**Report on Green Audit** 

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Of

# Toshniwal Arts, Commerce and Science College, Sengaon Dist Hingoli 431542



Audited by

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September 2019

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#### **Green Audit**

The Green Audit is systematic identification, quantification and analysis of green practices and green area cover of the campus, also called as Environmental Audit in large extent. The green practices such as Plantation, Solar Energy, Water Management, Water Harvesting, Waste Disposal Management, Environmental Awareness, Save Energy and proper Consumption, Control Noise and Air Pollution etc. come under Green Auditing.

Toshniwal Art's, Commerce and Science College, Sengaon established in 1993 in rural area of Marathwada region of Maharashtra state. The College campus has 10 Acres of Land used for the Administrative Building, Classroom sections, College Canteen, Plant Garden, Vehicle Parking, Girls Hostel, Indoor Sports Stadium & Outdoor Play Ground. Faculties from institute, NSS unit and Botany, Geology Department have taken lots of efforts to maintain green practices from last few years, with the changing time, the environment monitoring, air quality measurements, Vehicle and Noise Pollution increase day by day in and around the campus, hence it is necessary to go for studying the impact of these developments on campus environment through the Green Audits.

#### **Objectives:**

The main objective of the green audit is to promote the Environment Management and Conservation in the College Campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards.

#### Green auditing:

College has adopted 'Green Campus' system for environmental conservation and sustainability. There are main three pillars i.e. zero environmental foot print, positive impact on occupant health and performance and graduate demonstrating environmental literacy. The goal is to find the number of trees present in the campus, number of trees to be planted, energy and water uses in the campus and creating atmosphere for students to learn about the eco system etc.

#### Aims and Objectives:

- (1) Counting the number of trees present in the campus.
- (2) Identification of plant species.
- (3) Promotion of Green Practices.
- (4) Promotion of Environmental Awareness.
- (5) Suggesting the methodologies to be adopted for environment, green and energy conservations and utilizations.

#### Methodology and Observations:

An environmental audit conducted into phases:

pre-audit stage, audit stage and post-audit stage.

#### **Pre-Audit Stage**

Pre-audit stage involved the identification of target areas for environmental auditing. Accordingly following target areas were identified:

- ✤ Land Use System
- ✤ Biodiversity Status
- Climatic Conditions
- ✤ Water Resources and Management
- Energy Consumption
- ✤ Waste disposal and management
- Environmental Awareness

#### Audit Methodology

(A) Collection of data, observation and interaction: This stage of the Audit involved the activities relating to collection of data, observation, interactions and discussion with the concerned stakeholders i.e., faculty, administration and staff members from different departments and sections.

(B). Review of events : This was carried out in order to understand the various initiatives taken towards sustainable environmental conservation. For the purpose, visitor's book, purchase, policy level documents, AMC etc are examined.

(C) Inspection of sites: The audit team visited premises in order to have an idea of various activities carried. Campus greenery and gaps were identified. Team also had a visit to play ground, canteen, library, office rooms and parking area.

#### **Audit Report**

#### Land Use:

College campus comprised of 10 Acre land possessions used for Building and Play ground purpose only.

The Main building, College indoor sports complex, Women Hostel, Classroom section and Open air Play ground for outdoor games. As can be seen from the eagle eye view, the College premises looks very green with buildings separated from one another and well connected by internal roads. It can be seen that premises distributed as below:

- (1) Administrative and academic block
- (2) Classroom sections

- (3) Indoor sports complex
- (4) Girls Hostel Surrounding
- (5) Medicinal garden
- (6) Parking lots
- (7) Outdoor open air play ground







#### Green Area Cover:

An average percentage of green cover is 62%.

#### Administrative and Academic building:

This is most green cover area after Plant Garden, surrounded by trees, it not only control pollution but also controls noise pollution. The lawn inside the building and surrounded by plants, maintained plants in pots is made this area green. The efforts made by Botany

Department in maintaining medicinal and useful plants in pots are appreciable. Back side of administrative building there is medicinal plant garden. There are total 42 different medicinal plant species and total 60 numbers of medicinal plants. In front of building there is row of coconut tree.

#### College Canteen and Surrounding Area:-

This is better area of vegetation, have lots of scope for plantation. The NSS and Botany department planted surrounding small tree species. The numbers of plant are planted along the side of college canteen.

#### Classroom Area:-

Plantation to favor blocks surrounding is nice area of green cover side of classroom section there is plantation, some of the big trees and small trees.

