Y.C.W.M. Warananagar

For the first time in the history of the world, every human being is now subjected to contact with dangerous chemicals, from the moment of conception until death. - **Rachel Carson.**

"Thank God men cannot fly, and lay waste the sky as well as the earth." **Henry Ford**

Our task must be to free ourselves by widening our circle of compassion to embrace all living creatures and the whole of nature and its beauty. - **Albert Einstein**

Mr.Vilas Shamrao Patil.
Coordinator, Green Audit Committee,
Assistant Professor,
Department of Physics, Y.C.W.M. Warananagar.

About Green Audit

As per the Energy Conservation Act, 2001, Energy Audit is defined as "the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption". India with the second largest population in the world is now one of the fastest growing economies with a rapid growth in GDP. In the past few decades the need for trained people is rapidly increasing in the industrial and other fields to support our countries technological growth.

This has led to the establishment of more and more technological and educational institutions in India. India has a large number of Universities, colleges, and other institutions and the number is growing rapidly in the past few decades. In Maharashtra itself there are more than 6000 educational institutions now operating to cater to the needs of students from various areas of study for more than 2 million students. It is well known that educational institutions consume resources like water, electricity; Forest products and generates wastes like many industries. Establishment and operating of educational institute are not covered by any of the environmental laws in India. As a result, the importance of making the educational institute operate with self-consciousness in the utility of resources inside the campus is least understood. Eco campus is a concept implemented in many educational institutes across the globe to make them sustainable because of their mass consumption of resources and creation of waste. Waste minimization plans inside the educational institute for solid and wastewater is now mandatory to maintain the cleanliness inside the campus.

To find out the environmental performance of the educational institutions and to analyses the possible solutions for converting the educational campus as eco-campus the conduction of Green Auditing of institution is essential.

The first Green Auditing performed was totally based on proposed strategy on the Greening concept approved by the IIT Council on Greening Educational Institutions and the deliberations of a

consultative meeting held on 2 nd March 2013 at Indian Institute of Science, where representatives from six IITs along with IISc participated. This process of green audit enables us to assess our life style, action and assess its impact on the environment.

For second green auditing of YCWM Warananagar campus college formed internal 'Green Audit committee 2021-22' and the responsibility of coordinator of this committee is given to me again. This is the second attempt to conduct green audit of our college campus, there was already baseline data was collected in 2014-15.

For second auditing our committee followed rules, acts and formats set by Govt. of India, Ministry of Environment and Forest, New Delhi ,Central Pollution Control Board, New Delhi and proposed strategy on the Greening concept approved by the IIT Council. Focus was given on greening indicators like consumption of energy, electricity, fuel-natural gas, water as well as disposal of liquid waste, solid waste, hazardous waste and e-waste and air quality also.

For preparation of questionnaires and in conducting 'Green Audit' guidelines and help is taken from Prof. (Dr.) P. D. Raut, Professor and Head Department of Environmental Science Shivaji University, Kolhapur and alumni of our college Dr. Prashant Banne who is existing working as Director and Environment Consultant for SAITECH, Research and Development Organization.

The questionnaire contains month, year, total number of students and employees, visitors of the department, average working days and office timings. The information related to consumption of resources like water, electricity and handling of solid and hazardous waste was collected in the formats from departments and common facility centers. Collected data was grouped, tabulated in Excel sheets and analyzed. Final report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of YCWM Warananagar campus. Our team also proposed an structure of "Green Policy' for campus as Management Plan.

During the Green auditing for survey, data collection, monitoring, verification and for preparation of the second 'Green Audit Report-2021-22' our Hon. Chairman Saheb of SWVSM, Warananagar, Hon. Administrative office of SWVSM, Warananagar , Hon. Principal of our college encouraged us with their full support. All Heads of the departments, Professors, Non-Teaching staff, officers in-charges of the common facility centers of the college also gave full co-operation. I am also thankful to co-coordinators, committee members for supporting me during Green auditing. I must also thank students of our college for circulating and submitting questionnaires in time. I hope the efforts made will be helpful for YCWM campus to take one step ahead for greening purpose by publishing this second Green Audit Report- 2021-22.

Mr.Vilas S Patil.
Coordinator, Green Audit Committee
Assistant Professor, Department of Physics,
Y.C.W.M. Warananagar.

"LET'S GO GREEN TOGETHER....."

Dr. Prashant A. Banne, M.Sc. Ph.D. (Environmental Science)

- CEO & Managing Director, SAITECH Research & Development Organisation
- External Faculty, PCRA, Under petroleum Ministry, Govt. of India
- EIA Coordinator, accredited by NABET, Quality Council of India

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Expert Opinion

Environmental changes are caused by inequitable and unsustainable production and consumption patterns that aggravate poverty in many regions of the world. We believe that urgent actions are needed to address these fundamental problems and reverse the trends Stabilization of human population, adoption of environmentally sound industrial and agricultural technologies, reforestation, and ecological restoration are crucial elements in creating an equitable and sustainable future for all humankind in harmony with nature.

The activities pursued by colleges can create a variety of adverse environmental impacts Colleges and Universities have broad impact on the world around them, both negative and positive. But colleges are also in the unique position as educational institutions to be leaders in pursuing environmentally sustainable solutions.

Green Audit can be defined as systematic identification, quantification, recording, reporting & analysis of components of environmental diversity. The term "Green" means eco-friendly or not damaging the environment. The green audit practically involves energy conservation, use of renewable sources, rain water harvesting, efforts of carbon neutrality, plantation, hazardous waste management & E-waste management.

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"LET'S GO GREEN TOGETHER....."

This document presents a proposal for both the process and the content of an environmental assessment of Yashwantrao Chavhan Warana Mahavidyalaya /College (YCWM). The process involves the formation and deliberation of assessment teams, each consisting of a group of knowledgeable stakeholders within the campus community. This report serves to highlight YCWM's many accomplishments, and to make recommendations for improving the College'senvironmental sustainability.

The Environmental or Green audit report is prepared by Dr. Vilas S. Patil and his faculty associates at YCWM, Warananagar with support from, Hon. Chairman saheb. Hon. Administrative Officer of Shree of Warana Shikshan Mandal, Warananaga, Hon. Principal of YCWM & various stakeholders of Shree Warana Shikshan Mandal, Warananagar. I would like to extend my special appreciation for the amazing work done by Dr. Vilas S. Patil on the Green Audit project. Seeing their diligence, self-motivation and focus has been a source of motivation for the rest of the team, as we see a positive approach in the college.

Besides that, this assignment was done by Dr. Vilas Patil and his team, is not just about providing opportunities for student learning and growth, it was about an obligation to exercise leadership in promoting environmental sustainability, environmental awareness and commitment that leads to action, that leads to transformation and change. They have studied and presented their efforts in this report. This is not only for the institution itself, but just as importantly to be a role model institution for others to emulate and bring the environmental concerns and related mitigating measures to centre stage of Green campus life which extend locally, regionally and beyond.

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"LET'S GO GREEN TOGETHER....."

The overall goals of this project are four-fold:

- To introduce students to the tools of investigation and the process of quantification of resource use and sustainability using the YCWM Campus as a study site
- To analyze various resource use patterns and levels of resource use on the Campus
- To establish a baseline to assess future sustainability work.
- To identify and catalogue existing efforts to make the College a more environmentally sustainable institution of higher learning.

To accomplish these four objectives, they have to analyze resource use and the campus environmental impact through a series of environmental or sustainability lenses. YCWM College needed to conduct an audit, in order to judge how they are using their resources and if they can use them more efficiently.

YCWM is the multi faculty college (Arts, Commerce & Science), and expresses its commitmentto sustainability in many ways. It has taken a number of positive steps to reduce its environmental impact. But many areas remain in which substantial improvements can be made. The environmental aspect has studied the practices of the college regarding solid waste management, water and wastewater management, energy usage and pollution and Green campus maintenance. It may also examine the eco-friendly initiatives of the college.

It is observed that-

- Establishing an environmental policy statement indicating the commitment of the Institute towards improving its environmental performance.
- Evaluation of compliance with respect to applicable legal requirement.
- Increase visible communication on environmental issues.

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"LET'S GO GREEN TOGETHER....."

- Effective use of notice boards and signs.
- Plantation inside the college premises is found well maintained.
- The college undertakes various actives through NCC NSS like beautification, water and power management awareness.
- Baseline data generation for Air, water energy (in all forms electricity, fuel) and waste.
- Data management and analysis of trends with respect to energy consumption, waterconsumption waste water generation, solid waste generation (stream wise).
- Program on rain water harvesting has been taken up, the project is under progress.
- Establishing improvement objectives for reducing energy consumption waterconsumption and fuel consumption.
- Identification of improvement initiatives prioritization and rollout of suitable projects.
- Ensuring effective implementation of such projects to attain set environmental goals
- **449.28 KW SOLAR POWER PACK PLANT-**The management installed 449.28 KW solar power pack plant on roof of science building which comprising 1452 nos. of solar panels of 320W inverter and associated all equipment's. Out of 1452 solar panels of power pack project 484 placed on YC science building which generate 150.04 KW energy. The material and associated equipment's installation cost of above project is 2,69,77,500/- (Rs.) and came in force on 21st February 2019. Solar power pack plant in duration of March 2019 to May- 2022 of 39 month in which total electricity consumption in campus 1950818 units, electricity generated by Solar power pack plant is 1627189, electricity imported from Mahavitran is 537059units and power bank in account of Shree Warana Shikshan Mandal is 213430 units. In the duration of 39 months actual electricity units are payable are 323629 units out of it the of YCWM college is nearly around the 32563 units. The use of the electricity was is minimized than first phase of energy audit.

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"LET'S GO GREEN TOGETHER"

- College has green campus of 27 acres, efforts have been made on to bring part of land under cultivation of medicinal plants as well as other productive plants through NSS , NCC students ,Seniors students , teaching and nonteaching staff in college. In campus total 5623 tree of 152 varieties are present in which 3296 are trees, 1622 are shrubs, 668 are herbs and 37 are climbers.

- **Nature Based Wastewater Treatment System**-Parker LORD company funded, installed in campus and handover the '**Nature Based Wastewater Treatment System**' shortly Nature **Based** WWTPs, on 14th Noveber 2022. Its cost is more about 45 lakhs, which purify the water about 150-200 KLD (Kilo liters per day) i.e nearly 1,50,000-2,00,000 liters per day. The Centre for Environmental Research & Education **(CERE)**, Mumbai and **National Solutions**, Mumbai. Which recycle the campus drain water up to drinking standard level, but in campus that recycled water from system used for watering garden, washing and cleaning purpose.

Recommendations-

- A mechanism needs to be developed to identify the various environmental aspects & the Impact arising from the activities of the institute. This will enable the college to map itsvarious resources usage and waste streams, in accordance with the same control measures could be developed and implemented.
- College needs to develop a monitoring & measurement program for resources (waterelectricity, LPG & fuel)
- Consumption efficiency by

  (a) evaluating current consumptions,

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(b) setting timebased reduction targets,
(c) action plan to achieve the same with defined responsibilities,
(d) periodic review of effectiveness of actions implemented.

- Suitable communication by means of banner, posters, one point lesson can be displayedat vantage location to create awareness among all stakeholders.
- Student's community may be involved in small groups for different environmental improvement projects within the college as well outside the college boundary.
- The cleanliness of the common room for students and some of the classrooms found inadequate.
- Participation and involvement of the students can be improved by college event onpertinent days such as world environment day, earth day. World Water day etc.
- Waste Water reuse and recycle opportunities have not been explored.
- The college may take initiative for community plantation programme by involving students to offset the GHG emission,
- College needs to develop an emergency preparedness plan: Signage indication emergency evacuation layouts, routes and assembly area are not implemented.
- Stakeholder awareness on emergency preparedness needs to be improved.
- Infrastructure for firefighting needs to be reviewed periodically by experts.
- First aid room is not maintained in proper condition and register for monitoring periodically is maintained.
- Waste Generation & Management -
- E-waste and glass wastes generated from office IT and Science labs are handled through authorized service provider.
- The Chemistry. Botany and Zoology laboratories are using a number of hazardous chemicals (e.g.-mercuric chloride, formaldehyde, butyl alcohol etc). The Departmentneeds to identity all the hazardous chemicals and necessary

communication dos anddon'ts to minimize environmental and health impact by the user from the MSDS.

- Presently solid waste disposal process is done in unorganized basis. The collection of waste is done from the campus on as and when required basis and the solid waste disposed through only by recognized technologies like vermicomposting, decomposition etc
- The college has not yet taken any initiative for carbon accounting .
- Plantation program has been initiated inside the campus.
- Adequate awareness program amongst the students and other stakeholders (faculty other staffs, service providers etc) needs to be organized for proper solid waste disposal.
- The college may start proper communication with the local body for regular collection ofsolid waste from the campus. Various wastages like used tube lights, plastic bottles wereobserved on ground behind the common room.
- College needs to prepare & implement a waste handling & disposal procedure with clearidentification for different type of wastes Disposal area for different types of waste needsto be earmarked.
- The college does not have a waste collection system with proper segregation.The college may introduce waste collection bins with different colour code for biodegradable and non-biodegradable waste for source segregation with adequate signage.

Water Conservation-

- The college has not yet introduced any water consumption monitoring within the collegecampus. The authority may install flow meter at the intake point and generate water consumption pattern.
- The detailed layout of water dispensing taps is not available presently.

SAITECH RESEARCH AND DEVELOPMENT ORGANISATION

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"LET'S GO GREEN TOGETHER"

- The college may compare the water consumption from the measured data with WHOguideline, to chalk out water conservation measures for continual improvement.
- College needs to evaluate its water consumption efficiency by suitable monitoring of-
  (a) input from IRRIGATION DEPARTMENT
  (b) Quantity of water supplemented by rain water harvesting which is under implementation
  (c) operational control to reduce wastage in toilets & canteens,
  (d) identification & stoppage of leakages in pipelines.
- Float valve operated auto shut off switch may be installed for pump sets used for overhead tank filling.
- Washing waste water from canteen & kitchens needs to be suitably controlled to preventresidual food waste contaminating the storm water drains.
- The college doesn't have waste water treatment unit for the waste water generation from different chemical laboratories for the proper treatment. Effluent Treatment Plant (ETP)may be installed.
- The college has taken initiative for rain water harvesting Presently rainwater from college roof is being collected in college well and used for gardening Study on measurement of water quantity from the rain water harvesting should be required.

Energy Conservation & Efforts on Carbon Neutrality-

- Assessment of electrical load calculation is not yet done by the college.
- The college may assess the equipment rating to have the baseline data for assessing energy consumption pattern.
- Maximum numbers of electrical fans are found of older generation & non-energy efficient. The college may develop a phase out plan of the same by replacing with newenergy efficient fans.

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- High energy consuming Incandescent lights and fluorescent lights are found in use. Thecollege may plan for long term phase out plan of the same with less energy consuming LED or CFL lights.
- Many classrooms are found unoccupied while fans & lights are operational Automationor time control mechanism may be explored.
- The communication process for awareness in relation to energy conservation found inadequate.
- The college is having considerable area in the roof top, a cost benefit analysis may bedone for installation of solar panel to reduce carbon footprint. College needs to explorethe usage of renewable energy sources like solar panels for lighting & water heating,Electricity generation from Wind mills etc.
- The college may account the carbon foot print from per capita energy consumption andother means of GHG emission. Based on the baseline data the college may set targetand program to reduce carbon foot print.

Hope that the results presented in this report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as was spawn new initiatives and innovative practices. However, there is scope for further movement, particularly in relation to waste minimisation and energy monitoring By implementing a basic environmental management system, current good practice could be formalized and a framework could be set up for implementation of action plans and continual improvement

Thanks and Regards

Yours Sincerely,
Dr. Prashant A. Banne (CEO & Managing Director)

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EXECUTIVE SUMMARY:

The Green Audit Committee 2014-15 of our college Yashwantrao Chavan Warana Mahavidyahalaya, Warananagar has conducted a "Green Audit" in the academic year 2014-15 and published a wide report.

In college Green Audit Committee 2021-22 was formed conduct second Green Audit for duration of 2015-16 to 2021-22 and find out the weaknesses/ lacuna in existing Environmental Management Plan and propose best environmental policy for YCWM campus, which increase the sustainability of the institutions and reduce their resource consumption, which will benefit the institutions and the nation in many ways. So Yashwantrao Chavan Warana Mahavidyahalaya, Warananagar has conducted a second "Green Audit" in the academic year 2021-22 and published a report. 'Green audit' is one of such potential tools which can be used effectively by any educational institution for resource usage identification and optimization. If green audit properly deployed with all indicators, it will increase the sustainability of the institutions and reduce their resource consumption, which will benefit the institutions and the nation in many ways.

'Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable'. The main objective to carry out green audit is to check green practices followed by the college and to conduct a well formulated audit report to understand where we stand on a scale of environmental soundness. (This is the second attempt to conduct green audit of our college campus, there was baseline data and published Green Audit Report of 2014-15).

For collecting data Green Auditing questionnaires prepared based on the guidelines , rules, acts and formats set by Govt. of India, Ministry of Environment and Forest, New Delhi and Central Pollution Control Board, New Delhi. For preparation of questionnaires and in conducting 'Green Audit' guidelines and help is taken from alumni of our college Dr. Prashant Banne who is existing working as Director, SAITECH, Research and Development Organization in Kolhapur. Questionnaires were prepared for solid waste, energy, water, hazardous waste and e-waste. For audit purpose and suitability of analysis of data the study area i.e. our campus is grouped as Science Departments (includes Jr. and Sr. wing), Arts Departments (includes Arts Jr. wing ,HSVC wing and Language, Social sciences departments at Sr. wing), Commerce Department(includes Jr. and Sr. wing), Office(include Administrative Office, Principal chamber, meeting hall. Non-residential hall, store, strong room etc), Computer/ I/T. Lab. Gymkhana (includes gymnasium hall, gymkhana office, Shivneri ground, Medical officer room etc) , Exterior (includes Botanical Garden, Garden in front, in back of new building, Roads in Campus and area in near etc) and Common facility centers (includes Library and MPSC Staff quarters, Canteen, Boys hostel , Ladies hostel etc).

The environmental audit was carried for solid waste, electricity and energy, water, hazardous waste, noise and air quality. The 'Green Audit' also give a 'Environmental Management Plan' and propose an ‘Green Policy’ to increase the green practices in campus.

1. Solid Waste: In first Auditing we collected a factual data for this indicator, with making the minute changes in questionnaire the true data was collected for 2021-22 Green auditing. This indicator addresses waste production and disposal: paper waste, food waste, plastic, biodegradable waste, construction waste, glass waste, dust etc and recycling. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone.

The solid waste audit focused on volume, type and current management practice of solid waste generated in YCM campus. The solid waste collected was paper waste, plastic, biodegradable waste, construction waste, glass waste and other miscellaneous waste. The total solid waste collected in the campus is 6852 kg/month. Paper waste is a major solid waste generated by all the departments.

Data shows Category wise solid waste generation at different department in college. Very high amount of total solid waste i.e.≈ 6852.4 Kg/Month is collected in college, while maximum solid waste (4911.7 Kg/month) at CFC and minimum at Solid Waste (60 Kg/month) at IT. In assessment period Paper waste and Biodegradable is maximum i.e. 1984 Kg/month and 3715 Kg/Month respectively.

Data shows that maximum Biodegradable waste (3715 Kg/Month) and Paper waste (1984 Kg/Month) is generated while very less constructional waste and glass waste generate in college.

Total solid waste about 4911.7 Kg/Month is generated at CFC and minimum of only 6 Kg/month solid waste generated in commerce department.

Plastic waste generation at different department in college (Kg/Month). It shows that maximum plastic collected 666.7kg/month is generated in CFC while comparatively zero Plastic waste generated in commerce department. The plastic waste 60.55% is hard plastic,25.81 % is soft plastic and 13.64% is carry bags. Total plastic waste generated in college is 875.3 Kg/month.

Single sided used papers reused for writing and printing in all departments. Important and confidential reports/ papers are sent for pulping and recycling after completion of their preservation period.

Very less plastic waste is generated by some departments, office, garden etc but it is neither categorized at point source nor sent for recycling. Metal waste and wooden waste is stored and given to authorized Scrap agents (Siddhanath Paper Waste and Scrape Merchant, Kodoli, Dist-Kolhapur & Salunkhe raddi and scrap traders, Kodoli, Dist-Kolhapur) for further processing.

Few glass bottles are reused in the laboratories. Small paper piece waste, classroom waste, biodegradable waste is not used for composting but burn on site.

Food waste, dinning waste etc. of common canteen is thrown at site. Some paper dishes, plastic use throw dishes, packages of food are burned nearer the canteen. The food waste from main canteen and mess is not used or sent for vermin-composting plants.

2.Electricity and energy audit:

This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, natural gas and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. However, many may not realize how much influence the higher education sector has in the larger energy market. Energy sources utilized by all the departments and common facility centers include electricity, liquid petroleum and LPG.

449.28 KW SOLAR POWER PACK PLANT- Our management installed 449.28 KW solar power pack plant on roof of science building which comprising 1452 nos. of solar panels of 320W inverter and associated all equipment's. Out of 1452 solar panels of power pack project 774 placed on Main building which generate 239.94 KW energy , 194 placed on new building generate 60.14 KW energy and 484 placed on YC science building which generate 150.04 KW energy. The material and associated equipment's installation cost of above project is 2,69,77,500/- (Rs.) and came in force on 21st February 2019, from that day the Maharashtra State Electricity Distribution Co. Ltd(Mahavitran) and Shree Warana Shikhan Mandal work according to MOU between them. It contains the units of electricity consumption, electricity generation, import units and units in the bank/ storage. The detailed study of Solar power pack plant in duration of March 2019 to May- 2022 of 39 month in which total electricity consumption in campus 1950818 units, electricity generated by Solar power pack plant is 1627189, electricity imported from Mahavitran is 537059units and power bank in account of Shree Warana Shikshan Mandal is 213430 units. In the duration of 39 months actual electricity units are payable are 323629 units out of it the of YCWM college is nearly around the 32563 units. The use of the electricity was is minimized than first phase of energy audit.

In duration year 2015-16 to 2021-22 in between 2019 to 2021 due to COVID Pandemic the physical exertion of educational institution is closed and only online mode of

teaching -learning was on. Hence due lockdown in pandemic duration the electricity consumption was decreased. Especially in science wing regular practical's, projects and practical examinations are not performed in COVID pandemic hence electricity, liquid petroleum and LPG is averagely less consumed in second auditing duration.

Major use of energy is in Science Department, office, canteen, hostel and laboratories for lighting, transportation, cooking and laboratory work. Energy consumption by major energy consuming Equipment's in College laboratory is 2748.66 KW / Month, Energy consumption by less energy consuming Equipment's in College is 4358.26 KW / Month and Energy consumption by Lightning Equipment's in College is 4449 KW / Month . Thus, total Electric energy consumption in college is 11555.52 KW / Month. No any department and common facility centers were using CFL lamps in most of the department like Chemistry, Physics, Botany, Zoology. HSVC and in office also.

All the departments with common facility centers are using an incandescent lamp where increasing consumption of electricity observed. The street lights in front of main gate of campus are HID type and other street lights in campus are of sodium vapour lamp also increasing major consumption of electricity for lighting purpose. But some HID type and other street sodium vapour lamp are replaced by solar panel street lamps hence electricity consumption for lightning the campus was minimized in second phase of auditing.

In group of study area more electricity is consumed in administrative office, Computer laboratory, Science departments, library and MPSC center on the other hand, it consumed very less at arts and commerce departments.

In suggestions of Green Audit 2014-15 the building auditing, survey of adequate ventilation and natural light of infrastructure was essentially marked, hence it will be introduced in management plan. The management of institution was shouldered this task to the Civil Department of our sister branch college TKIET, Warananagar. By the recommendations of the building auditing team of engineers of the Civil department of TKIET college, some alteration and modifications in the infrastructures of Arts and Science buildings are performed in 2018-19. Hence due to adequate ventilation and natural light at major part of infrastructure, the consumption of electricity at air and light appliances in the college was minimized.

Hence, in science laboratory at some places exhausts fans are used at proper locations but their use has to be monitored in summer duration. Also high consumption of electricity is observed at office in duration of admission and examination.

Some water coolers (nearer to Chemistry lab and nearer Physics junior. lab. at first floor) are seen overflowing but its frequency was decreased, here wastage of electricity as

well as water was minimized, here monitoring responsibility was given to peon in near labs of Chemistry (Mr. Sopan Parit) and Jr. Physics (Mr. Sameer Dhalaiet).

Major electricity is required for water fetching, irrigating purpose although sprinkler, drip irrigation is used for watering the gardens in campus. In science department like Physics, Chemistry, Mathematics, Botany and Zoology electricity was shut downed after occupancy time is one of greening practices for energy conservation.

Audit shows major teaching as well as non-teaching staff is in campus and nearer to campus for resident and mass number of students are come from nearby villages of Warananagar hence consumption in fuel is less.

As our college is situated in rural area but bigger number of students are using vehicles, it increases to 24.13 %, and staff using four wheelers is is also increased. Study shows about 16.23 % students come to the college by walking, 2.3% student are using bicycle and, 42% are using state transportation vehicles and some student make use of private transportation like Vadap.

Staff members who lived out campus are using the vehicles in sharing for daily transportation. Use of bicycle bank scheme for female student was functioning but less number of female students are demanding it and private transportation vehicles are restricted in YCM campus from gate.

The college follows 'No Vehicle Day' on 13th December on occasion of death anniversary of Late. Tatyasaheb Kore was minimizes the fuel consumption for a day, which is a one of green practices followed by the college.

Study tours, collection tours, visits, treks, save fort and clean forts Abhiyan are followed by college which gives the message of importance of walking, which is very good green practice. Consumption of LPG for education or practical purpose is very less but high consumption is observed at common facility center like canteen, mess and staff quarters.

The LPG connection in name of the college and LPG is handled by departments of Physics, Chemistry, HSVC. For heating purpose at the time of practical, no leakages and off mode regulators are seen at time of verification.

Number of two wheelers is 712 , it consumes 8868 liter/month and number of four wheelers is 68, it consumes 1943 liter/month, i.e. total consumption of fuel in YCM campus is increased in second phase of auditing 10811 Liters/Month. But majority four-wheeler owners are using CNG gas and electricity driven cars, the staff parents as well as students are aware about the protection of environment and use of electricity driven vehicles, Green vehicles is increasing in campus.

3. A)Water and waste water audit: This indicator addresses water consumption, water sources, irrigation, storm water, appliances and fixtures. A water audit is an on-site survey and assessment to determine and improve efficiency water use. In survey water used at bathrooms, toilets, laboratory, kitchen, garden, shower and of as well as leakages and over flow of water from overhead tanks is also been evaluated.

The data collected from all the departments is examined and verified. For monitoring of water use number of times of filling of tanks per day, time for overflowing, rate of flow, water

wasted in liters per day due to overflowing is periodically is supervised by water management and water harvesting committee members. Data submitted by the departments it examined according to leakages, rate of flow of leakages, use for washing, use of water for cleaning etc by committee.

On an average the total use of water in the college is 1720180Liters/Month. Average use of water per month is minimized as comparative to first base line serve of audit.The maximum water used for bathroom is 527614 liters/ month (30.67%) followed by gardens on the premise are lush green throughout the year by using 375778 liters of water which is around(21.40%) and to keep the toilets clean 366039 liters/ month which is 21.27%. In the laboratories 39978 liters water is used every month. i.e. 2.32%. The use of water in kitchen is 47606 liters and it is 2.76%.The for the showers 5284 liters of water is used which is 0.31%. The use of water for drinking is 134052 liters which is 7.79% and 12.77% water i.e.219749 is used for washing purpose. But major loss of water is through overflow of tanks and it is observed about 3,34,109 Liters /Month and water loss due to leakages is 17,436 Liters/Month.The total water consumption at different sites in college preemies is 1720180 liters/ Month.

The major use of water is in common staffroom , science building, canteen, Staff quarters, hostels, canteen and at exteriors. There is also water filtration plant for filtration of water in the botanical garden which supplies filter water for drinking purpose.

Roof top rain water harvesting is also been practiced in some extent by the department of Chemistry with storing rain water and using it as distilled water and distributing to other department for practical purpose. In the Chemistry laboratory the water harvesting system is in working order during rainy season. Roof water is collected in big syntax tank and used as distilled water. This is used by all laboratories throughout the year.

Water harvesting is also practiced by digging two wells in campus at such geographical place where rain water and peculated water easily trapped in it. The collected drain water, rain water from roofs of building, rain water from paved area in the campus is send toward the wells.

Although our campus has canopy of trees (grand total -5623), huge botanical garden, garden and lawn in front of new building, garden in back of new building for this requirement of irrigating water is major and it is sufficiently filled by the wells but new design of water harvesting system and watering the garden is necessary.

In duration of 2015 to 2022 in YCWM campus 602 small trees are planted and cared by the institution and GPS mapping, e- mapping and classification of all big trees in campus started by the departments of Botany, Zoology and microbiology of our college.

Gardens are watered by using drip/sprinkler irrigation system to save water. The sprinklers are used for irrigating gardens, different lawns in campus is one of the steps toward greening practices.

No any leakages are observed while conduction of verification and site inspection of infrastructure, but still plumbing survey of water supply line is necessary to stop water supply after occupancy time and to use pressure valves / sensor valves to make control on overflow is necessary. Need of monitoring, controlling overflow is essential and periodically supervision drills should be arranged. In campus another small scale / medium scale/ large scale reuse and recycle of water system is necessary for Chemistry, Botany, Zoology, Biochemistry and Micro-biology department is necessary.

B) Water Environment: Waste water sample form the Chemistry, Botany and Zoology was examined for Physico-Chemical parameters in order to assess the characteristics of the laboratory waste. From the analysis report of laboratory waste it is observed the Chemical Oxygen Demand (COD) is higher. COD of waste water sample is 840 mg/L hence waste water is not suitable for irrigating purpose. It can be decreased and make suitable for irrigating by adding coagulants like $Fecl_3$ and $Fe_{2(}So_4$) and then passing the sample through the filter made up of sands, charcoal, activated carbon.

4. Hazardous waste audit:

A. Chemical waste: This indicator addresses hazardous waste, laboratories, medical waste, art supplies, colors, dies and chemicals used in campus maintenance. Hazardous materials represent significant risks to human health and ecological integrity. They often persist in the environment leaving a legacy of land and water contamination for generations. Many accumulate in the tissues of organisms and become concentrated within food chains, leading to cancer, endocrine disruption, birth defects, and other tragedies.

The minimization, safe handling, and ultimate elimination of these materials are again highly essential to the long-term health of the planet. Only in the department of Chemistry, Botany and Zoology the laboratories generate the chemical waste. Survey and data collection shows that chemical waste generated on the campus through Science laboratories is very less

and majorly generated by the department of Chemistry and botany, micro-biology and Industrial chemistry.

At time of site inspection it is observed that in the department of Chemistry hazardous chemicals are handled for practical purpose and these hazardous chemical wastes are drain out with basin water directly to the botanical garden and producing negative impact on environment. In some extent it produces an air, soil, water pollution. Hence for environmental sustainability the drainage of chemical laboratory should be collected in air tight cement chamber and frequently the chemical waste from chamber is sent for recycle or for scientifically destroy process to the Shree. Warana Sahakari dudh utpadak prakriya Sangh Ltd. Tayatyasaheb Kore nagar was a sister concern branch of our complex.

Although the laboratories of Zoology and Botany generating an less chemical waste and it is of category III, is also directly drained in lawn near the departments. It has to stored in cement chamber and it is frequently recycled or destroyed scientifically. In chemistry, Botany, Zoology different chemical bottles are labeled properly, tight with unbroken caps .

The study as well as collected data reveals that solid hazardous waste 4.125 Kg and liquid hazardous waste 9.5 liters are generated, it drained with making 100 times dilution. Usually there is a practice in the laboratories to store these hazardous chemicals in the containers and cans for safe disposal.

The stoppers of all the bottles are regularly checked. The exhaust fans are not provided in some laboratory to expel gaseous waste. In laboratory provide a separate dust bin for wet solid waste.

B. E-waste:

E-waste can be described as consumer and business electronic equipment that is near or at the end of its useful life. E-waste makes up about 5% of all municipal solid waste worldwide but is much more hazardous than other waste because electronic components contain cadmium, lead, mercury, and Polychlorinated biphenyls (PCBs) that can damage human health and the environment. E-waste generated in our college is of schedule III and is generated is very less in the institute is handled, treated and disposed in scientific way.

In the year 2012-13 and 2019-20 our college purchase committee sold an about 52 and 43 peripherals (CRT monitor, PIII computers, CPUS, UPS, Multi media system etc.) respectively which are not in use. Computers, Printers and other ICT equipment's which cannot be used are sold to vendors who do the recycling. Now our institute has some e-waste like chips, bulbs, circuit boards, mother boards, computers, batteries, relays, and switches with garbage.

The college is not using paperless office work mode for administration due to which in campus there is carbon emission in printers, carbon copy of bills, filing of cartridge inside the office and several departments is observed.

The non-working computer spare parts and other non-working electrical equipment's are dumped in different department at several places. Buy back policy is not available till 2020-21. But in last year we purchased 38 computer system associated with different peripherals of Acer from proprietor of Vekanteshwara System , Kolhapur which includes the buy back policy after six year of purchase.

Still cartridges of printers, laser printers are not refilled outside the college campus or no small room is still exists for the tonner filling in cartridge.

College has to conduct the awareness programmes regarding -E-waste Management with the help of Department of Physics and department of Electronics & Telecommunication of sister concerned TKIET, Warananagar.

E-waste handled in second phase of auditing is 613 kg per year, this total E-waste treated and disposed properly recycled by sending to registered authorized vendors. E-waste generated within college will be stored separately and disposed of for recycling through authorized vendors .

5. Air quality audit:

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 wind storm, pollen grains, natural dust, vehicular emissions, generators, fires and laboratory fumes etc. All the pollutants are measured by the Dr. Prashsnt Banne and his technical team. Six locations are selected for the ambient air quality monitoring , selection of stations is based on the Meteorological conditions of the area.

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 existing sugar factory unit of Shree Tatyasaheb Kore Warana Sugar factory, Warananagar, vehicular activities and domestic firewood burning, fuel burning etc.

The major pollutants released in the atmosphere will be PM_{10}, $PM_{2.5.}$ SO_2 NO_x and CO etc. All the air quality parameters are within standard limits of CPCB, New Delhi, suggesting ambient air quality at YCM campus.

College has green campus of 27 acres, efforts have been made on to bring part of land under cultivation of medicinal plants as well as other productive plants through NSS , NCC students ,Seniors students , teaching and nonteaching staff in college. In campus

total 5623 tree of 152 varieties are present in which 3296 are trees, 1622 are shrubs, 668 are herbs and 37 are climbers.

We created a green zone in our campus. The college has planted different types of large number of trees in the campus, hence the greenery around the institute helps to neutralize whatever carbon and its byproducts generated.

6.0 Noise Environment

The noise levels measurements were carried out using precision noise level meter. The noise level survey was carried out at six locations, at outside as well inside the study area campus. The major source of noise identified in the study area has been predominantly the vehicular movement, and the transportation activities.

7.0. Nature Based Wastewater Treatment System-

Sustainable development goal (SDG), includes providing access to adequate and equitable sanitation, improving water quality, and protecting and restoring water-related ecosystems. However, an estimated 80% of wastewater globally flows back to nature untreated, with serious public health and environmental implications.

Within the European Union, only 40 percent of rivers, lakes and estuaries meet minimum ecological standards for habitat degradation and pollution. External pressures, such as climate change, growing populations, and urbanisation are creating further pressure on sanitation services. But about 90% rivers, lakes etc. are so pollutes as the recycle and reuse of water culture not developed in rural as well as urban areas of India for that implications of SDG and its awareness through education is essential.

As a result, if we are to meet the SDGs, we need a sustainable sanitation approach which enables treatment of wastewater while sustaining ecosystems. This involves harnessing state-of-the-art technologies, notably nature-based solutions (NBS).

NBS have long been used to treat wastewater, stretching back to the use of wetlands for wastewater disposal by ancient civilizations, for example in Egypt and China. NBS for wastewater treatment also include ponds and soil infiltration, as well as innovative approaches such as willow systems, living walls, constructed rooftop wetlands, aquaponics and hydroponics.

In more recent years, there has been growing recognition of the function and importance of NBS as an alternative or supplement to conventional wastewater treatment systems. For example, treatment wetlands and stabilization ponds are NBS often used in decentralised wastewater treatment systems.

Parker LORD is the leading company in East Asia, the Hon. Mr. Anup Deshmukh, working as Regional Director, India and South East Asia Parker LORD and Hon. Mr. Ninad Joshi,HR Manager Parker LORD these both are the alumni of TKIET Warananagar, is our

sister concern branch of the institution. Under the Corporate Social Responsibility (CSR) of Parker LORD, in which management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders. After installation for three year the servicing and its maintenance was jointly hired by Parker LORD company funded, installed in campus and handover the '**Nature Based Wastewater Treatment System'** shortly Nature **Based** WWTPs, on 14th Noveber 2022. Its cost is more about 45 lakhs, which purify the water about 150-200 KLD (Kilo liters per day) i.e nearly 1,50,000-2,00,000 liters per day. The Centre for Environmental Research & Education **(CERE)**, Mumbai and **National Solutions**, Mumbai.

