



Shikshan Prasarak Mandal, Kolhapur

**BR. BALASAHEB KHARDEKAR COLLEGE,
VENGURLA**

Affiliated to University of Mumbai

GREEN AUDIT REPORT

(2015 to 2020)

GREEN AUDIT REPORT



Prepared by Department of Botany

Br. Balasaheb Khardekar College, Vengurla

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Forewords

Worldwide global warming, pollution, carbon credits are discussed to minimize carbon foot prints and achieve sustainable development. Academic institute can play key role to present role model projects to create awareness among society through students. Br. Balasaheb Khardekar College is having green campus full of variety of plant species and associated fauna. Considering the strength of Sahyadri to conserve rare species and rich biodiversity, coastal biogeography, mangrove ecosystem, institute conducts many activities to bring the change for sustainable success. Green audit can help for self-assessment and improvement regarding carbon credits collection, floral and faunal diversity assessment, water and electricity audits and to see the impact assessment of green activities. Br. Balasaheb Khardekar College, Vengurla is consistently maintaining green campus which invites birds and butterflies, odonates and reptiles. Many rare medicinal plants and ferns are found in the campus. Horticulture is base of Konkan economy; college has maintained horticultural crops like Mango, Jackfruit, Kokam, Awala, Chikku which is unique project for ecological and economical balancing.

Green Nature club, N. S.S and N.C. C. students are motivated for plantation and waste recycling activities, which multiplies the active projects. Mangrove conservation and Wetland restoration activities are regularly conducted to create awareness through workshops and conferences as well as through field study and cleanliness projects. Green initiatives taken by institutes are creating impact on students as well as society. Local communities are actively involved in green and clean mission along with the college.

Br. Balasaheb Khardekar College will continue mission green credits in future with green energy and scientific approach. Our institute has space and suitable biogeographically conditions which is asset to achieve success as per new National Educational Policy.

Dr. V. A. Dewoolkar

Principal

Br. Balasaheb Khardekar College, Vengurla

CERTIFICATE

This is to certify that the Department of Botany of Br. Balasaheb Khardekar College, Vengurla, has conducted detailed Green Audit of the college for the period of year 2015-2021. The Green audit is conducted according to applicable standards given by Central Pollution Board, New Delhi and Ministry of Environment, Forest Climate Change, New Delhi. The green audit involves Floral and faunal biodiversity records of the campus, water and energy audit, Solid waste management efforts, green activities conducted by institute.

In an opinion and to the best of my knowledge and through the information given to us, team has taken good efforts to report the green audit as per the environmental auditing principle accepted.

Dr. N. S. Chavan

Department of Botany

Shivaji University Kolhapur

Editorial

Green audit is a positive step towards sustainable development. In the Era of global warming and climate change every citizen has to reduce their own carbon foot prints to tackle with the adverse impacts of climate change. Academic institutes can create positive impact on society and set mindsets of youth towards clean and green environment management. Global goals like biodiversity conservation, food security, water and natural resources restoration can be understood at local level through small steps. A green audit of any academic institution reveals ways in which we can reduce energy consumption, water use and reduction in emission of carbon dioxide in the environment. It is a process to look into and ask ourselves whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation. This process of green audit enables us to assess our life style, action and assess its impact on the environment.

Br. Balasaheb Khardekar College, Vengurla is consistently taking efforts to create awareness about mangrove conservation, biodiversity assessment as well as horticultural trees plantation and maintenance for carbon sequestration. Considering the bio-geographical conditions, coastal environments, and institute is active in waste management, cleaning activities, plastic recycling as well as wetland restoration program. Green audit is done with the help of students as a small project to learn and present the assessment of energy consumption, water requirement, and air and water pollution. Unique botanical garden spread all over the 1 acre campus is asset to set a goal of minimizing the carbon footprints by maximum carbon sequestration. Heritage tree Banyan trees and rare *Garceia indica* avenue are proud treasure for motivating upcoming generations for green credit enhancement.

Hon. President of Shikshan Prasarak Mandal, Kolhapur, Secretary Jaykumar Desai and Patron Council Member, Daulatrao Desai, Administrative officer Dr. Manjiri Desai has vision to strengthen college with green goals. Principal, Dr. V. A. Dewoolkar has always supported to complete green audit. Global goals of carbon foot print minimization , water conservation, waste management and carbon sequestration enhancement through plantation and conservation of old trees, restoration of wetlands and coastal biodiversity and its documentation is consistently done by BKC and will be continued in future with more strength. Green audit report is right cause to review the work actually done about green credits and encourage Green activities towards sustainable development.

Dr. Dhanashree Patil
Head, Department of Botany,
Br. Balasaheb Khardekar College, Vengurla

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1. Introduction

1.1 Green Audit is a tool for Environment protection and conservation:

Global warming, climate change, waste management is current issues discussed all over the World. Sustainable solutions are to be searched for management of Environment protection through education and awareness to raise the country with green development. India is country with Agricultural base. We have rich biodiversity, which can be strength of sustainable development. So called development is creating some threats due to faster urbanization, industrialization along with heavy transportation –increased vehicle number. Natural resources like water, soil, air getting polluted and overused. Considering the future development and happy, healthy survival of human race certain majors are to be considered and practiced.

India is taking positive steps through **Swachh Bharat Mission**. Lot of awareness is created about cleanliness as well as plastic use minimization by reducing use polythene bags, waste segregation; plantation programs.UGC has made it mandatory to run mission **Clean campus and Green campus** program for higher education institutes.

Green audit is most important ecological tool to introspect ourselves about environment protection aspects. It is the process of regular identification, quantification, documentation, reporting and monitoring of environmentally important factors in specific area. Green audit can give direction about environment protection initiatives to be taken by institutes. Waste management, E waste generation, plastic use and disposal, water pollution and it's use, electricity use can be monitored through green audit. Academic institutes can be the centers to create awareness about environment protection and biodiversity conservation. Sustainable development needs wise use of natural resources. Green audit can give direction to institutes to consider the strengths and weaknesses of particular area with respect to environment and proceed with certain goals about environment protection. Carbon foot prints can be documented to design the strategies about wise development.

1.2 Need of Green Audit: Green audit is the process of identifying and determining the practices followed by the institute about use of natural resources. Traditionally we are taught

to use resources carefully. But during the process of globalization we have started adopting the easier ways to make ourselves comfortable and lazy ways. Mostly at public places and common places practices like overuse of electricity, water, papers is seen. Plastic disposal is ignored. Directly or indirectly it harms the environment in various ways. Green audit can be scientific way of data collection about exact cause. Green audit can make a documentation of positive aspect in the campus like minimum vehicle use, greenery in the campus etc. Green audit can improve environment consciousness among the people belong to institution. Academic institutes are connected with youth who are strength of Nation. Messages about Natural resource management can percolated in society through them to create greater impact about environment protection.

1.3 Goals of Green Audit:

Institute has conducted green audit with specific goals.

- i. Identification and documentation of green practices conducted by institutes.
- ii. Identify strength and weaknesses of green practices
- iii. Tree census for documentation of number of trees in campus of college.
- iv. Documentation of herbs ,shrubs and flora ,fauna representing the Western Ghats.
- v. Assessment of waste management practices in the campus.
- vi. Awareness about environment protection in campus
- vii. Identify and modify environmental risks
- viii. Motivate staff and students for careful use of Natural resources.
- ix. To note the rich biodiversity in the huge green campus
- x. To collect the baseline data about environmental parameter and resolve environmental issues in time.

1.4 Objectives of Green audit:

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

2. To identify and analyze significant environmental issues.
3. To set goal, vision and mission for Green practices in campus.
4. Establish and implement Environmental Management in various departments.
5. Continuous assessment for betterment in performance in green practices and its evaluation.
6. To prepare an Environmental Statement Report on green practices followed by different Departments, support services and administration building.

1.5 NAAC Criteria VII - Environmental Consciousness:

Academic institutes are playing a key role in development of human resources worldwide. Higher education institutes campus run various activities with aim to percolate the knowledge along with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc.

National Assessment and Accreditation Council (NAAC) which is a self governing organization that declares the institutions as Grade according to the scores assigned at the time of accreditation of the institution. Green Audit has become mandatory procedure for educational institutes under Criterion VII of NAAC. The intention of green audit is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring etc. for making the institution more eco-friendly.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, No vehicle day, Rain water harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

1.6 Benefits of Green Audit to an Educational Institute:

- There are many advantages of green audit to an Educational Institute:
- It would help to protect the environment in and around the campus.
- Recognize the cost saving methods through waste minimization and energy conservation.
- Find out the prevailing and forthcoming complications.
- Empower the organization to frame a better environmental performance.
- It portrays good image of institution through its clean and green campus.
- Finally, it will help to built positive impression for through green initiatives the upcoming
- NAAC visit.

1.7 BKC at a Glance: Green Campus

Coastal biodiversity, estuarine mangrove ecosystems are the strength of Sindhudurg district. Br. Balasaheb Khardekar College, Vengurla has got unique environment of Konkan in vicinity with richest flora and fauna with special biological diversity comprising fresh water wetlands, Sahyadri ranges.-hilly area, Ghats, estuaries and beaches as well as plateaus. Huge green campus with evergreen vegetation and big play ground surrounded with hilly area as well as big frontage of having coconut, mango, chikkoo and Amala plantation is rare environment to accelerate the learning process. Green Nature club is actively involved in Wetland conservation, butterfly documentation and development of Botanical garden to conserve rare species of Western Ghats.

Department of Botany, Department of Rural development, Zoology, Geography conducts the programs about environment conservation, plastic pollution minimization and creates awareness among society through youth with proper scientific and ecological training activities. Consistently faculty is involved in Mangrove conservation with Mangrove Foundation of Maharashtra and Forest Department. Wetland restoration committee of district collector Sindhudurg district has involved staff members and students for wetland documentation. NSS and NCC students are doing great work of water management, Cleanliness drives, cloth bag preparation and plantation activity. Campus is uniquely and rightly described as *Shantiniketan*. Consistency in organizing activities like Mangrove day celebration, Wetland day celebration, traditional eco-friendly ways of floral decoration, wild

life vegetable surveys and Botanical excursions, has great impact upon students, society and staff. Faculty is active in organizing workshops and conferences, exhibitions to develop skills among students which are suitable for sustainable development of Konkan and natural resources.

CHAPTER II

METHODOLOGY

2.1 Background of Br. Balasaheb Khardekar College, Vengurla, Green Audit preparation:

Institute is consistently conscious environment protection, natural resources restoration and awareness creation about environment conservation in sustainable way. Considering the requirement of Environment consciousness and green audit, IQAC committee decided to get the green audit done systematically. Huge green campus of college with rich biodiversity, existence of rare flora and fauna are regularly documented by department of Botany and Zoology. Green nature club is active since establishment of institute. Waste management, water conservation activities are regularly practiced by NSS and Green nature club by constructing small check dams and Chemistry department has raised a small unit to harvest natural rain water for laboratory. Department of rural development and Geography has done mapping of the area and Horticultural local trees are planted in the campus to motivate the local communities through students. Recycling of coconut shells, coir, leaf manipulation skills re practiced and taught to students through Gardening creative courses. Women development cell organizes skill development programs like nursery techniques as well as nutrition based programs to motivate students about food and health management through kitchen gardening.

2.2 Survey by questioner:

Questioner was prepared to collect data about use of water, waste disposal at various departments, vehicles in campus. Tree census was done by students as a small project with scientific base. Botanical garden is asset of institute and whole campus is rich with biodiversity. Birds and butterflies along with faunal diversity of reptiles and insects is done by Zoology students under guidance of Dr. V. M. Patole. Department of Geography completed mapping and data of longitude latitude was presented by students under guidance

of Prof. K. R. Kambale. Department of Chemistry looks after efficient distil water collection without any energy requirement in simple way. Prof. S. S. Chamankar presented disposal methods of waste chemicals as well as waste management. Office staff explained the use of papers and Department of Physics gave the electricity usage record and LED lights use.

2.3 Onsite mapping and location

Campus from Birds Eye View

Br. Balasaheb Khardekar College, Vengurla



By Prof. K. R. Kambale, Department of Geography, Br. Balasaheb Khardekar College, Vengurla

Location: By Prof. K. R. Kambale, Department of Geography, Br. Balasaheb
Khardekar College, Vengurla

SR.NO	LOCATION	LATITUDE	LONGITUDE	ALTITUDE
01	COLLEGE MAIN GATE	15°52'0.28"N	73°38'36.62"E	19 M {62 FT}
02	OFFICE	15°52'2.75"N	73°38'34.10"E	19 M {62 FT}
03	CANTEEN	15°51'59.69"N	73°38'33.57"E	19 M {62 FT}
04	LIBRARY	15°52'2.65"N	73°38'33.10"E	19 M {62 FT}
05	LADIES ROOM	15°52'3.22"N	73°38'32.89"E	19 M {62 FT}
06	GENTS AND LADIES TOILET	15°52'3.01"N	73°38'32.67"E	19 M {62 FT}
07	STAFF ROOM	15°52'4.07"N	73°38'32.31"E	19 M {62 FT}
08	GYMKHANA AND YCM	15°52'4.31"N	73°38'32.55"E	19 M {62 FT}
09	COLLEGE GROUND	15°52'8.13"N	73°38'33.17"E	24 M {78}
10	HALL NO 1	15°52'4.74"N	73°38'33.87"E	19 M {62 FT}
11	HALL NO 2	15°52'3.20"N	73°38'33.69"E	19 M {62 FT}
12	HALL NO 3,4,5,6	15°52'3.39"N	73°38'34.74"E	19 M {62 FT}
13	HALL NO 7,8	15°52'2.79"N	73°38'32.92"E	19 M {62 FT}
14	HALL NO 9,10	15°52'2.43"N	73°38'33.32"E	19 M {62 FT}
15	PHYSICS AND MATHS DEPT	15°52'5.46"N	73°38'36.23"E	21 M {68}
16	ZOOLOGY DEPT	15°52'5.38"N	73°38'37.20"E	21 M {68}
17	BOTANY DEPT	15°52'4.53"N	73°38'38.21"E	19 M {62 FT}
18	CHEMISTRY DEPT	15°52'4.04"N	73°38'37.99"E	19 M {62 FT}
19	MRD ENGLISH M SCHOOL	15°52'3.80"N	73°38'38.42"E	19 M {62 FT}

CHAPTER III

Water Audit

Water rightly said as Jivan –life, which is precious natural national resource available with fixed quantum. The availability of water is decreasing due to increasing population of Nation, as per capita availability of utilizable water is going down. Due to ever rising standard of living of people, industrialization, urbanization, demand of fresh water is increasing day by day. Hence, the national mission on water conservation was declared by the then Hon. Prime Minister Narendra Modi as 'Jal Shakti Abhiyan' and appealed to all citizens to collectively address the problem of water shortage, by conserving every drop of water and suggested for conducting water audit for all sectors of water use.

Definition: Water audit can be defined as a qualitative and quantitative analysis of water consumption to identify means of reducing, reusing and recycling of water. Water Audit is nothing but an effective measure for minimizing losses, optimizing various uses and thus, enabling considerable conservation of water in irrigation sector, domestic, power and industrial as well.

A water audit is a technique or method which makes possible to identify ways of conserving water by determining any inefficiencies in the system of water distribution. The measurement of water losses due to different uses in the system or any utility is essential to implement water conservation measures in such an establishment.

3.1 Importance of Water Audit:

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

3.2 Water sources in the campus:

Well water is the major source of water in College campus. Rainfall of Vengurla is 1612mm. Heavy rains is specialty of Konkan. Geographical strata with sandy soil covered with gravels

do not allow the water seepage. Big gutters and slopes keep the water flowing towards stream and finally to the sea. Water usage is carefully maintained.

Pictures of water wells



Drinking water facility



Well covered under shade to protect from leaf fall and safety



Tap for watering the gardens at Science wing



Well behind administrative block



Water tanks on terrace at Science wing

Innovative Way of Distilled water collection by Department of Chemistry



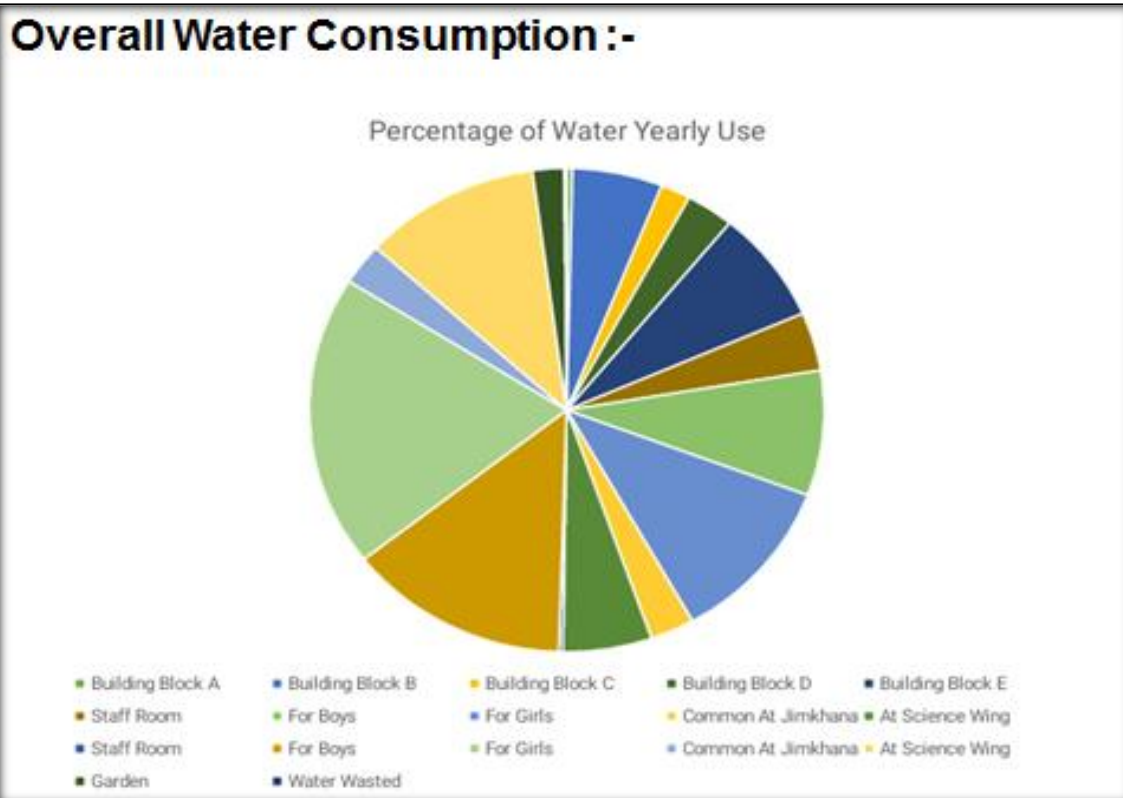
3.3 Water consumption in the College campus:

From the data collected for water audit of Br. Balasaheb Khardekar College, Vengurla the water distribution and water consumption pattern is noticed as follows. The departments are grouped in different groups as given in the methodology as

- a) Building Block A (Administrative Building with hall no.1 and 2)
- b) Building Block B (Staff room and Jimkhana)
- c) Building Block C (Library and Classrooms 7, 8, 9, 10)
- d) Building block D (Class rooms: 4, 5, 6, 7)
- d) Building Block E (Science wing). e) Wash room f) Toilets g) Gardens

Overall water consumption:

Sr. No.	Location	Total Daily Use (liter)	Total yearly use (kl)	Percentage %
1	Building Block A	50	18.25	0.37
2	Building Block B	750	273.75	5.65
3	Building Block C	250	91.25	1.88
4	Building Block D	400	146.00	3.01
5	Building Block E :	1000	365.00	7.53
6.	Wash room :			
	Staff room	700	189.00	3.90
	For Boys	1500	405.00	8.36
	For Girls	2000	540.00	11.14
	Common at Jimkhana	500	135.00	2.78
	At Science wing	1000	270.00	5.57
7.	Toilets :			
	Staff room	500	13.00	0.26
	For Boys	2500	675.00	
	For Girls	3500	945.00	
	Common at Jimkhana	500	135.00	
	At Science wing	2000	540.00	
8.	Garden	4000	96.00	
9.	Water wasted	200	7.000	
	Total :	21350	4844.25	



Water Quality:

1. Tap water (Well water)

Season	Concentration	Category	Remark
Summer	40ppm	soft	potable
Rainy	20pmm	soft	potable

Distilled water 0.00ppm 0 hardness

Naturally water with hardness below 50 ppm is potable water.

Results: Sufficient water supply for fulfilling the needs of college is maintained with due precaution about cleanliness of wells. College is **self-reliant for water**. During summer water is provided to needy people to fulfill need of drinking water.

Chapter 4

Energy Audit

Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also it can be said as “the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems”. The energy audit is key to a systematic approach for decision making in the area of energy management. It attempt to balance the total energy inputs with its use, and serve to identify all the energy streams in a facility.

4.1 Electricity audit:

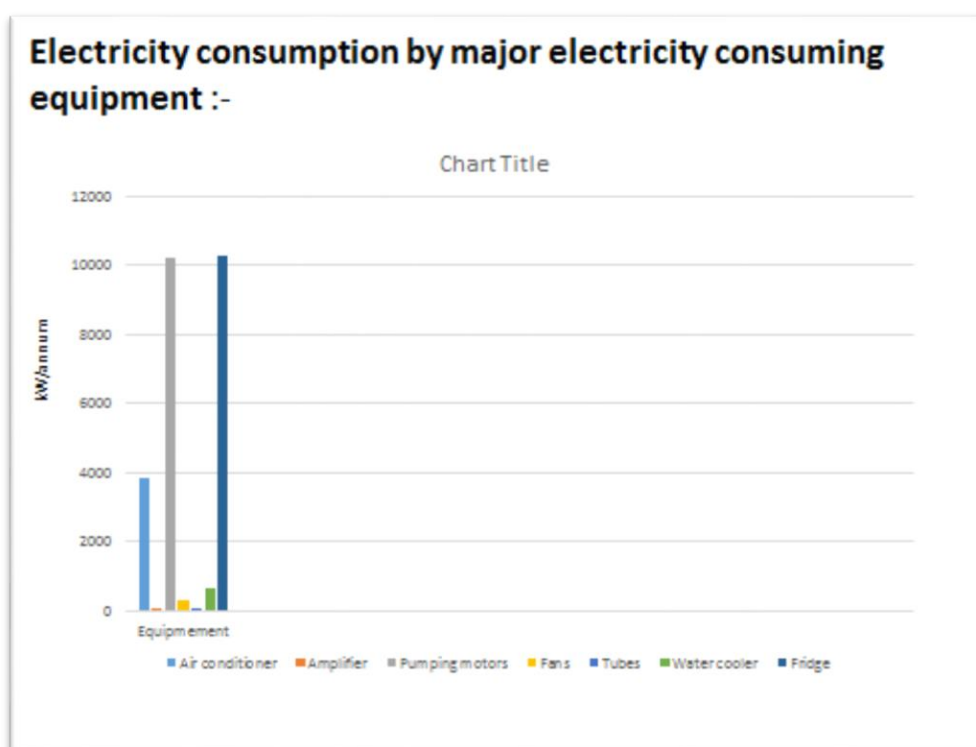
Energy resources utilized by all the departments, support services and the administrative buildings of , BKC College campus campus include electricity and liquid petroleum(Science Laboratories). Major use of the energy is at office, canteen, hostel and laboratories, for lighting, transportation, cooking and workshop instruments.

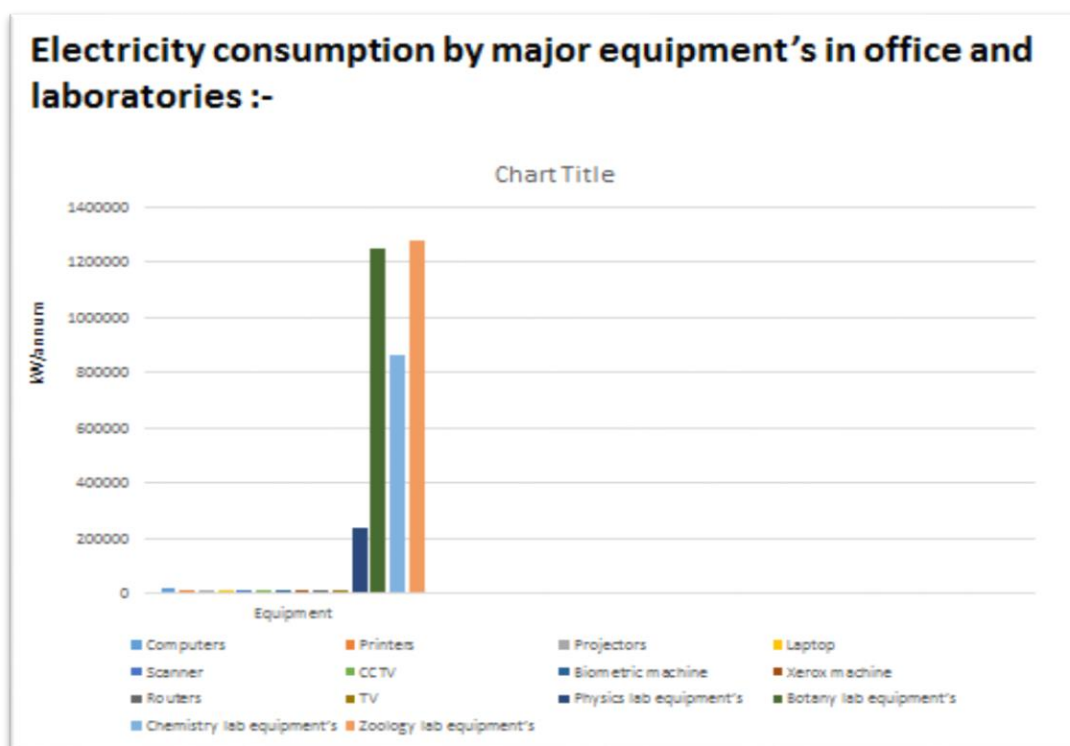
Electricity consumption by major electricity consuming equipment:

Sr. No.	Equipment	Number	kW/annum
1	Air conditioner	01	3825
2	Amplifier	02	12.5
3	Pumping motors	03	10200
4	Fans	105	306
5	Tubes	240	58.4
6	Water cooler	01	662
7	Fridge	03	10281
8	Total	355	25344.9

Electricity consumption by major equipment's in office and laboratories:

Sr. No.	Equipment	Number	kW/annum
1	Computers	35	14577.5
2	Printers	13	7735
3	Projectors	08	2312
4	Laptop	01	95.19
5	Scanner	01	204
6	CCTV	15	450
7	Biometric machine	01	8.5
8	Xerox machine	03	7344
9	Routers	04	137
10	TV	01	40.75
11	Physics lab equipment's	149	233321
12	Botany lab equipment's	34	1251147
13	Chemistry lab equipment's	72	864443
14	Zoology lab equipment's	43	1275768
	Total	380	3657582.94





Yearly consumption of the institution calculated from individual instrumental capacity is 3657582.94 kW/annum and the actual consumption calculated from the billing of the electricity of the electricity is 2575440 kW/annum. This shows that the institution is saving the electricity by proper management of electricity consuming instruments and laboratory equipment's. Thus the institution following the principle that **“Saving of electricity is the generation of electricity”**.

Chapter V

Solid Waste Audit

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduces or eliminates the adverse impact on the environment and human health. A number of processes are involved in efficiently managing waste for organization. It is necessary to manage the solid waste properly to reduce the load on waste management system.

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 Shivaji University campus. This report will help for further solid waste management and

Solid waste management:

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 Br. Balasaheb Khardekar College. 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 164 kg/month and 1968 kg/year. Paper waste is a major solid waste generated by all the departments. Old answer sheets, old bills and confidential reports are sent for shredding, pulping and recycling after completion of their preservation period to the Vengurla Nagarparishad waste management center which is best center in the country awarded for it's waste management systematics. Plastic waste is generated by all departments, administrative sections as well as support services but it is not categorized at point source and sent for recycling. Metal and waste is stored and given to authorized vendors for further processing. Glass bottles are reused in the laboratories. Green nature club creatively reuse the bottles for gifting the guests. Students are encouraged to paint the bottles with pictures of birds and animals.

Brown leaf management is the big challenge as campus produces nearly 3500kg/year. By simple above ground method of Huge-culture they are recycled into compost in scientific

way. Green nature students are trained for it. Compost is utilized for mango, chikkoo and other plants in Botanical garden.

Green nature club student members give demonstration of Waste recycling in small model basket to create interest among school students.

4 waste management units made up of flex sheets are set in campus to recycle huge biomass we collect from leaf falls. Dried leaves and wood branches fallen are recycled into compost.

Dustbins are placed in class rooms and laboratories as well as library to segregate the waste.

Chapter VI

Ambient Air Quality Status

Br. Balasaheb Khardekar College, Vengurla is situated near sea shore and port. Air quality parameters are due to the natural process like wind, pollen grains and natural dust. There are also anthropogenic activities like vehicular activity, generators, fires and laboratory fumes and construction activity are causing air pollution in the university campus BKC campus is a green campus, observed minimum air pollution as compared to other National Ambient Air Pollution Centers located in Kolhapur city.

6.1. National ambient air quality program (NAAQM)

Central Pollution Control Board, New Delhi initiated National Ambient Air Quality Monitoring (NAAQM) programme in the year 1984 to get spatial and temporal variation of ambient air concentrations for a wide range of pollutants that are considered relevant for evolving strategic management plan. The program was subsequently renamed as NAMP (National Air Quality Monitoring Program)...

6.2 Air Quality in campus:

Br. Balasaheb Khardekar College has huge campus and class rooms are set towards interior surrounded by green cover of old trees. Very less pollutant is found. Due to moisture in the campus and climatic condition very less dust is found. Students have calculated the dust particles, which are negligible. Though the class rooms and laboratories are near road, no disturbance of horns and sound is found. No sound pollution at all. Totally peaceful environment makes the ambience best for academic development.

6.3 Sound pollution: No sound pollution occurs due to systematic vehicle parking. Most of the students travel by public vehicles and bicycles. This is the notable thing. Staff members are also promoted for less fuel consumption. No Vehicle day is still organized by Jimkhana department to create awareness about use of cycles to minimize the air pollution.

Chapter 7

Carbon Sequestration

7.1 Carbon Sequestration

7.1.1 Need of study: While transforming ourselves from regional university to global university it is a responsibility of such universities to face the global future challenges and try to find out possible solutions for them. It is a social and environmental responsibility of Government Institutes, Universities, National and International Organizations to respond positively for various global issues at local level and should percolate the generated knowledge in to the society. Global Green Audit 2018-19 Shivaji University, Kolhapur. 111 warming and climate change are current environmental issues need to be addressed scientifically and efficiently. As Universities are provided with skillful human resource supported by analytical infrastructure, it is our duty to bring such ideas in practice. While understanding the call of time the Department of Environmental Science, Shivaji University has decided to enumerate the green cover of Shivaji University campus and quantify the carbon sequestration of existing tree population.

7.1.2 Objectives:

1. To study woody green cover of BKC campus.
2. To study species diversity of woody vegetation in the BKC campus.
3. To understand biomass and carbon stock accumulated by woody vegetation in the BKC campus.
4. To explore carbon sequestration potential of woody vegetation in the BKC campus.
5. To explore potential of woody vegetation of the BKC campus as an oxygen source.
6. To measure canopy cover of the trees on the BKC campus.
 - Area of Vengurle Tehsil : 302 Sqare Km (Rural : 289.05 sq.km + 12.98 sq. Km)
 - Villages : 83
 - Population : 85801
 - Sources of water : Wells Rivers, Tap water, Lakes, Bore machine

LATITUDE: 15°52'0.28"N
LONGITUDE: 73°38'36.62"E

ALTITUDE: 19 M {62 FT}

BKC campus covers an area of about 7 acres. The campus is covered with vegetation.

Carbon sequestration is long-term storage of carbon dioxide or other forms of carbon to avoid climate change. It has been considered as a way to slow the atmospheric and marine accumulation of greenhouse gases, which are released by burning fossil fuels. Vegetation carbon pool having the potential of 560 Pg (Pg: Pentagram= billion ton) of carbon storage globally. In the current study the focus is given on the assessment of existing carbon stock stored in BKC College campus in the form of woody vegetation by enumerating every tree species.

Overall **36241.3** tons CO₂ has been captured and stored in the Woody plants present on the College campus. A single tree consumes 0.0218 tons of CO₂ approximately annually consequently, as the campus possesses **170** mature Woody plants **13228074.5** tons CO₂ is consumed by all Woody vegetation on the campus.

Oxygen released

Woody vegetation in BKC campus has released tons of oxygen in their lifetime till date. Released oxygen is directly proportional to CO₂ sequestrate in the ratio of Green Audit. A single tree supports oxygen demand of two people for their life..

Thus **170** Woody trees on the BKC college campus are supporting **340** people on and around the campus.

Step 1: Determine the total green weight of the tree

The green weight is the weight of the tree when it is alive. First, you have to calculate the green weight of the above-ground weight as follows:

$$W_{\text{above-ground}} = 0.25 D^2 H \text{ (for trees with } D < 11)$$

$$W_{\text{above-ground}} = 0.15 D^2 H \text{ (for trees with } D > 11)$$

$$W_{\text{above-ground}} = \text{Above-ground weight in pounds}$$

D = Diameter of the trunk in inches

H = Height of the tree in feet

The root system weight is about 20% of the above-ground weight.

$$W_{\text{total green weight}} = 1.2 * W_{\text{above-ground}}$$

Step 2: Determine the dry weight of the tree

The average tree is 72.5% dry matter and 27.5% moisture. Therefore, to determine the dry weight of the tree, multiply the total green weight of the tree by 72.5%.

$$W_{\text{dry weight}} = 0.725 * W_{\text{total green weight}}$$

Step 3: Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree's dry weight total volume. Therefore, in determining the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

$$W_{\text{carbon}} = 0.5 * W_{\text{dry weight}}$$

Step 4: Determine the weight of carbon dioxide sequestered in the tree

CO₂ has one molecule of Carbon and 2 molecules of Oxygen. The atomic weight of Carbon is 12 (u) and the atomic weight of Oxygen is 16 (u). The weight of CO₂ in trees is determined by the ratio of CO₂ to C is 44/12 = 3.67. Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.67.

$$W_{\text{carbon-dioxide}} = 3.67 * W_{\text{carbon}}$$

Tree details:

- 10 years old tree
- 5 meter tall or 16.4 feet tall ("H")
- 25 cm trunk or 9.8 inch trunk ("D")

$$W_{\text{above-ground}} = 0.25 D^2 H = 0.25(9.8^2)(16.4) = 394 \text{ lbs}$$

$$W_{\text{total green weight}} = 1.2 * W_{\text{above-ground}} = 1.2 * 394 = 473 \text{ lbs}$$

$$W_{\text{dry weight}} = 0.725 * W_{\text{total green weight}} = 0.725 * 473 = 343 \text{ lbs}$$

$$W_{\text{carbon}} = 0.5 * W_{\text{dry weight}} = 0.5 * 343 = 171.5 \text{ lbs}$$

$W_{\text{carbon-dioxide}} = 3.67 * W_{\text{carbon}} = 3.67 * 171.5 = 629 \text{ lbs CO}_2 \text{ sequestered in 10 years;}$
that equals 285 kg. EcoMatcher uses an average of 250 kg CO₂ sequestered per tree.

Ultimately, the growth of each tree is non-linear, and the greatest sequestration stage is in the younger stages of tree growth, depending on rates and peaks of individual species, with the sequestration of CO₂ per year dropping thereafter. CO₂ sequestration can differ even within tree species, with multiple factors such as growth conditions also at play. But while the exact CO₂ sequestration rates may require more accurate measurements to pinpoint, the impact trees can create is undeniable in our global fight against climate change, in addition to the host of localized functions it can fulfill.

Tree species with highest population :

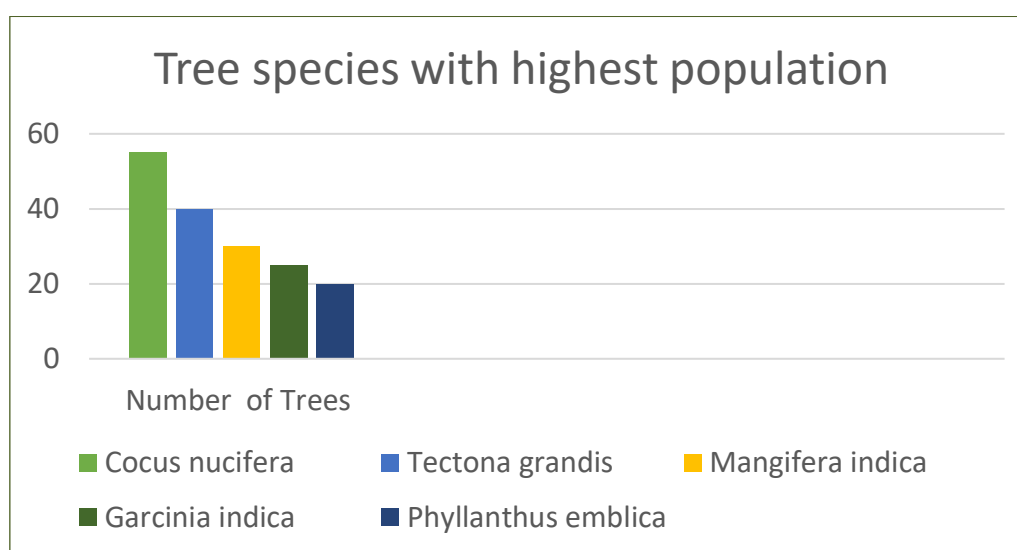
Sr. No.	Botanical Name	Common Name	Number
01.	<i>Cocus nucifera</i>	Coconut	55
02.	<i>Tectona grandis</i>	Saag	40
03.	<i>Mangifera indica</i>	Mango	30
04.	<i>Garcinia indica</i>	Kokum	25
05.	<i>Phyllanthus emblica</i>	Amla	20

Total biomass in tons of first five tree species (Tons)

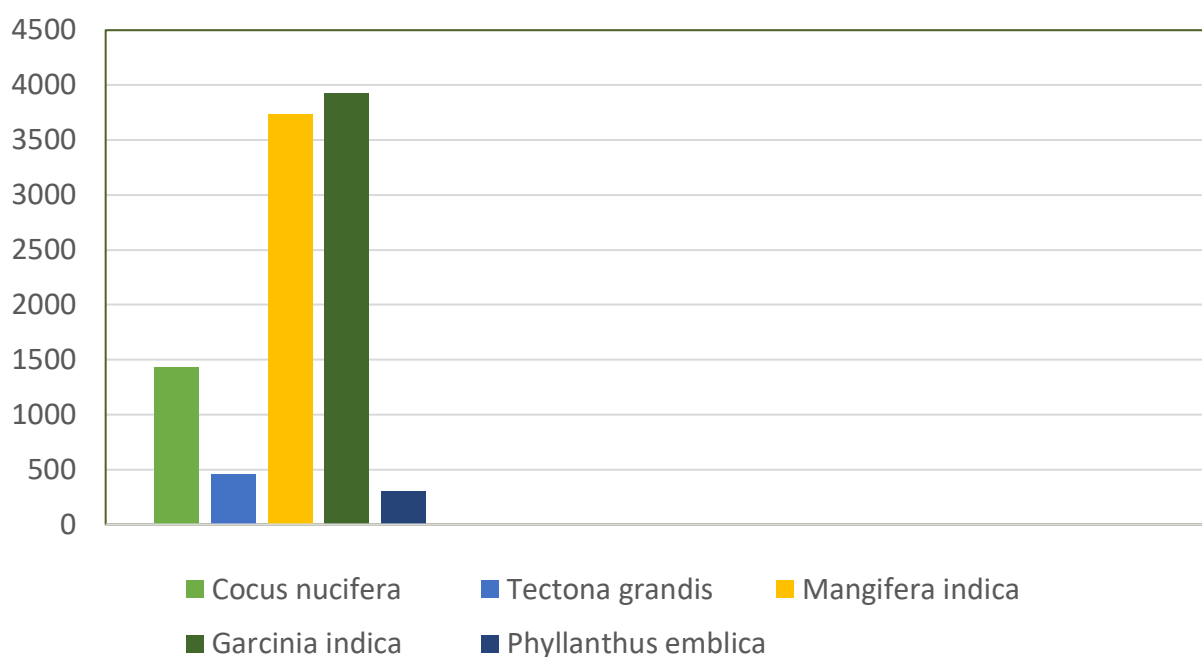
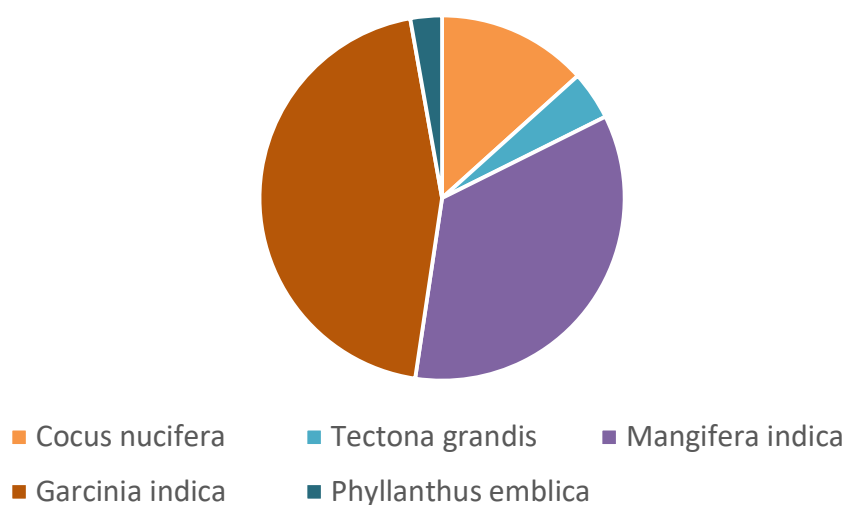
Sr. No.	Botanical Name	Biomass	Canopy	Total Weight
1.	<i>Mangifera indica</i>	859.5	1313.4	10314.09
2.	<i>Phyllanthus emblica</i>	69.27	3.2	831.23
3.	<i>Tectona grandis</i>	106.81	706.6	1281.7
4.	<i>Cocus nucifera</i>	330.07	8.77	3960.8
5.	<i>Garcinia indica</i>	1110.3	686	13324.3

Table no. 7.3: Total Weight of CO₂ Sequestered in the first five tree species

Sr. No.	Botanical Name	Dry Weight of the Tree	Weight of 'C' in Tree	Weight of CO ₂ Sequestered in the Tree
1.	<i>Mangifera indica</i>	7477.6	3738.8	13721.3
2.	<i>Phyllanthus emblica</i>	602.6	301.2	1105.6
3.	<i>Tectona grandis</i>	929.1	464.5	1704.9
4.	<i>Cocus nucifera</i>	2871.6	1435.7	5270.4
5.	<i>Garcinia indica</i>	7868.8	3934.3	14439.1



Total biomass in tons of first five tree species :-



Highest carbon stock species in tons

The starting of the 21st century brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO₂ is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from

preindustrial levels to more than 390 parts per million CO₂. On this background it is a need of time to cover the research areas interrelated with climate change.

The “Carbon Sequestration and Green cover inventory” is a current status of tree cover and vegetation carbon storage assessment of area under BKC campus. In an era of climate change and global warming carbon emission, carbon footprints, carbon sequestration, adaptations, mitigation are the keywords in academia. Carbon sequestration is a process of converting atmospheric carbon i.e. CO₂ in to other sinks of carbon such as vegetation, soil, ocean etc. in various forms to mitigate global warming audit is one of the important clauses of Kyoto Protocol.

7.2 Carbon footprints

In today's world one of the biggest issues faced by all of us is global warming. Global warming refers to an increase in average global temperature of mother Earth. The main cause of global warming is increase in the concentration of greenhouse gases (GHGs) in the atmosphere due to anthropogenic activities and their level is determined with the help of global warming potential (GWP) and expressed as Carbon Footprint (CF). Carbon Footprint is another phenomenon used for GHGs or carbon dioxide emission in terms of CO₂ equivalents. There are various definitions of carbon footprint are in literature. But the most recognized definition given by Wiedmann is that “the Carbon footprint is the measure of carbon dioxide emissions directly or indirectly caused by an activity or accumulated over the life stages of a product.” In other words, “A carbon footprint is the total greenhouse gas (GHG) emissions caused directly and indirectly by an individual, organization, event or product.”

As the BKC considered as institutional organization, the various energy resources like electricity, fuels, Liquefied petroleum gas (LPG) are used. It is necessary to calculate the carbon footprint of the College to upgrading the Clean Developmental Mechanism (CDM) in various processes. All the data from the various sources were collected from all the sectors where energy resources are used. The collected data is calculated by using standard emission factors.

7.2.1 Electricity Carbon Footprint:

In the college electricity is used for various purposes like office use, class rooms, and library and in the laboratories. The total electricity used in the college is 3657582.94kW/annum which (approximately) liberates 3167 kg of CO₂ per year. **7.2.2 Liquefied petroleum gas (LPG) footprint:**

The Liquefied petroleum gas (LPGs) is used in the Science laboratories, Hostels, Guest house and staff quarters on the campus. The total LPGs consumed is 3,3.2 kg/annum is responsible for the liberation of 9.09 kg of CO₂.

7.2.3 Vehicle footprint:

The vehicles are the source of CO₂ and other greenhouse gases. The number of vehicles passed through the campus daily, which emits the CO₂ in the atmosphere which add tons of CO₂ as vehicle footprint. The vehicle footprint of college is 37,3.23 kg of CO₂ per year approximately.

No Vehicle Day“,is celebrated to aware the community.

7.2.4 Paper footprint:

The papers are used in the institution for various purposes like exam answer sheets, circulars, notices, office work etc. The papers are responsible for the emission of CO₂. The University used total used 1, 7.17 reams of papers which emits the 1 tons of CO₂

7.2.5 Total footprint of the University:

The total footprint is the addition of all the footprints and it is expressed as tons of CO₂ per year. The total footprint of BKC is 41 tons of CO₂ per year approximately.

Canopy cover:



Great Banyan Tree in College Campus :Around 80 years old ,Heritage Tree.Spread over in 4000 sq feet area.



Areca catechu : Recent plantation



Cocos nucifera : 50 years old palms



Unique avenue of Rare Kokum *Garcenia indica* (Plants : 50years old.)



Cycas plant



Huge Mango trees in the campus : Visit of Eminent Scientists to celebrate Wetland Day Conference.

Botanical Garden:

Concept: A **botanical garden** or **botanic garden** is a garden dedicated to the collection, cultivation, preservation and display of a wide range of plants labeled with their botanical names. It may contain specialist plant collections such as cacti and other succulent plants, herb gardens, plants from particular parts of the world, and so on; there may be greenhouses, shade houses, again with special collections such as tropical plants, alpine plants, or other exotic plants. Visitor services at a botanical garden might include tours, educational displays, art exhibitions, book rooms, open-air theatrical and musical performances, and other entertainment.

Botanical gardens are often run by universities or other scientific research organizations, and often have associated herbaria and research programmes in plant taxonomy or some other aspect of botanical science. In principle, their role is to maintain documented collections of living plants for the purposes of scientific research, conservation, display, and education, although this will depend on the resources available and the special interests pursued at each particular garden.

The origin of modern botanical gardens is generally traced to the appointment of professors of botany to the medical faculties of universities in 16th century Renaissance Italy, which also entailed the curation of a medicinal garden. However, the objectives, content, and audience of today's botanic gardens more closely resembles that of the grandiose gardens of antiquity and the educational garden of Theophrastus in the Lyceum of ancient Athens.^[1]

The early concern with medicinal plants changed in the 17th century to an interest in the new plant imports from explorations outside Europe as botany gradually established its independence from medicine. In the 18th century, systems of nomenclature and classification were devised by botanists working in the herbaria and universities associated with the gardens, these systems often being displayed in the gardens as educational "order beds". With the rapid expansion of European colonies around the globe in the late 18th century, botanic gardens were established in the tropics, and economic botany became a focus with the hub at the Royal Botanic Gardens, Kew, near London.

Over the years, botanical gardens, as cultural and scientific organisations, have responded to the interests of botany and horticulture. Nowadays, most botanical gardens display a mix of the themes mentioned and more; having a strong connection with the general public, there is the opportunity to provide visitors with information relating to the environmental issues being faced at the start of the 21st century, especially those relating to plant conservation and sustainability.

Botanical Garden of Br. Balasaheb Khardekar College, Vengurla:

Sr. No.	Botanical Name	Vernacular Name	Family	IUCN Status	Importance	No. Of Species in Campus
Cryptogams						
Algae	Nostoc					
1						
2	Spirogyra					
Fungi						
3	<i>Ganoderma</i>	Wood Rotting Fungus	Ganodermataceae	---	Antioxidant and have Medicinal Properties	
4	<i>Agaricus</i>	Edible mushroom	Agaricaceae		Sugar free diet	
Bryophyta						
5.	<i>Anthoceros</i>	Field Hornwort	Anthocerotaceae	---	Seasonal	
6.	<i>Riccia</i>	Crystalworts / Liverworts	Ricciaceae	---	seasonal	

Pteridophytes						
7	<i>Adiantum</i>	Common Maidenhair Fern	Pteridaceae	---	Seasonal	
8.	<i>Sellaginella</i>					
9	<i>Nephrolepis</i>					
10	Climbing fern					
Cycads						
11.	<i>Cycas circinalis</i>	Sago Palm	Cycadaceae	---	Ornamental	
Palms						
12.	<i>Caryota urens</i>	Bherala Mad / Fishtail Palm	Arecaceae	Threatened	Medicinal Plant	
13.	<i>Areca catechu</i>	Supari, Phopal	Arecaceae	---	Commercial Plant	14
14.	<i>Cocus nucifera</i>	Coconut	Aracaceae	---	Commercial Plant	45
Angiosperms						
15.	<i>Saraca asoca</i>	Sita Ashok	Fabaceae	Vulnearabl e	Medicinal Plant	01
16.	<i>Phyllanthus emblica</i>	Amla	Phyllantha ceae	Red Listed Threatened	Medicinal Plant	20

				Species		
17.	<i>Mangifera indica</i>	Mango	Anacardia ceae	---	Medicinal as well as Commercial Plant	30
18	<i>Ficus religiosa</i>	Peepal	Moraceae	Red Listed	Medicinal	01
19.	<i>Cassia tora</i>	Takala	Fabaceae	Invasive	Industrial	Abundant
20.	<i>Mimosa pudica</i>	Touch-me- Not/ Lajalu	Mimosae	Invasive	Medicinal Plant	Abundant
21.	<i>Leea asiatica</i>	Bandicoot Berry/ Dida	Vitaceae	Red Listed	Medicinal Plant	Abundant
22.	<i>Tridax procumbens</i>	Tridax Daisy	Asteracea e	Threatened	Medicinal Plant	Abundant
23.	<i>Careya arborea</i>	Patina Oak/ Kumbha	Lecythida ceae	---	Medicinal Plant	05
24.	<i>Prunus dulcis</i>	Almond	Rosaceae	---	Medicinal as well as Commercial Plant	05
25.	<i>Chromolaena odorata</i>	Ranmodi	Asteracea e	Invasive	Butterfly Nectaring Plant	Abundant
26.	<i>Holarrhena pubescens</i>	Indrajao/ Pandhra Kuda	Apocynac eae	Threatened	Medicinal Plant	Abundant
27.	<i>Ixora coccinea</i>	Jungle	Rubiaceae	Threatened	Medicinal as well as	Abundant

		Geranium			Butterfly Nectaring Plant	
28.	<i>Lantana camara</i>	Wild Sage/ Ghaneri	Verbenace ae	Invasive	Medicinal, Fungicidal, Insecticidal, Antimicrobia l	Abundant
29	<i>Smilax zeylanica</i>	Ghotvel	Smilacace ae	---	Medicinal as well as Used as Wild Vegetable	Abundant
30	<i>Phyllanthus virgatus</i>	Bhuiaavla/ Seed under leaf	phyllantha ceae	---	Medicinal Plant	Abundant
31	<i>Calotropis gigantea</i>	Rui	Apocynac eae	---	Medicinal Plant	05
32	<i>Dioscorea wallichii</i>	Kadu Karanda	Dioscorea ceae	---	Medicinal Plant	Abundant
33.	<i>Impatiens balsamina</i>	Garden Balsam/ Terda	Balsamina ceae	---	Medicinal as well as Ornamental Plant	Abundant
34	<i>Commelina forskaonii</i>	Kena/ Day Flower	Commelin aceae	---	Wild Vegetable as well as Ornamental Plant	Abundant

35.	<i>Curcuma pseudomontana</i>	Ran Halad	Zingiberaceae	Vulnerable	Medicinal Plant	Abundant
36	<i>Rauvolfia serpentina</i>	Sarpagandha	Apocynaceae	Endangered	Medicinal Plant	Several
37	<i>Urena sinuata</i>	Burr Mallow/ Tupkadi	Malvaceae	Invasive	Medicinal Plant	Abundant
38.	<i>Ricinus communis</i>	Castor Oil Plant	Euphorbiaceae	invasive	Medicinal Plant	20
39	<i>Ocimum sanctum</i>	Tulsi	Lamiaceae	---	Medicinal Plants	15
40	<i>Combretum indicum</i>	Madhumalti	Combretaceae	---	Medicinal Plant	01
41.	<i>Melastoma malabathricum</i>	Lakeri	Melastomataceae	---	Ornamental Plant	05
42.	<i>Cordia dichotoma</i>	Indian Cherry/ Bhokar	Boraginaceae	Red Plant	Medicinal Plant	01
43	<i>Prosopis cineraria</i>	Ghaf / Shami	Fabaceae	Threatened	Medicinal Plant	01
44	<i>Garcinia indica</i>	Kokum	Clusiaceae	Vulnerable	Commercial as well as Medicinal Plant	25
45.	<i>Lagerstroemia speciosa</i>	Tamhan / Pride-of-India	Lythraceae	vulnerable	Medicinal Plant	02

46.	<i>Biophytum sensitivum</i>	Mukutti / Lajvanti	Oxalidaceae	---	Medicinal Plant	Abundant
47	<i>Anacardium occidentale</i>	Kaju / Cashew	Anacardiaceae	---	Commercial	150
48	<i>Curculigo orchioides</i>	Golden Eye-Grass	Hypoxycaceae	Endangered	Wild as well as Medicinal Plant	Abundant
49.	<i>Calocasia esculenta</i>	Taro, Alu,	Araceae	---	Wild Vegetable	Abundant
50.	<i>Manikara zapota</i>	Chikoo / Naseberry	Sapotaceae	---	Commercial	15
51	<i>Crotalaria verrucosa</i>	Khulkhula	Fabaceae	Red listed	Used as Green Manure and Butterfly Nectaring Plant	several
52.	<i>Cheilocostus speciosa</i>	Peva , Costus	Costaceae	---	Wild Vegetable, wild Ornamental Plant	Abundant
53	<i>Ficus benghalensis</i>	Vad , Banayan Tree	Moraceae	---	Medicinal as well as Religious Significance	05
54	<i>Citrus x limon</i>	Lemon , Limboo		---	Medicinal as well as for	10

					fruiting	
Cultivated horticultural species with commercial objective						
55	<i>Mangifera indica</i>	Mango	Anacardiaceae	---	Medicinal as well as Commercial Plant	30
56	<i>Prunus dulcis</i>	Almond	Rosaceae	---	Commercial as well as medicinal Plant	05
57.	<i>Areca catechu</i>	Supari / Phopal	Arecaceae	---	Commercial Plant	14
58	<i>Cocos nucifera</i>	Coconut	Arecaceae	---	Commercial Plant	45
49	<i>Garcinia indica</i>	Kokum	Clusiaceae	Vulnerable	Commercial as well as Medicinal Plant	25
50	<i>Anacardium occidentale</i>	Kaju / Cashew	Anacardiaceae	---	Commercial	150
51	<i>Manihara zapota</i>	Chikoo / Naseberry	Sapotaceae	---	Commercial	15
52	<i>Syzygium cumini</i>	Jambhul / Jamun	Myrtaceae	Invasive	Commercial	05
53	<i>Artocarpus</i>	Phanas /	Moraceae	Red listed	For Fruit,	04

	<i>us heterophyllus</i>	Jackfruit			Timber, Fodder and Fuel Wood	
54	<i>Tamrindus indica</i>	Tamrind, Chinch	Fabaceae	Least Concern	Medicinal as well as for fruit	03
55	<i>Tectona grandis</i>	Teak, Sag	Lamiaceae	---	Wood very durable, resistant to fungi	40

College has a huge green campus with cultivated trees as well as seasonal Cryptogams, fungi, Epiphytes, Angiosperms.

Chapter 8

Green initiatives

Br. Balasaheb Khardekar College is situated in Konkan which is hot spot of biodiversity. The coastal area and estuarine ecosystem makes it rich with floral and faunal, precious biodiversity. BKC aims to protect and conserve its biodiversity, fresh and clean ambience through many initiatives.

Following green initiatives are consistently taken to protect and conserve the nature:

1. Waste recycling: *Nirmal prakalp* at 4 schools and for college students

Awareness in schools through Nirmalprakalpat 4 schools and for college students :

1. VengurlaShala No.3 : 4/9/2018
2. 2.VengurlaShala No.4 :5/9/2018
3. 3.VengurlaShala No.2 : 6/9/2018
4. 4.VengurlaShala No.1 : 7/9/2018
5. 5. Parabwada Shala with NSS. Cloth bags distribution to say no to plastic. 10/9/2018

2. Wetland restoration :

1. Wetland day Celebration: 2nd Feb. 2016.

Objective: To create awareness about mangrove ecosystem conservation

Exhibition on Mangrove biodiversity was arranged at the B.K. College library to create awareness about mangrove conservation which represents rich wetland in the coastal region. B. Sc. I students worked as volunteers to arrange the event. Posters from Botany Department, Shivaji University were displayed showing beautiful photos of floral and faunal diversity and its importance. Research fellows Miss. Tarannum Mulla and Mr. Mehboob Shaikh explained the conservation aspects

2.2ndFeb.2017, was done by arranging a program on waste recycling demonstration in pep bottle Wet land day celebration 2nd Feb.2017, was done by arranging a program on waste recycling demonstration in pep bottles. Dr. Dhanashree Patil demonstrated the kitchen waste recycling in pep bottles. The bottles were filed with kitchen waste and soil for cultivation of vegetables. On the occasion students who got participated in flower show actively were felicitated by giving certificates they received. Shri. Virendra Desai,

Horticulture section was chief guests. Lecture about Ramsar Convention to B.Sc. I and II students by Dr. R. T. Patil

3. International Wetland day .2.2.2018 : Lecture about Ramsar Convention to B.Sc. I and II students by Dr. R. T. Patil

4. Wet land Brief Documentation, Sindhudurg District

1. Meeting at Kudal, Members of Sindhudurg Wetlands Brief documentation committee under district collector. 15/7/2018

2. Lecture by Mr. Mehaboob Shaikh, University of life, Dhamapur..18/7/2018 About understanding the format of Wetland documentation and data feeding at Tehasiladar office. 60 members participated, Swaminiself help group, MazaVengurle team and college students and staff

3. Field visits for Wetland survey: Nishant Talav 20.7.2018

4. Field visits for Wetland survey Bandh Aravali 22.7.2018

5. Field visits for Wetland Adeli Dharan 8.8.18

6. Field visits for Wetland survey Redi, Huda, Varachker, Bombadojichiwadi, Mharatale 17.8.2018

Meeting at Dhamapur:

Dr. Asharaff, Wetland Advisory board Delhi, visited Dhamapur and Kudal : Participation

5. Mangrove conservation: of 5 students with Dr. D. S. Patil in meeting. Students gave letters about wetland conservation to committee on 4.9.2018

1. Visit to Mandavi Backwater safari. : Students and 3 staff members benefited. Estuarine ecosystem was studied and bird watching under trained women force was done. 18.12.2018

2. International Mangrove day celebration -60 students and Swaminiself help group participated. Mangrove foundation, Mumbai -Malvan team supported the activity by distributing informative posters and power point presentation was done. Local fisher women were felicitated and gave guidance to students

6. Cleanliness drives: Campus cleaning, Beach cleaning and Estuary cleaning programs are conducted.

7. Biodiversity conservation :: One day Seminar arranged by As a co-ordinator and panel discussion team members –of UGC, SAP ,DRS –II Seminar on “**Biodiversity and coastal resources**” organized by Dept. Botany Shivaji University ,Kolhapur in collaboration with RFRC ,Vengurla -An opportunity for students and teachers to know about the ecological and economic importance of coastal biodiversity. 4 resource persons: Dr. Niranjana Chavan, Dr. Kuralapkar, Dr. Mahesh Gokhale given lectures with slides on bioresources and various strategies to conserve them sustainable for environment conservation with respect to social causes. Dr. D. K. Gaikwad, Dr. Pradip Haladawanekar, Dr. Mansing Nimbalkar, Dr. M. B. Gaikwad from Botany Dept. Shivaji University

8. Plantation: Plantation of Cashew plants: 150 cashew saplings were scientifically cultivated in college campus.

10. Conferences and workshops on Environmental Sustainability:

1. National Conference on Ecotourism
2. National conference on “Wetland Restoration and Mangrove Festival
3. Workshops on Ecotourism
4. Workshops on Creative Gardening skills

Waste recycling demonstrations in schools



Waste recycling units: 4 in campus

अफरोज अहमद : धामापूर, पाट येथे चर्चासत्र, तलावांना समितीसोबत भेट पाणथळ भूमी संरक्षित करण्याची गरज

लोकमत न्यूज नेटवर्क

सावंतवाडी : पाणथळ भूमी या पर्यावरणातील किडनी आहेत. जशी किडनी शरीरातील रक्त शुध्द करते, तशाच या पाणथळ भूमी पर्यावरण शुध्दीकरणाचे कार्य करतात. पर्यावरण व मानव यांनी सुवर्णमय काढून विकास करावा. पाणथळ भूमी, वने, जीवजंतु संरक्षित केले नाहीत तर आपले पृथ्वीवरील अस्तित्व धोक्यात येईल. यासाठी सर्वांनी एकत्र येऊन, असे मत भारत सरकार व नर्मदा नियंत्रण प्राधिकरण जलसंशोधन नदी विकास आणि गंगा संरक्षण मंत्रालयाचे सदस्य डॉ. अफरोज अहमद यांनी मांडले.

डॉ. अहमद यांनी सिंधुदुर्ग जिल्ह्यातील धामापूर व पाट तलावांना पाणथळ समितीसोबत भेट दिली. त्यानंतर पाणथळ समितीच्यावतीने 'अ स्टेप टु प्रोटेक्ट वेटर्लंड' या चर्चासत्रात सहभागी होत



सिंधुदुर्ग जिल्ह्यातील धामापूर येथील तलावाची डॉ. अफरोज अहमद यांनी पाहणी केली. यावेळी समाधान चव्हाण, सुभाष पुराणिक, सादिया अहमद उपस्थित होते.

त्यांनी मार्गदर्शन केले. यावेळी त्यांच्यासोबत सादिया अहमद, उपवनसंरक्षक समाधान चव्हाण, सहाय्यक उपवनसंरक्षक सुभाष पुराणिक, विलास काणे, वनस्पतीतज्ञ डॉ. बाळकृष्ण गावडे, वनस्पतीतज्ञ मिलिंद पाटील उपस्थित होते.

डॉ. अहमद म्हणाले की, पाणथळ जागा ह्या पर्यावरणाच्या व आपल्या दुष्टीकोनातून फार महत्वाच्या आहेत. भुविगत पाण्याची पातळी तर वाढतेच, त्याचबरोबर पर्यावरणातील वातावरणीय बदल धोपवण्याचे काम वाढते केले जाते. भूमीच्या सभोवतालचे तापमान हे ४ ते ५ अंश

सेल्सिअसने कमी असते. वनसंपदा, प्राणीसंपदा यांचे हे हॉटस्पॉट आहेत व त्यांचे जतन करणे आवश्यक आहे, असे मतही डॉ. अहमद यांनी व्यक्त केले. यावेळी सिंधुदुर्ग वन विभागाच्यावतीने डॉ. अहमद यांना पाणथळविषयी माहिती देण्यात

..तर पृथ्वीवरील अस्तित्व धोक्यात

- पाणथळ भूमी, वने, जीवजंतु संरक्षित करणे गरजेचे.
- सिंधुदुर्ग जिल्ह्यातील ६४ पाणथळ भूमींचे सर्वेक्षण.
- अहवाल शासनाला सादर करण्यात आला.
- चर्चासत्राला मिळाला चांगला प्रतिसाद.
- पाणथळ जागा ह्या पर्यावरणाच्या व आपल्या दुष्टीकोनातून फार महत्वाच्या : अहमद.

आली. जिल्ह्यात ३९३ पाणथळ भूमी आहेत. त्यातील केवळ ६४ पाणथळ भूमी म्हणून सर्वेक्षणासाठी निवडल्या गेल्या आहेत. बाबर डॉ. अहमद यांनी इतर पाणथळ भूमी या सर्वांनी मिळून संरक्षित केल्या पाहिजेत व त्यातून 'वनरस सिंधुदुर्ग' अशी ओळख निर्माण केली पाहिजे, असे सांगितले.

सचिन देसाई यांनी उच्च न्यायालयात माहिती सादर केल्यानंतर न्यायाधिकांनी सिंधुदुर्ग जिल्ह्यात सर्वसामान्य एकत्र येऊन कसे काम करतात, ते सांगितले. याप्रमाणे राज्यत इतरवही झाले पाहिजे, अशी भूमिकाही त्यांनी यावेळी मांडली. पाणथळ जमिनीचे महत्त्व मोठे आहे, असेही देसाई यांनी सांगितले.