#### College Parking and Surrounding Area:-

This area is good cover of plantation. The ornamental as well as avenue tree plantation increase the green area cover. A road side plantation by NSS and Botany Department make this area with good green cover.

#### Garden:-

The Plant Garden is highest in area of green cover and it should be. The lots of tree species including huge tree, avenue tree, medicinal plants, ornamental and flowering plants, bamboo plantation make this area rich and diversified. There is water harvesting practices carried at here though there is lots of scope. The rain water harvesting tank are situated near plantation it's beneficial to garden plants.

#### Girls Hostel Surrounding:-

The hostel building surrounding has very good plantation along with lawn. This area is connected by running road so this area has much scope for plantation.

#### Indoor & Outdoor Sports Stadium:-

This is the most green cover. The ground is surrounded by tree plantation but the species are very limited in number. As this area is always utilized for sport purpose, the green cover to the surrounding should be more.

#### Climatic Conditions:

The district has dry and tropical climate with hot summer and mild winter. Monsoon season of moderate rainfall. In Hingoli district, monsoon starts from the month of June and ends in September. In the remaining period the weather is very dry. The average rainfall in the district is 895 mm. About 83% of the rainfall occurs during June to September and July is the rainiest month. The maximum temperature of the district is 39.0 degree Celsius and minimum

temperatures are 12.5 Degree Celsius. The air is generally dry over the district except during the southwest monsoon when the relative humidity is high. Winds are generally light to moderate with increase in speed during the latter half of the hot season and in monsoon season. The winds blow predominantly from directions between west and north during the hot season. They are mostly from directions between southwest and northwest during the southwest monsoon season.

#### Rainfall

The semi-arid climate of the district is on the whole is agreeable. The winter season is from December to about the middle of February followed by summer season which last up to May. June to September is the south-west monsoon season, where as and November constitute the post-monsoon season. Sengaon tehsil falls in the rain shadow region.

Sr.no.	Year	Annual rainfall
1.	2016	800mm
2.	2017	652mm
3.	2018	695mm
4.	2019	851mm
5.	2020	925mm
<b>A</b>	1 . C 11	

Annual rainfall

Water Harvesting in College Campus:

Total water harvested/ recharge is: 32,65,080liter

Sr.No	Catchment	Year	Rainfall	Annual harvest	Water harvested/
	Area(m°)		(mm)	Potential	Recharge Yearly
1	2600m°			Value (Cu.m)	(liters)
		2016	850mm	4732	40,22,200
2	2600m°	2017	652mm	4732	30,85,264
3	2600m <sup>2</sup>	2018	690mm	4732	32,65,080
4	2600m <sup>2</sup>	2019	885.1mm	4732	41,88,293.2
5	2600m <sup>2</sup>	2020	974.5mm	4732	95,58,640
6	2600m <sup>2</sup>	2021	1093.6mm	4732	1,00,36,572

#### **Medicinal Plant Garden:**

The College developed a medicinal plant garden comprises of, herbs, shrubs and trees. There are robust angiosperms of more than 58 varieties growing in medicinal plant garden, Shrubs and trees like samudrashok, Korphad, kandvel, jangli lahasun, bel, karanj, Adulsa, Shatavari, gulvel, Nirgudi, arjuna, gunj, Sagargoti form a green canopy. The medicinal plant garden area

should be extended in this year. A water fall along with many herbal and medicinal plants further enhances the vibrant ambience in the campus. The seeds of medicinal plants are collected and preserve every year and such seed are distributed to local farmer. It's a main aim to conserve medicinal plants. In addition the herbal garden caters to health benefits as well.

#### Soil Analysis:

Soils are a vital natural resource whose proper use greatly determines the capabilities of life &socio-economic development of people. Being important component of geospherebiosphere system, Soil provides food, fiber, fodder, and fuel wood for varieties of basic human needs and shelter demand of future. Therefore, management of soil resource on scientific principles is of prime important. Soil is a natural dynamic body containing mineral matter, organic matter and living forms considered to be store house of nutrients even though their continuous removal by intensive cropping. Among the several factors that influence crop production potential, soil fertility is fundamental factors. It is the integral part of soil and generally defined as capacity of soil to supply nutrient needed by crop in proper form and which having both direct and indirect effect on plant growth. Available macronutrient content in soils was determined by following methods.