Drain out waste water of whole campus was collected in big tank through the underground cement and PVC pipes and daily 2 lakh liters water purified up to drinking mark. The purified water is lifted in the campus well near hostel / ITI . This water is used for the cleaning, washing, laboratory use, watering the gardens and domestic purpose.

Advantages of 'nature-based' wastewater treatment plants:

1)This WWTPs differ from traditional sewage treatment plants (STPs) in that they do not rely on chemical treatment of wastewater, and do not use motors and pumps to transport the water within the plant.

2)These plants do not have a high operational cost, do not require a constant supply of electricity and do not require technically trained staff to manage daily operations.

3) Various microorganisms present in these root systems of these plants are responsible for "cleaning up" the wastewater, which passes through the root beds.

4) This called nature-based solutions because they use the natural topography of the region to channel wastewater from homes to treatment plants, where the water is filtered through biological systems, like root zones, or more sustainable material like gravel and coconut husks. The water may also be treated through biological enzymes. There is none of the chemical treatment that a traditional, electro-mechanical STP in urban areas would use. For the same reason, and because they rely on naturally available materials, they are much cheaper to build and operate.

5)Preventing pollution of drains, water bodies and groundwater

6)Treated water can be used locally for secondary, non-pot able purposes like agriculture and washing

7)Lower operational and maintenance cost

8) Do not technically trained staff to operate

9) Do not rely on electricity to work, making them ideal for rural clusters where power cuts are frequent.

10) Make use of naturally available materials, no chemical treatment of water involved

8.0.Fire and Safety Audit- The Fire and Safety audit was conducted in year 2021-22, for which college committee was formed. The audit team of college the details captured in the report are based on the sitel visit as well as the information collected from office and Support team members.

The objective of this exercise was to identify the current safety management system practices and find the gaps in daily work of college and to improve the current safety standards in premises. These included, but not limited to, checking conformance to applicable Environment, Health and Safety aspects in the college in line with applicable regulatory requirements, maintenance services, existing hazards, status of compliance and identification of potential risks and suggesting immediate control measures.

Positive areas:

- Material kept below staircase was cleared immediately
- Some par of terrace was seen clean
- At some place cable trays are made for electric wiring
- Instructions are displayed as required.
- At chemical lab. and stores are displayed.
- Maintenance of firefighting arrangement should be done regularly.
- Dependingon the hazards they available in every room.
- Safe access ladders are present.
- While working in chemical Lab. staff and students wear apron.
- Ventilation safety is majorly implemented
- First aid box is maintained at required places.

Areas of Improvement:

- Reduction in fire load is required to be done by removing non – required item
- Newer equipment such as vacuum cleaner may be used for cleaning
- Dangling wires, unclean panel room, open main switches, access behind main panel are the electrical problem. Allproblems needs improvement
- Maintenance of earthing, checking its resistance is neglected insure

periodically.

- combustible fire hazards are lying in every area of college, regular removal is a must.
- Wherever necessary refrigerator may be used for chemicalstorage.
- Safety during working at height is neglected everywhere, including certainarea of terrace.
- Use suitable bird repellant to stop these birds entering in college premises
- Total emergency plan needs to be prepared
- Safe access should be provided to every work place.
- All aspects of safe chemical storage in laboratory must be implemented.
- Gas cylinder safety – teach concerned person and implement.
- Safety in canteen is totally neglected.
- Safety of all instruments should be ensured.
- Avoid corrosion everywhere. It may create bad accident.

Safety management

- There should a separate safety department
- All concerned must be given safety training on various areas of safety suitable tocollege
- Immediately start accident / fire reporting system/ mechanism.
- Regular safety Inspection is required
- Safety in storage, handling, use and disposal of chemical must be ensured
- On site emergency plan should be prepared and mocks are drilled periodically.
- Safety in laboratory must be studied and implemented.

Environmental Management Plan:

Environmental Management Plan gives the strength, weaknesses and suggestions on the environmental issues of YCWM campus. It also suggests about which area is to be given priority. The green audit of college campus reveals that the administration should take care of glass waste, waste water, chemical waste and e-waste management on high priority as the ignorance to these will deteriorate the environment on the campus. The entire exercise of green audit concluded that the college administration is keen on all the environmental issues. College have lot to gain by following links to work towards making a green campus and more environmental friendly campus. Students, staff, faculty and administration working together will produce the best results raising awareness and helping to push the environmental friendly agenda in front of campus.

Mr. Vilas S. Patil
Coordinator
Green Audit Committee

Dr. S. S. Khot.
Coordinator IQAC

Dr. A. M. Shaikh.
Principal, Y.C.W.M. Warananagar

Forwarded with best compliment for certification.

Summary of Green Audit of Yashwantrao Chavan Warana Mahavidyalaya, Warananagar, Dist-Kolhapur (Maharashtra State) is verified Certified by

Dr. Prashant A. Banne, M.Sc. Ph.D. (Environmental Science)

- CEO & Managing Director, SAITECH Research & Development Organisation
- External Faculty, PCRA, Under petroleum Ministry, Govt. of India
- EIA Coordinator, was accredited by NABET, Quality Council of India

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar. (Maharashtra- State)

Chapter -I

Look out into the universe and contemplate the glory of God. Observe the stars, millions of them, twinkling in the night sky, all with a message of unity, part of the very nature of God.-**Sai Baba**

Introduction

1.1 Introduction:

Warananagar is a classic illustration of integrated rural development through co-operative movement. It is a well planned township throbbing with industrial and educational activities. It is a place named after the river Warana which originates at Prachitgad in Satara district and merges in the river Krishna at Haripur near Sangli. The length of the river Warana is 80 Km. The river Warana forms the boundary line between Sangli and Kolhapur districts. Warananagar is situated on the banks of river Warana at the foot of Panhala and Jyotiba hill ranges, at 10 Km. westwards from Kini-Wathar on National Highway No. 4. Warananagar, where Yashwantrao Chavan Warana Mahavidyalaya is situated, is a hilly and rural area, called Warana. It comprises of near about 60 townships, villages and some remote settlements. During the Freedom Movement this place provided shelter to many freedom fighters and today it is remarkably known as a successful industrial and educational center. Just six decades ago, this area was a barren tract of land, notorious for day-light robbery. Life was difficult and full of hardship. The main occupation of the people was agriculture and fortune of the farmers was tied to climatic changes, scarcity of rain and volatile market prices. People were downtrodden and ignorant. With the establishment of a co-operative sugar factory, this area has been totally transformed. The credit for this socio-economic transformation goes to late Hon'ble Vishwanath Anna alias Tatyasaheb Kore, a visionary man with foresight, rare organizational skills and dedication. Late Hon'ble Tatyasaheb Kore was fully aware of the fact that along with the material prosperity, the cultural development and enlightenment is equally important and necessitated the creation of educational facilities. He wanted to provide work to the empty hands and made them strong and self-reliant.

Warana co-operative sugar factory is established in 1960 and proved to be a turning point which brought about socio-economic and consequently educational changes in the life of the people of this area. The development of sugar factory changed the socio-economical standard and living standard of poor farmers in Warana valley. But economic enrichment was not his only goal. His mission was to bring in the total transformation of rural youth and create a New Man who will be well educated, self-reliant, culturally rich and morally upright. He knew that along with the material prosperity, cultural development and moral enlightenment are equally important. He realized that creation of educational facilities, particularly facility of higher education was the prior need of this area.

Before the establishment of the aforesaid educational facilities, the students of this area were deprived of higher education and only a few well-to-do could afford to go to Kolhapur, the nearest city, for pursuing higher education. Having realised this, the leadership decided to create these facilities for the youth of this area for their total transformation. This led to the establishment of Shree Warana Vibhag Shikshan Mandal (Education Society) and subsequently, Shree Warana Mahavidyalaya, Warananagar in 1964. The college was renamed as Yashwantrao Chavan Warana

Mahavidyalaya, in 1992. Since 1964. our education society is striving towards the fulfillment of the above mentioned objectives. Establishment of our college, the first step in higher education, was followed by setting up of Primary and Secondary Schools, Engineering College, English Medium School, Military Academy and other educational institutes. All these institutes have more than adequate infrastructural facilities like imposing buildings, beautiful premises, spacious playgrounds. well qualified staff, rich libraries and laboratories. Each institute has proved to be a step ahead towards the achievement of our mission of 'Creating A New Man'.

1.1.1 Mission:-

"We stand united and determined for the total transformation of rural youth of Warana region towards self reliance, confidence and enlightment through higher education".

1.1.2Vision:-

"To become an Academy of excellence in higher education and human resource development in rural area".

1.1.3 Aims and Objectives of our Education Society

1. To create facilities of all sort of education by establishing, conducting and / or managing educational institutions of various types for imparting education such as literary, scientific, cultural, moral, physical, technical, vocational and professional. as the case may be.
2. To strive for an all-sided educational development and progress by instituting, scholarships, educational loans, prizes, free studentships and providing hostels or in any other convenient manner.
3. To facilitate education by conducting educational institutions at different places in accordance with the exigencies or circumstances and also to affiliate, to amalgamate or to take over or to co-operate with such other institutions which have similar aims and objectives, more particularly in the area of Warana region, in the Kolhapur and the Sangli Districts.
4. To start libraries, to organise courses of studies or lectures, to publish books, pamphlets, brochures, to issue, to print and publish other periodicals, daily bulletins, magazines, hand written, printed or cyclostyled papers, intended to advance social and cultural studies in all their branches.
5. To undertake such other activities as are conducive to and for the attainment of the above objectives.

1.1.4 Motto and Emblem of our College :- Our college was established in June 1964 with 128 students and 12 lecturers. Right from the beginning, it has Arts, Commerce and Science faculties. The motto of our college is taken from a well-known poem by Mr. V. V. Shirwadkar alias Kusumagraj, a great poet of Marathi.

With the above motto in mind, our college is striving for making the students attain perfection, become prosperous and lead a contented and successful life. The emblem of our college reflects the dreams seen by Late Hon'ble Tatyasaheb Kore for the development of Warana region. At the background of the emblem is Warana Sugar Factory, the nucleus of this industrial and educational complex. The symbols represent humanities, commerce, science, culture, defence, agricultural and industrial development through co-operation.

1.1.5 Goals and Objectives of our College:

1. To provide opportunities of higher education to the students of this rural area, coming from modest family background and to make them competent enough to face the challenges of the modern world.
2. To promote women's education by providing them hostel and boarding facilities at concessional rates.
3. To encourage the students to pursue higher education by providing them financial assistance in the form of free-ship.
4. To encourage the meritorious students by giving them scholarships and prizes for academic achievements.
5. To promote in-door and outdoor sports through creation of a spacious ground, an in-door stadium and necessary equipment's.
6. To give opportunities to the students to expose their latent talents and promote their socio-cultural growth.
7. To provide the facility of post-graduation for the students of Warana region.

Philosophy of the Founder Late Hon'ble Tatyasaheb Kore, the founder of this complex wanted to bring about a total transformation of the rural youth and create a 'New Man', who is well educated self-reliant, economically sound, culturally rich and morally upright.

Linkages between Goals and Activities The college undertakes a number of curricular, co-curricular and extra-curricular activities to achieve the above mentioned goals. For this purpose it runs its academic courses in all three faculties viz. Arts, Commerce and Science. The college has highly qualified faculty members, well maintained class rooms, well equipped laboratories and a rich library.

Our College was established in June 1964 (128 students and 12 lecturers) right from the beginning, has Arts, Commerce and Science faculties. Today campus is covering an area of 27 acres and college has15departments, 11 COC courses, 03 Post-graduate course and about 5000 students and 157 staff members. Also college imparts education in Arts, Science and Commerce faculties.

Since last 4-5 years, several attempts are being made to overcome the image of the college as a regional academic college. Several steps have been taken to raise the standards of teaching, learning, evaluation and research so as to measure up to global standards. Recently the expert team of Shivaji University, Kolhapur visited our college after evaluating all panel declared "Award of academic excellence". The faculties of Arts and Commerce are also gearing up to meet the demands of changing time. Establishment of COC courses ,add- on courses and extension activities etc are indicators of this change.

1.2 Green audit outline: Yashwantrao Chavan Warana Mahavidyalaya, Warananagar is playing a key role in the development of human resources and producing awareness about the environment consciousness, for which institute take number of steps by organizing different events of green practices. This institutes campus runs various activities with the aim to percolate the knowledge along with practical dimension among the society as well as the stakeholders. Our institute also try to give solution for different burning issues related to environment , its awareness as well as its protection. Different types of evolutionary methods are used to assess the problem concerning environment includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Survey, Collection of data, Interviews, Observations, Green audit etc.

As educational institutions nowadays are becoming more sensitive to environmental factors more concepts are being introduced to make them eco friendly. To preserve the environment within the campus, various viewpoints are applied by the our institute to solve their environmental problems such as promotion of the energy savings, energy conservation, water reduction, water harvesting , water environment, Solid waste management, air quality, noise pollution, minimizing use of Plastic, etc. Our institution plays an active role in creating

and modeling solution for such environmental problems. ‘Green audit’ is one of such concepts or principles introduced to make the educational institute environmentally sustainable.

"Green audit is a tool to assess general practices implemented by organization in term of its impact on environment". Green audit also throws a light on adverse practices which are responsible for degradation of environment. It shows strength and weakness of organization towards conservation of environment. It is helpful to recognize the need to function around the year in a manner to minimize its harmful environmental impact through ‘ Green Policy’. It means Green Audit is the base line survey to decide the Green policy. It also pinpoints the disturbing practices of natural resources utilization. It shows the path to build, implement and test new innovative system for better utilization of resource and minimization of waste generation. It helps to achieve the goal of university to become a role model in higher education of sustainable campus in social, economical and environmental views.

1.3 Need of Green audit: Green auditing is the process of identifying and determining whether institution practices are eco-friendly and sustainable. Traditionally we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals have become habitual for everyone especially in common areas. Now, it is necessary to check whether our processes are consuming more than required resource, Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resources utilization. In the era of climate change and resource depletion it is necessary to verify processes and convert them in to green and clean one. Green audit provides an approach for it and increases overall consciousness among the people working in institution towards environment.

1.4 Goals of Green audit:

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar has conducted a first green audit in the year 2014-15 in which the base line serve and data was collected and institution management plan , Green Policy wad formed. In year 2021-22 we started second phase of Green audit with specific goals as follows:

1. To conduct a baseline survey to know the reality status of green practices in institution.
2. To identify strength and weakness in green practices conducted in organization.
3. Identification and documentation of green practices followed by the institution according to our Green policy.
4. To analyze and suggest solution for problems identified from Audit Report.
5. To assess reality status of different types of waste management inside the institution and suggest the remedy.

6. To increase environmental consciousness throughout the campus among all the stakeholders.

7. To identify and assess if some environmental risks inside the institution.

8.To motivate staff as well as students for optimized sustainable use of available natural resources.

9. The long term goal of the environmental Green audit program is to collect baseline data of environmental status and implement Green Policy to resolve environmental issue before they become a problem.

10. To discuss some ways to strengthen the green policy and Green practices inside the institution.

11.To give the direction to work on some local environmental issues.

1.5 Objectives of Green audit:

1.To know the reality and status of green Policy and green practices in the institution.

2. To identify and analyze significant environmental issues in duration of 2015 to 2022 in campus.

3. To examine the current practices which can have impact on the environment such as of resource utilization, waste management , energy conservations, etc.

4. Formation of best green policy comprising the goal, vision and mission for Green campus.

5. Continues assessment for betterment in performance in green practices and its evaluation.

6. To prepare Green Audit Report and listing the green practices followed by different. departments, support services and administration office.

7. Prepare proposed best Green policy/ Management Plan/ Green Practices Plan from Academic year 2022-23..

Chapter-II

‘The best friend of earth of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on the earth.’ - **Frank Lloyd Wright**

METHODOLOGY

2.0.METHODOLOGY :- This is the baseline survey made in 2014-15 of our college which is totally based on proposed strategy on the Greening concept approved by the IIT Council on Greening Educational Institutions in the meeting held on 2 nd March 2013 at Indian Institute of Science, where representatives from six IITs along with IISc participated. This is the second attempt to conduct Green Audit of Yashwantrao Chavan Warana Mahavidyalaya,Warananagar, campus; hence, there is baseline data for the present work which was collected in first attempt of Green auditing in academic year 2014-15. The present study is based on onsite visits, personal observations and questionnaires and survey tools. Initially, based on data requirement, sets of questionnaires about Electricity consumption, Water consumption, fuel waste, solid waste collection, chemical waste, E-waste, Air pollution, Noise pollution etc were prepared. The Green Audit committee members then visited to all the departments in Science, Arts, Commerce, Computer lab., Administrative office, Gymkhana, Exteriors, Common Facility Centers (Eight parts for simplify the study) of the college and the members helped for filling the questionnaires. Such filled questionnaires are collected from each department for each month in the Year 2021-22. The generated data is subsequently gathered together, tabularized and used for the further analysis. From the outcome of the overall study, a final report is prepared. At first, all the secondary data required for the study was collected from various sources, like concerned departments, garden etc. At the beginning two seminars were arranged for the staff to clear the idea of green auditing and guide lines were provided to fill the questionnaires. Different case studies and methodologies were studied and the following methodology was adopted for present work.

2.1 Survey by Questionnaire: Data for green audit report preparation was collected by questionnaire survey method. Questionnaires prepared to conduct the green audit in the YWCM campus is based on the guidelines, rules, acts and formats prepared by Ministry of Environment and Forest, New Delhi, Central Pollution Control Board and other statutory organizations and guidelines from proposed strategy on the Greening concept approved by the IIT. Most of the guidelines and formats based on broad aspects and some of the issues or formats were not applicable for YCWM campus. Therefore, using these guidelines and formats, combinations, modifications and

restructuring was done and sets of questionnaires were prepared as solid waste, energy, fuel, water, hazardous waste, and e-waste, etc. With the help of questionnaires some data related to Green Audit is collected from students, employers. and data related from management is collected from interaction with them.

All the questionnaires comprises of group of modules. The first module is related to the general information of the concerned department, which broadly includes name of the department, month and year, total number of students and employees, visitors of the department, average working days and office timings etc. The next module is related to the present consumption of resources like water, energy, fuel or the handling of solid waste and hazardous waste. Maintaining records of the handling of solid and hazardous waste is much important in green audit. There are possibilities of loss of resources like water, energy due to improper maintains and the assessment of this kind of probability is necessary in green audit. At some locations in some departments loss of water and major energy consumption was observed due to lack of observation and improper handling of technical equipment's. One separate module is based on the-questions related to this aspect. Another module is related to maintaining records like, records of disposal of solid waste and records of solid waste recovery etc. For the better convenience the coordinator, green audit committee members arranged number of meetings with the HODs, professors and laboratory assistants of all the departments and officers in charge in CFC. In these meetings idea of the environment audit, green audit, indicators of green audit, greening practices, environmental issues in campus are discussed for concept clearance. Some statistics like, basic energy consumption characteristics for electrical equipment, Wattages of different common equipments in colleges etc. was provided with the questionnaires itself. Coordinator and co-coordinator of Green Audit committee guided to fill the questionnaire in month of Jan. 2022. The filled questionnaires from each department are collected at the end of each month in span of Jan. 2022 to Dec. 2022.

2.2 Site visits and observations : YCWM campus is of 27 acres and has vast built up area comprising of various departments, administrative building, teachers and staff quarters, student hostels, girls hostel, medical facility center, Gardens, Library, sports complex etc. All these

amenities have different kinds of infrastructure as per their requirement. All these buildings and parts of campus were visited by the Green Audit committee members to check the present condition. They are checked with the help of the filled questionnaires of departments and verified on site. Personal observations were made during the onsite visit. The census pertaining plants and trees in campus was carried out by Junior, Senior wing faculty , students of B.Sc.-II and III of Botany and Zoology department after their regular college timing in span of 2th November 2022 to 16th November 2022. (Exhibit –A Tree Counting: Survey of trees, plants etc in campus-). All the amenities were clubbed in as per their similarities and differences, which makes the survey and further analysis easier. For convenience all the science departments (Sr. and Jr.) were clubbed in one group, all Arts departments (Sr. and Jr.) were clubbed in one group, whole commerce department (Sr. and Jr.) as one group, administrative departments/ office / common staff room and related common things were clubbed in one group, computer lab. as one group, the Botanical garden, garden in front of new building, in front of library, in back of college buildings and roads in campus were clubbed as one group as Exteriors, Gymkhana , Gymnasium hall, Shivneri Kridangan were clubbed in one group, in another common facility centers services including Canteen, mess, Library, MPSC center, Boys/ girls hostel, teacher's quarters , medical facility center were grouped together. In such way YCWM campus is divided into eight parts for convenience of study of green Audit.

2.3 Onsite/Offsite Monitoring :-After collection of information from various department, committee members visited periodically and verified the data. The data related to energy survey, lighting survey, vehicle survey, solid waste generation, E- solid waste generation, water waste etc is verified personally by committee. Committee is periodically monitoring water storage, water requirements, water losses and water leakages in campus. Dr. Prashant Banne and his team periodically monitored and recorded the information regarding the air quality, noise pollution at Onsite/Offsite the campus.

2.4. Data analysis and report preparation: A proper analysis and presentation of data produced from work is a vital element. In case of green audit, the filled questionnaires of the survey from each group, were tabulated as per their modules, in excels spreadsheets. The tabulated data is then used for

further analysis. For better understanding of the results and to avoid complications, averages and percentages of the Tables were calculated. Graphical representation of these results was made to give a quick idea of the status. Interpretation of the overall outcomes was made which incorporates all the primary and secondary data, references and interrelations within. Final report preparation was done using this interpretation.

Chapter- III

‘What we are doing to the forests of the world is but a mirror reflection of what we are doing to ourselves and to one another.’

- Mahatma Ghandi

"Only when I saw the Earth from space, in all its ineffable beauty and fragility, did I realize that humankind's most urgent task is to cherish and preserve it for future generations."

- Barack Obama

If we go on using the Earth uncaringly and without replenishing it, then we are just greedy consumers.

- Satish Kumar

Overview of Green Audit

3.0 Overview of Green Audit-

3.1 Solid waste audit:

The population is increasing day by day therefore, there is an increasing demand for natural resources and other things necessary for fulfilling our day to day material needs. We are dependent on things right from small metal pin/ pen to chemicals, plastic and big house with full of glass material. Today`s era is of use and throw era.

In this 21st century we have become technocracy, as every person is using laptops, Personal computer, Mobile, tabs, printer etc and when they become useless they are thrown out as a waste. Waste management is one of the burning problems not only in India but also in the world. Hence it is necessary to use the things properly and manage them cautiously. The main purpose behind this audit is to analyze the quantity and volume of solid, liquid waste and their proper management. Similarly ,to make aware about their hazardous effects and to create awareness amongst the students, teachers about minimum use, reuse and recycle of the waste. Solid waste generation and its management is a burning issue in current days. The rate of generation of solid waste is very high and yet we do not have adequate technology to manage the generated waste.

Unscientific handling of solid waste can create threats to public health and environmental safety issues. Thus, it is necessary to manage the solid waste properly to reduce the load on waste management system. The purpose of this audit is to find out the quantity, volume, type and current management practice of solid waste generation in the YCM campus. This report will help for further solid waste management and to go for green campus development.

3.1.1 Generation of Solid Waste in Various Departments in college:

3.1.1.1 Status of solid waste generation in college: To analyze the total solid waste in various units and departments in college , it is categorized into eight groups viz. Science Departments, Arts Department, Commerce Department, Computer IT Department, Office , Gymkhana , Exteriors and Common Facility centers. Further at each department solid waste is measured in category like Paper, Plastic, Biodegradable, Glass waste and other. The solid waste collection in different department of college is shown below:

Table no. 1.1: Category wise solid waste generation at college (Kg/Month)

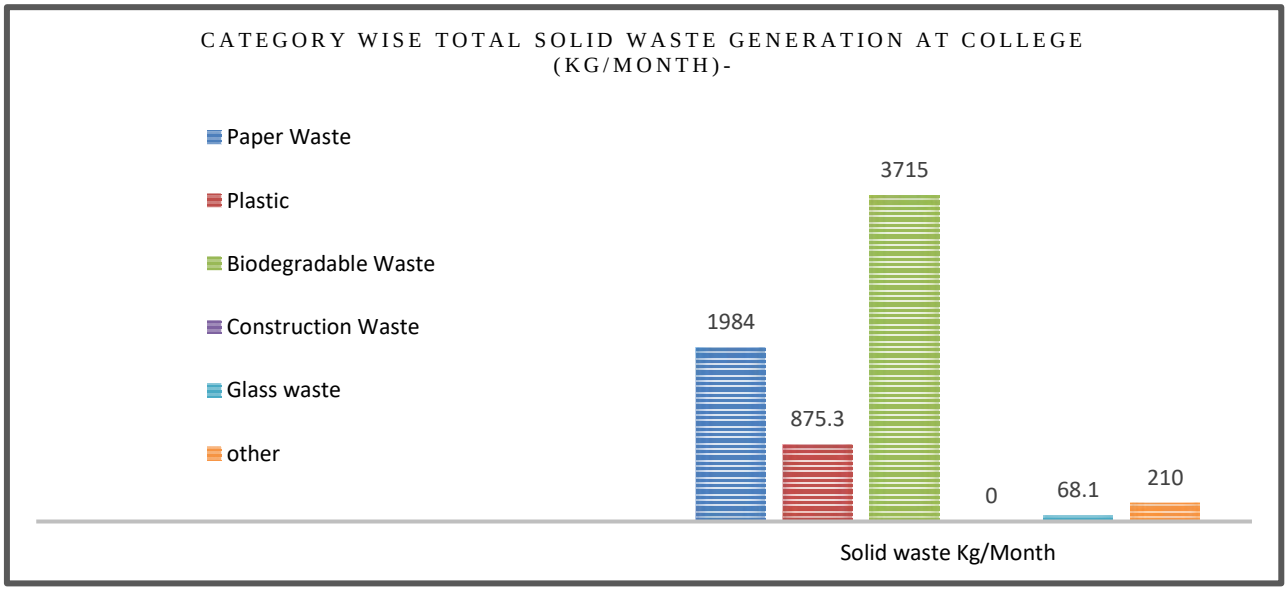
Sr. no	Departments	Category of Waste								Total solid waste	Description
		Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other		
			Hard	Soft	Carry bags						
1.	Science	134	10	12.	2.1	60.5	0	20.3	0	238.9	
2.	Arts	314	16	12	7.5	123.0	0.0	5.8	210	688.3	High
3.	commerce	6	0	0	0	0	0	0	0	6	Low
4.	I.T	20.00	20.0	0.0	0.0	20.0	0.0	0.0	0.0	60.0	
5.	Office	280.00	54.0	30.0	24.0	250.0	0.0	0.0	0.0	638	
6.	Gymkhana	20	5.0	5.0	5.0	150.0	0.0	0.0	0.0	185.0	
7.	Exterior	110	0.0	3.0	3.0	8.5	0.0	0.0	0.0	124.5	
8.	CFC	1100	425	164	77.7	3103	0.0	42	0.0	4911.7	Very high
Total solid		1984	530	226	119.3	3715	0.0	68.1	210	6852.4	
			875.3			3715	0.0	68.1	210	6852.4	

Data in Table No. 1.1 shows Category wise solid waste generation at different department in college. Very high amount of total solid waste i.e.≈ 6852.4 Kg/Month is collected in college, while maximum solid waste (4911.7 Kg/month) at CFC and minimum at Solid Waste (60 Kg/month) at IT. In assessment period Paper waste and Biodegradable is maximum i.e. 1984 Kg/month and 3715 Kg/Month respectively.

Table no. 1.2: Category wise solid waste generation at college (Kg/Month)-

Category	Paper Waste	Plastic	Biodegradable Waste	Construction Waste	Glass waste	other
Solid waste Kg/Month	1984	875.3	3715	0.0	68.1	210

Graph 1.1: Category wise Total solid waste generation at college (Kg/Month)-

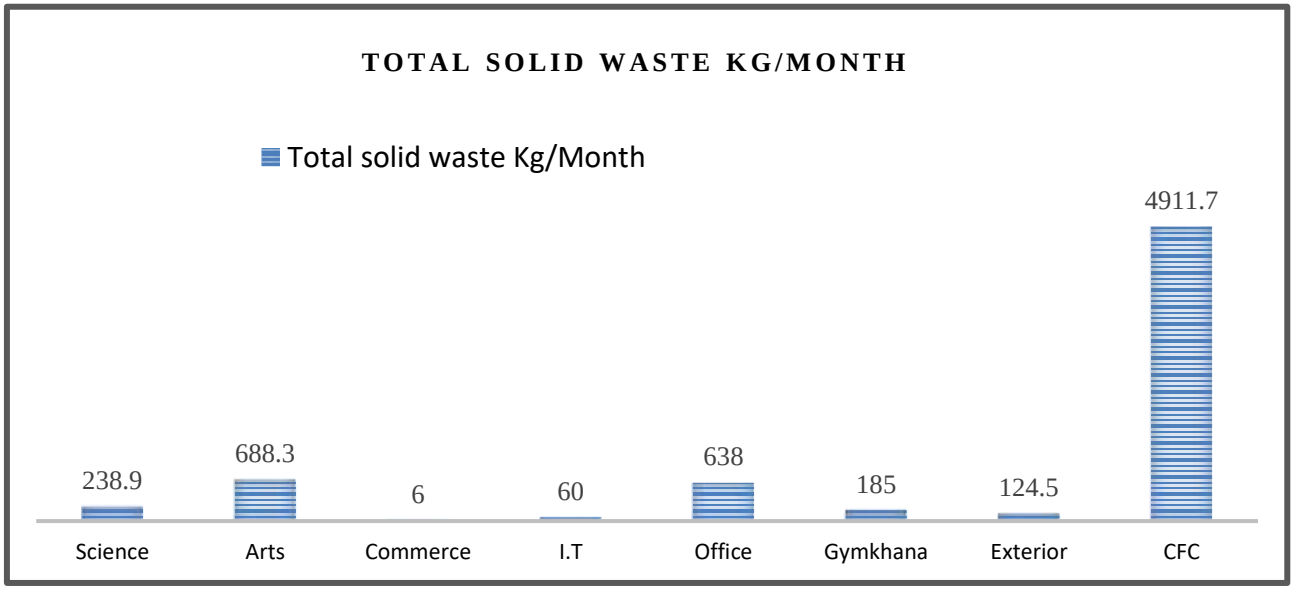


Above Table No. 1.2 and Graph 1.1 shows Category wise total solid waste generation at college in (Kg/Month). Data plotted shows that maximum Biodegradable waste (3715 Kg/Month) and Paper waste (1984 Kg/Month) is generated while very less constructional waste and glass waste generate in college.

Table no. 1.3: Category wise Total solid waste generation at different department in college (Kg/Month)-

Sr.no	Department	Total solid waste Kg/Month	Percentage with Total
1.	Science	238.9	3.48%
2.	Arts	688.3	10.4%
3.	Commerce	6	0.087%
4.	I.T	60.0	0.87%
5.	Office	638	9.31 %
6.	Gymkhana	185.0	2.7 %
7.	Exterior	124.5	1.82 %
8.	CFC	4911.7	71.37 %
Total Solid Waste		6852.4	100

Graph 1.2: Category wise Total solid waste generation at different department in college (Kg/Month)

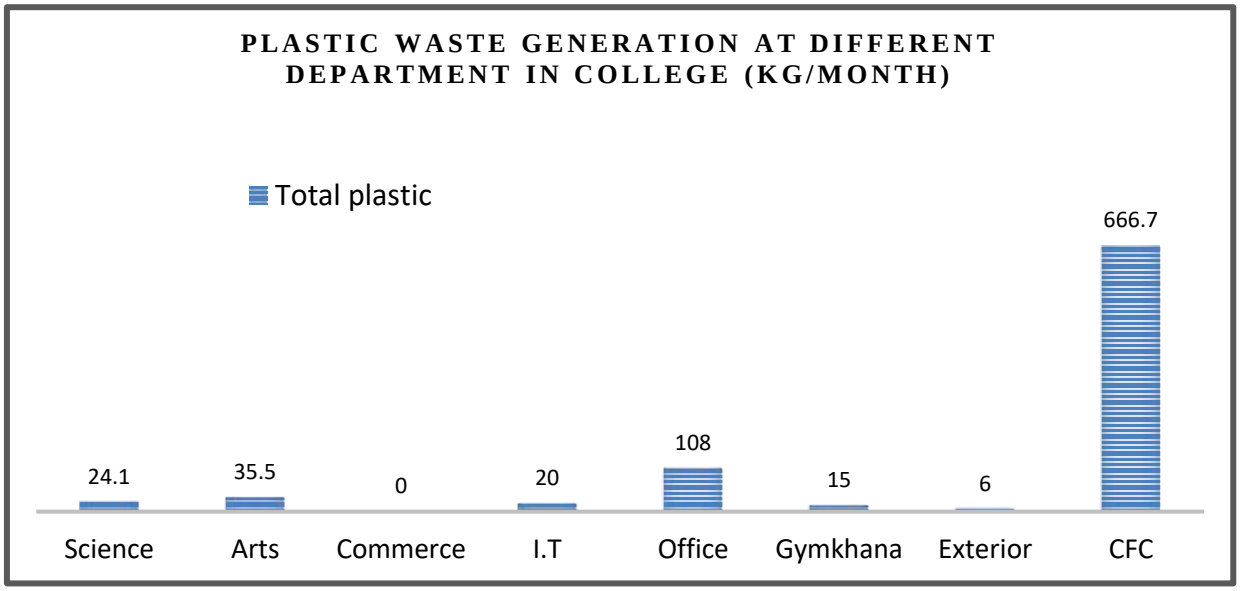


Above Table No. 1.3 and Graph 1.2 shows Category wise total solid waste generation at different department in college in (Kg/Month). Data collected shows that maximum total solid waste about 4911.7 Kg/Month is generated at CFC and minimum of only 6 Kg/month total solid waste generated in commerce department.

Table no. 1.4: Category wise Plastic waste generation at different department in college (Kg/Month)

Sr.no	Department	Hard Plastic	Soft Plastic	Carry bags Plastic	Total plastic
1.	Science	10	12.	2.1	24.1
2.	Arts	16	12	7.5	35.5
3.	Commerce	0	0	0	0
4.	I.T	20.0	0.0	0.0	20
5.	Office	54.0	30.0	24.0	108
6.	Gymkhana	5.0	5.0	5.0	15
7.	Exterior	0.0	3.0	3.0	6
8.	CFC	425	164	77.7	666.7
		530	226	119.3	875.3
		60.55%	25.81%	13.64%	100%

Graph 1.3: Category wise Plastic waste generation at different department in college (Kg/Month)



Above table no. 1.4 and Graph no.1.3 shows Category wise Plastic waste generation at different department in college (Kg/Month). It shows that maximum plastic collected 666.7kg/month is generated in CFC while comparatively zero Plastic waste generated in commerce department.

Table no. 1.5: Categorization of plastic waste in college (Kg/Month)

Category	Hard Plastic	Soft Plastic	Carry bags Plastic	Total plastic
Total plastic in Kg/ Month	530	226	119.3	875.3
% with total	60.55%	25.81%	13.64%	100%

Graph 1.4: Categorization of plastic waste in college (Kg/Month)

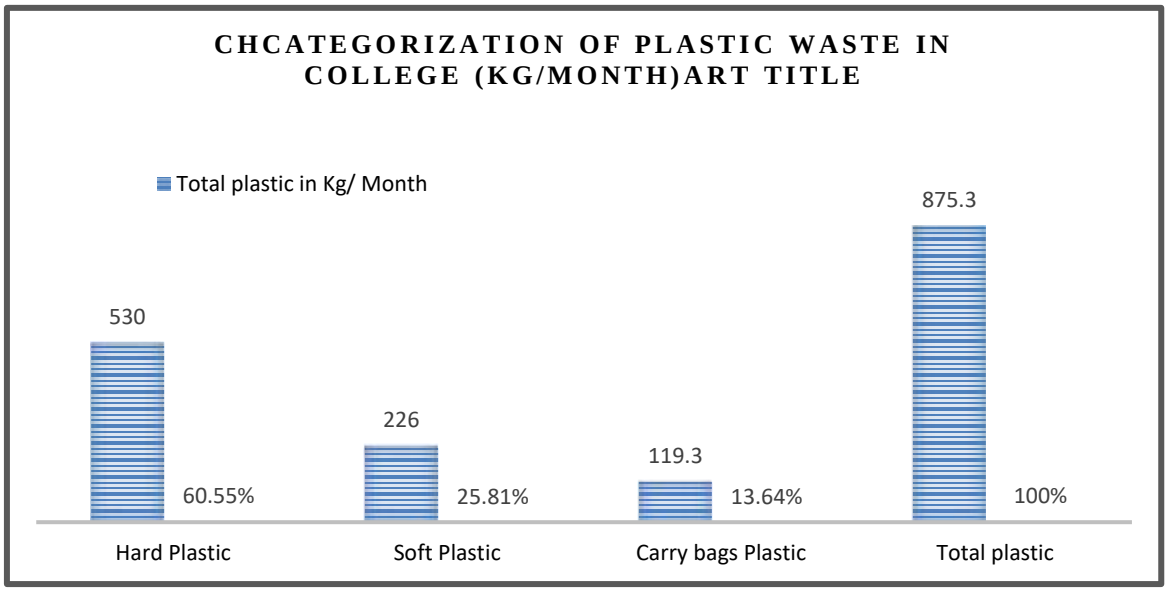


Table no. 1.5 and graph 1.4 shows that out of plastic waste 60.55% is hard plastic,25.81 % is soft plastic and 13.64% is carry bags. Total plastic waste generated in college is 875.3 Kg/month.

