



HINGALGANJ MAHAVIDYALAYA



GREEN AUDIT 2018-19 REPORT

Internal Quality Assurance Cell (IQAC)

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We are grateful for the consistent support provided by Teacher-in-Charge, Dr. Shamim Bhar.

We wish to express our heartfelt thanks to the External Expert, Dr Susanta Pramanik, for his valuable guidance and support in the initiative.

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Executive Summary

Green Audit aims at a systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. It studies environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience. Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. 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 component of a quality educational institution. Therefore, it is imperative that a college evaluates its own contributions toward a sustainable future.

Question of environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is very important. The rapid urbanization and economic development have led to several environmental and ecological crises. Consequently, it has become 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 carbon-di-oxide 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.

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CHAPTER 1

1.1. INTRODUCTION

In accordance with the Green Campus Evaluation Plan, as recommended by the Internal Quality Assurance Cell (IQAC) of the College, Hingaljanj Mahavidyalaya planned to conduct a green audit of the college in July 2018. After preliminary field work and other formalities, the report was finally sent for approval to the authority (Teacher-in-Charge and IQAC) in February 2019. The purpose of the audit was to make sure that the practices followed in the campus are healthy and environment friendly. With this in mind, the specific objectives of the audit were to evaluate the degree to which the Departments are in compliance with the applicable regulations, policies and standards and to ensure that the development of the college aims at sustainable development and green campus.

Although there is no universal definition of Green Audit, many leading companies/institutions follow the basic philosophy and approach summarized by the broad definition adopted by the International Chambers of Commerce (ICC) in its publication of Environmental Auditing (1989). The ICC defines Environmental Auditing as:

A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environment and natural resources in its operations/projects.

Keeping this view in mind, the Audit team has meticulously scanned and evaluated the present condition of the college campus using standardized methods of environmental evaluation. The primary focus of the initiative was to generate an awareness among the various stakeholders because a higher education institution has a huge social responsibility towards generation and propagation of awareness among students, staff and people of community. This generation of awareness is of extreme significance to ensure sustainable and environment-friendly development of any sector.

1.2 About the College

Hingalganj Mahavidyalaya is a Coeducational Undergraduate Degree college, affiliated to West Bengal State University, Barasat. The college offers Honours and General Degree programs in the Choice Based Credit System introduced by WBSU. Spanning across 4 Acres of pristine Sunderban landscape, the campus offers every modern facility and academic support to meet the growing demands of the student community. Hingalganj Mahavidyalaya houses a team of inspiring faculty, dedicated staff and modern infrastructure. The whole campus is under CCTV surveillance, ensuring security and discipline.

Vision:

The college envisions to create an academic ecosystem for the young generation where knowledge will be in sync with commitment to society and humanity. This vision is in direct concurrence with Tagore's dream of India "Where knowledge is free..."

Mission:

1. Equal opportunity to every student irrespective of gender, caste, creed and religion. At the same time, special care is taken to make the students belonging to economically and socially marginalized sections get motivated to excel and flower to their full potential.
2. Special emphasis is given on punctuality, regularity and discipline. While the students and staff share a mutual bond of love and indulgence, all are bound to observe the stated code of ethics and decorum to ensure serious deliverance of service.
3. Empowerment of women is a special agenda in the mission of the college. The college takes at least one significant innovative step every session to accomplish this. The exclusive cell for "Women Empowerment" acts as an active and progressive body in the college.
4. The faculty is well trained in modern methods of teaching. The college prioritizes digitization and use of modern technology both in classroom and office.
5. The focus is "local" but the means are "global". The college infrastructure has evolved and is still evolving to provide newest facilities to the students despite its remote location and geographical challenges.

1.3. OBJECTIVES

In recent time, the Green Audit of an institution has become very important for self-assessment of the institution which reflects the role of the institution in addressing, evaluating and mitigating the present environmental problems. The college has been putting efforts to keep our environment clean since its inception. But the auditing of this non-scholastic effort of the college has not been documented so far. 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 floral and faunal diversity of the college.
3. To record the meteorological parameter of Hingaljanj, where the college is situated.
4. To estimate the Energy requirements of the college.
5. To document the Waste disposal system.
6. To introduce and aware students to real concerns of environment and its sustainability.
7. To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections require high cost.
9. To bring out a status report on environmental compliance.
10. To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus.

1.4. METHODOLOGY

The Green Audit taken up by Hingalgañj Mahavidyalaya had been divided into three stages:

The Pre-Audit Stage: In the pre-audit stage, meetings provide an opportunity to support the capacity and objectives of the audit and enable discussions on the feasibility associated with the audit. The meeting provides the first opportunity to plan the audit and deal with several practical knowledge and concerns. The meeting provided the chance to gather information that the audit team can study before arriving on the site. The audit plan was handed over at this meeting and discussed in advance of the audit itself. At Hingalgañj Mahavidyalaya, the planning of audit processes was discussed in the pre-audit meeting. Audit team was also selected in this meeting with the help of IQAC and the college management. The audit protocol and audit plan were handed over at this meeting and discussed in advance of the audit itself.

