

Q-Con



Quality conscience

## Q-CON QUALITY SYSTEM PRIVATE LIMITED

### GREEN AUDIT CERTIFICATE

*This is to certify that the Green Audit of Visva-Bharati Santiniketan, Bolpur. (WB) has been successfully carried-out by Q-Con Quality System Pvt. Ltd. for the academic year 2021-22 and covers up to the date of issue of this certificate.*

*Visva-Bharati has taken very good initiatives for the comprehensive study of environmental impact of institutional working framework to fulfill the requirements of Green Audit and has taken necessary actions to implement it effectively.*

Certificate No. QCQS/GA/VB/22-23/01  
Valid up to 13 Dec 2023

Date 14 Dec 2022



Air Vice Marshal N B Singh, AVSM, VSM(Veteran)  
Chief Executive Officer  
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# VISVA-BHARATI

Santiniketan

GREEN AUDITING

# 2021-22

Audited by Green Audit Q Con Quality System Pvt Ltd

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# Chapter – 1 Introduction

## A. Green Audit

The Green audit process was begun in the 1970s with an intention of identifying the activities carried out in a given institution or company. This was initiated against the background of growing concern over changing climate and related aspects. Green audit is a tool to identify the range of environmental impacts and assess the compliance of the operations on the development and regular activities within an organization. It may also assess the compatibility of the operations within an organization or a company with existing applicable laws and regulations and the expectations of their various stakeholders. It further assesses the possible implications and effect of pollution due to the operations within the organization. The audit also seeks to identify possible means and methods to save investments, enhance work quality, improve health and safety of their employees, reduce liabilities, and reduce the rate of environmental pollution. A continuous process of such audit might result in maintaining the quality of these aspects within the premises of any organization.

Most companies, government and non-government bodies and other institutions conduct green audit aiming:

- To ensure that the performance of the institution with respect to environmental activities they are involved in, is in compliance with existing laws and regulations.
- To check the functionality and their operating success including water supply, energy related matters and other similar matters that are related to green operations in the campus
- To formulate or update the institution's environmental policy, if warranted.
- To measure the environmental impact of operational process related to green activities in the campus.
- To measure the performance of each operation and actions in the campus.

- To generate a database of green activities for continuous monitoring to assess the success of each of them.
- To identify future potential liabilities.
- To align the institution's developmental and day to day activities with the stated vision, mission, strategies, etc.
- To identify possible ways to reduce expenditure and running costs on equipment, appliances etc. or try enhancing revenue income.
- To improve process and materials efficiency, and in response to stakeholder requests for increased disclosure.

The process of green audit based on operational activities within an institution happens not necessarily based on laws and regulations. It might be largely based on awareness and concerns on environmental performances within and outside the institute's premises. This further strengthens the fact regarding social responsibilities of the organization. Majority of the institutions that conducted green audits in the recent past has realized the importance of the same as they could easily manage their operational costs and provide good atmosphere to their stakeholders. The green audit also provides opportunities to identify full range of operations within an organization, the impacts of maintaining and functioning of its operational goods and services, the actual source of raw materials for different activities within the organization, the costs of operations of its offices, functional units, and other facilities. It also provides chances to understand the relationship with employees, material suppliers, stakeholders, etc. The recommendations, findings and suggestions that emerge during green audit would certainly help the management of the organization to set up future action plan that best suits to them.

## **B. General steps involved in Green Audit**

1. Systematic and exhaustive data collection.
2. Evidence based documentation of activities.
3. Regular monitoring.
4. Provide standards and methods for improvement by establishing cost effective green action plan.

## Chapter – 2

### Visva-Bharati – A Historical Account

#### 1. Brief History

Visva-Bharati was founded by the first Asian Nobel Laureate, Gurudev Rabindranath Tagore in 1921. Visva-Bharati was declared to be a central university and an institution of national importance by an Act of Parliament in 1951 (ACT NO. 29 OF 1951 [ 9th May, 1951.]. The President of India is the Paridarsaka (Visitor) of the University, the Governor of West Bengal is the Pradhana (Rector), and the Prime Minister of India acts as the Acharya (Chancellor). The President of India appoints the Upacharya (Vice-chancellor) of the University.

In May 1951, Visva-Bharati was declared to be a Central University and "An Institution of National Importance" by an Act of Parliament. It was granted the status of a unitary, teaching, and residential university. The university is divided into institutes, centers, departments, and schools. The respective departments are included in the institutes. The university's programs dealing with its rich cultural heritage, as well as art and dance education, are funded by the UGC, MHRD Government of India. Besides, there are a number of other central government funding institutions like Department of Science and Technology (DST), ICAR, DBT etc. have recognized and funded Visva-Bharati.

#### 2. Mission and Vision

To study the mind of man in its realization of different aspects of truth from diverse points of view.

To bring into more intimate relation with one another, through patient study and research, the different cultures of the East on the basis of their underlying unity.

To seek and realize in a common fellowship of study the meeting of the East and the West, and thus ultimately to strengthen the fundamental conditions of world peace through the establishment of free communication of ideas between the two hemispheres.

To undertake research into the study of the religion, literature, history, science and art of Hindu, Buddhist, Jain, Islamic, Sikh, Christian and other civilizations may be pursued along with the culture of the West, with that simplicity in externals which is necessary for true spiritual realization, in amity, good fellowship and co-operation between the thinkers and scholars of both Eastern and Western countries.

To win the friendship and affection of villagers and cultivators by taking a real interest in all that concerns their life and welfare, and by making an effort to assist them in solving their most pressing problems.

To initiate a dialogue between academic study and research of rural economy/culture and on-field experience.

### **3. History:**

A study of the evolution of Visva-Bharati during the lifetime of its founder, Gurudev Rabindranath Tagore, offers an insight into what this institution was intended to achieve. Rabindranath founded a school for children at Santiniketan and it was around this nucleus that the structure of an unconventional university developed through careful planning.

In 1863, on a seven-acre plot at the site of the present institution, Debendranath Tagore, the poet's father, had built a small retreat for meditation, and in 1888 he dedicated, the land and buildings, towards establishment of a *Brahmavidyalaya* and a library. Rabindranath's school *Brahmacharyasrama* which started functioning formally from December 22, 1901 with no more than five students on the roll, was, in part, a fulfilment of the wishes of his father who was a considerable figure of his time in the field of educational reforms. From 1925 this school came to be known as Patha-Bhavana.

The school was a conscious repudiation of the system introduced in India by

the British rulers and Rabindranath initially sought to realize the intrinsic values of the ancient education in India. The school and its curriculum, therefore, signified a departure from the way the rest of the country viewed education and teaching. Classes were held in open air in the shade of trees where man and nature entered into an immediate harmonious relationship. Teachers and students shared the single integral socio-cultural life. The curriculum had music, painting, dramatic performances and other performative practices. Beyond the accepted limits of intellectual and academic pursuits, opportunities were created for invigorating and sustaining the assorted faculties of the human personality.



**Figure 1: One of the gardens of the university**



**Figure 2: Picturesque of Rabindra Bhavana**

#### **4. Geography**

The University is situated in West Bengal, Santiniketan Taluk in Birbhum district of West Bengal. Its locational coordinates are 23°40'44"N 87°40'25"E. The locality comes under the midland region of West Bengal, which has the geographical features of undulated land areas tapering into paddy fields. The raised part of the region provides conducive conditions for the growth of tropical evergreen and deciduous varieties of fruit yielding and other trees.

#### **5. General Information:**

The University offers UG programmes and PG programmes. The university has 8 Bhavanas, viz., 1) Bhasha Bhavana {16 Nos of Departments & Centres (D&C)}; 2) Vidya Bhavana (9 D&C); 3) Kala Bhavana (5 Ds); 4) Sangit Bhavana (2 Ds); 5) Siksha Bhavana (11 D&C); 6) Vinaya Bhavana (3 D&C), 7) Palli Siksha Bhavana (12Ds); & 8) Palli Samgathan Vibhaga (4Ds). Beside this, there are two schools (Patha Bhavana and Siksha Satra) and one hospital (Pearson Memorial Hospital).

The University has almost 10700 students on its rolls in various programmes with girls forming almost 55%. There are 470 teaching staffs in the aided stream in various disciplines. More than 50% of the members of different faculties are women. About 584 non-academic, administrative staff members and other supporting staffs that are working in the university office and different departments.

#### **6. Green Audit Report, Executive Summary:**

Although the Green audit of Visva-Bharati University was started first time from this year, but it seems the concept of green audit is well established throughout the campus and surroundings. This report of the green audit was a comprehensive evaluation after thorough evaluation of all aspects related to concerned green activities of the campus. It identified the green activities in the campus involving, management, teachers, and students. It also identified lacunas in green practices of the campus and recommended a few practices to be implemented for it to become a green campus. The following were the common recommendations posted in the internal audit by the Green Audit Committee of the university.

The University has tried their level best to implement policies and practices that help them to achieve a green campus. They have also created different awareness programmes, such as water management and energy management. Most of the recommendations were dealt by the campus authority as suggested by official green audit team.

## **7. Role of Management in Green Management**

The part played by the University management in bringing the campus to a green one is adorable. The following were the initiatives by the University authorities in green management:

1. The management developed separate teams for implementing green policy in the campus.
2. Regular evaluation system has been established with monitoring cells for green activities in the campus.
3. The management has allotted budget for implementing green policies in the campus.
4. The green monitoring cell evaluates developmental and functional activities and makes recommendations for improvement of the green aspects.
5. These recommendations are implemented without delay and fail.
6. Clubs that are related to green activities are encouraged to conduct programs in and around the campus.
7. The management is keen on the social commitments and tries to reach out to the general public through teachers and students.
8. The management is keen in conducting awareness programs based on its green policies.
9. The support and part played by management is vital in the green campus related activities.

## 8. Swachh Visva-Bharati

Swachh Visva-Bharati, “*Green Visva-Bharati, Clean Visva-Bharati*” is a novel initiative of the entire campus community to institutionalize cleanliness as an integral part of its functioning. The steps taken by the management to achieve this has fulfilled when Visva-Bharati listed in the MHRD, India Swachhatha Campus ranking twice. Mainly the university aim to achieve the following objectives by implementing Swachh Campus:

- To support the *Swachhta* movement in the country.
- To contribute positively to the environmental consistency.
- To campaign for good health, well-being, clean water, sanitation, and clean energy.
- To monitor the environmental performance of the university.
- To formulate and implement a green protocol for students, faculty and campus level.

## Chapter – 3

### Audit Preparations

#### 1. Management

The Visva-Bharati management was very keen in taking up the green audit to check their position with respect to other universities. In the light of this, the university management approached Sacred Heart University, which has a consultancy wing offering services like green audit of institutions. The **Q Con Quality System Pvt Ltd** agreed to conduct the green audit of Visva-Bharati. After this, there was a preliminary visit to the campus to set up different criteria and questions that are necessary for an updated green audit.

