

REPORT OF GREEN CAMPUS AUDIT

Submitted to

Dr.N.G.P.ARTS AND SCIENCE COLLEGE
Coimbatore – 641 048, Tamil Nadu, India.

Date of Audit: 27.06.2018 (Wednesday)

Submitted by



NATURE SCIENCE FOUNDATION
(A Unique Research and Development Centre
for Society Improvement)



An ISO 9001:2015 Certified Organization
LIG-II, 2669, Gandhi Managar, Peelamedu
Coimbatore - 641 004, Tamil Nadu, India.

Phone: 0422 2510006, Mobile: 9566777255, 9566777258
Email: director@nsfonline.org.in, directornsf@gmail.com

Motto

‘Save the Nature to Save the Future’ & ‘Go Green to Save the Planet’

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1. Introduction

Green campus is an area of the Organisation or the Organisation as a whole itself contributing to have an infrastructure or development that is structured and planned to incur less energy, less water, less or pollution free, less or no CO₂ emission (Aparajita, 1995). Green Campus Audit is a tool of the environment management system which is used methodologically for protection and conservation of environment and sustenance of the ecosystem. Green campus constitutes the environmental friendly practices and education combined to promote sustainable and eco-friendly practices along with user-friendly technology in the campus. It creates environmental culture, develops sustainable solutions to environmental problems and provides solutions to various social and economic needs (APHA, 1981). It provides the concept of Green building and oxygenated building which in turn provides a healthy atmosphere to the stakeholders.

Green Campus Audit ensures the Organization's campus should be greenish with large diversity of trees, herbs, shrubs, climbers and lawns to reduce the environmental pollution and soil erosion, also useful for biodiversity conservation, landscape management, proper water irrigation, natural topography and vegetation (Gowri and Harikrishnan, 2014). The maintenance of an eco-friendly campus ensures a neat and clean environment. For the benefit of stakeholders, solid state management, recycling of water, disposal of sewage and waste materials including electronic and biomedical wastes, plastic use, etc. should be followed consistently in the organization campus.

Green Campus Audit procedures includes the definition of green audit, methodology on how to conduct Green audit at Educational Institutions and Industrial sectors as per the checklist of Environment Management Systems and International Standards on ISO 14001:2015, Indian Green Building Council, Swachh Bharath Scheme under Clean India Mission to understand the principles and importance of various audits in the context of the organization and risk assessment at 360° views (Gnanamangai *et al.*, 2018). It analyses to help the educational institutions and industries to maintain eco-friendly environment and personal hygiene to various stakeholders and supports the nation as a whole for the noble cause of environmental protection and nature conservation which in turn enhances the quality of life to all living beings (Arora, 2017).

2. Aims and Objectives of Green Campus Audit

- To recognise the initiatives taken towards the green campus by means of gardening by the Organization.
- To identify and provide baseline information to assess threat and risk to the ecosystem due to Organization development.
- To recognise and resolve different environmental threats of the Organization.
- To grow a large number of oxygen producing and carbon-di-oxide absorbing plants in the campus to give a pure atmosphere to the stakeholders.
- To ensure proper utilization of resources available in the surrounding areas towards future welfare of the community.
- To set a procedure for disposal of all kinds of wastes and use green cover as a carbon sink for pollution free air.

- To assess the greenish nature of an Organization campus in terms of trees, herbs, shrubs, climbers, twins, lianas, lawns and reflected in reducing the environmental pollution soil erosion, biodiversity conservation, landscape management, natural topography and vegetation.

3. Scope and Goals of Green Auditing

The Management of the Organization (Auditee) should be shown their inherent commitment towards making ecofriendly atmosphere through the green auditing and ready to encourage all types of green activities. They should promote all kinds of green activities such as conduct of environment awareness programmes, campus farming, planting trees, maintenance of greening, irrigation, use of biofertilizers and avoidance of chemical fertilizers and agrochemicals on the campus etc., before and after the green auditing. The management should formulate 'Green and Environment Policies' based on green auditing report. A clean and healthy environment should enhance an effective teaching and learning process and provides a conducive learning environment to the stakeholders. They should create the awareness on the importance of environment through environmental education among the student members. Green Audit is the most efficient and ecological way to manage environmental problems (IGBC, 2018).

Green campus audit may be beneficial to the campus in improving the greenery activities which in turn useful to save the planet for future generation. Green campus audit is a kind of professional care and a simple indigenized system about the environment monitoring in terms of planting a large number of trees which is the responsibility of each and every individual who are the part of economical, financial, social, environmental factors. It is necessary to conduct green audit frequently at least once in three years in campus because students and staff members should aware of the green audit and its advantages to save the planet by means of 'Go green concept' and help the institution to set environmental examples for the community, and thereby to educate the young learners. Green audit is a professional and useful tool for an Organization to determine how and where they are maintaining the campus eco-friendly manner (WGBC, 2018). It can also be used to implement the mitigation measures is a win-win situation for all the stakeholders and the planet. It gives an opportunity for the development of ownership, personal and social responsibility for the stakeholders.