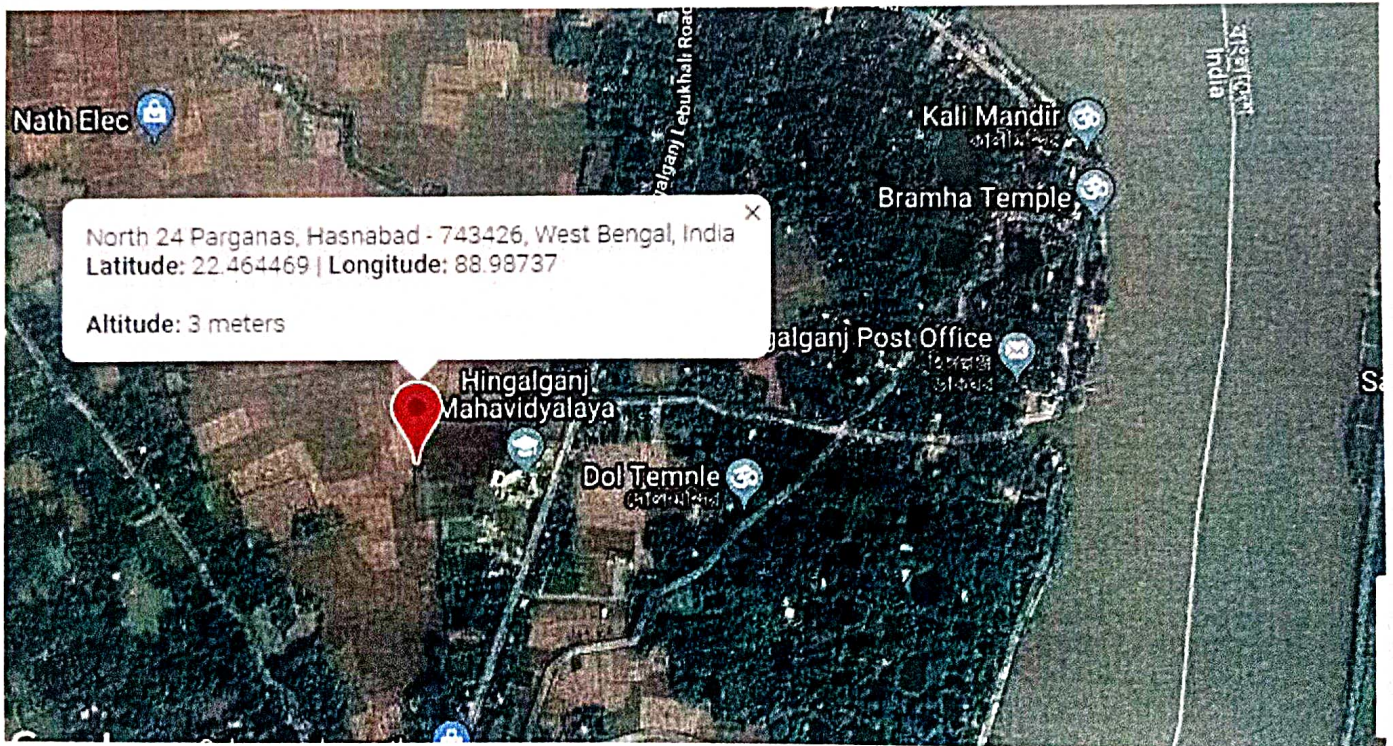
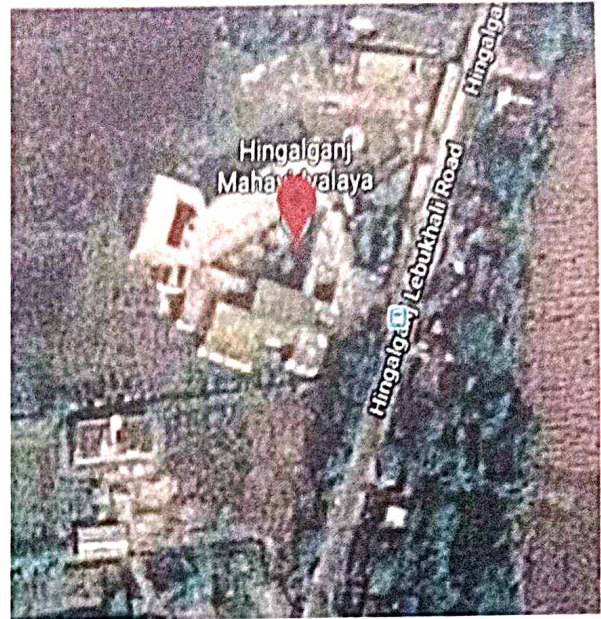
The Management of the college has shown the commitment towards the green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environment friendly such as awareness programs on the environment, campus farming, planting more trees on the campus, etc., after the green auditing. The management of the college was willing to formulate policies based on green auditing report.