3.1.2 Current practice of solid waste management:

Biodegradable waste generated in campus mostly from canteen, hostels, mess, and quarter kitchens, Canteen waste is not properly collected. It is thrown on site. Biodegradable waste from gardens, lawns and classroom waste is burned at different location on site like back of the office, near canteen, near boys hostel, on side of roads, near botanical garden etc. Glass waste is generated from laboratory mainly in the form of bottles, glassware's is not send for recycle, it is thrown on site of campus and other glass waste are thrown with solid waste.

Paper waste is a major solid waste generated by all departments. Most of the departments including Administrative building are using one side papers for printing and writing. But in some departments like Physics , Chemistry, Botany, Zoology, store , examination section use two sided paper / used papers in journal for printing. Old journal files are used for filing the official records, it reduces expense on stationary as well as solid waste generation.. Answer sheets, old bills and confidential reports are sent for pulping and recycling after completion of their preservation period through private scrape merchant. Periodically college sell the paper waste scrape to private merchant.

Plastic waste is the category of solid waste generated in large quantity in the campus and it is not segregated or categorized it is throw with paper waste, other solid waste and burned on site at different locations. Most of the departments are throwing the plastic waste along with regular waste. Plastic waste generated in college / college campus send for proper destroying/ recycling.

3.1. Electricity and Energy audit:

Main energy source in the campus is electricity of MSEB. As 'Warana' is industrial and educational complex, MSEB department supplied 1mega Volt uninterrupted power supply . Warana Shikshan Mandal provides electricity to our college, When rarely interrupted we get electricity from diesel generator (≈5 KV) which is common facility of Warana Shikshan Mandal . Energy sources utilized by all the departments of college include electricity, liquid petroleum and LPG. Major use of the energy is at office, canteen, hostel and laboratories for lighting, transportation, cooking and laboratory work. There is provision of generating electricity on site of campus.

449.28 KW solar power pack plant-

Our management installed 449.28 KW solar power pack plant on roof of science building which comprising 1452 nos. of solar panels of 320W inverter and associated all equipment's. Out of 1452 solar panels of power pack project 774 placed on Main building which generate 239.94 KW energy , 194 placed on new building generate 60.14 KW energy and 484 placed on YC science building which generate 150.04 KW energy. The material and associated equipment's installation cost of above project is 2,69,77,500/- (Rs.) and came in force on 21st February 2019, from that day the Maharashtra State Electricity Distribution Co. Ltd (MAHAVITRAN) and Warana Shikhan Mandal work according to MOU between them. It contains the units of electricity consumption, electricity generation, import units and units in the bank/ storage. The detailed study of Solar power pack plant in duration of March 2019 to May- 2022 of 39 month in which total electricity consumption in campus 1950818 units, electricity generated by Solar power pack plant is 1627189, electricity imported from MAHAVITRAN is 537059 units and power bank in account of Warana Shikshan Mandal is 213430 units. In the duration of 39 months actual electricity units are payable are 323629 units out of it the of YCWM college is nearly around the 32563 units. The use of the electricity was is minimized than first phase of energy audit.

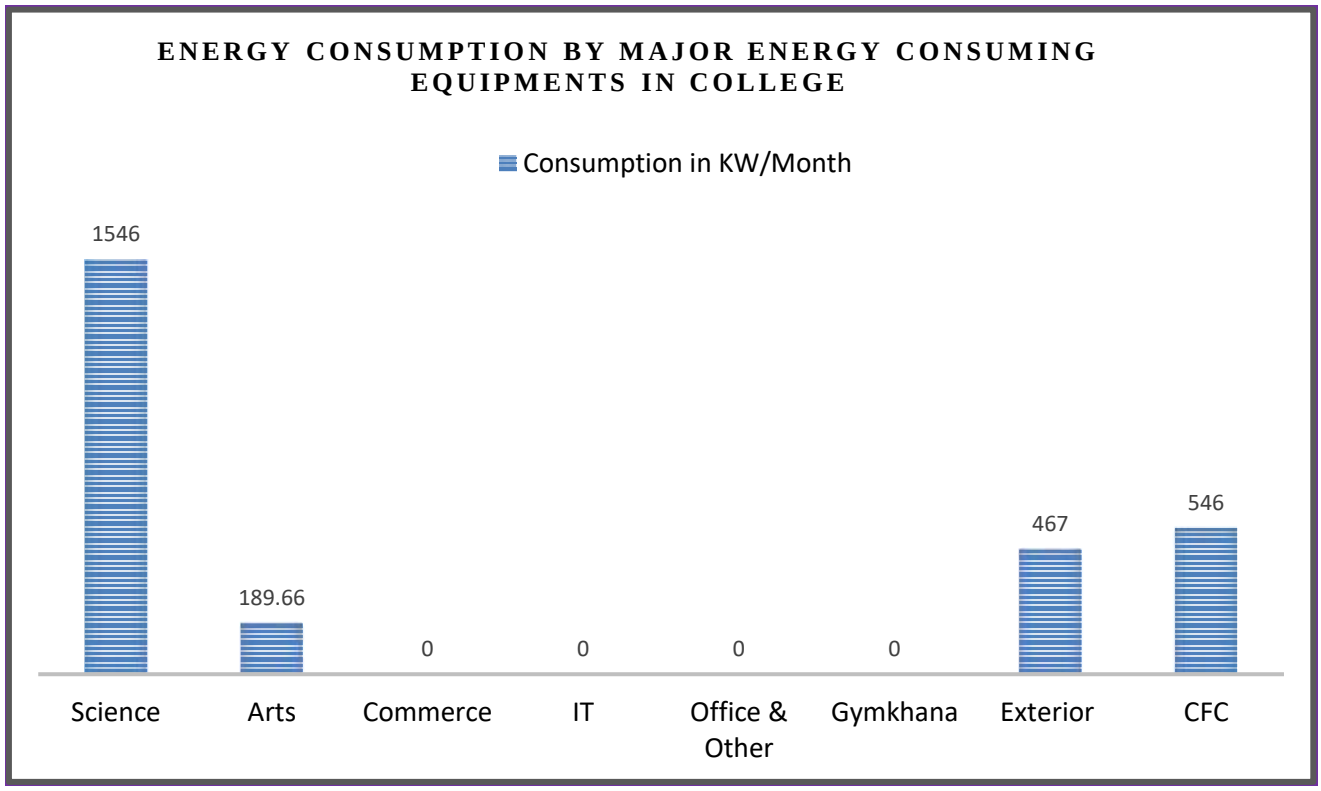
To analyze the total energy consumption, various units and departments in the college are categorized into eight groups viz. Science Departments, Commerce Department, Arts Department, Computer IT Department, Office , Gymkhana , Exteriors and common Facility centers. Further at each category, energy consumption is calculated on energy usage like office equipment's (Computers, Printers, Laptop, LCD projector), Lights, fan and vehicles for evaluating fuel consumption. For sort of analysis electric energy consuming equipment's are categories in to three groups Major energy consuming Equipment's, less energy consuming Equipment's , Lightning equipment's and collected data analyzed together for total energy consumption.

3.2.1 Energy consumption at college

Table No. 2.1 Energy consumption by Major energy consuming Equipment's in College.

Sr.No.	Department	Consumption in KW/Month	Description
1)	Science	1546	High
2)	Arts	189.66	
3)	Commerce	00	Low
4)	IT	00	Low
5)	Office & Other	00	Low
6)	Gymkhana	00	Low
7)	Exterior	467	
8)	CFC	546	
Total		2748.66	

Graph No.2.1 Energy consumption by Major energy consuming Equipments in College.

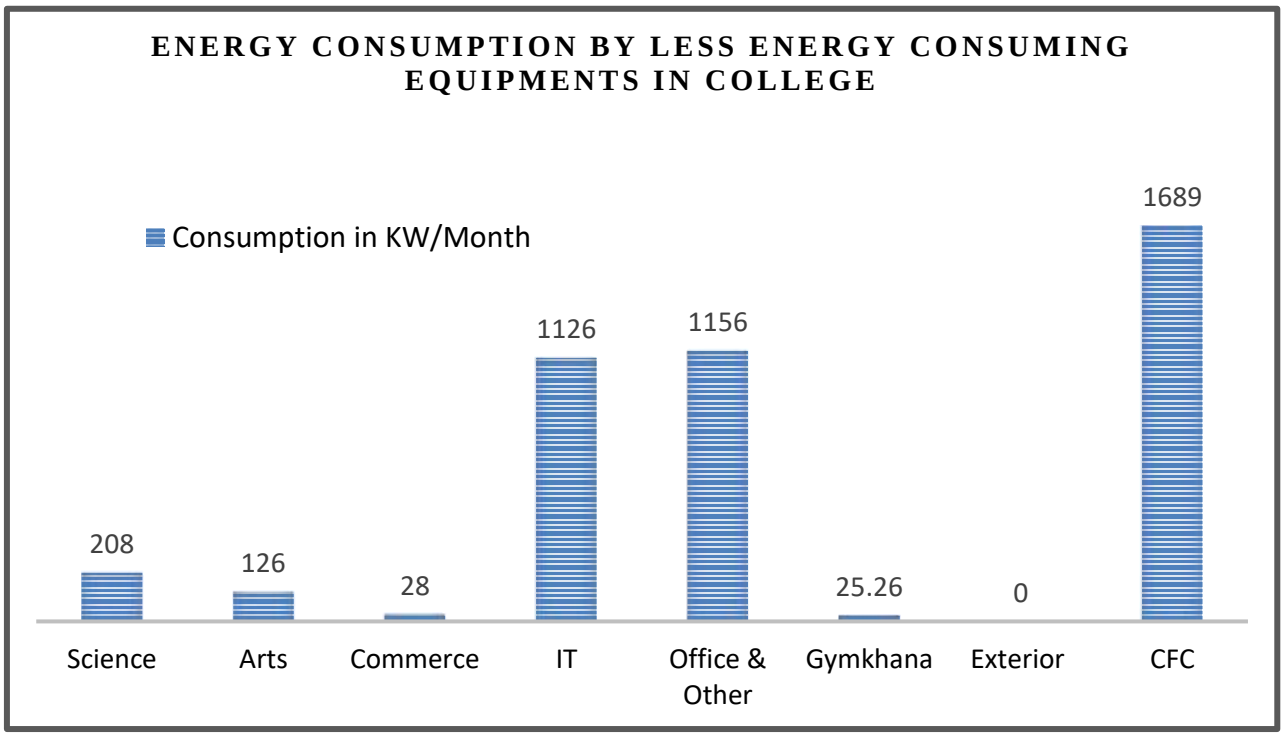


Above table and graph shows major energy consuming Equipment's are available at science departments hence energy consumption for it is high (1546 KW/Month) and less number of Major energy consuming Equipment's are required at Arts, commerce, IT, office and gymkhana, hence electric energy for these department is low.

Table No. 2.2 Energy consumption by less energy consuming Equipment's in College

Sr. No.	Department	Consumption in KW/Month	Description
1)	Science	208	
2)	Arts	126	
3)	Commerce	28	
4)	IT	1126	
5)	Office & Other	1156	
6)	Gymkhana	25.26	
7)	Exterior	00	Low
8)	CFC	1689	High
Total		4358.26	

Graph No.2.2 Energy consumption by less energy consuming Equipments in College.

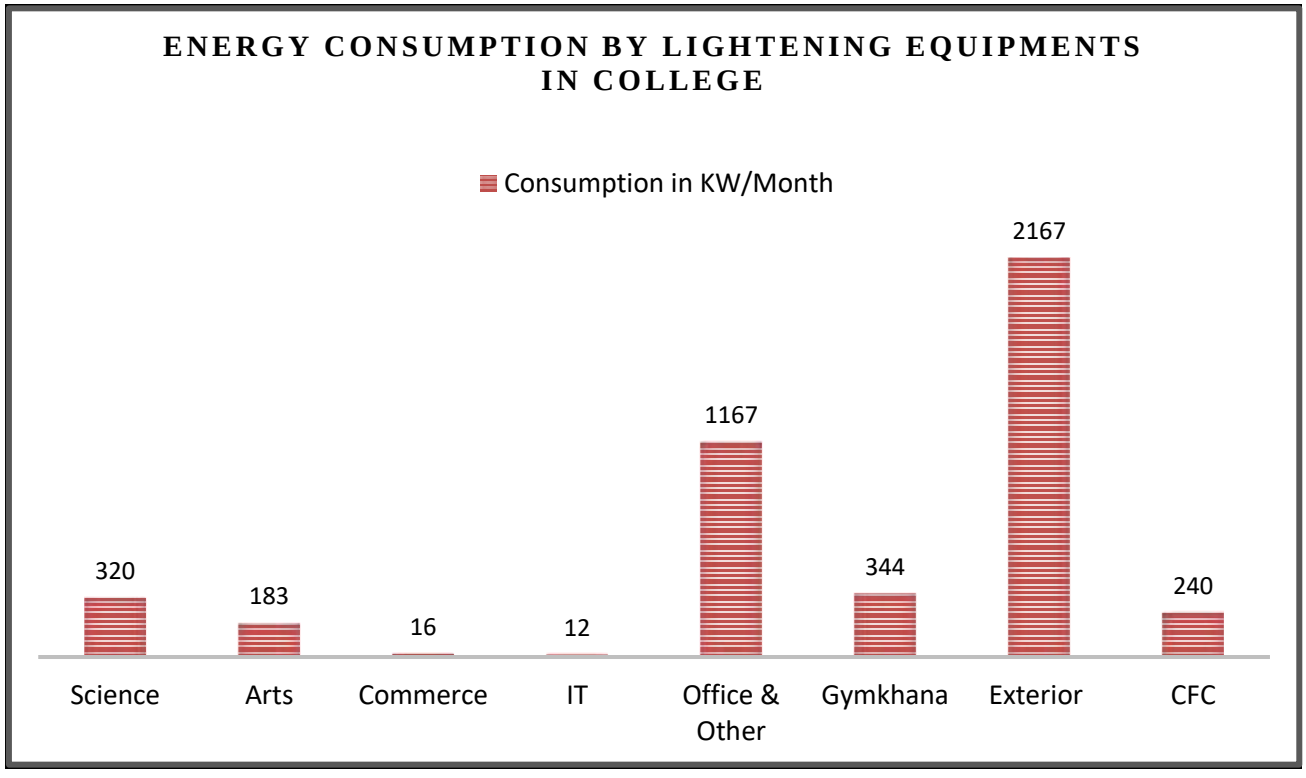


Above table and graph shows less energy consuming equipment's consuming high energy at IT, Office and CFC (1689 KW/Month)while such equipment's consuming very less electric energy at Gymkhana, Commerce, IT and exterior of college.

Table No. 2.3 Energy consumption by Lightning Equipment's in College

Sr.No.	Department	Consumption in KW/Month	Description
1)	Science	320	
2)	Arts	183	
3)	Commerce	16	Low
4)	IT	12	
5)	Office & Other	1167	High
6)	Gymkhana	344	
7)	Exterior	2167	
8)	CFC	240	
Total		4449	

Graph No.2.3 Energy consumption by Lightening Equipments in College.

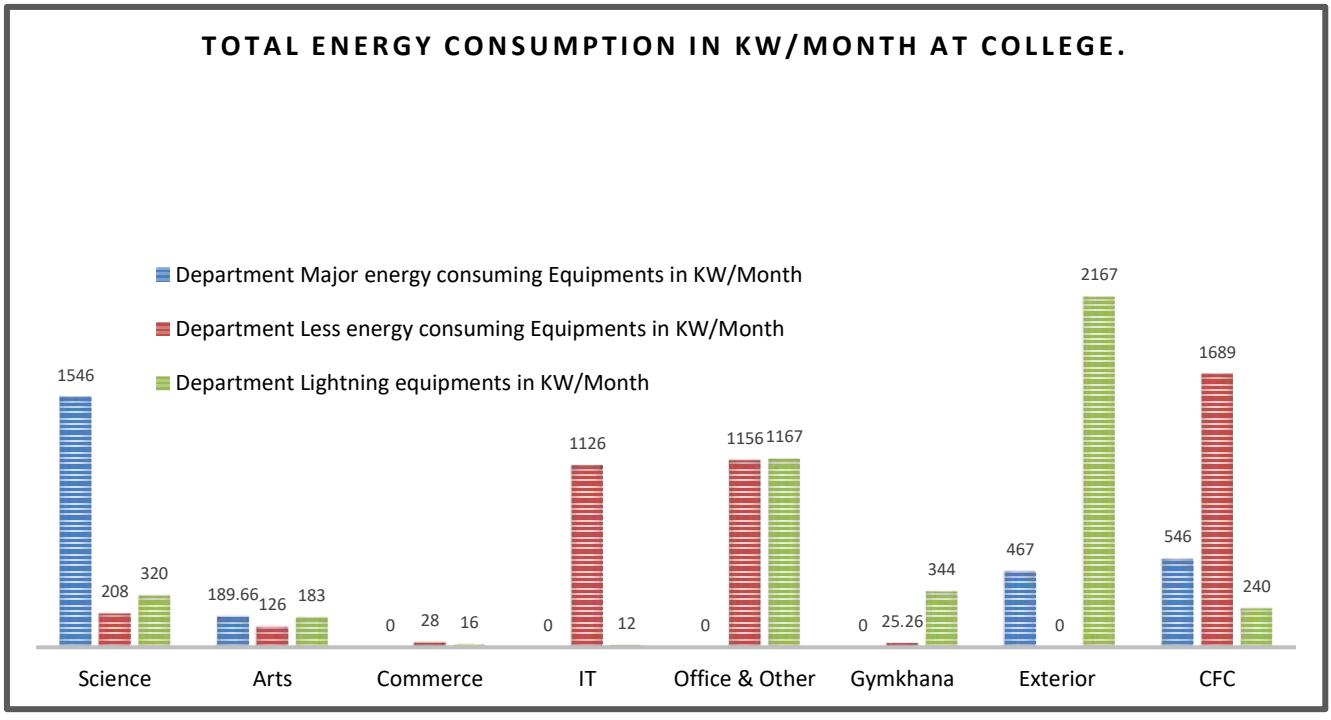


Energy consumption by Lightning equipment's in different departments of College is shown above. High energy consumption for lightning purpose is shown at Exteriors of college while very small consumption of it is shown at I.T and Commerce department.

Table No. 2.4 Total energy consumption in KW/Month at college

Sr.No.	Department	Total energy consumption by			Total	Description
		Major energy consuming Equipments in KW/Month	Less energy consuming Equipments in KW/Month	Lightning equipments in KW/Month		
1)	Science	1546	208	320	2074	High
2)	Arts	189.66	126	183	498.66	
3)	Commerce	00	28	16	44	Low
4)	IT	00	1126	12	1138	
5)	Office & Other	00	1156	1167	2323	
6)	Gymkhana	00	25.26	344	369.26	
7)	Exterior	467	00	2167	2634	High
8)	CFC	546	1689	240	2475	
Total		2748.66	4358.26	4449	11555.92	

Graph No.2.4 Total energy consumption in KW/Month at college.

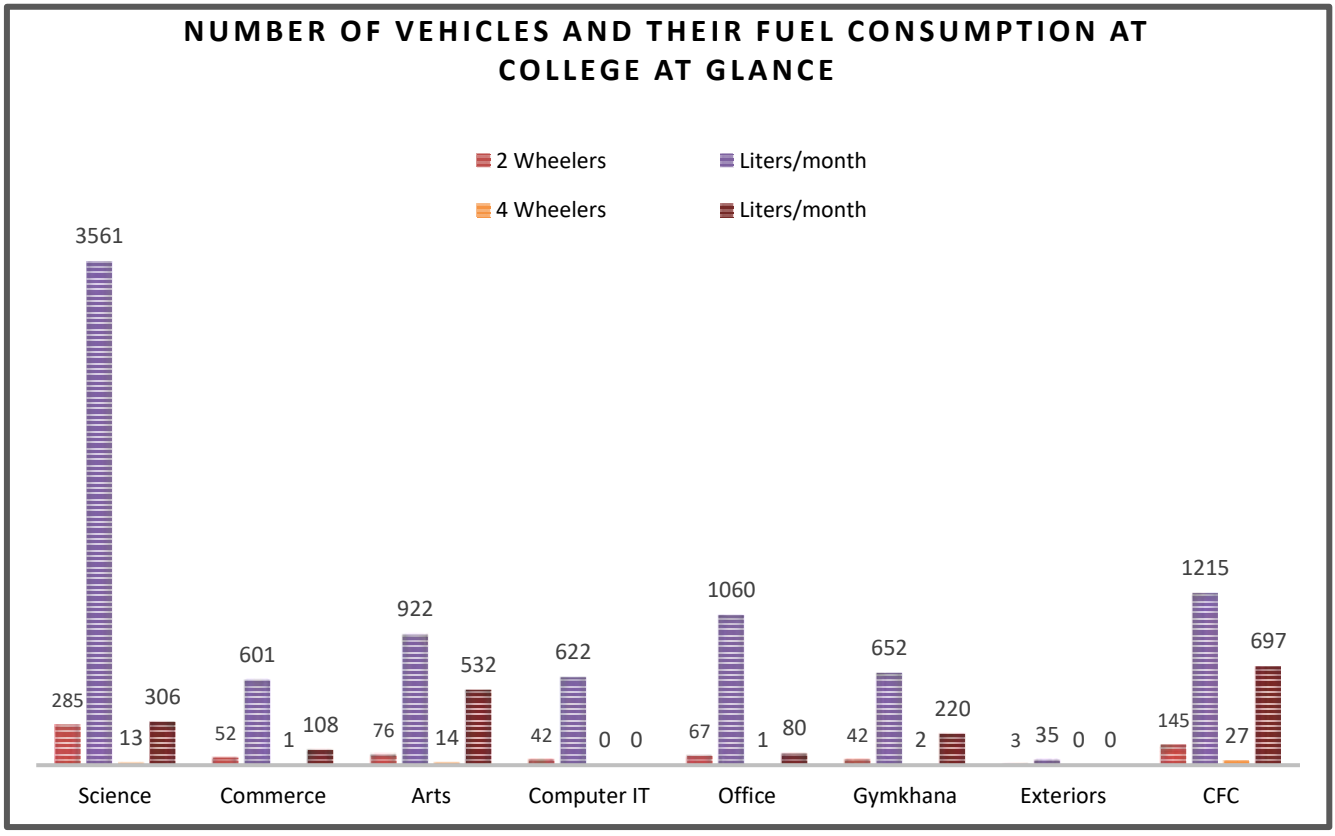


Collected data for total electric energy consumption in different departments of the college shows that more consumption is observed at Exteriors (≈2634 KW/Month) while in Arts, Commerce and Gymkhana its overall consumption is very less.

Table No. 2.5 Number of Vehicles and Their Fuel Consumption at college at glance:-

Sr. No	Department	Vehicles				Description
		2 Wheelers	Liters/month	4 Wheelers	Liters/month	
1.	Science	285	3561	13	306	High
2.	Commerce	52	601	01	108	
3.	Arts	76	922	14	532	
4.	Computer IT	42	622	00	00	
5.	Office	67	1060	01	80	
6.	Gymkhana	42	652	02	220	
7.	Exteriors	03	35	00	00	Low
8.	CFC	145	1215	27	697	
Total		712	8668	58	1943	

Graph No.2.5 Number of Vehicles and Their Fuel Consumption at college at glance



We collected data from students, teaching staff, administrative/non-teaching staff about Vehicles, their Fuel Consumption and mode of transportation using questionnaires . It is collectively shown in above reveals that larger number of vehicles and higher consumption of fuel (≈3561 Liter/Month) is at Science department while less number of vehicles and consumption of fuel at IT and Exterior of the college.

Mainly fuel consumption on college campus is by vehicles , it is also an important criterion for energy audit. Average count of two wheelers is 712 and of four wheelers it is 58 . It is seen that number of two wheelers is more than that of four wheelers. The fuel utilized by two wheelers is 8668 liters /month and by four wheelers is 1943 liters /month . Collected data also shows that number of four wheelers is maximum at science departments while minimum at Exterior and Computer/I.T. department. Science department has maximum number of two wheelers as number of students is maximum at the concern department. At the exterior of the college campus has minimum number of two wheelers because there is minimum number of students/ staff and guest are interacting in this part if college.

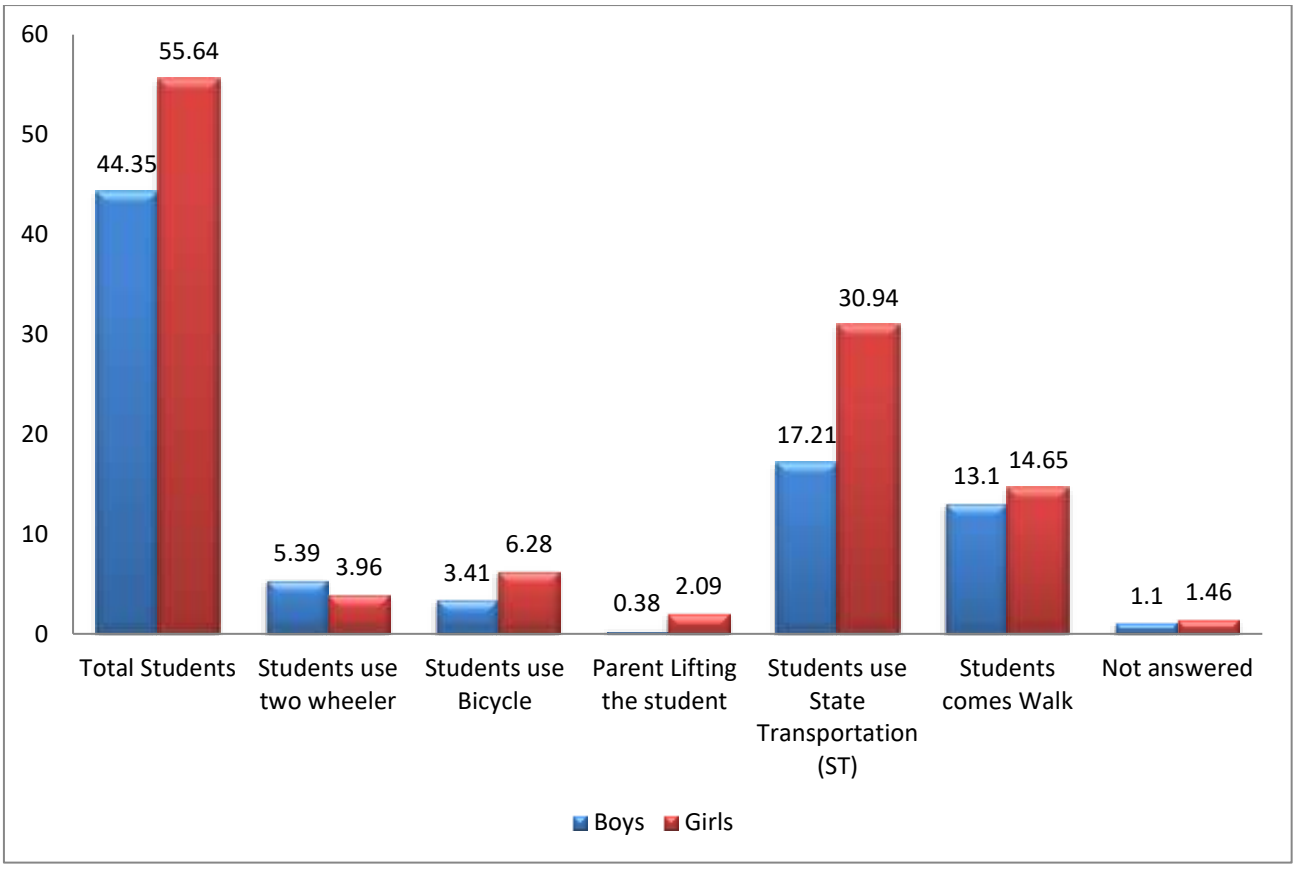
Table No.2.6

Students data at glance : Number of Vehicles and Their Fuel Consumption at College

Sr.no	Total Students			Students use two wheeler			Students use Bicycle			Parent Lifting the student			Students use State Transportation (ST)			Students comes Walk			Not answ-ered
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	
1 %	44.35	55.64	100	5.39	3.96	09.34	3.41	6.28	9.69	0.38	2.09	2.48	17.21	30.94	48.15	13.10	14.65	27.76	2.56
% with total	100%			09.34%			9.69%			2.48%			48.15%			27.76%			2.56 %

Graph No. 2.6 :

Students data at glance : Number of Vehicles and Their Fuel Consumption at College



We collected an information from students for the completion of Energy Audit. In this form also survey of student's vehicle, type of transportation used by the students is done. We prepared a questionnaire to get information in detail. As the strength of students in our college is 4450, circulation of an questionnaires to students, taking information, gathering together, handling it for analysis is very difficult, hence our Green Audit team collected all relating information from the students in the classroom at the time of lectures by raising their hands. With this method it minimized not only physical and mental exertion but also it saved an expense on much of stationary and minimizes relating solid waste. We got the information of students who were present in the classroom on the day of data collection is only the demerit of this method. The collected data, its statistical analysis , distribution and percentage with total is shown in above Table No.2.6 . It shows the percentage of female students is (55.64 %) greater than male students (44.35%). About 48.15 % students are using State Transportation (ST), about 10% students are using bicycle and about 28% students use the walking mode while only 9.5% students use their own two wheeler vehicle. Parents of 2.5% students drop them to the college.

In our college there is cycle bank scheme for girl students, so majority of girls' student use bicycle for college and It is seen that 11.50% of girls are using bicycle for transportation also about 27% of girls students use walking mode.

Table No.2.7 Data of the Students using vehicles: (%):

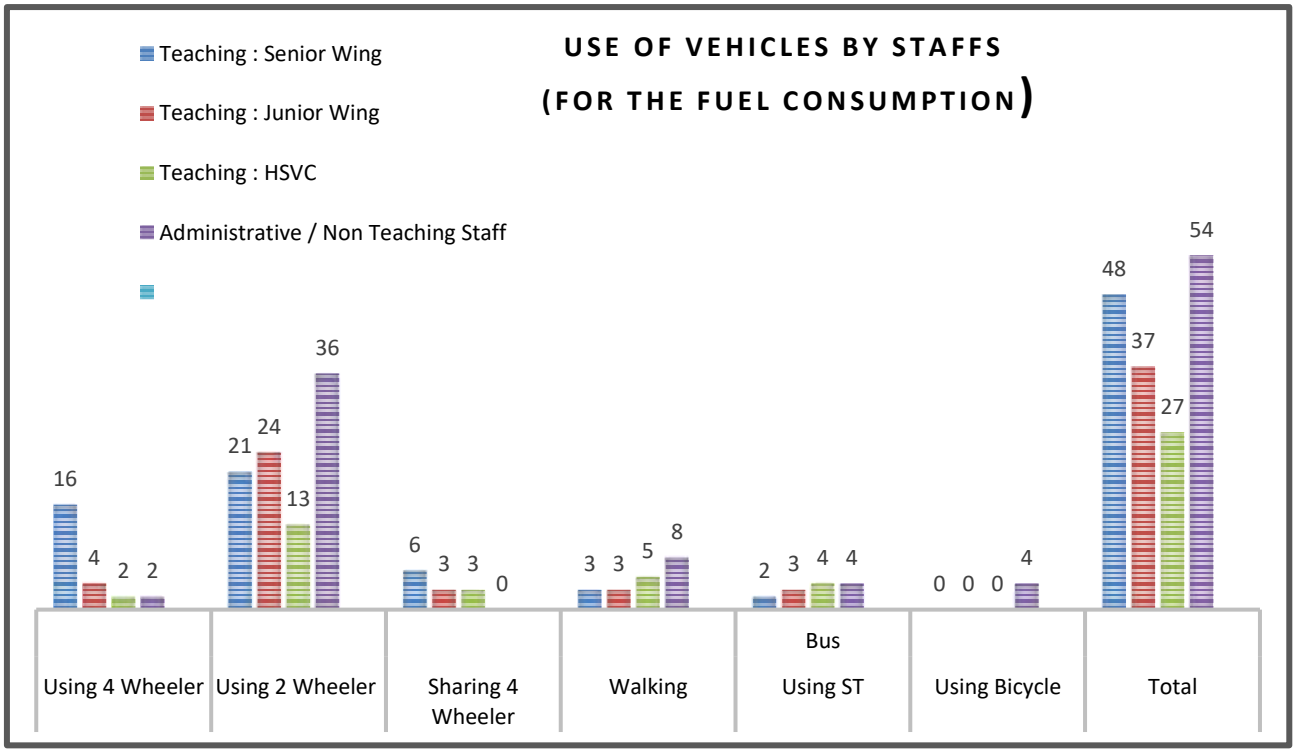
Sr.no.		Total Students		Students using two wheeler		Students using Bicycle		Parent Lifting the student		Students using State Transportation (ST)		Students come by Walk mode		Not answered
Boys /Girls		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
1.	%with total strength	44.35	55.64	5.39	3.96	3.41	6.28	0.38	2.09	17.21	30.94	13.10	14.65	2.56

This table shows the comparative percentages of male and female students adopting the mode of transportation for college. It reveals that percentage of girl students adopting State Transportation (ST),walking, bicycle is greater than that of the percentage of boy students and Greater number of boys about12% are using two wheeler at the same time only 7% of girl student are using their two wheeler. That our girl students are more conscious about environment than boys student, so they use environment friendly modes of transportation like ST (Vehicle with sharing), Bicycle, walking etc.

Table No. 2.8 Use of Vehicles by Staffs (For the Fuel Consumption)

Sr. No.	Staff	Using 4 Wheeler	Using 2 Wheeler	Sharing 4 Wheeler	Walking	Using ST Bus	Using Bicycle	Total
1.	Teaching : Senior Wing	16	21	06	03	02	00	48
2.	Teaching : Junior Wing	04	24	03	03	03	00	37
3.	Teaching : HSVC	02	13	03	05	04	00	27
4.	Administrative / Non Teaching Staff	02	36	00	08	04	04	54
Total		24	94	12	19	13	4	166
% with total		13.48%	63.12%	4.96%	9.93%	5.67%	2.84%	100%

Graph No. 2.7 Use of Vehicles by Staffs (For the Fuel Consumption)



Like the students we collected an information from staff for the completion of Energy Audit. In this survey of Staff (Faculty of all Sr. Jr. wing, office staff, non-teaching staff, Gardner etc) we collected data about vehicle, type of transportation used by them to come to college. So we prepared questionnaire to get information in detail, distributed them, helped them for filling, completed in all respect and collected. Its statistical analysis is grouped in four categories Teaching : Senior Wing, Teaching :Junior Wing, Teaching : HSVC, and Administrative / Non Teaching Staff is shown in above Table No:2.8.

Above Table as well as Graph 2.8 shows the use of vehicle by staff of our college. About 14% of staff is using four wheeler, 63% staff is using two wheeler vehicles while about 5% staff is using four wheeler with sharing, 10 % are come by walking, about 6% staff use ST and about 3% staff using Bicycle for transportation.

Table No. 2.9 Showing Residence of staff:-

Sr	Details	No. Staff having residence near campus	No. Staff having residence just far from campus	Total
1.	Its %	**63.83%**	**36.17%**	100%

While collecting information from staff by questionnaire we collected the information about the residence of the staff from college campus. From above Table No :2.9 it clears that about 63.83%

of our staff resides near the college campus and only 36.17% of staff resides just far from campus (≈ 25 to 30 KM distance) which minimize fuel consumption in liter per month.

Table No.2.10 LPG consumption in college:-

Sr.No	Department		Kg per year	Total
1.	Science	Physics	40	200
		Chemistry	120	
		Botany	40	
2.	Commerce	--	--	--
3.	Arts	HSVC	240	240
4.	Computer IT	--	--	---
5.	Office	--	--	--
6.	Gymkhana	--	--	--
7.	Exteriors	--	--	--
8.	CFC	--	5342	5342
Total				5782

In our college LPG gas required for practical purpose at science wing in Chemistry, Physics, Botany department, at Arts wing in HSVC and at Common Facility Centers (CFC) in canteen for cooking/ domestic. Collected information shows LPG consumption is higher at CFC.

3.2.1 Science Department

It includes Department of Physics, Chemistry, Mathematics, Botany and Zoology. The collected data also shows that Department of Mathematics has maximum number of office equipment's and energy consumption is 40.01 KW / month while minimum number of office equipment's and energy utilization is by Botany and Zoology department.

