GREEN AUDIT
OF
THOUBAL COLLEGE, THOUBAL
(MANIPUR)
2019

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CHAPTER I

INTRODUCTION

"Someone's sitting in the
Shade today because
Someone planted a tree
A long time ago."

-Warren Buffet
(American Business tycoon)

Environmental auditing originated in the United States in the 1970s as a way of checking whether a company was complying with the multitude of new environmental laws and regulations. The United States Environmental Protection Agency (EPA) defined environmental audit as "*a systematic, documented, periodic and objective review by regulated entities of facility operations and practices related to meeting environmental requirements"* (EPA, 2003 cited in Anthony *et al*., 2003, p.36).

Green auditing is a means of assessing environmental performance (Welford, 2002). It is a systematic, documented, periodic and objective review by regulated entities of facility operations and practices related to meeting environmental requirements (EPA, 2003). It is otherwise the systematic examination of the interactions between any operation and its surroundings. This includes all emissions to air; land and water; legal constraints; the effects on the neighbouring community; landscape and ecology; the public's perception of the operating company in the local area. Green audit does not stop all compliance with legislation. Nor is it a 'green washing' public relations exercise. Rather it is a total strategic approach to the organization's activities (CBI, 1990).

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background, it becomes essential to adopt the system of the Green Campus for the institute which will lead to sustainable development. Thoubal College, Thoubal (Manipur) is deeply concerned and unconditionally

believes that there is an urgent need to address these fundamental problems and reverse the trends. Being one of the premier institutions of higher learning in Manipur, the College initiated 'The Green Campus' program two years back that actively would promote the various projects for the environment protection and sustainability.

INDIA is the first country in the world to make environmental audits compulsory. The government of India, by its gazette notification [No. GSR 329 (E)] of March 13, 1992, made it mandatory for all industries to provide annual environmental audit reports of their operations, beginning with 1992-93. Under this, industries are required to provide details of water, raw materials and energy resources used as well as the products and wastes generated by them. These audit reports were to be submitted to the concerned State Pollution Control Boards on or before September 30 every year.

Green Audit is the most efficient & ecological way to solve such an environmental problem. For protecting the nature, we have to show our sense of humor towards the mother earth. In corporate sector the practice of saving environment through the various programmes like CSR (Corporate Social Responsibility), Go Green, Save Water, Save Trees, Plantation of trees are to be taken. It will definitely work for the future. (Beţianu, 2008). That is the only way out to safeguard the planet. The Green Audit of is Requirement of NACC Committee to the Colleges of the country. It is necessary to conduct a green audit in college campus to make students aware of the green audit, its advantages in saving the planet.

Need for Green Audit:

There is a provision of green audit in college campus. A committee has been formed to monitor the proper conservation and plantation of plants in the campus. As per the suggestions made by IQAC, the Department of Botany is given the responsibility to do green audit with active cooperation from other departments. Accordingly, a report on green audit has been prepared by department of Botany Thoubal College, Thoubal. This college was established in 1963 and accredited with Grade 'B' by NAAC, Bengaluru. Total area of the college main campus is 15 acres out of which 20 percent is covered by herbs, shrubs and trees, including valuable medicinal plants. The plants have been systematically identified by the green audit committee. More than 431 plant species were audited. Extra efforts have been taken by the college to create environment consciousness amongst students. One major step in this regard is the extensive plantation program organized by NSS, NCC, and garden committee and teachers and students of the college. Plantation is encouraged by principal and faculties of all departments to increase greenery and reduce carbon emission effects. The existing botanical garden is maintained by the garden committee of this college. Extension programs also organized to create environment awareness and conservation of biodiversity amongst the students and public.

Acknowledgement

The audit team would like to thank our Principal, Smt. O. Chaoba Devi for her consent to conduct this audit. We would like to sincerely thank all the faculty members of all Departments, non-teaching staff and students for their kind cooperation with us during this survey. We would also like to specially thank the Laboratory Assistants of all the science Departments who helped us a lot in furnishing useful information.

CHAPTER II
Objectives of Green Audit

1. Verifying compliance: Verifying compliance with standards or best available techniques.
2. Identifying problems: Detecting any leakage, spills or other such problems with the operations and processes.
3. Formulating environmental policy: Formulating the organisation's environmental policy if there is no existing policy.
4. Measuring environmental impact: Measuring the environmental impact of each and every process and operation on the air, water, soil, worker health and safety and society at large.
5. Measuring performance: Measuring the environmental performance of an organization against best practices.
7. Confirming environmental management system effectiveness: Giving an indication of the effectiveness of the system and suggestions for improvement.
8. Providing a database: Providing a database for corrective action and future plans.
9. Developing the organization's environmental strategy: Enabling management to develop its environmental strategy for moving towards a greener corporate and performance culture.
10. Communication: Communicating its environmental performance to its stakeholders though reporting will enhance the image of the company.

Procedure of Environmental Audit:

There are a number of different environmental auditing procedures advocated in the auditing literature. A model of the audit procedure which is universally accepted was first developed by Arthur D Little. This was later adopted by the International Chamber of Commerce (ICC) in 1989. Based on this approach, Humphrey and Hadley (2000) divided the environmental auditing process into three main areas of activity i.e., (i) Pre-Audit Activities, (ii) On Site Activities and (iii) Post Audit Activities. Each of these phases comprises a number of clearly defined objectives with each objective to be achieved through specific actions. These actions produce results in the form of outputs at the end of each phase.

(i) Pre-audit activities: Once a commitment to auditing has been made, a number of activities need to be completed before the on-site activities commence. This is being done to reduce the amount of time spent in on-site activities which is expensive for both the auditee and audit team. The pre-audit activities usually include the following:

- The auditee should be informed of the date of the audit as soon as possible, enabling them to adjust and become used to the concept.
- The audit scope should be identified. The auditee should usually be consulted when establishing the scope.
- The audit plan should be designed in such a way that it can accommodate changes based on information gathered during the audit and effective use of resources. Audit team and assignment of responsibility should be established.
- The background information on the facility including the facility's organization, layout and processes and the relevant regulations and standards, should be collected.
- The background information on the site's historical uses, and the location of soil and groundwater contamination should be collected.
- The pre-audit questionnaire should be sent to auditee (Humphrey and Hadley, (2000).

(ii) On-site audit activities: The on-site audit is the most important step of the audit procedure. This includes:

- •The opening meeting is the first step between the audit team and auditee. In this meeting the purpose of audit, the procedure and the time schedule are discussed.
- •Site inspection is the second step for on-site activity. In this step the audit team may discover matters which are important to the audit but which are not identified at the planning stage.
- •The on-site phase requires the audit team to develop a working understanding of how the facility manages the activities that influence the environment and how any EMS, if there is one, works.
- •Assessing strengths and weaknesses of the auditee's management controls and risks associated with their failure need to be established.
- •Gathering audit evidence involves collecting data and information using audit protocol.
- •Communicating with the staff of the auditee to obtain most information.
- •Evaluating the audit evidence against the objectives established for the audit and an agreed protocol.
- •An exit meeting takes place once all of audit findings have been finalized with facility personnel (Humphrey and Hadley, 2000).

(iii) Post-audit activities: Post-audit activities begin with the preparation of a draft report. The draft report should be reviewed by the facility personnel directly involved in the audit. The final report should be derived from it and it should then be distributed to all interested parties within the organization. Humphrey and Hadley (2000) confirm that it is important for management to follow-up the report and develop an action plan to implement those audit findings. The ICC (1991) (cited in Humphrey and Hadley, 2000) identifies five elements of a successful follow-up programme. These include:

- A standard action plan format
- Established procedures for approving the action plan and communicating its contents
- Regular reporting of the action plan's status
- Special reporting and chasing up of overdue action and
- Independent auditing of the action plan to verify that all actions sanctioned have been completed.

The formal audit procedure is completed as soon as the action plan has been completed.

General steps followed:

1. Systematic and comprehensive data collection
2. Documentation with physical evidences
3. Independent periodic evaluation with regulatory requirements and appropriate standards
4. Systematic and comprehensive improvement and management of existing system

Target Areas of Green Auditing:

Green audit forms part of a resource management process. Although they are individual events, the real value of green audits is the fact that they are carried out at defined intervals and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water, minimizing waste generation or pollution and also on economic efficiency. All these indicators are assessed in process of "Green Auditing of educational institute". Eco-campus focuses on the reduction of contribution to emissions, procures a cost effective and secure supply of energy, encourages and enhances energy use conservation, promotes personal action, reduces the institute's energy and water consumption, reduces wastes to landfill and integrates environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint.