The Audit Stage: The Audit Stage encompasses of the team selection and the field works performed. Looking after the unique structure, location and ambiance of the college, the Green Audit Team focused on Material Issues pertaining to college which have the highest influence on the Green Attributes of the College. The Audit stage also focused on the Methodology adopted. Checklist approach is adopted for transparent evaluation of the topics and increase readability for independent reader.

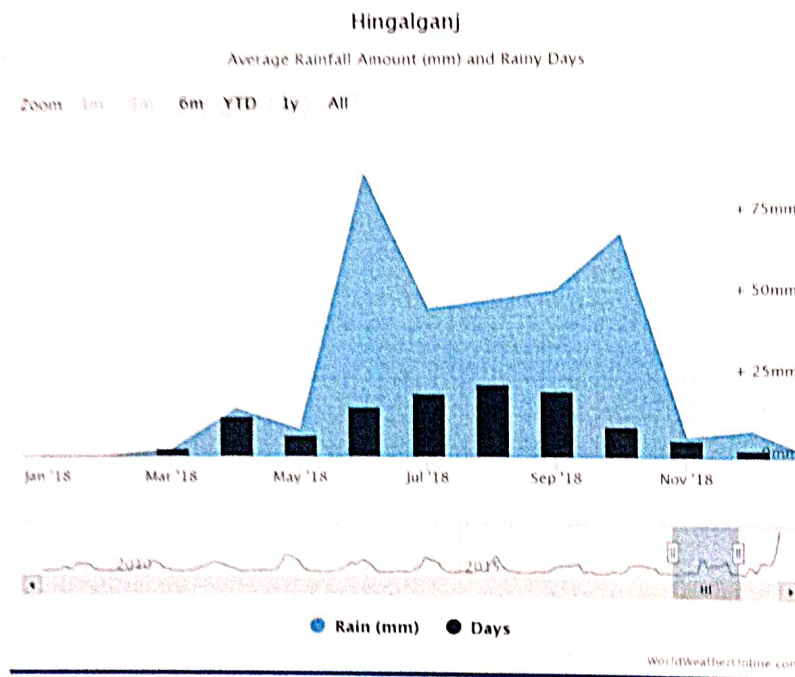
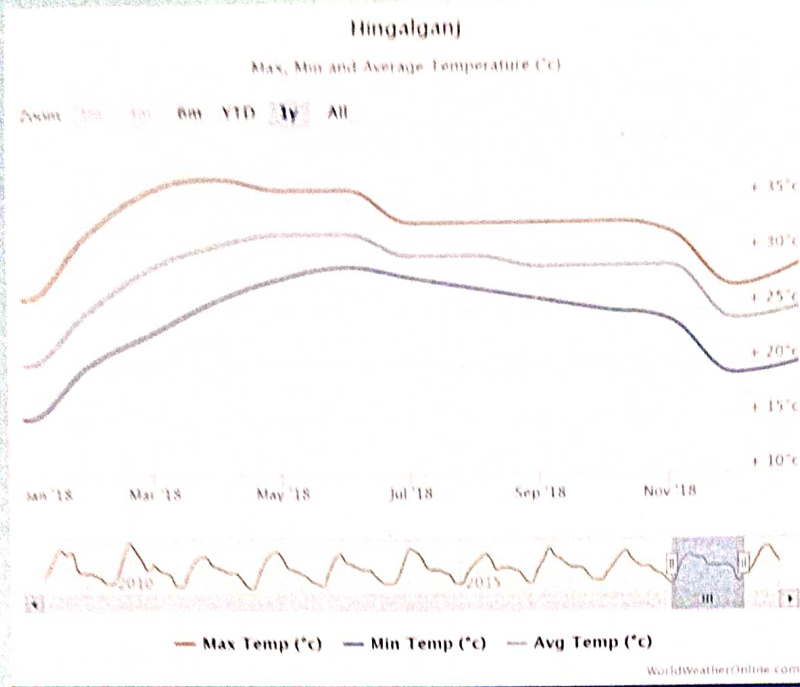
The Post Audit Stage: The post-audit stage ensures formulation of Draft findings and sent to management response. Since the audit is done internally, it was important to ensure approval of IQAC for the draft. After getting draft approval, the audit team went for final report formulation.

CHAPTER 2

2.1 GEOGRAPHICAL LOCATION WITH CAMPUS MAP



Annual Weather Trends



Source: <https://www.worldweatheronline.com/lang/en-in/hingalganj-weather-averages/west-bengal/in.aspx>

Weather Report of Canning Weather Station

Station : CANNING (INDIA (STATIONS NORTH OF LATITUDE 20~N))

Location : 22 15N , 88 40E , 4 masl.