The following were different criteria set forth for the present green audit:

- Green Practices
- Water Management
- Energy Management
- Carbon Footprint

A detailed questionnaire for each aforementioned criteria was prepared based on the campus visit and thorough evaluation of the previous internal audit. The audit team in discussion with the University Green Audit Committee has identified a team including teachers, non-teaching staff and students. The team has collected information that is addressed in the questionnaire.

## **2. Internal Green Audit Committee (Teaching and non-teaching Staffs & students)**

The following table illustrate the details of Internal Green Audit Committee involved at various levels of this audit process:

1. Prof. Pratap Kumar Padhy, HOD, Department of Environmental Studies - Chairperson
2. Prof. D. K. Mandal, HOD, Department of Zoology - Member
3. Dr. Arindam Chatterjee, Chief Medical Officer, PMH - Member
4. Mr. Amit Sengupta, University Engineer - Member
5. Mr. Ashok Kumar Mahato, Joint Registrar (Estate) - Member
6. Dr. Debashish Chatterjee, Assistant Professor, Department of Statistics - Member
7. Dr. Sanjib Mandal, Superintendent, Garden Section - Member
8. Dr. P. Bhikkhu, Joint Registrar, IQAC - Member
9. Mr. P. K. Ghosh, Internal Audit Officer – Convener

## **3. The Green Audit Process:**

1. Selection of area/activities/parts of the campus.
2. Planning of visit to campus to discuss about the audit process.
3. Scope of audit process was identified in consultation with the auditee.
4. A meticulous plan of action was designed.
5. A team consisting of teachers, non-teaching staff and students was constituted with specific tasks and a proper time schedule.
6. Data pertaining to identified parameters for green auditing of the campus were collected directly through an on-site visit.
7. Available background information on the identified activities and other parameters were collected.
8. The role of each stakeholder in green related activities has been collected.
9. Historical aspects of green activities in the campus including flora fauna, water usage and waste generation, etc. were collected.

10. A questionnaire based on the preliminary visits and other evaluations was communicated to the authorities who are involved in the in-house data collection.
11. Data collection based on questionnaire.
12. Visit to the campus by audit team.
13. Data analysis and evaluation.
14. Discussion on the findings.
15. Report preparation.

#### **4. Onsite audit activities**

1. The preliminary visit and meeting with the campus authorities was the first step between the audit team and the auditee.
2. Site inspection for determining parameters for audit.
3. Site visit and evaluation of collected information of the audit team.
4. Meeting with the HODs, Principals, IQAC Director, teachers, non-teaching staffs, and students.
5. Meeting with the in-house audit team for evaluation and clarifications.

## **Chapter – 4 Green Audit**

### **1. Inspection**

The preliminary visit in connection with the pre-audit process to the campus had identified criteria for audit, parameters to be evaluated and time schedule of green audit of Visva-Bharati. It included meeting with the HODs, Principals, IQAC Director, teachers, In-charge of different green activities of the campus and students representing different departments, clubs and fora. This enabled the auditing to gather all necessary preliminary information that is useful in preparing pre auditing questionnaire and data sheets. The on-site audit team collected information based on questionnaire and data sheet.

### **2. Questionnaire**

The detailed questionnaire (Annexure I, II, III & IV) was handled by three different audit teams, and information was gathered. Information pertaining to green activities, water management, energy management and carbon footprint was analyzed under different titles and sub-titles. This was based on the parameters identified. The questionnaire was comprehensive, covering qualitative and quantitative dimensions.

### **3. Evaluation of documents and reports**

The audit visit to the campus evaluated documents and reports (departments, clubs, and fora) that are necessary for the audit process. This further strengthened the claims made by the campus authority on green operations in the campus. To generate future action plan, the audit team had a detailed discussion with different in-house team in the institute and a concluding discussion session with IQAC Director and Bursar was done to finalize the plans.

## 4. Findings and Analysis

### Analysis of Green Gardens

Visva-Bharati is situated in a peri-urban area where farming and agriculture are still being practiced in and around the campus. The campus biodiversity (Table-1, 2) is an example of how they have imbibed the local practices and culture in preserving local biodiversity within the campus. The University management and authorities who are responsible for greening the campus is aptly adopting methods to preserve local flora and fauna. The botanical garden and different concept-based gardens (spice garden, star plants garden, medicinal plants garden, *Dasapushpam* garden, ayurvedic preparation-based plants (eg. *Nalpamara*, *Thriphala*, etc.), are ideal for academic practices and learning while practicing

**Table 1: List of trees of Visva-Bharati**

Sl No	Common Name in English	Common Name in Bengali	Botanical Name	Family
1.			<i>Thuja orientalis</i> Syn. <i>Platycladus orientalis</i>	Cupressaceae
2.	African tulip	Rudrapalash	<i>Spathodea campanulata</i>	Bignoniaceae
3.	Ailanthus/Tree of heaven	Ailanthus	<i>Ailanthus excelsa</i>	Simaroubaceae
4.	Akashmoni	Sonajhuri	<i>Acacia auriculiformis</i>	Fabaceae
5.	Arjuna	Arjun	<i>Terminalia arjuna</i>	Myrtaceae
6.	Ashoka tree	Ashok	<i>Sarca asoca</i>	Fabaceae
7.	Aswattho	Pipal tree	<i>Ficus religiosa</i>	Moraceae
8.	Banyan	Bot	<i>Ficus bengalensis</i>	Moraceae
9.	Banyan	Krishna Bot	<i>Ficus bengalensis</i> var <i>Krishnae</i>	Moraceae
10	Black Babool	Babla	<i>Vachellia nilotica</i> Syn. <i>Mimosa arabica</i> , <i>Acacia arabica</i>	Fabaceae
11	Blue gulmohor	Neel kontho	<i>Jacaranda mimosifolia</i>	Bignoniaceae
12	Bottle brush	Botol brush	<i>Melaleuca citrine</i> Syn. <i>Callistemon lanceolatus</i>	Myrtaceae
13	Brownea/ Scarlet flame bean	Pakhi Phool	<i>Brownea ariza</i>	Fabaceae
14	Bull bay	Magnolia	<i>Magnolia grandiflora</i>	Magnoliaceae
15	Casuarina/ Australian oak	Jhau	<i>Casuarina equisetifolia</i>	<u>Casuarinaceae</u>
16	Champak	Swarna champa	<i>Magnolia champaka</i> Syn. <i>Michelia champaca</i>	Magnoliaceae
17	Child life tree	Putrabjiva/ jiosuta	<i>Putranjiva roxburghii</i>	Euphorbiaceae

18	Chinese juniper	Jhau	<i>Juniperus chinensis</i>	Cupressaceae
19	Christmas tree Monkey puzzle tree	Xmass	<i>Araucaria columnaris</i> Syn. <i>Araucaria cookii</i>	Araucariaceae
20	Coffee	coffee	<i>Coffea arabica</i>	Rubiaceae
21	Cycas	Cycas	<i>Cycas circinalis</i>	Cycadaceae
22	Cycas	Cycas	<i>Cycas revoluta</i>	Cycadaceae
23	Davil's tree	Chhatim	<i>Alstonia scholaris</i>	Apocynaceae
24	Eucalyptus	Eucalyptus	<i>Eucalyptus citriodora</i>	Myrtaceae
25	Eucalyptus	Eucalyptus	<i>Eucalyptus maculate</i>	Myrtaceae
26	Flame of forest	Palash	<i>Butea monosperma</i> Syn. <i>B. Frondosa</i>	Fabaceae
27	Gold mohor/ Radhachura	Radhachura	<i>Peltophorum pterocarpum</i>	Fabaceae
28	Golden Shower	Amaltash	<i>Cassia fistula</i>	Fabaceae
29	Bronze shower		<i>Cassia moschata</i>	Fabaceae
30	Burmese Pink Cassia		<i>Cassia renigera</i>	Fabaceae
31			<i>Cassia nodosa</i>	Fabaceae
32			<i>Cassia marksiana</i>	Fabaceae
33			<i>Cassia bakeriana</i>	Fabaceae
34	<i>Pink Shower Tree</i>		<i>Cassia javanica</i>	Fabaceae
35			<i>Cassia grandis</i>	Fabaceae
36			<i>Cassia leptophylla</i>	Fabaceae
37			<i>Cassia feruginea</i>	Fabaceae
38			<i>Cassia hybrida</i>	Fabaceae
39			<i>Cassia lancasteri</i>	Fabaceae
40	Gulmohor	Gulmohor	<i>Delonix regia</i>	Fabaceae
41	Indian beech tree		<i>Millettia pinnata</i> Syn. <i>Pongamia pinnata</i>	Fabaceae
42	Indian boxwood	Jojongondha	<i>Gardenia latifolia</i>	Rubiaceae
43	Indian coral tree	Lal Parijat	<i>Erythrina variegata</i>	Fabaceae
44	Indian Cork tree	Himjhuri	<i>Millingtonia hortensis</i>	Bigniniaceae
45	Indian fir	Debdaru	<i>Polyalthia longifolia</i>	Annonaceae
46	Indian fir (drooping)	Pendulam debdaru	<i>Polyalthia longifolia</i> 'Pendulata'	Annonaceae
47	Indian lilac	Ghora Neem	<i>Melia azedarach</i>	Meliaceae
48	Kadamba	Kadam	<i>Neolamarckia cadamba</i> Syn. <i>Anthocephalus chinsis</i>	Rubiaceae
49	Kassode tree	Minjiri	<i>Senna siamea</i> Syn. <i>Casia siamea</i>	Fabaceae
50	Lucky nut	Kolke	<i>Cascabela thevetia</i> Syn. <i>Thevetia peruviana</i>	Apocynaceae
51	Madras thorn	Jelapi	<i>Pithecellobium dulce</i> Syn. <i>Inga dulcis</i>	Fabaceae
52	Madras thorn	Jilipi	<i>Pithecellobium dulce</i> Syn. <i>Inga dulcis</i>	Fabaceae
53	Majestic heaven lotus	Dadra	<i>Gostavia augusta</i>	Lecythidaceae
54	Malabar chestnut		<i>Pachira cyathophora</i>	Malvaceae
55	Maple twist	Muchkunda	<i>Pterospermum acerifolium</i>	Malvaceae
56	Medlar (variegated)	Holud bakul	<i>Mimusops elengi</i> Variegata'	Sapotaceae
57	Medlar tree	Bakul	<i>Mimusops elengi</i>	Sapotaceae
58	Mehogini (Large leave)	Mehogini	<i>Swietenia macrophylla</i>	Meliaceae
59	Mehogini (West Indian)	Mehogini	<i>Swietenia mahagoni</i>	Meliaceae