#### **Tree diversity:**

College location is between latitude 19°46'19.47" N and longitude 76°53'76.54" Ein Sengaon, Dist. Hingoli India. It encompasses an area of about 07 Acres. The area is immensely diverse with a variety of tree species performing a variety of functions. Most of these tree species are planted in different periods of time through various plantation programmes organized by the authority and have become an integral part of the college. The trees of the college have increased the quality of life, not only the college fraternity but also the people around of the college in terms of contributing to our environment by providing oxygen, improving air quality, climate amelioration, conservation of water, preserving soil, and supporting wildlife, controlling climateby moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in summer. Many spices of birds are dependent on these trees mainly for food and shelter. Nectar of flowers and plants is a favorite of birds and many insects. Leaf -covered branches keep many animals, such as birds and squirrels, out of reach of predators. Different species display a seemingly endless variety of shapes, forms, texture and vibrant colors. Even individual trees vary their appearance throughout the course of the year as the seasons change. The strength, longlifespan and regal stature of trees give them a monument – like quality. They also remind us the glorious history of our institution in particular. We often make an emotional connection with these trees and sometime become personally attached to the ones that we see everyday. A thick belt of large shadytrees in the peripheryof the college have found to be bringing down noise and cut down dust and storms. Thus, the college has been playing a significant role in maintaining the environment of the entire Sengaon town in its surrounding areas. The following are the tree species with whom we are being attached.









#### Water Analysis Report:

Water quality testing is important because it identifies contaminants and prevents waterborne diseases. Drinking or using contaminated water can result in severe illness or death. That is why it is important to ensure that drinking water is safe, clean and free from bacteria and disease.

The parameters for water quality are determined by the intended use. Work in the area of water quality tends to be focused on water that is treated for human consumption, or in the environment.

#### Noise level in the surrounding:

The human ear is constantly being assailed by man-made sounds from all sides, and there remainfew places in populous areas where relative quiet prevails. There are two basic properties of sound. Loudness is the strength of sensation of sound perceived bythe individual. Itis measured in terms of Decibels. Just audible sound is about 10 dB, a whisper about 20 dB, library place 30 dB, normal conversation about 35-60 dB, heavy street traffic 60-0 dB, boiler factories 120 dB, jet planes during take-off is about 150 dB, rocket engine about 180 dB. The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as Pollutant as itharms hearing system. The WHO has fixed 45 dB as the safe noise level for a city. For international standards a noise level up to 65 dB is considered tolerate. Loudness is also expressed in oneequals the loudness of 40 dB sound pressure at 1000 Hz. Frequency is defined as the number of vibration per second. It is denoted as Hertz (Hz).

PLACE	MEASUREMENTS	MINIMUM	Maximum	AVERAGE
	(DurationinSec.)	(dBA)	(dBA)	(dBA)
Canteen	60	74	90	85
Library	60	51	85	65
Auditorium	60	53	75	71
Ground1	60	59	90	70
Ground2	60	56	90	68
Gymnasium	60	68	82	76
CollegeFront Gate	60	50.7	78.0	71.0
CollegeBackGate	60	54	75.9	73.5
GirlsHostel	60	52	90	68

Table: Measurements of Noise in and around campus

Inside the Campus: 35-90 dBA

Outside the Campus: 54-93 dBA

#### Waste disposal:

Waste disposal are the activities and actions required to manage waste from its inception to its final disposal. This includes the collection, transport, treatment and disposal of waste, together with monitoring and regulation of the waste management process. The waste from all around the college is separated daily as wet and dry waste indifferent bags which are disposed separately. Dry waste includes paper, cardboard, glass tin cans etc. on the other hand; wet waste refers to organic waste such as vegetable pads, left-over food etc. Separation of waste is essential as the amount of waste being generated today causes immense problem. The material was composted and evaluated as a fertilizing material. Disposal ofthese waste results in the production of good quality organic manure that can be used as soil amendments and source of plant nutrients.

With smart initiatives like "Think Green Campus Model", waste management is helping colleges and universities to achieve a higher level of environmental performance. By reusing or recycling we are contributing to the conservation of natural resources, saving energy, helping to protect the environment, reducing landfill. We will also reduce our impact on the environment by minimizing the carbon emissions associated with both disposing of old products and obtaining new ones. TACSC adopts environment friendly practices and takes necessary actions such as – energy conservation, waste recycling, carbon neutral etc. The biological reusable waste are processed as organic manure for the plants available in the

college campus and the other solid waste generated in the college campus is taken to the community of municipality for recycling and disposal.

#### Solar Energy Harvesting system:

The institutional functioning and working requires at most approximately 25 units of electricity a day that sums about to be nearly 750 units a months hence considering the needs and necessities of electricity college has considered to install solar photovoltaics of 5 kW.