Green campus audit is nothing but a professional tool to assess the greenery activities in the educational institutions and give a value addition to the campus and considered as a resource management process. Eco-campus concept mainly focuses on the efficient use of energy and water; minimize waste generation or pollution and also economic efficiency (Pradip and Patil, 2014). Green campus audit process may be undertaken at frequent intervals and their results can illustrate improvement or change over time. There are several target listed in the Green audit process in which a few are taken into consideration as per the Indian scenario is concerned. Eco-campus focuses on the reduction of carbon emissions, water consumption, wastes to landfill and enhance energy use conservation to integrate environmental considerations into all contracts and services considered to have significant environmental impacts.

4.About the Organization

With a view to providing education to all, Dr. N.G.P. Arts and Science College was established by the Kovai Medical Center Research and Educational Trust, Coimbatore in 1997. The Founder and Chairman Dr.Nalla G. Palaniswami, and Secretary Dr.Thavamani D. Palaniswami are the driving force of the institution. The College began its educational journey with 4 Under Graduate programmes, now it is emerging as the one of the top self-financing colleges in Tamil Nadu.

It is a Co-Educational Autonomous College, affiliated to the Bharathiar University, Coimbatore. Also, it is recognized under 2(f) and 12(B) of UGC act 1956 by University Grants Commission, New Delhi. The college was accredited by the NAAC with “A” Grade with the CPGA of 3.17 in the second cycle, March 17, 2016. The college is consecutively ranked at the national level within 100 ranks by the National Institutional Ranking Framework (NIRF) by MHRD. The College is also granted the DST-FIST to enrich the research facilities. The college, at present offers 26 UG, 13 PG, 8 M.Phil & 9 Ph.D programmes. Our college has an intellectual capital of more than 294 academically well experienced teaching fraternity amongst 91 faculty members are doctorates and they cater to the needs of 6391 students on roll.

The Institution has been granted funds to undertake major and minor research projects, and conduct seminars, conferences and workshops by various funding agencies like UGC, DRDO, ICMR, ICSSR, CSIR, DST, DBT and TNSCST. The College exercises 43 Best Practices to aggrandize the holistic development of the students. Through these practices students have been given space for enhancing employability skills, research culture, and entrepreneurship attitude.

The Training and Placement Cell in the college functions effectively in providing various placement oriented training, value added programmes, company specific training to make them employable in the top MNCs. Every year, more than 90% placement opportunities are achieved. Apart from the placement cell, the Career Guidance Cell, Entrepreneurship Development Cell play vital role in fulfilling needs of the student community. The Management provides scholarships every year to 100s of meritorious students in academics and sports as well. It creates opportunities for many students to excel in education who belong to socially economically weaker section. The College firmly believes that the blend of discipline and education will make the students enter the present phenomenon with the flying colours.

Dr. N.G.P. Arts and Science College is maintaining more green cover area and open unutilized landfills zone after building construction as per the guidelines of World Green Building Council, Indian Green Building Council, Environmental Regulations and Compliances.



5. Audit Details

Date / Day of Audit	:27.06.2018 (Wednesday)
Venue of Audit	:Dr.N.G.P Arts and Science College Coimbatore - 641 048, Tamil Nadu, India.
Audited by	:Nature Science Foundation, Coimbatore - 641 004, Tamil Nadu, India.
Audit type	:Green Campus Audit
Name of ISO EMS Auditor	:Mrs. S. Rajalakshmi, Chairman, ISO QMS & EMS Auditor, NSF.
Name of Lead Auditor	:Dr. R. Mary Josephine, Board of Directors & Botanist, NSF.
Name of Subject Expert-I	:Dr. D. Vinoth kumar, Joint Director & Biotechnologist, NSF.
Name of Subject Expert-II	:Dr. V.S. Ramachandran, Professor (Retired) in Botany, Bharathiar University, Coimbatore.
Name of IGBC AP Auditor	:Dr. B. Mythili Gnanamangai, IGBC AP, Indian Green Building Council.
Name of ASSOCHAM Auditor	: Er. Ashutosh Kumar Srivastava, Associated Chambers of Commerce and Industry
Name of Eco & Green Officer	: Ms. S. Sowndharya, Eco & Green Council Programme Officer, NSF.

6. Procedures followed in Green Campus Audit

Green campus audit is a structured process of documenting the credentials in terms of number of trees, herbs, shrubs, lawns, climbers and lianas reflected in reducing the environmental pollution and soil erosion and useful for biodiversity conservation, landscape management, natural topography and vegetation. It is a kind of a professional tool for assessing the green campus. Green audit projects the best environmental practices and initiatives taken in the organisation at the prescribed site of audit that brings added value to the organisation in maintaining the eco-friendly campus to the stakeholders. The first step of the audit is ensuring that the organisation has a central role in building the green campus, in order to validate the same (Adeniji, 2008).

Green campus is not intended for the self-sustainability of the building alone, it

also involves in propagation of the green campus initiatives so as to be adopted by any individuals and organization at a minimum cost. Green campus audit has been conducted as per the checklist of Nature Science Foundation, Coimbatore, Tamil Nadu, India (www.nsfonline.org.in) through the authenticated Professionals for people qualified to investigate and evaluate the campus for validating the best environmental practices. Professional team of ISO Environment Management Audit (14001:2015), Indian Green Building Council Accredited Professionals, Experts of Green campus Lead Auditors and Botanists / Zoologists / Biotechnologists were selected to conduct the Green campus audit process.

During the audit, the nature of plants and animals / birds species present in the campus were recorded. Establishment of lawns, trees, herbs, shrubs and climbers and establishment of terrace / kitchen / herbal / zodiac / ornamental / medicinal garden / aquarium and aquatic (hydrophytes) plants in the campus were recorded. Labelling of common names and Botanical names of plants were observed. The operation of the water irrigation system, drip and sprinkler irrigation methods and use of recycled water for irrigation purpose or any other purpose in the campus area were noted. The number of water wells, bore wells and water reservoir facilities in the campus were also noted as per the Audit Manual of Gnanamangai *et al.* (2018).

Attempts made for water scarcity during summer season towards the maintenance of plants and frequency of watering for plantations in the campus were noted. Biodiversity conservation education, projects, awareness programmes, etc., through Indian Biodiversity Act and Ministry of Environment, Forests and Climate Change, Government of India and the conduct of outreach programmes for dissemination of Green campus motto were recorded (Venkataraman, 2009). Conduct of outreach programmes for dissemination of Green campus motto to the students and staff members including public domain and signing of MoU with Government and Non-Governmental Organizations to ensure green campus activities for future generation were noted. Technology driven solutions initiated by the Green campus organization can also be disseminated and documented successively for propagating the attitude of the Green campus in wider masses.

The purpose of the green audit is to ensure that the practices followed in the campus are in accordance with the Green and Environment Policy developed by the Government and private agencies working with environment sustainable development adopted by the institution. The criteria, methods/procedures, checklists and recommendations used in the audit were based on the identified risks. The methodology includes: preparation and filling up of questionnaire along with checklists, physical inspection of the campus, observation and review of the document, interviewing responsible persons and data analysis, measurements and recommendations. The methodology adopted for this audit was a four step process comprising of data collection, data analysis, best practices followed in the campus and recommendations and suggestions given to the organization to improve the greeneries practices further.

6.1. Study of Flora and Fauna diversities at Dr.N.G.P. Arts and Science College

Dr.N.G.P Arts and Science College Campus is located about 4 km from

Coimbatore International Airport. College campus has Greenary with a well-to-do flora and faunal diversity. The campus is clean and green. Biodiversity provides a useful measure of the quality of the environment and the ecological studies are important aspects of environment, in view of the consideration of environmental quality and protection of natural flora and fauna.

6.2. Documentation of Plant species at Dr.N.G.P. Arts and Science College

Various vascular plant species were collected across Dr.N.G.P Arts and Science College campus and subjected to identify them based on botanical name, family, habitat, uses and anthropogenic disturbances to the natural vegetation in campus. The plants were freshly collected and their digital photographs were also taken. The collected plant specimens have been identified using taxonomic literatures (Gamble and Fischer, 1915-1936; Matthew, 1983; Nair and Henry, 1983; Henry *et al.*, 1989; Chandrabose and Nair, 1988). Further, their identification was confirmed by matching with authentic specimens in the Madras Herbarium (MH), Botanical Survey of India, Southern Circle, Coimbatore, India.

Key to Plant Families Identification

1a. Seeds enclosed in fruit wall, Perianth Present.....	2
b. Seeds not enclosed in fruit wall, perianth absent.....	Gymnosperm
2a. Leaves usually net veined seeds-2.....	3
b. Leaves parallel veined, seeds-1.....	66
3a. Petals free.....	4
b. petals connate	41
4a. Corolla and calyx present.....	5
b. Corolla and calyx absent.....	24
5a. calyx of united sepals; ovary inferior	31
b. Calyx of distict or unit sepals; ovary syncarpous.....	6
6a. Sepals imbricate in bud	7
b. Sepals valvate in bud.....	24
7a. Sepals more or less united at the base.....	19
b. Sepals free	8
8a. Stamens more than 12	9
b. Stamens 10 or fewer	13
9a. Sepals 2-3.....	11
b. Sepals 4 or more.....	10
10a. Stamens inserted on the disk.....	Cleomaceae
b. Stamens inserted of the gynophore	Capparaceae
11a. Trees, Petals more or like the sepals; carpels free	Mangnoliaceae
b. Herbs, petals coloured unlike the sepals; carpels united.....	12
12a. Plants with yellow sap, Flowers pedicelled	Papaveraceae
B. Plants with watery sap, Flowers sessile.....	Portulacaceae
13a. Flowers unisexual,gynoecium apocarpus.....	Menispermaceae
b. Flowers bisexual, gynoecium Syncarpous.....	14
14a. Petals 4, Stamens 6	Brassicaceae
b. Petals 5, Stamens ∞	15
15a. Ovary1, loculated	16
b. Ovary 2-more loculated.....	17

- 16a. Flowers actinomorphic, placentas free- centralCaryophyllaceae
- b. Flowers zygomorphic, placentas parietalVilaceae
- 17a. Filaments of anthers more or less unitedPolygalaceae
- b. Filaments of anthers more or less united18
- 18a. Leaves stipulate; stamens 5 or 1019
- b. Leaves exstipulate; stamens usually 8Sapindaceae
- 19a. Style 5; stamen 5 Oxalidaceae
- b. Style many; stamens 10 Zygophyllaceae
- 20a. Leaves pellucid-gland dotted Rutaceae
- b. Leaves not gland dotted21
- 21a. Placentas parietal; Fruit elongatedMoringaceae
- b. Placentas axile; Fruits not elongated22
- 22a. Ovules and seeds pendulous; sometimes horizontal.....Meliaceae
- b. Ovules and seeds erect or ascending23
- 23a. Stamens alternate with the petals..... Anacardiaceae
- b. Stamens opposite the petalsVitaceae
- 24a. Leaves simple; Flowers 3-merous.....Annonaceae
- b. Leaves compound; Flowers 4-6 merous 25
- 25a. Filaments of anther united into a columnar toothed cup.....26
- b. Filaments of anther free; rarely connate at the base in ring28
- 26a. Stamens 15; anther unitedSterculiaceae
- b. Stamens 2; anther free.....27
- 27a. Anther unilocular; pollen muricateMalvaceae
- b. Anther bilocular; pollen smoothBombacaceae
- 28a. Stamens 4-5; usually embraced and adnate to the base of the petal.....29
- b. Stamen many; atleast twice as many as and free from the petals30
- 29a. ShrubLythraceae
- b. StragglerRhamnaceae
- 30a. Anther dehisce by slits; fruits capsuleTiliaceae
- b. Anther dehisce by spores; fruits drupeElaeocarpaceae
- 31a. Ovary syncarpous; placentas 3-5, arietal.....32
- b. Ovary 1 or more free, placentas basal.....33
- 32a. Climbing herbs tendril.....Passifloraceae
- b. Erect shrubs or trees with tendril.....Turneraceae
- 33a. Ovules arising from the inner angles or from base of the carpels or loculi.....34
- b. Ovules pendulous form the apex of the carpels or locules.....Combretaceae
- 34a. Carpels solitary; fruits legume.....35
- b. Carpels more than 1; fruits otherwise.....37
- 35a. Flowers zygomorphic; petals imbricate.....36
- b. Flowers actinomorphic; petals valvate.....Mimosaceae
- 36a. Upper petals outermost stamens monodelphous or diadelphous.....Fabaceae
- b. Upper petals innermost stamens always freeCaesalpinaceae
- 37a. Flowers unisexual.....Cucurbitaceae
- b. Flowers bisexual.....38
- 38a. Ovary 1-celled.....Cactaceae
- b. Ovary more than 1 celled.....39
- 39a. Carpels free if ultimately united the styles distinct.....40

b. Carpels and styles united throughout.....	Myrtaceae
40a. Flowers in dichasial – polychasial cyme.....	Molluginaceae
b. Flowers in clustered, cymes or solitary.....	Aizoaceae
41a. Ovary inferior, stamens as many as the corolla lobes.....	42
b. Ovary superior, stamens numerous.....	43
42a. Anther free; ovary 2-loculed; stipulate.....	Rubiaceae
b. Anther syngenesious; ovary 1-loculed, exstipulate.....	Asteraceae
43a. Ovary 1-loculed; placentation free central.....	Plumbaginaceae
b. Ovary 2-many loculed; placentation axile or parietal.....	44
44a. Ovary 3 or more carpelled.....	Sapotaceae
b. Ovary 2-carpelled.....	45
45a. Corolla actinomorphic.....	46
b. Corolla zygomorphic.....	50
46a. Plants leafless; parasitic.....	Cuscutaceae
b. Plants leafy ; not parasitic	47
47a. Leaves opposite; stamens 2.....	48
b. Leaves alternate; stamens 4 or more	49
48a. Leaves not scabrid, corolla tube white: fruits berry	Oleaceae
b. Leaves scabrid; corolla tube orange; fruits capsules	Nyctanthaceae
49.a. Anther inseperatable; corona present	Asclepidiaceae
b. Anther seperatable; corona absent	Apocyanaceae
50a. Corolla lobes imbricate ;fruit drupe	Boraginaceae
b. Corolla lobes plicate; fruit capsule	Convolvulaceae
51.a Ovary cells many ovulated	Solanaceae
b.Ovary cells 1-4 ovuled.....	52
52.a Carpels 2 or more ovulated ; fruits dehiscent	53
b.Carpels 1 –ovulated ; fruits indehiscent	57
53.a Fruits dehiscent; seeds supported on reticulae.....	Acanthaceae
b.Fruits indehiscent; seeds not supported on reticulae.....	54
54.a Leaves compound; fruits elongated; seeds winged	Bignoniaceae
b. Leaves simple;fruits not elongated, seeds not winged.....	55
55.a Ovules many on swollen placentas; seeds albuminous.....	Scropulariaceae
b.Ovules 2 lobed placenta ; seeds not albuminous.....	56
56.a Flowers solitary; axile placentation	Pedaliaceae
b. Flowers raceme; axile placentation.....	Marytiniaceae
57.a Ovary entire, style terminal	Verbinaceae
b. Ovary 4 –lobed, style gynobasic.....	Lamiaceae
58.a Flower bisexual	59
b. Flower unisexual	62
59.a. Ovary inferior	60
b. Ovary superior	61
60.a Ovary 4-6 loculated; ovules many	Aristolochiaceae
b. Ovary 1-loculated; ovules 1-4	Santalaceae
61.a Perianth not tubular	Amarathaceae
b. Perianth trubular	Nyctaginaceae
62a. Leafless trees; brachlets ribbed and joined at the nodes.....	Casuarinaceae
b.Leaves well developed ; brachlets not ribbed and not joined at the nodes.....	63

63 a. Ovary 1- loculed; ovules 1-2 in each locule.....	64
b. Ovary 2 or more loculed; ovules 1 or 2 in each locule.....	65
64a. Leaves glandular.....	Euphorbiaceae
b. Leaves eglandular.....	Urticaceae
65a. Filaments inflexed in bud with reversed anther.....	Moraceae
b. Filaments not inflexed in bud, not with reversed anther.....	Ulmaceae
66a. Terrestrial or epiphytic.....	67
b. Aquatic, marsh or riparian.....	Cyperaceae
67a. Arbrorescent woody; leaf blade many nerved articulate with sheath.....	Bambusaceae
b. Herbs with herbaceous culms; leaf blade sessile not articulate with sheath.....	68
68a. Perianth 0 or reduced to scale.....	Araceae
b. Perianth present.....	69
70a. Plant armed.....	71
b. Plant unarmed.....	72
71a. Plants Xerophytic; leaves fibrous.....	Agavaceae
b. Plants not xerophytic; leaves nor fibrous.....	Lilliaceae
72 a. Perianth segments connate.....	Amaryllidaceae
b. Perianth segments free.....	73
73a. Outer perianth calycine; inner coroline.....	Commelinaceae
b. Outer and inner perianth.....	74

6.3.Documentation of Animal species at Dr.N.G.P. Arts and Science College

Animals like Mammals and Birds were observed by visual sightings and by calls also the avifaunal data were observed through the Nikon 8 x 40 binoculars and photographs were taken by Canon 600 D camera (55-250 mm). The recorded data was noted in the field work note. They were identified with the help of field guide- "Birds of Indian subcontinent" by Richard Grimmett, and the IUCN category of the birds were also noted with the same. The point count and transect line methods were used to record the number of bird species in the study area in which regular visits and personal visits were carried out (Ferenc *et al.*, 2014). The surveys were conducted to understand the distribution of bird species in relation to habitats and nesting behavior of birds in the study area. Based on survey richness and abundance of bird species were calculated using Shannon-weaver diversity index. Based on available data and species were selected for nest site selection study. Selected species of birds was analysed for its nest site characteristics between the habitats and also plant species preference was enumerated and assessed. The number of breeding bird species and nests found in different habitats as dependent variables such as biotic and abiotic factors as the independent variable (Jayson and Mathew, 2000; Beebe and Griffiths, 2000).

7. Green Campus Audit Observations

It covers both qualitative and quantitative measurements including physical observation of greeneries in terms of growing of terrestrial plants and animals. Biodiversity conservation strategies are very essential to conserve a variety of plant and animal species in the campus ecosystem. Best practices followed on green campus initiatives in the Organization and recommendations for greening are illustrated in the audit report.

7.1. Flora and Faunal diversity in Dr.N.G.P. Arts and Science College

The institution has rich floral and faunal diversity and the details are given below.

S.No	Botanical name	Family
1	<i>Cocos nucifera</i> Linn.	Arecaceae
2	<i>Peltophorum ferrugineum</i> (DC.) Hayne	Fabaceae
3	<i>Tectona grandis</i> L.f.	Lamiaceae
4	<i>Azadirachta indica</i> A.Juss	Meliaceae
5	<i>Delonix regia</i> (Boj. Ex Hook.) Raf.	Fabaceae
6	<i>Samanea saman</i> Jacq.	Fabaceae
7	<i>Pongamia glabra</i> (Vent.)	Fabaceae
8	<i>Eugenia jambolana</i> Lam.	Myrtaceae
9	<i>Dalbergia latifolia</i> Roxb	Fabaceae
10	<i>Michelia champaca</i> Linn.	Magnoliaceae
11	<i>Bassia longifolia</i> Linn.	Sapotaceae
12	<i>Artocarpus integrifolia</i> L.f.	Moraceae
13	<i>Melia dubia</i> Cav.	Meliaceae
14	<i>Eucalyptus grandis</i> L.	Myrtaceae
15	<i>Bambusa denrocalamus</i>	Poaceae
16	<i>Ficus religiosa</i> Linn	Moraceae
17	<i>Mimusops elengi</i> Linn.	Sapotaceae
18	<i>Polyalthia longifolia</i> Benth.	Annonaceae
19	<i>Calophyllum inophyllum</i> Linn.	Clusiaceae
20	<i>Araucaria excelsa</i> Lamb.	Araucariaceae
21	<i>Schefflera actinophylla</i> (Endl.)	Araliaceae
22	<i>Cassia fistula</i> L.	Fabaceae
23	<i>Nerium oleander</i> L.	Apocynaceae
24	<i>Nerium indicum</i> Mill	Apocynaceae
25	<i>Plumeria alba</i> Linn.	Apocynaceae
26	<i>Plumeria rubra</i> Linn.	Apocynaceae
27	<i>Ficus benjamina</i> L.	Moraceae
28	<i>Ficus elastica</i> L.	Moraceae
29	<i>Casuarina equisetifolia</i> L.	Casuarinaceae
30	<i>Phoenix dactylifera</i> L.	Arecaceae
31	<i>Vinca rosea</i> L.	Apocynaceae
32	<i>Bougainvillea spectabilis</i> Wild	Nyctaginaceae
33	<i>Allamanda schottii</i>	Apocynaceae
34	<i>Musa paradisiaca</i> Linn.	Musaceae
35	<i>Ixora coccinea</i> Linn.	Rubiaceae
36	<i>Quisqualis indica</i>	Combretaceae
37	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae
38	<i>Heliconia brasiliensis</i>	Heliconiaceae
39	<i>Morinda tinctoria</i> Roxb.,	Rubiaceae
40	<i>Psidium guajava</i> L.	Myrtaceae

41	<i>Carica papaya</i> L.	Caricaceae
42	<i>Punica granatum</i> Linn.	Punicaceae
43	<i>Moringa oleifera</i> Linn	Moringaceae
44	<i>Tamarindus indica</i> Linn	Caesalpinaceae
45	<i>Gomphrena globosa</i> L.	Amaranthaceae
46	<i>Aibizialebbeck</i> (L.) Benth	Fabaceae
47	<i>Ficus benghalensis</i> L.	Moraceae
	<i>Plectranthus barbatus</i> Andrews	Lamiaceae
48	<i>Celosia argentea</i> L.	Amaranthaceae
49	<i>Phyllanthus acidus</i> L.	Euphorbiaceae
50	<i>Millingtonia hortensis</i> L.f.	Bignoniaceae
51	<i>Borassus flabellifer</i> L.	Arecaceae
52	<i>Cascabelathevetia</i>	Apocynaceae
53	<i>Millingtonia hortensis</i> L.f.	Bignoniaceae
54	<i>Thespesia populnea</i> L Sol ex Correa	Malvaceae
55	<i>Citrus limon</i> (L.) Burm.f.	Rutaceae
56	<i>Acalypha hispida</i> L	Euphorbiaceae
57	<i>Tithonia diversifolia</i> (Hemsl.) A.Gray	asteraceae
58	<i>Cycas revoluta</i> Thunb.	Cycadaceae
59	<i>Pisonia alba</i> Span	Nyctaginaceae
60	<i>Caryotaurens</i> L.	Arecaceae
61	<i>Lantana camara</i> L	verbenaceae



Dr.N.G.P. Arts and science college(Autonomous)
Green Audit
HERBAL GARDEN
LIST OF PLANTS

12

S.No	Botanical Name	Family
1	<i>Phyllanthus niruri</i> Linn.,	Euphorbiaceae
2	<i>Euphorbia hirta</i> Linn.	Euphorbiaceae
3	<i>Acalypha indica</i> Linn.	Euphorbiaceae
4	<i>Vinca rosea</i> L.	Apocynaceae
5	<i>Aerva lanata</i> L.	Amaranthaceae
6	<i>Boerhavia diffusa</i> Linn.	Nyctaginaceae
7	<i>Euphorbia heterophylla</i> L.	Euphorbiaceae
8	<i>Solanum nigrum</i> Linn.	Solanaceae
9	<i>Nerium oleander</i> L.	Apocynaceae
10	<i>Costus speciosus</i> Koen Ex. Retz.	Costaceae
11	<i>Murraya koenigii</i> L.	Rutaceae
12	<i>Lawsonia inermis</i> Linn.	Lythraceae
13	<i>Ocimum tenuiflorum</i> L.	Lamiaceae
14	<i>Plectranthus barbatus</i> Andrews	Lamiaceae
15	<i>Cardiospermum halicacabum</i> L.	Sapindaceae
16	<i>Chrysanthemum coronarium</i> L.	Asteraceae
17	<i>Citrus limon</i> (L.) Burm. F.	Rutaceae
18	<i>Phyllanthus acidus</i> L.	Euphorbiaceae
19	<i>Eclipta prostrata</i> L	Asteraceae
28	<i>Solanum trilobatum</i> L.	Solanaceae
29	<i>Aloe vera</i> (L.) burm. F.	Xanthorrhoeaceae
30	<i>Andrographis paniculata</i> (Burm.f.) Wall	Acanthaceae
31	<i>Epipremnum aureum</i> (Linden & Andre)	Araceae
32	<i>Cissus quadrangularis</i> L	Vitaceae
33	<i>Centella asiatica</i> L. Urban	Apiaceae
34	<i>Abutilon indicum</i> (Link) Sweet	Malvaceae
35	<i>Moringa oleifera</i> Lam.	Moringaceae
36	<i>Vitex negundo</i> L.	Lamiaceae
37	<i>Justicia adhatoda</i> L.	Acanthaceae
38	<i>Melia azedarach</i> L.	Meliaceae
39	<i>Trichodesma indicum</i> L.	Boraginaceae
40	<i>Baliospermum montanum</i> Blume	Euphorbiaceae
41	<i>Calotropis procera</i> (Aiton) W.Aiton	Apocynaceae
42	<i>Emilia sonchifolia</i> (L.) DC. Ex Wight	Asteraceae
43	<i>Andrographis echioides</i>	Acanthaceae
44	<i>Ocimum basilicum</i> L.	Lamiaceae
45	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC	Amaranthaceae
46	<i>Tridax procumbens</i> L.	Astraceae

47	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae
48	<i>Oxalis corniculata</i>	Oxalidaceae
49	<i>Azardiracta indica</i> A.Juss	Meliaceae
50	<i>Mentha arvensis</i>	Lamiaceae
51	<i>Rhinacanthus nasutus</i>	Acanthaceae
52	<i>Kalanchoe pinnata</i>	Crassulaceae
53	<i>Bauhinia racemose</i>	Caesalpinioideae
54	<i>Commelina benghalensis</i> L.	Commelinaceae
55	<i>Bougainvillea spectabilis</i> Wild	Nyctaginaceae
56	<i>Bassia longifolia</i> Linn.	Sapotaceae
57	<i>Peltophorum ferrugineum</i> (DC.) Hayne	Fabaceae
58	<i>Pisonia alba</i> Span	Nyctaginaceae





List of Birds

S.No	Common Name	Scientific Name
1	Common babbler	<i>Turdoidescaudata</i>
2	Common Myna	<i>Acridotherestrictis</i>
3	Common house Crow	<i>Corvussplendens</i>
4	Jungle Crow	<i>Corvusmacrorhynchos</i>
5	House Sparrow	<i>Passer Domesticus</i>
6	Common Drongo	<i>Dicrurusadsimilis</i>
7	Blue rock pigeon	<i>Columba livia</i>
8	Grey Francolin	<i>Francolinuspondicerianus</i>
9	Plain Prinia	<i>Priniainornata</i>
10	Red-wattled Lapwing	<i>Vanellusindicus</i>
11	Red vented bulbul	<i>Pycnonotuscafer</i>
12	Purple Sunbird	<i>Cinnyrisasiaticus</i>
13	Rose ringed parakeet	<i>Psittaculakrameri</i>
14	White-breasted kingfisher	<i>Halcyon smyrnensis</i>
15	Bat	
16	SpottedOwlet	<i>Athenebrama</i>
17	Indian thick-knee	<i>Burhinusindicus</i>
18	Emerald dove	<i>Chalcophapsindica</i>

List of Animals

S.No	Common Name	Scientific Name
1	Indian Palm Squirrel	<i>Funambuluspalmarum</i>
2	Indian pariah dog	<i>Canis lupus familiaris</i>
3	Cat	<i>Feliscatus</i>
4	Little skimmer	<i>Orthetrumtaeniolatum</i>
5	Indian peafowl	<i>Pavocristatus</i>
6	black rat	<i>Rattusrattus</i>

7.2. An account of more Oxygen producing and Carbondioxide absorbing plants in the Campus

There are some plants which are being considered highly efficient in oxygen production and carbondioxide absorption which in turn reflected the quality of the green campus. If more oxygen is made available in the campus naturally, the stakeholders may be free from various cardiovascular and pulmonary problems and breathing troubles. The college campus has several oxygen producing plants and trees. The notable species are *Azadirachta indica*, *Nerium oleander* L., *Thespesia populnea* L Sol ex Correa, *Bamboosa aridinarifolia*.



Thespesia populnea



Nerium oleander



Azadirachta indica



Bamboosa aridinarifolia

7.3. Rainwater Harvesting System

Rainwater harvesting system is a traditional old practice not only in drought prone areas and also in areas having seasonal rainfall. The Indian traditional rainwater harvesting is being practiced in various parts of the country to improve the ground water status (Musayev *et al.*, 2015; Khanal *et al.*, 2018). Now the threatening features of the lower ground level of water has created a revamp of newly featured rainwater harvesting systems. Indian traditional rainwater harvesting systems are constructed based on three modes either direct pumped, indirect pumped or by gravity alone in the campus. In addition, lakes, bonds, water channels and any other water reservoir

methods are considered as the rainwater harvesting system. The green campus should have adopted any of the above said modes of rainwater harvesting or any new methods that has the benefit of conserving the water resource as well. A small square shaped pit containing gravels and sands may be constructed near the building in which rainwater will be harvested from the roof of the building using a pipe. There was two rain water harvesting system in the college campus.



Rain Water Harvesting pit in front of A1 Block



Rain water harvesting pit in front of B1 Block

8. Best practices followed on Green Campus initiatives in the Organization

1. It is observed that Dr.N.G.P.Arts and Science College is maintaining the green cover area after building construction as per the guidelines of World Green Building Council and Indian Green Building Council to provide a healthy environment and ecofriendly atmosphere to the stakeholders.
2. Dr.N.G.P Arts and Science College has established rainwater harvesting models to recharge the borewells by collecting rainwaters from the building roofs, open areas and playgrounds including unexplored areas which are channelized to flow of rainwaters to increase the ground water level.
3. The campus has an oxygen producing and carbon-di-oxide absorbing plants such as oxygen producing plants and trees. The notable species are *Azadirachta indica*, *Nerium oleander* L., *Thespesia populnea* L *Sol ex Correa*, *Bamboosa aridinarifolia*.

9. Recommendations for Greening

- Suggested to create a 'Herbal Garden' to increase the amount of medicinal plants that are used for various types of illnesses and also to maintain the environment's sustainability.
- Suggested to conduct a survey of non-flowering plants in the campus.
- Suggested to conduct a survey of faunal biodiversity in the campus other than Mammals, Birds, Butterflies and Mosquitos which were already completed a brief survey.

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(Mrs. Rajalakshmi Jayaseelan)
Chairman of NSF
Certified ISO QMS & EMS Auditor

(Dr. D. Vinoth Kumar)
Joint Director of NSF & Botanist
Certified Lead Eco Auditor

(Dr. B. Mythili Gnanamangai)
Certified Auditor IGBC AP & ASSOCHAM
Indian Green Building Council

(Er. B. Vijayalakshmi)
Certified Energy & Environment Auditor
Environmental Management System
(ISO 14001:2015)