60	Mexican lilac		<i>Gliricida sepium</i> ( Syn. <i>G. maculata</i> )	Fabaceae
61	Neem	Neem	<i>Azadiracta indica</i>	Fabaceae
62	Orchid tree	Kanchan	<i>Bauhinia purpurea</i>	Fabaceae
63	Orchid tree	Kanchan	<i>Bauhinia variegata</i>	Apocynaceae
64	Pagoda tree	Gulancha	<i>Plumeria alba</i>	Apocynaceae
65	Pagoda tree	Gulancha	<i>Plumeria obtuse</i>	Apocynaceae
66	Pagoda tree	Gulancha	<i>Plumeria pudica</i>	Apocynaceae
67	Pagoda tree	Gulancha	<i>Plumeria rubra</i>	Apocynaceae
68	Pride of India	Deshi Jarul	<i>Lagerstroemia speciosa</i>	Lythraceae
69	Pride of India	Biliti Jarul	<i>Lagerstroemia thorelli</i>	Lythraceae
70	Rain tree/monkey pod tree	Jolsiris	<i>Samanea saman</i>	Fabaceae
71	Ravenala tree	Pathopadak	<i>Ravenala madagascariensis</i>	<u>Strelitziaceae</u>
72	Red Sandal wood	Lan Chandan	<i>Pterocarpus santalinus</i>	Fabaceae
73	Rubber tree	Rubber	<i>Ficus elastica</i>	Moraceae
74	Sal	Sal	<i>Shorea robusta</i>	Dipterocarpaceae
75	Sandal Wood	Chandan	<i>Santalum album</i>	Santalaceae
76	Sausage tree		<i>Kigelia pinnata</i>	Bignoniaceae
77	Silk Cotton tree	Shimul	<i>Bombax ceiba</i>	Malvaceae
78	Siris	Siris	<i>Albizia lebbek</i>	Fabaceae
79	Sissoo	Sisu	<i>Dalbergia sissoo</i>	Fabaceae
80	Tamarind	Tentul	<i>Tamarindus indica</i>	Fabaceae
81	Teak	Segun	<i>Tectona grandis</i>	Lamiaceae
82	Tellicherry	Kurchi	<i>Holarrhena antidysenterica</i>	Apocynaceae
83	Torch tree	Bonpulak	<i>Ixora pavetta</i> Syn. <i>I. praviflora</i>	Rubiaceae
84	Trumpet tree (Caribbean)	Basantika	<i>Tabebuia argentea</i> Syn. <i>T. aurea</i>	Bignoniaceae
	Trumpet tree (Golden)	Basantika	<i>Handroanthus chrysotrichus</i> Syn. <i>Tabebuia chrysotricha</i> ,	Bignoniaceae
85	Trumpet tree(Pink)	Golapi basantika	<i>Tabebuia rosea</i>	Bignoniaceae
86	Trumpet tree(Violet)	Beguni basantika	<i>Tabebuia avellaneda</i>	Bignoniaceae
87	Trumpet tree(White)	Sada basantika	<i>Tabebuia pallida</i>	Bignoniaceae
88	Weeping fig		<i>Ficus benjamina</i>	Moraceae
89	West Indian pea	Bokful	<i>Sesbania grandiflora</i>	Fabaceae
90	White champak	Swyet champa	<i>Magnolia champaka</i> 'Alba' Syn. <i>Michelia champaca</i> 'Alba'	Magnoliaceae
91	Woolly dyeing rosebay	Dudhkoraiya	<i>Wrightia arborea</i> Syn. <i>W. tomentosa</i>	Apocynaceae
92	Yellow Silk Cotton	Holud Shimul	<i>Cochlospermum religiosum</i>	

**Table 2: List of fruit trees/shrubs/climbers of Visva-Bharati**

SL NO	COMMON NAME IN ENGLISH	LOCAL NAME IN BENGALI	BOTANICAL NAME	FAMILY
1.	Aonla/Indian gooseberry	Amloki	<i>Phyllanthus emblica</i> Syn. <i>Emblica officinalis</i>	Phyllanthaceae/ Euphorbiaceae
2.	Areca nut/Betel nut	Supuri	<i>Areca catechu</i>	Arecaceae/Palmae
3.	Bael/Golden Apple	Bael	<i>Aegle marmelos</i>	Rutaceae
4.	Banana	Kola	<i>Musa paradisiaca</i>	Musaceae
5.	Ber/Indian jujube	Kul	<i>Ziiphus mauritiana</i>	Rhamnaceae
6.	Bullock's heart	Nona ata	<i>Annona reticulata</i>	Annonaceae
7.	Carambola/ Star apple	kamranga	<i>Averrhoa carambola</i>	Oxalidaceae
8.	Cashew nut	Kajubadam	<i>Acacardium occidentale</i>	Anacardiaceae
9.	Chironji	Piyal	<i>Buchanania cochinchinensis</i> Syn. <i>B. lanzan</i>	<i>Anacardiaceae</i>
10	Coconut	Narkel	<i>Cocos nucifera</i>	Arecaceae/Palmae
11	Custard apple/ Sugar apple	Ata	<i>Annona squamosa</i>	Annonaceae
12	Date	Khejur	<i>Phoenix dactylifera</i>	Arecaceae/Palmae
13	Dillenia/Elephant Apple	Chalta	<i>Dillenia indica</i>	Dilleniaceae
14	Fig	Dumur	<i>Ficus carica</i>	Moraceae
15	Grapes	Angur	<i>Vitis vinifera</i>	Vitaceae
16	Guava	Peyara	<i>Psidium guajava</i>	Myrtaceae
17	Hog palm	Deshi amra	<i>Spondias pinnaata</i>	Anardiaceae
18	Hogpalm	Biliti amra	<i>Spondias mombin</i>	Anardiaceae
19	Indian Almond	<i>Kathbadam</i>	<i>Terminalia catappa</i>	Combretaceae
20	Indian ebony	Kendu	<i>Diospyros melanoxylon</i>	Ebenaceae
21	Indian oersimmon	Deshi gaab	<i>Diospyros malabarica</i>	Ebenaceae
22	Jackfruit	Kanthal	<i>Artocarpus heterophyllus</i>	Moraceae
23	Jamun	Jam	<i>Syzygium cumini</i>	Myrtaceae
24	Karonda	Karancha	<i>Carissa carandas</i>	Apocynaceae
25	Khirni	Khirkul	<i>Manilkara hexandra</i>	Sapotaceae
26	Lemon	Gongharaj/ goralebu	<i>Citrus limon</i>	Rutaceae
27	Lime	Patilebu	<i>Citrus aurantifolia</i>	Rutaceae
28	Litchi	Litchu	<i>Litchi chinensis</i>	Sapindaceae
29	Longan	Anshfol	<i>Dimocarpus longan</i>	Sapindaceae
30	Mango	Aam	<i>Mangifera indica</i>	Anacardiaceae
31	Monkey jack/Monkey fruit	Madal	<i>Artocarpus lacucha</i>	Moraceae
32	Olive	Jolpai	<i>Elaeocarpus serratus</i>	Elaeocarpaceae
33	Palm	Taal	<i>Borassus flabellifer</i>	Arecaceae/Palmae
34	Phalsa	Phalsa	<i>Grewia asiatica</i>	
35	Pineapple	Anaros	<i>Ananas comosus</i>	Bromeliaceae
36	Pomegranate	Dalim	<i>Punica granatum</i>	Lythraceae
37	Pummelo	Batabi	<i>Citrus maxima</i> Syn. <i>C. grandis</i>	Rutaceae
38	Rose apple	Golap jam	<i>Syzygium jambos</i>	Myrtaceae
39	Sapota	Sofeda	<i>Manilkara zapota</i> Syn. <i>Achras zapota</i>	Sapotaceae
40	Sweet lemon	Musambi	<i>Citrus limettiodes</i>	Rutaceae
41	Sweet lime	Misti jamir	<i>Citrus limetta</i>	Rutaceae
42	Tamarind	Tentul	<i>Tamarindus indica</i>	Fabaceae
43	Water apple	Jamrul	<i>Syzygium samarangense</i>	Myrtaceae
44	Wood apple	Koyeth bael	<i>Limonia acidissima</i>	Rutaceae

Students of related subjects are actively involved in gardening, maintenance, etc. of gardens within the campus. Further, they find the garden an apt place for discussions, combined studies, practicals, aesthetic purposes, spending leisure time, etc. Students are learning garden techniques by working in the garden with the help of teachers concerned. Garden makes ample space and scope for them to conduct practicals including budding, grafting, lawn making, etc. for students of Agriculture, Botany and Environmental Studies. They also find this as a good opportunity to observe and learn about birds and butterflies. Students from the department of Zoology learn about insects and their role in pollination by observing the same in the botanical garden. So far, 90 plant species are identified and maintained in the garden (Table 3). Students of Botany are doing bee keeping and are learning the bee preference towards plants from the garden. Preparation of vermi-compost and training on the same for those who are interested are conducted in the garden. There are enough resources (species of flora and fauna) available in different gardens and these resources are being utilized by the Botany and Zoology students for project works.

**Table 3: List of ornamental shrubs of Visva-Bharati**

Sl No	Common Name in English	Local Name in Bengali	Botanical Name	Family
1	Alder (White)	Sada buttercup	<i>Turnera subulate</i>	Passifloreceae
2	Alder (Yellow)	Holud buttercup	<i>Turnera ulmifolia</i>	Passifloreceae
3	Aralia (dinner plate)	Aralia	<i>Polyscias balfouriana</i> Syn. <i>Aralia balfouriana</i>	Araliaceae
4	Aralia (Ming)		<i>Polyscias fruticose</i>	Araliaceae
5	Aralia (Fern-leaf)	Fern pata aralia	<i>Polyscias filicifolia</i>	Araliaceae
6	Aralia (Variegated)		<i>Polyscias paniculata</i> 'Variegata'	Araliaceae
7	Barleria (Rosy)	Jhinti (Golapi)	<i>Barleria cristata</i> 'Rosea'	Acanthaceae
8	Barleria (White)	Jhinti (sada)	<i>Barleria cristata</i> 'Candida'	Acanthaceae
9	Barleria (Yellow)	Jhinti (Holud)	<i>Barleria cristata</i> 'Prionites'	Acanthaceae
10	Blue plumbago	Neel chita	<i>Plumbago auriculata</i>	Plumbaginaceae
11	Blue sage	Kalo bashak	<i>Eranthemum pulchellum</i> Syn. <i>Daedalacanthus narvosus</i>	Acanthaceae
12	Bush allamanda	Lota kolke	<i>Allamanda nerifolia</i>	Apocynaceae
13	Bush allamanda	Lota kolke	<i>Allamanda schotti</i>	Apocynaceae
14	Bush magnolia	Jhop magnolia	<i>Magnolia liliifera</i> Syn. <i>M. Mutabilis</i>	Magnoliaceae
15	Cananga	Ketoki	<i>Cananga kirkii</i>	Annonaceae
16	Candle bush	Dad mordon	<i>Cassia alata</i>	Fabaceae
17	Cape jasmine	Gondhiraj	<i>Gardenia jasminoides</i>	Rubiaceae