Date range displayed : January 2018 to December 2018 |

Month ^	T (°C)	T. max ave. (°C)	T. min ave. (°C)	T. max abs. (°C)	T. min abs. (°C)	Prec. (mm)	Days 1 mm	Days 0.1 mm	Days snow	Days storm	Days fog	Days frost	F-TM	F-Tm	F-R
<u>JANUARY 2018</u>	17.8	24.3	11.2	29.2	8.6	0.0	0	0	0	0	0	0	100%	100%	100%
<u>FEBRUARY 2018</u>	24.2	30.6	17.8	35.0	13.4	0.0	0	0	0	0	0	0	96%	100%	100%
<u>MARCH 2018</u>	28.2	33.6	22.8	36.0	18.4	12.0	2	4	0	0	0	0	96%	100%	100%
<u>APRIL 2018</u>	29.2	34.3	24.1	37.4	19.6	85.0	8	8	0	0	0	0	93%	98%	96%
<u>MAY 2018</u>	30.5	34.9	26.2	37.0	19.6	127.0	6	6	0	1	0	0	93%	98%	100%
<u>JUNE 2018</u>	30.7	34.9	26.5	40.0	23.6	393.0	19	19	0	4	0	0	98%	97%	100%
<u>JULY 2018</u>	29.6	32.5	26.6	35.0	24.8	469.0	28	28	0	1	0	0	100%	100%	100%
<u>AUGUST 2018</u>	29.8	32.7	26.9	34.4	24.4	208.0	23	23	0	1	0	0	100%	100%	100%
<u>SEPTEMBER 2018</u>	30.0	33.4	26.6	36.0	24.4	164.0	12	12	0	1	0	0	95%	98%	100%
<u>OCTOBER 2018</u>	28.1	32.5	23.7	36.0	19.4	72.0	7	7	0	0	0	0	100%	100%	100%
<u>NOVEMBER 2018</u>	24.7	30.2	19.1	33.0	14.8	5.0	1	1	0	0	0	0	98%	100%	100%
<u>DECEMBER 2018</u>	19.5	25.6	13.3	28.4	7.4	16.0	3	3	0	0	0	0	98%	100%	100%
PERIOD SUMMARY	26.9	31.6	22.1	40.0	7.4	1551.0	109	111	0	8	0	0	97%	99%	100%

Source: Meteomanz.com

AIR POLLUTION AND QUALITY INDEX FOR HASNABAD

Pollutant	Concentration (µg/m ³)	Sub Index
NO ₂	28.67	36
PM ₁₀	71.00	71
SO ₂	2.83	4



AQI: 71

(SATISFACTORY)

AQI	Remark	Color Code	Possible Health Impacts
0-50	Good		Minimal Impact
51-100	Satisfactory		Minor breathing discomfort to sensitive people
101-200	Moderate		Breathing discomfort to the people with lung, heart disease, children and older adults
201-300	Poor		Breathing discomfort to people on prolonged exposure
301-400	Very Poor		Respiratory illness to the people on prolonged exposure
>400	Severe		Respiratory effects even on healthy people

SOURCE: <http://emis.wbpcb.gov.in>

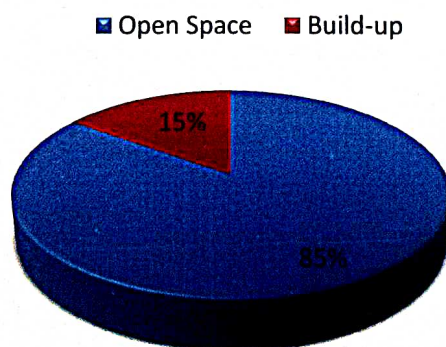
2.2 Land use Pattern of Hingalganj Mahavidyalaya **(As on 12/12/2018)**

2.2.1. GENERAL OVERVIEW OF THE CONCEPT OF LANDUSE:

Land use refers to man's activities and the various uses which are carried on and derived from land. Viewing the earth from space, it is now very crucial to evaluate man's activities on natural resource. In situations of rapid changes in land use, observations of the Earth from space give the information of human activities and utilization of the landscape (Howarth 1981). Remote sensing and GIS techniques are now used extensively for advanced land use mapping and planning. The collection of remotely sensed data facilitates the synoptic analyses of earth system, functions, patterning, and change in the local, regional as well as at global scales over time. Satellite imagery particularly is a valuable tool for generating land use map.

Table 1. LAND USE DATA OF HINGALGANJ MAHAVIDYALAYA

CATEGORIES OF LAND USE AREA IN SQ METRES	AREA IN SQ METRES
OPEN SPACE AND PLANTATION	11,669.00
BUILT UP AREA	2090.32
TOTAL AREA	13,759.32



2.2.1. a. LAND USE (BUILT UP AREA) ANALYSIS:

CATEGORIES OF LAND USE (BUILT UP AREA)	AREA IN SQ METRES
PLAYGROUND	800
MAIN FACULTY BUILDING WITH ADMINISTRATIVE BLOCK	1486.45
BOYS HOSTEL	-
GIRLS HOSTEL	603.87
ALUMNI BUILDING	-
AUDITORIUM	-
INDOOR STADIUM	-
CANTEEN	-
CYCLE STAND	48.30
GENERAL LIBRARY	88.23
COMMON ROOM FOR BOYS	50.17
COMMON ROOM FOR GIRLS	52.00
UNION ROOM	46.45
SCIENCE BUILDING	-
ARTS BUILDING	1486.45
GYM,CAREER COUNSELLING	-
ENVIROMENTAL STUDIES/AWARENESS	50.17
STUDENTS AND TEACHER CANTEEN	-
SECURITY QUATER	-
Boys TOILET	27.59
Girls TOILET	10.87
Staff TOILET	25.64
BOYS' HOSTEL WARDEN'S QUARTER	-
GIRLS' HOSTEL WARDEN'S QUARTER	13.94
Women Empowerment Cell Room	-
Emergency medical room	15.14
Computer lab	-
GIS lab	-
Training hall	-