पाणथळ भूमी संरक्षणाच्या दुष्टीकोनातून उच्च न्यायालयाच्या आदेशानुसार सिंधुदुर्ग जिल्ह्यातील ६४ पाणथळ भूमींचे प्राथमिक सर्वेक्षण करून त्याचा अहवाल शासनाला सादर करण्यात आल्याचे यावेळी स्पष्ट करण्यात आले. याच विषयाला अनुसरून हे चर्चासत्र आयोजित करण्यात आले होते. त्याला चांगला प्रतिसाद मिळाल्याचे उपवनसंरक्षक चव्हाण यांनी सांगितले. पाणथळ भूमी संरक्षणासाठी यावेळी प्रा. हसन खान व अपरीत खान यांनी मालवणी गावाचे सादर केले.

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कांदळवनाचे रक्षण केल्यास मच्छीमारांनाही लाभ!

वैगुल्यात राष्ट्रीय कार्यशाळेचे उद्घाटन जागतिक पाणथळ दिन व कांदळवन उत्सव : खर्डेकर महाविद्यालय ते मांडवी खाडीपर्यंत जलकुंभ दिंडी

वार्ताहर
वैगुल्यात
जिल्ह्यात असण्याचा निहाय सौराष्ट्रीचे सार्वजनिक क्षेत्रात हा विकास आरोग्यदायी होऊ शकेल. कांदळवनाची जैववैविध्यता राखणी केल्याने पर्यटकांसोबत त्यांच्या लाभ मच्छीमारांसाठी मिळणार आहेत असे प्रतिपादन पातळमंथरी दीपक केसरकर यांनी केले. जिल्ह्यातील कांदळवन परिसरात दहा बॅटरी ऑपरेटेड पाणबुड्या देण्यात येणार असल्याचे केसरकर यांनी जाहीर केले. जागतिक पाणथळ दिन व कांदळवन उत्सवाविषयी व कांदळवने खर्डेकर महाविद्यालय आणि सिंधुदुर्ग केलोव्हाईट डीप्लोमेटिक कॉलेज यांच्यात आयोजित करण्यात आलेल्या पाणथळ जागा व कांदळवन सर्वेक्षणार्थ दोन दिवसीय राष्ट्रीय कार्यशाळेचे उद्घाटन पातळमंथरी केसरकर यांच्या हस्ते जलकुंभ काला पुरव्याने करण्यात आले. यावेळी भारतीय महिला शास्त्रज्ञ संघ कोल्हापूरच्या डॉ. निरुद्धा चव्हाण, जिल्हाधिकारी स्त्रीय पांडुरंग, सहाय्यक संचालिका शीतल पचबाई, उपवनसंरक्षक समाधान चव्हाण, जिल्हा निरोजन विकास समितीच्या प्रमुख ममता इंदकर, तहसीलदार शरद गोसावी, मुख्याधिकारी दीपक सावंत, समाजवी सुनील मोरारकर, जलसंपदा अखिल राजेंद्र, डॉ. बी. एन.



वेगुल्यात जागतिक पाणथळ दिन व कांदळवन उत्सवानिमित्त आयोजित केलेल्या राष्ट्रीय कार्यशाळेत बोलताना पातळमंथरी दीपक केसरकर. वाजुला अन्य मान्यवर.

कांदळवन सफर...

- पातळमंथरींनी घेतला कांदळवन सफरीचा आनंद
- कांदळवन परिसरात बॅटरी ऑपरेटेड पाणबुड्या देणार

सावंत, युनिव्हर्सिटी ऑफ लॉफॉरे सचिन देसाई, भारतीय जलसंस्कृती मंडळ कोल्हापूरचे

डॉ. अनिलराज जगदादे, स्वामिनी महिला बचत मंडळाचे शेला हुले, गाईन क्लब कोल्हापूरचे अमृत कल्याण सावंत, प्रा. बाळकृष्ण गावडे, समकालीन स्त्रीय केंद्र राष्ट्रीय महाराष्ट्र संघाचे संस्था गोव्याचे डॉ. दिशाक नायडू, प्रा. मनोज दुर्गसकर, सदीप राणे, पं. स. सदस्या अनुश्री कांबळी, सुकन्या नरसुले उपस्थित होते. लॅण्ड ऑफ वेल्थनेटचे प्रकाशन कार्यशाळेच्या उद्घाटन व खर्डेकर महाविद्यालय ते मांडवी खाडीपर्यंत जलकुंभ दिंडी काढण्यात आली. यात वेगुल्यात जलकुंभचे

झांज एक्क व सिंधुदुर्ग विद्याभित्तेनचे लेडीम एक्क, विद्याची व विलक सदस्यी झाले होते. यावेळी प्रीतीश नाड यांनी गावाचे यावेळी स्वामिनी महिला बचत गट वेगुल्या, दिवा नारायण बचत गट तारामुंदरी देवगड, पुर्का क्लब, स्वच्छता कामगार, पाणथळ स्वयंसेवकींचा सत्कार करण्यात आला. लॅण्ड ऑफ वेल्थनेट या पुस्तकाचे प्रकाशन करण्यात आले. प्रस्ताविक डॉ. घनश्री पाटील, स्वागत प्राचार्य विलास देऊलकर, सूचसंचालन मनीषा मुनुमदार यांनी तर प्रा. विवेक चव्हाण यांनी आभार मानले.

आकटबोट इतिहास उद्घाटन..!

वेगुल्या येथील स्वामिनी महिला बचत गटाच्या आकटबोट इतिहास उद्घाटनानी यावेळी केसरकर यांच्या हस्ते करण्यात आले. यावेळी त्यांनी बचत गट चालविणे असलेल्या कांदळवन परिसरात पातळमंथरींनी नेकेनू प्रवास करीत जाऊन सफरीचा जिल्ह्यातील कांदळवन परिसरात दहा बॅटरी ऑपरेटेड पाणबुड्या देण्यात येणार असल्याचे केसरकर यांनी यावेळी सांगितले.



Ecotourism : Wetland Day celebration at Weland site with scientists from SACON





Ambekhan Wetland



Chapter IX

Summary and Conclusion

Summary:

Green Audit is one of the important tools to check the balance of natural resources and its judicious use. Green auditing is the process of identifying and determining whether institutional practices are eco-friendly and sustainable. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area.

The Department of, Department of Botany, Br. Balasaheb Khardekar College, Vengurla has conducted a “Green Audit” of BKC campus during the academic year 2015 to 2021.. The main objective to carry out green audit is to check the green practices followed by institute and to conduct a well-defined audit report to understand whether the college is on the track of sustainable development. After completing the audit procedure of college for green practices, there are following conclusions, recommendations and Environmental Management Plan (EMP) which can be followed by university in future for keeping campus environment friendly.

Conclusion:

From the green audit following are some of the conclusions which can be taken for improvement in the campus.

1. College takes efforts to dispose majority waste by proper methods. Online messages, use of back side of paper for rough work are helpful for reducing the use of papers and ultimately reducing carbon footprint.
2. Awareness about plastic bag minimization was promoted by making 5000 cloth bags by students and its distribution. Reducing the use of one time use plastic bottles, cups, folders, pens, bouquets, decorative items will be useful to solve the problem of plastic pollution to some extent.
3. Composting methods are experimented: Huge culture, Brown leaf recycling, Vermicomposting is done efficiently for composting and vermicomposting. There is a scope to utilize the organic matter manure production.
5. Use of LED lamps and Tube Lights is minimum and is to be encouraged.
6. Self-reliant about water due to sufficient wells .A continuous counter trench (CCT) has given good results on percolation of water and for filling up of lakes on campus. Roof top rain water harvesting has proved beneficial for Chemistry lab to get distilled water.

7. Toilets and bathrooms are consuming more water in the departments. The replacement of old taps can be beneficial for solving this issue

8. No Vehicle Day“ proves to be one of the good practices to save the fuel and help for green and clean environment on the campus. Cycles and public vehicles are used by students, which is appreciable culture in Konkan.

11. The overall ambient air quality on the campus is good while some air quality issues

12. Seven acres of green campus is full of rare plant species and supporting variety of

Birds, butterflies have turned the campus into almost a beautiful biodiversity park.

Environment Management Plan :

By understanding the dynamics of present situation of resource utilization and current practices of waste disposal, the TEAM BKC has prepared Environment Management Plan, for the college. This plan will reveal the strengths and weaknesses and suggests remedies to develop green and clean campus. The EMP also gives suggestion for the priority of work to carry out.

Sector	Strength	Weakness	Suggestion	Priority
Solid waste :				
1.Paper	Paper use is minimized by sending online Notices	Duplication of records in hard copy forms	Can be still minimized by careful use of paper. Back side of papers can be used for rough work	low
2.Plastic	No plastic is permitted in the campus. 5000 cloth bags are distributed	Still students use plastic in the campus	Total ban should be done.	High
3.Biodegradable waste	Brown leaf recycling into fertilizers	100 percent recycling should be done	Can be improved	low
4. Glass waste	Low percentage, glass wear	Careful handling can be taught	Need to segregate properly	low
5.Bio-medical waste	Negligible	NA	NA	Very low
7.Sanitary napkins	Systematic segregation is arranged	Awareness about proper disposal is lacking among girls	Consistent follow up should be taken	High
8.Energy	Instruction to switch off the lights and bigger windows	Still the lights and fans are kept on	Solar panels can be installed	Low
9. Water	Sufficient water . Provide the water during summer to the needy people	Wells are to be recharged	Dripping can be done for increasing plantation	Low
10. Air	Fresh and pleasant air.	No	Should be maintained	Low
11. Noise	Less	No	In future noise pollution may increase. Green screens can be increased	Low
12. Tree vegetation :	Very much satisfactory. 170 full grown trees and 100 and more smaller with bushes.	Can lead to biodiversity park	Scope to conserve rare tree species	low

Green Audit Procedure Performed by Br. Balasaheb Khardekar College, Vengurla and college team.

Date: 11.08.2021

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RECOMMENDATIONS:

Green Audit Procedure Performed and certified by

Date: 11.08.2021

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