Table No. 2.11 Department wise office Equipment's and their energy consumption (KW/ Month) at Science Department.

Sr, No.	Departments	No. of office equipment's					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
1	Physics	04	01	03	01	01	10	35	
2	Chemistry	02	01	05	01	01	10	42	
3	Maths.	10	01	01	01	01	14	49	High
4	Botany	01	01	03	01	01	07	22	Low
5	Zoology	01	01	03	01	01	07	21	Low
	Total	18	5	15	05	05	48	169	

Total number of office equipment's at Science department is 48 and energy consumption is 169 KW/Month. Maximum number of office equipments and energy consumption by them is in the Mathematics department that is 49 KW/Month and minimum number of office equipments and energy consumption by them is in the Botany and zoology department that is nearly 21 to

22KW/Month. Similarly, to analyze the electric consumption lightening equipment(Tube, bulb, CFL etc) and fans(Ceiling, Table, Wall, Pedestal etc.) is also considered.

Table 2.12 Department wise Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Week) at science Department:

Sr, No.	Departments	No. of equipment's				Total equipment's	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
1.	Physics	42	12	00	14	68	130.96	High
2.	Chemistry	16	00	15	12	43	114.21	
3.	Maths	08	00	02	05	15	92.25	
4.	Botany	18	00	00	06	24	76.17	
5.	Zoology	14	00	00	05	19	72.20	Low
		98	12	17	40	162	485.79	

Maximum use of the energy for lightening and fan is in the Department of Physics, minimum use of the energy for lightening and fan is in the Department of Zoology. The total number of fluorescent tube is maximum i.e. 98 and their electric consumption is 215.83 KW per Month. In science department total number of ceiling fans is 40 and their electric consumption is 237.17 KW per Month.

Energy consumption of fuel was calculated by counting two wheeler and four wheeler at the Science Department.

Table No. 2.13 :Number of Vehicles and Their Fuel Consumption at Science Departments

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	210	12
2.	Average Liters of fuel / month	2553	540
3.	Maximum at	Chemistry	Zoology
4.	Minimum at	Maths. and Zoology	Physics

In science departments there are 210 two wheelers, utilizes 2553 liters/ month fuel while only 12 four wheelers utilizes 540 liters/ month fuel. Department of Chemistry utilizes maximum fuel/month by two wheelers while Department of Zoology utilizes maximum fuel/month by four wheelers . Minimum fuel for two wheelers is utilized by Mathematics and Zoology Department and minimum fuel for four wheelers is utilized by Physics Department.

2.2 Arts department

Department of Marathi, Hindi, English, History, Economics, Sociology, Geography and HSVC were studied in this category.

Table No. 2.14. Department wise Office Equipments and their energy consumption (KW/ Month) at Arts Department.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KWper Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
1.	Marathi	01	--	--	--	--	01	04	
2.	Hindi	01	--	--	--	--	01	8.28	
3.	English	01	--	--	--	--	01	19.12	
4.	History	01	--	--	--	--	01	5.33	
5.	Economics	01	--	--	--	--	01	4.2	
6.	Sociology	01	--	--	--	--	01	14.95	
7.	Geography	01	01	01		01	04	5.21	
8,	HSVC	01	01				02	10.35	
Total		08	02	01		01	12	71.44	

Table No.2.15. Energy consumption (KW/Month) at Office equipments in Arts Department.

Name of Equipment	Computers /Laptops	Printers	Projectors	Total
Number of unit	09	02	01	10
Energy consumed/ Month	64.02	2.26	5.16	71.44

Total number of office equipments at Arts department is 12 and energy consumption is 71.44 KW/Month. As office equipment ,number of computers in Arts department is maximum i.e.09 than printers and LCD projector hence energy consumed is maximum i.e. 64.02 KW/Month followed by projectors and printers i.e 5.16 KW/Month and 2.26 KW/Month respectively.

Maximum number of office equipments is maximum i.e. 04 at Geography and energy consumption in the Department English is 19.12 KW/Month and minimum number of office equipments and energy consumption by them is in the Marathi department that is 04 KW/Month.

Table 2.16. Department wise Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Week) at Arts Department

Sr, No.	Departments	No. of equipments			Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	Ceiling /Table Fans			
	Marathi	01	00	01	02	6.9	
	Hindi	02	00	02	04	3.76	low
	English	01	00	01	02	103.2	
	History	01	00	01	02	8.26	
	Economics	01	00	01	02	6.4	
	Sociology	01	00	01	02	103.89	High
	Geography	18	00	05	23	6.36	
	HSVC	05	07	03	15	11.2	
	Total	30	7	15	52	249.97	

Table No.2.17 Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at Arts Department.

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	30	07	15	52
Energy consumed/Month	121.29	38.08	90.6	249.97

Maximum use of the energy for lightening and fan is in the Department of sociology minimum use of the energy for lightening and fan is in the Department of Hindi. The total number of fluorescent tube is maximum i.e. 30 and their electric consumption is 121.29 KW per Month. In Arts department total number of ceiling fans is 15 and their electric consumption is 90.6 KW per Month.

Energy consumption of fuel was calculated by counting two wheeler and four wheeler at the Science Department.

Table No.2.18. Number of Vehicles and Their Fuel Consumption at Arts Departments:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	87	14
2.	Average Liters of fuel / month	1012	532
3.	Maximum at	HSVC	HSVC
4.	Minimum at	English	Economics

In Arts departments there are 87 two wheelers ,utilizes 1012 liters/ month fuel while only 14 four wheelers utilizes 532 liters/ month fuel. HSVC at jr. wing utilizes maximum fuel/month by two wheelers and by four wheelers . Minimum fuel for two wheelers is utilized by English Department and minimum fuel for four wheelers is utilized by Economics Department

3.2.3. Commerce Department: Senior and Junior commerce wing is categorized here.

Table No. 2.19. Office Equipments and their energy consumption (KW/ Month) at Commerce Department.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
1.	Commerce	01	0	0	0	0	01	8.21	low

Table No.2.20. Energy consumption in (KW/Month) at Office equipments in Commerce Department.

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	01	00	00	01
Energy consumed/Month	8.21	00	00	8.21

Number of office equipment's at Commerce department is 01and energy consumption is 8.21 KW/Month.

Table 2.21. Department wise Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Commerce Department

Sr, No.	Departments	No. of equipments			Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	Ceiling /Table Fans			
1.	Commerce	01	00	01	02	9.4	low

Table No.2.22. Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at Commerce Department.

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	01	00	01	02
Energy consumed/Month	2.85	00	6.55	9.4

Number of lightening equipments and fans at Commerce department is 02 and energy consumption is 9.4 KW/Month.

Table No.2.23. Number of Vehicles and Their Fuel Consumption at Commerce Departments:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	40	01
2.	Average Liters of fuel / month	475	108

In Commerce departments there are 40 two wheelers , utilizes 475 liters/ month fuel while only 01 four wheelers utilizes 108 liters/ month fuel.

3.2.4. I.T. Department: Computer Science, I.T.,COC computer and subjects, two computer laboratory were studied in this category .

Table No. 2.24. Total Office Equipments and their energy consumption (KW/ Month) at I.T. Department.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
1.	I.T	63	01	02	00	01	67	807.58	high

Table No. 2.25. Office Equipment's and their energy consumption (KW/ Month) at I.T. Department.

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	65	01	01	67
Energy consumed/Month	792.78	8.2	6.6	807.58

Total number of office equipment's at I.T. department is 67 out of that 63 are computers, 02 laptops, 01 printer and 01 LCD screen, total energy consumption is maximum i.e. 807.58 KW/Month.

Table 2.26 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at I.T. Department

Sr, No.	Departments	No. of equipment's			Total equipment's	Energy Consumed KW per Month	Description
		Tubes	Bulbs	Ceiling /Table Fans			
1.	IT	12	00	10	22	233.84	High

Table 2.27. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at I.T. Department

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	12	00	10	22
Energy consumed/Month	12.86	00	220.98	233.84

Number of lightening equipment's and fans at I.T. department is 22in which 12 are tube and 10 are fans and energy consumption is 12.86 KW/Month ,220.98 KW/Month respectively. Here total energy consumed is 233.84 KW/Month.

Table No.2.28. Number of Vehicles and Their Fuel Consumption at Computer(I.T) Departments:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	04	00
2.	Average Liters of fuel / month	110	00

In Computer (I.T.) departments there are only 04 two wheelers ,utilizes 110liters/ month fuel which is very less rather than other departments, also no any staff member has an four wheelers.

3.2.5. Office :

The energy consumption in Main administrative office, Principal's chamber, Staff room, Ladies room, store room, enquiry section, meeting hall, NAAC room, Non residential hall, CAP section etc, were studied in this category.

Table No. 2.29. Office Equipment's and their energy consumption (KW/ Month) at Office

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
	Office	13	08	02		01	24	801.03	High
	CAP	02	03				05	57.47	
		15	11	02		01	29	858.5	

Table No. 2.30. Office Equipments and their energy consumption (KW/ Month) at Office.

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	17	11	01	29
Energy consumed/Month	644.8	175.3	38.4	858.5

Total number of office equipments at office department is 29 out of that 17 are computers/ laptops,11 printer and 01 LCD screen, total energy consumption is maximum i.e. 858.5 KW/Month.

Table 2.31. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at office

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	LED	Ceiling /Table Fans			
	Office	43	00	21	64	128	1470	high
	CAP	04	00	04	08	16	23.1	
		47		25	72	144	1493.1	

Table 2.32. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at office

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	47	25	72	144
Energy consumed/Month	1126.15	143.69	223.26	1493.1

Number of lightening equipments and fans at office department is 144 in which 47 are tube, 25 bulbs and 72 are fans and energy consumption is 1126.13 KW/Month ,143.69 KW/Month ,223.26 KW/Month respectively. Here total energy consumed is 1493.1 KW/Month.

Table No.2.33. Number of Vehicles and Their Fuel Consumption at Office:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	67	01
2.	Average Liters of fuel / month	1060	80

At administrative office there are 67 two wheelers ,utilizes 1060 liters/ month fuel while only 01 four wheelers utilizes 80 liters/ month fuel.

3.2.6 Gymkhana : The energy consumption in Gymkhana office, Gymnasium hall, Shivneri ground etc, were studied in this category.

Table No. 2.34. Office Equipments and their energy consumption (KW/ Month) at Gymkhana

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	LCD	projectors			
1.	Gymkhana	01	01	00	00	00	02	20.83	

Table No 2.35. Office Equipments and their energy consumption (KW/ Month) at Gymkhana

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	01	01	00	02
Energy consumed/Month	19.61	1.22	00	20.83

Total number of office equipments at Gymkhana department is 02, total energy consumption is maximum i.e. 20.83 KW/Month.

Table 2.36. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Gymkhana.

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
1.	Gymkhana	62	00	04	04	70	498.63	

Table 2.37.Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Gymkhana.

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	62	04	04	70
Energy consumed/Month	470.20	7.60	20.83	498.63

Number of lightening equipments and fans at Gymkhana department is 70 in which 62 are tube, 04 bulbs and 04 are fans and energy consumption is 470.2 KW/Month ,7.6 KW/Month , 20.83 KW/Month respectively. Here total energy consumed is 498.63 KW/Month.

Table No 2.38 Number of Vehicles and Their Fuel Consumption at Gymkhana:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	38	02
2.	Average Liters of fuel / month	520	220

At Gymkhana there are 38 two wheelers ,utilizes 520 liters/ month fuel while only 02 four wheelers utilizes 220 liters/ month fuel.

3.2.7. Exteriors: The energy consumption in Botanical Garden, Gardens, Lawns in campus, roads in campus, Lamps used lighting the campus etc, were studied in this category.

Table No. 2.39 Office Equipments and their energy consumption (KW/ Month) at Exteriors

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	LCD	Projectors			
1.	Exteriors	00	00	00	00	00	00	00	nil

No any office equipments are used in Exterior**.**

Table .2.40 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Exteriors

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
1.	Exterior	22	20	04	00	46	2279.3	high

Table 2.41. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Exteriors

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	22	24	00	46
Energy consumed/Month	1676.04	603.26	00	2279.3

Number of lightening equipments and fans at Exteriors of college is 46 in which 22 are tube, 24 bulbs and energy consumption is 1676.04 KW/Month ,603.26 KW/Month respectively. Here total energy consumed is high i.e.2279.3 KW/ Month .

Table No. 2.42. Number of Vehicles and Their Fuel Consumption at Exteriors:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	03	00
2.	Average Liters of fuel / month	35	00

At Exterior of college campus there are only 03 two wheelers ,utilizes 35 liters/ month fuel while there are no four wheelers .

3.2.8.. Common Facility centers (CFC)

The energy consumption in Library, Canteen, VKCA ,Boys Hostel, Girl Hostel, Staff Quarter, Health center, Medical center etc, were studied in this category. But electricity bills of section Boys Hostel, Girl Hostel, Staff Quarter, Health center , Medical center is paid by Management . Hence energy consumption in these section is not considered for the report. The energy consumption in Library, Canteen, VKCA ,Boys Hostel, Girl Hostel, Staff Quarter, Health center, Medical center etc, were studied in this category. But electricity bills of section Boys Hostel, Girl Hostel, Staff Quarter, Health center , Medical center is paid by Management . Hence energy consumption in these section is not considered for report

Table No. 2.43. Office Equipments and their energy consumption (KW/ Month) at CFC.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	LCD	projectors			
1.	Exteriors	00	00	00	00	00	00	00	nil

No any office equipments are used in CFC**.**

Table 2.44. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at CFC

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
	CFC	117	08	08	72	205	730.21	

Table 2.45 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at CFC

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	117	16	72	205
Energy consumed/Month	201.16	48.28	480.77	730.21

Number of lightening equipments and fans at CFC of college is 205 in which 117 are tube, 16 bulbs 72 fans and energy consumption is 201.16 KW/Month ,48.28 KW/Month,480.77 KW/Month respectively. Here total energy consumed is high i.e.730.21 KW/Month .

Table No.2.46. Number of Vehicles and Their Fuel Consumption at CFC:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	148	27
2.	Average Liters of fuel / month	1193	697
3.	Maximum at	Staff Quarter	Staff Quarter
4.	Minimum at	Medical center	Medical center

In Common Facility Centers (CFC) there are 148 two wheelers ,utilize 1193 liters/ month fuel while only 27 four wheelers utilizes 697 liters/ month fuel. At staff quarters utilizes maximum fuel/month by two wheelers as well as four wheelers . Minimum fuel for two wheelers and four wheelers is utilized by Medical center.

3.3 Water audit:

Water is our most precious resource. Without it no plant or animal can survive. India is predicted to become drier, because of rising population and urban demand so the need to save water and ensure sustainability will grow. We all have a role to play by reducing our usage of water. We can secure our water supply for generations to come. We have to find new ways of source and preserve our precious water and we need educational institute to help by saving as much water as they can. This will save the money and reduce the impact on the environment.

Now-a-day colleges have become more aware regarding usage of water .The water audit of educational institute provide a fun and educational way to investigate ways that water is used every day, determine which areas of the campus may be causing problems and to spread the message of water conservation. These investigations will help to minimize water loss by detecting leakages and faulty fixtures so they can be repaired as soon as possible. This guideline will help to understand where and how more water is being used in our institute. It is divided into three parts; Part 1: Assessment of Water requirement in institute campus, Part 2 :Water storages in campus and Part 3 : collect information about water losses in campus. We all have a role to play so we can reduce our water usage and we can secure our water supply for generations to come. The Water Corporation has been finding new ways to preserve our precious water, and we need educational institutes to help by saving as much water as they can.

3.3.1 Water and waste water audit: A water audit is an on-site survey and assessment of water using hardware, fixtures, equipment, landscaping, and management practices to determine the efficiency of water and to develop recommendations for improving water use efficiency. In simple words, a water audit is a systematic review of a site that identifies the quantities and characteristics of all 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 preserve and save water more efficiently.

Since, water uses vary greatly from one type of business or institution to another and from site to site, water audit is crucial to determine quantity, nature and quality of water consumption. Water audit for water utility refers to tracking, assessing and validating all components of flow from the site of withdrawal or treatment through the water distribution system and into the consumer's properties. On the other hand, water audit of an office building would review direction and quantity of water used for domestic, cooling/heating, sanitary and landscaping processes. Whereas usage of water for domestic purpose , audit examines the major areas in which a facility uses water, including human consumption, personal hygiene and sanitation, washing, cleaning, laundry, gardening etc.

Water audit comprises of preparation of layout of water sources, distribution network, and service / delivery points to water users and return flow of waste or excess water. The layout should include locations and capacities of flow measurement devices installed at key points, dimensions of pipes and fittings in the water supply system, locations and particulars of flow control devices and history sheets of all measuring and control devices including pipes and fittings. A study of the availability of water sources and past consumption patterns for various sectors is necessary to understand the present water utilization and projecting future requirement. Data on development of sustainable source of water through rainwater harvesting and effluent recycling should also be taken into consideration.

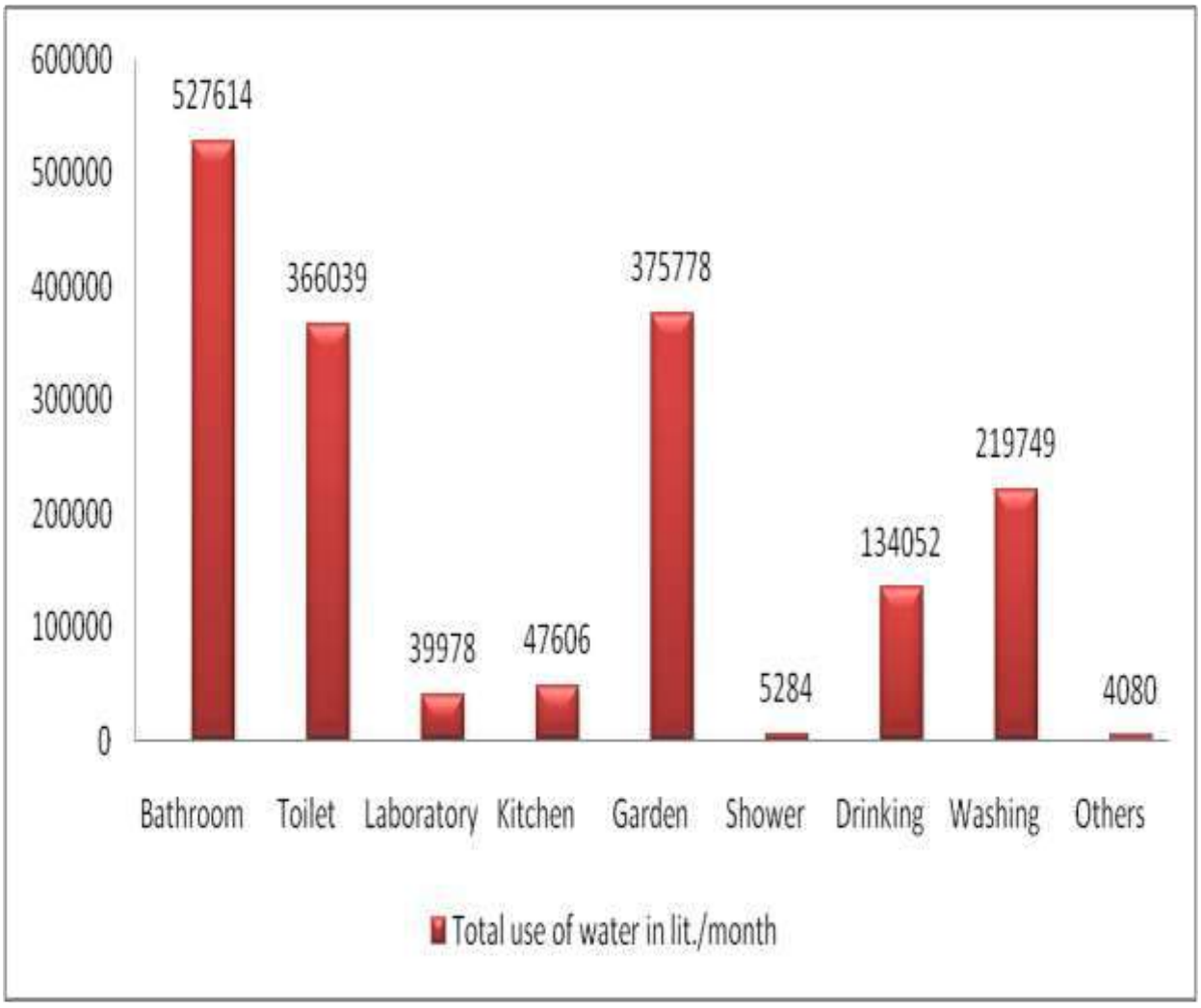
3.3.2 Water Audit of college: Data related the water audit is collected by circulating questionnaires, from water user profiles of it there are roughly 1700 students, 111 employers, 63 visitors on an average come each day in campus.

3.3.2.1 Assessment of water requirement at different sites in college: It includes Bathroom , Toilet, Laboratory, Kitchen, Garden , Shower , Drinking , Washing etc sites in college campus and water consumption on these sites were studied .

Table No.3.1 Monthly Average Water Consumption at different sites of collage

Site	Bathroom	Toilet	Laboratory	Kitchen	Garden	Shower	Drinking	Washing	Others	Total
Total use of water in lit/month	527614	366039	39978	47606	375778	5284	134052	219749	4080	1720180
Percentage with total	30.67 %	21.27%	2.32%	2.76%	21.84%	0.31%	7.79%	12.77%	0.24%	100%

Graph No. 3.1 Monthly Average Water Consumption at different sites of collage

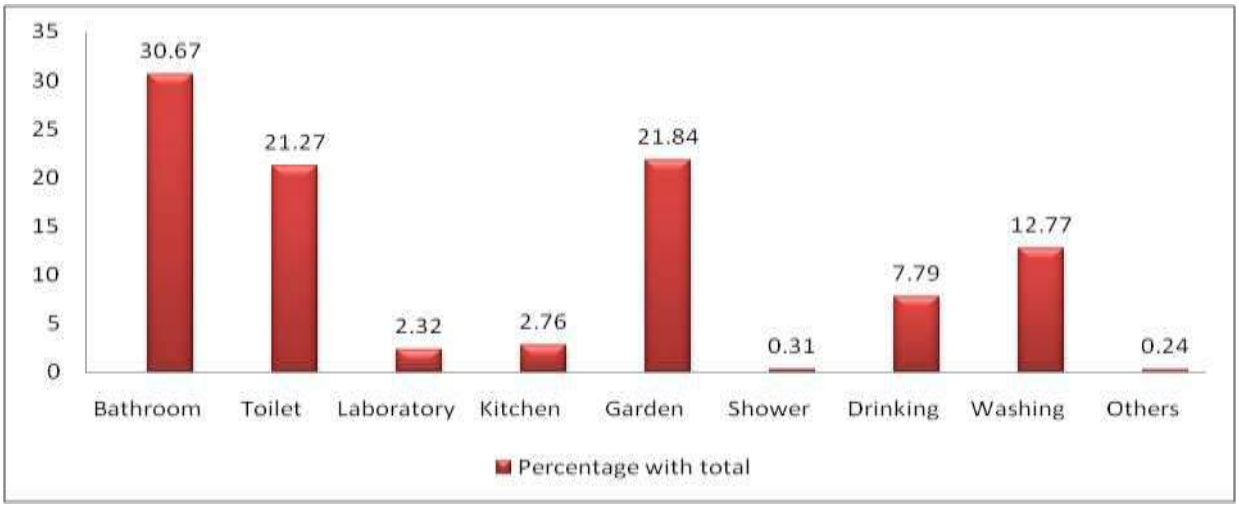


Monthly average water consumption at different sites of all departments at college premises is as below:

The total water consumption at different sites in college preemies is 1720180 liters/ Month. The maximum water used for bathroom is 527614 liters/ month (30.67%) followed by gardens on the premise are lush green throughout the year by using 375778 liters of water which is around(21.40%) and to keep the toilets clean 366039 liters/ month which is 21.27%. In the laboratories 39978 liters water is used every month. i.e. 2.32%. The use of water in kitchen is 47606 liters and it is 2.76%.The for the showers 5284 liters of water is used which is 0.31%. The use of water for drinking is 134052 liters which is 7.79% and 12.77% water i.e.219749 is used for washing purpose.

Water consumption at different site in percent is as shown below:

Graph No.3.2 Monthly Average Water Consumption at different site of collage



Collected and analyzed data in above graph clears that about the same (i.e.21 to 22 %) water consumption observed at Toilet and garden sites of college and very small water is used for Kitchen as well as shower purposes.

Table No.3.2-

Department wise and site wise Total Assessment of water requirement in college in liters

Sr. No.	Departments	Sites									Total per month	Total per Year
		Bathroom	Toilet	Laboratory	Kitchen	Garden	Shower	Drinking	Washing	Other		
1	Science	48000	141029	431728	000000	2063202	000000	45400	9160	0000	228210	2738519
2	Arts	48800	32000	48000	24000	000000	000000	67064	95864	0000	26311	315728
3	Commerce	000000	000000	000000	000000	000000	0000	79200	000000	0000	6600	79200
4	Computer Lab.	59440	46560	0000	0000	0000	00000	57840	32580	0000	16369	196420
5	Office	4032000	984960	000	000	0000	0000	748800	984960	000	562560	6750720
6	Gymkhana	112000	1722000	0000	0000	0000	0000	122500	119000	000	172958	2075500
7	Exterior	0000	0000	0000	0000	2446080	000	57840	32580	000	211375	2536500
8	Common Facility Centers	2031120	1465896	0000	547248	0000	63360	430136	1362840	48960	495797	5949560
Total		6331360	4392445	479728	571248	4509282	63360	1608780	2636984	48960	1720180	20642147

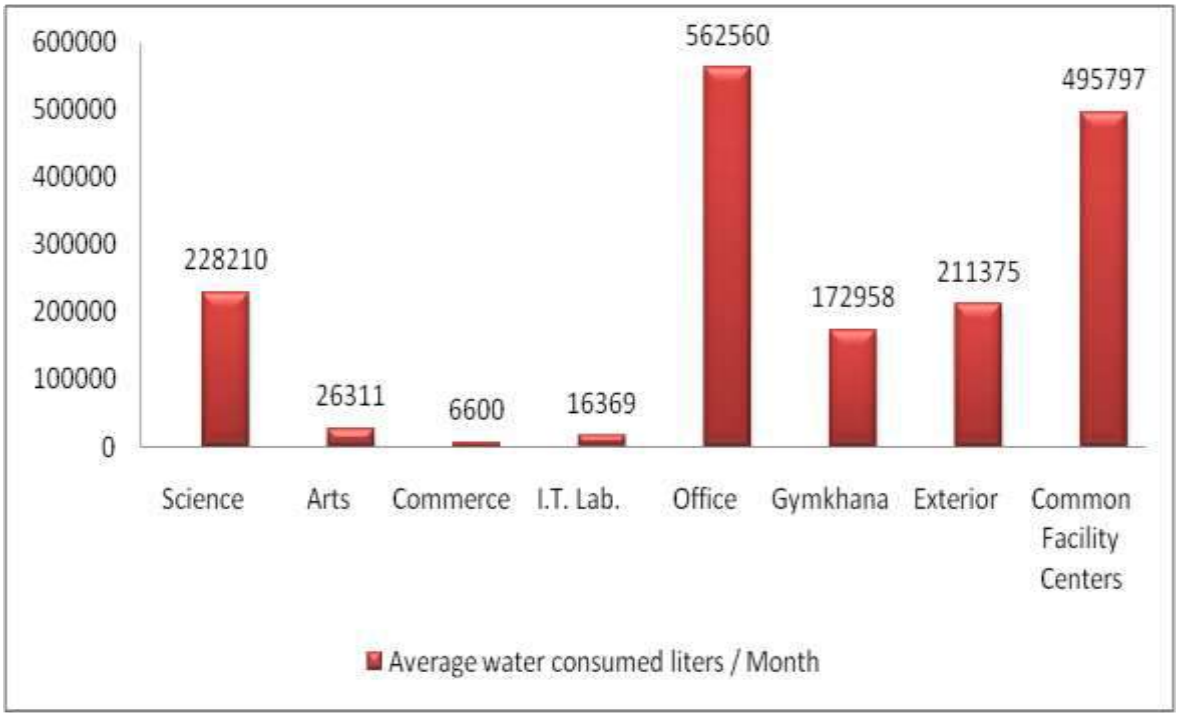
Above table reveals that the requirement of water for Toilet, Laboratory and Garden is maximum while water consumption at kitchen and shower site is very less.

Table No.3.3 Department wise Total Assessment of water requirement in college in liters per month

Departments	Science	Arts	Commerce	I.T. Lab.	Office	Gymkhana	Exterior	Common Facility Centers	Total water consumed
Average water consumed liters/ Month	228210	26311	6600	16369	562560	172958	211375	495797	1720180
Average water consumed liters / Year	2738519	315728	79200	196420	6750720	2075500	2536500	5949560	20642147

Graph No.3.3.

Department wise Total Assessment of water requirement in college in liters per month



Above Table No. 3.3 and Graph No. 3.3 shows Department wise Total Assessment of water requirement in college in liters per month from it water consumption in office and CFC department is 5 to 6 lakh liters /Month, while water consumption at Arts and I.T. laboratory is 16 to 26 thousands liters /Month, is minimum ,water is required for Commerce department is very minimum, it is only for drinking purpose.

Data of water leakages and loss of water due to leakages is collected from each department with help of questionnaires, its analyzed form is shown in following table.

Table No.3.4.

Department wise and Site wise Average Water Losses (Leakages) per month in college:

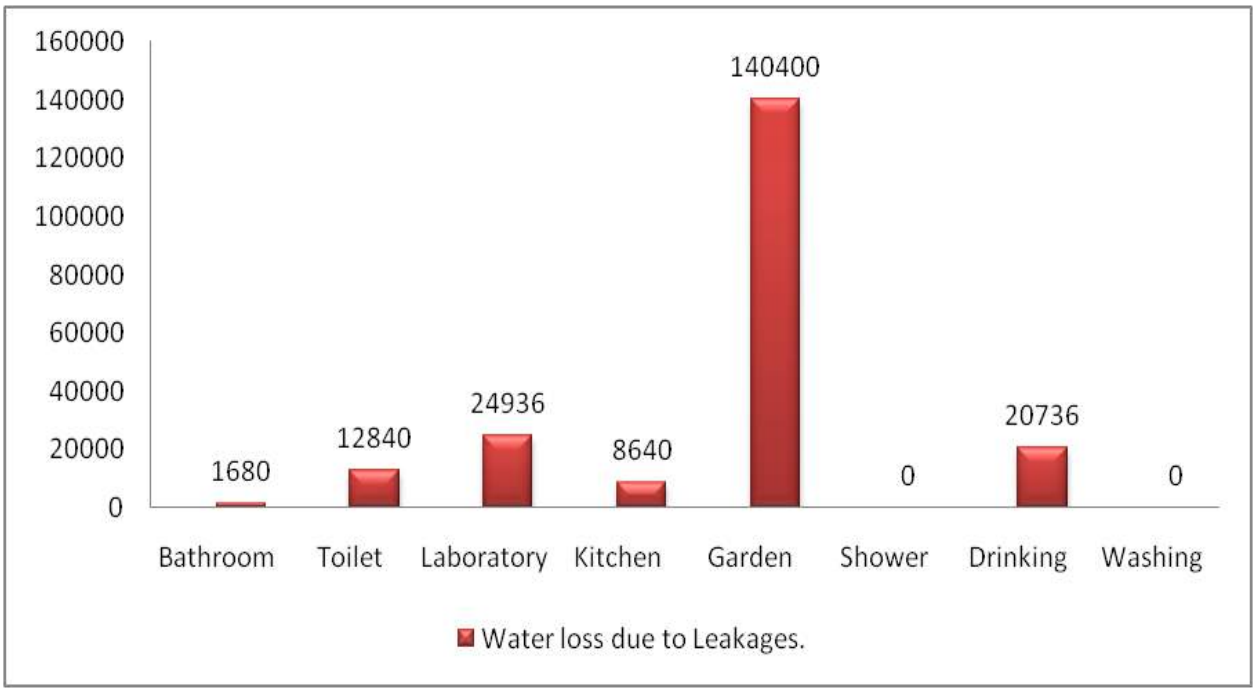
Sr. No.	Departments	Water loss site								Total water loss per Year in Lit.	Total water loss per Month in Lit.
		Bathroom	Toilet	Laboratory	Kitchen	Garden	Shower	Drinking	Washing		
1	Science	--	4320	24936	--	--	--	--	--	29256	2438
2	Gymkhana	--	00	--	--	--	--	--	--	00	00
3	Office	--	00	--	--	--	--	--	--	00	00
4	Common Facility Centers	--	00	--	--	--	--	--	--	00	00
5	Exterior	1680	8520	--	8640	140400	--	20736	--	179976	14998
Total		1680	12840	24936	8640	140400	00	20736	00	209232	17436

Data shows that water loss due to leakages seen in Science at Toilet and Laboratory site. In Exterior at drinking, Garden, Kitchen and toilet site water loss due to leakages is observed. Average water loss due to leakage is 17436liter/month or 209232 liter/month, is maximum at garden (140400 liter/year).

Table No.3.5 Site wise Average Water Losses (Leakages) per month in college.

Water loss site	Bathroom	Toilet	Laboratory	Kitchen	Garden	Shower	Drinking	Washing	Total water loss per Year in Liter	Total water loss per Month in Lit.
Total Water loss due to Leakages per Year in Liter	1680	12840	24936	8640	140400	--	20736	--	209232	17436
Total Water loss due to Leakages per Month in Liter	140	1070	2078	720	11700	00	1728	--	--	17436

Graph No.3.4. Site wise Average Water Losses (Leakages) per Year in college



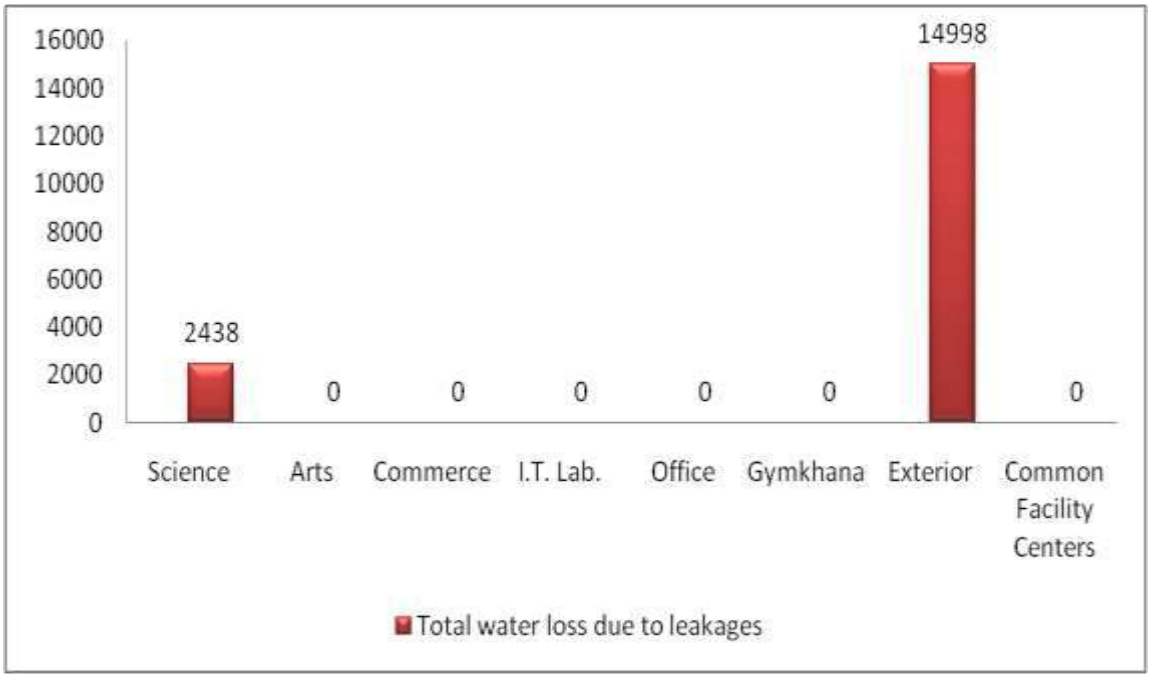
Water loss due to leakages is maximum (i.e.140400 liters/year) at garden site while water loss at bathroom site of college is negligible.

Table No.3.6.

Department wise Average Water Losses (Leakages) per month in college

Departments	Science	Arts	Commerce	I.T. Lab.	Office	Gymkhana	Exterior	Common Facility Centers
Total water loss due to leakages	2438	00	00	00	00	00	14998	00

Graph No. 3.5. Department wise Average Water Losses (Leakages) per month in college



Graph No.3.5 shows that in science department water losses due to leakages is 2438 liters/month and in Exterior is 14998 liters/month.

Information/ data of water loss in campus due overflow at water storage is collected through questionnaires again data is verified by Green Audit Committee Member with periodically visiting and monitoring the sites. To record water loss due to overflow Audit committee arranged number of drills and visits. Committee monitored, personally measure, kept the record of time (in minute) of water flowing, flow rates (liter/minute) and recorded water loss at each visit. Taking an average following water structure of over flow is shown.