2.2.2. Major Findings and Recommendations

Hingalganj Mahavidyalaya, which was established in the year 2005, has an eco-friendly environment. It is very close to Sundarban; so, fresh air can be felt from everywhere. However,

1. Less green cover area is found in the campus, though it has lots of open space but still green belt is very less here. Though outside the campus there is a lot of greenery, still the campus should have at least 20% green belt. The college has a long legacy of healthy environmental practices including periodic plantation, their preservation and maintenance which is very good for sustainable campus management for better and sustainable land use.
2. Girls' common room is not up to the mark, windows are at normal height and without curtain. No attached washroom is present with the girl's common room.
3. Both boys' and girls' toilets are available in the college but it has no proper exhaust system.
4. This college had a cycle stand but that is very small in size.
5. The college has a girls' hostel within the campus, but the height of the boundary wall is very low and there is no separate provision for 24 X 7 security. The kitchen is also not very modern. For cooking purpose still traditional fuel like wood, cow dung cake etc. are being used. There is a temporary uncovered dumping spot for waste disposal in the hostel premises.
6. There is no room for alumni.
7. The playground is very big but there is no stadium or rest room for players.
8. There is no auditorium or indoor stadium in the college.
9. Student's union room is present in the college but as the size is too small, authorities are constructing a new union room in the college campus.
10. There is no multi or mini GYM or career counseling center in the campus
11. There is no separate room for security guard(s).

Recommendations

1. It has 85% open land which can be used for plantation to generate a better and sustainable campus environment. 20% of this area may be used for plantation cover.
2. For Girls' Common Room, it is recommended to allot a new room along with attached washroom and sanitary napkin vending machine and incinerator machine. The windows must be above 7 feet with screen/curtain. For the time being, screen curtains must be used in windows in the present room.
3. It is recommended to install at least 2 exhaust fans for each toilet.
4. It is recommended that the authority must raise the height of the boundary wall and appoint 24 X7 security personnel to strengthen the existing staff.
5. It is also recommended to renovate the hostel-kitchen and use LPG instead of wood and cow dung cake.
6. There must be a permanent dumping pit along with a sustainable composting system
7. There must be a separate room or building for alumni.
8. It is recommended to construct a stadium along with a players' rest room and washroom.
9. An auditorium and an indoor stadium are recommended.



Well ventilated, illuminated classrooms and wide open green space: Two vital and positive features of the campus

BIODIVERSITY AT COLLEGE CAMPUS

Methodology:

1. Random-Sampling adopted as predominant method.
2. The total area was surveyed at day time.
3. Tree species were documented through physical verification on foot and photographed as much as possible.
5. For faunal species direct sighting was prioritized. However, for some cases, circumstantial evidences were also given consideration.
6. Observing mammals depend critically on the size of the species and its natural history. Diurnal species are common and highly visible. Nocturnal species, however, are rare and difficult to detect. In some cases, dung deposits and footprints were also observed that served as a potential clue for the presence and absence of the concerned species.
7. Birds sampling was done on the basis of direct sighting, call determination and from the nests of some bird species.
- B. Reptiles were found mostly by looking in potential shelter sites like the under surface of rocks, logs, tree hollows and leaf litter and also among and underneath the hedges.
9. Amphibians were searched near pond, road beside wetland and in other possible areas.
10. Active invertebrates like the insects require more active search. For larger winged insects like butterflies, dragonflies and damselflies, random samplings were carried and point sampling was also done.
12. Digital photography was done for all the species recorded as much as possible.

2.3 PLANTDIVERSITY OF HINGALGANJ MAHAVIDYALAYA (AS ON 12/12/2018)

Major Findings and Recommendation

1. Hingalganj Mahavidyalaya is within the geo-position between 22.4677° N, 88.9845° E It encompasses an area of about 3.4 acres. As this college is under Sundarban range so the area is immensely diverse with a variety of tree species performing a variety of functions. But within the college campus the amount of green belt is very less.
2. Most of the tree species are planted in different periods of time through various plantation programmers organized by the authority and have become an integral part of the college.
3. As the land where the college is presently located was a paddy field, so no as such indigenous plant species is found, almost all the plants are planted by the college authority. Here in the table the tree diversity is shown.
4. College already has a well-maintained garden of seasonal flower.
5. The college celebrates “Bana Mahotsav”, an annual tree plantation program in the campus where students and teachers plant trees in the campus.
6. Bio-fertilizers are used along with chemical fertilizer.