18	Cat's tail	Shib jhul	<i>Acalypha hispida</i>	Euphorbiaceae
19	Catharanthus	Nayantara	<i>Vinca rosea</i>	Apocynaceae
20	Chinese croton		<i>Excoecaria bicolor</i>	Euphorbiaceae
21	Coleus	Coleus	<i>Solenostemon scutellarioides</i> Syn. <i>Coleus blumei</i>	Lamiaceae
22	Common lantana	Kutush	<i>Lantana camera</i>	Verbanaceae
23	Copper leaf	Tama pata	<i>Acalypha wilkesiana</i>	Euphorbiaceae
24	Coral plant	Lal russelia	<i>Russelia equisetiformis</i> Syn. <i>Russelia juncea</i>	Plantaginaceae
25	Cotton rose	Sthala padma	<i>Hibiscus mutabilis</i>	Malvaceae
26	Crape myrtle	Furush (Sada)	<i>Lagerstroemia indica</i> 'Candida'	Lythraceae
27	Crape myrtle	Furush (Golapi)	<i>Lagerstroemia indica</i> 'Rosea'	Lythraceae
28	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Bangalore Beauty'	Euphorbiaceae
29	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Bank of Queen'	Euphorbiaceae
30	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Carnival'	Euphorbiaceae
31	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Crispum'	Euphorbiaceae
32	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Delaware'	Euphorbiaceae
33	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Elite'	Euphorbiaceae
34	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Exotic'	Euphorbiaceae
35	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Fantasy'	Euphorbiaceae
36	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Fire'	Euphorbiaceae
37	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Glory'	Euphorbiaceae
38	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Golden Ring'	Euphorbiaceae
39	Croton	Patabahar	<i>Codiaeum variegatum</i> 'H.D. Maity'	Euphorbiaceae
40	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Princess'	Euphorbiaceae
41	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Punctatum aureum'	Euphorbiaceae
42	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Rainbow'	Euphorbiaceae
43	Croton	Patabahar	<i>Codiaeum variegatum</i> 'Warrenii'	Euphorbiaceae
44	Day Jasmine	Diner raja	<i>Cestrum diurnum</i>	Solanaceae
45	Delek air		<i>Memecylon edule</i>	Melastomataceae
46	Dombeya	Domrupani	<i>Dombeya sp</i>	Malvaceae
47	Egyptian star flower		<i>Pentus lanceolata</i>	Rubiaceae
48	Fire bush	Hamelia	<i>Hamelia patens</i>	Rubiaceae
49	Fire cracker plant	Kanakambori	<i>Crossandra infundibuliformis</i> Syn. <i>C. Undulaefolia</i>	Acanthaceae
50	Flag bush (Pink)	Golapi mussanda	<i>Mussaenda erythrophylla</i> 'Rosea'	Rubiaceae
51	Flag bush (Red)	Lal mussanda	<i>Mussaenda erythrophylla</i> 'Scarlet'	Rubiaceae
52	Flag bush (White)	Sada mussanda	<i>Mussaenda philippica</i>	Rubiaceae
53	Flag bush (Yellow)	Holud mussanda	<i>Mussaenda luteola</i>	Rubiaceae
54	Forest champa	Bon champa	<i>Spermadictyon suaveolens</i> Syn. <i>Hamiltonia suaveolens</i>	Rubiaceae
55	Forest jasmine		<i>Clerodendrum inerme</i>	Verbenaceae
56	Golden dew drop	Duranta	<i>Duranta repens</i> Syn. <i>D. erecta</i>	Verbanaceae

57	Gustavia		<i>Gustavia spp</i>	<u>Lecythidaceae</u>
58	Hydrangea/ Hortensia	Hydrangea	<i>Hydrangea Spp</i>	<u>Hydrangeaceae</u>
59	Mallow/ Shoe black plant	Joba	<i>Hibiscus rosa-chinensis</i>	Malvaceae
60	Mickey mouse plant	Kanak champa	<i>Ochna serrulate</i>	Ochanthaceae
61	Mogra/Arabian jasmine	Beli	<i>Jasminum sambac</i>	Oleaceae
62	Morning kiss/ Musical Notes		<i>Clerodendrum macrosiphon</i>	Lamiaceae
63	Oleander (pink)	Golapi karabi	<i>Narium oleander 'Carnea'</i>	Apocynaceae
64	Oleander (red)	Rokto karabi	<i>Narium oleander 'Carmenumflore pleno'</i>	Apocynaceae
65	Oleander (white)	Sada karabi	<i>Narium oleander 'Album'</i>	Apocynaceae
66	Orange jasmine/ Chinese box	Kamini	<i>Murraya paniculate</i>	Rutaceae
67	Orange jasmine/ Chinese box	Kamini	<i>Murraya exotica</i>	Rutaceae
68	Orchid tree	Kanchan	<i>Bauhinia acuminata</i>	Fabaceae
69	Orchid tree	Kanchan	<i>Bauhinia tomentosa</i>	Fabaceae
70	Pin wheel	Tagor	<i>Tabernaemontana divaricata</i> <i>Syn. T. Coronaria</i>	Apocynaceae
71	Poinsettia (Red)/ Fire ball	Lal pata	<i>Euphorbia pulcherrima</i>	Euphorbiaceae
72	Poinsettia (White)	Sada poinsettia	<i>Euphorbia leucocephala</i>	Euphorbiaceae
73	Poinsettia (Wild)	Jongli poinsettia	<i>Euphorbia heterophylla</i>	Euphorbiaceae
74	Powder puff	Powder puff	<i>Calliandra hybrida</i>	Fabaceae
75	Powder puff (Red)	Lal Powder puff	<i>Calliandra haematocephala</i>	Fabaceae
76	Pride of Barbados	Krishna chura	<i>Caesalpinia pulcherrima</i>	Fabaceae
77	Pride of Barbados	Radha chura	<i>Caesalpinia pulcherrima 'Flava'</i>	Fabaceae
78	Queen of the night	Rater rani	<i>Cestrum nocturnum</i>	Solanaceae
79	Rain of gold		<i>Thryallis glauca</i>	Malpighiaceae
80	Rangan/ West Indian Jasmine	Rangan	<i>Ixora spp</i>	Rubiaceae
81	Rose	Golap	<i>Rosa spp</i>	Rosaceae
82	Shrub vinca	Dakur	<i>Kopsia fruticose</i>	Apocynaceae
83	Spicy jatrophia		<i>Jatropha panduraefolia</i>	Euphorbiaceae
84	Star jasmine	Kundo	<i>Jasminum multiflorum</i>	Oleaceae
85	Thorn apple	Dhutra	<i>Datura stramonium</i>	Solanaceae
86	Variegated cassava		<i>Manihot esculenta 'Variegata'</i>	Euphorbiaceae
87	Wax mallow	Lonka joba	<i>Malvaviscus arboreus</i>	Malvaceae
88	Yellow bell	Tecoma	<i>Tecoma gaudichaudi</i>	Bignoniaceae
89	Yellow bell	Tecoma	<i>Tecoma stans</i>	Bignoniaceae
90	Yesterday-today- tomorrow		<i>Brunfelsia calycina</i> <i>Syn. Franciscea hopeana</i>	Solanaceae

It would be nearly impossible to learn taxonomy and morphology for Botany students if plants are not available nearby. Different species of plants in the garden make this possible. Students are keen in maintaining species that are dealt with in their syllabus for practicals and further observation.

The authorities are keen in developing the garden to higher levels by getting funds from sources such as Spices Board. The grants in aid were rightly spent in developing a spice garden with respective identification names and other details pertaining to the species in the spice garden.

The department of Botany and Nature Club initiated an agriculture garden where different species such as ginger, turmeric, chilli, etc are grown. The vegetables harvested from the vegetable garden are utilized either in different messes or sell it out among the staff and students. A portion is shared among the volunteers.

## **5. Arboretum**

Visva-Bharati is maintaining an arboretum where natural species of plants are maintained. The plant diversity in the arboretum includes star plants, concept-oriented plants based on *ayurvedic* preparations, etc. It is a place to conserve endemic plant species as well. The University authority is keen to enrich the arboretum by adding plants of different values.

## 6. Fruit Yielding Plants

Currently, in Kerala, there is a trend in cultivation of different species of fruit yielding plants in farms and orchards. Visva-Bharati is also giving emphasis in adding new species and varieties of different fruit yielding plants in their campus. This would add value and awareness among students and staff about such plants. There are about 20 different fruit yielding species are available in the campus (Table 4). Although the fruit yielding species are cultivated at different places in a scattered manner, they are properly labelled and displayed.

**Table 4: List of fruit yielding plants of Visva-Bharati**

1	<i>Ananus comosus</i>
2	<i>Annona muricata</i>
3	<i>Annona squamosa</i>
4	<i>Artocarpus integrifolia</i>
5	<i>Artocarpushirsutus</i>
6	<i>Citrus limon</i>
7	<i>Garcinia mangostana</i>
8	<i>Hylocereusundatus</i>
9	<i>Mangifera indica</i>
10	<i>Morus alba</i>
11	<i>Musa paradisiaca</i>
12	<i>Nepheliumlappaceum</i>
13	<i>Nepheliummutabile</i>

14	<i>Passiflora edulis</i>
15	<i>Phyllanthus emblica</i>
16	<i>Psidium guajava</i>
17	<i>Punica granatum</i>
18	<i>Spondias pinnata</i>
19	<i>Syzygium jambos</i>
20	<i>Syzygium samarangense</i>
21	<i>Tamarindus indica</i>

## 7. Medicinal Plants

The diversity of medicinal plants in any place, especially in an academic campus is indicative the emphasis that the institute given towards traditional knowledge. This would be a platform for awareness, learning, and source for local usage. Visva-Bharati is maintaining a medicinal plant garden that consists of a good wealth of plant species. The present status of flora that have medicinal importance is representative of regional and local floristic diversity. About 74 plant species in the medicinal plant garden were found maintained on the campus (Table 5).