Table No.3 .7.Deprtment wise Water Storage (Department wise details of water structures of overflow) (Data from Annexure-3 Table-2)

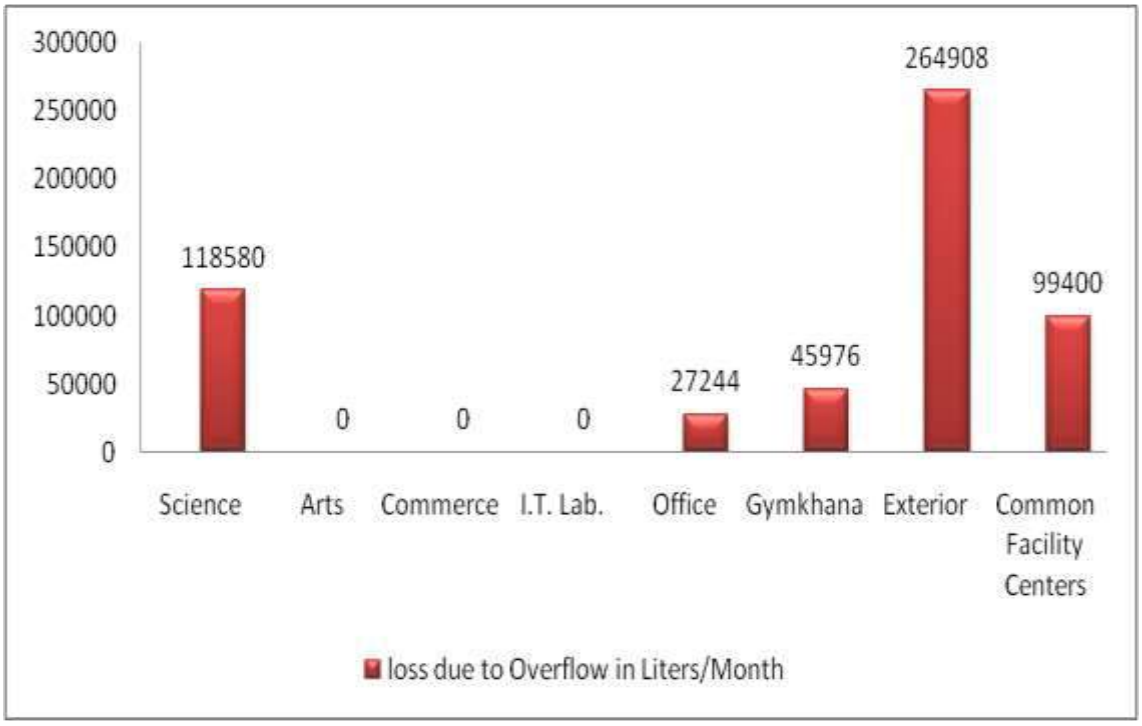
Sr. No.	Depart-ments	Storage Tank Site	Capacity in liters	Number of Tanks	Number of Times it is filled Daily	Daily Average time of water over flowing min	Flow Rate Liter / min (Average)	Daily Water losses due to overflow liter (Average)	Water loss in week liter (Average)	Water loss liter per month (Average)	Water loss liter in Year (Average)
1.	Science	a)Science building b)F.M.Filter house tank	20265 194779687	01 02	one	418	44.28	4235	29645	118580	1422960
				03							
2.	Gymkhana	a)Shivneri b)Gymkhana New-1 c)Gymkhana New-1	8950 5094 5094	01 01 01	one	34	154.42	1642	11494	45976	551772
				03							
3.	Office	Office-1	47250	01	one	15	64.85	973	6811	27244	326928
4.	CFC	a)YCWM Library-1 b)YCWM Library-2 c)Canteen-1 d)Canteen-2	1097 3119 5074 5074	01 01 01 01	one	56	251.28	3550	24850	99400	1192800
				04							
5.	Exterior	Quarters Total 6	6536 each	06	one	144	394	9461	66227	264908	3178896
	Total			17		667	908.83	19861	139027	556108	6673356

Table shows at Exteriors water loss by overflow is maximum 264908 lit./month and at office it is minimum 27244 lit./month .

Table No. 3.8. Department wise Loss of water due to overflow in lit./Month

Departments	Science	Arts	Commerce	I.T. Lab.	Office	Gymkhana	Exterior	Common Facility Centers	Total
loss due to Overflow in Liters/Month	118580	00	00	00	27244	45976	264908	99400	556108

Graph No. 3.6 Department wise Loss of water due to overflow in lit./Month



At exterior, Science and CFC departments of college water loss by overflow of tanks is maximum respectively it is 264908lit./month, 118580 lit./month,99400lit./month while at Arts, Commerce and I.T. laboratory is zero.

Total water used from each storage tank is recorded by measuring the storage tank measurements and daily monitoring the height before filling the tank. With the help of questionnaire we calculate total water used per month in liters. Data recorded of total used water from monitoring the water tanks and water consumed at each department in college is shown below.

Table No.3.9

Total Average Water Used per Month in the college (by monitoring the tanks)

Sr.No.	Storage Tank Site	Total Average Water Used Per Year(Lit.)	Total Average Water Used Per Month(Lit.)
1	Science	3333930	277827
2	Arts	--	--
3	Commerce	--	--
4	Computer Lab/I.T.	--	--
5	Office	10126513	843876
6	Gymkhana	1943664	161972
7	Exterior	2217327	1847777
8	Common Facility Centers	18804463	1567038

Table No.3.10 Total water consumed at each department from assessment of water requirement (From above Table No. 3.3)

Sr.No.	Storage Tank Site	Total Average Water Used Per Year(Lit.)	Total Average Water Used Per Month(Lit.)
1	Science	2738519	228210
2	Arts	315728	26311
3	Commerce	79200	6600
4	Computer Lab/I.T.	196420	16369
5	Office	6750720	562560
6	Gymkhana	2075500	172958
7	Exterior	2536500	211375
8	Common Facility Centers	5949560	495797

Actually Arts, Commerce and I.T departments water user, use water from Office tank, if we add the water requirement of these three departments in office consumption and compared above two tables we see in following.

Table No.3.11 Comparison of Table No.3.9 and Table No.3.10

Sr. No	Storage Tank Site	Total Average Water Used (by monitoring the tanks) Table No.3.9		Total water consumed at each department from assessment of water Table No.3.10	
		Total Average Water Used Per Year(Lit.)	Total Average Water Used Per Month(Lit.)	Total Average Water Used Per Year(Lit.)	Total Average Water Used Per Month(Lit.)
1	Science	3333930	277827	2738520	228210
2	Arts	--	--	--	--
3	Commerce	--	--	--	--
4	Computer Lab/I.T.	--	--	--	--
5	Office	10126513	843876	7342080	611840
6	Gymkhana	1943664	161972	2075496	172958
7	Exterior	2217327	1847777	2536500	211375
8	Common Facility Centers	18804463	1567038	5949564	495797

Thus from above table the figures for all the departments (Science, Office, Gymkhana and Exterior) are nearly matched except CFC because in CFC (canteen, Boys and girls hostel etc) data of water requirement collected by questionnaire and data from actually tank monitoring are mismatched.

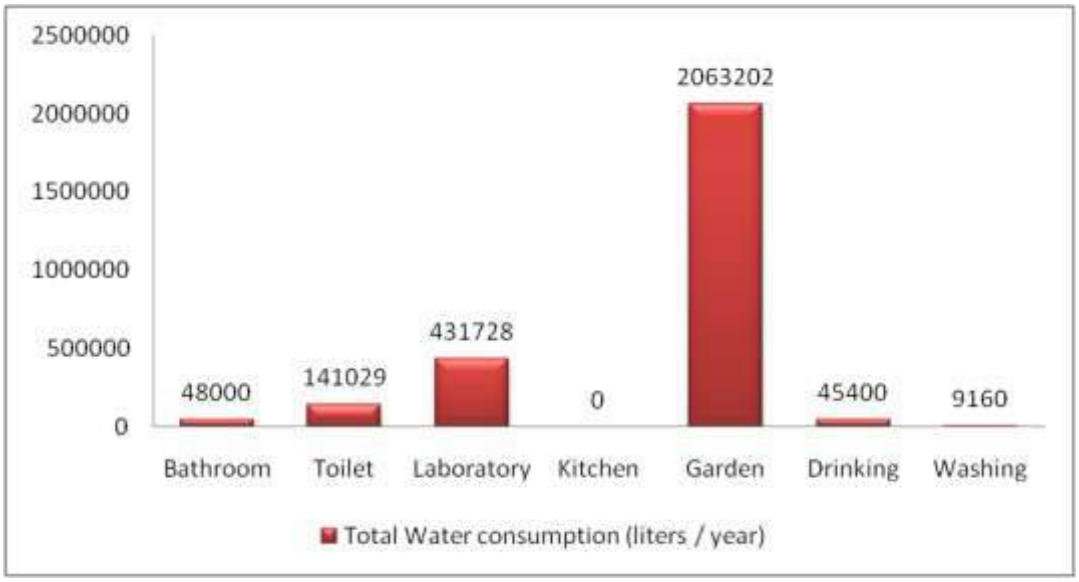
3.3.2.2 Science Department

Total number of water user in the science department is roughly 1800 (students, employers, visitors etc) their water consumption is as fallows.

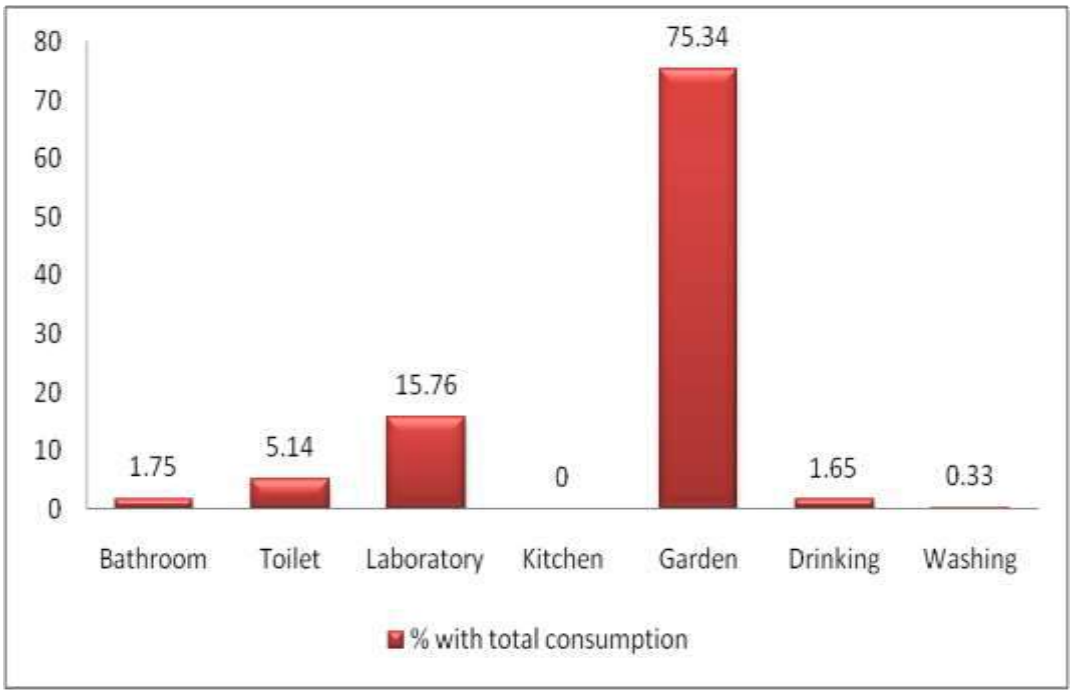
Table.No.3.12 Yearly Water Consumption at different sites of Science Department

Sites	Bathroom	Toilet	Laboratory	Kitchen	Garden	Drinking	Washing	Total
Total Water consumption (liters / year)	48000	141029	431728	000	2063202	45400	9160	2738519
% with total consumption	1.75	5.14	15.76	0.0	75.34	1.65	0.33	100.00

Graph no. 3.7 Yearly Water Consumption at different sites of Science Department



Graph no. 3.8 Percentage of Yearly Water Consumption at different sites of Science Department



Yearly water consumption by Science department is about 2738519 liters , water is consumed by the garden use is major source utilization comprising 75.34 % (2063202 liters/year). While 15.76 % (431728 lit./year) and 5.14% (141029Lit./year) consumed for Laboratory and toilet purpose. Only 1.65% water is consumed for drinking and 1.75% for bathroom purpose.

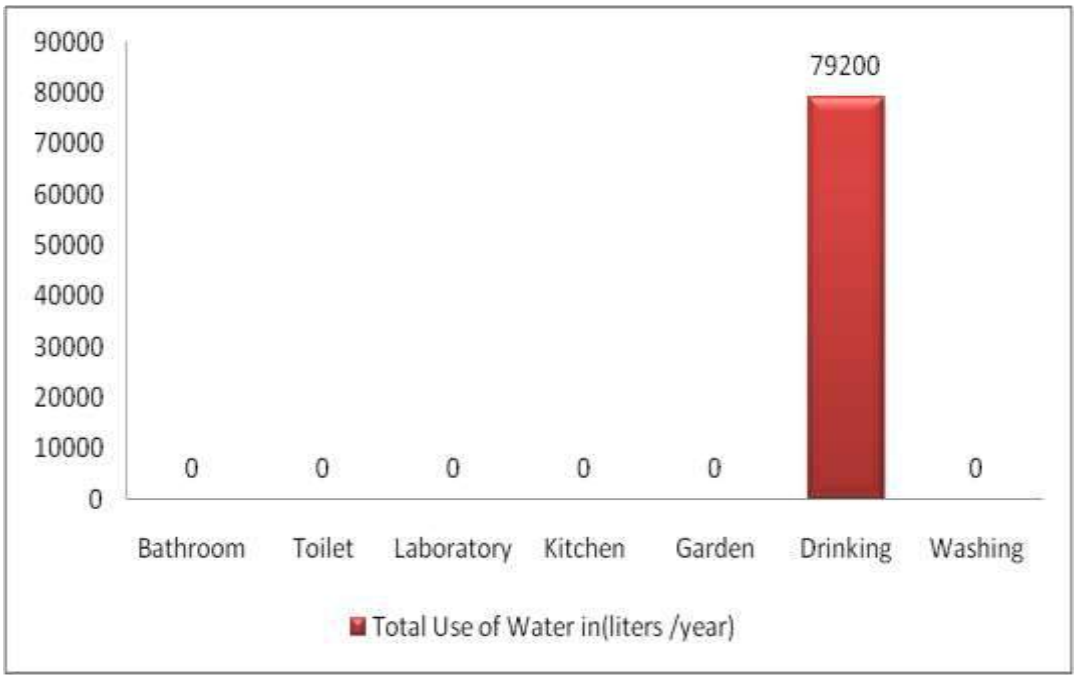
3.3.2.3Commerce Department

Total number of water user in the Commerce department is roughly 730 (students, employers, visitors etc), their water consumption is as fallows.

Table.No.3.13 Yearly Water Consumption at different sites Commerce Department

Sites	Bathroom	Toilet	Laboratory	Kitchen	Garden	Drinking	Washing	Total
Total Use of Water in(liters /year)	0	0	0	0	0	79200	0	79200
Percentage with total water consumption	0	0	0	0	0	100	0	100

Graph No.3.9 Yearly Water Consumption at different sites Commerce Department



About 79200 liters of water consume by commerce department , it is used for drinking (79200 liters /Year) purpose, while water consumed for Bathroom, Toilet, laboratory, Kitchen, Garden, washing is minimum.

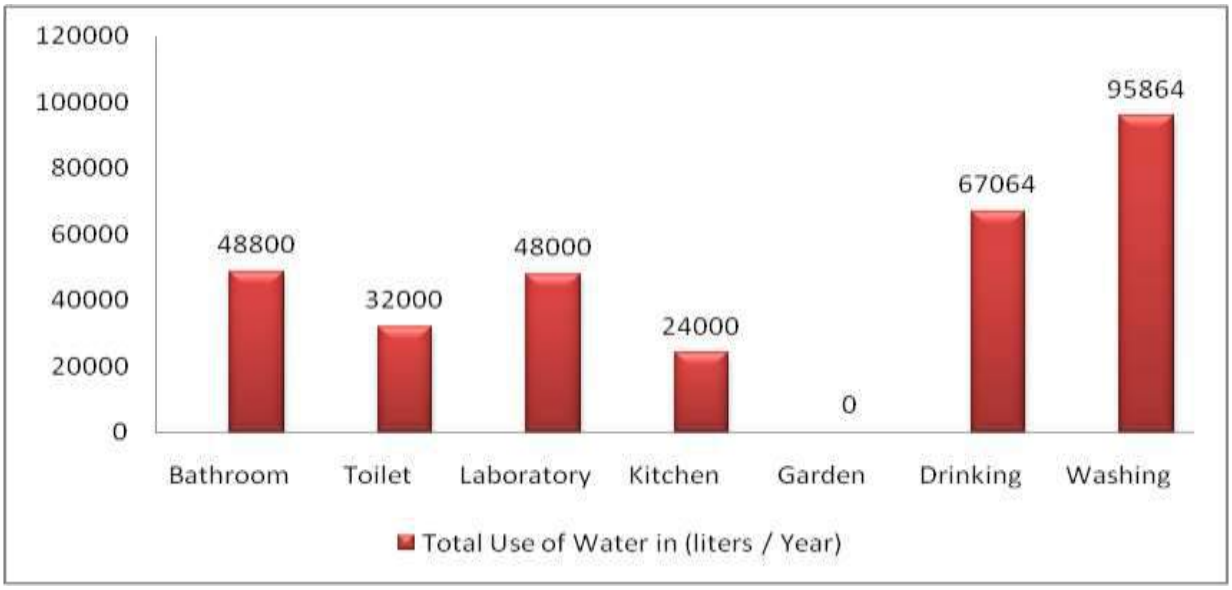
3.3.2.4Arts Department

Total number of water user in the Arts department is roughly 1900(students, employers, visitors etc), their water consumption is as fallows.

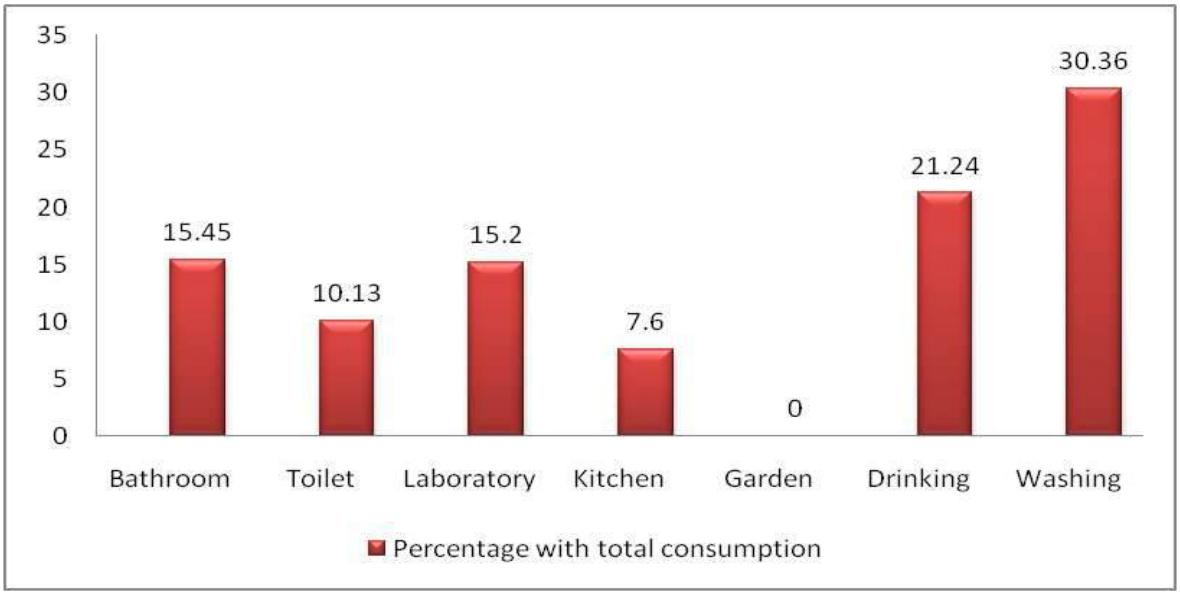
Table No.3.14 Yearly Water Consumption at different sites of Arts department

Water sites	Bathroom	Toilet	Laboratory	Kitchen	Garden	Drinking	Washing	Total water Consumption Lit. /Year
Total Use of Water in (liters / year)	48800	32000	48000	24000	0	67064	95864	315728
Percentage	15.45	10.13	15.20	7.60	0	21.24	30.36	100

Graph No. 3.10. Yearly Water Consumption at different sites of Arts department



Graph No.3.11. Percentage of Yearly Water Consumption at different sites of Arts department



Yearly water consumption at Arts department is about 315728 liters. Consumption of water for washing is 30.36% (95864liters/year), for drinking 21.24%(67064 liters/year), for bathroom and Laboratory water consumption is same (≈ 15%).

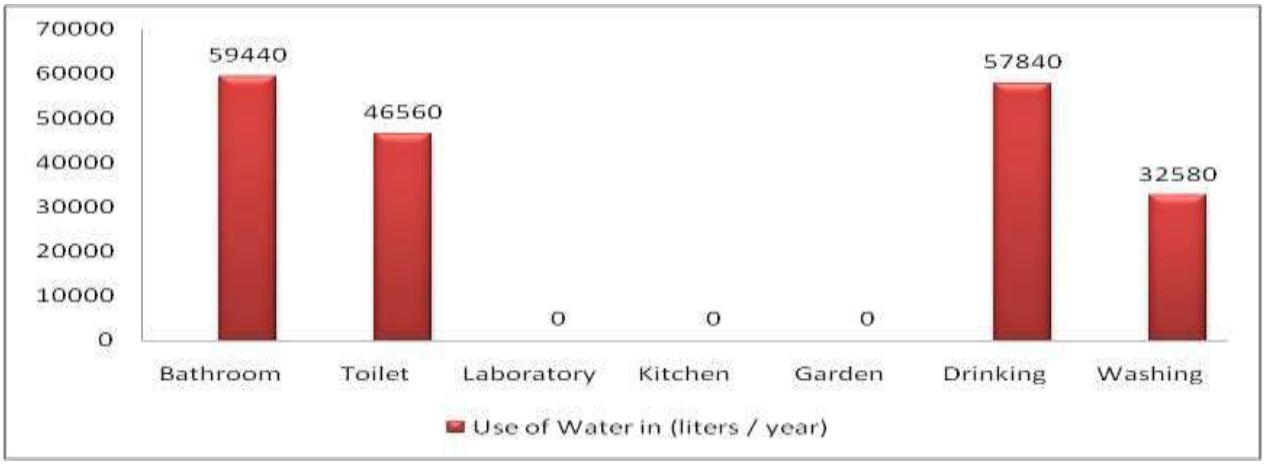
3.3.2.5 I.T Department

Total number of water user in the I.T department is roughly 526 (students, employers, visitors etc), their water consumption is as fallows.

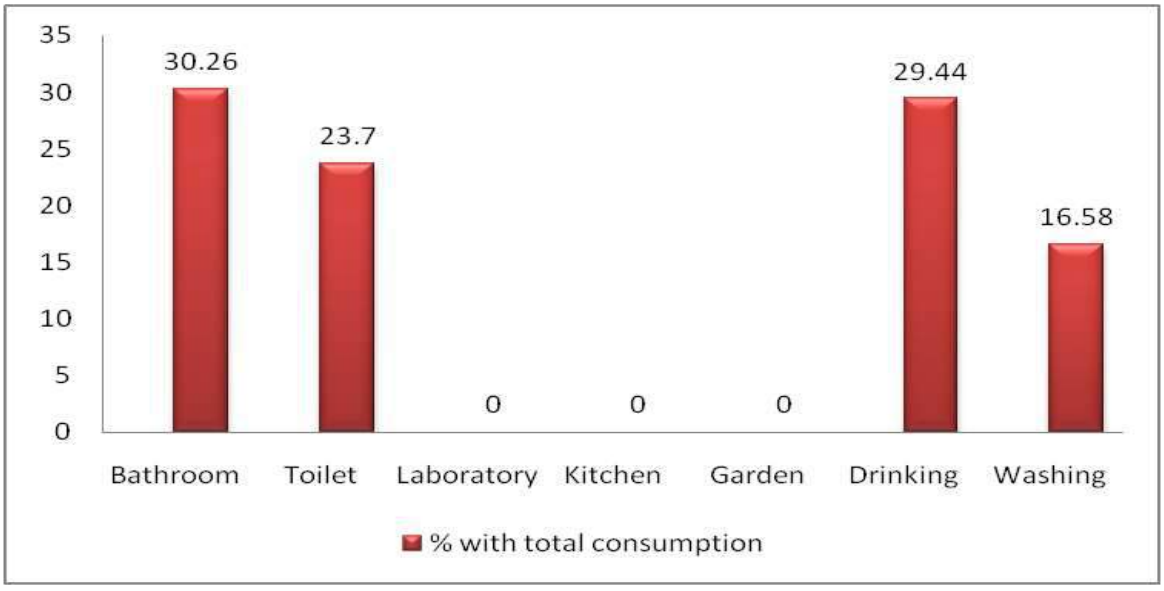
Table No.3.15 Yearly Water Consumption at different sites of I.T.lab

Water loss site	Bathroom	Toilet	Laboratory	Kitchen	Garden	Drinking	Washing	Total water Consumption Lit. /Year
Use of Water in (liters / year)	59440	46560	0	0	0	57840	32580	196420
% with total consumption	30.26 %	23.70%	0%	0%	0%	29.44%	16.58%	100%

Graph No. 3.12. Yearly Water Consumption at different sites of I.T.Lab.



Graph No. 3.13. Percentage of Yearly Water Consumption at different sites of I.T.Lab.



About 196420 liters of water is consumed by computer lab (IT), of which the use of bathroom and toilet is major source of utilization comprising 59440 liters/year, i.e. 30.26 % and 57840 liters/year i.e. 29.44% respectively . While water consumed for Laboratory, Kitchen and garden purpose is negligible.

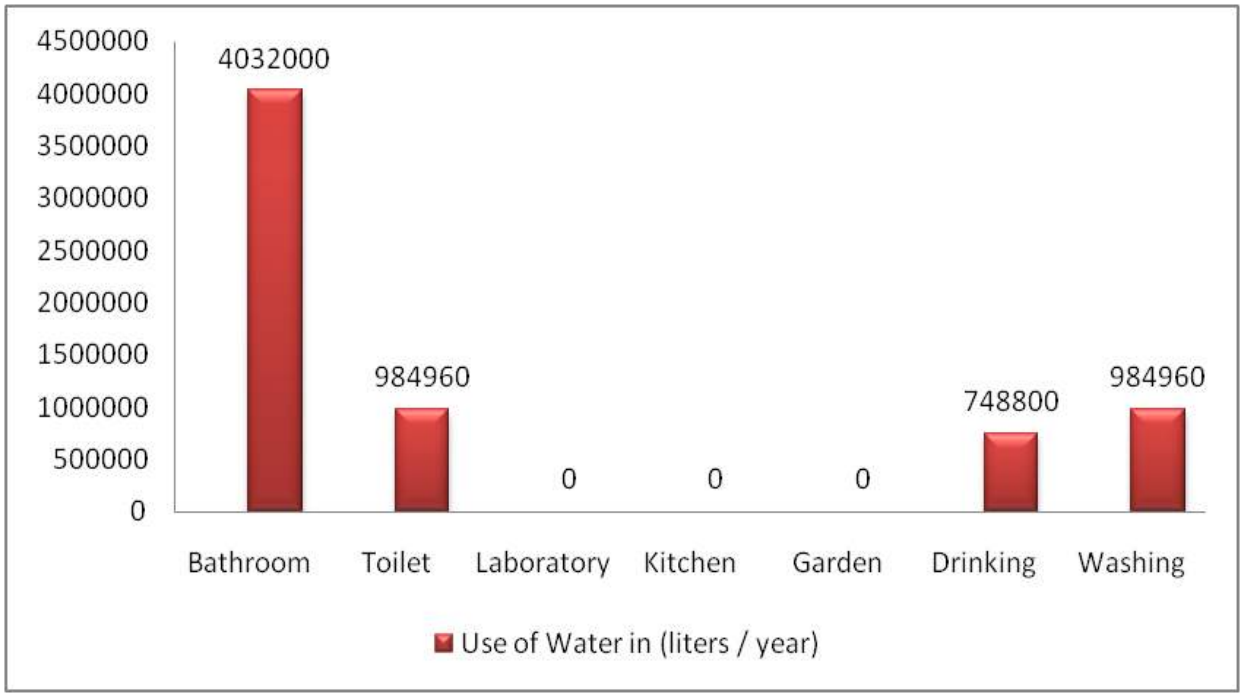
3.3.2.6 Office Department

Total number of water user in the office department is roughly 745(students, employers, visitors etc), their water consumption is as fallows.

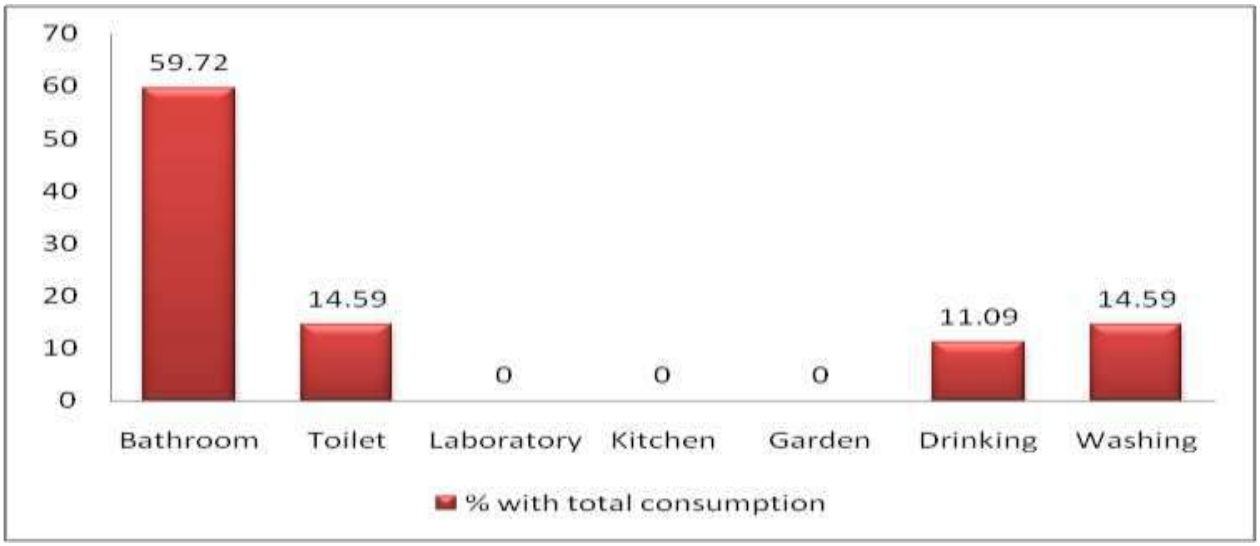
Table no. 3.16 Yearly Water Consumption at different sites of Office.

Water used site	Bathroom	Toilet	Laboratory	Kitchen	Garden	Drinking	Washing	Total water Consumption Lit. /Year
Use of Water in (liters / year)	4032000	984960	0	0	0	748800	984960	6750720
% with total consumption	59.72	14.59	0	0	0	11.09	14.59	100

Graph No. 3.14 Yearly Water Consumption at different sites of Office



Graph No. 3.15. Percentage of Yearly Water Consumption at different sites of office



About 6750720 liters of water per year is consumed by office of which the bathroom and toilet use is major source of utilization comprising 4032000 liters/year, i.e. 59.72 % and 984960. liter/year i.e. 14.59% respectively . While for Washing and drinking purpose less water and it is consumed about 984960 liter/year (i.e.14,59%) and 748800 (i.e. 11.09%.) respectively.

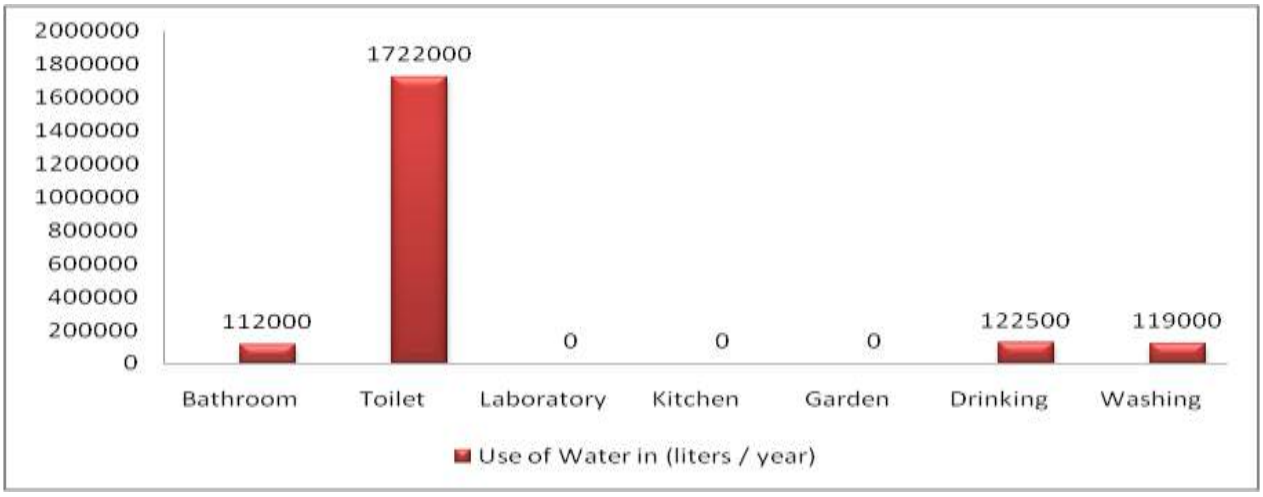
3.3.2.7 Gymkhana

Total number of water user in the Gymkhana department is roughly 185(students, employers etc), their water consumption is as fallows.

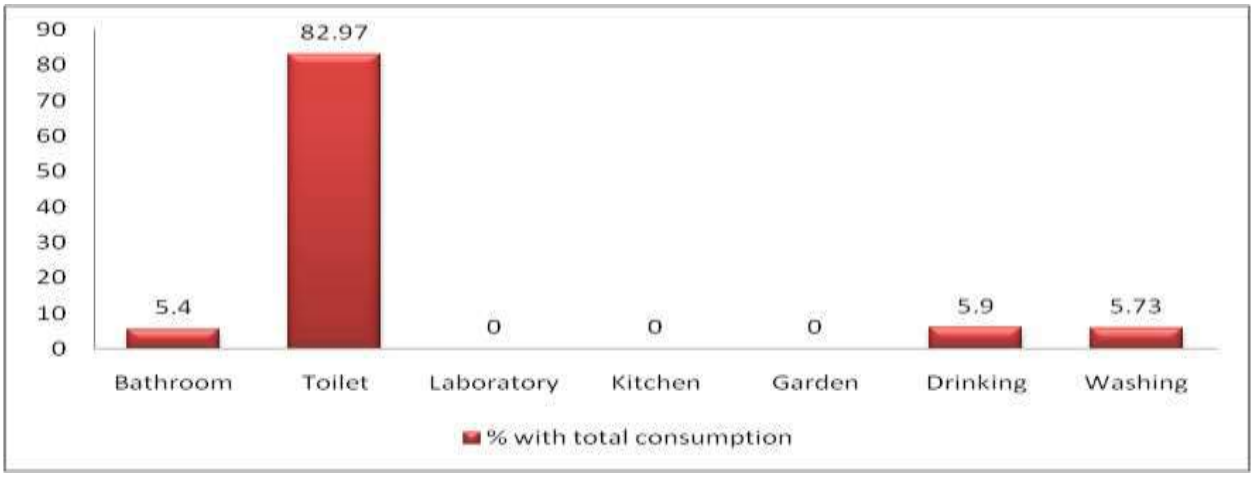
Table.No.3.17 Yearly Water Consumption at different sites of Gymkhana

Water used site	Bathroom	Toilet	Laboratory	Kitchen	Garden	Drinking	Washing	Total water Consumption Lit. /Year
Use of Water in (liters / years)	112000	172000	0000	0000	0000	122500	119000	2075500
% with total consumption	5.40	82.97	0	0	0	5.90	5.73	100

Graph No.3.16. Yearly Water Consumption at different sites of Gymkhana



Graph No. 3.17. Percentage of Yearly Water Consumption at different sites of Gymkhana.



About 2075500 liter of water is consumed per year by Gymkhana. Bathroom and Toilet use is major source of utilization i.e. 112000 i.e. 5.4% while for toilet 1722000 i.e. 82.97% while drinking purpose 122500 liters/year, 5.90% while for washing purpose 119000 liters/year i.e. 5.73% water is used. The average figures are shown but maximum consumption of water at time of sports camp (like taluka, university, state and national level competitions).