Methodology of Green Auditing

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution. The criteria, methods and recommendations used in the audit were based on the identified risks. The methodology includes: preparation and filling up of questionnaire, 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 three-step process comprising of:

1. Data Collection – In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements. Following steps were taken for data collection:

- The team went to each department and centre, Library, canteen etc.
- Data about the general information was collected by observation and interview.
- The power consumption of appliances was recorded by taking an average value in some cases.

2. Data Analysis - Detailed analysis of data collected include: calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the Manipur State Power Corporation Limited (MSPCL). Data related to water usages were also analysed using appropriate methodology.

3. Recommendation – On the basis of results of data analysis and observations, some steps for reducing power and water consumption were recommended. Proper treatments for waste were also suggested. Use of fossil fuels has to be reduced for the sake of community health. The above target areas particular to the college was evaluated through questionnaire circulated among the students for data collection.

CHAPTER III
Post Audit Stage

The base of any green audit is that its findings are supported by documents and verifiable information. The audit process seeks, on a sampled basis, to track past actions, activities, events, and procedures to ensure that they are carried out according to systems requirements and in the correct manner. Although they are individual events, the real value of green audits is the fact that they are carried out at defined intervals and their results can illustrate improvement or change over time. Although green audits are carried out using policies, procedures, documented systems and objectives as a test, there is always an element of subjectivity in an audit. The essence of any green audit is to find out how well the environmental organization, environmental management and environmental equipment are performing. Each of the three components are crucial in ensuring that the organization's environmental performance meets the goals set in its green policy. The individual functioning and the success of integration will all play a role in the degree of success or failure of the organization's environmental performance.

Geographical Background of Thoubal College

Thoubal College Campus is located in an area locally known as "Thoubal Lamdong" meaning an elevated area from the surrounding land. Physically, its location is of considerable significance as it has on an elevated trough in the middle of the Thoubal Khunou hill trench in the north and Thoubal valley. It has an elevation of 784 meters (2572 ft) from the MSL and lies at the coordinates point of 24^0 65'50" E of Greenwich and 93^0 99'80" N longitude, The College Campus covers an area of about 15 acres (6.07 hectare). Areas covered under this Green Audit are as follows:

- Determination of Land use pattern of the College.
- Determination of Green Area of the College Campus and study of the Flora of the College campus.
- Study of the Fauna of the College campus

Land use pattern of the College

The land-use pattern of the college is mainly of:

A. Build-up area (area occupied by buildings)
B. Area occupied by water tank, reservoir, swimming pool, etc. C. Area under tree plantation
D. Agricultural Land
E. Play ground

1. Build-up area of the College:

A. Build-up area (Area occupied by buildings)		**Length(in ft)**	**Breadth(in ft)**	**Total (in Sq.ft)**
1. Administrative Block I (Principal's Office Complex)		78.00	31.00	2418.00
2. Administrative Block II (Account Section)		35.00	20.00	700.00
3. Office of IGNOU, NSS and NCC		96.00	23.00	2208.00
4. Department of Geology		61.00	34.00	2074.00
5. Bio Technology Laboratory		13.00	30.00	390.00
6. Old Science Block: Departments of Physics & Chemistry		127.00	32.00	4064.00
7. New Science Block: Departments of Botany, Zoology, Geography, Statistics, Computer Science & Chemistry		256.00	38.00	9728.00
8. B.Voc. Building		60.00	36.00	2160.00
9. Department of Mathematics		41.00	28.00	1148.00
10. Old Block-1: Department of Education, Environmental Science and General Class Rooms (North Wing)		182.00	18.00	3276.00
11. Old Block-II: General Class Rooms (Eastern Wing)		191.00	28.00	5348.00

12. New Arts Block (Main Building)-I: Department of Political Science, History, Economics, Manipuri and English	108.00	24.00	2592.00
13. New Arts Block –II: General Class rooms (near Library Building)	86.00	36.00	3096.00
14. College Library	64.00	37.00	2368.00
15. Fitness Centre	60.00	63.00	3780.00
16. Indoor Stadium (Hall)	113.00	85.00	9605.00
17. Multipurpose Hall	85.00	46.00	3910.00
18. Nimaichand Hall	155.00	28.00	4340.00
19. College Canteen	34.00	26.00	884.00
20. Boys' Common Room (New)	56.00	25.00	1400.00
21. Old Student's Union Room	26.00	23.00	598.00
22. Girls' Common Room (old Building)	28.00	17.00	476.00
23. Girls' Common Room (New Building)	58.00	36.00	2088.00
24. Girls' Hostel	212.00	47.00	9964.00
25. Boys' Hostel	76.00	35.00	2660.00
26. Old Pandal	40.00	24.00	960.00
27. Chowkidar's Quarter	32.00	30.00	960.00
28. College Out House (2 Nos.)	10.00	10.00	100.00
29. College Temple	12.00	10.00	120.00
30. Washroom Complex (near Boys common room)	53.00	18.00	954.00
31. Washroom Complex for eastern wing	36.00	20.00	720.00
32. Cycle Shed Donated by Students Union	55.00	26.00	1430.00
32. Garage No.1	90.00	12.00	1080.00
33. Garage No.2	60.00	12.00	720.00
35. Botanical Garden	79.00	44.00	3476.00
Total Build up area = 91,795.00 Sq.ft = 2.11 acres **Total Area of the College = 15.00 acres**			

B. Area occupied by Water tank, reservoir, swimming pool etc:	Length (in ft)	Breadth (in ft)	Total area (in Sq.ft)
1. Water harvesting Tank	140.00	90.00	12600.00
2. Swimming Pool	170.0	68.00	11560.00
3. Water Reservoir (Physics)	15.00	09.00	135.00
4. Tank near boys' hostel	64.00	54.00	3,456.00
Total = 27,751.00 Sq.ft = 0.64 acres			

C. Area under Tree Plantation:	Total area (in Sq.ft)
1. Tree Plantation Near Reservoir Tank	6,989.01
2. Near Administrative Block I and II	3,586.20
3. Tree Plantation Near Education Department and General Class Rooms	3,043.67
4. Near Fitness Center	2,780.70
5. Near Jubilee Hall	9,941.50
6. Plantation Near B.Voc And New Science Block	24, 713.84
7. Near Playground	9,018.75
8. Eastern Side of Play Ground	22,921.65
10. Near Swimming Pool	27,687.79
11. Near Girls' Hostel	2,529.65
12. Botanical Garden	13,312.60
13. Near Indoor Stadium	10,390.12
14. Western Side along the Boundary Wall	3,992.13
Total = 1,16,193.77 Sq.ft = 2.67 acres	

D. Agricultural Land:	Total area (in Sq.ft)
1. Near Boys' Hostel	92,435.12
2. Near Girl's Hostel	22,629.98
Total=1,15,065.10 Sq.ft = 2.64 acres	

E. Area occupied by Play Grounds:	Total area (in Sq.ft)
1. Football Field	185,330.82

2. Area in front of Science Block	19,620.15
3. Area in front of Fitness Centre	7,227.92
Total=212178.89 Sq.ft	
F. Fallow Land:	**Total area (in Sq.ft)**
1. Near Girls Hostel	6,996.67
2. Near Canteen	2,618.19
3. Near Nimaichand Memorial Hall	2,760.17
4. South of Science Block	2,579.19
Total=14,954.22 Sq.ft = 0. 034 acres	
Grand Total: (A+B+C+D+E+F) = 5,77937.98 Sq.ft = 13.27 acres	

Observations

Total area of the College = 15 acres

A. Total Build-up area = 2.11 acres
B. Total water (reservoir and tanks) = 0.64 acres
C. Total tree plantation area = 2.67 acres
D. Agricultural area = 2.64 acres
E. Playground area = 4.87 acres
D. Fallow land area = 0.034 acres

Actual total area of the College: 13.27 acres (5, 77937.98 ft^2)

- Loss : 1.73 acres lost because of encroachment by the surrounding farmers.

Recommendations

It is proposed to have a proper fencing to stop further encroachment on college campus.

CHAPTER IV
Auditing for Green Campus Management

Unfortunately, biodiversity is facing serious threats from habitat loss, pollution, over consumption and invasive species. Species are disappearing at an alarming rate and each loss affects nature's delicate balance and our quality of life. Without this variability in the living world, ecological systems and functions would break down with detrimental consequences for all forms of life including human beings. Newly planted and existing trees decrease the amount of carbon dioxide in the atmosphere. Trees play an important ecological role within the urban environment as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere and release it as oxygen. The amount of oxygen that a single tree produces is enough to provide one day's supply of oxygen for people. So, while you are busy studying and working on earning those good grades, all the trees on campus are also working hard to make the air cleaner for us. Trees on our campus impact our mental health as well. Studies have shown that trees greatly reduce stress which is a huge deal considering that many students are under some amount of stress.

Green Area of the College Campus and study of the Flora of the College campus

This includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards This also helps in ensuring that the Environmental Policy is enacted, enforced and reviewed using various environmental awareness programmes.

The flora of Thoubal College Campus has been listed and counted at regular intervals using standard methods as described by Raunkiaer (1934), Cain (1950), Curtis & McIntosh (1950), Curtis & Cottam (1956), Puri (1960), Misra (1968) and Mueller-Dombois & Ellenberg (1974). Various tree plantation programs are being organized during World Environment Day (5th June) and Van Mahotsava (1st week of July) at college campus. This program helps in encouraging eco-friendly environment and awareness among villagers. The plantation program includes the plantation of various types of both indigenous and exotic species of trees and shrubs. One Botanical Garden covering an area of 13,312.60 sq.ft. have been established in the year 2013. Many important species of trees, shrubs and herbs (both indigenous and exotic) are being conserved in this Botanical Garden.

Observations

Trees, palms and bamboos: Altogether 80 tree species belonging to 65 genera that are distributed over 35 families could be listed during the present investigation. Besides the trees, nine species of palms and one bamboo species could also be listed. Efforts have been made to give scientific names to all the tree species. Some of the tree species are of great medicinal values whereas some are fruit bearing.

Herbs, Shrubs and Climbers: Altogether 52 plant species belonging to 49 genera that are distributed over 29 families could be listed during the present investigation**.** Many of the plant species in this group are also of significant medicinal values.

Grassland Flora: In the patches of grasslands like the playground, fallow lands, inside the botanical garden and agricultural lands, a total of 81 plant species belonging to 73 genera that are distributed over 32 families could be listed and counted during the present investigation**.** Many of the plant species have significant medicinal values.

1. **Tree Species:**

Sl. No.	Botanical Name	Family	Common Name	Local Name	No of individuals
1	*Acaciabinervia* (Wendl.) J.F. Macbr.	Leguminosae	Coast myall	Evergreen pambi	1
2	*Acacia nilotica* (L.) Del	Leguminosae	Gum tree	Chingonglei	1
3	*Albizia odoratissima* (L.f.) Benth.	Leguminosae	Siris tree	Uil (Uin)	4
4	*Aquilaria malaccensis* Lam.	Thymelaeaceae	Eagle wood	Agar Chandan	1
5	*Araucaria bidwillii* Hook.	Araucariaceae	Bunya pine		1
6	*Ardisia paniculata* Roxb.Syn. Ardisia *colorata* Link	Primulaceae	Panicled coral berry	Uthum	2
7	*Artocarpus heterophyllus* Lam.	Moraceae	Jack fruit	Theibong	4
8	*Azadirachta indica* A. Juss.	Meliaceae	Margosa/Nee m	Neem	1
9	*Bauhinia acuminata* L.	Leguminosae	White orchid tree	Chingthrao angouba	2
10	*Bauhinia variegate* L.	Leguminosae	Camel's foot tree	Chingthrao arangba	2
11	*Calliandra haematocephala* Hassk	Leguminosae	Lady's puff white		
12	*Calliandra tergimina* var. *emarginata* (Willd.) Barneby.	Leguminosae	Pink powder puff		
13	*Calliandra rubescens* (M. Martens & Galeotti) Standl.	Leguminosae	Lady's puff red		
14	*Callistemon linearis* DC.	Myrtaceae	Bottle brush	Likli lei	7
15	*Camellia sinensis* (L.) Kuntze	Theaceae	Tea	Cha mana pambi	2

16	*Canarium strictum* Roxb.	Burseraceae	Black dammer	Mekruk	1
17	*Carica papaya* L.	Caricaceae	Papaya	Awa thabi	2
18	*Celtis australis* L.	Cannabaeceae	European nettle tree	Heikreng	1
19	*Cinnamomum camphora* Nees & Eberm.	Lauraceae	Camphor plant	Karp or pambi	1
20	*Citrus limon* (L.) Osbeck	Rutaceae	Lemon	Champra	12
21	*Citrus maxima* (Burm.) Merr.	Rutaceae	Shaddock	Nobab	5
22	*Corymbia citrodora* Hook.	Myrtaceae	Lemon scented gum	Nasik Champı nambi	1
23	*Cupressus sempervirens* L.	Cupressaceae	Italian cypress		21
24	*Dalbergia sissoo* Roxb. ex DC.	Leguminosae	Indian rose wood	Sisoo	3
25	*Delonix regia* (Bojer) Raf.	Leguminosae	Gol mohor	Gol mohor	36
26	*Diospyros montana* Roxb.	Ebenaceae	Bombay ebony	Tomal	1
27	*Dipterocarpus tuberculatus* Roxb.	Dipterocarpaceae	English gurjan tree	Yangou	1
28	*Dipterocarpus turbinatus* Gaertn. f.	Dipterocarpaceae	Common gurjan tree	Khangra	1
29	*Docynia indica* (Wall.) Decne.	Rosaceae	Indian crap apple	Heitup	4
30	*Elaeocarpus floribundus* Blume	Elaeocarpaceae	Olive nut	Chorphon	23
31	*Eucalyptus globulus* Labill.	Myrtaceae	Blue gum	Nasik	3
32	*Ficus benghalensis* L.	Moraceae	Banyan tree	Khongnang bot	4
33	*Ficus hispida* L.f.	Moraceae	HairyFig	Ashi heibon	3
34	*Ficus racemosa* L. Syn. *F. glomerata* Roxb.	Moraceae	Fig	Heibong	2
35	*Garcinia xanthochymus* Hook.f. ex T. Andr.	Clusiaceae	Gamboge	Heirangkhoi	2
36	*Gmelina arborea* Roxb.Syn. *G. sinuata* Link	Lamiaceae	Wang	White teak/ Coomb teak	11

37	*Jacaranda mimosifolia* D. Don	Bignoniaceae	Indian lilac	Jakaranda	2
38	*Kigelia africana* (Lamk.) Benth.	Bignoniaceae	Sausage tree	U-sebot	18
39	*Lagerstro emiaindica* L.Syn. *L. chinensis* Lam.	Lythraceae	Kanglei	Queen flower	1
40	*Litchi chinensis* Sonn.	Sapindaceae	Litchi	Lichi	1
41	*Litsea monopetala* (Roxb.) Pers.Syn. *L. polyantha* Juss.	Lauraceae	Tallow laurel	Tumitla	16
42	*Magnolia campbelli* Hook. f. & Thoms.	Magnoliaceae	Pink tulip tree	Uthambal	1
43	*Magnolia champaca* (L.) Baill. ex Pierre Syn. *Michelia champaca* L.	Magnoliaceae	Champak	Leihao	2
44	*Magnolia figo* (Lour.) DC. Syn. *M. Fuscata*	Magnoliaceae	Banana shrub		1
45	*Magnolia lillifera* Druce	Magnoliaceae	Egg magnolia	Pumina	1
46	*Mangifera indica* L.	Anacardiaceae	Mango	Heinou	7
47	*Melaleuca bracteatea* F. Muell.	Myrtaceae	Yellow bottle brush	Liklilei hangampal	1
48	*Mesua ferrea* L.	Clusiaceae	Iron wood	Nageshwor	1
49	*Mimusops elengi* L.	Sapotaceae	Indian meddler	Bokul	33
50	*Pinus monticola* Douglas ex D. Don	Pinaceae	Silver pine		1
51	*Murraya koenigii* (L.) Sprengel	Rutaceae	Curry leaf tree	Kang-graibi	1
52	*Murraya paniculata* (L.) Jack	Rutaceae	Orange jasmine	Kamini kushum	2
53	*Nyctanthes arbortristis* L.	Oleaceae	Night flowering jasmine	Singgarei	1
54	*Oroxylum indicum* (L.) Kurz	Bignoniaceae	Indian trumpet flower	Samba	1
55	*Parkia timoriana* (DC.) Merr.	Leguminosae	African locust bean	Yongchakkk	2