**Table 5: List of Medicinal plants in Visva-Bharati**

1	<i>Achyranthes aspera</i>
2	<i>Adenantherapavonina</i>
3	<i>Adhatoda vasica</i>
4	<i>Aerva lanata</i>
5	<i>Aloe vera</i>

6

*Alpinia calcarata*

7	<i>Alpinia galanga</i>
8	<i>Alstonia scholaris</i>
9	<i>Andrographis paniculate</i>
10	<i>Anisomeles indica</i>
11	<i>Asparagus racemosus</i>
12	<i>Azadirachta indica</i>
13	<i>Bacopa monnieri</i>
14	<i>Biophytum sensitivum</i>
15	<i>Boerhavia diffusa</i>
16	<i>Butea monosperma</i>
17	<i>Calotropis gigantea</i>
18	<i>Cardiospermum halicacabum</i>
19	<i>Careya arborea</i>
20	<i>Cassia fistula</i>
21	<i>Cassia occidentalis</i>
22	<i>Catharanthus roseus</i>
23	<i>Centella asiatica</i>
24	<i>Chasalia curviflora</i>
25	<i>Cinnamomum zeylanicum</i>
26	<i>Clerodendrum viscosum</i>
27	<i>Clitoria ternatea</i>
28	<i>Cocos nucifera</i>

29

*Coffea arabica*

30	<i>Coriandrum sativum</i>
31	<i>Costus pictus</i>
32	<i>Curcuma longa</i>
33	<i>Cycas circinalis</i>
34	<i>Datura metel</i>
35	<i>Datura stramonium</i>
36	<i>Diospyros sp.</i>
37	<i>Duranta plumieri</i>
38	<i>Eclipta alba</i>
39	<i>Elephantopus scaber</i>
40	<i>Elettaria cardamomum</i>
41	<i>Emblica officinalis</i>
42	<i>Emelia sonchifolia</i>
43	<i>Euphorbia hirta</i>
44	<i>Evolvulus alsinoides</i>
45	<i>Ficus benghalensis</i>
46	<i>Ficus microcarpa</i>
47	<i>Ficus racemose</i>
48	<i>Ficus religiosa</i>
49	<i>Garcinia mangostana</i>
50	<i>Heliotropium indicum</i>
51	<i>Hemidesmus indicus</i>

52

*Hibiscus rosa-sinensis*

53	<i>Holoptelea integrifolia</i>
54	<i>Holarrhena antidysenterica</i>
55	<i>Hopea parviflora</i>
56	<i>Ipomoea sepiaria</i>
57	<i>Ixora coccinea</i>
58	<i>Kaempferiakalangal</i>
59	<i>Lannea coromandelica</i>
60	<i>Leucas aspera</i>
61	<i>Mimosa pudica</i>
62	<i>Murraya koenigii</i>
63	<i>Myristica fragrans</i>
64	<i>Nelumbium speciosum</i>
65	<i>Ocimum basailicum</i>
66	<i>Ocimum sanctum</i>
67	<i>Oxalis corniculata</i>
68	<i>Phyllanthus niruri</i>
69	<i>Pimenta dioica</i>
70	<i>Piper longum</i>
71	<i>Plumbago rosea</i>
72	<i>Pongamia pinnata</i>
73	<i>Psidium guajava</i>
74	<i>Rauvolfia serpentina</i>

## 9. Birds of Visva-Bharati Campus

A list of bird species found in the university campus is given in Table 6. Status: VC=Very Common, C=Common; Migratory Status: R=Resident, W=winter visitor. S=summer visitor

**Table 6: List of birds found in Visva-Bharati**

SI No.	Scientific Name	Common Name	Status	Migratory Status
<b>I</b>		<b>Order</b>	<b>Anseriformes</b>	
	Family	Anatidae		
1	<i>Dendrocygna javanica</i>	Lesser Whistling-Duck	VC	R
2	<i>Anser anser</i>	Graylag Goose	C	W
3	<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	VC	R
<b>II</b>		<b>Order</b>	<b>Galliformes</b>	
	Family	Phasianidae		
4	<i>Ortygornis pondicerianus</i>	Gray Francolin	C	R
<b>III</b>		<b>Order</b>	<b>Podicipediformes</b>	
	Family	Podicipedidae		
5	<i>Tachybaptus ruficollis</i>	Little Grebe	VC	R
<b>IV</b>		<b>Order</b>	<b>Columbiformes</b>	
	Family	Columbidae		
6	<i>Columba livia</i>	Rock Pigeon	C	R
7	<i>Streptopelia decaocto</i>	Eurasian Collared-Dove	VC	R
8	<i>Streptopelia chinensis</i>	Spotted Dove	VC	R
9	<i>Treron Phoenicopterus</i>	Yellow-footed Green-Pigeon	VC	R
<b>V</b>		<b>Order</b>	<b>Cuculiformes</b>	
	Family	Cuculidae		
10	<i>Centropus sinensis</i>	Greater Coucal	VC	R
11	<i>Clamator jacobinus</i>	Pied Cuckoo	C	S
12	<i>Eudynamys scolopaceus</i>	Asian Koel	VC	R
13	<i>Hierococcyx varius</i>	Common Hawk-Cuckoo	VC	R

<b>VI</b>	<b>Order</b>	<b>Caprimulgiformes</b>		
	Family-1	Caprimulgidae		
14	<i>Caprimulgus asiaticus</i>	Indian Nightjar	C	R
	Family-2	Apodidae		
15	<i>Apus affinis</i>	Little Swift	C	R
16	<i>Cypsiurus balasiensis</i>	Asian Palm-Swift	VC	R
<b>VII</b>	<b>Order</b>	<b>Gruiformes</b>		
	Family	Rallidae		
17	<i>Gallinula chloropus</i>	Eurasian Moorhen	VC	R
18	<i>Fulica atra</i>	Eurasian Coot	VC	W
19	<i>Porphyrio poliocephalus</i>	Gray-headed Swamphen	VC	R
20	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	C	R
<b>VIII</b>	<b>Order</b>	<b>Charadriiformes</b>		
	Family-1	Charadriidae		
21	<i>Vanellus malabaricus</i>	Yellow-wattled Lapwing	C	R
	Family-2	Jacanidae		
22	<i>Metopidius indicus</i>	Bronze-winged Jacana	C	R
<b>IX</b>	<b>Order</b>	<b>Ciconiiformes</b>		
	Family	Ciconiidae		
23	<i>Anastomus oscitans</i>	Asian Openbill	C	R
<b>X</b>	<b>Order</b>	<b>Suliformes</b>		
	Family	Phalacrocoracidae		
24	<i>Microcarbo niger</i>	Little Cormorant	VC	R
<b>XI</b>	<b>Order</b>	<b>Pelicaniformes</b>		
	Family	Ardeidae		
25	<i>Ardea cinerea</i>	Gray Heron	C	R
26	<i>Ardea purpurea</i>	Purple Heron	C	R
27	<i>Ardea alba</i>	Great Egret	C	R
28	<i>Ardea intermedia</i>	Intermediate Egret	C	R
29	<i>Egretta garzetta</i>	Lesser Egret	VC	R
30	<i>Bubulcus ibis</i>	Cattle Egret	VC	R
31	<i>Ardeola grayii</i>	Indian Pond-Heron	VC	R

32	<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	C	R
<b>XII</b>	<b>Order</b>	<b>Accipitriformes</b>		
	<i>Family</i>	Accipitridae		
33	<i>Pernis ptilorhynchus</i>	Oriental Honey-buzzard	VC	R
34	<i>Circus aeruginosus</i>	Eurasian Marsh-Harrier	C	W
35	<i>Accipiter badius</i>	Shikra	VC	R
36	<i>Milvus migrans</i>	Black Kite	C	R
<b>XIII</b>	<b>Order</b>	<b>Strigiformes</b>		
	<i>Family-1</i>	Tytonidae		
37	<i>Tyto alba</i>	Barn Owl	C	R
	<i>Family-2</i>	Strigidae		
38	<i>Otus bakkamoena</i>	Indian Scops-Owl	C	R
39	<i>Glaucidium radiatum</i>	Jungle Owlet	R	R
40	<i>Athene brama</i>	Spotted Owlet	VC	R
<b>XIV</b>	<b>Order</b>	<b>Bucerotiformes</b>		
	<i>Family</i>	Upupidae		
41	<i>Upupa epops</i>	Eurasian Hoopoe	VC	R
<b>XV</b>	<b>Order</b>	<b>Coraciiformes</b>		
	<i>Family-1</i>	Alcedinidae		
42	<i>Alcedo atthis</i>	Common Kingfisher	C	R
43	<i>Pelargopsis capensis</i>	Stork-billed Kingfisher	VC	R
44	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	VC	R
45	<i>Ceryle rudis</i>	Pied Kingfisher	R	R
	<i>Family-2</i>	Meropidae		
46	<i>Merops orientalis</i>	Green Bee-eater	VC	R
47	<i>Merops philippinus</i>	Blue-tailed Bee-eater	C	S
<b>XVI</b>	<b>Order</b>	<b>Piciformes</b>		
	<i>Family-1</i>	Megalaimidae		
48	<i>Psilopogon haemacephalus</i>	Coppersmith Barbet	VC	R
49	<i>Psilopogon lineatus</i>	Lineated Barbet	VC	R
50	<i>Psilopogon asiaticus</i>	Blue-throated Barbet	C	R
	<i>Family-2</i>	Picidae		

51	<i>Dinopium benghalense</i>	Black-rumped Flameback	VC	R
<b>XVII</b>	<b>Order</b>	<b>Psittaciformes</b>		
	Family	Psittaculidae		
52	<i>Psittacula eupatria</i>	Alexandrine Parakeet	C	R
53	<i>Psittacula krameri</i>	Rose-ringed Parakeet	VC	R
<b>XVIII</b>	<b>Order</b>	<b>Passeriformes</b>		
	Family-1	Campephagidae		
54	<i>Coracina macei</i>	Large Cuckooshrike	C	R
	Family-2	Oriolidae		
55	<i>Oriolus kundoo</i>	Indian Golden Oriole	C	R
56	<i>Oriolus chinensis</i>	Black-naped Oriole	C	W
57	<i>Oriolus xanthornus</i>	Black-hooded Oriole	VC	R
	Family-3	Artamidae		
58	<i>Artamus fuscus</i>	Ashy Woodswallow	VC	R
	Family-4	Aegithinidae		
59	<i>Aegithina tiphia</i>	Common Iora	VC	R
	Family-5	Dicruridae		
60	<i>Dicrurus macrocercus</i>	Black Drongo	VC	R
	Family-6	Laniidae		
61	<i>Lanius cristatus</i>	Brown Shrike	C	W
	Family-7	Corvidae		
62	<i>Dendrocitta vagabunda</i>	Rufous Treepie	VC	R
63	<i>Corvus splendens</i>	House Crow	VC	R
64	<i>Corvus macrorhynchos</i>	Large-billed Crow	R	R
	Family-8	Cisticolidae		
65	<i>Orthotomus sutorius</i>	Common Tailorbird	VC	R
66	<i>Prinia hodgsonii</i>	Gray-breasted Prinia	VC	R
67	<i>Prinia inornata</i>	Plain Prinia	C	R
68	<i>Cisticola juncidis</i>	Zitting Cisticola	C	R
	Family-9	Acrocephalidae		
69	<i>Acrocephalus dumetorum</i>	Blyth's Reed Warbler	C	W
	Family-10	Hirundinidae		

70	<i>Hirundo rustica</i>	Barn Swallow	VC	W
	Family-11	Pycnonotidae		
71	<i>Pycnonotus cafer</i>	Red-vented Bulbul	VC	R
	Family-12	Phylloscopidae		
72	<i>Phylloscopus inornatus</i>	Yellow-browed Warbler	VC	W
73	<i>Phylloscopus fuscatus</i>	Dusky Warbler	C	W
74	<i>Phylloscopus nitidus</i>	Green Warbler	VC	W
75	<i>Phylloscopus trochiloides</i>	Greenish Warbler	VC	W
	Family-13	Sylviidae		
76	<i>Chrysomma sinense</i>	Yellow-eyed Babbler	VC	R
	Family-14	Leiothrichidae		
77	<i>Argya striata</i>	Jungle Babbler	VC	R
	Family-15	Sturnidae		
78	<i>Gracupica contra</i>	Asian Pied Starling	VC	R
79	<i>Sturnia malabarica</i>	Chestnut-tailed Starling	VC	R
80	<i>Acridotheres tristis</i>	Common Myna	VC	R
	Family-16	Turdidae		
81	<i>Geokichla citrina</i>	Orange-headed Thrush	C	R
	Family-17	Muscicapidae		
82	<i>Copsychus saularis</i>	Oriental Magpie-Robin	VC	R
83	<i>Eumyias thalassinus</i>	Verditer Flycatcher	C	W
84	<i>Ficedula albicilla</i>	Taiga Flycatcher	VC	W
	Family-18	Dicaeidae		
85	<i>Dicaeum erythrorhynchos</i>	Pale-billed Flowerpecker	VC	R
	Family-19	Nectariniidae		
86	<i>Leptocoma zeylonica</i>	Purple-rumped Sunbird	VC	R
87	<i>Cinnyris asiaticus</i>	Purple Sunbird	VC	R
	Family-20	Estrildidae		
88	<i>Lonchura punctulate</i>	Scaly-breasted Munia	VC	R
	Family-21	Motacillidae		
89	<i>Motacilla alba</i>	White Wagtail	C	W
90	<i>Anthus rufulus</i>	Paddyfield Pipit	C	R
91	<i>Anthus hodgsoni</i>	Olive-backed Pipit	VC	W

## 10. Awareness Programs

Several significant and fruitful awareness programs for both students and staff of the campus is arranged every year in the campus. Reflections from students are evident how effective such awareness programs conducted in the campus. Major programs conducted in the campus during the last three years are:

## 11. Environment Related

1. Nature camps.
2. Field visits to different types of ecosystems.
3. Observances of Earth Day, World Environment Day, Wetland Day, Ozone Day etc.
4. Arranging seminars and symposiums on awareness and conservation by nature and natural systems.



Figure 3: Awareness campaign for Clean Campus initiatives



**Figure 4: Awareness campaign for Clean Campus during Pous Mela**

5. Collection and distribution of saplings.
6. Bird and butterfly watching.
7. Sapling planting etc.
8. 2016-2017 organic farming
9. 2016-2017 paddy cultivation
10. Engaging students in maintaining spices garden
11. Engaging students in maintaining herbal garden and medicinal garden.
12. Maintaining of *shanthistal*
13. Participation of teachers in different orientation program
14. Initiation of vermi-compost.
15. Initiation of biogas plant.

## 12. Training and Workshops



**Figure 5: One of the Rainwater harvesting systems in the campus**

- Mushroom cultivation workshop
- Apiculture workshop
- Flower arrangements workshop
- Workshop on eco-friendly carry bags



**Figure 6: Swachh Bharat Abhiyan**



**Figure 7: Vermi Composting system in the campus**

### **Campaigns**

- Plastic free campaign
- Nature camps, field trips
- Some of these activities are year-round programs, and others are regular year-wise or semester-wise or any other stipulated time programs. This indicates that students and teachers are concerned and actively involved in green activities in campus.



Figure 8: Plastic Free Abhiyan

## Water Management

### 1. Major Findings:

- ✓ The ponds and other water resources in the University are well maintained.
- ✓ Separate tanks were installed for different blocks and for different purposes. This enables to use water with maximum potential control.
- ✓ The University has rain water harvesting mechanism which is to be appreciated. This will help generate awareness about the importance of water conservation and shall act as a model system to be followed by other institutions as well.
- ✓ Wick irrigation farming and drip irrigation systems present in the campus were found to be effective in reducing the amount of water used in agriculture sector.
- ✓ The University organizes awareness programmes on water conservation frequently to spread the message of significance of conserving water.
- ✓ Students who are involved in green committees are doing a good job in water related awareness programmes.
- ✓ There are 10 ponds in the campus with an approximate area of 35 acres. These

waterbodies help in recharging our groundwater resources, besides some ponds are used by the locals. Campus sometimes uses this water directly for irrigating the agricultural fields in KVK and Agriculture Departments and also for sprinkling grounds and roads during Pous Mela, Vasantosthav and other big events of the campus for suppressing particulate air pollutants.

✓ The Campus itself is in a rural setup, where part of the rainwater goes

back to atmosphere as evapotranspiration and majority goes to underground and recharge groundwater naturally through plants in the field with a little surface runoff.

**Table7: Details of water analysis of Visva-Bharati**

<i>Activity</i>	<i>Average use practice in KL</i>	<i>Number of activity / day</i>	<i>Water use/person / day (L)</i>	<i>Number of persons using water</i>	<i>Total water consumption /day (KL)</i>
<b>Washing hands and face</b>	20	10000	20	20	<b>10000</b>
<b>Bath</b>	250	5000	50	250	<b>5000</b>
<b>Gardening</b>	<b>10</b>	<b>100</b>	<b>100</b>	<b>10</b>	<b>100</b>

## 2. Suggestions

- ✓ There is no particular mechanism to find the water wastage. This has to be dealt with utmost care without delay and has to be included in the future action plan.
- ✓ There is no proper water consumption monitoring system in the university.
- ✓ The University does not have waste water treatment for waste water generated from laboratories, canteen, hostel kitchen, toilets, bathrooms and office rooms.
- ✓ The waste water from canteen and kitchens is not suitably controlled and is not used for gardening. This has to be addressed and suitable action plans have to be evolved.
- ✓ Water measuring flow meter is not there in any of the places to determine exact water consumption and division
- ✓ No adequate facilities available in the university to treat the wastewater from chemical laboratories.
- ✓ Water fountain in the university was found to be dysfunctional. This need to be activated.

## 3. Energy Management

An assessment of energy consumption, energy sources used, energy management, lighting devices used and other appliances used by the campus community is an important aspect of sustainability of the community. Hence this is a relevant aspect of the assessment. The audit team assessed the number of electrical appliances and their respective uses in terms of consumption of energy per month in KWh. This indicates the energy management of the campus. Based on the assessment we made suggestions and recommendations.

The new buildings which are coming up in our campus are all equipped with full LED lights, efficient fans and ACs. Some of the old buildings are already switched to 30-50% of LED lights and also having efficient fans and ACs. The remaining old buildings may also be switching towards LED lights in due course.

Street light illumination system is mostly equipped with LED type outdoor fittings.

Energy efficient ceiling fans have been introduced in the system. Our streetlights are almost equipped with LED and some parts of campus also have solar lights as well.

#### 4. Electricity Consumption in a sampled building (Department of Statistics, Siksha Bhavana )

**Table 8: Consumption of electricity in a sampled building**

Sl. No.	Utility	Load in KW	Loading %	Monthly Consumption in KWh in summer months	Monthly Consumption in KWh in winter months
1	Light	3292	8.27	171.642	101
2	Fan	2395	6.03	239.616	153.09
3	Computer	8000	20.17	603.546	239
4	Air Conditioner	24600	61.9	772.096	259.96
5	Water Pump+ Aqua Guard + Cooler	1450	3.64	23.7664	2.4864
Total		39737	100	1810.67	755.54

Visva-Bharati University now started tracking electricity consumption in all the building. This will help to understand the electricity over usage in any place

#### 5. Renewable Source of Energy – Solar Power Plants

The University has established two separate 20 KW solar power plant each (2 x 20 = 40KW), of which some part is shared to common grid (KSEB) and some part is utilized in the campus itself. Final higher KW solar capacity will be shortly installed. By learning the importance and power conservation by tapping energy from renewable energy sources, the management plan to extend the capacity of the solar power plant by installing more solar power plants in the campus.



**Figure 8: Roof-top Solar Power Plants**

Following are the details of generation and utilization of power generated out of solar powerplants.

- Total energy produced by the solar panels per year 3650 KWh.

Other than this, the biogas plant installed in the campus generates about 7.5 KW per hour. The beneficiary of the solar power plant is the MCA building and surrounding villages. At present it is working with its fullest establishment capacity and this is a prototype.



**Figure 9: Biogas Plants of the Bio-solar hybrid plant**

It is a good practice and model for the campus community to aim at generating the required power and cooking gas inside the campus itself by using renewable energy sources.

Out of the lighting fixtures, there are 70% LED based lights, which a positive step is taken towards the conservation of energy. In spite of a sylvan campus, there are very less number of fans and AC in university campus as the university is well controlled by enhancing natural air circulation via proper ventilation. The water distribution system of the campus is a well-designed one. The water tanks kept in optimum locations, resulting in minimum energy wastage. There is a functional biogas plant, inside the campus, which aids in saving few LPG cylinders used for cooking/heating.

## **6. Findings**

- Electricity charges approximately Rs. 48200000/ Year
- Biogas-solar hybrid power generation pilot plant has to be used for making bigger biogas generating power plant and that can be a good renewable sources of energy
- Energy generated by the biogas plant per month is equivalent to 1.5 LPG cylinders.
- With the establishment of higher capacity solar power plant, the campus management could reduce the dependency on public electricity supply and the cost should come down.
- Currently the contribution of solar energy is around 1% of the total electricity consumption. University has to find a way to reduce the dependency of non-renewable energy sources. As per verbal communication university is trying to gather 10-15% energy from renewable water sources.

## 7. Carbon Footprint Audit

The most common greenhouse gases are carbon dioxide, water vapour, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth's atmosphere. Each human being is contributing towards adding green-house gases to the atmosphere depending upon his day-to-day activities and usage of instruments and machineries for different purpose.

Release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon footprint. An understanding about the same of any institute where large number of anthropogenic activities are happening is important to assess the contribution of emission of gases that are responsible for Green House Effect. Auditing for carbon footprint of Visva-Bharati Campus was done using a detailed questionnaire, so that the impact of the community on global environment can be assessed.

## 8. Major Findings

1. Total number of Students – Around 11000
2. Total number of Teachers – Less than 500
3. Number of non-teaching staff – Less than 600
4. Number of persons using cars – Around 200 (2L fuel per day)
5. Number of persons using two wheelers - 500 (1L fuel per day)
6. Number of persons using public transport – 1539, 21 km per day, average (180L of fossil fuel per day)
7. Number of cycles used in the campus– 3000
8. LPG usage - 77.5 Cylinders per month
9. Total fossil fuel usage per day - 980L, apart from LPG and fuel for generators

It is evident that majority of the campus community are relying on public transport system for commutation leading to the expense of 980 L of fuel per day. This shall be considered as a very conservative approach. Assuming that 200 persons travel together combined with number of motorcycles and cars lead to the usage of 200L of fuel per day. This causes the emission of about 612kg of CO<sub>2</sub> per day. This measurement is excluding the natural emission of CO<sub>2</sub> by human by

breathing (i.e. 1140g/day). Consumption of one liter LPG releases about 1.5kg of CO<sub>2</sub>. At the rate of 77.5 cylinders per month the University is using about 1085 L of LPG that releases 1627.5kg CO<sub>2</sub> per month. Since there is no data from similar institution available a comparison of carbon footprint is not attempted.