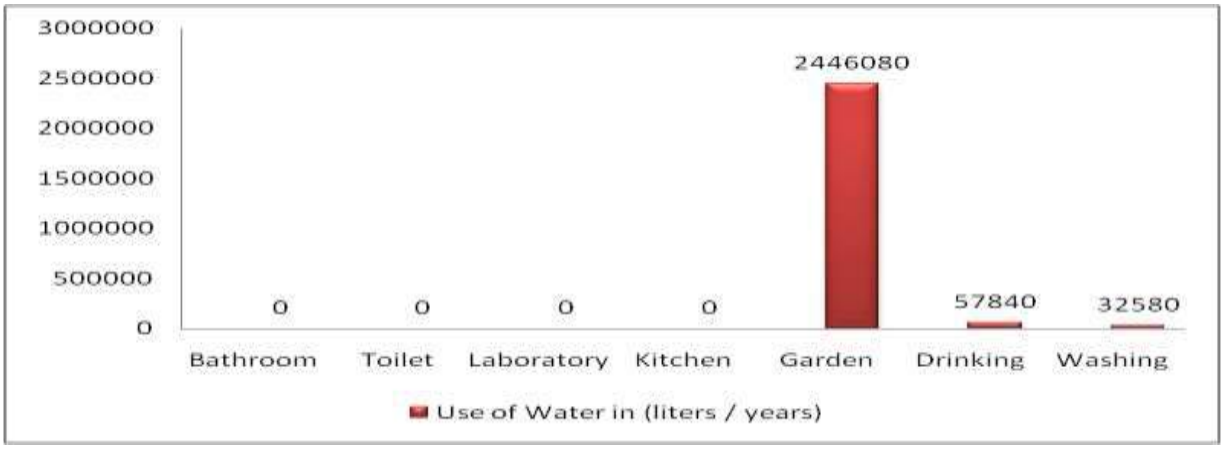
3.3.2.7 Exterior

Total number of water user in the Exterior is roughly 546 (students, employers, visitors etc), their water consumption is as fallows.

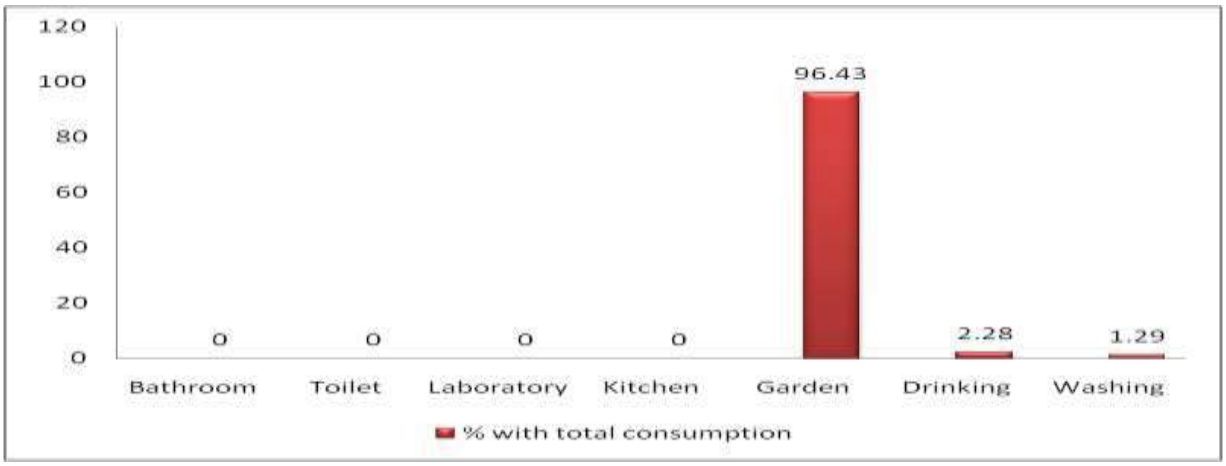
Table.No.3.18 Yearly Water Consumption at different sites of Exterior

Water used site	Bathroom	Toilet	Laboratory	Kitchen	Garden	Drinking	Washing	Total water Consumption Lit. /Year
Use of Water in (liters / years)	00	00	00	00	2446080	57840	32580	2536500
% with total consumption	00	00	00	00	96.43	2.28	1.29	100

Graph No.3.18. Yearly Water Consumption at different sites of Exteriors



Graph No. 3.19. Percentage of Yearly Water Consumption at different sites of Exteriors



About 2536500 liters of water consumed by exteriors per year of which garden use is maximum 2446080 liter/year(i.e. 96.43% of total) while drinking purpose is minimum i.e. 57840 liter per year (i.e. 2.2% of total use).

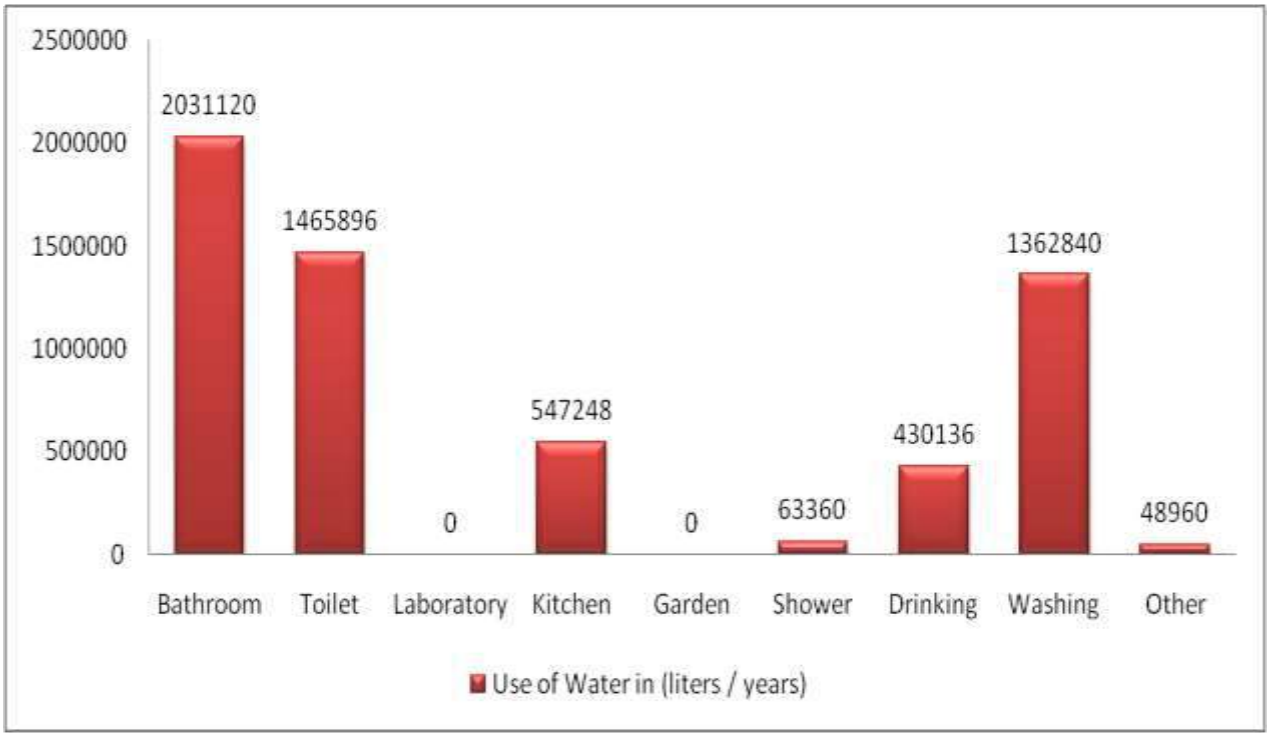
3.3.2.8 Common Facility Centers (CFC)

Total number of water user in the CFC is roughly 1423 (students, employers, visitors etc), their water consumption is as fallows

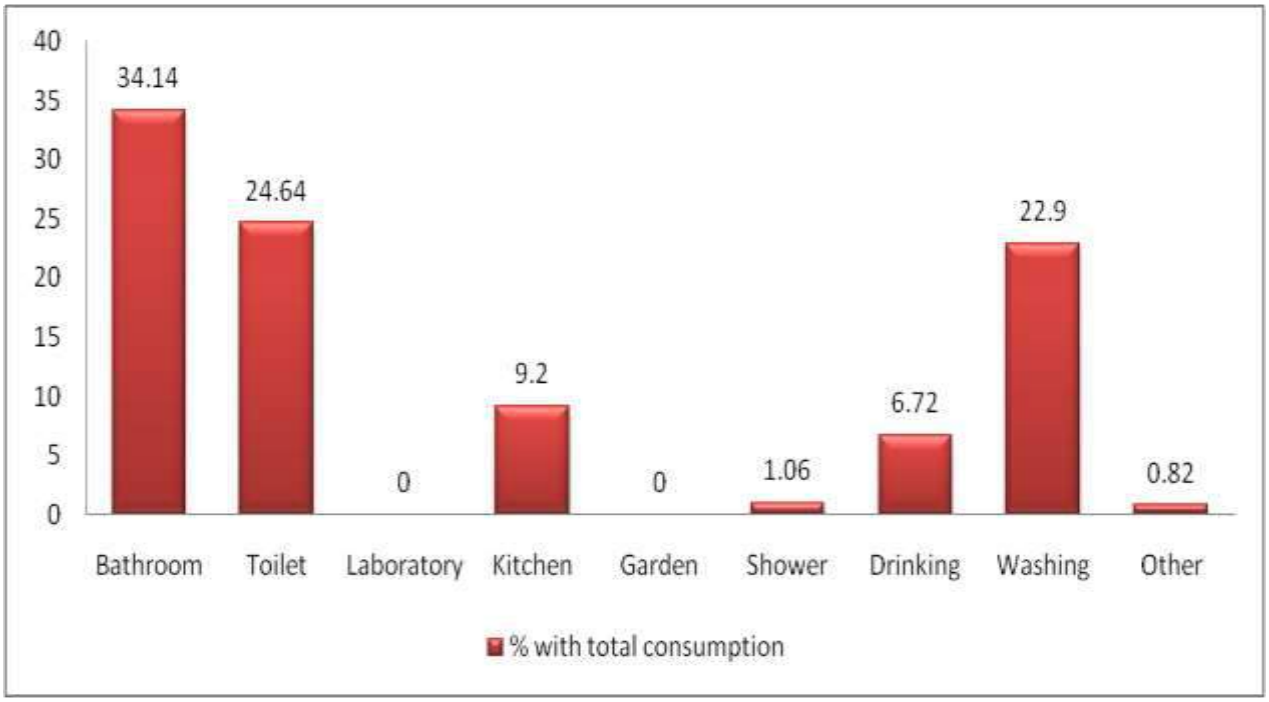
Table.No.3.19 Yearly Water Consumption at different sites of CFC

Water used site	Bathroom	Toilet	Labora-tory	Kitchen	Garden	Shower	Drinking	Washing	Other	Total water Consum-ption Lit. /Year
Use of Water in (liters / years)	2031120	1465896	00	547248	00	63360	430136	1362840	48960	5949560
% with total consump-tion	34.14	24.64	00	9.20	00	1.06	6.72	22.90	0.82	100

Graph No.3.20. Yearly Water Consumption at different sites of CFC



Graph No. 3.21. Percentage of Yearly Water Consumption at different sites of CFC



About 5949560 liter of water per month is consumed by Common facility center of which use of water in bathroom and toilet is maximum, 2031120 liter/year i.e. 34.13% for bathroom and 1465896 liter/year i.e. 24.63% for toilet purpose. While shower and other purpose use of water is minimum, 63360 liters/year i.e. 1.06% and 48960 liter/year i.e. 0.82 % respectively.

3.3.3Water Management Practices at college Campus.

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar has become good runner in water conservation, water harvesting and management of water available on campus.

a)Rain Water recharge:

The wells in campus located at such natural geographical places where the peculation of rain is trapped in these. As the wells in the campus are located down, the rain water and peculated water from campus is easily collected in it. Water discharged in bore well.

The waste water from drinking and washing sites is directly send in the nearby garden and lawns.

b)Roof Top Rain water Harvesting –

The Roof Top Rain water from buildings of Arts , commerce, Science, Library, B.Ed / D.Ed, TKIET Library recharge the campus well which is backward of library helps the rain water harvesting .

The Roof Top Rain water from buildings of Boys hostels, Mess, Staff quarters , I.T.I recharge the well in hostel campus.


GPS Map Camera
Warananagar, Maharashtra, India
TKIET Campus, College Rd,
Warananagar, Maharashtra 416113, India
Lat 16.856238°
Long 74.197063°
24/11/22 03:20 PM GMT +05:30
Google


GPS Map Camera
Warananagar, Maharashtra, India
V54X+G2F, Warananagar, Maharashtra
416113, India
Lat 16.856202°
Long 74.197461°
24/11/22 03:17 PM GMT +05:30
Google

c)College well-

The water from recharged well is used for watering gardens, lawns, road side lawns which fulfills need of college campus. YCMM campus is partly self- sufficient in water ,because for drinking purpose water of Warana river is used.

d)College well behind boy's hostel.-

Water from boys hostels bathrooms are collected in it which is supplied to college campus gardens & lawns.

e)Water filtration plant-

The college campus has a small water filtration plant in side of botanical garden which fulfills drinking water need.

f)Plantation in campus-

College has green campus of 27 acres. Efforts have been made on to bring part of land under cultivation of medicinal plants as well as other productive plants through NSS , NCC students, Seniors students, teaching and nonteaching staff in college. In campus total 5021 trees of 152

varieties are present in which 3087 are trees, 1424 are shrubs, 473 are herbs and 37 are climbers.

g)Use of Sprinklers:

For irrigating the gardens and lawns drip/ sprinklers are installed in campus for water consumption and electricity.

h)Nature Based Wastewater Treatment System-

Sustainable development goal (SDG), includes providing access to adequate and equitable sanitation, improving water quality, and protecting and restoring water-related ecosystems. However, an estimated 80% of wastewater globally flows back to nature untreated, with serious public health and environmental implications.

Within the European Union, only 40 percent of rivers, lakes and estuaries meet minimum ecological standards for habitat degradation and pollution. External pressures, such as climate change, growing populations, and urbanisation are creating further pressure on sanitation services. But about 90% rivers, lakes etc. are so pollutes as the recycle and reuse of water culture not developed in rural as well as urban areas of India for that implications of SDG and its awareness through education is essential.

As a result, if we are to meet the SDGs, we need a sustainable sanitation approach which enables treatment of wastewater while sustaining ecosystems. This involves harnessing state-of-the-art technologies, notably nature-based solutions (NBS).

NBS have long been used to treat wastewater, stretching back to the use of wetlands for wastewater disposal by ancient civilizations, for example in Egypt and China. NBS for wastewater treatment also include ponds and soil infiltration, as well as innovative approaches such as willow systems, living walls, constructed rooftop wetlands, aquaponics and hydroponics.

In more recent years, there has been growing recognition of the function and importance of NBS as an alternative or supplement to conventional wastewater treatment systems. For example, treatment wetlands and stabilization ponds are NBS often used in decentralised wastewater treatment systems.

Parker LORD is the leading company in East Asia, the Hon. Mr. Anup Deshmukh, working as Regional Director, India and South East Asia Parker LORD and Hon. Mr. Ninad Joshi,HR Manager Parker LORD these both are the alumni of TKIET Warananagar, is our sister concern branch of the institution. Under the Corporate Social Responsibility (CSR) of Parker LORD, in which management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders. After installation for three year the servicing and its maintenance was jointly hired by Parker LORD company funded, installed in campus and handover the '**Nature Based Wastewater Treatment System'** shortly Nature **Based** WWTPs, on 14th Noveber 2022. Its cost is more about 45 lakhs, which purify the water about 150-200 KLD (Kilo liters per day) i.e nearly 1,50,000-2,00,000 liters per day. The Centre for Environmental Research & Education **(CERE)**, Mumbai and **National Solutions**, Mumbai.

Drain out waste water of whole campus was collected in big tank through the underground cement and PVC pipes and daily 2 lakh liters water purified up to drinking mark. The purified water is lifted in the campus well near hostel / ITI . This water is used for the cleaning, washing, laboratory use, watering the gardens and domestic purpose.

Advantages of 'nature-based' wastewater treatment plants:

1)This WWTPs differ from traditional sewage treatment plants (STPs) in that they do not rely on chemical treatment of wastewater, and do not use motors and pumps to transport the water within the plant.

2)These plants do not have a high operational cost, do not require a constant supply of electricity and do not require technically trained staff to manage daily operations.

3) Various microorganisms present in these root systems of these plants are responsible for "cleaning up" the wastewater, which passes through the root beds.

4) This called nature-based solutions because they use the natural topography of the region to channel wastewater from homes to treatment plants, where the water is filtered through biological systems, like root zones, or more sustainable material like gravel and coconut husks. The water may also be treated through biological enzymes. There is none of the chemical treatment that a traditional, electro-mechanical STP in urban areas would use. For the same reason, and because they rely on naturally available materials, they are much cheaper to build and operate.

5)Preventing pollution of drains, water bodies and groundwater

6)Treated water can be used locally for secondary, non-pot able purposes like agriculture and washing

7)Lower operational and maintenance cost

8) Do not technically trained staff to operate

9) Do not rely on electricity to work, making them ideal for rural clusters where power cuts are frequent.

10) Make use of naturally available materials, no chemical treatment of water involved

3.4 Hazardous Waste Audit

3.4.1Chemical Waste:

Hazardous waste is waste that poses substantial or potential threats to public health or the environment. These wastes may be found in different physical states such as gaseous, liquids, or solids. A hazardous waste is a special type of waste because it cannot be disposed of by common means like other by-products of our everyday life. Depending on the physical state of the waste, treatment and solidification processes might be required. The four characteristics are Ignitability, Corrosivity, Reactivity, and Toxicity.

. For simplicity Y.C.Warana Mahavidyalaya Warananagar college campus divided into eight parts includes Science, Arts, Commerce, Gymkhana, Computer Lab., Office, Exterior and CFC. Out of these small quantity of Hazardous waste is observed only in Department of Chemistry, which is generated due to various chemicals handled in the department. It is in the form of solid as well as in liquid state. Data of Hazardous waste recorded is given below:

Table No.4.1: Hazardous Waste Generated at College

Sr. No.	Department	Type of Hazardous Waste	Hazardous Waste in (kg)	Hazardous Waste in (liters)
1	VKCA/ MPSC	Laboratory Chemicals and other	Nil	Nil
2	Botany	Laboratory Chemicals and other	Nil	Nil
3	Garden	Laboratory Chemicals and other	Nil	Nil
4	HSVC	Laboratory Chemicals and other	Nil	Nil
5	Library	Laboratory Chemicals and other	Nil	Nil
6	Gymkhana	Laboratory Chemicals and other	Nil	Nil
7	Sociology	Laboratory Chemicals and other	Nil	Nil
8	Hindi	Laboratory Chemicals and other	Nil	Nil
9	Economics	Laboratory Chemicals and other	Nil	Nil
10	History	Laboratory Chemicals and other	Nil	Nil
11	English	Laboratory Chemicals and other	Nil	Nil
12	Geography	Laboratory Chemicals and other	Nil	Nil
13	Marathi	Laboratory Chemicals and other	Nil	Nil
14	Commerce	Laboratory Chemicals and other	Nil	Nil
15	Computer (IT)	Laboratory Chemicals and other	Nil	Nil
16	Mathematics	Laboratory Chemicals and other	Nil	Nil
17	Zoology	Laboratory Chemicals and other	Nil	Nil
18	Chemistry	Laboratory Chemicals and other	4.320	11.500
19	Cap-Centre	Laboratory Chemicals and other	Nil	Nil
20	Physics	Laboratory Chemicals and other	Nil	Nil
Total			4.320	11.500

Above Table no. 4.1 shows that data is recorded from 20 different departments in college but hazardous Chemical Waste is generated only in Chemistry department. No other department (i.e. 19 departments) generate any type of Hazardous Waste. Here solid hazardous waste is 4.320 Kg and liquid hazardous waste is 11.5 liters.

3.5. E-Waste :-

Generation of E-waste is apparent at every colleges. In academic colleges there are several equipments and instruments running in administrative as well as in various departments used for educational activities. Computers, Printers, Scanners, Xerox machines are mostly used for administrative work..At time of teaching, learning and evaluation in academic college we deal with electric material, electric equipments/ instruments ,measuring instruments, different electric circuits, wires, ICs, Microprocessors, PCBs, electronic components(like resistors, diodes, transistors, transformers, inductances, relays, etc),damages instruments, hardware's and peripherals of computer system, lighting equipments(like Bulbs, tube), fans all these include in E-wastes. The more use of such listed materials generates E- waste when these instrument/ equipments get worn out with time.

3.5.1 Science Departments:

Table No.5.1 E-waste handled, treated and disposed by science departments as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Physics	30.5	30.5
2	Chemistry	50	50
3	Mathematics	0	0
4	Botany	0	0
5	Zoology	02	02
Total		82.5	82.5

Data collected shown in above table reveals that, major source of e-waste are generated in Science department. Chemistry department generated highest amount of e-waste as compared to other departments .It is followed by Physics department which generated 30.500 kgs of e-waste which is treated and disposed in proper manner. other science departments generates negligible amount of e-waste.

3.5.2 Commerce Departments :

Table 5.2 E-waste handled, treated and disposed by Commerce departments as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Commerce	0	0

The Commerce department of our college has no any type of e-waste material.

3.5.3 Arts Departments:

3.5.3. 1 Language Department :

Table 5.3 E-waste handled, treated and disposed by Language departments as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Marathi	0	0
2	Hindi	0	0
3	English	0	0

The Language department of our college doesn't generate any E- waste.

3.5.3.2 Social Science and HSVC Department :-

Table 5.4 E-waste handled, treated and disposed by Social science and HSVC departments as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Economics	0	0
2	History	0	0
3	Geography	0	0
4	HSVC	0	0

In Social Science and HSVC Department, there is no e-waste material.

3.5.4 Computer Department/ I.T. Lab. :

Table 5.5 E-waste handled,treated and disposed by Computer departments as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Information Technology	51	51

In Department of Computer Science 51 kg e-waste is generated in last year, it is treated and disposed in proper manner.

3.5.5 Office department

Table 5.6 : E-waste handled,treated and disposed by Administrative Office as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Administrative Office	0	0
2	Principal Chamber	0	0
3	Enquiry room	0	0
4	Staff Room	0	0
5	Ladies Room	0	0
6	Meeting Room	0	0
7	NAAC Room	0	0
8	Store Room	0	0
9	Strong Room	0	0
10	Gents Room	0	0
11	Gents Lavatory	0	0
12	Cultural Hall	0	0

Administrative Office and other Sections has no e-waste material.

3.5.6 Gymkhana :

Table 5.7 : E-waste handled, treated and disposed by Gymkhana as

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Gymnasium Hall	0	0
2	Office	0	0
3	Ground	0	0
4	Doctor Room	0	0

Gymkhana and in other parts of Gymkhana has no e-waste material.

3.5.7 Exteriors :-

Table 5.8 : E-waste handled, treated and disposed by Exteriors as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Exteriors and Botanical garden	0	0

In Exteriors college there is no e-waste material.

3.5.8 Common Facility Center :

Table 5.9: E-waste handled, treated and disposed by Common Facility Center as,

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Canteen	0	0
2	Mess	0	0
3	Library	10	10
4	MPSC Center	0	0
5	Boys Hostel	0	0
6	Girls Hostel	0	0
7	Staff Quarters	0	0
8	Health Center	0	0

There are various common facility centers in our college campus like canteen, mess ,hostels, MPSC center, Library, Health Center and staff Quarters but only Library handled 10 kg e-waste material, which is disposed in last year.

Table 5.10. Department wise E-waste generation and its disposal in college:

Sr No.	Departments	E-waste handled(kg)	E-Waste treated and disposed(kg)
1	Science Departments	82.500	82.500
2	Commerce Departments	0	0
3	Arts a) Language Department b) Social Science and HSVC Department	 0 0	 0 0
4	Computer Department	51	51
5	Office	0	0
6	Gymkhana	0	0
7	Exteriors	0	0
8	Common Facility Center	10	10
Total		**143.500**	**143.500**

The total amount of e-waste generated by various departments of college is about 143.5 kg per year. .Science department generates maximum of e-waste about 82.5 kg in year, followed by Computer department generates 51kg and Common facility centers generate 10 kg e-waste. All other departments generate 0 kg e-waste.

3.6. Air Environment

Air pollution has long term and short term impact on the biotic and abiotic component of the environment. The ambient air quality with respect to the core zone around the periphery of Yashwantrao Chavan Warana Mahavidyalaya, Warananagar, was monitored. The study area represents both rural and industrial environment. The chief sources of air pollution in the study area are mainly due to existing sugar factory unit of Tatyasaheb Kore Sugar Industry, other industrial units (like Wagpos, Manugraph, Biltube milk products etc) and vehicular activities and domestic firewood burning, fuel burning etc. The major pollutants released in the atmosphere will be PM_{10}, $PM_{2.5.}$ SO_2 NO_x and CO etc.

This section describes the selection of sampling locations, methodology adopted for sampling, analytical techniques and frequency of sampling.

3.6.1 Methodology

- Selection of sampling locations

Selection of ambient air quality monitoring stations is based on the Meteorological conditions of the area.

Ambient Air Quality Monitoring (AAQM) stations were establish at Six locations with due consideration to the Meteorological conditions of the area.

Table- 6.1 Ambient Air Quality Monitoring Locations

Sr. No.	Code No.	Station Name	Description
1.	AAQ1	Near Main Gate	Sensitive zone
2.	AAQ2	Near Sugar Factory	Industrial area
3.	AAQ3	Near main Building	Sensitive zone
4.	AAQ4	Near Library	Sensitive zone
5.	AAQ5	Near Gymnastic Hall	Sensitive zone
6.	AAQ6	Near Bus Stop	Rural area

The ambient air quality monitoring has been done twice in month for every location.

The air environment data is generated for the following parameters:

- PM2.5 : Respirable Particulate Matter (RPM);
- PM10 : Respirable Particulate Matter (RPM);
- Sulphur dioxide (SO_2); and
- Oxides of Nitrogen (NO_x)
- Carbon monoxide (CO);

3.6.2 Sampling Duration

- Twenty-four hourly samples, twice a month at all air-monitoring stations.

3.6.3 Instruments Used

Respirable Dust Samplers (APM-451) of "Envirotech" make are used for sampling PM2.5, PM10 and gaseous pollutants like SO_2, NO_x. The gases are collected in a sampling tray attached to the Respirable Dust Sampler.

3.6.4 Methodology for Analysis

The air samples are analyzed as per IS: 5182 "Method for Measurement of Air Pollution".

- PM2.5/ PM10: Gravimetric Method (IS: 5182, Part IV)
- SO_2: Modified West and Gaeke Method (IS: 5182, Part II)
- NO_x: Jacobs and Hochheiser Method (IS: 5182, Part VI)
- CO: NDIR spectroscopy method

3.6.5 Presentation of Results

The ambient Air quality monitoring data analyzed and tabulated in the **Table - 6.2 to Table-6.7** which is compared with National Ambient Air Quality Standards as tabulated in **Table – 6.8 (Annexure-Q)**

Table- 6.2 Ambient Air Quality Monitoring Results

Near Main Gate (A1)					
Date of sampling	**SO_2 ($\mu g/m^3$)**	**NOx ($\mu g/m^3$)**	**PM2.5 ($\mu g/m^3$)**	**PM10 ($\mu g/m^3$)**	**CO (ppm)**
13.01.2022	14.4	19.4	20.4	39.5	BDL
18.01.2022	11.3	19.0	21.7	40.7	BDL
03.02.2022	12.8	20.1	19.6	49.2	BDL
18.02.2022	13.6	18.7	18.4	46.8	BDL
10.03.2022	15.6	20.3	22.8	50.6	BDL
26.03.2022	14.6	18.8	21.3	48.3	BDL
15.04.2022	13.9	19.1	20.9	45.9	BDL
25.04.2022	15.1	18.9	19.7	44.8	BDL
17.05.2022	10.9	19.2	20.2	48.3	BDL
28.05.2022	14.2	18.0	20.7	47.2	BDL
09.10.2022	10.3	18.6	16.7	37.4	BDL
26.10.2022	13.1	18.9	16.9	42.4	BDL
06.11.2022	12.4	19.4	17.9	43.2	BDL
20.11.2022	11.8	18.7	18.4	44.8	BDL
11.12.2022	12.1	20.2	19.5	46.5	BDL
26.12.2022	13.6	19.3	20.4	41.3	BDL

Table- 6.3 Ambient Air Quality Monitoring Results

Near Sugar Factory (A2)					
Date of sampling	**SO_2 ($\mu g/m^3$)**	**NOx ($\mu g/m^3$)**	**PM2.5 ($\mu g/m^3$)**	**PM10 ($\mu g/m^3$)**	**CO (ppm)**
13.01.2022	19.8	24.9	24.8	53.1	BDL
18.01.2022	20.3	21.8	26.1	52.8	BDL
03.02.2022	11.2	19.8	18.7	40.1	BDL
18.02.2022	14.4	20.7	22.1	47.9	BDL
10.03.2022	13.8	22.3	23.9	49.9	BDL
26.03.2022	16.7	19.9	21.8	50.4	BDL
15.04.2022	19.3	23.6	24.2	52.6	BDL
25.04.2022	18.7	24.2	22.6	51.3	BDL
17.05.2022	22.4	28.3	26.8	58.9	BDL
28.05.2022	15.9	26.9	22.7	53.4	BDL
09.10.2022	16.8	24.8	24.6	56.2	BDL
26.10.2022	18.3	27.3	25.5	52.3	BDL
06.11.2022	17.9	26.2	23.9	54.7	BDL
20.11.2022	16.8	22.8	20.8	48.6	BDL
11.12.2022	20.4	24.1	24.7	51.7	BDL
26.12.2022	22.4	28.3	26.8	58.9	BDL

Table- 6.4 Ambient Air Quality Monitoring Results

Near Main Building (A3)					
Date of sampling	**SO_2 ($\mu g/m^3$)**	**NOx ($\mu g/m^3$)**	**PM2.5 ($\mu g/m^3$)**	**PM10 ($\mu g/m^3$)**	**CO (ppm)**
13.01.2022	10.8	19.7	16.3	46.7	BDL
18.01.2022	8.3	18.4	14.8	41.3	BDL
03.02.2022	8.6	19.1	15.2	38.2	BDL
18.02.2022	7.9	17.9	13.9	36.8	BDL
10.03.2022	9.3	16.8	15.8	37.6	BDL
26.03.2022	8.8	15.4	16.1	41.4	BDL
15.04.2022	8.4	16.2	14.5	44.2	BDL
25.04.2022	9.3	18.7	14.3	40.8	BDL
17.05.2022	8.0	17.3	15.1	39.6	BDL
28.05.2022	8.2	18.2	14.9	41.8	BDL
09.10.2022	7.8	13.6	11.3	29.6	BDL
26.10.2022	8.3	15.9	14.4	32.2	BDL
06.11.2022	8.1	16.4	15.2	34.8	BDL
20.11.2022	8.8	17.5	13.1	38.4	BDL
11.12.2022	7.9	16.2	14.8	40.2	BDL
26.12.2022	8.0	18.1	16.0	42.8	BDL

Table- 6.5 Ambient Air Quality Monitoring Results

Near Library (A4)					
Date of sampling	**SO_2 (μg/$m^{3)}$**	**NOx (μg/$m^{3)}$**	**PM2.5 (μg/$m^{3)}$**	**PM10 (μg/$m^{3)}$**	**CO (ppm)**
13.01.2022	10.2	19.8	14.2	43.7	BDL
18.01.2022	9.3	18.4	13.8	41.4	BDL
03.02.2022	11.0	17.8	15.7	36.9	BDL
18.02.2022	9.6	16.9	14.4	38.6	BDL
10.03.2022	8.4	14.1	11.6	30.1	BDL
26.03.2022	9.3	15.4	13.9	40.5	BDL
15.04.2022	8.4	17.2	15.2	38.4	BDL
25.04.2022	11.8	20.3	17.6	45.9	BDL
17.05.2022	9.9	18.4	14.3	39.8	BDL
28.05.2022	10.1	19.2	16.8	40.2	BDL
09.10.2022	9.6	17.7	15.2	41.6	BDL
26.10.2022	8.9	16.9	16.4	39.9	BDL
06.11.2022	8.7	19.4	15.9	42.8	BDL
20.11.2022	8.7	18.1	14.3	39.4	BDL
11.12.2022	9.1	18.4	16.8	41.8	BDL
26.12.2022	9.3	19.2	17.1	42.7	BDL

Table- 6.6 Ambient Air Quality Monitoring Results

Near Gymnastic Hall (A5)					
Date of sampling	**SO_2 (μg/$m^{3)}$**	**NOx (μg/$m^{3)}$**	**PM2.5 (μg/$m^{3)}$**	**PM10 (μg/$m^{3)}$**	**CO (ppm)**
13.01.2022	8.6	15.8	13.8	40.7	BDL
18.01.2022	8.2	16.2	12.9	41.9	BDL
03.02.2022	8.0	17.3	13.6	42.3	BDL
18.02.2022	8.1	14.9	12.3	32.8	BDL
10.03.2022	8.4	15.8	13.1	40.9	BDL
26.03.2022	9.1	15.9	14.8	39.5	BDL
15.04.2022	9.2	16.1	14.2	42.7	BDL
25.04.2022	9.7	18.3	15.4	47.2	BDL
17.05.2022	8.3	17.4	14.3	41.8	BDL
28.05.2022	8.7	16.9	13.8	44.9	BDL
09.10.2022	9.1	17.8	13.7	40.8	BDL
26.10.2022	8.5	18.3	14.1	42.6	BDL
06.11.2022	8.3	18.6	15.2	38.9	BDL
20.11.2022	9.4	17.2	13.4	36.8	BDL
11.12.2022	8.7	17.4	13.7	40.2	BDL
26.12.2022	8.6	17.9	14.1	43.1	BDL

Table- 6.7 Ambient Air Quality Monitoring Results

Near Bus Stop (A6)					
Date of sampling	**SO_2 (µg/$m^{3)}$**	**NOx (µg/$m^{3)}$**	**PM2.5 (µg/$m^{3)}$**	**PM10 (µg/$m^{3)}$**	**CO (ppm)**
13.01.2022	20.7	25.7	28.1	53.2	BDL
18.01.2022	20.9	22.9	24.2	50.7	BDL
03.02.2022	19.8	24.7	21.6	52.9	BDL
18.02.2022	18.4	23.1	22.9	58.4	BDL
10.03.2022	21.2	27.4	28.3	60.4	BDL
26.03.2022	20.6	25.2	25.2	55.3	BDL
15.04.2022	19.9	24.8	26.8	51.6	BDL
25.04.2022	18.4	26.3	27.3	54.8	BDL
17.05.2022	20.3	25.8	20.5	53.6	BDL
28.05.2022	19.2	24.9	25.2	56.9	BDL
09.10.2022	14.9	20.8	17.4	44.8	BDL
26.10.2022	17.6	23.4	22.4	51.3	BDL
06.11.2022	18.4	26.5	26.2	53.4	BDL
20.11.2022	19.8	22.7	23.8	55.1	BDL
11.12.2022	20.1	23.6	21.4	50.8	BDL
26.12.2022	19.7	21.9	20.9	53.2	BDL

Ambient air quality analysis results for the six monitoring locations which were selected to represent condition of the region are given below.

3.2.6 Near Main Gate (A1)

The location comes under Sensitive zone. The concentration of PM2.5 ranged from 16.7-22.8 µg/m3 while that of PM10 was in the range of 37.4-50.6 µg/m3, SO2 and NOx were in the range of 10.3-15.6 µg/m3 and 18.6-20.3 µg/m3 respectively. The CO values were observed in the Below Detectable Limit.

3.2.7 Near Sugar Factory (A2)

The location comes under Industrial zone. The concentrations of PM2.5 and PM10 at this location were in the range of 18.7-26.8 µg/m3 and 40.1-58.9 µg/m3 respectively. While the values of SO2 and NOX were observed in the range of 11.2-22.4 µg/m3 and 19.8-28.3 µg/m3 respectively. The CO values were observed in the Below Detectable Limit.

3.2.8 Near Main Building (A3)

The location comes in the Sensitive zone. Here the PM2.5 and PM10 concentrations were in the range of 11.3-16.3 µg/m3 and 29.6-46.7 µg/m3 respectively. The concentrations of SO2 and NOx were observed in the range of 7.8-10.8 µg/m3 and 13.6-19.7 µg/m3 respectively. The CO values were observed in the Below Detectable Limit.

3.2.9 Near Library (A4)

This location comes within the Sensitive zone. The concentrations of PM2.5 and PM10 at this location were in the range of 11.6-17.6 µg/m3 and 30.1-45.9 µg/m3 respectively. While the values of SO2 and NOX were observed in the range of 8.4-11.8 µg/m3 and 14.1-20.3 µg/m3 respectively. The CO values were observed in the Below Detectable Limit.