56	*Phoebe farnesiana* Brandis	Lauraceae		Uningthou	1
57	*Phyllanthus emblica* L. Syn. *Emblica officinalis* Gaertn.	Phyllanthaceae	Indian gooseberry	Heikru (Heigru)	5
58	*Pimenta dioica* (L.) Merr.	Myrtaceae	Allspice/ Jamaica pepper		1
59	*Pinus nigra* J.F.Arnold	Pinaceae	Black pine		1
60	*Pinus radiate* D.Don	Pinaceae	Golden pine		1
61	*Pinus virginiana* Mill.	Pinaceae	Yellow pine		2
62	*Pinus contorta* Douglas ex Loudon	Pinaceae	Lodgepole pine		1
63	*Polyalthia longifolia* (Sonner.) Thw.	Annonaceae	Mast tree	Ashok pambi	4
64	*Prunus domestica* L.	Rosaceae	Plum	Heikha	1
65	*Punica granatum* L.	Punicaceae	Pomegranate	Kaphoi	1
66	*Psidium guajava* L.	Myrtaceae	Guava	Pungdon	20
67	*Quercus acutissima* Carruth.	Fagaceae	Oak	Uyung nayatpi	1
68	*Ravenala madagascariensis* Sonn.	Strelitziaceae	Traveller'stree		1

69	*Santalum album* L.	Santalaceae	Sandal wood	Cha chandan	1
70	*Schefflera arboricola* (Hayata) Merr.	Araliaceae	Dwarf umbrella tree	Laikhut manbi	1
71	*Schima wallichii* Choisy	Theaceae	Needle wood	Usoi	1
72	*Spathodea campanulata* Pal.	Bignoniaceae	African tulip tree	Iphoo pambi	7
73	*Spondias pinnata* (L.f.) Kurz	Anacardiaceae	Hog plum/ Wild mango	Heining	3
74	*Syzygium cumini* (L.) Skeels	Myrtaceae	Black plum	Jam	28
75	*Tectona grandis* L.	Lamiaceae	Teak	Chingshu	1
76	*Terminalia arjuna* Bedd.	Combretaceae	Arjun tree	Mayokpha	2

77	*Thuja occidentalis* L.Syn. *Thuja compacta* Standish ex Gordon	Cupressaceae	Eastern white cedar	Thuja manam nungshibi	1
78	*Toona ciliata* M. Roem.Syn. *Cedrela toona* Roxb. ex Rottler	Meliaceae	Moulmein cedar / Red cedar	Tairen	2
79	*Xylosma longifolia* Clos	Salicaceae	Dandal	Nongleishang	1
80	*Zanthoxylum rhetsa* DC.Syn.*Z. limonella* (Dennst.)Alston *Fagara rhetsa* Roxb.	Rutaceae	Indian prickly ash	Ngang /Naoseknam	1

2. Bamboo

Sl. No.	Botanical Name	Family	Common Name	Local name	No of individuals
1	*Bambusa sps*	Poaceae	Bamboo	Wa	2

3. Palms

Sl. No.	Botanical Name	Family	Common Name	No of individuals
1	*Borassus flabellifer* L.	Arecaceae	Palmyra palm	1
2	*Chrysalidocarpus lutescens* Syn. *Areca lutescens*	Arecaceae	Butterfly palm /Areca palm	2
3	*Dypsis lutescens* (H. Wendl.) Beentje & J. Dransf.	Arecaceae	Butterfly palm /yellow palm	1
4	*Dypsis decaryi* (Jum.) Beentje & J. Dransf.	Arecaceae	Triangular palm	1
5	*Hyophorbe indica* Gaertn.	Arecaceae	Areca Palm	1
6	*Livistonia chinensis* (Jacq.) R. Br. ex Mart.	Arecaceae	Chinese palm	1
7	*Phoenix humilis* Royle ex Becc. & Hook.f.	Arecaceae	Dwarf date palm	1
8	*Roystonea regia* Kunth (Cook)	Arecaceae	Royal palm	1
9	*Washingtonia filifera* (Linden ex Andre) H. Wendl. ex de Bary	Arecaceae	Fan palm	1

4. Herbs, Shrubs and Climbers

Sl. No.	Botanical Name	Family	Common Name	Local Name
1	*Aechmea gamosepala* Wittm.	Bromeliaceae	Match stick plant	
2	*Adenocalymna alliaceum* Miers	Bignoniaceae	Garlic vine	Chanam lei
3	*Aganosoma cymosa* (Roxb.) G.Don	Apocynaceae	Clove scented	Pasotlei
4	*Agave cantala* (Haw.) Roxb. Ex Salm-Dx Salm-Dyck	Asparagaceae	Century plant	Kewa
5	*Allamanda cathartica* L.	Apocynaceae	Allamanda	
6	*Aloe vera* (L.) Burm.f.	Xanthorrhoeaceae	Ghritkumari	Indian aloe
7	*Artabotrys hexapetalus*(L.f.) Bhandari	Annonaceae	Climbing ylang-ylang	Chini champa
8	*Arundo donax* L.	Poaceae	Giant reed	Yengthou
9	*Asclepias curassavica* L.	Apocynaceae	Milkweed	Krishna chura
10	*Achyranthes aspera* L.	Amaranthaceae	Chaff-flower	Khujum-pere
11	*Acmella paniculata* (Wall. ex DC.) R.K Jansen Syn. *Spilanthes paniculata* Wall.ex	Compositae	Toothache plant	Manjreng
12	*Ageratum conoids* (L.) L.	Compositae	Goat weed	Khongjai napi
13	*Alternanthera philoxeroides* (Mart.) Griseb.	Amaranthaceae	Alligator weed	Kabo napi
14	*Alternanthera sessilis* (L.) R.Br. ex	Amaranthaceae	Sessile joy weed	Phakchet
15	*Alysicarpus heterophyllus* (Baker) Jafri & Ali	Leguminosae	Moneywort	
16	*Amaranthus spinosus* L.	Amaranthaceae	Prickly amaranth	Chengkruk tingkhang panba
17	*Artemisia nilagirica* (C.B.Clarke) Pamp.	Compositae	Mugwort	Laibakngou
18	*Arundinella nepalensis* Trin.	Poaceae	Tambuki grass	
19	*Axonopus compressus* (Swa.) P.Beauv.	Poaceae	blanket grass	
20	*Barleria cristata* L.	Acanthaceae	Philippine violet	Amurei
21	*Beaucarnea recurvata* Lem. Syn. *Nolina recurvata* (Lem.) Hemsl.	Asparagaceae	Pony tail	Nolina
22	*Basella alba* L.	Basellaceae	Malabar spinach	Urok sumbal

23	*Bidens biternata*(Lour.) Merr.& Sherff	Compositae	Beggar teak	Hameng sampakpi
24	*Blumeopsis flava* (DC.) Gagnep.	Compositae		Haochak
25	*Bougainvillea spectabilis* Willd.	Nyctaginaceae	Glory of garden	Cherei
26	*Brunfelsia australis* Benth.	Solanaceae	Yesterday, today & tomorrow	
27	*Calotropis gigantea* (L.) Dryander	Asclepiadaceae	Swallow wort	Aangot pambi
28	*Camellia japonica* L.	Theaceae	Camellia	Kemelia
29	*Camellia kissi* Wall.	Theaceae	Camellia	Kemelia
30	*Campsis grandiflora* (Thunb.) K. Schum.	Bignoniaceae	Trumpet creeper	Mayek lei(brick red)
31	*Catharanthus roseus* (L.) G.Don	Apocynaceae	Madagascar periwinkle	Saheb lei
32	*Chrysanthemum atkinsoni* C.B. Clarke	Compositae	Chrysanthemum	Chandramukhi
33	*Clerodendrum glandulosum* Lindl. Syn. *C. colebrookianum* Walp.	Lamiaceae	East Indain glory bower	Kuthap laba/B.P. Mana
34	*Clerodendrum thompsoniae* Balf.	Lamiaceae	Bleeding heart	Kundo manbi
35	*Codiaeum variegatum* Blume	Acanthaceae	Croton	
36	*Codonacanthus pauciflorus* Nees	Rubiaceae		Nongmangkha angangba
37	*Chenopodium album* L.	Amaranthaceae	Goose foot	Monshaobi
38	*Cynodon dactylon* (L.) Pers.	Compositae	Bermuda grass	Tingthou