# Chapter – 5 Recommendations

## 1. General recommendations

1. All the lists of plants shall be uploaded in the University site.
2. A file shall be maintained to assess and analyses the usage of garden by different stakeholders.
3. There shall be a digital platform where students and staff shall get details about plants and animals in the campus. This may include name, information of systematic position as per standard classifications, usage, value, further references, etc.
4. The name boards shall be updated with QR code technology that enable the students and staff to scan the QR code to access relevant information of the taxa.
5. There shall be a discussion forum in the campus where a discussion on green activity is possible by students, alumni, staff, etc. and the moderator of the group shall update the information in the digital repository accordingly.
6. Students and staff shall take initiative to start live campus discussion groups where green conservation and awareness shall be the main agenda.
7. The deliberations shall be shared among students and other stakeholders through campus/social media.

## 2. Water Management

1. Strengthening awareness on water conservation among student and teacher communities.
2. Observe 'world water day' on March 22<sup>nd</sup> with different programmes (cycle rally, street play, flash-mob, poster, elocution etc. can be conducted).
3. Apply for club (This is an initiative of Directorate of Environment and ClimateChange, Govt. of west Bengal) to get financial assistance.
4. 'Save Water' posters to be affixed in the classrooms, hand washing areas.
5. Repair water leaks and leaky toilets immediately.

6. Install water aerators and automatic shut-off devices on faucets.
7. Use low-flow shower heads and timer shut-off devices with automatic sensors to reduce water use during showers.
8. Bring a water bottle to university. At the end of the day, any leftover can be poured onto the garden.
9. Set up an efficient water recycling system in the University canteen.
10. Install more rain water harvesting systems.
11. Install waste water system for chemistry labs.
12. Use green solvents and green methods (e.g., double burette titration) in the chemical laboratories.

### **3. Energy Management**

1. The on grid solar power plant can bring down electricity costs and might prove to bring in financial benefits in the long run. Being at a relatively high lying area of the town, there would be no issues with sunshine, particularly in summer.
2. Gradual replacement of existing non-LED based lights to LEDs can further bring down costs for lighting.
3. Replacement of existing electric fans with BLDC fans can significantly reduce power consumption and help in a good reduction in electricity charges.
4. Instead of using desktop workstations, we could consider desktop virtualization, wherever possible which could lead to reduced power consumption and reduced power costs.

### **4. Carbon Footprint**

1. Operate a university bus, with an optimal route planning, could reduce fossil fuel consumption.
2. Encourage the use of bicycles and public transport system by the community, particularly the student community.
3. Planting of trees to negate the effect of burning of fossil fuels.
4. Carpooling, wherever possible, for who are using cars should be encouraged.

## Chapter – 6: Future Action Plans

1. Year wise internal audit on green, water and energy to be conducted by Internal Green Audit Committee.
2. Green Audit committee should consist of students as well.
3. Proper management and month wise mapping of water and energy usage to be conducted by monitoring the same in the records.
4. Department wise awareness programs to be organized by department staff representative to each committee.
5. Proper waste water management.
6. Proper monitoring and disposal of waste discharge from chemical laboratories.
7. Implementation of sign boards and indications of water and energy usage.
8. Energy maintenance by proper usage of electrical appliances.
9. Vegetable and agriculture crop planting has to be increased using advanced technologies.
10. Promotion of visit to agriculture farm lands and processing centers.
11. Marketing of vegetables and crops cultivated in the campus.

The students and staff who are active in green related activities and have a clear vision about how and what should be planned for a greener campus. They think that planting of more saplings during *Vriksharopan* programme and during World Environment Day would cater more awareness and enthusiasm in students who join afresh each year. The University is also planning to initiate plant a tree/adopt a tree program where each student will be planting a sapling and taking care of it during his or her stay in the University. Although the University follow a university curriculum by implementing several such awareness program in their academic and non-academic activities promote more students turn to green activities.

## **Conclusions:**

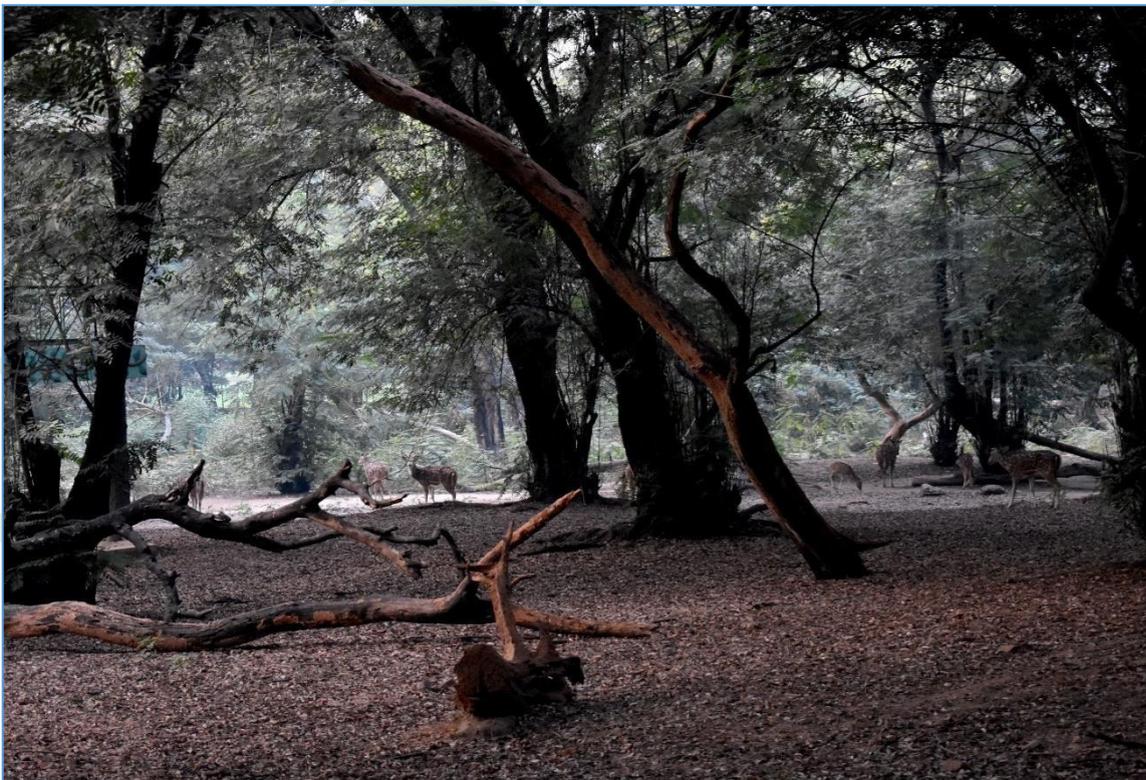
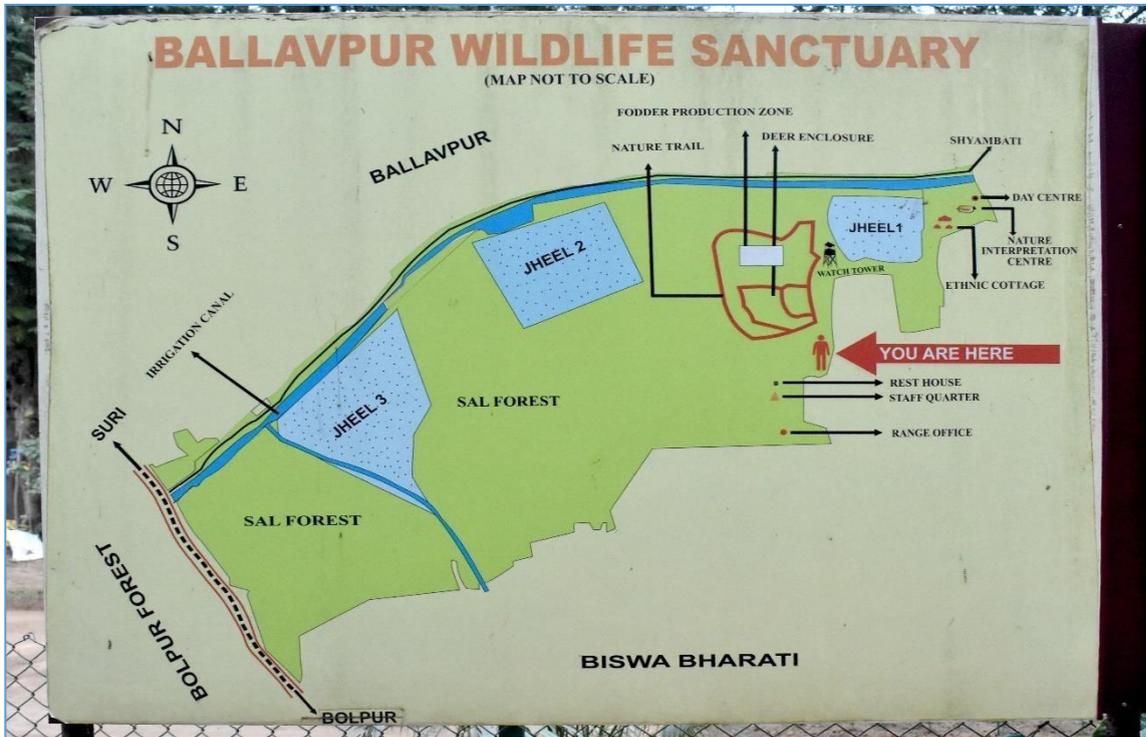
1. The management and other authorities are keen to make the campus a green campus.
2. Visva-Bharati is making learning process by practical approach. This is fulfilled by setting different types of gardens, arboretum concept-based garden and conservation of water and energy.
3. Staff and students are aware about the commitment of the institute towards the society.
4. Green audit at times makes the campus authority to understand the effect of implications towards greenness and conservation of water and energy.
5. The evaluation process proved that the authorities have applied implications suggested in the previous internal audit.
6. The campus community functions are oriented with an eco-friendly approach that enables the student community to develop a genuine approach on conservation of nature, and natural resources.
7. The results presented in the present report would be helpful for the authorities to make future action plans to develop more sophisticated ideas in bringing more values in future efforts towards conservation of biodiversity, water and energy.
8. We, the Q Con Green Audit team, submitting the comprehensive audit report to the authorities of Visva-Bharati Campus. We hope the audit finding would help them implement better management plan to achieve a complete green campus, save maximum water and energy for a better future.

We suggest the University management to conduct the subsequent audit in regular intervals (may be during December 2023). This would help them understand whether they are heading forward by achieving the set forth plans and goals.

## **Acknowledgements**

The Q Con Green Audit team thanks the Internal Green Audit Committee, and the Registrar of Visva-Bharati, Santiniketan for entrusting us the green audit of their campus. We wholeheartedly thank the teaching and non-teaching staffs and students for their timely support rendered to the green audit team at different stages of the process that helped us to complete the audit in time. We also thank Heads of various departments, Principals, and the Teacher-in-charge from each department for sharing documents and information in time. The support from different sections and fora was adequate and timely. The support from the office staff during visit to the campus for verification of documents is also highly appreciated.

# Photographs











## Annexure – I

### Green auditing of Visva-Bharati , Santiniketan Auditing for Green campus management

1. Is there a garden in your university? Area?
2. Is there concept-based garden (star plants, medicinal plants, endemic species, agriculture, etc.), specify area for each.
3. Do students spend time in the garden? If so, approximate time and purpose. (Lists with priority Annexure-I).
4. List the plants (scientific names, Family, etc.) in the garden, with approx. numbers of each species (Annexure-II).
5. List of campus flora (attach a list of plants with details, including scientific name, family, approximate number of plants, etc.) in your campus
6. Name and number of the medicinal plants in your University campus.
7. Any threatened plant species planted/conserved (provide a list with their threat status).
8. List the plants to be planted on your campus in the next three years. (Trees, vegetables, herbs, etc.)
9. List the species planted by the students, with numbers (Annexure –III).
10. Have you got any external funding for developing gardens in the campus? If yes, year, agency, and amount of funding.
11. Explain how you utilized funds for gardens.
12. Whether you have displayed scientific names of the plants in the Campus?
13. What are the vegetables cultivated in your vegetable garden? (Mention the quantity of harvest in each season).
14. How much water is used in the vegetable garden and other gardens?
15. Mention the source and quantity of water used (per month).  
  
Are you using any type of recycled water in your garden?
16. Who is in charge of gardens in your University?
17. Is there any permanent staff to look after gardens in the campus?

18. List the name and quantity of pesticides and fertilizers used in your gardens?
19. Are you doing any organic practice in your campus? List them?
20. Do you have any composting pit (specify what compost) in your University? If yes, what you do with the compost generated?
21. Do you have a vegetable garden on the campus?
22. If yes, how the harvested vegetables are utilized? Do you have any market in the campus?
23. Is there a nature club in your University? If yes what are the activities?
24. Is there any arboretum in your University? If yes details of the trees planted.
25. Is there any fruit yielding plants in your University? If yes details of the trees planted.
26. Is there any groves in your University? If yes details of the trees planted.
27. Is there any irrigation system in your University?
28. What is the type of vegetation in the surrounding area of the University?
29. What are the nature awareness programs conducted in the campus? (2014-19). Provide a list(annexure-IV)
30. What is the involvement of students in the green cover maintenance? Planting saplings and maintenance
31. What is the total area of the campus under tree cover? Or under tree canopy?
32. Share your future plans for further improvement of green cover.
33. Have you incorporated green conservation aspects in your curriculum?
34. How often you conduct public programs on green conservation?
35. Do students reach out to the public in conveying the message of nature conservation?

## **Annexure – II**

### **Green Auditing of Visva-Bharati , santiniketan**

#### **Questionnaire for Water Management Auditing**

1. What is the total Area of the campus?
2. Number of total teachers, non- teaching staff and students in the campus.
3. Provide a list with different uses of water in the campus (Annexure 2-I).
4. Name different sources of water in your University?
5. How many wells are there in your University?
6. Number of electric motors used for pumping water from each well?
7. What is the total horse power of each motor?
8. What is the depth of each well?
9. What is the present depth of water in each well?
10. How does your University store water?
11. Capacity of the overhead water tank/s in the campus? (in liters)
12. Quantity of water pumped every day? (in liters)
13. How do you justify that the water usage is judicious in the campus?
14. Is there any water wastage? If yes, specify why and how.
15. Is there any mechanism to identify water wastage in the campus, explain (Annexure 2-II)
16. What are the possible ways to check wastage of water?
17. Is there any waste water generation happening in the campus?
18. What are the possible sources of waste water in the campus?
19. Where does the waste water go?
20. Are you reusing the waste water after recycling it?
21. What are the systems of management of water used in your labs, especially Chemistry lab (or labs where experiments are happening involving chemicals)?
22. Does this water get mixed with ground water?
23. Is there any treatment for the lab water after usage?
24. Is there a system of practice of green chemistry in your campus? Give details.

25. Write down four ways that could reduce the amount of water used in your University.
26. Record of water use from the University water meter for six months.
27. Amount, if any, as charges towards water paid for water connections.
28. Number of water coolers in the campus. Amount of water used per day? (in liters)
29. Number of water purifiers in the campus, if any.
30. Number of water taps in the campus. Amount of water used per day?
31. Number of bath rooms and toilets separately for staff rooms, common, hostels (Annexure2- III).
32. Number of toilets?
33. Amount of water used per day in the toilets?
34. Number of water taps in the canteen. Amount of water used per day?
35. Amount of fire-wood used in the canteen kitchens?
36. How much ash collected after burning fire wood per day in the canteen?
37. Amount of water used per day for irrigation purpose.
38. Number of water taps in laboratories. Amount of water used per day in each lab?
39. Number of taps in hostels.
40. Total use of water in each hostel?
41. Provide a list of month wise water usage in different areas in the campus
42. Is there any water used for agricultural purposes?
43. Is there any rain water harvest system in the campus? If yes, details of the storage capacity?
44. Report on the status of their functioning.
45. Provide number of damaged taps in the campus? Amount of water lost due to damaged taps or water supply system per day?
46. How do you convey the message of water conservation in the campus?
47. How many water fountains are there? \_\_\_\_\_
48. How often the garden is getting irrigated?
49. Amount of water used to water the ground?
50. Amount of water used for University bus cleaning? (liters per day)
51. Is there any other way by which water is being utilized?
52. Area of the University land which is under concrete tiles.

53. Is there any future plan for the water management in the campus?

54. Is there any water saving techniques followed in your University? Explain?

55. Is there any mechanism by which message on water conservation is been conveyed to staff and students.

GREEN AUDIT

## **Annexure – III**

### **Green auditing of Visva-Bharati , Santiniketan**

#### **Questionnaire for Energy Management Audit**

1. List out ways of energy usage in the campus. (Electricity electric stove, kettle, microwave, incinerator; LPG, firewood, Petrol, diesel and others).
2. Electricity bill amount for the last three years.
3. Amount paid for LPG cylinders for last three years.
4. Any other payments towards energy related matters for last three years in the campus
5. Weight of firewood used per month and amount of money spent? Also mention the amount spent for petrol/diesel/others, if any?
6. Is there any energy saving methods employed in your University? If yes, please specify.
7. What are the types of bulbs used in the campus?
8. Provide a list of number of bulbs of each type.
9. Provide the total energy utilization by each type of bulb per month.
10. How many CFL bulbs has your University installed? Mention use (Hours used/day for how many days in a month)
11. Energy used by each bulb per month? (For example- 60 watt bulb x 4 hours x number of bulbs = kWh).
12. How many LED bulbs has your University installed? Mention use (Hours used/day for how many days in a month)
13. How many incandescent (tungsten) bulbs has your University installed? Mentions use (Hours used/day for how many days in a month)

14. How many fans installed in the campus? Mention use (Hours used/day for how many days in a month)
  15. Energy used by all fans per month? (kwh)
  16. How many air conditioners are in use in the campus? Mention time of their usage (Hours used/day for how many days in a month).
  17. Energy used by all air conditioners per month? (Kwh).
  18. How many electrical equipment including weighing balance used in the campus? Mention use (Hours used/day for how many days in a month)
  19. Energy used by each such electrical equipment per month? (Kwh).
  20. How many computers were in use in the campus? Mention the energy use. (Hours used/day for how many days in a month)
  21. Energy usage by all computers per month? (kwh)
  22. How many photocopier machines are installed and in use at present in the campus? Mention use (Hours used/day for how many days in a month).
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1. Energy used by all photocopier per month? (kwh) Mention use (Hours used/day for how many days in a month)
  2. How many cooling apparatus present in the campus? Mention use (Hours used/day for how many days in a month)
  3. Energy used by all cooling apparatus per month? (kwh) Mention use (Hours used/day for how many days in a month).
  4. How many inverters your University installed? Mentions use (Hours used/day for how many days in a month)
  5. Energy used by each inverter per month? (kwh)
  6. How many electrical equipment used in different labs (methods that are not included in the above calculations) in the campus? Mentions use (Hours used/day for how many days in a month)
  7. How many electrical equipment's are available in all labs in the campus?
  8. Energy used by all equipment's together per month? (kwh)
  9. How many heaters used in the canteen of your University? Mention their use (Hours used/day for how many days in a month)

10. Energy used by each heater per month? (kwh)
11. Number of street lights in your University?
12. Energy used by all street lights per month? (kwh)
13. Number of televisions in your University and hostels?
14. Energy used by all TVs per month? (kwh)
15. Any other items that use energy (Please write the energy used per month) Mention the application (Hours used/day for how many days in a month)
16. Does the campus have any alternative energy sources/nonconventional energy sources? (photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.
17. Do you run “switch off” drills at University?
18. Are your computers and other equipment put on power-saving mode?
19. Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby modes most of the time? If yes, how many hours?
20. What are the energy conservation methods adapted by your University?
21. Are there any public awareness systems informing necessity of energy conservation in the campus?

Write a note on the methods/practices/adaptations by which you can reduce the energy use in your University campus in future.

## **Annexure – IV**

### **Green Auditing of Visva-Bharati, Santineketan**

#### **Questionnaire for Carbon footprint Auditing**

1. Total number of students and teachers in your University?
2. Total Number of vehicles used by the stakeholders of the University /per day.
3. No. of cycles used/day in the campus.
4. No. of two wheelers used (average distance travelled, cc of two wheelers and quantity of fuel and amount used/day). (C.F-Annexure-I).
5. No. of cars used (average distance travelled, power of engine (cc) and quantity of fuel and amount used/day). (C.F-Annexure-II).
6. No. persons using common (public) transportation (average distance travelled and quantity of fuel and amount used/day).
7. No. of persons using University conveyance (general transportation) by the students, non-teaching staff and teachers (average distance travelled and quantity of fuel and amount used per day)
8. Number of parent-teacher meetings in a year? Parents turned up (approx.)
9. Mention their mode of travel and give approximate cost of their commutation.
10. Number of visitors with vehicles per day?
11. Number of generators used/day (hours). Provide quantity and amount for fuel usage/day.

12. Number of LPG cylinders used in the campus. Provide quantity and amount of fuel used /day.
13. Quantity of kerosene used in the canteen/labs (Provide quantity and amount of fuel used per day and amount spent).
14. Amount of taxi/auto charges paid and the amount of fuel used per month for the transportation of vegetables and other materials to the campus.
15. Amount of taxi/auto charges paid per month for the transportation of office goods to the University.
16. Amount of taxi/auto charges paid per month by the stakeholders of the University.
17. Use of any other fossil fuels in the University (Give the amount of fuel used per day and amount spent). (C.F-Annexure-III).
18. What are the methods you might adopt in the future to reduce the quantity of fuel used by the stakeholders/students/teachers/non-teaching staff of the University.

Audited by

Q Con Green Audit Team

Audit Date: 12<sup>th</sup> and 13<sup>th</sup> Dec 2022

  
**Sourabh Dutta**  
Lead Auditor  
Q- Con Quality System Pvt Ltd



***THANK YOU***

GREEN AUDIT

**End Of the report**

**Q-CON QUALITY SYSTEM PRIVATE LIMITED**