The geographical location of the institution is at latitude of  $19^0$  78' and at longitude of  $76^0$  91'. The overall area occupied by photovoltaic modules is approximately 125 sq ft/kW hence the net area covered for panel installation is ~ 625 sq.ft. There are 20 photovoltaic modules installed having a capacity of 250 W each made of poly crystalline Silicon solar cells. The solar photovoltaic modules are connected in series to each other so that the net output of these interconnections should be feeded to inverter. This is stepped upto 11 kV by a step-up transformer and connected to the existing 11 kV grid.

The grid interactive solar photovoltaic system is used without battery backup, these system works only when the grid power is available since the grid power outage are very rare this system will normally provide the greatest amount of bill savings to the customer against investments. However in the event of an outage the system is designed to shut down until the utility power is restored, the inverter switches to sleep mode and awaits restoring of grid power. Once the grid power is restored the inverter synchronizes itself to grid and starts feeding power.

- 1. The Solar Photovoltaic panels generate DC current in the presence of sun light.
- 2. DC Current is fed into inverter and converted into AC form.
- 3. The system works in synchronization with grid electricity and hence the load is powered using combination of solar and grid electricity.
- 4. In case of load shading (absence of electricity) solar system gets synchronized with diesel generators and generates exactly same sine waves.
- 5. The preferential circuit is present so that the electricity generated by the solar system is utilized first and remaining demands are fulfilled using grid electricity.
- Solar system generates exactly same, in phase electricity using free raw materials i.e. Sun light.

The performance of 5 kW grid interactive solar power plants has been analyzed It is observed that the average basis of output power generation is 25 watt/day during summer season. This is lower than the expected power output on account of teething trouble

associated with inverter and the grid encounter in the operation of plant. It was found due to regular and frequent failure of constant electrical supply by grid to solar plant and also lack of experience in handling the instruments. Some unexplained inverter failures might be caused by disturbance from the grid and other interconnected issues.

#### List of Audited Plant Species:

Tree Species:

Sr.no	Botanical Name	Common Name	Family
1.	<b>Tectonagrandis</b>	Sagwan	Verbenaceae
2.	Butea monosperma	Palas.	Fabaceae
3.	Tamarindus indica	Chincha	Fabaceae
4.	Thevetia neriifolia	Pewalikanher	Apocynaceae
5.	Leucaenaleucocephala	Subabhul	Fabaceae
б.	Prunusdulcis	Badam	Rosaceae
7.	Syzygiumcumini	Jamun	<u>Myrtaceae</u>
8.	Bamboo	Bamboo	Poaceae,
9.	Cocosnucifera	Coconut	Arecaceae
10.	Nerium oleander	Kanher	Apocynaceae
11.	Dypsislutescens	Areca palm	Arecaceae
12.	Plumeria alba	Chafa	Apocynaceae
13.	Eucalyptus obliqua	Nilgiri	Myrtaceae
14.	Micheliachampaca	Sonchapha	Magnoliaceae
15.	Mesuaferrea	Nagchafa	Calophyllaceae
16.	Azadirachta indica	Kadulimb	<u>Meliaceae</u>
17.	Mangifera indica	Mango	Anacardiaceae
18.	Hibiscus rosa-sinensis	China rose	Malvaceae
19.	Cascabelathevetia	Pewalikener	Apocynaceae
20.	<b>Jatrophacurcas</b>	Mogalerand	Euphorbiaceae
21.	Cycas circinalis	Cycas	Cycadaceae
22.	Lawsoniainermis	Mehndi	Lythraceae
23.	Dalbergia sissoo	Sheeshem	Fabaceae
24.	Leucaenaleucocephala	Sarkarisubabul	Fabaceae
25.	Ficus benghalensis L	Vad	Moraceae
26.	Ziziphusmauritiana	Ber	Rhamnaceae

27.	Phyllanthusemblica	Motaamla	Phyllanthaceae
28.	Phyllanthusmimosifolius	Chotamla	Phyllanthaceae
29.	Bougainvillea	Paper flower	Nyctaginaceae
30.	Bauhinia racemosa	Appta	Fabaceae
31.	Bauhinia variegata	Aptta	Fabaceae
32.	Thespesiapopulnea	Paraspimpal	Malvaceae
33.	Millettia pinnata	Karanj	Fabaceae
34.	Helicteresisora	Murud sheng	Malvaceae
35.	Tamarindus indica	Chincha	Fabaceae
36.	Mimusopselengi	Bakul	Sapotaceae
37.	Tradescantia	Nargiskiankhe	Commelinaceae
38.	Saracaasoca	Ashoka	Fabaceae
39.	Thuja occidentalis	Thuja	Cupressaceae
40.	Swieteniamahagoni	Mahagoni	Meliaceae