38

39	*Coix gigantea* Koenig ex Roxb.	Poaceae	Job's tear	Chaning
40	*Cordyline fruticosa* (L.) Goeppert	Asparagaceae	Cabbage palm	Shakti shel
41	*Cordyline rubra* Otto & A. Dietr.	Asparagaceae	Palm lily	Shakti shel
42	*Cycas revoluta* Thunb.	Cycadaceae	Sago palm	Mapangi Yendang
43	*Cymbopogon citratus* (DC) Stapf	Poaceae	Lemon grass	Haona
44	*Cardamine hirsuta* L.	Brassicaceae	Hairy bitter	Chantrukman
45	*Carex cruciata* Wahlenb.	Cyperaceae	Greater tussock grass	
46	*Centella asiatica* (L.) Urb.	Apiaceae	Indian pennywort	Peruk
47	*Chenopodium album* L.	Amaranthaceae	Goose foot	Monshaobi
48	*Chrysopogon aciculatus* (Retz.) Trin.	Compositae	Love-thorn	Pakhra lukhra
49	*Colocasia esculenta* (L.) Schott Syn. *Arum esculentum* L.	Araceae	Elephant ear	Paan
50	*Commelina appendiculata* C.B. Clarke	Commelinaceae	Day flower	Wangden khoibi
51	*Commelina benghalensis* L.	Commelinaceae	Day flower	Wangden khoibi
52	*Cynodon dactylon* (L.) Pers.	Compositae	Bermuda grass	Tingthou
53	*Cyperus rotundus* L.	Cyperaceae	Nut sedge	Sembang kaothum
54	*Cyrtococcum patens* var. *latifolium*	Compositae		Kang mapal
55	*Dracaena reflexa* Lam.	Asparagaceae	Song of India	
56	*Duranta repens* L.	Verbenaceae	Golden dewdrop	Samballei
57	*Elaeagnus parvifolia* Wall. Ex Royle	Elaegnaceae	Russian olive	Heiyai
58	*Euphorbia milii* Des Moul.	Euphorbiaceae	Crown of thorns	
59	*Echinochloa colona* (L.) Link	Poaceae	Barnyard grass	
60	*Eclipta prostrata* (L.) L.	Compositae	False daisy	Uchi sumbal
61	*Eragrostis unioloides* (Retz.) Nees ex Steud.	Poaceae	Chinese lovegrass	
62	*Erigeron bonariensis* L.Syn. *Conyza bonariensis* (L.) Cronquist	Compositae	Flax-leaf fleabane	
63	*Euphorbia hirta* L.	Euphorbiaceae	Asthma weed/ Snake weed	Pakhang leiton
64	*Fimbristylis ferruginea* (L.) Vahl	Cyperaceae	Rusty sedge	
65	*Gynura bicolor* (Roxb. ex Willd) DC.	Compositae	Okinawan spinach	Tera paibi

66	*Gardenia angusta* (L.) Merr.	Rubiaceae	Cape jasmine	Kaboklei
67	*Heliconia psittaco* L.f.	Heliconiaceae	Lobster claw	
68	*Hibiscus rosa-sinensis* L.	Malvaceae	China rose	Juba kushum
69	*Hydrangea aspera* D. Don	Hydrangeaceae	Bigleaf hydrangea	Tha taruk satpi
70	*Hedyotis crataegonum* Spreng.	Rubiaceae		Langban koukha
71	*Heliotropium indicum* L.	Boraginaceae	Indian heliotrope	Linmarei
72	*Hydrocotyle javanica* Thunb.	Araliaceae	Java pennywort	Lai Peruk
73	*Hydrocotyle sibthorpioides* Lam.	Araliaceae	Lawn marsh pennywort	Lai Peruk
74	*Iris clarkei* Baker ex Hook.f.	Iridaceae	Himalayan iris	Kombirei manbi
75	*Ixora coccinea* L.	Rubiaceae	Jungle geranium	
76	*Imperata cylindrica* (L.) Rausch.	Poaceae	Japanese blood grass	Ee
77	*Jasminum sambac* (L.) Ait.	Oleaceae	Arabian jasmine	Mallika
78	*Juncus effusus* L.	Juncaceae	Common/soft rush	
79	*Kyllinga tenuifolia* Steud.	Cyperaceae		
80	*Lilium monadelphum* M. Bieb.	Liliaceae	Yellow lily	
81	*Leersia hexandra* Sw.	Poaceae	Swamp rice grass	Hup
82	*Leucas aspera* (Willd.) Link	Lamiaceae	Common leucas	Mayang lembum
83	*Lindernia anagallis* (Burm.f.) Pennell	Linderniaceae		
84	*Lindernia crustacea* (L.) F. Muell.	Linderniaceae	False pimpernel	
85	*Ludwigia adscendens* (L.) H. Hara	Onagraceae	Water primrose	Tebo
86	*Mazus pumilus* (Burm.f.) Steenis	Phrymaceae	Japanese mazus	
87	*Melinis minutiflora* P. Beauv.	Poaceae	Molasses grass	
88	*Mimosa pudica* L.	Leguminosae	Sensitive plant	Kangphalekaithabi
89	*Nerium oleander* L.	Apocynaceae	Oleander	Kabirei
90	*Oxalis corniculata* L.	Oxalidaceae	Wood sorrel	Yensil
91	*Philodendron xanadu* Croat, Mayo & J. Boos	Araceae	XanaduPhilodendron	
92	*Polianthes tuberosa* L.	Asparagaceae	Tube rose	Kundalei
93	*Passiflora edulis* Sims	Passifloraceae	Passion fruit	Sitaphal
94	*Phaius tankervilleae* (Banks) Blume	Orchidaceae	Greater swamp orchid	
95	*Paspalum scrobiculatum* L.	Poaceae	Kodomillet	

96	*Pennisetum glaucum* (L.) R.Br.	Poaceae	Pearl millet	
97	*Persicaria orientalis* (L.) Spach Syn. *Polygonum orientale* L.	Polygonaceae	Oriental pepper	Chaokhong angouba
98	*Polygonum kawagoeanum* Makino Syn. *P. micranthum* Meisn.	Polygonaceae	River buttercup	Chaokhong macha
99	*Phleum alpinum* L.	Poaceae	Alpine cat's tail	
100	*Phyllanthus fraternus* G. L. Webster	Phyllanthaceae	Stone breaker	Chakpa Hhikru
101	*Phyllanthus virgatus* G. Forst Syn. *P. simplex* Retz.	Phyllanthaceae	Seed under leaf	
102	*Plantago asiatica subsp. erosa* (Wall.) Z.Yu Li	Plantaginaceae	Flea seed	
103	*Polycarpon prostratum* (Forssk.) Asch. & Schweinf.	Caryophyllaceae		
104	*Ranunculus scleratus* L. Syn. *R. indicus* Roxb.	Ranunculaceae	India buttercup	Kakyella (Kakyel khujin
105	*Rorippa indica* (L.) Hiern Syn. *Nasturtium indicum* (L.) DC.	Brassicaceae	Water cress	Uchi hanggam
106	*Rotala rotundifolia* (Buch.-Ham. ex Roxb.) Koehne	Lythraceae	Blistering ammania	Loubuk leiri
107	*Rungia pectinata* (L.) Nees	Acanthaceae	Comb rungia	
108	*Sambucus javanica* Blume	Adoxaceae	Chinese Elder	Khenam
109	*Senna tora* (L.) Roxb. Syn. *Cassia tora* L.	Leguminosae	Common senna	Thaonam
110	*Spathiphyllum wallisii* Regel	Araceae	Cobra head	
111	*Schoenoplectiella supina* (L.) Lye Syn. *Schoenoplectus supinus* (L.) Palla	Cyperaceae	Bulrush	
112	*Scrophularia elatior* Wall. Ex Benth.	Scrophulariaceae	Tall figwort	
113	*Senna tora* (L.) Roxb. Syn. *Cassia tora* L.	Leguminosae	Common senna	Thaonam
114	*Sida cordata* (Burm. f.) Borss. Waalk.Syn. *S. humilis* Cav.	Malvaceae	Heart-leaf sida	Uhan
115	*Sida rhombifolia* L.	Malvaceae	Jelly leaf	Uhan
116	*Stellaria media* (L.) Vill. Syn. *S. media* f. *apetala* Rouy & Foucaud	Caryophyllaceae	Chickweed	Yerum keirum
117	*Solanum ferox* L.	Solanaceae	Indian nightshade	Leipung khanga
118	*Stellaria media* (L.) Vill. Syn. *S. media* f. *apetala* Rouy & Foucaud	Caryophyllaceae	Chickweed	Yerum keirum
119	*Solanum americanum* L. Syn. *S. nigrum* L.	Solanaceae	Black nightshade	Morok manbi

120	*Solanum ferox* L.	Solanaceae	Indian nightshade	Leipung khanga
121	*Solanum myriacanthum* Dunal Syn. *S. porphyranthum* Dunal	Solanaceae		Shing khanga
122	*Sporobolus indicus* (L.) R.Br.	Poaceae	Smut grass	
123	*Stellaria media* (L.) Vill. Syn. *S. media* f. *apetala* Rouy & Foucaud	Caryophyllaceae	Chickweed	Yerum keirum
124	*Stemodia viscosa* Roxb.	Plantaginaceae	Sicky blue rod	
125	*Tecoma stans* (L.) Juss. ex Kunth	Bignoniaceae	Yellow bells	
126	*Tradescantia spathacea* Sw.	Commelinaceae	Boat lily	
127	*Urena lobata* L.	Malvaceae	Aramina / Congo jute	Sampakpi macha
128	*Viola pilosa* Blume	Violaceae	Smooth leaf white violet	Huikhong
129	*Xanthium strumarium* L.	Compositae	Cockle bur	Sampakpi achouba
130	*Youngia japonica* (L.) DC. Syn. *Crepis japonica* (L.) Benth.	Compositae	Oriental false hawksbear	Tera paibi macha
131	*Yucca gloriosa* L.	Asparagaceae	Spanish dagger / Mound lily	Yerum lei
132	*Zehneria scabra* Sond.	Cucurbitaceae	Wild hops	Lam thabi/Pabashree
133	*Zamia furfuracea* L.f.	Zamiaceae	Florida arrowroot	Mapangi yendang

Recommendations:

- More trees should be planted in the campus as only 2.67 acres are under tree cover which is hardly 20% of the total geographical area of the College. As a national norm, 33% of the total geographical area should be under tree cover.
- Listing of fern flora and of aquatic plants should be taken up at the earliest.
- A separate orchidarium exclusively for the endemic orchids of the state could also be developed. At present the Botanical Garden houses only one orchid species.
- Reviews periodically the list of trees planted in the garden, allot numbers to the trees and keep records. Give scientific names, common English names and local names to the newly planted species of trees.
- A separate herbal medicinal plants garden could be developed in the campus as the State of Manipur is included under Indo-Burma Hot Spot of Biodiversity (one of the 34 Hot Spots of Biodiversity of the world).
- Promote environmental awareness as a part of course work in various curricular areas, encourage independent research projects, and community service.
- Create awareness on environmental sustainability, importance of trees, conservation of medicinal plants and takes actions to ensure environmental sustainability.
- Establish a College Environmental Committee that will hold responsibility for the enactment, enforcement and review of the Environmental Policy. The Environmental Committee shall be the source of advice and guidance to staff and students on how to implement this Policy.
- Ensure that an audit is conducted annually and action is taken on the basis of audit report, recommendation and findings.
- Celebrate every year 5th June as 'World Environment Day', first week of July as Van Mahotsava with tree plantation programs on this day to make the campus more Green.
- The organization may take initiative for community plantation programme by involving students to offset the GHG emission. Celebrate every year 16th September as "International Day for the Preservation of Ozone Layer".
- Green habitat concept should be adopted for all the building construction activities of the College in future, which may help a long way in reducing energy usage, increasing aesthetic appeal of the buildings and class rooms, besides reducing carbon foot print and shades for the benefit of the students.

CHAPTER– V
Study of the Fauna of the College campus

A total of 102 animal species 87 belonging to genera could be observed during the present audit. The faunal diversity of Thoubal College Campus, Thoubal has been studied and recorded/documented as:

FAUNAL GROUP (i) . Invertebrates:

1. Phylum: Coelenterata

Sl. No.	Scientific Name	Common Name	Local Name
1	*Hydra vulgaris* Pallas	Hydra	

2. Phylum: Annelida

Sl.No.	Scientific Name	Common Name	Local Name
2	*Hirudinaria granulosa*	Leech	Timpha
3	*Hirudinaria manillensis*	Leech	Timpha
4	*Pharetima elongata*	Earthworm	Tinthrok
5	*Pharetima planata*	Earthworm	Tinthrok
6	*Pharetima posthuma*	Earthworm	Tinthrok

3. Phylum: Arthropoda

(a) Class: Crustacea

Crustacean Fauna of Thoubal College Pond

Sl. No.	Scientific Name	Common Name	Local Name
7	*Cyclops viridis*	Water flea	
8	*Daphnia cucullata*	Water flea	

3. Phylum: Arthropoda.

(b) Class: Myriapoda

Sl. No.	Scientific Name	Common Name	Local Name
9	*Julus londinensis*	Millipede	Lai shagol
10	*Scolopenda subspinipes*	Centipede	Nachan

3. Phylum: Arthropoda.

(c) Class: Insecta

(i) Insect Fauna of Thoubal College (aquatic insects):

Sl. No.	Scientific Name	Common Name	Local Name
11	*Belostoma indicum*	Giant water bug	Naosek
12	*Berossus pulchellus*	Aquatic beetle	Tharaikokpi
13	*Chironomus sps.*	Midge	–
14	*Cybister convexus*	Aquatic beetle	Tharaikokpi
15	*Cybister tripunetatus asiaticus*	Aquatic beetle	Tharaikokpi
16	*Dineutus unidentatus*	Aquatic beetle	Tharaikokpi
17	*Dyticus transversalis*	Aquatic beetle	Tharaikokpi
18	*Hydaticus fabric*	Aquatic beetle	Tharaikokpi
19	*Hydrophillud indicus*	Aquatic beetle	Tharaikokpi
20	*Lethocerus indicus*	Giant water bug	Naosek
21	*Nepa cinerea*	Water scorpion	Haonaosek
22	*Ranatra chinensis*	Water stick insect	
23	*Sandracottus manipurensis*	Aquatic beetle	Tharaikokpi

(ii) Insect Fauna of Thoubal College (terrestrial insects):

Sl. No.	Scientific Name	Common Name	Local Name
24	*Aeshna cyanea*	Dragon fly	Charang
25	*Anopheles stephensi*	Mosquito	Kang
26	*Antherea assama*	Muga silk worm	Muga tin
27	*Antherea proylei*	Oak tasar worm	Tasar leima
28	*Apis dorsata*	Honeybee	Hayingkhoi
29	*Apis indica*	Honeybee	Hayingkhoi
30	*Carausius morosus*	Stick insect	Cheitek tin
31	*Cicada sankana*	Tree bugs	Hari nongnang
32	*Cimex lectularius*	Bed bug	Maa
33	*Coccinella variabilis*	Ladybird beetle	Sandrembi

34	*Culex Pipiens fatigans*	Mosquito	Kang
35	*Ephemera sps.*	Black butterfly	Kurak
36	*Gryllus campestris*	Mole cricket	Harou
37	*Lepsima cineta*	Silver fish	Lairik tin
38	*Mantis religiosa*	Praying mantis	Thangon lenbi
39	*Melanopus spretus*	Grasshopper	Koujeng
40	*Musca domestica*	Housefly	haying
41	*Nephotettix nigropictus*	Green leaf hopper	
42	*Pediculus humanus capitis*	Head louse	Hik
43	*Periplaneta americana*	American cockroach	Kharmi
44	*Periplaneta orientalis*	Indian cockroach	Kharmi
45	*Rhaphicera satricus*	Butterfly	Kurak
46	*Schistocerca gragaria*	Locust	Koujeng
47	*Sitophylus oryzae*	Rice weevil	Phoujum
48	*Termes sps.*	Queen termite	Leishau mapi

4. Phylum: Arachnida

Sl. No.	Scientific Name	Common Name	Local Name
49	*Aranea sps.*	Spider	Mirang

5. Phylum: Mollusca

Sl. No.	Scientific Name	Common Name	Local Name
50	*Achantina achantina*	Giant African land snail	Moreh tharoi
51	*Arion vulgaris*	Slug	U-kakphei
52	*Lymnaea luteola*	Freshwater snail	Maibi tharoi
53	*Pila globosa*	Freshwater snail	Labuk tharoi

Vertebrates

1. Class: Pisces

Sl. No.	Scientific Name	Common Name	Local Name
54	*Amblypharyngodon mola*		Muka nga
55	*Anabas testudineus*	Climbing perch	Ukabi
56	*Channa orientalis*		Meitei ngamu
57	*Channa punctatus*		Ngamu bogra
58	*Clarias batrachus*	Cat fish	Ngakra
59	*Colisa fasciatus*		Ngapemma
60	*Colisa sota*		Tombemma
61	*Ctenopharyngodon idella*	Grass carp	Napi chabi
62	*Cyprinus carpio*	Common carp	Common carp
63	*Glossogobius giuris*		Nynon nga
64	*Heteropneustes fossilis*		Ngachik
65	*Monopterus albus*		Ngaprum
66	*Puntius chola*		Phabou nga
67	*Puntius chonchonius*		Phabou nga
68	*Puntius phutunio*		Ngakha meingangbi
69	*Puntius ticto*		Ngakha

2. Class: Amphibia

Sl. No.	Scientific Name	Common Name	Local Name
70	*Bufo melanosticus*	Common toad	Hangoi borobi
71	*Hyla annectans*	Hyla	Hangoi asungba
72	*Limnonectes limnocharis*	Cricket frog	Labuk Hangoi/Narak hangoi
73	*Limnonectes tigerinus*	Bull frog	Moreh hangoi
74	*Microhyla ornata*	Microhyla	Koktumbi

75	*Polypedates leucomystax*	Banana frog	Hangoi tangsang

3. Class: Reptilia

Sl. No.	Scientific Name	Common Name	Local Name
76	*Amphiesma stolata*	Buff striped keelback	Lilha
77	*Bungarus fasciatus*	Banded krait	Linkhak
78	*Calotes mystaceus*	Garden lizard	Numit yungbi/ Echuppi chum
79	*Calotes versicolour*	Garden lizard	Numit yungbi
80	*Hemidactylus garnoti*	House lizard	Chum
81	*Mabuya multifasciata*	Many lined grass skink	Charu chum/Narak chum
82	*Naja naja kouthia*	Monoceled cobra	Kharou
83	*Rhabdophis himalayanus*	Himalayan keelback	Tanglei
84	*Typhlops diardii*	Worm snake or blind snake	Timunapun
85	*Xenochrophis piscator*	Checkered keelback or water snake	Lillabob

4. Class: Aves

Sl. No.	Scientific Name	Common Name	Local Name
86	*Acridotheres grandis*	Orange billed jungle myna	Chonga amubi
87	*Acridotheres tristis*	Common myna	Chonga angangbi
88	*Acrocephalus agricola*	Paddy field warbler	Mongba loubuk koi
89	*Corvus splendens*	House crow	Meitei kwak
90	*Macropygia unchall*	Bartailed cuckoo dove	Lam khunu meiraang
91	*Passer domesticus indicus*	House sparrow	Sen-daang
92	*Phylluscopus fuscatus*	Dusky leaf warbler	Mong-tit-murei
93	*Pycnonotus jocosus*	Red-whiskered bulbul	Khoining
94	*Strepropelia decaocta*	Burmese ring dove	Lam khunu hawai maan

5. Class: Mammalia

Sl. No.	Scientific Name	Common Name	Local Name
95	*Bos Taurus indicus*	Red Sindhi cow	Shan
96	*Canis lupus familiaris*	Domestic dog	Hui
97	*Falis catus domesticus*	Domestic cat	Houdong
98	*Mus musculus*	House mouse	Uchi
99	*Pteropus giganteus*	Flying fox	Mayang shekpi
100	*Rattus norvegicus*	Brown rat	Uchi
101	*Rattus rattus*	Common Indian black rat	Bora uchi
102	*Rhinolophus luctus*	Horse shoe bat	Shekpi

Recommendations:

- More fruit bearing trees should be planted in the campus to encourage nesting by the visiting avi-fauna.
- An aquarium with local ornamental fishes could be installed at the Zoology Department.

CHAPTER VI

Auditing for Energy Management

Energy cannot be seen but we know it is there because we can see its effects in the forms of heat, light and power. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. An old incandescent bulb uses approximately 60W to 100W while an energy efficient light emitting diode (LED) uses only less than 10 W. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices. Electricity Consumption in the College Campus.

Electricity Consumption per Year in the College campus has been estimated to be around 1301 kWh. Average Electrical Consumption per Month and per Day was estimated to be 108.4 kWh and 4.33 kWh respectively. Plenty of ICL (incandescent lamp) bulbs are still in use in the campus which consumes more amount of electricity and at the same time releases more amount of CO_2 when compared to CFL and LED bulbs. On an average a 100W ICL bulb when used for 3.5 hours daily will consume 127.75kWh of electricity releasing 104.76 kg of CO_2 annually. In comparison, a 20W CFL (Compact Fluorescent Lamp) when used for 3.5 hours daily will consume only 25.55kWh of electricity while releasing only 20.95 kg of CO_2 annually. The power consumption patterns when calculated @ Rs 4/- per kWh will amount to Rs 511.0 for an ICL bulb whereas it is only Rs 102.20 for a CFL bulb. Power consumption can be further lowered when we use the LED bulbs in the campus. A 10W LED light bulb when used for 3.5 hours daily will consume 12.77kWh of electricity releasing only 10.47 kg of CO_2 annually with an expenditure of Rs 51.11.

Similarly, a CRT monitor of 155W when used for 8 hours daily will consume 310kWh of electricity annually thereby releasing 254.2kg of CO_2 into the atmosphere. Whereas an LCD screen of 30W when used for the same number of hours daily will consume only 60kWh of electricity annually and releasing only 49.2kg of $CO_{2\ into}$ the atmosphere annually. The running cost of a CRT monitor is Rs 1240.00 per annuum while that of LCD monitor is only 240.00. So, when we replace a single CRT monitor of a desktop computer by a LCD monitor, we can reduce the annual power consumption by 250kWh at the same time reducing the release of CO_2 by 205kg. In terms of monetary benefits, we can save an amount of Rs 1000.00 for every CRT monitor being replaced by LCD monitors.

Electric Appliances installed in Thoubal College Campus:

Block Name	Sl. No.	Room Name	ICL Bulb	Tube Light/CFL Bulbs/LED	Ceiling Fan/ Other Fans	Other Electric Appliances
Administrative Block-I (First Floor)	1	Principal's Office	-	Tube light-2 LED-6	3	Desktop Computer-2 Photocopier Machine-1 Printer-4
	2	Teacher's Common Room	-	Tube light-3 Fog light -6	3	LCD TV-1
	3	Washroom	-	CFL-4	-	-
Administrative Block-I (Ground Floor)	4	IQAC Office	-	CFL-4	4	-
	5	Cash Counter Room	-	CFL-4 Tube light-7	2	Photocopier Machine-1
	6	Washroom	1	-	-	-
Administrative Block- II	7	Office -1	-	CFL-2	1	-
	8	Office -2 (Cashier's Office)	-	CFL-2	1	Desktop Computer-1 Photocopier Machine-1 Printer-1
Office of IGNOU, NSS and NCC	9	IGNOU	2	Tube light-1	1	Desktop Computer-1, Printer-1
	10	IGNOU	1	CFL-1	1	-
	11	NSS	-	Tube light1, CFL-1	2	-
	12	NCC Office	-	CFL-1	1	Photocopier Machine-1
	13	Washroom	2	-	-	-
	14	Generator Room	1	-	-	-
New Science Block (Second Floor)	15	Botany Lab-I	8	-	4	-
	16	Botany Lab-II	8	-	4	Laminar Flow Chamber -2, Oven-2, Centrifuge Machine-1, Electronic balance -1, Distillation plant -2
	17	Botany Teachers Common Room	4	-	2	Refrigerator -1 Desktop Computer -1 Digital microscope -1 Printer- 1