3.2.10 Near Gymnastic Hall (A5)

The location comes under Sensitive Zone. The concentration of PM2.5 ranged from 12.3-15.4 µg/m3 while that of PM10 was in the range of 32.8-47.2 µg/m3. SO2 and NOx concentrations were in the range of 8.1-9.7 µg/m3 and 14.9-18.3 µg/m3 respectively. The CO values were observed in the Below Detectable Limit.

3.2.11 Near Bus Stop (A6)

The location comes under Rural Area Zone. The concentration of PM2.5 ranged from 17.4-28.3 µg/m3 while that of PM10 was in the range of 44.8-60.4 µg/m3. SO2 and NOx concentrations were in the range of 14.9-21.2 µg/m3 and 20.8-27.4 µg/m3 respectively. The CO values were observed in the Below Detectable Limit.

The summary of the monitoring results including minimum, maximum and average levels are presented in Table 1.2. The results obtained were compared for 24hrs average standards for residential areas prescribed by the National Ambient Air Quality Standards (NAAQS). The National Ambient Air Quality Standards are presented in **Table 6.8**

Table 6.8: National Ambient Air Quality Standards (NAAQS)

Sr. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air (µg/m^3 except indicated)		
			Industrial Area	Residential, Rural and Other Areas	Sensitive Area
1	Sulphur Dioxide (SO_2)	Annual Average *	80	60	14
		24 Hours**	120	80	32
2	Oxides of Nitrogen (NO_x)	Annual Average *	80	60	14
		24 Hours**	120	80	31
3	Suspended Particular Matter (SPM)	Annual Average *	360	140	70
		24 Hours**	500	200	100
4	Respirable Particular Matter (RPM)	Annual Average *	120	60	50
		24 Hours**	150	100	78
5	Carbon Monoxide (CO)	8 Hourly Average*	5.0 mg/m^3	2.0 mg/m^3	1.0 mg/m^3
		1 Hour Average**	10.0 mg/m^3	4.0 mg/m^3	2.0 mg/m^3

1)Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval

2)24 hourly /8 hourly values should be met 98% of the time in a year. However, 2% of the time it may exceed but not on two consecutive days

The salient observations of the results and their compliance to the 24 hourly average NAAQ standards are as follows:

1)The maximum concentration of PM2.5 observed was 28.3 µg/m^3 near Bus Stop site. The peak PM10 value of 60.4 µg/m^3 was also observed near Bus Stop site.

2)The Sulphur Dioxide levels monitored at all the locations confirms to the standards of 80 µg/m^3, with highest value of 22.4 µg/m^3 observed Near sugar Factory.

3)The Oxides of Nitrogen levels monitored at all the locations also complies with the stipulated standards of 80 µg/m^3.

4)The Carbon Monoxide levels also complied with the stipulated standards of 2.0 mg/m^3, The CO levels at all the locations were within the stipulated limit.

5)Sampling location which are in campus shows sensitive zone standards while Sampling location which are out campus shows industrial area , Rural area zone standards.

3.7 WATER ENVIRONMENT

The purpose of this study is to:Assess the waste water characteristics of the laboratory waste;

Waste water sample was examined for physio-chemical parameters in order to assess the characteristics of the laboratory waste. The sample was collected and analyzed as per the procedures specified in 'Standard Method for the Examination of Water and Wastewater' published by American Public Health Association (APHA).

Sample for chemical analysis was collected in polyethylene cans. Selected physio-chemical parameters have been analyzed to identify the laboratory waste water quality.

The results of sample are as given below **Table 7.1**.

Table 7.1: Laboratory waste analysis Results

Sr. No.	Parameters	Results	Unit
1	Ph	7.4	---
2	Total Dissolved Solids (TDS)	268	mg/l
3	Bio-chemical Oxygen Demand (BOD)	88	mg/l
4	Chemical Oxygen Demand (COD)	844	mg/l
5	Oil and Grease	0.03	mg/l

From the analysis report of laboratory waste it is observed that Chemical Oxygen Demand (COD) is higher.

From above report the COD of laboratory waste water sample is observed to be high (840mg/L), hence it is not suitable for irrigation purpose. It can be decreased and make suitable for irrigating by adding coagulants like $Fecl_3$ and $Fe_{2(}So_4$) and then passing the sample through the filter made up of sands, charcoal, activated carbon.

3.8. NOISE ENVIRONMENT

The noise levels measurements were carried out using precision noise level meter. The noise level survey was carried out at six locations, located within the in campus and out campus of Yashwantrao Chavan Warana Mahavidyalaya, Warananagar. The major source of noise identified in the study area has been predominantly the vehicular movement, and the transportation activities.

3.8.1Selection of Locations for Monitoring

Noise monitoring has been undertaken for the duration of 24 hrs at each location to cover up all the periods of the day to establish the noise levels and assess the impact of the total noise generated at the study area. The environment setting of each noise monitoring location is given in **Table 8.1.**

Table 8.1: Details of Noise Monitoring Locations

Location Code	Monitoring Location	Criteria
N1	Near main gate	Sensitive zone
N2	Near sugar factory	Industrial area
N3	Near main building	Sensitive zone
N4	Near library	Sensitive zone
N5	Near gymnastic hall	Sensitive zone
N6	Near bus stop	Rural area

3.8.2 Instrument Used for Monitoring

Sound pressure level (SPL) measurements were automatically recorded with the help of an Integrated Sound Level Meter to give the equivalent noise level for every hour continuously for 24 hours in a day

3.8.3 Results

Equivalent noise levels viz., L_{day} and L_{night}, at the noise monitoring locations are provided in **Table 8.2** while noise standards are given in **Table 83.**

Table 8.2: Noise Monitoring Results in the Study area

Name of Station	Noise Levels (dBA)		Ambient Noise Standard (dBA)		
	Day	Night	Day	Night	Category of area
Near main gate	68.0	51.2	50	40	Silent zone
Near sugar factory	68.8	55.5	75	70	Industrial
Near main building	61.4	46.2	50	40	Silent zone
Near library	55.0	41.3	50	40	Silent zone
Near gymnastic hall	54.0	41.0	50	40	Silent zone
Near bus stop	71.5	61.5	65	55	Urban area

From the monitoring survey of noise levels it was observed that the day time noise levels were observed in the range of 54.0-71.5 dB(A). The higher noise levels are due to vehicular traffic in the area. The night time noise levels observed at all the 6 locations were found to be in the range of 41.0-61.5 dB(A), which are found to be higher due to the transportation.

Table 8.3: Ambient Noise Quality Standards

Category of Area/Zone	Limits in dB(A) Leq*	
	Day Time	Night Time
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence Zone	50	40

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

Night time shall mean from 10.00 p.m. to 6.00 a.m.

- ✓ Silence zone is defined as an area comprising not less than 100 meters around hospitals, educational institutions and courts. The silence zones are zones, which are declared as such by the competent authority.
- ✓ Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

Chapter-IV

Aware of the suffering caused by the destruction of life, I undertake to cultivate compassion and learn ways to protect the lives of people, animals, plants, and minerals.

- Thich Nhat Hanh, Buddhist monk

Our task must be to free ourselves by widening our circle of compassion to embrace all living creatures and the whole of nature and its beauty.

- Albert Einstein

We share the earth not only with our fellow human beings, but with all the other creatures.

- Dalai Lama

OUR CAMPUS


College Well


Solar Water heater at Boys hostel

Vermicomposting Plant.


Botanical garden

‘Shivneri Ground’ 


Ramps for Disabled students

Green Lawn Behind Science Building

Lawn near Science Building Parking

Use of LED Lamps

Lawn in Front of Library

Roof top Rain Water Harvesting
(Back Side of Library Building)

Roof Top Water Harvesting
(New Building)


Green Lawn: Study Area


Lawn In Front of College


Lawns: Near Main Stage

Front Lawn : Sprinklers

‘Smurti- Mandir’: Late. Tatyasaheb Kore

Boys Hostel Campus


Boys Hostel Campus


Trees in Hostel Campus

Greenery on both sides of Road In Boys Hostel Campus

Medical facility center & Greenery around the road

Lawn :Nilkantheshaver Garden

View near Nilkantheshaver

Waste Collector

College Roads

Gymnasium Hall

Top View of Entrance

Solid Waste Collection

Collection of Chemical Waste from Laboratory

Arrangement of coloured bench for disabled students

College- Rose Garden

College farm

– Disable friendly environment

1. Ramps for classroom and Library

Water conservation facilities available in the Institution:

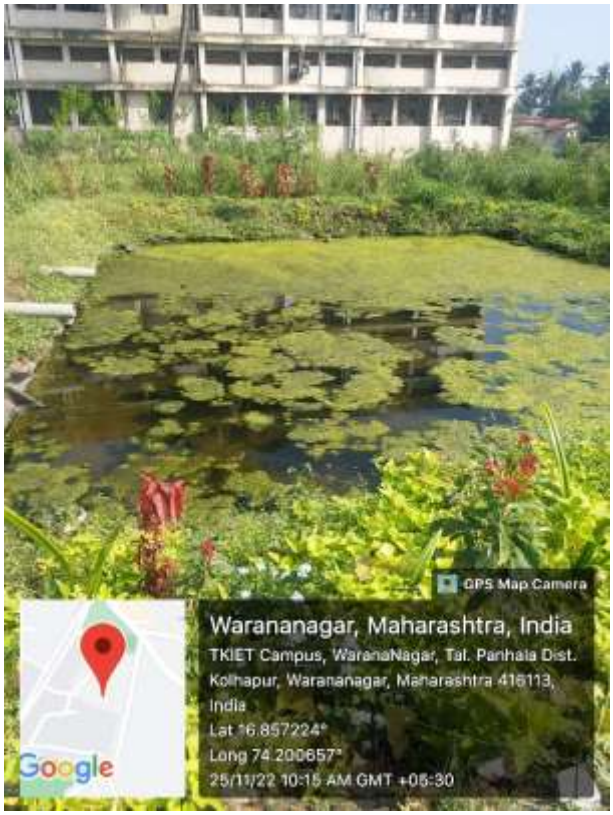
1. Rain water harvesting

Bore well /Open well recharge

2. Construction of tanks and bunds

3. Waste water recycling

Maintenance of water bodies and distribution system in the campus



Chapter-V

Environment Consciousness Through Green Practices:

5.0 Environment Consciousness through Green practices:

5.1. Environment Consciousness:

A clean and healthy environment is one of the desired pre-requisites in any educational institution. To accomplish this, our institution emphasizes on adopting good green practices and bringing environment consciousness to our campus and surrounding areas through various endeavors. The institute is conscious of environmental issues. It tries to create environmental awareness among the stakeholders. The conscious involvement of all stake holders facilitates this process.

The institution works towards inculcating best practices, invoking environmental consciousness among students and creating global awareness. The institute authorities are very keen on making the campus eco-friendly by adopting energy conservation practices, effective waste management at source and plantation for making the campus clean, green and healthy. Some following strategies adopted by the college for environmental consciousness are listed as 'Green Practices'. Environment awareness, Tree plantation, Clean campus, Energy conservation, Rain water harvesting, Solar street lamps, Solid and Liquid Waste Disposal, Green auditing of campus, Greening the campus, No vehicle day , Bicycle Bank for girls, Awareness rallies, Different Competitions for the awareness and protection of environment like Best from waste competition, Trackings, study tours/ visits to biodiversity places to give the message of walk, Cleaning of campus and the nearby villages on different occasion.

5.2 Initiatives taken by the college to make the campus eco-friendly-

In the present year the college started Environmental Eco-club to implement green policy around the year to make the college eco-friendly. The club undertakes activities like organization of related event , beautification, tree plantations, awareness programs, water and power management

In order to create environmental awareness amongst the students, they are encouraged to participate in activities like 'Swachata Abhiyan', Save Fuel, No Vehicle Day etc.

Various competitions like Rangoli, Essay, Elocution, Poster Presentation etc. on the topics related to environment are organized. Students are also motivated to give message of eco-friendly practices through Street Plays, Rallies, Articles in Botanical News Letter, Wall Paper, Warana Varshik etc

5.2.1Energy conservation:

There is a close connection between excess use of energy and environmental damage. Consumption of energy for routine activities like lighting, heating, cooling and ventilation results into severe depletion of invaluable environmental resources. Attempts are made for energy conservation through following measures:

- Majority of our class rooms, office, gymnasium, canteen, hostels and staff quarters are provided with spacious windows to have enough ventilation and sun light, so the use of electricity is naturally less.
- Preference is given to the most energy efficient and environmentally sound appliances such as energy-saving CFL and LED bulbs and LED tubes with reflectors. All computers in the institution are provided with LED screens.
- It is ensured that all electronic and electrical equipment, such as computers, are switched off when not in use and are generally configured in power saving mode, when such option is available. The air-conditioners are not used anywhere in the campus.
- LPG is used in the department of Physics, Chemistry and HSVC for practical and educational purpose but its consumption is very less.
- 'No Vehicle Day' is observed every year on 13th December which is death anniversary of the founder of the institution late Tatyasaheb Kore.
- Students and staff are encouraged to walk by organizing workshop on 'Yogic Walking' and walking competition for faculty members.
- Majority of staff coming from other places use vehicles in sharing. About 45 % of students use state transport vehicles for college.
- To promote use of cycling, Cycle Bank Scheme for girl students is run as one of our Best Practices.

5.2.2 Use of renewable energy:

To make the campus pollution free and to conserve conventional energy resources, our college tries to enhance use of solar energy. Presently, use of renewable energy in our campus is as listed below.

- Sunlight is our principle source of energy. All the rooms in both the buildings are airy and sunny and do not need electricity during day time.
- Solar water heating panels are used for Boys

and Girls Hostels.

- **449.28 KW Solar Power Pack Plant on Roof**- Our management installed 449.28 KW solar power pack plant on roof of science building which comprising 1452 nos. of solar panels of 320W inverter and associated all equipment's. Out of 1452 solar panels of power pack project 774 placed on Main building which generate 239.94 KW energy , 194 placed on new building generate 60.14 KW energy and 484 placed on YC science building which generate 150.04 KW energy. The material and associated equipment's installation cost of above project is 2,69,77,500/- (Rs.) and came in force on 21st February 2019, from that day the Maharashtra State Electricity Distribution Co. Ltd(Mahavitran) and Warana Shikhan Mandal work according to MOU between them. It contains the units of electricity consumption, electricity generation, import units and units in the bank/ storage. The detailed study of Solar power pack plant in duration of March 2019 to May-2022 of 39 month in which total electricity consumption in campus 1950818 units, electricity generated by Solar power pack plant is 1627189, electricity imported from Mahavitran is 537059units and power bank in account of Warana shikshan mandal is 213430 units. In the duration of 39 months actual electricity units are payable are 323629 units out of it the of YCWM college is nearly around the 32563 units. The use of the electricity was is minimized than first phase of energy audit.

5.2.3 Water Harvesting:

In campus water harvesting and water recycle systems are functioning. Our students published no. of articles in Warana Varshik Magazins (2017-22) Pani Re Pani' (Water… Water), on burning environment and on some global issues. And got lot of prizes osf Shivaji University, Kolhapur. The number of students won the elocution competitions on the water harvesting and its current coin importance.

5.2.3 Plantation:

There are a good number of trees and plants that make the campus of the college green. The college campus has Total 5623 trees including flower plants, medicinal plants, fruit plants and local varieties.

The college has made conscious efforts to bring unutilized land under plantation through NSS, NCC, staff and students. In campus about 602 trees are planted in year 2016 to 2022 . Drip/sprinkle irrigation scheme is being used for watering the gardens and lawns. The increased green cover has reduced carbon foot- print of the college campus. Plantation is done on the occasions of on special days like, Teachers Day, Guru Pournima, Kranti Din, Paryavaran Day etc. Welcome of our guests is done by giving plants.. As an effort towards creating awareness on plantation in nearby places Cycle Rallies are arranged by NSS/NCC students, on different occasions.

- Following chart shows tree plantation in the campus.

Table. 1. Total Plants (Campus Excluding Botanical Garden)

S. No.	Name	Types	Total No.
1	Trees	85	3296
2	Shrubs	46	1622
3	Herbs	17	668
4	Climbers	4	37
	Grand Total	**152**	**5623**

Table. 2. Classification as per utility of Tree Plants (Campus Excluding Botanical Garden)

Sr. No.	Plant class	Types	Quantity
1	Avenue trees	16	838
2	Flowering plants	22	405
3	Fruiting Trees	27	640
4	Gymnosperm	05	086
5	Ornamental trees	08	462
6	Palms	07	883
	Total	**85**	**3296**

5.2.4E-waste management:

Institute disposes all types of E-waste by outsourcing. The institute has remarkably less e-waste in the form of chips, bulbs, circuit boards, mother boards, computers, batteries, relays, and switches. Institute sends it for recycle or disposes scientifically by outsourcing.

5.3 Some Green practices-

1.Cycle Bank for Girl Students- The scheme is started with a goal to Promote women education particularly in rural area. - Warana region where our institution is situated comprises of near about 70 villages and some hilly settlements. Majority of our students

come from such places. Facilities of S. T. bus is available but very often does not suit to the college timings. Even the students have to walk miles together to reach the nearby bus stand, as there is no provision of state transport to the settlements where they live.. Very often students have to travel by private transport which is more expensive and inconvenient, particularly for the girl students. It has been noticed that because of the inadequacy of transportation facility, parents from rural area do not allow their daughters to have higher education.

Establishment of Cycle Bank Scheme for the girl students is a novel concept to provide easy and almost cost free transportation facility to girl students and promote the noble cause of 'women education'.

Every year about 80-85 bicycle are distributed among girl students who coming from rural areas and facing travelling problems, under cycle bank scheme. Which they can use for transportation to college and also for personal purpose.

As cycling is one of the best exercises, the beneficiaries have developed physical fitness also. It is one of best green practices of our institution which minimize fuel consumption, Energy consumption control co_2 and air pollution of campus surrounding.

Tree plantation-Tree plantation is done in and outside the campus by faculty, students, various occasion like Krantidin, Anniversaries of distinguished people, Teacher's day etc.

Also college organize tree plantation programmes through NSS and NCC in adopted villages. The students gave the plants to their teachers as a gift on Teacher's Day. Usually plants are used as gifts and token of appreciation. The greenery in campus helps for carbon neutrality.

Swachata Abhiyan- Students are encouraged to give active participation in 'Swachata Abhiyan'. Under this NCC and NSS student run different programme to clean the nearby villages and adopted villages. The students of our college participate in 'Clean India Mission' to clean their villages and the surroundings of college campus. They have occasionally cleaned local bus stand and river beds etc.

The student of NSS participate very actively and enthusiastically in camp and they extend their duties to clean villages nearby. To create awareness about the cleanness, college organizes different programmes through NCC and NSS also.

Classroom cleaning by student: Students keep their classroom clean. Students take initiative in keeping the campus clean, washing the classrooms. After any programme, the campus is immediately cleaned by the students.

College campus cleaning: The students of NSS and NCC clean the surroundings /campus of college at different occasion.

Drip/sprinkle irrigation: Drip/sprinkle irrigation: Drip/sprinkle irrigation has been used for watering the garden / lawns The increased green cover has reduced carbon foot- print of the college campus. It reduces water and electricity consumption.

Dust bin:-Dustbins are placed at proper places in college to collect wastes (solid, wet separately) and these are monitored periodically.

Warana Magazine-Institution tries to create awareness about the issues related to environment among students through students articles, photos, sketches, poems. visit reports, essays etc in Warana Magazine.Through our Annual Warana Varshik the message of environmental consciousness and cleanliness is given to the society.

Lead college activity: College organize different activities under the Lead College Activity : To different activities under the Lead College Activity : To Preserve Enviroment, To Enhance Use of Non-conventional and Renewable Energy. To create the environmental awareness between the stakeholders college organize the workshops and seminars through which eminent personalities and expertise give the guidelines.

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Cultural programs-In different programmes like Yovkamohostav, Cultural competition, NSS/ NCC cultural programme the message of 'Save Nature', 'Save Environment', 'Save Water', 'Save energy', 'Save baby girl', 'Save birds' etc is given through street plays (Pathnatya) , Muknatya, dances, one act play, street plays (Pathnatya) , Muknatya, dances, one act play and group songs. Such practices create awareness about environmental consciousness and students participate actively.

Yoga- Yoga shibirs are organized by NSS,NCC. All the faculty members observed International Yoga Din by practicing yoga. Yoga workshops are organized for NCC and girls students.

Projects on environmental Science –In the syllabi of B.A./B.Sc./B.Com.II under the subject Environmental Studies, projects have been included. We allot the projects to the students concerning to the local area environmental issue. It creates the better understanding about the environmental consciousness.

Women empowerment :- Every year college organize Maha Hadaga for women empowerment.

All girl students of the college, all female faculties and many other eminent women from Warananagar enthusiastically participated in the event and once again enjoyed the childhood.

Best from Waste competition: Best from Waste competition is organized to encourage creativity, reuse and recycling of waste material.

Students actively participate in this event produce articles from paper cuttings, useful things from old cloths/ cottons, wall pieces from small wooden sticks, things from husk etc, which enrich environment consciousness.

Elocution competition- College organize

elocution competition in different subjects related environment issues. Every year such competitions were arranged on different occasions in these students were motivated to handle on the subjects related energy conservation , water harvesting , save earth, solid waste management and environmental consciousness. Zilla Parishad, Kolhapur and Panchyat samiti , Panhala combined arrange an elocution completion in each year named 'Swachata Karadak Spardha.'

(on subject of water harvesting, pollution free town, Swachat Abiyan etc) . In which our college student team is winner of fist two prizes from last three years.

No Vehicle Day:- 'No Vehicle Day' is arranged every year on 13th December which is death anniversary of the Late Tatyasaheb Kore, founder of the institution. Which is one step to reduce the fuel consumption as well as carbon emission.

Poster presentation and exhibition :- college organize poster presentation campaign, through this competition our student throw the light on environmental issues by handling the burning issues related to care of environment.

Poster presentation and exhibition give some solution for care of environment and increase the awareness about it. In such competition student handle the issues like Hiking price of electricity, tree cuttings, necessity of plantation, Water harvesting, Drip irrigation, chemical free cultivation, say no to plastic, Solid waste management, save water etc.

Essay writing:-The college organizes essay competitions in different subjects like preservation of eco- system, go toward villages, Free addictions ,Save biodiversity, tree plantation, save baby girl, save enery, benefits of blood donation, rural cleanliness etc.

Lecture of eminent personality- Every year we organize the lectures of the eminent personality in different sectors who aware and improve the technical knowledge about burning issues of environment and its ecology.

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Establishment of 'Rockery':- Students of B.Sc.-III botany established a 'Rockery' in the botanical garden of the college. This rockery have sheltered almost 30 different xerophytic plant species **.** Students of Botany and Zoology Department each year make the rockery to plants, trees before the rainy season.

Treks-Trekking is essential for every one , it keeps us healthy and strong. Keeping this object Departments like Geography, History, Sociology, Botany, Zoology, NCC,NSS units

organize treks to historical and biodiversity place which gives the message if walk and create awareness about environmental consciousness.

Study tours/ Visits:- Departments like Geography, History, Sociology, Botany, Zoology, Physics organize study tours and visits to historical and bio-diversity places.

Adventure camps: our students have participated in 'Adventure Camp' gave the message of Sahyadri Conservation and create Environmental Awareness.

Say no to plastic: Our Students from NSS and NCC have actively participated the drive of making Panhala Plastic Free. Today Panhala is declared 'No Plastic Zone' and this is success of the united efforts. A team of 20 students leaded by faculty member Dr. Vilas S. Patil, Department of Physics organize 'Waste Plastic Bottle Free Abhiyan' at Sindhudurga Fort in last year. The collected waste plastic bottles send for recycle through Sindhudurga Corporation.

For last two year our students from NCC and NCC clean the premises of historical place 'Monument of Shiva Kashid ' in Panhala.

NSS / NCC Activity:-NSS/ unit organized Cleaning of College campus and Cleaning of Temple Premises, School premises, Dinking water premises (river/ lake) in adopted Village.

Snake Exhibition:-

As in the Warananagar Agriculture is main business obviously snake bite cases frequently occure. To remove mythes about snake and to

dessiminate knowledge about usefulness of poisonous and non poisonous snakes (300 students and staff are participated)

Snake Rescue

In warananagar and in nearby villages remove snake from residential area to its habitat this activity.

Slide Show on Snake Diversity of Western Ghats:

As warananagar is situated in the western Gahats , to understand snake diversity in western Ghats

Work Shop on Handling of Non Poisonus Snakes :

As the Warananagar Agriculture is main business obivesly snake bite cases are frequently occure. To train the students in indentifying poisonous and non poisonus snakes. To dessiminate knowledge about usefulness of poisonous and non poisonous snakes (300 students are Present)

Nature Games:

Increase awarness for conservation of nature and to understand food web through game ,to understand nature and its basic rules.

Use of CFL Lamps :- To light the exterior of buildings as well as for lightening purpose in department of chemistry and HSVC uses CFL from last seven year.

Proper recycle: In department of Chemistry glass , plastic waste collected and sent for recycle. Chemicals used are low concentrated but these are diluted for number of times before drain. Chemical waste from laboratory is collected in large packed drums and send for recycle.

Rain water Harvesting:-Rain water collected every year, it is used to fulfill the necessity of distilled water for experimental work of all science department.

Air Quality Checking :- Periodically Air Quality Checking in campus is conducted with help of our ex- student Dr. Banne Prashant who is working as Director, Saitech, Research and Development Organization, Kolhapur.

Blood Donation Camps:-College creates awareness about blood donation by periodically organizing blood donation camps .

Greeting Card Making :- Department of Botany organized a work shop on' Greeting Card Making' by using pressed and dried plant parts from herbaria. Thirty students of B.Sc. II &B.Sc.III III participated the event and learnt the technique of the same, which encourage awareness about Environment and attitudes towards the Best form Waste.

Today's Plant Activity :- On every teaching day of the year the B.Sc.-III students from Botany Department display a plant in front of the department under the activity ' Todays Plant.' Along with this they also provide the information on Botanical Name, Family, Common Name, occurrence and Medicinal uses of that plant which gives beneficial information about local plants.

Plants Counting, GPS- Mapping of Trees and Biomass Assessment:-Junior, Senior wing faculty , students of B.Sc.-II and III of Botany and Zoology department actively participated in the Plant Counting (Biomass Assessment) programmee of 'Green Audit' under which the counting of plants in overall campus , its classification and the Biomass generated is estimated in span of 2th November 2015 to 16th November 2015 after their regular college timing.

Gardens and Greenery:- Warananagar is having a treasure of gardens and greenery. The campus is having variety of gardens which includes Botanical garden, Landscape gardens, Garden of Medicinal plants etc. The emphasis has been given to save the rich bio-diversity of the region. The students of B.Sc.-II have studied these gardens from the view point of botany and to study the architecture for their horticultural term papers. They have enlisted various plants grown therein and submitted the term paper for the practical examinations.




Vermicomposting Plant:-The efforts were also made to form a Vermicomposting plant in Botanical garden to convert the bio-mass and bio-degradable waste, canteen waste in campus to 'Vermicompost' and which is being used for the greenery of the campus.

Medicinal and cosmetic products:- Students of B.Sc.- II are working on 'Medicinal and cosmetic products' for their Horticulture Term paper.

Save Birgd-

Our Botany and Zoology student form small nests on different trees in botanical garden due to which bird diversity in our college garden is increased.

Organization of Nature Visits:-Being the students of Botany, our staff and pupils are always in interaction with 'Nature'. The acquisition of knowledge of botany can be well demonstrated in the 'Nature Visits'. Every year we organize study tours to various biodiversity rich places where we share our knowledge with students and localities. This indicates our affinity towards nature and its conservation.

Rangoli competition :- In this competition number of students helps in making the awareness of other students with well handling of burning issues of environmental pollution and need of save baby girl. The college create the awareness about environment protection by organizing 'Rangoli Competition'

Identification of medicinal plants:- Correct identification and authentication of medicinal plants is having prime importance in the field of pharmacy. Our department provides these facilities to the T.K. pharmacy college and Biotechnology Dept. of TKIET. None the less we have signed an MOU with these institutions for mutual sharing of knowledge between us. We have some common publications in National journals under this activity.

Plantation of endemic plants:-Bio-diversity conservation is one of the important subjects now a days. Being botany students it's our prime duty to save the nature for which we are taking plantations programmes every year. We give more emphasis on the root drugs and endemic plants for their conservation. We have also shared our botanical expertise with the social forestry department of the Maharashtra and have exchanged the botanical materials.

Celebration of Birth Anniversaries:-

India wish to become a 'Super Power' at the end of 2020. Scientists and students are playing vital role in this movement. We are also committed to become the part of this International Event. Being science students we always celebrate the 'Birth Anniversaries' of important scientists and make students aware of their contribution in 'World Building'. These create scientific awareness among the students for their own development none the less these types of events are supportive for creating awareness about nature and its conservation

Bio-treasure :-Botanical gardens are playing vital role as 'Bio-treasure' in the field of Botany. We are very proud to mention here that our college has got botanical garden of almost one acre area. This shelters plant diversity like algae, bryophytes, pteridophytes, gymnosperms, angiosperms etc. The emphasis has been given to propagate endemic and endangered plants of the region. The samplings are collected during field visits, from the lead botanical garden of the Shivaji Uniersity, Kolhapur and Social Forestry department of the Maharashtra Government.

'Avishkar' Research Competition:-

Every year our students participate in 'Avishkar' University Level Research Poster Presentation Competition organized by Shivaji University and bag the prizes. In this competition our student present the research poster on the local environmental consciousness issues. Mainly on the Energy conservations, Solid Waste Management, Water Harvesting, Air Pollutions etc.

Concession in fees for girls;- (efforts for gender equality)Right from the beginning the institution has supported and facilitated woman education and multifaceted development of the female gender.

In 1980 Late. Tatyasahebji Kore established ladies hostel. He provided concession in the tuition fees and hostel fees to the needy girls, so that maximum number of girls should avail the facility of education. Today also Yashwantrao Chavan Warana Mahavidyalaya works on the principles and philosophy of the founder.

Animal corner:

On every teaching day of the year the B.Sc.-III students from Zoology Department display a information of animals in front of the department under the activity ‘Animal corner.’ Along with this they also provide the information on animal Name, Family, Common Name, occurrence etc.

Gymkhana:- College Gymkhana plays a vital role in the multi-faceted development of students. The Gymkhana provides sports facilities of 24 types to both girls and boys. Excellence in Mallakhamb is the best practice of the institution.

The boys Mallakhamb team is the winner of R.P. Powar Mallakhamb Trophy for 29 years in row . The girls Rope Mallakhamb team has all India place.

uring last five years total 835 girls and 605 boys participated in various types of sports. Out of them 394 girls and 366 boys participated in team events and 241 girls and 239 boys played individual sports. Girls Hockey team and Handball team are the Zonal winners for the last 12 years in row.

NCC:-

College has the Boys NCC unit as 56 MAH BN NCC Kolhapur and girls NCC unit as 6 MAH Girls BN NCC Kolhapur. Intake of Boys NCC unit is 104 and girls unit is 50 cadets. Both boys and girls cadets take oath of body donation, participate in various social activities and awareness programmes. They have equal opportunity of participating in various State and National level Camps and appearing for 'B' and 'C' Certificate exams. Participation of NCC Girls and Boys cadets in regional, State and National level Camps.

. Health Awareness:-

Every year girls are made aware of the health issues through expert lectures. Care is taken that every year at least one doctor should be invited to guide the girls. Hemoglobin checkup camps are organized. From 2010 to 2015 following Doctors provided guidance to the girls regarding their health.

Chapter –VI

Earth provides enough to satisfy every man's need, but not every man's greed.

- Mahatma Gandhi

Man has lost the capacity to foresee and to forestall. He will end by destroying the earth.

- Albert Schweitzer

Process of Green Auditing at Glance…

Green Audit Awareness: Meetings with experts- Dr.Prashant Banne.

Meeting :Green Audit Committee with expert

Green Audit: Faculty Awareness through: PPT presentation.

Green Audit: Concept understanding through interaction in staff.

Classroom Awareness “Save Energy”

Meeting: to fix different indicators for auditing

Near Sugar Factory **(**AAQ2**)**

Near main Building (AAQ3)

Near Library (AAQ4)


Near Gymnastic Hall (AAQ5)

Near Bus Stop (AAQ6) 


Plant Counting-NilKantheshwar


Plant Counting- Garden in front of college


Plant Counting- Boys Hostel

Greenery Measurements.

Plants counting

Water Tank Monitoring- Office Site

Water overflow Monitoring (Library Site)

Water Tank Monitoring- Science building Site

Water Tank Monitoring- Filter House Site

Green auditing: Student Data Collection

Green auditing: Student Data Collection (Science wing)

Student Data Collection: With raising Hands

Data Collection : Vehicle Use of Students

Interaction with students: Green Audit

Noise Measurement: Green Audit

Chapter-VII

‘Problems cannot be solved at the same level of awareness that created them.’

- Albert Einstein

"You can tell how high a society is by how much of its garbage is recycled."

-John Muir

Proposed Green Policy

Green Policy: 2021-22

The green Audit committee of our college conducted green audit in 2014 -15 very keenly and its second phase is conducted in 2021-22. By the green audit report, college has already taken some steps to conserve the energy as well as to avoid loss of energy. College students, faculty members and other staff all are committed to undertake this green audit as a means of continually improving in environmental performance of campus and to make it eco-friendly. College recognizes the need to function around the year in a manner to minimize its harmful environmental impact so green policy is decided.

YCWM College Green Policy is based on three pillars:

- Environmental sustainability: The Green Policy must ensure sustainability of the environment.
- Economic viability: Economic viability options should be considered in the implementation of the Green Policy.
- Social acceptance : Social acceptance is a key to the success of the Green Policy and therefore, the social context of the community, faculty and students must be taken into consideration in the Green Policy.

To this end YCWM College will:

1. Reduce energy consumption, especially of electrical and fuel energy in college campus.

YCWM College therefore commits to:

- No of electrical Appliances are replaced by most energy efficient and environmentally sound appliances, which includes using energy-saving light (CFL, LED) bulbs and LED tubes with reflectors.
- Ventilation and natural light survey of infrastructure was conducted accordingly some renovation of infrastructure was applied. Maximize the use of windows for air and natural light.
- Encourage staff, students and conference guests to save energy through visible reminders, incentives and information to increase awareness. This particularly concerns switching off electrical appliances when not in use.
- Conduct switch off drills at regular intervals and fix its responsibility on teaching / non teaching staff.
- Ensure that all electronic and electrical equipment's, such as computers, are switched off when not in use, and are generally configured in power saving mode when such option is available.
- Provide energy efficient heating systems, with adjustable controls for individual heating appliances wherever possible, and ensure that comprehensible instructions are available to staff and students on the use of heating controls
- Each block of institute has individual power control panels and energy meters installations, which help in separate and effective monitoring and control of energy consumption.
- Arrange 'No Vehicle Days' periodically/frequently (monthly if possible).
- Encourage to the students and staff of the college for walk and use vehicle with sharing to minimize fuel energy consumption.
- To Maximize use of renewable energy plan to install solar energy panel for 100 computers in lab.

2. Maximize the proportion of waste that is recycled & minimize the quantity of non recyclable refuse.

YCWM College therefore commits to:

- Reduce the absolute amount of waste that it produces from office, departments and common facility centers like college canteen, staff quarters.
- Take steps to plant big vermin composting near canteen.
- Compost all biodegradable wastes from gardens, lawns in campus, not to burn it on site.
- Donate absolute old computers to schools or the needy.
- Recycle or safely and scientifically dispose E-wastes like damaged circuits, ICs, switches, electrical components, parts of computers and electrical appliances regularly.
- Place sufficient big waste bins where essential and monitor them periodically.
- Categories solid waste in to wet, dry, glass and constructional at source.
- Not to burn classroom waste on site.
- Always purchase recycled resources where these are both suitable and available.
- Make specific arrangements for events, such as cultural Events, internal and external seminars and conferences, where significant recyclable waste is likely to be produced, in order to both minimize the waste produced and maximize what is recycled / reused.
- Promote reuse of items and waste recycling among staff, students and conference guests through training, competitions, posters , Environmental incentives and awards.
- Dispose all waste, whether solid or otherwise, in a scientific manner and ensure that it is not released directly to the environment
- Reduce the practice of burning plastic and other waste material which emits harmful gas on burning . Burning shall be prevented in the campus.
- Declare YCWM college campus as plastic free and noise free.

3. Minimize consumption of water.

YCWM College therefore commits to:

- Build an underground big water tank for roof water harvesting near old building, use it for drinking and as distilled water for practical purpose.
- Build cement water tank near library for roof water harvesting of new as well as library building.
- Encourage decrease in water usage among teaching/ nonteaching staff, students, visitors, parents and conference guests.
- Monitor the overflows of water tank by shouldering responsibility on peons/ nonteaching staff in the concerned department.
- Install appliances which reduce water consumption.
- Minimize wastage of water and reduce electricity for water fetching. Ensure that the equipment used for water drinking usage, are regularly serviced, and the water wastage of such equipment should be used for watering purpose of garden.