## Flowering and Ornamental Plants:

Scientific Name	Common name	Family
Catharanthusroseus	sadafuli/nayantara	Apocynaceae
Jasminumsambac	mogara	Oleaceae
Quisqualis indica	madhumalati	Combretaceae
Ipomoea sp.	ganeshvel	Convolvulaceae
Lantana camera	haladikunku/ghaneri	Verbenaceae
Hedychiumflavescens	Sontakka/Sonchafa	Zingiberaceae
Ixora sp.	Scarlet Ixora	
Canna indica	Kardali	Cannaceae
Bixa orelina	Kunku	Bixaceae
Rosa sp.	Gulab	Rosaceae

### **Medicinal Plants:**

1.	Argyreia nervosa	Samudrashok	Convolvulaceae
2.	Bacopamonnieri	Bawachi	Plantaginaceae
3.	Aloe vera	Korphad	Asphodelaceae

4.	Cissus quadrangularis L.	Knawel	Vitaceae
5.	Allium ursinum	Jangelilahasun	Amaryllidaceae
6.	Aegle marmelos	Bel	Rutaceae
7.	Mangifera indica	Mango	Anacardiaceae
8.	Magnolia champaca	Sonchpha	Magnoliaceae
9.	Mesuaferrea	Nagchafa	Calophyllaceae
10.	Millettia pinnata	Karanj	Fabaceae
11.	Mimosa pudica	Lajalu	Fabaceae
12.	Adhatodazeylanica	Adulsa	Acanthaceae
13.	Asparagus racemosus	Shatavari	Asparagaceae
14.	Ficus benghalensis L	Vad	Moraceae
15.	Tinospora cordifolia	Gulvel	Menispermaceae
16.	Phyllanthusemblica	Amla	Phyllanthaceae
17.	Vitex negundo	Nirgudi	Lamiaceae
18.	Semecarpusanacardium	Bibaa	Anacardiaceae
19.	Curcuma aromatica	Wild turmeric	Zingiberaceae
20.	Bursera	Bursera	Burseraceae
21.	Terminalia arjuna	Arjuna	Combretaceae
22.	Madhuca longifolia	Moha	Sapotaceae
23.	Chrysopogonzizanioides	Khas	Poaceae
24.	Plumbago zeylanica	Chitrak	Plumbaginaceae
25.	Catharanthusroseus	Vinca	Apocynaceae
26.	Jatrophacurcas	Mogalerand	Euphorbiaceae
27.	Moringa oleifera	Drumstick	Moringaceae
28.	Abrus precatorius	Gunj	Fabaceae
29.	Clitoriaternatea	Gokrna	Fabaceae
30.	Ocimum gratissimum	Lavangtulsi	Lamiaceae
31.	Tridaxprocumbens	Zakhamjudi	Asteraceae
32.	Barleriacuspidata	Katekornti	Acanthaceae
33.	Jasminum	Jasmine	Oleaceae
34.	Croton tiglium	Jamalgota	Euphorbiaceae
35.	Cestrum nocturnum	Ratrani	Solanaceae

36.	Thespesiapopulnea	Paraspimpal	Malvaceae
37.	Nyctanthes arbor-tristis	Pariijat	Oleaceae
38.	Bryophyllum pinnatum	Panfutii	Crassulaceae
39.	Combretumindicum	Madhumalti	Combretaceae
40.	Caesalpiniabonduc	Sagargoti	Fabaceae
41.	Sapindusmukorossi	Soapnut	Sapindaceae
42.	Carissa carandas	Karwand	Apocynaceae

# Other Herb and Shrub Species:

Scientific Name	Family	Common Marathi Name
Solanum virginianum	Solanaceae	Bhuiringani
Riciniscommunis	Euphorbiaceae	Erandel/Erand
Parthenium hysterophorus	Asteraceae	Ganjargavat
Calotropis gigantean	Asclepiadaceae	Rui/Ruchki/Mandar















#### **Recommendations need to be followed for Green Practices:**

- (1) Plantation as a regular practice and caring of plants by adopting plants by faculty and students.
- (2) Water management by preparing Farm Ponds, Rain Water Harvesting etc.
- (3) Waste management by processing and composting waste disposal.
- (4) Solar Energy Use for light purpose.
- (5) Save Energy Practices by minimizing use of unwanted electric instruments and checking leakages and changing wiring to avoid short circuit where require. Use LED bulbs where ever required.
- (6) Environmental Awareness for vehicle free day, minimize noise pollution by assigning sign boards etc.

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