Table: 2. List of tree species of Hingaljanj Mahavidyalaya

LIST OF FLORA

Sl. No.	Common/local Name	Scientific Name	Family	Number
1	Calendula	<i>Calendula officinalis</i>	Asteraceae	100
2	Sonajhuri	<i>Acacia auriculiformis</i>	Sapindaceae	3
3	Gomari	<i>Gmelina arborea</i>	Lamiaceae	3
4	Mango	<i>Mangifera indica</i>	Anacardiaceae	25
5	Bakul	<i>Mimusops elengi</i>	Sapotaceae	2
6	Neem	<i>Azadirachta indica</i>	Meliaceae	1
7	Java Apple (Jamrul)	<i>Syzygium samarangense</i>	Myrtaceae	1
8	Sapodilla (Sabeda)	<i>Manilkara zapota</i>	Sapotaceae	2
9	Guava	<i>Psidium guajava</i>	Myrtaceae	2
10	Mahogani	<i>Swietenia mahagoni</i>	Meliaceae	125
11	Lambu	<i>Khaya anthotheca</i>	Meliaceae	15
12	Betel Nut	<i>Arecatechu</i>	Arecaceae	100
13	Lemon	<i>Citrus limon</i>	Rutaceae	5
14	Gulmohur	<i>Delonix regia</i>	Fabaceae	1
15	Indian Christmas Tree	<i>Araucaria columnaris</i>	Araucariaceae	1
16	Milkwood-Pine (Chatim)	<i>Alstonia scholaris</i>	Apocynaceae	5
17	Krishnachura	<i>Delonix regia</i>	Fabaceae	1
18	Jackfruit	<i>Artocarpus heterophyllus</i>	Moraceae	1
19	Kamranga (Star Fruit)	<i>Averrhoa carambola</i>		1
20	Debdaru	<i>Polyalthia longifolia</i>	Annonaceae	30
21	Zinnia	<i>Zinnia elegans</i>	Asteraceae	50
22	Jaba (Hibiscus)	<i>Hibiscus rosasinensis</i>	Malvaceae	26
23	Beli (Arabian Jasmine)	<i>Jasminum sambac</i>		1
24	Rose	<i>Rosa</i>	Rosaceae	20
25	Shiuli (Night-flowering Jasmine)	<i>Nyctanthes arbor-tristis</i>	Oleaceae	2
26	Togor (Pinwheel flower)	<i>Tabernaemontana divaricate</i>	Apocynaceae	12
27	Gondhoraj Phool (Gardenia)	<i>Gardenia jasminoides</i>		2
28	Jhau (beach pine)	<i>Casuarina equisetifolia</i>		3
29	Stholopodmo (Chinese Rose)	<i>Hibiscus mutabilis</i>	Malvaceae	2
30	Marigold	<i>Tagetes erecta</i>	Asteraceae	200
31	Chandramallika (Chrysanthemum)	<i>Chrysanthemum morifolium</i>	Asteraceae	70
32	Sunflower	<i>Helianthus annuus</i>		180
33	Dahlia	<i>Dahlia pinnata</i>	Asteraceae	100
34	Petunia	<i>Petunia atkinsiana</i>	Solanaceae	100

PHOTOGRAPHS OF SOME OF THE PLANTS IN THE CAMPUS



CARBON ABSORPTION BY FLORA IN THE CAMPUS

According to European Environment Agency¹, over one year a mature tree will take up about 22 kilograms of carbon dioxide from the atmosphere, and in exchange release oxygen. Each year, 1.3 million trees are estimated to remove more than 2500 tons of pollutants from the air. (<https://www.eea.europa.eu>, 2018)

1. Carbon absorption capacity of 43 full-grown trees in the campus of the Institution ($43 \times 22 \text{ kg CO}_2$) = 946 kg or 0.95 tons of CO_2 per year.
2. The carbon absorption capacity of 336 semi-grown trees is 50% of that of full grown trees. Hence, the carbon absorption ($336 \times 11 \text{ kg CO}_2$) = 3696 kg or 3.7 tons of CO_2 .
3. There are 868 bushes of various species being raised in the gardens of the Institution. Carbon absorption of bush plants varies widely according to the species. Certain bushes absorb as high as 49,000 g CO_2 per plant, whereas some others absorb as low as 150 g CO_2 per plant. In the absence of a detailed scientific study and botanical survey, the per-plant carbon absorption was assumed to be 200 g (in consultation with environment scientists). Based on this, the total carbon absorption of 4420 plants was calculated to be $868 \times 200 \text{ g} = 173600 \text{ g}$ or 173.6 kg or 0.2 tons of CO_2 .

The grand total of carbon absorption by the flora in the campus of Hingal Ganj Mahavidyalaya is $(1 + 2 + 3) = 4.85$ tons per year.