- Maximize use of drip and sprinkler for watering the gardens, lawns, trees and flower plants, for the recycled water Nature Based Wastewater treatment Plant of college.
- Encourage staffs to arrange lectures in gardens, lawns in campus rather than classroom when possible to increase their love and affection toward the environment.
- Note that water conservation is also related to water treatment infrastructure and attendant costs and can include capturing rainwater and grey water for irrigation purposes.

4. Minimize the use of chemical pollutants both in college by students and staff

YCWM College therefore commits to:

- Ensure dilution of some chemical and hazardous waste at since laboratory (about 100 times) before draining it. Collect laboratory waste in air tight cement chamber, send it periodically for recycle/reuse or destroy properly.
- Ensure that all chemicals used by college, staff have a minimal detrimental impact on the environment, i.e. should be biodegradable and non-toxic, even where this exceeds make its dilution proper before drain.
- Dispose the chemical waste generated from the laboratories in a scientific manner.

5. To motivate students and faculties for good air quality in the campus.

YCWM College therefore commits to:

- Plant the rare and eco-friendly plants, through we have green campus.
- Encourage the faculties and students to plant trees in the garden.
- Review periodically the list of trees planted in the garden from time to time.
- Arrange 'No Vehicle Days' periodically/frequently (monthly if possible).
- Organize free checking PUC camp in campus by pollution department of Govt.
- Monitor the air quality and noise level in campus regularly and display it for awareness.
- Arrange programme to teach Yoga and Pranayama techniques to the students and staff of the college, encourage them to walk.

6. To create environmental awareness

YCWM College therefore commits to:

- Conduct environmental awareness workshops as a part of the program.
- Conduct events such as nature games to spread environmental awareness among the students.
- Create awareness of environmental sustainability and take actions to ensure environmental sustainability.
- Promote environmental awareness as a part of course work in various curricular areas, independent research projects, and community service

7. Ensure that the Green Policy is enacted, enforced and reviewed.

YCWM College therefore commits to:

- Establish a College Eco Club that will hold responsibility for the enactment, enforcement and review of the Green Policy. The Eco Club would be the source of advice and guidance to staff and students on how to implement this Policy.

- Ensure that the Eco Club will review the Green Policy on an annual basis, and will monitor progress and set measurable targets wherever possible.
- Require that every staff and student member recognizes the responsibility to ensure that the commitments in the Green Policy are properly put into practice.
- To Ensure that a Green audit is conducted annually and action is taken on the basis of the recommendation of audit report.

Mr. Vilas Shamrao Patil.

Assistant professor,
Department of Physics,
and
Coordinator Green Audit Committee

Dr. A. M. Shaikh

Principal.
Yashwantrao Chavan Warana Mahavidyalaya,
Warananagar.

Chapter-VIII

Plans to protect air and water, wilderness and wildlife are in fact plans to protect man.

- Stewart Udall

A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people.

- Franklin D. Roosevelt

The use of solar energy has not been opened up because the oil industry does not own the sun.

- Ralph Nader

CONCLUSION , RECOMMANDATIONS AND ENVIRONMENTAL MANAGEMENT PLAN

CONCLUSION , RECOMMANDATIONS AND MANAGEMENT PLAN

The Green Audit Committee of Yashwantrao Chavan Warana Mahavidyalaya. Warannagar has conducted a "Green Audit and its report" of our college in the academic year 2014-17 and second phase of green auditing was conducted in 2021-22 for duration of 2015-2022. As we know that 'Green auditing' is the process of identifying and determining whether institutions practices are eco-friendly and sustainable.Green audit means is process of checking green practices followed by college and to conduct a well formulated audit report and recommend the remedies to stand at better scale of environmental soundness. It can able to understand that the practices inside the college weather is it eco-friendly or not?. In second attempt to conduct green audit of our college campus, in auditing of campus we in detail record all type of practices followed by college, accordingly from report the conclusions, recommendations and best management plan as an 'Green Policy' of college to keep college campus environment eco-friendly.

Conclusions:

Following are some of the conclusions which can be taken for improvement in the campus.

- At first auditing total 5623 trees are present to make the campus of the college green. The college planted trees and taken the care of all, these includes flower plants, medicinal plants, fruit plants and local varieties. In Green Audit duration 2016 to 2022 in campus 602 trees are planted their better care is taken.
- College taken efforts in serious efforts to dispose majority solid waste by proper methods but more garden waste is brunt on site.
- Students and staff of the college are encouraged for walk and use vehicle with sharing to minimize fuel energy consumption and Green or electrical vehicles are increasing.
- Dispose of confidential paper waste by supplying for recycle.
- LPG is handled by department of Physics, Chemistry, HSVC for practical for educational or practical purpose but its consumption is very less.
- In science department like physics, chemistry, Mathematics, Botany and Zoology electricity was shut downed after occupancy time is one best greening practice for energy conservation.
- Biodegradable waste is not used efficiently for composting and vermicomposting it is to be increased.
- Electricity consumption is more at some departments.
- CFL lamps is used more in some department.
- Toilets and bathrooms and exterior are consuming more water.
- Good waste water management is in practice with Parker LORD company funded, installed the '**Nature Based Wastewater Treatment System**' shortly Nature Based WWTPs, from 14th

November 2022. Its cost is more than 45 lakhs, which purify the water about 150-200 KLD (Kilo liters per day) i.e nearly 1,50,000-2,00,000 liters per day.

- Majority staff using two-wheeler vehicles, some staffs using four wheeler in sharing
- Major electricity required for water fetching and irrigating .
- College installed 449.28 KW solar power pack plant on roof of science building which comprising 1452 nos. of solar panels of 320W inverter and associated all equipment's. 1452 solar panels of power pack project 774 placed on Main building which generate 239.94 KW energy, 194 placed on new building generate 60.14 KW energy and 484 placed on YC science building which generate 150.04 KW energy.The material and associated equipment's installation cost of above project is 2,69,77,500/- (Rs.) and came in force on 21st February 2019 which reduce the expense on electricity.
- Roof top rain water harvesting has proved beneficial for filling up the well on campus.
- Water filtration Plant is functioning properly.
- A special day like, Teachers Day, Guru panama are celebrated by new plantation in our campus also for Welcome of the guest's plants are used.
- The air-conditioners are not used anywhere in the campus.
- E-waste segregation, handling and disposal are properly done.
- Air quality on the campus is good.
- Biodegradable wastes from gardens, lawns in campus, is burnt on site , it is not composted.
- The college employs persons for periodic pruning of the trees and the plants
- Classroom waste is not sent for composting
- College arrange the events, such as Cultural Events, Internal and External seminars and conferences, in order to literate the student in both how to minimize the waste produced and maximize what is recycled / reused.
- Adequate ventilation and natural light survey of college infrastructure is conducted; accordingly renovations are made.
- There is no use of air conditioners in college campus.
- To promote use of cycling, Cycle Bank Scheme for girl students is run as one of our Best Practices.
- The air-conditioners are not used anywhere in the campus.
- All the rooms in both buildings are airy and sunny and do not need electricity during day time.
- Solar water heating panels are used for Boys and Girls Hostels.
- Solar power lamps are used to light some part of area in front of new and old buildings.
- Drips and sprinklers are used for watering the gardens and lawns.

- Roof top rain water harvesting is also being practiced, up to some extent, by the department of chemistry, by storing rain water, using and distributing it as distilled water to other departments and it is used for the practical.

Recommendations: Following are some of the key recommendation for improving campus environment:

- Conduct switch off drills at regular intervals and fix its responsibility on teaching / non-teaching staff.
- Provide energy efficient heating systems, with adjustable controls for individual heating appliances wherever possible, and ensure that comprehensible instructions are available to staff and students on the use of heating controls
- Institution has done Water Audit that has helped to save water. Responsibility of monitoring the overflows of water tank is fixed on peons/ non -teaching staff in the concerned department.
- save electricity by proper maintenance of the wiring and electrical equipment.
- Adopted solar power to light up the roads, area in front of new and old buildings
- Biodegradable wastes from gardens, lawns in campus, is not burnt on site , but it is composted.
- Sufficient big waste bins are placed where essential (in classroom, near office etc) and monitored periodically.
- Segregation solid waste in to wet, dry, glass and constructional at source, biodegradable is sent for composting.
- Classroom waste on segregation is sent for composting.
- College purchases recycled resources where they are both suitable and available.
- Classroom waste on segregation is sent for composting.
- Sufficient big waste bins are placed where essential(in classroom, near office etc) and monitored periodically
- An environmental Green policy has to be prepared with all the conclusions, recommendations and current green practice carried by college.
- A frequent visit should be conducted to ensure that the generated waste is measured, monitored and recorded regularly and information should make available from concerned staff.
- The waste should be reused or recycled at maximum possible places.
- Glass waste should be disposed properly and send it for recycle.
- Reduce chemical wastes formation in chemistry laboratory. Adopt the principles of green chemistry to reduce chemical wastes
- Pipes, overhead tanks and plumbing system should be maintained properly to reduce leakages and wastages.

- Start an E-banking suvidha for junior wing class and distance mode admissions as experimental and again implement it for other wings.
- Use the facility of extension counter of Shree Warana Bank,Warananagar for bank mode payment.
- At science laboratories large amount of water wasted during the process practical, design small water recycle system for science wing.
- The college should develop internal procedures to ensure its compliances with environmental legislation and responsibility should be fixed to carry out it in practice.

ENVIRONMENT MANAGEMENT PLAN

After studying a present situation of different resource, it's utilization, methods adopted for waste disposal and current green practices followed in college campus. The Green Audit committee has prepared an Environment Management Plan for the college. This plan will reveal the strengths , weaknesses and suggests remedies for the green and clean campus.

ENVIRONMENTAL MANAGEMENTPLAN
ENERGY
ELECTRICITY

SRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)Use of Solar water heater at girls and boys hostel. 2)Use of LED/ CFL lamp for lightning in some department like Chemistry, HSVC. 3) No use of air conditioner any where in campus. 4)In science wing electricity supply is closed after occupancy time. 5) Adequate ventilation and natural light is present in classroom as well as in some department. 6)Use of LCD,LED monitors in everywhere. (no CRT monitors are observed.) 7)Recently ventilation and light survey is proposed with help of experts of our sister concern branch of TKIET. 8) For watering drip, sprinklers irrigating system are used. 9) College installed 449.28 KW solar power pack plant on roof of science building. Which minimize the electricity bills.	1)More electricity is used for water fetching purpose. 2)Use of electricity is more in some department like admin. Office. Computer/ I.T lab. and science department etc. 3) Unnecessary use of Lights , fans and computers at some places when no one is using. 4)Some traditional heating coil (energy consuming) equipment's are used in science departments. e.g. Botany, chemistry. 5) Requirement of electricity for computer lab. is large.	1)Avoid use of light / fan (electricity) when adequate natural light / ventilation is present. 2)Create an awareness about electricity saving(e.g. circular, notice, supplying instructions etc) 3)Take steps to use renewable energy resources i.e. wind mills. 4)Monitor and control the overflows of water tank. 5) Place central electricity cut- off switch to shut down / close electric supply in all departments after occupancy time. 6) Use solar pump for fetching water in tanks.	Low

FUEL

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)Bicycle Bank Scheme for girl student with about 90 bicycle 2) About 48.15 % students are using State Transportation(ST), about 10% students are using bicycle and about 28% students use the walking mode . 3)while only 9.5% students use their own two wheeler vehicle to college. 4) about 14% of staff using four wheeler,64% staff using an two wheeler vehicles 5)while about 4% staff is using four wheeler with shairing,10 % come by walking, about 6% staff use ST and about 3% staff is using Bicycle for transportation 6)Important is that about 23% staff did not use any type of vehicle and adopt environment friendly mode(walking) of transportation for college.	1)Use of two wheeler is maximum. 2)Major use of LPG at CFC (common facility center) like canteen and mess. 3) PUC checking is not organized. 4)Less number of student as well as staff come by walking. 5) Avoid use of carbon paper and don't fill the cartridges of computer printer in office or inside the campus.	1)General awareness about walk and health fitness should be created among stake holders. 2) Organize PUC checking camp periodically for awareness of pollution. 3)Produce an awareness among stakeholders of institution to use vehicle in sharing. 4)Plan bio-gas project for kitchen purpose of canteen and mess. 5)Frequently organize No Vehicle day, bicycle day etc. 6)Conduct free PUC camp in the college.	Medium

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
7) About 67.5% of our staff resides near the college campus and only 32.5% of staff resides just far from campus (Far from 25 to 30 KM distance) which minimize fuel consumption in liter per month. 8)'No Vehicle day' on some occasion. 9)Use of LPG very less ,it is used at some departments of science and HSVC where is it essential. 8) Number of green practices through like Tracking, study tour, save fuel, sports, save electricity, poster presentation, debates, writings etc awareness in stake holder is produced by some departments and college also. 9)Diesel generator is occasionally /rarely used. 10) Campus has uninterrupted 1 kv electricity power supply of electricity provided by MSEB. 11) Less use of institutional transportation vehicle. 12) There are a good number of trees and plants that make the campus of college green. The college campus has Total 5623 trees including flower plants, medicinal plants, fruit plants and local Varieties.			

SOLID WASTE
PAPER

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)Use of two sided printing on paper at office and many departments. 2) One sided papers from students laboratory journals, project reports are used for rough printing / writing. 3)Old journal files/ covers are used for office and departmental records. 4)Very less amount of small papers is observed in classroom waste. 5)Large paper waste is collected from office, staff room etc 6)Major paper waste is collected in CFC(i.e. Canteen, Quarters, etc) 7) Well equipped computer Lab. with about 100 nodes.	1)Large amount of paper stationary was required for office work. 2)Major printed stationary was required internal evaluation work, internal memos, notices, unit tests etc. 3) Number of set of copies are required for official record. 4)Large amount of carbon paper waste is generated in bill section of office. 5) major consumption of paper is observed at time of admission and examination. 6)Solid waste(paper waste) from office and staffroom is burned near the parking. 7) At different places paper waste is burned.	1)Avoid use of carbon paper in bill section of office. 2)For internal Memos and Notices use e-mail, sms, Intercom , mobile network and advanced techniques of ICT . 3)Start an 'E-banking suvidha' for junior wing class and distance mode admissions as experimental and again implement it for other wings. 4)Use the facility of extension counter of Warana Bank for bank mode payment. 5)Switch towards the paperless office work. 6) Send all type of the paper waste for recycle or for proper destroy. 7)For the internal memos, notices use SMS, MMS, mobile, e-mail etc. 8)Adopt the on line tutorials. Tests for B.A., B.SC.and B.Com.III experimentally after successful implementation apply for other wings. 8)For on line examination use well equipped computer Lab.	High

PLASTIC

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)Large amount of hard plastic is collected.	1)Plastic thrown with the general waste in many department. 2)Some amount of soft plastic and carry bags collected. 3)At some places hard and soft plastic is burned at campus.	1) Segregation of waste at the sources . 2)Send all type of plastic waste for recycle. 3)Declare the college campus as 'Plastic Free'	Medium

BIODEGRADABLE WASTE

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)Clean Campus. 2)Classrooms are clean. 3)Total green trees / plants are 5623 (green campus). 4)Every year tree plantation. 5)NCC,NSS and last year student gave their devoted efforts for cleaning the classroom as well as campus. 6)Waste bins are placed in classrooms as well as in corridors. 7)Periodically cutting and cleaning of lawns and gardens 8)Composting is carried in small extent on campus site. 9)Average in month about an seven ton biodegradable waste is collected in campus.	1)Biodegradable waste in campus and small paper waste is burned on site at different places. 2)Some wet garden waste is burned near the botanical garden. 3)No composting or vermin-composting seen in botanical garden. 4)All collected biodegradable waste is not composted properly. 5)The food waste from canteen and mess is thrown nearer, is not composted. 6)Classroom waste (plastic piece, paper waste, soft plastic, carry bags, dust etc.) is thrown at site and burned. 7)Garden waste from, botanical garden, waste of big trees (big pieces of wood ,grass, leaves , coconut branches etc.) and grass on the ground is burned near boys hostel, near health center. 8)Waste from the canteen is burned near it.	1)Provide small readymade composting plant at different places for biodegradable waste composting. 2)Start major Fermi-composting plant on campus at proper location. 3)Use the output of composted plant for nursery, plantation and gardening purpose. 4) Sufficient, big waste bins are placed where essential (in classroom, near office etc) and monitored periodically 5) Food waste from canteen not on site.	Medium

WATER UTILIZATION

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)In campus very much availability of water. 2)Roof top water harvesting is practiced by the department of chemistry. 3)The water filtration is functioning and which supplies filter water for drinking purpose. 4) Water harvesting is practiced by digging two wells in campus at such geographical place where rain water and peculated water easily trapped in it. 5)Campus is self sufficient for irrigating the water to lawns, gardens ,etc by these two wells. 6) Gardens are watered by using drip/sprinkler irrigation system to save water 7) Less number of leakages are observed while conduction of verification of data. 8) Scope for rain water harvesting.	1)The major use of water is in common staffroom , science building, canteen, Staff quarters, hostels, and at exteriors. 2)Reuse of waste water is not observed. 3)Leakages are less but observed at Bathroom, toilets and exteriors. 4) For Botanical garden traditional watering is used. 5)No any small/ large water recycle plant under progress. 6)At some places Lavatory outlets are open air. 7) Outlets of some laboratory is directly used for garden. 8) No Proper attention toward Rain water harvesting . 9)Water in large quantity is used	1) Inspection of infrastructure and plumbing survey of water supply line is necessary. 2) To stop water supply after occupancy time central on /off halve is necessary. 3)Install the water guard at overhead water tank or pressure valves / sensor valves to make control on overflow of tanks . 4) Install rain water harvesting system at old ,New and library building. 5)Repair the roof water collecting pipes on both buildings. 6)Apply the proposals to UGC or other funding authority for water reuse/ recycle system. 7) Immediately install small scale waste water Reuse/ recycle plant.	Medium

WASTE WATER

STRENGTH	WEAKNESS	SUGGESTIONS	PRIORITY
1)Two wells in campus at such geographical place where rain water and peculated water easily trapped in it. 2) Good waste water manageme is in practice '**Nature Based Wastewater Treatment System**' shortly Nature Based WWTPs, from 14th November 2022. Its cost is more than 45 lakhs, which purify the water about 150-200 KLD (Kilo liters per day)	1)No gutters are build up to drain the waste water from departments and etc, 2)As the new , old and library building, boys hostile, ladies hostel, gymnasium hall and CFC are scattered ,hence total roof water is not trapped by wells. 3)Large amount of drinking water is wasted for bathroom, toilets and sometime for irrigating purpose. 4) Very less steps toward waste water harvesting.	1)Design the new drain piping to collect the used water for washing, blush , bathroom etc. 2)Install the water recycle/ reuse plant for above mentioned drain water. 3)Use the drip irrigation for botanical garden from abovementioned water. 4)Build check dam to trap the rain water in campus geographical location.	

CHEMICAL WASTE

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)Less chemical waste is handled only by Chemistry, Botany and Zoology departments. 2)The dilution of hazardous chemical is very high. 3) Chemical waste and it is of category III. 4) In chemistry, Botany, zoology different chemical bottles are labeled properly, tight with unbroken caps	1) By Department of Chemistry it is directly drained in botanical garden near the departments. 2) In some extent it produces an air, soil, water pollution 3) By Zoology and Botany it is directly drained in lawn near the departments. 4)At some places hard and soft plastic is burned oat campus. 5) The exhaust fans are not provided in these laboratories to expel gaseous waste. 6) In these laboratory provide an dust bin for wet solid waste.	1) Segregation of waste at the sources 2) Collect the chemical waste of Chemistry, Zoology and botany in air tight cement chamber . 3) Send it frequently for recycled or destroyed scientifically to approved chemical industry. 4) Immediately fix exhaust fans to expel gaseous waste in these laboratory where it essential	Medium

HAZARDOUS WASTE

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1) Waste chemicals are drain out after hundred times dilution. 2) Hazardous chemicals are kept in sealed containers. 3) Use of Hazardous chemicals only under expert supervision.	1) Proper disposal methods for hazardous chemicals are not used.	1) Hazardous chemical waste should be transferred to disposal facility centre. 2) There must be presence of collection tank and collected waste should be recycled .	Medium

GLASS WASTE

STRENGTHS	WEAKNESS	SUGGESTIONS	PRIORITY
1)Less handling of glassware (i.e. only by some departments in science) 2)Already reuse of bottles in some departments at science. 3)Very small glass waste generation.	1)Glass waste is thrown in regular waste though it is recyclable. 2)Glass waste is not segregated while throwing in waste bin. 3)Some pieces of glassware are directly thrown in campus near some science laboratory 4)some glass pieces thrown near boys and girls hostel also.	1) Sent broken glassware for recycle. 2)Collect the pieces of glass ware nearer to science departments, boys and girls hostel by NSS/NCC students.	High

E-WASTE

STRENGTHS	**WEAKNESS**	**SUGGESTIONS**	PRIORITY
1)E-waste generated in our college is of schedule III and it is generated in very less quantity. 2) In year 2017-18 the Purchas committee of college sold an about 19 old computer peripherals like (CRT monitor, P III computers , CPUS, UPS, Multi media system etc .) hence less generation of e-waste.	1) Institute have some e-waste like chips, bulbs, circuit boards, mother boards, computers, batteries, relays, and switches with garbage. 2)E-waste thrown along with the regular waste, some of the E-waste is hazardous and some of it is recycled. 3) Carbon emission in printers, carbon copy of bills, filing of cartridge inside the office and several department is observed. 4) The non-working computer spare parts and other non-working electrical equipments are dumped in different department at several places is observed. 5) Buy back policy at the time of purchase is not in force.	1)Purchase committee should decide specific policy for the destroying E-Waste. 2)Adopt an buy back policy at the time of purchase if available. 3) The cartridge of laser printers should be refilled outside the college campus. 4) Conduct the awareness programmers regarding -E-waste Management with the help of Department of physics and department of Electronics & Telecommunication of sister institute TKIET, Warananagar.	

		\5) All the e-waste generated per year within campus will be stored separately and disposed off through authorized vendors.	

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Coordinator IQAC

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Principal, Y.C.W.M. Warananagar

Forwarded with best compliment for certification.

The whole Green Audit Report is Verified and Certified by

Dr. Prashant A. Banne, M.Sc. Ph.D. (Environmental Science)

- CEO & Managing Director, SAITECH Research & Development Organisation
- External Faculty, PCRA, Under petroleum Ministry, Govt. of India
- EIA Coordinator, was accredited by NABET, Quality Council of India

Annexures

Annexure- A
Yashwantrao Chavan Warana Mahavidyalaya, Warananagar
Green Audit –(2021-22)
(Plants Counting in Campus of the Institute)

The green audit was conducted in the last week of September 2015. During these studies, we have reported presence of more than 5000 individuals of the plants belonging to variety of groups as foliage, flowering, fruiting trees, shrubs, herbs and climbers, making this campus lush green in appearance. The plants included large trees of evergreen species like Mango, Jackfruit, baniyan trees and palms. The roads are decorated by avenue trees namely Ficus benjamina, ashoka, royal palms etc. Ornamental foliage and flowering plants are cultivated in the carries between road dividers. The campus is well maintained by irrigating the vegetation with sprinklers and drip irrigations where ever possible. Campus includes formal gardens namely Nilkantheswara garden, botanical garden, Tatyasaheb Kore garden and informal gardens at TK college of Pharmacy, YCWM garden, HSVC garden, and TKIET garden. The gardens are supported with spacious lawns and water-bodies. This gives a pleasant and eco-friendly feel to every visitor.

There are 355 flowering individuals those serve as source of pollen food and nectar for many insect likewise more than 640 individuals that bears delicious fruits are attraction for varieties of birds. The conserved area with dense vegetation, source of water, and least disturbance is an ideal place as habitat of biodiversity.

Table. 1. Total Plants (Campus Excluding Botanical Garden)

S. No.	Name	Types	Total No.
1	Trees	85	3296
2	Shrubs	46	1622
3	Herbs	17	668
4	Climbers	4	37
	Grand Total	**152**	**5623**

Table. 2. Classification as per utility of Tree Plants (Campus Excluding Botanical Garden)

Sr. No.	Plant class	Types	Quantity
1	Avenue trees	16	838
2	Flowering plants	22	405
3	Fruiting Trees	27	640
4	Gymnosperm	05	086
5	Ornamental trees	08	462
6	Palms	07	883
	Total	**85**	**3296**

Table 3. Avenue trees in the campus

S. No.	Name	No.	Remark
1.	Acacia auriculiformis	13	A
2.	Acacia nilotica	9	A
3.	Azadirachta indica	140	A
4.	Cassia	10	A
5.	Cassurina equesitifolia	3	A
6.	Cinnamomum verum	1	A
7.	Dendrocalamus strictus	160	A
8.	Eucalyptus lanceolatus	87	A
9.	Ficus elastic	1	A
10.	Grevillea robusta (Silvar oak)	20	A
11.	Holoptelia integrifolia (Vaval)	3	A
12.	Melia azadirchta	7	A
13.	Polyalthia longifolia	222	A
14.	Quercus	16	A
15.	Sapindus trifoliatus (Soap berry)	9	A
16.	Tectona grandis	137	A
	Avenue trees (16)	**838**	

Table 4. Flowering trees in the campus

S. No.	Name	No.	Remark
1.	Albizia lebbeck	5	FL
2.	Allamanda cathartica	43	FL
3.	Alstonia scholaris	51	FL
4.	Arabica coffee	2	FL
5.	Bauhnia racemose	1	FL
6.	Bauhnia variegate	1	FL
7.	Bignonia	39	FL
8.	Bombax sp.	1	FL
9.	Butea monosperma	2	FL
10.	Cassia fistula	1	FL
11.	Dalbergia sissoo	46	FL
12.	Delonix regia	8	FL
13.	Maduca indica	4	FL
14.	Magnolia champaca	7	FL
15.	Millingtonia hortensis	9	FL
16.	Mimusops elengi	1	FL
17.	Murraya exotica	7	FL
18.	Peltophorum pterocarpum	2	FL
19.	Polyanthus tuberosa Nishigandha	1	FL
20.	Kigelia pinnata	3	FL
21.	Saraca indica	137	FL
22.	Spathodia companulata	34	FL
	Flowering plants (22)	**405**	

Table 5. Fruit bearing trees in the campus

S. No.	Name	No.	Remark
1.	Aegle marmelos	4	FR
2.	Annona reticulate	5	FR
3.	Annona squamosa	36	FR
4.	Artocarpus heterophyla	12	FR
5.	Carrisa carandas	1	FR
6.	Citrus lemon	53	FR
7.	Emblica officinarum	18	FR
8.	Eugenia jambolana (Syzygium cumini)	24	FR
9.	Ficus benghalensis	5	FR
10.	Ficus carica	3	FR
11.	Ficus racemosa (glomerata)	41	FR
12.	Ficus religiose	4	FR
13.	Ficus rubiginosa (Pimpari)	1	FR
14.	Lucana (Subabhul)	7	FR
15.	Mangifera indica	198	FR
16.	ManilKara zapota (Acrus sapota)	12	FR
17.	Morinda citrifolia	5	FR
18.	Moringa oleifera	9	FR
19.	Muntingia calabura	18	FR
20.	Musa indica	34	FR
21.	Pithecolobium dulce	13	FR
22.	Psidium guajava (Guava)	80	FR
23.	Punica granatum (Dalimb)	2	FR
24.	Santalum album (Chandan)	20	FR
25.	Tamarindus indica	24	FR
26.	Terminalia bellirica (Bhehada)	1	FR
27.	Terminalia catappa	10	FR
	Fruiting Trees (27)	**640**	

Table 6. Gymnosperm trees in the campus

S. No.	Name	No.	Remark
1.	Podocaurps	32	G
2.	Cycas circinalis	01	G
3.	Cuprus	01	G
4.	Pinus sp.	06	G
5.	Thuja occidentalis (Gymnosperm)	46	G
	Gymnosperm (05)	**86**	

Table 7. Ornamental trees in the campus

S. No.	Name	No.	Remark
1.	Caesalpinia	139	O
2.	Callistemon lanceolatus	1	O
3.	Dracaena sanderiana (Lucky bamboo)	95	O
4.	Dracaena fragrance (Long Leaf)	8	O
5.	Euphorbia pulcherrima	13	O
6.	Ficus benjamina	198	O
7.	Sansevieria cylindrical	5	O
8.	Sansevieria trifasciata	3	O
	Ornamental trees (08)	**462**	

Table 8. Palms trees in the campus

S. No.	Name	No.	Remark
1.	Areca catechu (Bittlenut)	88	P
2.	Caryota urens	15	P
3.	Coccus nucifera	264	P
4.	Dypsis lutescens (Areca Palm)	358	P
5.	Phoenix sylvestris	5	P
6.	Roystonea regia	121	P
7.	Washingtonia robusta (Fan palm)	32	P
	Palms (07)	**883**	

Table. 9. Shrubs growing in the campus

S. No.	Name	Individual No.
1	Acalypha	672
2	Acalypha hispida	84
3	Acalypha nuda	42
4	Acalypha nuda Red	253
5	Acalypha thema	9 x 1
6	Adenium	2
7	Adhatoda vasica	3
8	Agave	3
9	Asparagus racemosus	1
10	Barleria	1
11	Bougainvelia	5
12	Cajanus cajan	50
13	Calatropis procera	5
14	Calliandra haematocephala	31
15	Cestrum noctarnum (Ratrani)	2
16	Chlorophytum	122
17	Citharexylum quadrangulare (Sitaranjan)	7
18	Clerodendron	20

19	Clerodendron inermis	115x2.5
20	Croton	197
21	Dieffenbachia	8
22	Duranta repens (Erecta) golden	220
23	Duranta variegate	189
24	Euphorbia milii	5
25	Galpamia glauca (Gracilis yellow fl hedge)	27
26	Hamelia patens	14
27	Hibiscus rosa-sinensis	29
28	Ixora chinensis	3
29	Ixora coccinia	10
30	Ixora miniature	13
31	Jatropa curcuns	22
32	Lantana camera	13
33	Morus alba	5
34	Mussenda	15
35	Nerium oleander	158
36	Nyctanthes arbor-tristis (Parijatak)	1
37	Plumbago auriculata (Neeli tilvan)	60
38	Plumbago zeylanica (saphed tilvan)	30
39	Plumeria acuminate (Pivala Chapha)	18
40	Ricinus cummunis	2
41	Rose	6
42	Tabebuia chrysantha (Yellow tebebua)	46
43	Tabernaemontana	142
44	Tabernaemontana variegate	101
45	Tecoma stans	192
46	Thevetia neriifolia	96
	Shrubs	**1622**

Table. 10. Herbaceous plants growing in the campus

S. No.	Name	No.
1	Abelmoschus esculentus Bhendi	1
2	Aloe vera	9
3	Alternanthera Spices	36
4	Bepilia	60
5	Canabis indica	130
6	Catharanthus alba	31
7	Catharenthus roseus	23
8	Catharenthus wrinkifolia	45
9	Convolvulus	44
10	Cymbopogon	21
11	Nymphaea lotus	35
12	Ocimum sanctum	65
13	Pancracium	45
14	Pentos	2
15	Pimenta dioica (All spices)	1
16	Solanum xanthocarpum	19
17	Typha	101
	Herbs	**668**

Table. 11. Climbers growing in the campus

S. No.	Name	No.
1	*Quisqualis indica*	16
2	*Polygonon leptopus*	12
3	*Mansoa allicaema*	7
4	*Bignonia venusta*	2
	Total	37

Report on Botanical Garden

The Warana Mahavidyalaya Botanical garden supported 170 angiosperms belonging to 66 families and 8 species of gymnosperms belonging to 6 families in addition to many seasonal plants. Cryptogams included 6 algae, 7 bryophytes and 9 pteridophyte species. This phyto-diversity included many medicinal plants. Studies further showed 16 species of birds and many insects.

The diversity of plants and birds was studied by arranging frequent visits for one year to the Botanical garden of the Y. C. Warana Mahavidyalaya, Warananagar, situated in Western Ghats (Sahyadri ranges) at 16.854535 N and 74.197676 N in Kolhapur district (Maharashtra).

Table 12. Diversity of cryptogams in the Botanical Garden

Group of plants	Algae	Bryophytes	Pteridophytes
No. of species	06	07	09

Table 13. Diversity of phanerogams in the Botanical Garden

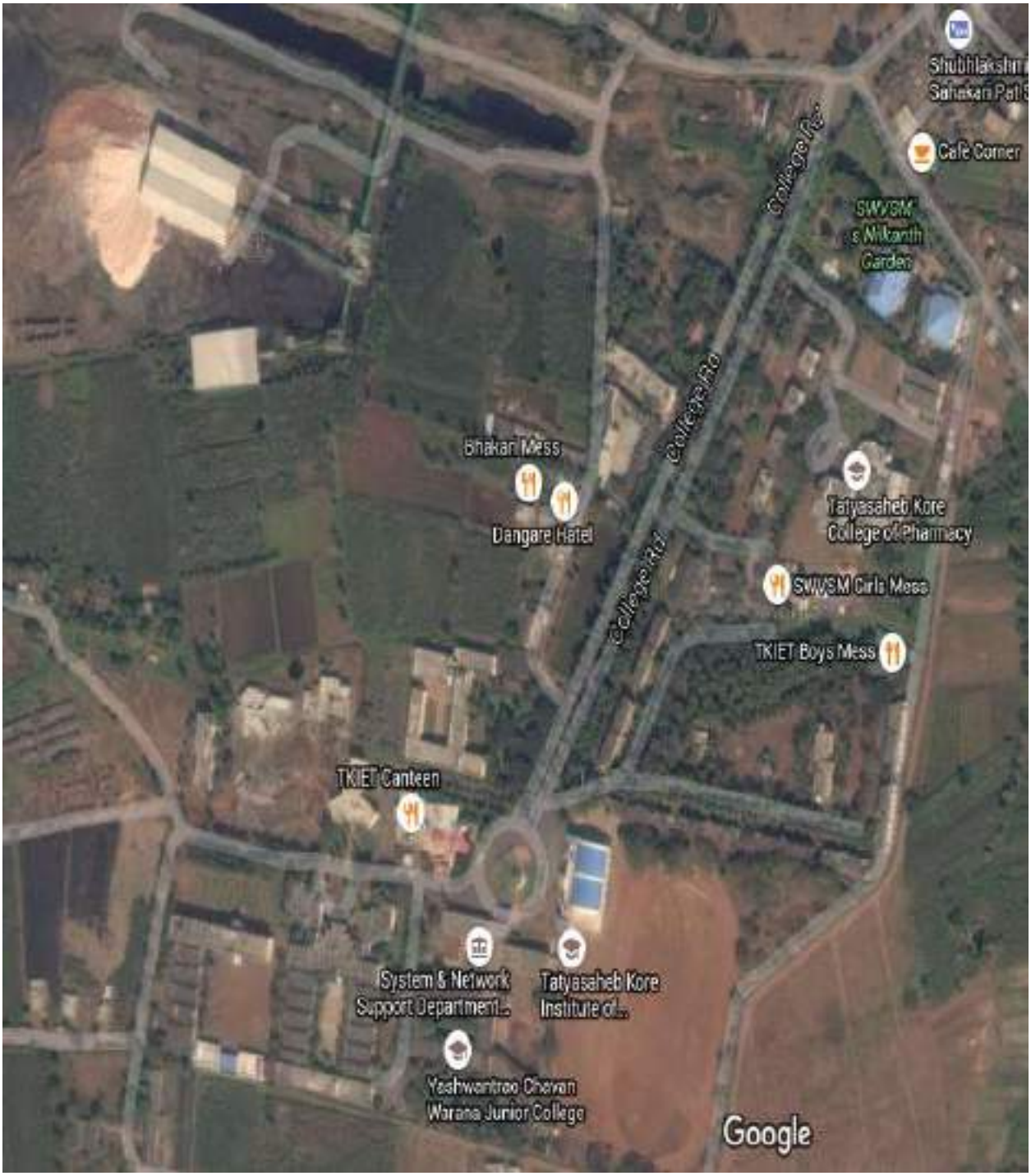
Group of Plants	Gymnosperms	Angiosperms		Total No.
		Dicotyledonous	Monocotyledonous	
No. of Species	08	137	33	178
No. of Families	06	52	14	74

Table 14. Birds observed in the Botanical Garden

Sr. No.	Name	Common name
1	Sparrow	Chimani
2	Sunbird	Sunbird
3	Hornbill	Rakhi Dhanesh
4	Black Drongo	Kotval
5	Koyal	Kokila
6	Kingfisher	Khandya
7	Crow	Kawala
8	Red vented Bulbul	Red vented Bulbul
9	Tailor Bird	Shimpi
10	Maina	Salunkhi
11	Iora	Iora
12	Pigeon	Kabutar , Parava
13	Roseringed Parakeet	Popat, parrot
14	Owl	Ghubad
15	Yellow browed bulbul	Yellow browed bulbul
16	Grey Heron	Bagala

Annexure- B

Google Map of Institute



Layout of Institute: