

H. P. B. Girls' College, Golaghat



GREEN AUDIT REPORT



Bengenakhowa P. O., Golghat District, Assam - 785702

Telephone: 03774 295000, +919335526875

Email: hpbgc1969@gmail.com,

Website: www.hpbgirlscollege.edu.in

GREEN AUDIT REPORT

2021



INTERNAL QUALITY ASSESMENT CELL

(IQAC)

Preface

The future of humankind depends very much on our ability to change our lifestyles and agree to follow a low consumption pattern of living in terms of resources taken from the globe and return to a sustainable development path at the earliest. The world today is confronted with the great problem of environmental degradation and pollution. Climate around the world – in developed as well as developing regions – has started showing violent changes, destroying life and property and annihilating peaceful living conditions. Man's quest for economic development and the rapid urbanization at local, regional and global level has led to several environmental and ecological crises.

The opportunity to restore nature to its prolonged state of hosting life forms to flourish under its caring environs is according to scientists, very short and lasting only up to 2030. Within this time, with the willing actions of every citizen wherever they are, coordinated and directed actions should start and continue thereafter till a balancing stage is reached where moderate use of resources and mitigation actions for healing the hurts already inflicted, balance positively to a sustainable nature. If we do not start action now, the situation may go out of control and when our grandchildren reach adulthood; their chances of survival will be very bleak.

Life expectancy of those few who survive will be much shorter than what we have now. This is something we all agree to avoid. The students who are in schools and colleges now are to be the enlightened leaders of immediate tomorrow. Our national educational authorities, as in most developed countries, therefore insist that every student in our country should learn how damages to the environment occur and how to avoid such situations, emphasizing more on possible remedial measures. This green education should start from schools and colleges, and the insistence on Green Audit of higher education institutions on an annual basis is to make students and staff well informed of the extent of ecological footprints each one creates, as well as on which areas one should concentrate to make his or her environs greener than before.

On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric CO₂ from the environment. The National Assessment and

Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures.

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of institute. It aims to analyse environmental practices within and outside of the concerned place, which will have an impact on the eco-friendly atmosphere. Green audit is a valuable means for a college to determine how and where they are using the most energy or water or other resources; the college can then consider how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The 2021 Green Audit report of H. P. B. Girls' College is prepared in such a manner that it can educate every stakeholder of the institution, on the major contributors tending to destroy and on every step helpful to restore, leading to further flourishing of its green status. A brief presentation of the contents of this report by the teachers to the other stakeholders would help in getting every one of them to start taking further steps to achieve a 'brighter shade of green' for his or her campus and the region.

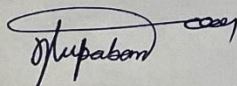
Audit team

Green Audit- Hemo Prova Borbora Girls' College, Golghat

Certificate

This is to certify that Green Audit for Hemo Prova Borbora Girls' College, Golaghat has been conducted in the month of October-November 2021 to assess institutional performance against its environmental policies and objectives and its impact on the environment which include Flora and Fauna, Water etc . Further, it is certified that assessment has been made on the original data collected on site and verified by green auditing team for validity and reliability. Photographs and data are genuine and are taken directly by the audit team or indirectly provided by the internal audit team.

External Auditors:

1. 

(Mr. Ritupaban Borah)

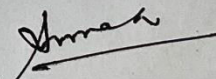
Assistant Conservator of Forest

Department of Forest, Golaghat Division, Assam

**Assistant Conservator of Forest
Golaghat Division**

Date : 23/12/2021

2.



(Dr. Roshan Sarmah,)

Assistant Professor

Department of Botany

Debraj Roy College, Golaghat, Assam

DR. R. SARMAH
Assistant Professor
Department of Botany
D.R. College, Golaghat, Assam

Internal Audit Team

Sl. No	Name		Designation
1.	Dr. Sunil Handique	Convenor	Assistant Professor, Department of Assamese
2.	Dr. Palash Handique	Advisor	IQAC Coordinator, Assistant Professor, Department of Economics
3.	Dr. Bulbuli Baruah	Member	Associate Professor, Department of Political Science
4.	Dr. Dibya Jyoti Borah	Member	Assistant Professor, Department of English
5.	Mr. Mohendra Doley	Member	Assistant Professor
6.	Dr. Rashmi Buragohain	Member	Assistant Professor, Department of Assamese
7.	Mr. Mongolsing Rongphar	Member	Assistant Professor, Department of English
8.	Mr. Wasim Khan	Member	Assistant Professor
9.	Swastika Devi Chandrawali	Member	President, Students' Union
10.	Ankita Sharma	Member	Social Service Secretary, Students' Union

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1. HEMO PROVA BORBORA GIRLS' COLLEGE AT GLANCE

Hemo Prova Borbora Girls' College, Golghat has long been recognized as a premier institution of higher learning for women in the district of Golaghat. Established in the year 1969 the college is the only girls' college in the district and has been a centre for academic excellence and achievement since its inception. In the process of establishing the college noble-minded donor, the late Alok Chandra Borbora came forward and provided an amount of Rs 70000/- in the glorious memory of his late mother Hemo Prova Borbora. It is today one of the finest institutions for Humanities and Social Sciences, while also offering Vocational and Add-on courses like Fundamentals of Indian Equity Market, Gender Studies, Poly-House, Self-Defence, Fundamentals of Yoga, and Improvement of Communication Skills Through Mother Tongue are among its strengths. Located at the cutting edge of knowledge, HPB Girls' College has not just kept pace with the changing world but has been the pioneering spirit behind many innovations in the field of education. The striving is to imbue the teaching/learning process with a unique blend of intellectual rigour and aesthetic and ethical engagement.

The prime objective of establishing the college was to foster the advancement of higher Education among females in the rural areas of Golaghat District. The first batch started in the Boarding House of Golaghat Government Bezbaruah Higher Secondary School on 22.07.1969. Thus it had a humble beginning with only twenty six girl students. Later the college was shifted to its present place where it has been growing with permanent structures. The college is permanently affiliated to Dibrugarh University as well as registered under UGC 2 (f) and 12 (B) vide letter No. 825/78 CP dated 19.01.1978 of University Grants Commission. It has made significant strides in its development to become one of the leading colleges in the district imparting instructions in almost all arts subjects at Higher Secondary and Undergraduate levels including Major Courses.

The College has seen remarkable growth over the years and today it is not only one of the most distinguished higher educational institutions in the district, but is also, by many accounts, the college of first choice in many subjects. It boasts of an accomplished faculty of thirty one members, and almost Fifteen Hundred students. The College is also proud of its efficient and

very supportive non-academic staff. The College also has a rich collection of books and journals in its library, the NSS and NCC Rooms, etc. spread over 14.19 acres of land, the College premises are housed in one of the most beautiful locations of Golaghat, well connected by road and train.

At HPB the belief is in a holistic vision that never discounts the past, but at the same time embraces the future with unwavering confidence in the ability to shape it and harness its potentialities. The aim of the institution was to provide access to higher education of quality to women.

The college is committed to nurturing and creating women who are equipped to be world citizens. H. P. B. students understand that with the power of knowledge, comes the responsibility to translate it into creative citizenship. They recognize challenges as opportunities. The students are empowered with professional competence, an ability to assume positions of leadership with ease and shatter inhibitory glass ceilings.

The college campus is well known for its mesmerizingly beautiful landscape, a vast sports ground, and two women hostels which can accommodate nearly 200 students. It also has one finest auditorium in Golaghat, a modernized conference room, a high-tech Gym and a well-equipped indoor stadium. The College provides liberal, lively and Competitive environment enabling students to carve out a niche for themselves in their chosen arenas. Besides the infrastructural facilities, the strength of the College lies in its congenial and enriching atmosphere, which plays a crucial role in maintaining the excellent record the College is renowned for. Generations of students who have been groomed in this College have excelled in different walks of life, with the years spent in the College providing them a solid foundation on which they could craft their success. The College has celebrated its golden jubilee year in 2019. The National Assessment and Accreditation Council (NAAC) visited the college in 2012 and accredited it with a high "B" Grade (2.71 CGPA).

2. TOTAL CAMPUS AREA AND COLLEGE BUILDING SPREAD AREA

1.	Campus Area	14.89 acres
2.	Built area	11,372 Sq m.

3. PREVIOUS NAAC GRADING

Sl. No	Phase	Grade	CGPA	Year of Accreditation	Accreditation Period
1.	1 st Phase	B		2003	2003-2008
2.	2 nd Phase	B	2.71	2012	2012-2017
3.	3 rd Phase	ongoing			

4. CAMPUS INFRASTRUCTURE



Fig 1 Master plan of the college campus

Sl. No	Name of Building	Purpose
1.	Administrative cum Library Building	Providing modern administrative facilities and digitally equipped well spacious library
2.	Examination control Room	Providing examination related activities

3.	Girls' Hostel No. 1	Providing residential facilities for the students
4.	Girls' Hostel No. 2	Providing residential facilities for the students(outstation students)
5.	Auditorium Hall	Common functions
6.	DELC Building	Providing teaching and learning facilities
7.	Open Stage	Performing various cultural activities
8.	Students Parking lot	Parking students' vehicles
9.	Security cum Generator room	For uninterrupted power supply and security restroom
10.	Parking lot for Teachers	Parking bikes and bicycles
11.	Parking lot for Principal	Parking bike and car
12.	Canteen cum Guest House	Food and snacks for stakeholders and room for guests
13.	Academic Building 1	Providing teaching and learning facilities
14.	New Girls' Common Room	Rest room for girls
15.	Old Girls' Common Room	Rest room for girls
16.	Academic Building 2 Cum Conference Hall	Providing teaching and learning facilities and for organizing seminar, workshop etc
17.	KKHSOU Office	Teaching and learning facilities
	Old Library Building cum ACTA office	For classes and examinations
18.	Indoor Stadium	Indore games
19.	Academic Building 3	Providing teaching and learning facilities
20.	Academic Building 4	Providing teaching and learning facilities
21.	Water Faucets	Provision for water supply



Fig 2 Aerial View of the college campus

(Source Google Earth)

5. AUGMENTED INFRASTRUCTURE DURING POST RE-ACCREDITATION PERIOD

Sl. No	Augmented Infrastructure	Purpose of the building	Amount in Rs
1.	Indoor Stadium	Providing infrastructure for various indoor games like table tennis, badminton, yoga ,gymnasium etc.	70,00000
2.	Canteen cum Guest	Providing Canteen facilities for	30,00000

	house	students, faculties and staff and also providing accommodation for the guest.	
3.	Girls' Common room	Providing modern facilities with disabled friendly bathrooms and office of the Students' Union body	25,00000
4.	Home Science laboratory	Providing modern laboratory facilities for Home science students	20,00000
5.	Education laboratory and departmental classroom	Providing modern laboratory as well as ICT based classroom for the students of Education departments	25,00000
6.	Four No's of classroom (Top floor)	Providing ICT based classroom for all the students	30,00000
7.	Administrative and Library building	Providing modern administrative facilities and digitally equipped well spacious library	1,0000000

6. OBJECTIVES OF THE GREEN AUDIT:

In recent time, the Green Audit of an institution has been becoming a paramount important for self-assessment of the institution which reflects the role of the institution in mitigating the present environmental problems. The college has been putting efforts to keep our environment clean since its inception. Therefore, the purpose of the present green audit is to identify, quantify, describe and prioritize framework of Environment Sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out Green Audit are:

1. To map the Geographical Location of the college
2. To document the ambient environmental condition of weather, air, water and noise of the college

3. To document the waste disposal system
4. To estimate the Energy requirements of the college
5. To document the floral and faunal diversity of the college
6. To report the expenditure on green initiatives during the last five year.
7. To document the quality drinking water
8. The document the quality of recycled waste water.
9. To document the solid Waste disposal system.

7. METHODOLOGY

The purpose of the green audit of H. P. B. Girls' College is to ensure that the practices followed in the campus are in accordance with the Green Policy of the country. The methodology includes: collection of data, physical inspection of the campus by the expert teams, observation and review of the documentation and data analysis.

8. NATURAL ENVIRONMENT – GREEN AUDIT

8.1. 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 H. P. B. Girls' College. It included meeting with the Principal, IQAC coordinator, teachers in charge of different green activities of the campus and students representing different departments. 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.

8.2. 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 foot print was analysed under different titles and sub-titles. This was based on the parameters identified. The questionnaire was comprehensive covering qualitative and quantitative dimensions.

8.3. 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 coordinator and Bursar was done to finalise the plans.

8.4. Findings and analysis

H. P. B. Girls' College is spread over 14.89 acres of land with a built up area of 11372 Sq. Mtrs. The entire campus is surrounded by greenery on all side with variety of trees, bushes and grass. The fauna and flora are very rich and the buildings in the campus are constructed with minimum disturbance to this lingering greenery. The trees of the college have increased the quality of life, not only for the college fraternity but also the people around of the college in terms of contributing to our environment by providing oxygen, improving air quality, climate amelioration, conservation of water, preserving soil, and supporting wildlife, controlling climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun's radiant energy, keeping things cool in summer. Many species of birds are dependent on these trees mainly for food and shelter. Nectar of flowers and plants is a favorite of birds and many insects. Leaf – covered branches keep many animals, such as birds and squirrels, out of reach of predators. Different species display a seemingly endless variety of shapes, forms, texture and vibrant colours. Even individual trees vary their appearance throughout the course of the year as the seasons change. The strength, long lifespan and regal stature of trees give them a monument – like quality. They also remind us the glorious history of our institution in particular. We often make an emotional connection with these trees and sometime become personally attached to the ones that we see every day. A thick belt of large shady trees in the periphery of the college have found to be bringing down noise and cut down dust and storms. Thus, the college has been playing a significant role in maintaining the environment of the entire Ludhiana town in its surrounding areas

In subsequent greening efforts, the initiative of labeling the trees with their botanical names and names in local language was continued and more number of trees added to enrich the biodiversity of the campus. This activity was carried out by Campus development Cell (CDC) along with the faculty members of Botany Department (Adhoc). The labeling process is now completed; but, with several trees grown up with added standing biomass, the bigger trees will

have to be measured at breast height and tree data entered in a register. This activity will be taken up by the same.

8.5.Garden

H. P. B. Girls' College is located in a peri-urban area where students from both rural and urban enroll for the course offered by the college. The geographical location of the college provides an aspect of lovely greenery campus. In addition to the natural greenery the college also has gardens, looked after and nurtured by the staffs under the aegis of College Campus Development Committee (CDC). Students 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 Botany (HS) and Environmental studies. Table 1 is the data of campus flora.

Floral Diversity in H.P.B Girls' College Campus

SI No	Common Name	Botanical name	Family
Group : Angiosperm and Gymnosperm			
1	Guava <i>Modhuri</i>	<i>Psidium guajava</i> L.	Myrtaceae
2	Papaya <i>Amita</i>	<i>Carica papaya</i> L.	Caricaceae
3	Eucalyptus	<i>Eucalyptus maculate</i> Hook.	Myrtaceae
4	Mango <i>Aam</i>	<i>Mangifera indica</i> L.	Anacardiaceae
5	Champak <i>Titachapa</i>	<i>Magnolia champaca</i> (L.)	Magnoliaceae
6	Arjuna	<i>Terminalia arjuna</i> (Roxb.ex DC)	Combretaceae

7	Kadam	<i>Anthocephalus cadamba</i> (Roxb.)	Rubiaceae
8	Krishnachura	<i>Delonix regia</i> (Hook.) Raf.	Fabaceae
9	Jackfruit <i>Kothal</i>	<i>Atrocarpus heterophyllus</i> Lam	Moraceae
10	Date palm <i>Khejuri</i>	<i>Phoenix dactylifera</i> L.	Arecaceae
11	Rangal	<i>Ixora coccinea</i> Comm.ex.Lam	Rubiaceae
12	Acacia	<i>Acacia auriculiformis</i> Benth.	Fabaceae
13	Monkey Puzzle Tree <i>Araucaria</i>	<i>Araucaria araucana</i> (Molina) K.Koch	Araucariaceae
14	Indian bael <i>Bel</i>	<i>Aegle marmelos</i> (L)	Rutaceae
15	Litchi	<i>Litchi chinensis</i> Sonn.	Sapindaceae
16	Teak <i>Chegun</i>	<i>Tectona grandis</i> L.f	Lamiaceae
17	Rusty kamala <i>Morolia</i>	<i>Mallotus tetracoccus</i> (Roxb.)Kurz	Euphorbeaceae
18	Chebulic Myrobalan <i>Hilikha</i>	<i>Terminalia chebula</i> Retz	Combretaceae
19	Bual	<i>Litsea monopetala</i> (Roxb.)	Lauraceae
20	Blackboard tree <i>Chotiyona</i>	<i>Alstonia scholaris</i> (L)	Apocynaceae
21	Coconut Narikol	<i>Cocos nucifera</i> L.	Arecaceae
22	Neem Maha Neem	<i>Azadirachta indica</i> A.Juss.	Meliaceae
23	Chinaberry Ghuraneem	<i>Melia azedarach</i> L.	Meliaceae
24	Cassia tree Bor medelua	<i>Senna siamea</i> Lam.	Fabaceae
25	Japanee Ajar	<i>Lagerstroemia indica</i> L.	Lythraceae
26	Ajar	<i>Lagerstroemia speciosa</i> L.	Lythraceae
27	Night flowering Jasmine <i>Hewali</i>	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae

28	Powder puff	<i>Calliandra haematocephala</i> Hassk.	Fabaceae
29	Cycas	<i>Cycas pectinata</i> Buch.-Ham.	Cycadaceae
30.	Paniyal	<i>Flacourtia jangomas</i> (Lour.)Raeusch	Salicaceae
31.	Silver oak	<i>Grevillea robusta</i> A.Cunn.	Proteaceae
32.	Gamhar <i>Gamari</i>	<i>Gmelina arborea</i> Roxb.	Lamiaceae
33,	East Indian Ebony <i>Kendu</i>	<i>Diospyros melanoxylon</i> Roxb.	Ebenaceae
34.	Jam <i>Jamu</i>	<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae
35.	Pani Jamuk	<i>Syzygium jambos</i> (L.) Alston	Myrtaceae
36.	Agar plant <i>Sasi</i>	<i>Aquilaria malaccensis</i> Lam.	Thymelaeaceae
37.	Weeping fig <i>Nahori bor</i>	<i>Ficus benjamina</i> L.	Moraceae
38.	Fig tree <i>Dimoru</i>	<i>Ficus hispida</i> L.f	Moraceae
39.	frangipani <i>Gulanch</i>	<i>Plumeria rubra</i> L.	Apocynaceae
40.	Drumstick tree <i>Sojina</i>	<i>Moringa oleifera</i> Lam.	Moringaceae
41.	Rainbow shower tree <i>Bilati hunaru</i>	<i>Cassia javanica</i> L.	Fabaceae
42.	Amla <i>Amlokhi</i>	<i>Phyllanthus embelica</i> L.	Phyllanthaceae
43.	Needlewood tree <i>Nogaver</i>	<i>Schima wallichii</i> Choisy	Theaceae
44.	Betel palm <i>Tamul</i>	<i>Areca catechu</i> L.	Arecaceae
45.	Snow in summer (<i>Melaleuca</i>)	<i>Melaleuca linariifolia</i> Sm.	Myrtaceae
46	Golden shower Tree <i>Hunaru</i>	<i>Cassia fistula</i> L.	Fabaceae

47.	Tamarind <i>Teteli</i>	<i>Tamarindus indica</i> L.	Fabaceae
48.	Castor oil plant <i>Era</i>	<i>Ricinus communis</i> L.	Euphorbiaceae
49.	Crepe jasmine <i>Kothona</i>	<i>Tabernaemontana divaricata</i> (L)	Apocynaceae
50.	Duranta	<i>Duranta repens</i> L	verbenaceae
51.	Curry tree <i>Narahingha</i>	<i>Murraya koenigii</i> (L.) Spreng	Rutaceae
52.	Glory bower <i>Dhopat tita</i>	<i>Clerodendrum infortunatum</i> L	Lamiaceae
53.	Croton Patabahar	<i>Codiaeum variegatum</i> (L) Rumph.ex A.Juss	Euphorbiaceae
54.	Jujube <i>Bogori</i>	<i>Ziziphus jujube</i> Mill	Rhamnaceae
55.	Devdaru	<i>Polyalthia longifolia</i> (sonn.) Thwaites	Annonaceae
56.	Knanchan	<i>Bauhinia purpurea</i> L.	Fabaceae
57.	Turkey berry <i>Hativekuri</i>	<i>Solanum torvum</i> Sw.	Solanaceae
58.	Ringworm bush Khorpat	<i>Senna alata</i> (L). Roxb.	Fabaceae
59.	Hairy fig Khongal dimoru	<i>Ficus hirta</i> Vahl	Moraceae
60.	Carambola Fruit Kordoi	<i>Averrhoa carambola</i> L	Oxalidaceae
61.	Purja	<i>Ehretia acuminata</i> R.Br	Boraginaceae
62.	Varuna Borun	<i>Crataeva nurvala</i>	Capparaceae
63.	Rattan Betgos	<i>Calamus Flagellum</i> Griff.ex Mart	Arecaceae
64.	Mahi- Thekera	<i>Carallia brachiata</i> (Lour.)	Rhizophoraceae
65.	Siamee Rough Bush <i>Houragos</i>	<i>Streblus asper</i> Lour.	Moraceae
66.	Antique spurge <i>Hiju</i>	<i>Euphorbia antiquorum</i> L.	Euphorbiaceae
67.	Indian coral Tree <i>Modar</i>	<i>Erythrina variegata</i> L.	Fabaceae
68.	Pomelo <i>Bortenga</i>	<i>Citrus maxima</i> (Burm). Merr	Rutaceae
69.	custard apple	<i>Annona reticulata</i> L.	Annonaceae

	<i>Atlas</i>		
70.	Mulberry <i>Nuni</i>	<i>Morus alba</i> L.	Moraceae
71.	Baghnola	<i>Actinodaphne bourdillonii</i> Gamble.	Lauraceae
72.	Gohora	<i>Premna bengalensis</i> C.B.Clarke	Lamiaceae
73.	Chacheni	<i>Eurya acuminata</i> DC.	Pentaphragaceae
74.	Golden trumpet <i>Lota</i> <i>korobi</i>	<i>Allamanda cathartica</i> L.	Apocynaceae
75.	Bush allamanda	<i>Allamanda schottii</i> Pohl	Apocynaceae
76.	Climbing Croton <i>Lota mahudi</i>	<i>Croton caudatus</i> Geiseler	Euphorbiaceae
77.	Ou -Lota	<i>Tetracera sarmentosa</i> (L) Vahl	Dilleniaceae
78.	Cobra saffron <i>Nahor</i>	<i>Mesua ferrea</i> L.	Calophyllaceae
79.	Banana <i>Kol</i>	<i>Musa balbisiana</i> Colla	Musaceae
80	Night blooming Jasmine <i>Hasnahana</i>	<i>Cestrum nocturnum</i> L.	Solanaceae
81.	Tejpat	<i>Cinnamomum</i> <i>tamala</i> (Buch.- Ham.)	Lauraceae
82.	Jalpai	<i>Elaeocarpus serratus</i> L.	Elaeocarpaceae
83	Chika morolia	<i>Alangium chinense</i> (Lour).Harms	Cornaceae
84	Beautyberry <i>Tongloti</i>	<i>Callicarpa macrophylla</i> Vahl	Lamiaceae
85	Common Lantana <i>Gu ful</i>	<i>Lantana camara</i> L.	Verbenaceae
86	Indian rhododendron, <i>Futukola</i>	<i>Melastoma</i> <i>malabathricum</i> L.	Melastomataceae
87.	Orange Jessamine <i>Kamini kanchon</i>	<i>Murraya paniculata</i> L.	Rutaceae
88.	Ramdatun <i>Tikoni borua</i>	<i>Smilax perfoliata</i> Lour.	Smilacaceae
89.	flaming glorybower	<i>Clerodendrum splendens</i> G.Don	Lamiaceae

90.	Piper	<i>Piper thomsonii</i> (C. DC.) Hook. fil.	Piperaceae
91.	Flamevine <i>Niyor maloti</i>	<i>Pyrostegia venusta</i> (ker gawl.) Miers	Bignoniaceae
92.	Garlic vine <i>Nohoru lota</i>	<i>Mansoa alliacea</i> (Lam.) A.H.Gentry	Bignoniaceae
93	Day blooming Jasmine	<i>Cestrum diurnum</i> L.	Solanaceae
94	Royal palm	<i>Roystonea regia</i> (Kunth)	Arecaceae
95	Madagascar Periwinkle <i>Nayantora</i>	<i>Catharanthus roseus</i> L.	Apocynaceae
96	Bamboo (Jati bah)	<i>Bambusa tulda</i> Roxb.	Poaceae
97	Many-Flowered Ixora	<i>Ixora polyantha</i> Wight	Rubiaceae
98	Luck plant <i>Hukloti</i>	<i>Flemingia strobilifera</i> (L.) W.T.Aiton	Fabaceae
99	Chickweed <i>Gundhua bon</i>	<i>Ageratum conyzoides</i> L	Asteraceae
100	Tulsi	<i>Ocimum sanctum</i> Linn	Lamiaceae
101	asthma-plant <i>Gakhiroti bon</i>	<i>Euphorbia hirta</i> Linn	Euphorbiaceae
102	sickle senna <i>Medelua</i>	<i>Senna tora</i> (L.) Roxb	Fabaceae
103	Oldenlandia <i>Bonjaluk</i>	<i>Hedyotis diffusa</i> Wild	Rubiaceae
104	<i>Durun bon</i>	<i>Leucus aspera</i> Wild	Lamiaceae
105	Colombian waxweed <i>Panijetuka</i>	<i>Cuphea carthagenensis</i> (Jacq.)	Lythraceae
106	Crotalaria <i>Ghontakorno</i>	<i>Crotalaria pallida</i> Aiton	Fabaceae
107	little ironweed <i>Hohodevi bon</i>	<i>Cyanthillium cinereum</i> (L.) H.Rob.	Asteraceae
108	Shaggy Button Weed <i>Gahori bon</i>	<i>Spermacoce hispida</i> · L	Rubiaceae
109	fountain bush <i>Nangol vonga</i>	<i>Rotheca serrata</i> L	Lamiaceae
110	Cow grass <i>Dolisa bon</i>	<i>Axonopus compressus</i> (Sw.) P.Beauv.	Poaceae

111	The nut grass Keya bon	<i>Cyperus rotundus</i> L.	Cyperaceae
112	Bonguti	<i>Chrysopogon aciculatus</i> Retz.	Poaceae
113	Barmuda grass Dubori bon	<i>Cynodon dactylon</i>	Poaceae
114	Gale of the wind Bon amlokhi	<i>Phyllanthus niruri</i>	Phyllanthaceae
Group ; Pteridophyta			
115	Nodding Clubmoss	<i>Lycopodium cernuum</i> L	Lycopodiaceae
116	Maidenhair creeper	<i>Lygodium flexuosum</i> Linn.	Lygodiaceae
117	Japanese climbing fern	<i>Lygodium japonicum</i> (Thunb)	Lygodiaceae
118	Deer fern	<i>Struthiopteris spicant</i> L.	Blechnaceae
119	Parastic maiden fern Bihlongoni	<i>Christella parasitica</i> (L.) H.Lé	Thelypteridaceae
120	<i>Dhekia</i>	<i>Diplazium esculentum</i> Retz.	Athyriaceae

Timber yielding plants:

SL no	Common name	Botanical name
1	Eucalyptus	<i>Eucalyptus maculate</i> Hook.
2	Mango Aam	<i>Mangifera indica</i> L.
3	Champak Titachapa	<i>Magnolia champaca</i> (L.)
4	Eucalyptus	<i>Eucalyptus maculate</i> Hook.
5	Kadam	<i>Anthocephalus cadamba</i> (Roxb.)
6	Teak Chegun	<i>Tectona grandis</i> L.f
7	Needlewoodtree Nogaver	<i>Schima wallichii</i> Choisy
8	Gamhar Gamari	<i>Gmelina arborea</i> Roxb.
9	Ajar	<i>Lagerstroemia speciosa</i> L.

Table 2. Campus Fauna

SI No	Types	Number of Species	Name of Species
1	Mammal	05	<i>Macaca mulata</i> Bandor
			<i>Rattus sp.</i> Nigoni
			<i>Herpestes javanicus</i> Neul
			<i>Pteropus giganteus</i> Baduli
			<i>Funambulus palmarum</i> Kerketua
2.	Bird	10	<i>Bubulcus ibis</i> Bogoli
			<i>Amaurornis phoenicurus</i> Dauk
			<i>Ardeola grayii</i> Kona musori
			<i>Passer domesticus</i> Ghorsirika
			<i>Phalacrocorax fuscicollis</i> Pani kauri
			<i>Eudynamys scolopaceus</i>

			<i>Kuli</i>
			<i>Dendrocygna javanica</i> <i>Horali hah</i>
			<i>Corvus splendens</i> <i>Kauri</i>
			<i>Psittacula krameri</i> <i>Bhatou</i>
			<i>Dicrurus macrocercus</i> <i>Fesu</i>
	Migratory Birds	10	<i>Cuculus micropterus</i> <i>Keteki</i>
			<i>Todorna ferruginea</i> <i>Chakoi chokua</i>
			<i>Anas acuta</i> <i>Nejal hah</i>
			<i>Pandion haliaetus</i> <i>Kuruwa</i>
			<i>Lanius schach</i> <i>Erakhati</i>
			<i>Motacilla citreola</i> <i>Balimahi</i>
			<i>Chlidonias hybrid</i> <i>Gonga siloni</i>
			<i>Actitis hypoleucos</i> <i>Balikhusora</i>
			<i>Saxicola maurus</i> <i>Hilkatora</i>
			<i>Coracina melaschistos</i> <i>Kuli Erakhati</i>
3	Amphibian	03	<i>Hoplobatrachus tigerinus</i> <i>Bamun vekula</i>

			<i>Duttaphrynus melanostictus</i> <i>Suk vekuli</i>
			<i>Euphlyctis cyanophlyctis</i>
4	Snake	04	<i>Bungarus fasciatus</i> <i>Hoksu hap</i>
			<i>Enhydris enhydris</i> <i>Dhura hap</i>
			<i>Lycodon aulicus</i> <i>Maroli hap</i>
			<i>Ptyas mucosa</i> <i>Musuagum</i>
5	Lizard	02	<i>Eutropis carinata</i>
			<i>Sphenomorphus macculatus</i>
6	Butterfly	06	<i>Junonia atlites</i>
			<i>Junonia almana</i>
			<i>Catopsilia pomona</i>
			<i>Papilio polytes</i>
			<i>Eurema hecabe</i>
			<i>Ypthima huebneri</i>
7.	Fish	14	<i>Puntius sophore</i> <i>Puthi</i>
			<i>Rasbora daniconius</i> <i>Donikona</i>
			<i>Anabas testudineus</i> <i>Kawoi</i>
			<i>Ophiocephalus punctatus</i> <i>Goroi</i>
			<i>Labeo rohita</i>

			<i>Rou</i>
			<i>Clarias batrachus</i> <i>Magur</i>
			<i>Catla catla</i> <i>Bahu</i>
			<i>Heteropneustes fossilis</i> <i>H</i>
			<i>Systemus sarana</i> <i>Cheniputhi</i>
			<i>Amphipnous cuchia</i> <i>Kuchia</i>
			<i>Labeo gonius</i> <i>Kuhi</i>
			<i>Amblytharyngodon mola</i> <i>Mua</i>
			<i>Wallago attu</i> <i>Borali</i>
			<i>Mystus tengara</i> <i>Hingora</i>
			<i>Ophiocephalus orientalis</i> <i>Chengeli</i>

Herbal Garden: Herbal gardens refer to growing of medicinal and aromatic plants which are having preventive and curative properties against diseases or ailments. Our college has a well maintained herbal garden with about 30 species of plant that are maintained properly. This helps the students to see and learn about the plants in their natural habitat. List of plant species found in the herbal garden of the college are given below.



Fig: Herbal Garden

Species of Herbal Garden

SL.No	Local Name	English Name	Scientific Name
1	এল'ভৰো	Aloe vera	<i>Aloe barbadensis</i> miller
2	মচন্দৈ	Bishop's Weed	<i>Houttuynia cordata</i> Thunb.
3	শগুণীলতা	Xaguni lataa	<i>Tinospora crispa</i> (L.)Hook
4	গাঠিয়ন	Gathiyani	<i>Kaempferia galanga</i> L
5	গাখীৰতী	Gakhiyati	<i>Pouzolzia zeylanicaa</i> (L.)
6	কৰ্ফুল	Karphul	<i>Hornstedtia linguiformis</i> (Schult) K.Schum
7	আগিয়াচতি/আগচেতি	Indian Pivet	<i>Plumbago zeylanica</i> L.
8	শতমূল	Shatamull	<i>Asparagus racemosus</i> Willd.
9	মৌ তুলসী	Sweet honey leaf	<i>Stevia rebaudiana</i>
10	ক'লীয়া তুলসী	Holy Basil	<i>Ocimum tenuiflorum</i>
11	বশিল্যকৰণী	Bixlyakarani	<i>Alternanthera bettziekiana</i>
12	নফোঁফু	East Indian Glory Bower	<i>Clerodendrum gladulosum</i> Coleb.
13	হাঁড়জোৰা লতা	Veldt grape	<i>Cissus quadrangularis</i> L.
14	মহাভৃংগৰাজ	Pilabhamgara	<i>Wedelia chinensis</i> (Osb.)Merr.
15	চৰিতা	Chirata	<i>Swertia chirayita</i> (Roxb.ex Flaming)
16	বচ	Calamus	<i>Acorus calamus</i> L.
17	ৰুপহী ঠকেৰো	Rupohi Thekera	<i>Garcinia lanceafolia</i> Roxb.
18	ৰাম তুলসী	Sweet basil	<i>Ocimum basilicum</i> L.
19	ততিফুল	Nongmangkha	<i>Phlogacanthus thyriformis</i> Mabb.
20	বগা বাহক	Malabar nut	<i>Jasticia adhatoda</i> L.
21	বন নহৰু	Ban Naharu	<i>Crinum pratens</i> Herb.
22	বৰ মানমিনি	Bar Manimuni	<i>Centella asiatica</i> (L.)Urban
23	সৰু মানমিনি	Xaru Manimuni	<i>Hydrocotyle sibthorpioides</i> Lamk.
24	শুহনি	Xuhani	<i>Spilanthes paniculata</i> Wall. Ex DC
25	দোৰোণ বন	Doron ban	<i>Leucas cephalotes</i>
26	পদনি	Mint	<i>Mentha arvensis</i>

8.5.1. Polyhouse Cultivation

Add-on course on Poly-House aided by Agriculture Department Govt. of Assam was offered and completed by the Department of Political Science in association with Agriculture University as a part of MoU signed between the stakeholders. The course on Polyhouse envisages growing crops under controlled environment such as temperature, humidity, and fertilizers which is the ultimate objective of the farming system. The course Polyhouse, the future of farming in India, was offered with an objective to create awareness among the students about the traditional cultivation in open field, which is a risk due to the unpredictability climate and condition and exposure to insects and pest.

With the changing of weather and robust rocketing of temperature due to extensive farming in the Northeast India, introduction of Polyhouse to the college fraternity and eventually the society through students would help them educate about less destructive farming.



Fig: Polyhouse

8.5.2. Green House

H. P. B. Girls' College is committed to all round development of the students. To create awareness and ideas about less land and productive agriculture the college has built up Greenhouse. Keeping in mind that Greenhouse for colleges and projects can be a simple facility in which students or members of the group can explore with handling crop variations and cross-pollination, cooling and heating, etc. as understanding the wonders and law of nature is the focus of environmental study. Greenhouse also improves the physical, mental, and personal well-being, of students and or members of the group. Being inside the garden provides satisfaction and a better quality of life. Students through the Greenhouse cultivation will be made aware of the things happening in the world today like climate changes, global warming, and the way it affects plants. Learning about plants' reactions to light, heat, and cold and the measures to counter them with the use of the greenhouse are invaluable lessons for all students.

Greenhouse in the college was built in the year 2020 since then; there are vibrant activities in it. The greenhouse was built with an aim to educate students as well as to generate resources and revenue for the college. Currently, it is maintained under the supervision of Mr. Monjit Gohain, Assistant Professor, Department of Political Science.



Fig: Greenhouse

8.5.3. Best Practices: Swaach aru Seujia HPB (Clean and Green HPB)

1. Title of the Practice:

Swaach aru Seujia HPB (Clean and Green HPB)

Goal:

- (a) To make campus eco-friendly
- (b) To sensitize the students as well as teachers about the importance of clean and green campus.
- (c) To reduce carbon footprint in the college.
- (d) To send message about the importance of improving the health of the Mother Earth.

2. The Practice:

The IQAC prepares a schedule for each department to clean the campus on a rotation basis for a period of one week. Departments are required to clean and sanitize the campus with the help of student and staff. Faculty members are required to participate actively with full devotion. An initiative has also been initiated by IQAC to ban entry of vehicles in the campus on every second and fourth Saturday of a month. This practice has been considered as a robust step to curb the carbon footprint in the college campus.

Evidence of Success:

- (a) This practice helps to make the college campus clean and green.
- (b) It seems that students are very much aware about their social responsibility towards cleanliness.
- (c) Noise level and busy vehicles movement is heard and seen less on these days.
- (d) Teaching and Students fraternity responded positively to the steps and willingness to render service to Mother Earth has been noticed.

3. Problems Encountered and Resources Required:

Due to summer and winter vacations students and teachers remain absent in the month of July and December. So, this practice has not been realized during these two months. So, additional external man forces are required during these periods so that the goal of clean college and green college can be realized throughout the year.

8.5.4. Awareness programs

Environment related (Observation of environment days)



Fig: Environmental day celebration

8.5.5. Plantations



Fig: Green College Project



Fig: Green College Project

8.5.6. Campaign



Fig: Cleanliness campaign



Fig: Cleanliness campaign

9. RENEWABLE SOURCE OF ENERGY

The College has started to adopted renewable source through its humble beginning. It has been decided that number of solar street lights will be increased and photovoltaic cell will be installed in the coming years in order to mitigate the use of nonconventional source of energy in the campus. Currently, the college has 3 Nos of Solar street lights. It has been suggested to the management to switch gradually to renewable energy.

10. COOKING ENERGY SAVINGS

The team examined the energy requirements in the hostel kitchen and checked for any energy leakages. While electricity is used for refrigeration, cooking energy for the meals, tea & coffee making etc. comes from LPG (19 kg) cylinders and a kiln fired by firewood. The steam produced from this biomass route is piped to various cooking units. At present, annual biomass fuel (firewood) required is 1100 kg (~1.1 Tonne/year) which is generated from the college

campus itself. Further it was also suggested that a project report can be prepared that will advice the authorities to reduce the purchase of firewood and LPG through a very efficient and systematic cooking by the cooks in the hostel.

11. CARBON FOOTPRINT AUDIT

Climate change is one of the most important challenges facing mankind. Government is embarking upon a series of measures to reduce greenhouse gas (GHG) emissions. These include promoting use of cleaner energy and renewable energy, improving energy efficiency and energy conservation, encouraging greening and raising public awareness.

To reduce GHG emissions arising from electricity consumption in institutions, buildings etc, it is believed that an important step which could be taken by stakeholders is to find out the amount of GHG released to the atmosphere arising from the operation of their buildings and to take appropriate actions to reduce such emissions through Carbon Audit. Carbon Audit is a means of measuring and recording the GHG emissions of an organization or building within a defined system boundary.

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. Carbon Footprint in the college was done using a detailed questionnaire to know the amount of Carbon footprint and to curb the issues for a better clean and green campus.

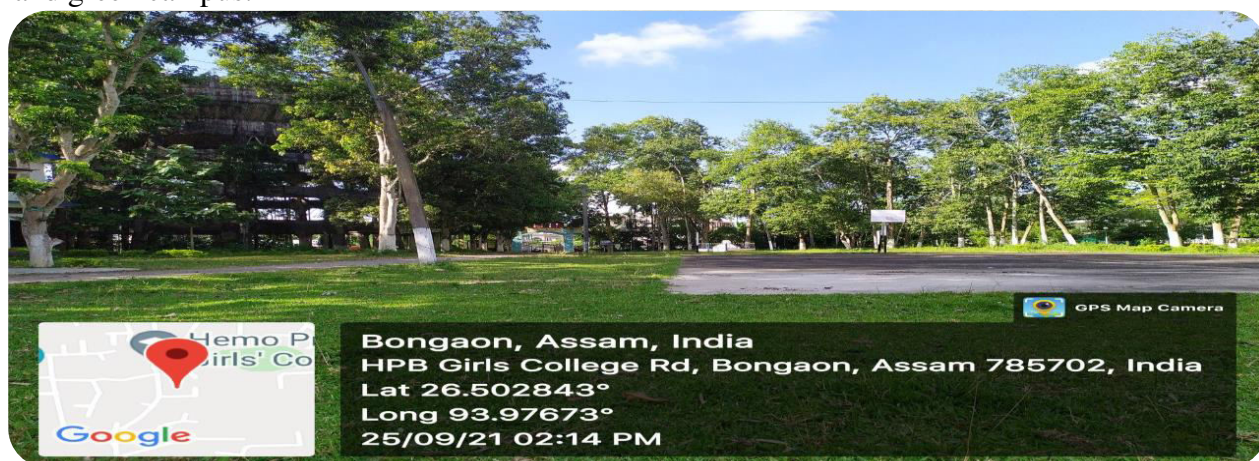


Fig: Automobile free zone

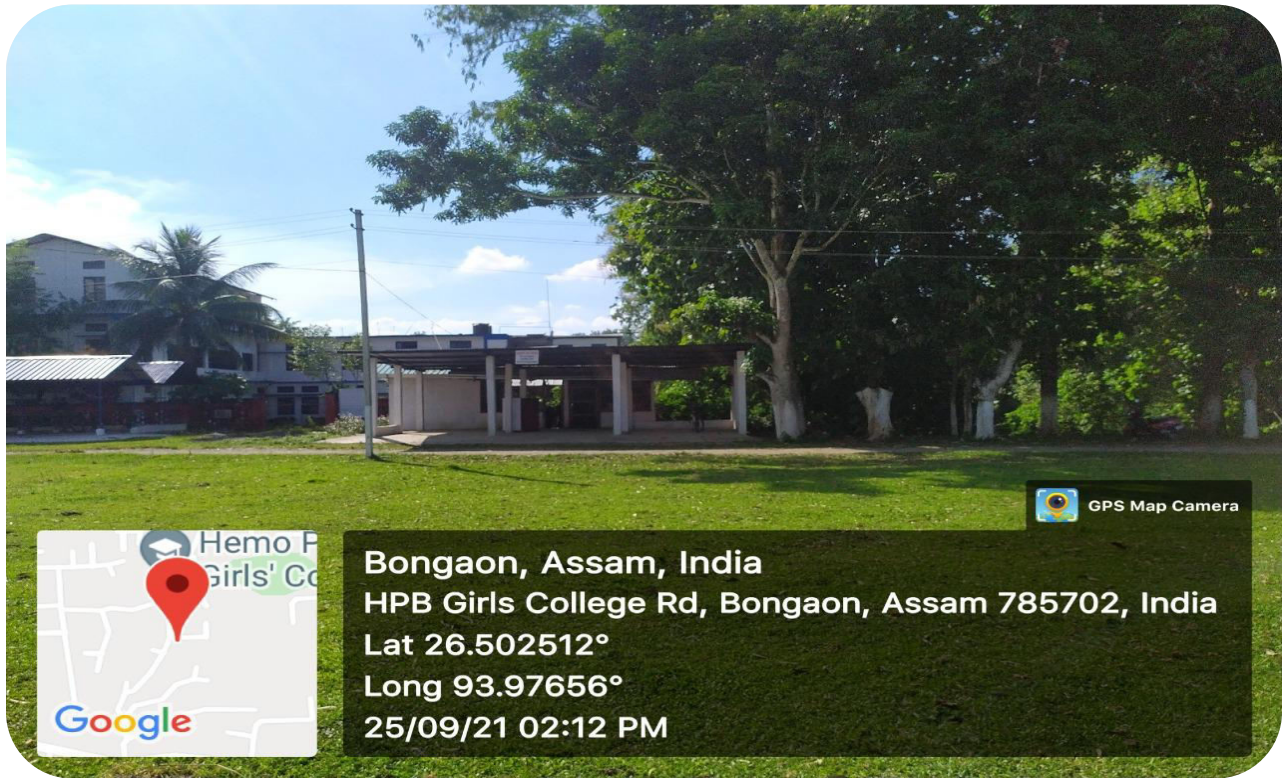


Fig: Automobile free zone

11.1. Findings

	Total	Using Cars/four wheeler	Two Wheeler	Using Public Transport	Using Bicycle	On foot
Teacher	45	8	15	12	2	8
Student	1048	0	100	500	50	300
Staff	15	0	10	3	2	0
Others/Parents per day (Average)	30	5	15	8	1	1
LPG	8 cylinders/per month					

Based on the above data assumption is made as the following

Particulars	Usage	Total
Car	13X5=65 liters	65
Two wheeler	150X3=450 liters	450
Public Transport	523X2=1046 liters	1046
LPG	4 kgs per day	4
Generators	1 liter per day	1
Total on average		1566 l/day

It is evident that majority of the campus community are relying on public transport system to reach the college. This shall be considered as a very conservative approach.

12. WATER AUDIT

H. P. B. Girls' College is blessed with copious rains, never drying bore well, tanks and ponds – big and small. Even with 1100 strong student community with nearly 150 students in the hostels as well as approximately 50 faculty, non-teaching personnel and top management officials combined, throughout the year in its premises, water has never been a problem since the College establishment, as the tanks are systematically fed with an extensive rain harvesting scheme.

The 2021 Green Auditing of H. P. B. Girls' College noted that the Campus on the whole, consumes 10770 Litres of water every month. The College depends on the urban water supply and bore well. The water tank with rain water harvesting in the campus is capable of supplying its entire requirement of water. The water quality, as proved by testing at regular intervals, is that there is no water problem in the campus either on quality or on quantity.

The water consumption per day 10770 Litres is pumped out from the bore well by electric pumps, filtered, and purified before being used. Three pumps operate for 4 hours (combined) a day. The percentage of loading for the 1 HP motor is 85% and for the 0.5 motor is 90%, which is acceptable as per the energy conservation measure.

12.1. What is water audit?

A water audit is an on-site survey and assessment of water-using hardware, fixtures, equipment, landscaping, and management practices to determine the efficiency of water use and to develop recommendations for improving water-use efficiency. In simple words, a water audit is a systematic review of a site that identifies the quantities and characteristics of all the water uses. The site may vary from a public water utility, facility (institutional or commercial properties like malls, office, schools etc.) or a household. The overall objective of conducting a water audit is to identify opportunities to make system or building water use more efficient.

Since water uses vary greatly from one type of business or institution to another and from site to site, therefore water audit is crucial to determine quantity, nature and quality of water consumption. Water audit for a water utility refers to tracking, assessing and validating all components of flow from the site of withdrawal or treatment through the water distribution system and into the consumer's properties. On the other hand, water audit of an office building would review direction and quantity of water used for domestic, cooling/heating, sanitary and landscaping processes. Whereas, a domestic water use audit examines the major areas in which a facility uses water, including human consumption, personal hygiene & sanitation, washing, cleaning, laundry, gardening etc. Thus, even though the nature and scale of water use varies and differs according to the sites and systems, the underline principle is common, that is, water use audit determines where the water ends up and in what amount. The audit exercise provides decision making tools to the concerned people in the utility, institutions or households by identifying inefficient uses, problem areas wherein water conservation and remedial measures can be undertaken.

Water auditing is an ongoing process and rarely stays consistent in a site or system over time. Therefore in order to gauge progress from adopted water conservation and cutbacks,

water audit should be performed on a regular basis. In addition it provides convincing overview of the water use trends, effectiveness of conservation measures and potential cost and water savings.

12.2. Methodology

The key components in the water audit methodology undertaken for the H. P. B. Girls' College included-

i. Pre Audit Information

- Preliminary literature review of concepts and methodologies related to water audit for utility, facilities and households.
- Walk through the entire building to understand the nature of water uses and the systems installed in the building.
- Discussion with the administrators, faculty members, students, hostellers and hostel kitchen employees on the various water uses during the day and the source of water.
- Regular discussions with the administrative department including the electrician, housekeeping and canteen in charge were conducted throughout the exercise on current situation and the past trends in water consumption, current sources, supply amount, source metering, distribution, storage, wastewater generation etc.

ii. Base-lining and benchmarking

The water audit for the college included both primary and secondary data collection for various identified water uses. Primary data collection included the following components

- Development of questionnaire format for individual water use, mopping, gardening etc.
- Sample survey of H.P.B staff to estimate individual water consumption on sanitary and drinking purposes based on questionnaire format. Of the 50 above employees, 36 undertook a week long observation of their personal

water use in toilets and for drinking. Thus the per capita average of personal water use was calculated for the audit based on this representative sample.

- For other water uses in kitchen, garden, mopping etc. primary data on time, patterns and frequency of water use was recorded over a varying period of time.
- Flow rate calculation from the taps flow rates and number of all water using fixtures/ equipment was also undertaken.
- Collating records of water pumped to the overhead tanks, average bore well withdrawals, to estimate actual supply.

iii. Conducting an water audit at the building level

- The data collection and processing for personal water use including drinking, flushing and face/ hand washing, mopping, gardening, utensil washing etc. was done on the basis of actual consumption.
- One litre bottle and 10 litres bucket method was used to estimate the flow rate from various taps used for a variety of purposes. This was then calculated with the frequency of use to determine the actual water use.
- As part of the survey, staff members recorded the number of daily visits to, flushes in toilets and urinals, along with daily frequency of hand washing and average time of water flow from the taps.
- The data for all the above uses was calculated for varying time period for e.g personal water use survey was based on a weeklong observation by the H.P.B staff to calculate per capita use.

12.3. Water supply

The primary source of water for HPB is a private bore wells located near the administrative building and Girls' Hostel No. 1. The office building receives majority of its water supply from groundwater, supplemented by Urban Water supplied water which is available within the campus.

The total depth of the bore wells are around 300 feet below the ground level and during the time of drilling water was found at a depth of 132-137 feet. The submersible water pumps are 1.5 HP. The

secondary water source for HPB, urban water supply located within the campus is being pumped with surface water pump overhead with 0.5 HP motor pumps.



Fig: Water Faucets



12.4. Water Usage

H. P. B. Girls' College has 16 building with different floors including Hostels, Canteen, Guest House, Auditorium, Library and Indoor Stadium. The following table is the data of no. of toilets, washrooms, faucets, filters.

Sl. No	Building	No. of Toilet/ Urinal	Bathroom	No. of Water Tap	RO/ Filters	No. of Washing Basin	No. of Flush	Kitchen Sink
1.	Administrative/Staff common room/Library	6		11	4	8	6	1
2.	Examination Branch	2	1	2				
3.	Girls' Common Room (Old)	5		5	1	1		
4.	Girls' Common Room (New)	1		3	1	3	2	
5.	Canteen cum Guest	2	2	1	1	4	1	1

	House							
6.	Academic Building- 2	1		1			1	
7.	KKHSOU Building					1		
8.	Old Library	1	1	1	1	1		
9.	Indoor Stadium	4	2	4				
10	Girls' Common Toilet	4		4		1	1	
11	Girls' Hostel No. 1	9	9	10	2	8	8	1
12	Girls' Hostel No. 2	9	9	10	1	8	8	1
13	Hostel Kitchen	1		5		3		2
14	Auditorium	1		1		1	1	
15	DELC Building	3		4		1	1	
16	RO/Water Faucets			10				
17	TOTAL	49	24	72	11	40	29	6

12.5. Data processing

The total staff and students strength at HPB is estimated at 700 per day on an average, which includes regular, on contract, interns, canteen/office staff etc.

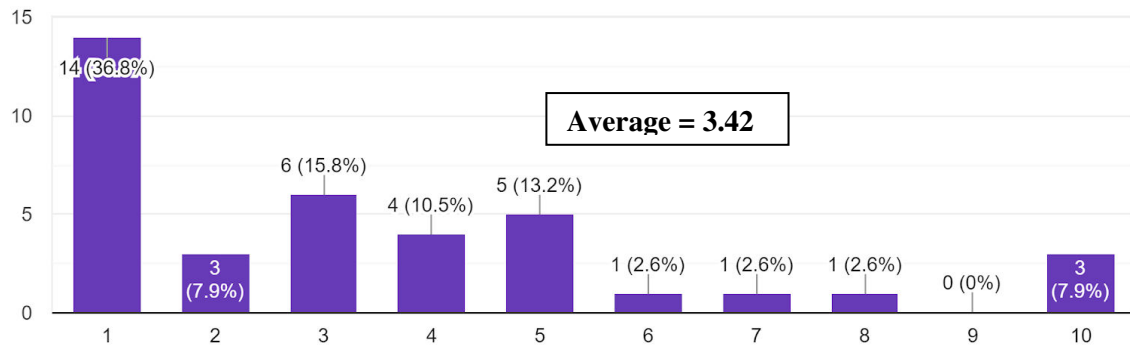
Table 1. Composition at H. P. B. Girls' College and Hostel

Sl. No	Composition	Male	Female	Total
1.	Teachers	22	23	44
2.	Office Staff	7	3	10
3.	Grade IV	8		8
4.	Students		1048	1048
5.	Hostel Cooks	3	2	5
6.	Others			
	Total	40	1076	1115

12.6. Water Usage Data in the Hostel (Collected from 38 students out of 140)

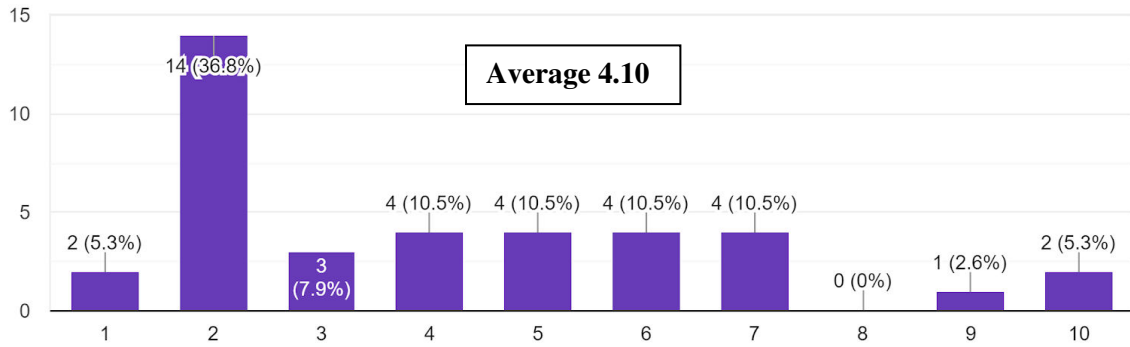
Visit to the Toilet in a day (mention number)

38 responses



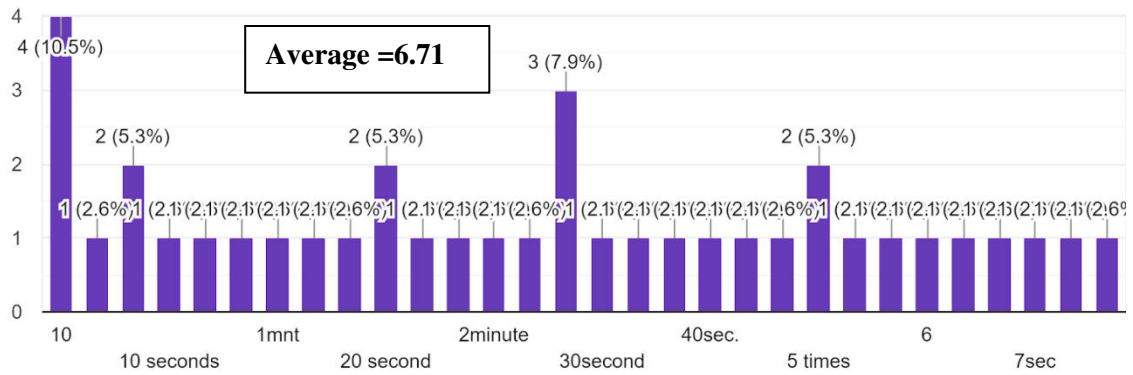
Number of times you used the mug for any purpose.

38 responses



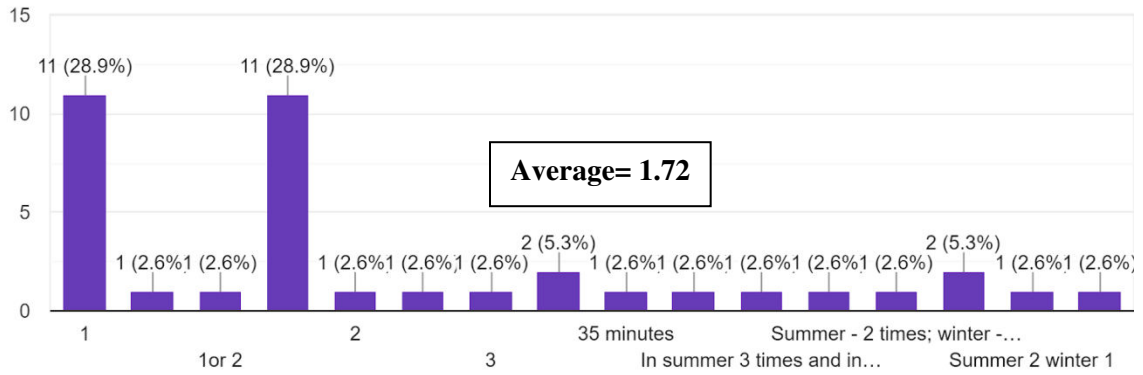
Average time the tap is running while you are washing hands(in seconds)Please be Very Precise

38 responses



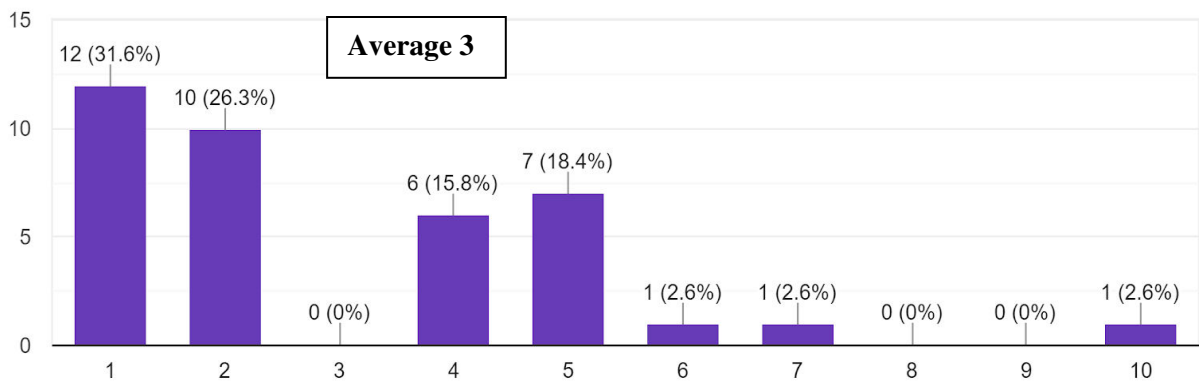
Number of times you bath in a day (cumulative Summer and Winter)

38 responses

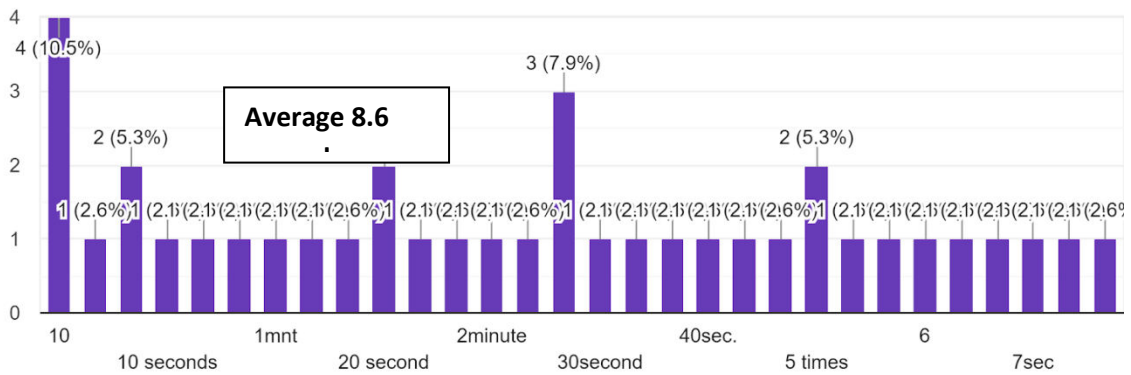


Number of times you FLUSHED in a day for any purpose

38 responses

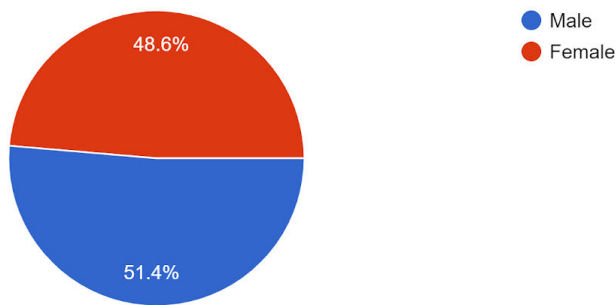


Average time the tap is running while you are washing hands(in seconds)Please be Very Precise
38 responses



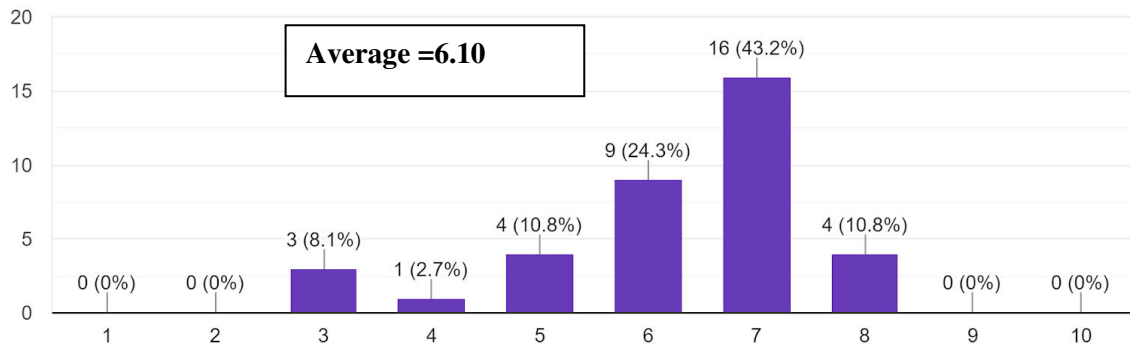
12.7. Water Usage Data Collected from the College Teaching and Non-Teaching Staff (37 samples).

Sex
37 responses



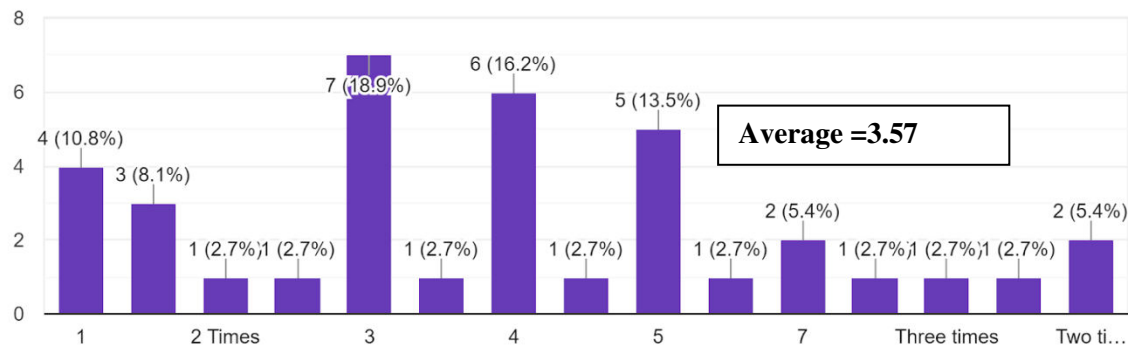
Duration of stay in the college (Hours) (Per day)

37 responses



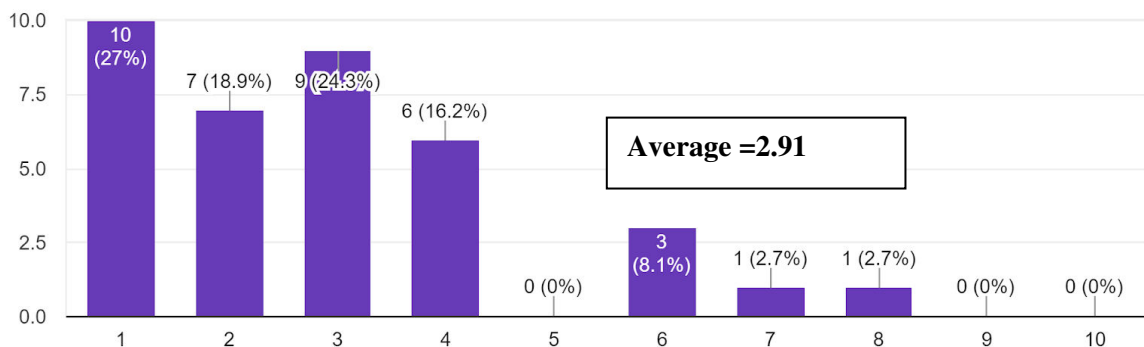
Visit to the Toilet during the day (mention number)

37 responses



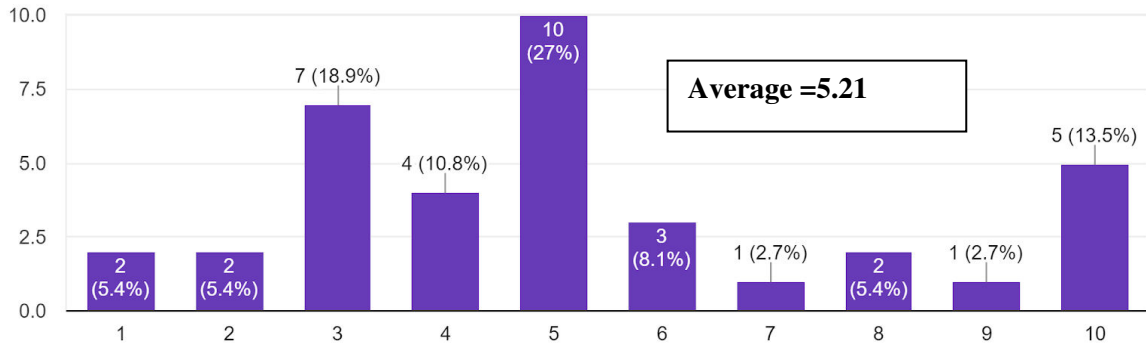
Number of times you used the mug for any purpose.

37 responses



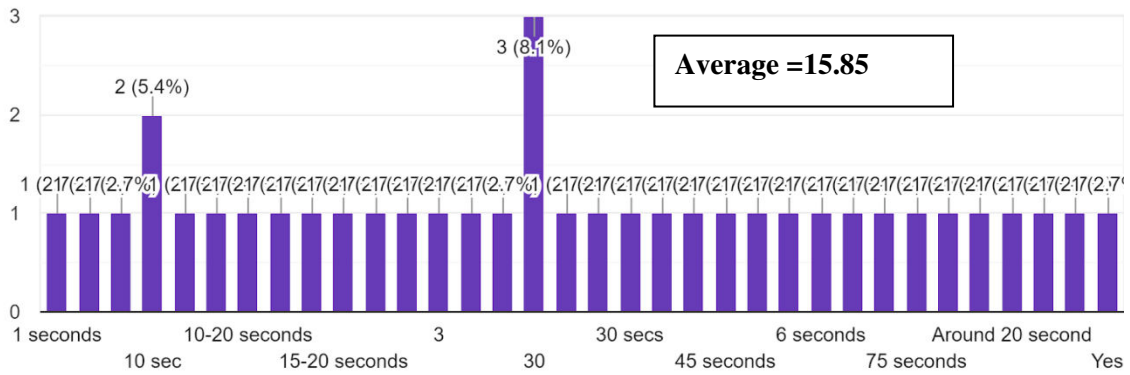
Number of times you wash hands in a day.

37 responses



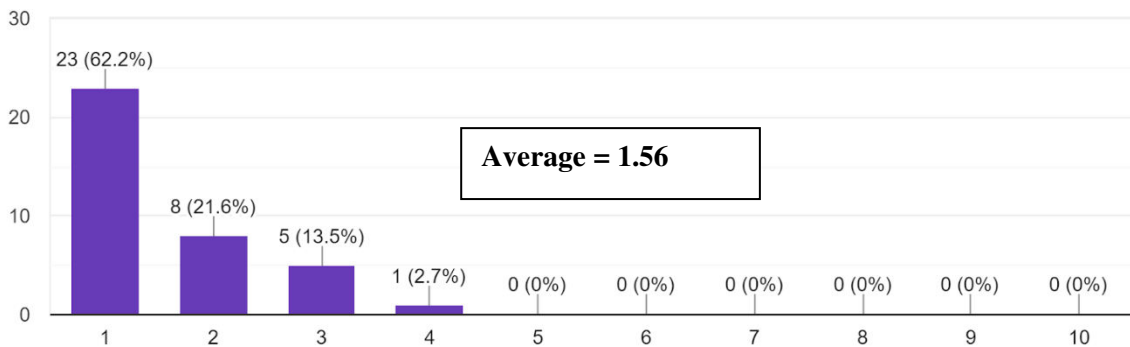
Average time the tap is running while you are washing hands(in seconds)Please be Very Precise

37 responses



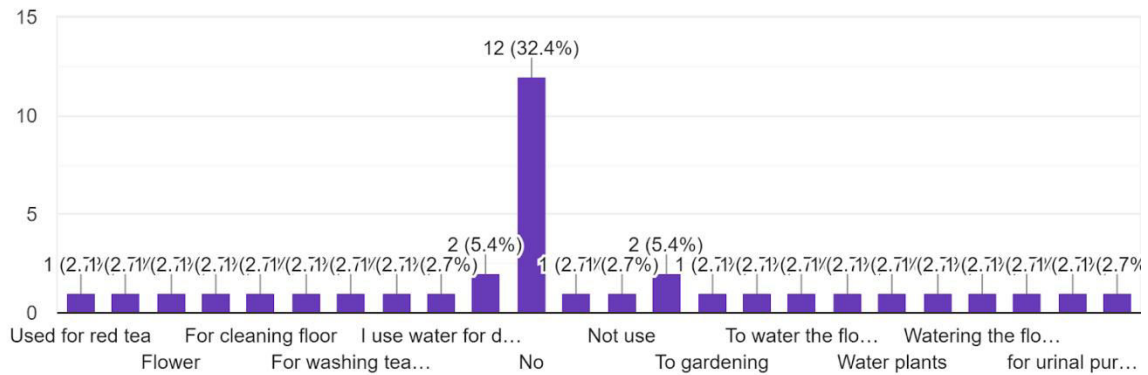
Mention in liters(approximately) you draw water from RO (Aqua Guard etc) for drinking.

37 responses



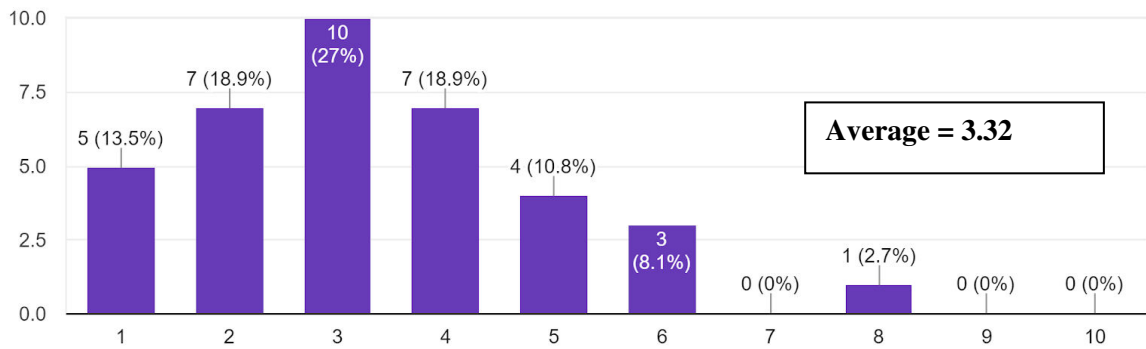
Mention any other purpose(s) you use water in the college campus.

37 responses



Number of times you use the flush in a day for any purpose

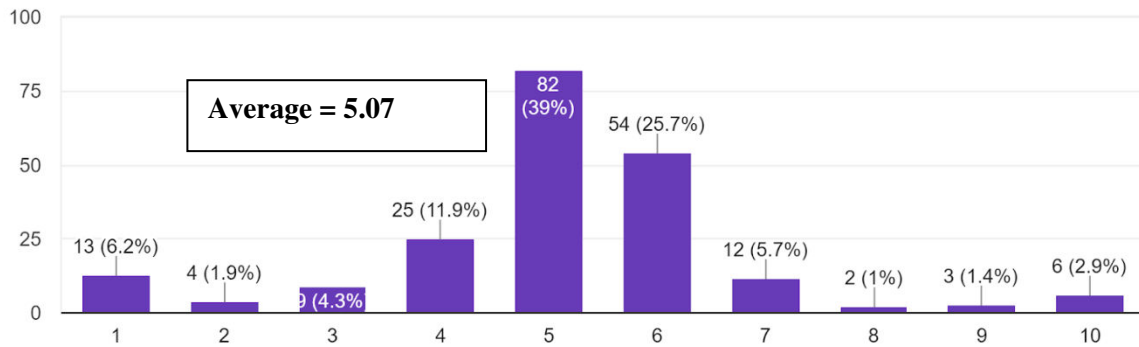
37 responses



12.8. Water Usage Data Collected from Students (210 samples)

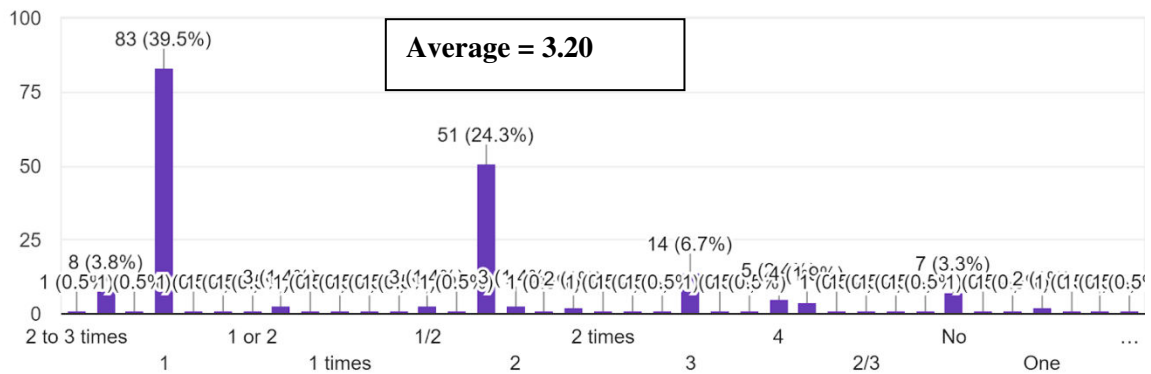
Duration of stay in the college (Hours) (Per day)

210 responses



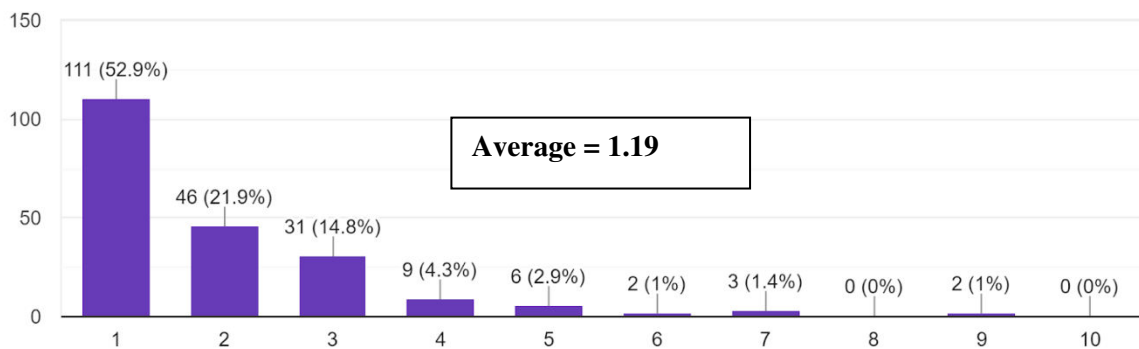
Visit to the Toilet during the day (mention number)

210 responses



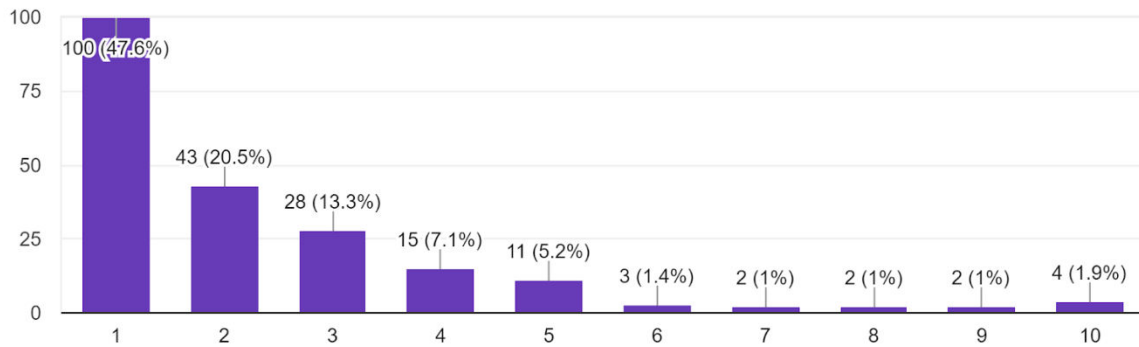
Number of times you FLUSHED in a day for any purpose

210 responses



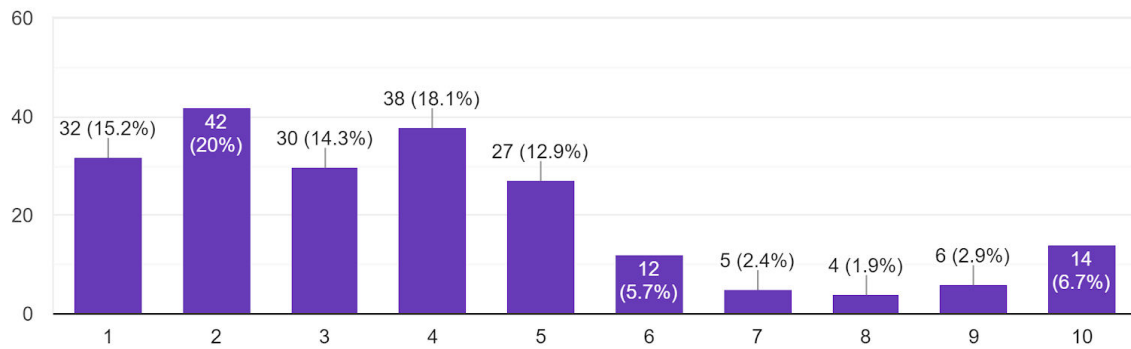
Number of times you used the mug for any purpose.

210 responses



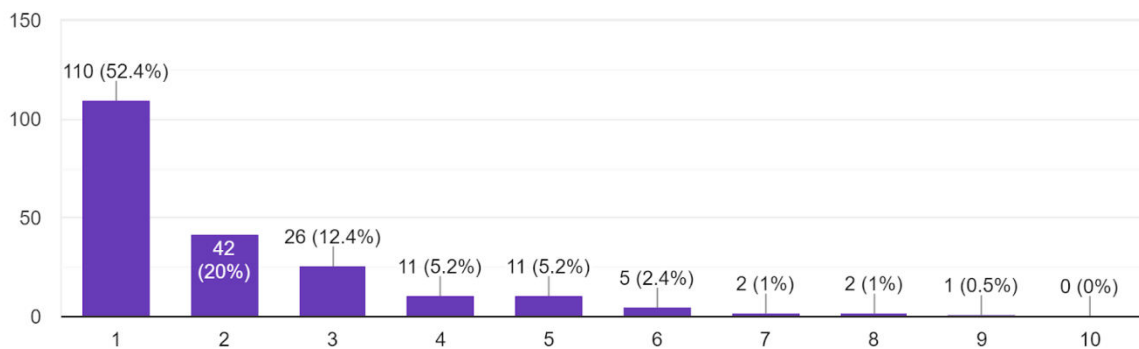
Number of times you have WASHED your hands in a day.

210 responses



Mention in liters (approximately) you draw water from RO (Aqua Guard etc) for drinking.

210 responses



The cleaning staff and hostellers initiate cleaning, washing and mopping activities from 7 am in the morning and generally continue till 7 in the evening in one shift. Buckets are used for mopping which are generally filled from the toilet or terrace taps. Therefore, to conduct a building water audit water consumption data for all these uses were required to be monitored and recorded. Toilet water use including for flushing and face/ hand washing along with drinking was clubbed under personal water use. In order to collect primary data and to ensure accuracy, a brief questionnaire format was prepared and survey conducted for the HPB staff and students (College and Hostels). Of the 45 teaching and non-teaching staffs 37 responded the questionnaires. Similarly, 38 out of 100 students response were taken for sampling. Of 1048 students 210 samples were taken for sampling. The questionnaire required the respondents to monitor their daily toilet/urinal visits, hand washing frequency, average water release time from the tap, drinking water consumption etc. for a week. Of the 37 respondents, 17 were female and 18 were male. The average daily working hours came to about 7.7 hours during which the average toilet and urinals visits were about 2.2 and 3.5 for women and men employees respectively.

The average number of times women flushed during the day was calculated to 2.9 or 3 times, whereas men used the urinal flushes 2.3 times daily. Similarly on an average the respondents washed their hands 3.9 times daily and each time the tap is usually left opened for about 17.4 seconds. While women washed their hands 3.5 times daily for an average time of 20 seconds, men leave open the tap for about 16 seconds for hand washing about 4.1 times daily. The average daily drinking water consumption for the individual employees was calculated as 1.6 litres. Of the 37 respondents, 36 filled bottles or used glasses for drinking from the RO filters during the day.

To estimate the water use in irrigating plants, 10 litres bucket was used to record flow rate and duration for gardening was recorded. Plants are irrigated using a bucket. Plants are irrigated early morning before 9 am.

The average number of times students flushed during the day was calculated to 2.9 or 3 times, similarly they washed their hands 3.5 times daily for an average time of 20 seconds leaving the tap open. The average daily drinking water consumption for the student was calculated as 1.6 litres. Whereas, 50 students carry water from home and the rest filled bottles or used glasses for drinking from the RO filters during the day.

Audit method for the hostellers also was based on Questionnaires and observation through the help of

Hostel Administration and Warden. Based on the responds inmate visit the toilet at 5 times a day and used the flush at the same rate. They wash hands at an average of 8 times a day while drinking water at the rate of 3 litres. Hostellers' uses 4 buckets (15 litres) per day and for other purposes assumption were made at 5 litres per day. At an average an individual uses 30 litres per day including washing clothes. Cooking, Washing, Washing utensils etc. in hostel were estimated at 400 litres per day.

It is estimated that usually on a regular working day of the week around 900 people are usually present in the premises, which is around 85% of the total strength of HPB. Thus, the toilet, drinking and hand washing water use have been calculated using this assumption.

12.9. Calculation of water consumption pattern

A. Water consumption data

1. Potable water consumption (daily)

a. Drinking

Total water use for drinking is 1000 litres/ day* (Hostel and College)

b. Cooking

Total water use in cooking 300 litres/ day (Hostel and College)

2. Non- potable water requirements (daily)

a. Toilet Flush

Total flush water use in toilets is 3000 litres/day (Hostel and College)

b. Washing clothes and other things 4000 litres/day

c. Basin water use

Total water use in basins for face/hand washing 1500 litres/ day (College and Hostel)

d. Washing utensils

Total water use in washing utensils/vegetables etc. is 600 litres/ day (College and Hostel)

- e. Washing & cleaning (floor mopping, toilet cleaning)

Total water use in floor mopping is 250 litres/ day

- f. Gardening

Total water use in watering plants is 120 litres/ day

12.10. Overall Water Consumption

Therefore based on the above recordings, monitoring and calculation the total water consumption for the college is 10770 litres per day based on the assumed staff strength per day as mentioned above.

Source: Actual monitoring and primary survey

A. Water losses

There were no visible leakages that were observed during the audit exercise at CSE.

Table 3: Total Water Supply and Use at HPB

S. No	Heads	Water use (in litres)
1.	Average daily water supply, to the overhead tanks from the underground tank (both bore well and urban water supply)	11000
2.	Total calculated water consumption from the water audit	10770
3.	Difference between water consumption from overhead tanks and actual water use for various purposes	230

12.11. Rainwater Harvesting & Wastewater recycling System in the college campus

The rainwater system in the college was installed in 2020 and all the rainwater is recharged into the water tank of 1000 liters each. RWH potential is about 8000-10000 litres per annum, while the annual rainfall recorded in Golaghat is on an average 3130 mm. The total area of the college is about 14.13

sqm and has several areas which are unpaved for increased recharge. The entire system was installed at a cost Rs. 50,000 in 2020 and is regularly maintained to ensure quality and efficiency. The system recharges water through network of the rooftop of the administrative building, etc.

The wastewater recycling system at the college has been designed to collect approximate litre of 100 per day based on the assumption that at any given moment at least a 300 people would be occupying the premises. The components involved in treatment are a settler, a baffled reactor, a planted filter and a polishing pond. The treated wastewater is used for gardening and recharge purposes. Potential for water savings

Based on the information collected and observations, the following can be recommended to reduce water use and increase its efficiency.

1. Replacement of single flush cisterns with dual flush cisterns, in men, women and students' toilet. At present the toilet commodes have 10 litre flush which can be replaced with 3/6 litres or 2/4 litres dual flush cisterns. Dual flush WCs operate on a split button with the user having the option of which one to use. Usually the smaller button operates the shorter flush of 3 litres which is adequate for flushing liquid waste, while the larger button is for 6 litres flush for more substantial waste. This can reduce water use by around 30-40% and save 870 litres per day (if water uses reduction is by 40%).
2. The urinals in the men's toilets, which at present use about 5 litres of water per flush could be replaced with water-efficient urinals use 2.8 litres per flush. Waterless urinals could also be installed in the toilets, but there are some concerns with its maintenance and effectiveness.
3. Flow fixtures could be installed on the taps on the terraces that are used for watering the plants on all floors (except 5th floor), since their flow rate is between 11-22 litres per minute. Flow fixtures typically controls, deliver a precise volume of water at faucets, showerheads, and hose outlets, typically 5.6 – 8.3 liters per minute, irrespective of varying line pressure. Other technology is aerators which are generally installed or taps fitted with aerators are available, which can cut the water usage of faucets by as much as 40% from 15 litres per minute to 9.4 litres per minute. Rest of the taps in the toilets and kitchen operate at a much lower flow rate. An aerator spreads the water flow into many small droplets. Conventional faucet aerators don't compensate for changes in inlet pressure, so the greater the water pressure, the more water you use.
4. It is recommended that flushing should be avoided for disposing toilet paper or other rubbish

and e of rubbish, use a rubbish bin and avert unnecessary flushing.



Fig: Rainwater Harvesting



Fig: Wastewater recycling System

12.12. Water Management in the campus

1. Rain water harvesting system of 4000 litre capacity has been installed.
2. A water conservation and green awareness campaign is being conducted in the campus.
3. Rain water collection pits are dug in order to recharge ground water.
4. More greenery has been added consistently in order to improve ground water resource.

12.13. Water Quality Testing Data

District Level Laboratory, Golaghat PHE Division



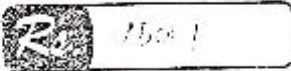
Bkko No

Sl. No

Received with thanks from Sir HPB Gini's College

Rs 1500 (in words Rupees One Thousand Five Hundred only)

Only for Physical/Chemical/Bacteriological analysis of water.



Date: 20/12/21

[Signature]
in-charge
Dist. Level Laboratory
Golaghat

**DISTRICT LEVEL LABORATORY (PHE) GOLAGHAT DIVISION
GOLAGHAT, ASSAM**

Receipt No. **1446**

Water Analysis Report Of ADMIN BUILDING HPB Girl's College

01. Name of Collector :
 02. Date of Collection : 24/8/22
 03. Date of Despatch :
 04. Date of Testing : 25/8/22
 05. Type of Source : DW
 06. Type of Analysis : Physical Chemical Bacteriological



TEST	PERMISSIBLE LIMIT	RESULT
01. Turbidity	1.0 - 5.0	<u>3 N/D</u>
02. Total Dissolved Solid	500 - 2000	<u>-</u>
03. PH Value	6.5 - 8.5	<u>7.0</u>
04. Iron	0.3 - 1.0	<u>0.2 P.P.M</u>
05. Hardness	200 - 600	<u>50</u>
06. Calcium	75 - 200	<u>-</u>
07. Magnesium	30 - 100	<u>-</u>
08. Alkalinity	200 - 600	<u>80</u>
09. Chloride	250 - 1000	<u>-</u>
10. Nitrate	45 (No relaxation)	<u>-</u>
11. Sulphate	200 - 400	<u>-</u>
12. Residual Chlorine	0.2 - 1.0	<u>-</u>
13. Arsenic	0.01 (No relaxation)	<u>-</u>
14. Fluoride	1.0 - 1.5	<u>N/D</u>
15. BACTERIOLOGICAL		

RESULT	COLIFORM	ECOLI	RESULT
a) Excellent	No Coliforms/100 ml	Nil	<u>.....</u>
b) Satisfactory	1-2 Coliforms/100 ml	Nil	<u>.....</u>
c) Suspicious	3-10 Coliforms/100 ml	Nil	<u>.....</u>
d) Unsatisfactory	above 10 coliforms/100 ml	Nil	<u>.....</u>

ADVIC: Report, as per as Sample Received.

[Signature]
Signature
Asstt. Chemist

[Signature]
Signature
In-charge, Laboratory

**DISTRICT LEVEL LABORATORY (PHE) GOLAGHAT DIVISION
GOLAGHAT, ASSAM**

Receipt No. **1447**

Water Analysis Report Of GIRLS COMMON ROOM HPA Girl's College

01. Name of Collector :
 02. Date of Collection : 24/8/21
 03. Date of Despatch :
 04. Date of Testing : 25/8/21
 05. Type of Source : D/W
 06. Type of Analysis : Physical Chemical Bacteriological



TEST	PERMISSIBLE LIMIT	RESULT
01. Turbidity	1.0 - 5.0	<u>3 Nil</u>
02. Total Dissolved Solid	500 - 2000	<u>-</u>
03. PH Value	6.5 - 8.5	<u>7.0</u>
04. Iron	0.3 - 1.0	<u>0.22 PPM</u>
05. Hardness	200 - 600	<u>45</u>
06. Calcium	75 - 200	<u>-</u>
07. Magnesium	30 - 100	<u>-</u>
08. Alkalinity	200 - 600	<u>80</u>
09. Chloride	250 - 1000	<u>-</u>
10. Nitrate	45 (No relaxation)	<u>-</u>
11. Sulphate	200 - 400	<u>-</u>
12. Residual Chlorine	0.2 - 1.0	<u>-</u>
13. Arsenic	0.01 (No relaxation)	<u>-</u>
14. Fluoride	1.0 - 1.5	<u>ND</u>
15. BACTERIOLOGICAL		

RESULT	COLIFORM	ECOLI	RESULT
a) Excellent	No Coliforms/100 ml	Nil	<u>-</u>
b) Satisfactory	1-2 Coliforms/100 ml	Nil	<u>-</u>
c) Suspicious	3-10 Coliforms/100 ml	Nil	<u>-</u>
d) Unsatisfactory	above 10 coliforms/100 ml	Nil	<u>-</u>

ADVIC: Report, as per as sample received.

[Signature]
Signature
Asstt. Chemist

Sd/
Signature
In-charge, Laboratory

DISTRICT LEVEL LABORATORY (PHE) GOLAGHAT DIVISION
GOLAGHAT, ASSAM

Receipt No. **1448**

Water Analysis Report Of CANTEEN, HPB Gini's College

01. Name of Collector :
 02. Date of Collection : 24/8/21
 03. Date of Despatch :
 04. Date of Testing : 25/8/21
 05. Type of Source : DFW
 06. Type of Analysis : Physical Chemical Bacteriological



TEST	PERMISSIBLE LIMIT	RESULT
01. Turbidity	1.0 - 5.0	<u>2 NTU</u>
02. Total Dissolved Solid	500 - 2000	<u>-</u>
03. PH Value	6.5 - 8.5	<u>7.0</u>
04. Iron	0.3 - 1.0	<u>0.20 P.P.m</u>
05. Hardness	200 - 600	<u>5.0</u>
06. Calcium	75 - 200	<u>-</u>
07. Magnesium	30 - 100	<u>-</u>
08. Alkalinity	200 - 600	<u>7.5</u>
09. Chloride	250 - 1000	<u>-</u>
10. Nitrate	45 (No relaxation)	<u>-</u>
11. Sulphate	200 - 400	<u>-</u>
12. Residual Chlorine	0.2 - 1.0	<u>-</u>
13. Arsenic	0.01 (No relaxation)	<u>-</u>
14. Fluoride	1.0 - 1.5	<u>ND</u>
15. BACTERIOLOGICAL		

RESULT	COLIFORM	ECOLI	RESULT
a) Excellent	No Coliforms/100 ml	Nil	<u>/</u>
b) Satisfactory	1-2 Coliforms/100 ml	Nil	<u>/</u>
c) Suspicious	3-10 Coliforms/100 ml	Nil	<u>/</u>
d) Unsatisfactory	above 10 coliforms/100 ml	Nil	<u>/</u>

ADVIC: Report, as per as sample received.

W.S.
 Signature
 Asstt. Chemist

Sa/
 Signature
 In-charge, Laboratory

Year of establishment

**DISTRICT LEVEL LABORATORY (PHE) GOLAGHAT DIVISION
GOLAGHAT, ASSAM**

Receipt No. **1449**

Water Analysis Report Of H2 STEEL NO - 2 H.P.B. Gini's College

01. Name of Collector :
 02. Date of Collection : 24/8/24
 03. Date of Despatch :
 04. Date of Testing : 25/8/24
 05. Type of Source : D/W
 06. Type of Analysis : Physical Chemical Bacteriological



TEST	PERMISSIBLE LIMIT	RESULT
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01. Turbidity	1.0 - 5.0	<u>3 Nil</u>
02. Total Dissolved Solid	500 - 2000	<u>-</u>
03. PH Value	6.5 - 8.5	<u>7.0</u>
04. Iron	0.3 - 1.0	<u>0.22 ppm</u>
05. Hardness	200 - 600	<u>5.0</u>
06. Calcium	75 - 200	<u>-</u>
07. Magnesium	30 - 100	<u>-</u>
08. Alkalinity	200 - 600	<u>75</u>
09. Chloride	250 - 1000	<u>-</u>
10. Nitrate	45 (No relaxation)	<u>-</u>
11. Sulphate	200 - 400	<u>-</u>
12. Residual Chlorine	0.2 - 1.0	<u>-</u>
13. Arsenic	0.01 (No relaxation)	<u>-</u>
14. Fluoride	1.0 - 1.5	<u>ND</u>

15. BACTERIOLOGICAL

RESULT	COLIFORM	ECOLI	RESULT
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a) Excellent	No Coliforms/100 ml	Nil	<u>/</u>
b) Satisfactory	1-2 Coliforms/100 ml	Nil	<u>/</u>
c) Suspicious	3-10 Coliforms/100 ml	Nil	<u>/</u>
d) Unsatisfactory	above 10 coliforms/100 ml	Nil	<u>/</u>

ADVIC: Report, as per as sample Received.

[Signature]
Signature
Asstt. Chemist

[Signature]
Signature
In-charge, Laboratory

Y... ..

**DISTRICT LEVEL LABORATORY (PHE) GOLAGHAT DIVISION
GOLAGHAT, ASSAM**

Receipt No. **1450**

Water Analysis Report Of..... OLD LIBRARY..... HPA G.M.S. College ..

01. Name of Collector :
 02. Date of Collection : 24/8/21
 03. Date of Despatch :
 04. Date of Testing : 25/8/21
 05. Type of Source : D/W
 06. Type of Analysis : Physical Chemical Bacteriological



TEST	PERMISSIBLE LIMIT	RESULT
01. Turbidity	1.0 - 5.0	<u>3 NTU</u>
02. Total Dissolved Solid	500 - 2000	<u>-</u>
03. PH Value	6.5 - 8.5	<u>7.0</u>
04. Iron	0.3 - 1.0	<u>0.20 ppm</u>
05. Hardness	200 - 600	<u>50</u>
06. Calcium	75 - 200	<u>-</u>
07. Magnesium	30 - 100	<u>-</u>
08. Alkalinity	200 - 600	<u>80</u>
09. Chloride	250 - 1000	<u>-</u>
10. Nitrate	45 (No relaxation)	<u>-</u>
11. Sulphate	200 - 400	<u>-</u>
12. Residual Chlorine	0.2 - 1.0	<u>-</u>
13. Arsenic	0.01 (No relaxation)	<u>-</u>
14. Fluoride	1.0 - 1.5	<u>ND</u>
15. BACTERIOLOGICAL.		

RESULT	COLIFORM	ECOLI	RESULT
a) Excellent	No Coliforms/100 ml	Nil	<u>/</u>
b) Satisfactory	1-2 Coliforms/100 ml	Nil	<u>/</u>
c) Suspicious	3-10 Coliforms/100 ml	Nil	<u>/</u>
d) Unsatisfactory	above 10 coliforms/100 ml	Nil	<u>/</u>

ADVIC: Re. Pont, as per as sample Received.

Signature
Asstt. Chemist

Signature
In-charge, Laboratory

DISTRICT LEVEL LABORATORY (PHE) GOLAGHAT DIVISION
GOLAGHAT, ASSAM

Receipt No. **1451**

Water Analysis Report Of OFFICE, HPB Gini's College

01. Name of Collector :
 02. Date of Collection : 24/8/21
 03. Date of Despatch :
 04. Date of Testing : 25/8/21
 05. Type of Source : DTW
 06. Type of Analysis : Physical Chemical Bacteriological



TEST	PERMISSIBLE LIMIT	RESULT
01. Turbidity	1.0 - 5.0	<u>3. N/A</u>
02. Total Dissolved Solid	500 - 2000	<u>-</u>
03. PH Value	6.5 - 8.5	<u>7.0</u>
04. Iron	0.3 - 1.0	<u>0.21 PPM</u>
05. Hardness	200 - 600	<u>30</u>
06. Calcium	75 - 200	<u>-</u>
07. Magnesium	30 - 100	<u>-</u>
08. Alkalinity	200 - 600	<u>7.5</u>
09. Chloride	250 - 1000	<u>-</u>
10. Nitrate	45 (No relaxation)	<u>-</u>
11. Sulphate	200 - 400	<u>-</u>
12. Residual Chlorine	0.2 - 1.0	<u>-</u>
13. Arsenic	0.01 (No relaxation)	<u>-</u>
14. Fluoride	1.0 - 1.5	<u>N.D.</u>
15. BACTERIOLOGICAL		

RESULT	COLIFORM	ECOLI	RESULT
a) Excellent	No Coliforms/100 ml	Nil	<u>-</u>
b) Satisfactory	1-2 Coliforms/100 ml	Nil	<u>/</u>
c) Suspicious	3-10 Coliforms/100 ml	Nil	<u>/</u>
d) Unsatisfactory	above 10 coliforms/100 ml	Nil	<u>-</u>

ADVIC: Report, as per as Sample Received

[Signature]
Signature
Asstt. Chemist

[Signature]
Signature
In-charge, Laboratory

Y... ..

13. WASTE MANAGEMENT

Waste measure and its disposal

1. Total staff and students – 1200 approx.
2. Number of hostel inmates - 130
3. Number of Garbage dumps – 4
4. Number of toilets - 29
5. E-wastes- computers, electrical and electronic parts – Disposal by selling
6. Plastic waste- Burning, dumping pit
7. Solid wastes – Damaged furniture, paper waste, paper plates, food wastes
8. Chemical wastes – Laboratory waste
9. Waste water – Washing, urinals, bathrooms
10. Glass waste – Broken glass wares from the labs
11. Waste treatments –compost system
12. Napkin incinerator – 3 Nos

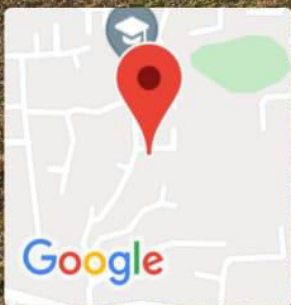
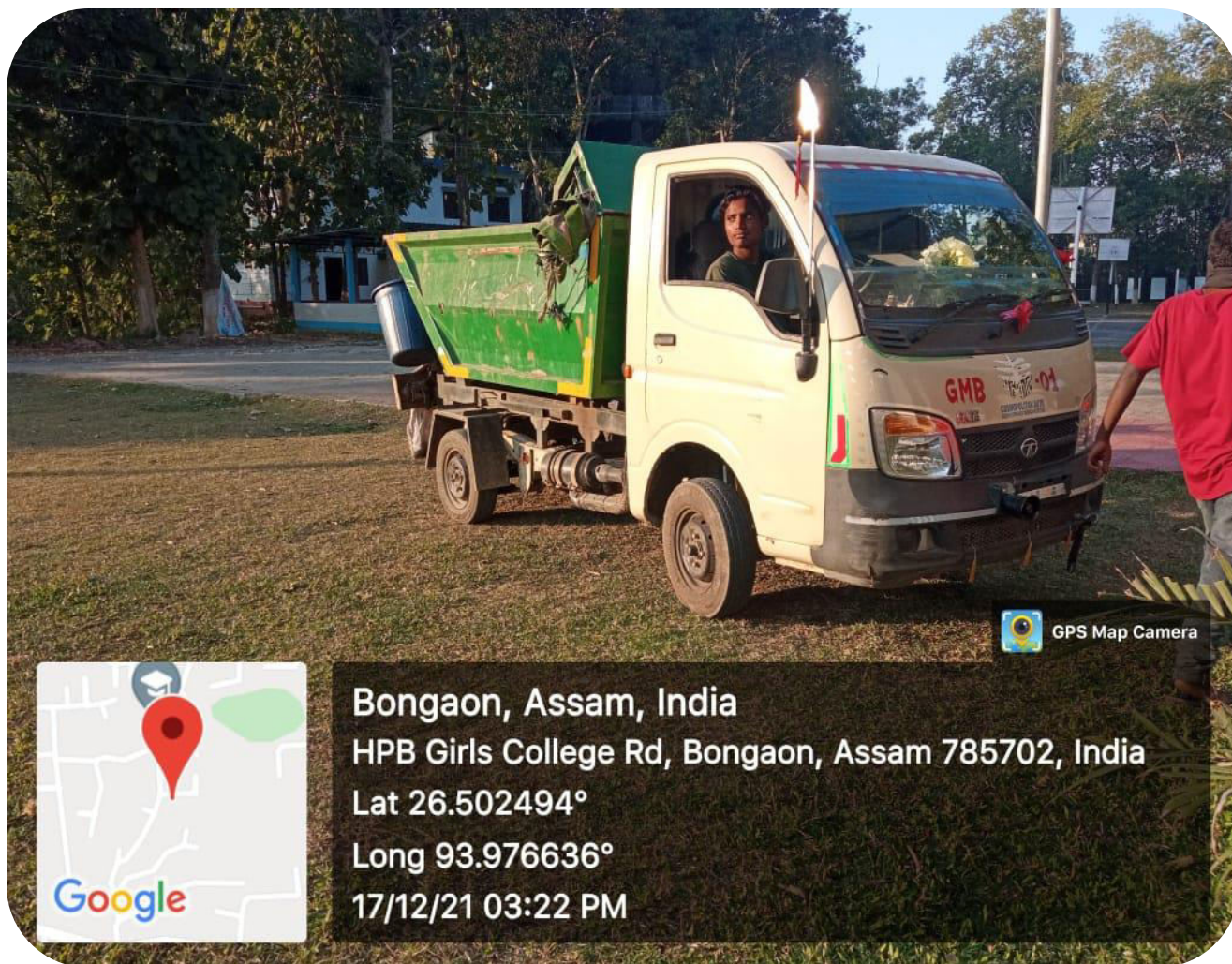
13.1. SOLID WASTE MANAGEMENT

Solid waste are unwanted material disposed of by man, which can neither flow into streams nor escape immediately into atmosphere and causes air, water and soil pollution or any material that we discard, that is not liquid or gas. The waste generated in the campus that includes wrappers, glass, metals, paper, plastics, etc. Old newspapers, used papers and journal files, workshop scrap etc. are given for recycling to external agencies. Glass, metals, plastic and other non-biodegradable wastes are given to external agencies where they are segregated and disposed/ recycled according to the nature of the waste. Apart from dry solid waste, the campus generates an average of 10 kgs of organic waste per day and 10 kgs of processed food waste per day from canteens and hostels which is to vermicompost site. To tackle the issue of solid waste management, the college has followed two types of treatment for recovery and recycling. For biodegradable waste, e.g. fallen leaves of plants, Domestic waste- are being carried to the Vermi Compost Plant made available in the college. For non biodegradable waste e.g. glass metals, other utensils has been collected through dustbins and disposed it in buffering places with the help of Golaghat Municipality Board (GMB) garbage dispensing vehicle. Sanitary Napkin

Incinerators have been installed in the girls' hostels to facilitate disposal of sanitary napkins in an environment-friendly way. The college organizes awareness program which enhances the knowledge about waste management in the students and motivates them for proper management of solid and liquid waste.



Fig: Solid Waste management (Vermicompost Project)



Bongaon, Assam, India
HPB Girls College Rd, Bongaon, Assam 785702, India
Lat 26.502494°
Long 93.976636°
17/12/21 03:22 PM

Fig: Solid Waste management

13.2. LIQUID WASTE MANAGEMENT

The liquid wastes generated in the campus include Sewage, Laboratory, Laundry, hostel and canteen effluent waste. The college is yet to install Sewage Treatment Plant (STP) to treat the entire waste water. However, effort has been made by the authority to dump the waste water and other solid waste into pit to recharge underground water.

13.3. E-WASTE MANAGEMENT

Electronic goods are put to optimum use; the minor repairs are set right by the teaching staff; and the major repairs are handled by the inviting technician and are reused. UPS Batteries are recharged / repaired / exchanged by the suppliers. The waste compact discs and other disposable non-hazardous

items are used by students for decoration during college fests as a creative means of showcasing the waste management practice that has been induced in the minds of the students.



Fig: E-WASTE MANAGEMENT



Fig: E-WASTE MANAGEMENT

13.4. EXISTING WASTE MANAGEMENT METHODS PRACTICED

1. Cleaning the campus on a daily basis
2. Segregation of waste into degradable and non-degradable by the cleaning staff.
3. Waste bin's in placed in corridors, office and staff rooms.
4. Incinerators to burn sanitary napkins.
5. E-waste and plastic waste disposal
6. Campaigns for reduce, reuse and recycle.
7. Push for natural and biodegradable use in the campus.

13.5. OBSERVATION AND RECOMMENDATION

The College has missed few major recycling opportunities, with the exception of food waste from the dining halls. Installation of sanitary napkin incinerator at administrative building and increasing the capacity of existing incinerator in girl's hostel should be implemented. Different colored bins maybe placed in order to collect and segregate various types of waste. Periodical training in health & hygiene, waste management and disposal, green healthy practices may inculcate a positive attitude for a clean and healthy living.

There should be proper sign boards displayed to tell students where to go for the disposal of other recyclables, plastics and hazardous wastes. There should be in place a policy for the handling and disposal of hazardous materials. The college should have in place plans for dealing with hazardous wastes in academic departments (art, chemistry, etc.) as well as the maintenance activities (paints, etc.). The college is committed to manage chemical wastes produced in its practical and research laboratories in a safe and environmentally sound manner that complies with all applicable central and state government regulations.

At present, the college does not have a proper waste management system and wastes happen reach the environment (air and water). Since the college has a strong commitment to protect the environment and to be abide by the regulations of the government, in next five years the college plan to introduce "Chemical's Waste Management Guidelines".

14. RECOMMENDATIONS

14.1. General Recommendations

1. Formation of Environmental Club in the college.

2. Students and staff shall take initiative to start live campus discussion groups where green conservation and awareness shall be the main agenda.
3. The college will make an effort to increase the areas for Environmental Studies.
4. Though the college is occupied with greenery, plantation drive will be continued.
5. Installation Biogas plant and Compost units.
6. Set up water recycling unit where the recycled water can be used for gardening in college and hostels.
7. Display boards of fauna diversity to generate enthusiasm for learners.
8. Organize earn while learn eco-friendly programs.
9. Conduct exhibitions for parents and public on environment and sustainable practices.
10. Introduce add-on courses eco-friendly income generating to all interested students.
11. Establish a purchase policy that is energy saving and eco-friendly.
12. Ensure participation of students and teachers in local environmental issues.
13. Dig sufficient rain water pits in the 18 acre campus wherever possible and maintain it regularly.
14. Installation of Solar panels to generate electricity.
15. Organize seminar, workshop etc. on environmental issues.
16. Display of environmental awareness board such as – Save water, save electricity, No wastage of food/water, no smoking, switch off light and fan after use, plastic free campus etc.
17. Different coloured waste bins to segregate waste and its easy collection.

14.2. Water Management

1. Strengthening awareness on water conservation among student and teacher communities.
2. 'Save Water' posters to be affixed in the classrooms, hand washing areas.
3. Repair water leaks and leaky toilets immediately.
4. Install water aerators and automatic shut-off devices on faucets.
5. Bring a water bottle to college. At the end of the day, any leftover can be poured onto the garden.
6. Set up an efficient water recycling system in the college canteen.
7. Install more rain water harvesting systems.
8. Push for sensor based water flush with increased force.
9. Proper maintenance of Toilets and faucets to control water wastage.

14.3. Energy Management

1. Increase the use of efficient and minimum energy consumption LED bulb.
2. Replacement of non-LED bulb by LED bulb at the earliest.
3. To replace two and three stars Air-conditioned to five stars air condition.
4. Replacement of existing electric fans with BLDC fans can significantly reduce power consumption and help in a good reduction in electricity charges.

14.4. Carbon Footprint

1. Switch to Green and renewable energy
2. Staff practices and Education
3. Planting of trees to negate the effect of burning of fossil fuels.
4. Encourage the use of bicycles and public transport system by the community, particularly the student community.

15. FUTURE ACTIONS PLAN

1. The college has potentialities to push for a massive oxygen power house in the town therefore; plantation in the barren areas shall be implemented.
2. It has been noticed that Rain Harvesting is limited to only Academic Building whereas, huge built up areas are left unused, so, drive for RHS will be given importance in the coming years.
3. Department wise awareness programs on the importance of environment to be organized by department staff representative to each committee.
4. Proper waste water management to be implemented so that the policy of Recovery, Recovery and Reuse can be fostered.
5. Proper monitoring and disposal of waste discharge by forming Sanitation Committee for different kinds of wastage.
6. Implementation of sign boards and indications of cleanliness, water and energy usage.
7. Energy maintenance by proper usage through shifting from traditional to modern and efficient electrical appliances.
8. Vegetable and agriculture crop planting has to be increased using advanced technologies.
9. Green House, Polyhouse, Vermicompost etc. to be increased to generate revenue.
10. College will initiate awareness program on the importance of respect towards nature.
11. To increase resource efficiency and reducing pollution and waste.

12. The aims of the college in the coming years are Clean Air, Enhancing Beauty and Frequent Engagement with Environment, Clean and Plentiful Water through Awareness Drive and Plantation Drive.

16. CONCLUSION

We humans and the stunning multitude of other living creatures on this earth are completely dependent on each other. Our beautiful green and blue planet is our shared and only home. We have a choice. We can destroy and degrade our natural capital for short term gain, and leave an impoverished inheritance for future generations. Or we can preserve and enhance the world - for ourselves, for future generations and for all the other creatures who share the globe with us.

The college therefore, is committed to becoming an innovative leader among academic institutions in the areas of environmental education and research and in the practice of environmental management and stewardship. The college is obliged to the principle of sustainable development, and will use its resources in a manner that does not compromise the ability of future generations of the college and global communities to meet their needs. The college is devoted to promote the environment management and conservation in the college campus and community with the purpose to identify, quantify, describe and prioritize framework of environment sustainability in compliance with the applicable regulations, policies and standards. The clarion call of the college is not to degrade but to improve environment.

Annexure 1

Green Auditing of H. P. B. Girls' College, Golaghat

1. Is there a garden in your college? 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 college campus.
7. Any threatened plant species planted/conserved (provide a list with their threat status). 8.
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).
16. Are you using any type of recycled water in your garden?
17. Who is in charge of gardens in your college?
18. Is there any permanent staff to look after gardens in the campus?
19. List the name and quantity of pesticides and fertilizers used in your gardens?
20. Are you doing any organic practice in your campus? List them?
21. Do you have any composting pit (specify what compost) in your college? If yes, what you do with the compost generated?
22. Do you have a vegetable garden on the campus?

23. If yes, how the harvested vegetables are utilized?
24. Do you have any market in the campus?
25. Is there a nature club in your college? If yes what are the activities?
26. Is there any arboretum in your college? If yes details of the trees planted.
27. Is there any fruit yielding plants in your college? If yes details of the trees planted.
28. Is there any groves in your college? If yes details of the trees planted.
29. Is there any irrigation system in your college?
30. What is the type of vegetation in the surrounding area of the college?
31. What are the nature awareness programs conducted in the campus? (2014-19). Provide a list (annexure-IV)
32. What is the involvement of students in the green cover maintenance? Planting saplings and maintenance.
33. What is the total area of the campus under tree cover? Or under tree canopy?
34. Share your future plans for further improvement of green cover.
35. Have you incorporated green conservation aspects in your curriculum?
36. How often you conduct public programs on green conservation?
37. Do students reach out to the public in conveying the message of nature conservation?

Annexure – II

H. P. B. Girls' College, Golaghat

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 college?
5. How many wells are there in your college?
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 college store water?
11. Capacity of the overhead water tank/s in the campus? (in litres)
12. Quantity of water pumped every day? (in litres)
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 college.
26. Record of water use from the college 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 litres)
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 (Annexure 2- 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 college bus cleaning? (litres per day)
51. Is there any other way by which water is being utilized?
52. Area of the college land which is under concrete tiles.
53. Is there any future plan for the water management in the campus?
54. Are there any water saving techniques followed in your college? Explain?
55. Is there any mechanism by which message on water conservation is being conveyed to staff and students.

Personal Water Use/Teaching/Non-Teaching/Students/Hostellers

1. Name:
2. Gender:
3. Floor:
4. Duration of Monitoring: 15/10/2021 to 15/11/2021

Table 1: Toilet Water Use

- *Every time you use the toilet, please fill in information the box provided.*
- *In case you are also using urinal, please mention the related information.*
- *Please mark NA for the day there was no data collection*

Week 1	Day of the week	Duration in office (Timing)	Visit to the Toilet during the day (mention number)		Number of times you FLUSHED in a day for any purpose (toilet paper disposal, waste cleaning, pre use etc.) (Mention Number)		Number of times you used the mug (mention number)	Number of times you have WASHED your hands in a day (Mention Number)	Average time the tap is running while you are washing hands (in seconds) Please be Very Precise
			Toilet	Urinal	Toilet Flushes	Urinal (FLUSHES)			
	DAY 1								
	DAY 2								
	DAY 3								
	DAY 4								
	DAY 5								
	DAY 6								
	DAY 7								

Table 2: Drinking Water Consumption

- *Do you use a bottle to drink water?.....YesNo*
- *Capacity of the water bottle(in litres)*

B. Baseline Information

1. Facility Name
2. Address
3. Period of surveyingfrom to
4. Total catchment area of the project/campus in square metres/feet:
5. Area of rooftops / terraces

 - a. Area of unpaved surfaces
 - b. Area of paved surfaces

C. Water user profile

Water users includes staff, visitors etc.

- a. Total number of water users.....
- b. Number of office staff
- c. Number of visitors (daily).....
- d. Average water use timing⁷
- e. Average working days
- f. Office timings

D. Water supply data

What is total daily water supply in the building (litres per day)?

- a. What are main source of water for the facility?

Source	Primary	Secondary
Municipal supply		
Groundwater (Bore wells)		
Tankers (Private or Public)		

Rainwater		
Others		

- b. For the municipal supply, are the water bills based on meter reading (actual consumption) or flat rate?
- c. Municipal supply time.....
- d. Average Flow rate..... Its/min & Pressure... (PSI)
- e. *Monthly water bill (if based on actual meter reading) and divide it by number of days/ billing period. You will get average water consumption per day.*
.....
.....
- f. Number of working tube wells on the site
- g. Yield of working bore well/ tube well (litres per hour)
- h. Average hours of pumping the tube well x yield of tube well (per hour)

E. Water Storage

Details of the storage structures

Storage tanks	Numbers	Capacity	Number of times it is topped (or filled) daily	Time of operation
Overhead				
O1				
O2				
O3				
Underground				
U1				
U1				

F. Water consumption data

- 3. Potable water consumption (daily)

Drinking

- Total water use for drinkinglitres.....
- Staff Total..... litres
- Visitors Total..... litres

Cooking

- Total water use in cooking litres

-
- Staff Total

4. Non- potable water requirements

Toilet Flush

Total flush water use (both toilets and urinals) Total.....litres ..

- Total toilet flush water use Total.....litres
- What is the capacity of cistern.....
- Do you have single flushing or dual flushing system
- Average number of times people visit toilets daily
- Total number of flushes daily
- How many times flushing is done (on average)..... daily
- Number of toilets.....
- Do flush valve (tankless) toilets have water-saving diaphragms? Yes... No
- Are toilets equipped with automatic water-flushing systems? Yes...
No...
- If so, what is the timing cycle? _____
- Are the sensors/timers coordinated with regular work hours? Yes...
No...

Urinal Flush

xii. Total urinal flush water use Total.....litres.....

xiii.Number of urinals

xiv.What type of flushing system does it have?.....

- Cistern based.....if yes, capacity of cistern.....
- Gate valve/ tap based.....If yes, average time used... flow rate?.....

- Automatic sensors..... water released per flushing.....
- How many peoples using urinals (on average)

Basin water use

- *Total water use in basins.....litres.....*
- Number of basins
- What types of tap are installed on basins?
 - Normal taps (threading type)
 - If yes, average time of tap used.....
 - Average flow rate
 - Average quantity of water used each time.....
 - Automatic taps (with sensors)..... water released per use.....
 - Push button taps If yes, average time of use.....
 - Are faucets equipped with aerators? Yes... No...

Washing utensils

- *Total water use in utensils litres*
- Running tap- (What is flow rate¹¹ of the tap)& running time
- Sink- Capacity..... & number of times it i

Floor washing

- *Total water used daily in floor washing* *Total litres*
 - Do you use running hose
 - Average time of using hose..... Flow rate of hose
 - Do you use bucket & broom
 - Average numbers of buckets used..... capacity of bucket.....
- Number of times of washing daily/weekly
- Total area where washing is done

Gardening

- Total water use in gardening *Total..... litres*
- Total green area or under plantation Yes... No...
 - Watering is done by running hose / sprinkler.....
 - Flow rate of hose/ sprinkler.....
 - Average time taken to water plants dailymins
 - Number of times watering per day/week
- Watering is done during what time of the day.....
....Morning.... Noon Afternoon ..
..Evening.....Night

Water losses

Leakages

- Number of fixtures
 - Faucets..... Toilets..... Hoses.....
- Number of leaking Fixtures

Annexure – III

H. P. B. Girls' College, Golaghat

Questionnaire for Carbon footprint Auditing

1. Total number of students and teachers in your College?
2. Teachers No of non-teaching staff Male Female.
3. Total Number of vehicles used by the stakeholders of the college/per day.
4. No. of cycles used/day in the campus.
5. No. of two wheelers used (average distance travelled, cc of two wheelers and quantity of fuel and amount used/day).
6. No. of cars used (average distance travelled, power of engine (cc) and quantity of fuel and amount used/day).
7. No. persons using common (public) transportation (average distance travelled and quantity of fuel and amount used/day).
8. No. of persons using college conveyance (general transportation) by the students, nonteaching staff and teachers (average distance travelled and quantity of fuel and amount used per day)
9. Number of parent-teacher meetings in a year? Parents turned up (approx.)
10. Mention their mode of travel and give approximate cost of their commutation.
11. Number of visitors with vehicles per day?
12. Number of generators used/day (hours). Provide quantity and amount for fuel usage/day.
13. Number of LPG cylinders used in the campus. Provide quantity and amount of fuel used /day.
14. Quantity of kerosene used in the canteen/labs (Provide quantity and amount of fuel used per day and amount spent).
15. 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.
16. Amount of taxi/auto charges paid per month for the transportation of office goods to the college.
17. Amount of taxi/auto charges paid per month by the stakeholders of the college.
18. Use of any other fossil fuels in the college (Give the amount of fuel used per day and amount spent).

19. 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 college.