OXYGEN EMISSION BY FLORA IN THE CAMPUS

According to the Arbor Day Foundation, 'a mature leafy tree produces as much oxygen in a season as 10 people inhale in a year'. (<https://www.arborday.org/trees/treefacts/>)

A person breathes 7 or 8 liters of air per minute. Air is about 20% oxygen. But the exhaled air has about 15% oxygen, and hence the net consumption is about 5%.¹

Therefore, a person uses about 550 liters of pure oxygen each day.

Calculation of oxygen emission by flora:

The number of liters in 1 kilogram depends on the density of the substance being measured. Liter is a unit of volume, and kilogram a unit of mass. Liters and kilograms are approximately equivalent when the substance measured has a density of close to 1 kilogram per liter.

On average, one full-grown tree produces nearly 260 pounds or 117.6 kg of oxygen each year. Two mature trees can provide enough oxygen for a family of four.

1. Total oxygen emitted by 43 full-grown trees per year ($117.6 \text{ kg} \times 43$) = 5056.8 kg or 5.06 tons.
2. Total oxygen emitted by semi-grown trees ($58.8 \text{ kg} \times 336$) = 19756.8 kg or 19.76 tons (oxygen emission is 50% of that of the full-grown tree).
3. Total oxygen emitted by 868 bushes is calculated based on the following oxygen-inhaling requirement per person per day. A normal human being requires 550 liters of oxygen per day. 400 bushes produce enough oxygen per day to enable a person to breathe adequate quantity of oxygen of 550 liters. Total quantum of oxygen produced by 400 plants per day is 550 liters of oxygen.

Taking 400 plants as one unit, the number of units of bushes in the campus ($868/400$) = 2.16. Total quantity of oxygen produced by 2.16 units is ($2.16 \times 550 \text{ litres}$) = 1188 liters of oxygen per day.

The annual production of oxygen at this rate (1188×365) = 433620 litres or kg of oxygen, which is approximately 433.620 tons of oxygen.

<u>S.No</u>	<u>Flora</u>	<u>Quantity of CO₂ (Tons)</u>
1	Fully Grown Trees	0.29
2	Semi Grown Trees/Plants	19.76
3	Bushes	0.2
	Total	1.63

Oxygen Emission Table:

<u>S.No</u>	<u>Flora</u>	<u>Quantity of O₂ (Tons)</u>
1	Fully Grown Trees	5.06
2	Semi Grown Trees/Plants	1.14
3	Bushes	433.62
	Total	439.82

Recommendations

We all know that the green belt within the college campus is very significant. The trees of the college can increase the quality of life, not only the college fraternity but also the people around 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 animals are dependent on these trees mainly for food and shelter. Flowers and fruits are eaten by monkeys, and nectar is a favorite of birds and many insects. Leaf – covered branches keep many animals, such as birds and squirrels, out of reach of predators.

1. Planting more trees to increase the amount of green belt.
2. Planting indigenous and local species particularly endangered ones
3. In the girl's hostel campus kitchen garden can be done.
4. It is also advised to plant herbal or medicinal plants, preferably a herbal garden can be maintained within the college campus.
5. Internal lanes in campus should have lawns to increase green cover to facilitate carbon absorption.

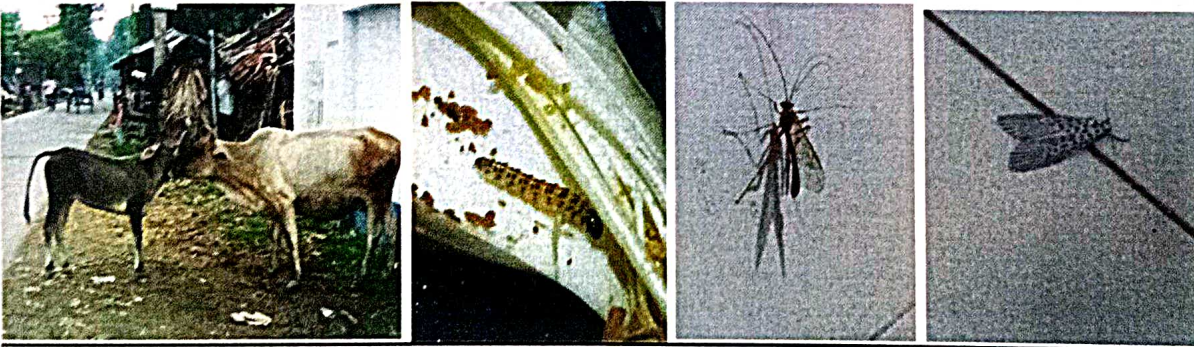
2.4. FAUNAL DIVERSITY IN HINGALGANJ MAHAVIDYALAYA COLLEGE CAMPUS

Hingalganj Mahavidyalaya is located in North 24 Parganas district of West Bengal at the western bank of river Ichamati. The campus falls in the Sub-Tropical climate region, and enjoys monsoon type of climate. The highest temperature is recorded just prior to the onset of monsoon (around May, early May-June). Summer rain is heavy, and is principally observed from late June to August by the moisture-laden South-West Monsoon, on striking the Himalayan foothills of the north. The climatic condition of the North 24 Parganas district as a whole and Hingalganj Mahavidyalaya in particular is very suitable for a wide variety of flora and fauna to support its rich biodiversity. The faunal diversity of Hingalganj Mahavidyalaya campus has been studied and documented.