	18	Chemistry Lab –I	8	-	4	-
	19	Chemistry Lab- II	8	-	4	-
	20	Chemistry Lab–III	8	-	4	-
	21	Washroom-III	3	-	-	-
	22	Veranda	8	-	-	-
Old Science Block (Physics Store)- First Floor	23	Physics Teachers Common Room	3	CFL-2	13	Refrigerato-1, Desktop Computer-1 Printer-1, Practical Electronic Equipments-5, Electric kettle-1
	24	Physics Lecture Hall –I				
	25	Physics Lecture Hall –II				
Old Science Block (Physics Store) Ground Floor	26	Physics Lab-I	6		4	
	27	Physics Lab-II				
	28	Physics Lab-III				
Department of Geology	29	Geology Teachers Common Room		Tube light -2,	2	Desktop Computer-1 Printer-1
	30	Geology Lab-I		Tube light -2	2	-
	31	Geology Lab-II		Tube light -2	2	Digital microscope -1
Biotechnology Laboratory	32	Biotech Laboratory	-	CFL-3	Ventilation fan-2	Desktop Computer-1, Electronic balance-1, Distillation plant -2, Oven-2, Mechanical shaker-2, Autoclave -1, Digital microscope-1, Mantle Heater-3
Department of Mathematics	33	Department of Mathematics	-	Tube light-4 CFL-4	4	Laptop-5
B. Voc. Building	34	Food Technology Department	-	6	5	Photocopier Machine-1 Desktop Computer-1, Refrigerator-1 Heater-2

New Arts Block –I (Ground Floor)	35	Department of Political Science	2	Tube light-2 CFL-4	1	Desktop Computer-1
	36	Department of History	2	Tube light-2 CFL-4	1	Desktop Computer-1
	37	Department of English	3	-	1	Desktop Computer-1
	38	Department of Economics	1	-	1	-
	39	Department of Manipuri	1	Tube light-2	1	Desktop Computer-1
	40	Washroom	4	-	-	-
New Arts Block – I (First Floor)	41	Washroom	4	-	-	-
	42	Class Room 1	4	Tube light-3	2	-
	43	Class Room 2	4	Tube light-3	2	-
New Arts Block –II General Class rooms (near Library Library	44	Class Room 3 (Room No 53&54)	-	Tube light-8	4	-
	45	Class Room 4 (Room No 55 & 56)	-	Tube light-8	4	-
Old Block-1: Department of Education, Environmental Science and General Class Rooms (North Wing)	46	Class Room 5 (Room No 35)	-	-	-	-
	47	Class Room 6 (Room No 36)	-	-	1	-
	48	Class Room 7 (Room No 37 &38)	-	-	2	-
	49	Class Room 8 (Room No 39)	-	-	-	-
	50	Class Room 9 (Room No 40 &41)	1	-	2	-
	51	Class Room 10 (Room No 42)	-	-	-	-
	52	Dark Room Room No 43	-	-	-	-
	53	Department of Education	-	-	-	-
	54	Department of Environmental Sciences	-	-	-	-
	55	Class Room 12 (Room No 23)	-	-	-	-

Old Block-II: General Class Rooms (Eastern Wing)	56	Class Room 13 (Room No 24)	-	-	-	-
	57	Class Room 14 (Room No 25)	-	-	-	-
	58	Class Room 15 (Room No 26)	-	-	1	-
	59	Class Room No–27	3	-	1	Laptop-1
	60	Class Room No (Room No 28)	2	-	1	-
	61	Class Room 16 (Room No 29 & 30)	-	-	4	-
	62	Class Room 17 (Room No 32 & 32)	4	-	2	-
	63	Class Room 18 (Room No 33 &34)	5	-	1	-
College Library	64	Library I	9	Tube light-3	4	-
	65	Library II	1	Tube light-1	1	Desktop Computer-2
	66	Library III	1	Tube light-1	1	Photocopier Machine - 2
	67	Washroom	1	Tube light-1	-	-
Girls Common Room (old)	68	Girls Common Room	-	-	-	-
Girls Hostel	69	Warden's Office	2	-	1	-
	70	Hostel Rooms	2	Tube light-32	16	-
	71	Washroom I	4	-	-	-
	72	Washroom-II	4	-	-	-
	73	Veranda	-	CFL-3	-	-
Boys Hostel	74	Warden's Office	2	-	1	-
	75	Hostel Rooms	2	Tube light-32	16	-
	76	Washroom I	4	-	-	-
	77	Washroom-II	4	-	-	-
	78	Veranda	-	CFL-3	-	-
New Girls Common Room	79	New Girls Common Room	2	-	1	-

Washroom Complex	80	Washroom Complex I	-	-	-	-
	81	Washroom Complex II	-	-	-	-
Recreation Hall No	82	Recreation Hall No 1		CFL-8 Fog light -6	6	
	83	Washroom	3	-	-	-
Indoor Stadium	84	-	-	-	-	-
Fitness Centre	85					
Nimaichand Hall	86	-	-	-	-	-
Canteen	87	Main Room	1	-	1	-
	88	Kitchen	1	-	-	-

Type of Electrical appliance	**No.**	**Total watts**	**Average use in hours/day**	**Total electricity consumption in kwh/day**
1. ICL bulbs	151	9060	0.5	4.53
2. CFL bulbs/tubelight	164	7380	0.5	3.69
3. No of LED bulbs	8	96	3	0.288
4. No of celling fans	152	10640	0.5	5.320
5. No of ventilators	2	800	1	0.8
6. No of desktop computer sets	93	18600	2	37.2
7. No of computer printers (Dot, Inkjet and Laser)	11	5500	0.5	2.2
8. No of photocopiers	7	1000	0.5	3.5
9. No of refrigerators	3	600	2	0.8
10. No of room heaters	5	4000	0.2	0.8
11. No of electric tea makers/water boilers	0	0	0	0
12. Electric water pumps	1	1000	0.5	0.5
13. Laminar Air flow	2	900	0.5	0.5
14. Oven	4	6000	0.3	1.8
15. Centrifuge Machine	1	120	0.3	0.036

16.Electronic balance	2	440	0.5	0.22
17. Distillation Plan	2	240	0.5	0.120
18. Autoclave	1	1500	1	1.5
29. Mantle Heater	3	1500	1	1.5

Main areas for improvement

- The institution is having two DG sets. The DG set exhaust is not found to be channelized through stack of stipulated height as per requirement with the Air prevention and control of pollution Rules 1982. The emission level monitoring from the stack needs to be done to check compliance to national emission standard.
- The existing DG sets is not equipped with acoustic enclosure as per requirement of the Environmental Protection rules 1986. The standby DG set is the source of both noise pollution & air pollution due to inadequate acoustics &improper exhaust system. DG is located just by the side of boundary wall enabling subsequent effect in surrounding outside area.
- There is no noise monitoring data available to check the compliance with the ambient noise norms as per noise pollution (Regulation and control) rules 2000.
- In DG room fuel storage is without any secondary containment, any spillage will go to ground & the storm water drain just outside the DG room.

Energy Conservation & Efforts on Carbon Neutrality

Floor wise master list connected electrical equipment with type and energy rating (e.g. – lights, fans Single line diagram could not be evidenced to assess connected load against approved amount by CESC & floor wise load distribution. This will enable floor wise monitoring of load.

The institution may assess the equipment rating to have the baseline data for assessing energy consumption pattern.

Maximum number of electrical fans is found to be of older generation and no star ratings therefore non-energy efficient. The institution may develop a phase out plan of the same by replacing with new energy efficient fans.

High-energy consuming Incandescent lights and fluorescent lights are found in use. The institution may plan for long-term phase out plan of the same with less energy consuming LED or CFL lights.

The institution needs to evaluate power usage efficiency by suitable measurement & monitoring of (a) total connected load segregated in lighting, AC's, fans and other utilities (b) developing operational controls to switch off lights, fans and AC's when rooms / classrooms are unoccupied. Many unoccupied classrooms are found to have fans and bulbs operational. Automation / time control mechanism may be explored.

Action Taken

Both the DG sets of the college campus obtained NOC from the concerned authority. Other machines in use within the campus have least impact to air environment.

The college management is concerned for power saving. The practice of closing down instruments, fan, bulbs, computers, printers etc. is in practice among all the teachers and students. Conversion process of all the bulbs into LED is undergoing with a motto to save energy. The college is processing to install solar panels in the college campus in near future. The college has a health care centre with timely basic health inspection by government health practitioner. Fire-fighting arrangement has been installed in the college to counter adverse situation. The organization may account the carbon footprint from per capita energy consumption and other means of GHG emission. Based the baseline data the organization may set target and programmed to reduce carbon footprint.

GREEN AUDIT REPORT

AERIAL PHOTOGRAPH OF THOUBAL COLLEGE

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