LIST OF FAUNA

FAUNA GROUP	Scientific Name	FAUNA GROUP	Scientific Name
BIRDS	<ul style="list-style-type: none"> • <i>Anhinga melanogaster</i> (Oriental Darter) • <i>Heliopaispersonatus</i> (Masked finfoot) • <i>Leptoptilosdubius</i> (Greater Adjutant) • <i>Pelargopsisamauroptera</i> (Brown winged King fisher) • <i>Acridotherestrictis</i> (Common myna) • <i>Streptopeliaorientalis</i> (Oriental Turtle Dove) • <i>Athene noctua</i> (Little owl) • <i>Pycnonotuscafer</i> (Redvented Bulbul) 	REPTILES	<ul style="list-style-type: none"> • <i>Ptyasmucosus</i> (Indian Rat Snake) • <i>Calotes versicolor</i> (Oriental Garden Lizard) • <i>Hemidactylus frenatus</i> (Common house gecko) • <i>Eutropismultifasciata</i> (Many Striped Skink) • <i>Enhydrisenhydris</i> (Rainbow water snake) • <i>Xenochrophiscerasogaster</i> (Pain ted keelback) • <i>Boigatrigonata</i> (Indian Gaama) • <i>Bungarus caeruleus</i> (Common Indian Krait) • <i>Najanajakaouthia</i> (Monoocelate Cobra) • <i>Viperarusselli</i> (Russell's Viper)
MAMMALS	<ul style="list-style-type: none"> • <i>Macacamulatta</i> (Rhesus Monkey) • <i>Sciurus carolinensis</i> (Eastern Gray Squirrel) • <i>Pteropusgiganteus</i> (The Indian Flying fox) • <i>Rousettus leschenaultia</i> (Indian fulvous fruit bat) • <i>Bandicotabengalensis</i> (Indian mole rat) • <i>Mus booduga</i> (Little Indian field mouse) • <i>Feliscatus</i> (Cat) 	BUTTERFLIES	<ul style="list-style-type: none"> • <i>Euploea crameri</i> (Spotted Black crow) • <i>Colotis amata</i> (Small salmon arab) • <i>Junoniaalmanac</i> (Peacock Pancy) • <i>Junoniaatlites</i> (Grey Pancy) • <i>Mycalesisperseus</i> (Common Bush Brown) • <i>Papilioclytia</i> (Common Mime) • <i>Papiliopolymnestor</i> (Blue Mormon)
AMPHIBIANS	<ul style="list-style-type: none"> • <i>Duttaphrynusmelanostictus</i> (Common Indian Toad) • <i>Euphlyctiscyanophlyctis</i> (Skipper Frog) • <i>Fejervaryalimnocharis</i> (Paddy Field Frog) • <i>Hoplobatrachustigerinus</i> (Common Indian Bull frog) • <i>Euphlyctishexadactylus</i> (Indian Green Frog) 	MOTHS	<ul style="list-style-type: none"> • <i>Eressadiscinota</i> • <i>Amsactaemittens</i> • <i>Paralleliaonelia</i> • <i>Auchavelans</i> • <i>Thoseacana</i>
OTHER INSECTS **AQUATIC BUG	<ul style="list-style-type: none"> • <i>Lethocerus indicus</i> • <i>Diplonychusrusticus</i> • <i>Laccotrephes griseus</i> • <i>Hydrometra butleri</i> • <i>Chrysocoris purpureus</i> • <i>Cantaoozellatus</i> • <i>Viliusmelanopterus</i> • <i>Acanthaspismicrographa</i> • <i>Dolycoris indicus</i> 	SPIDER	<ul style="list-style-type: none"> • <i>Araneusellipticus</i> • <i>Leptyphantes sp.</i> • <i>Draposa sp.</i> • <i>Oxyopusshweta</i> • <i>Menemerus sp.</i>

PHOTOGRAPHS OF SOME ANIMAL SPECIES IN AND AROUND THE CAMPUS



2.5 ELECTRICAL POWER CONSUMPTION AT HINGALGANJ MAHAVIDYALAYA

Major Findings and Recommendations

1. Hingalganj Mahavidyalaya is one of the biggest educational institutions of Sundarban area. The college consumes on an average 18225kWhr (units) of electricity per year only to maintain its volumetric activities throughout the year.
2. There have no solar LED lights only old filament bulbs, CFL bulbs and tube lights present in the whole campus area.
3. The college authority is planning to install solar lights to decrease the conventional power consumption.
4. The campus has a 20KV Generator as backup power supply.

Appliance List of Main Campus

S.No	Appliance	Wattage	Units	Total	S.No	Appliance	Wattage	Units	Total
1	Halogen Bulb	400	1	400	8	Air Conditioner	1800	5	9000
		100	1	100	9	Computer	200~	14	2800
		50	1	50	10	Printer	100~	6	600
2	Filament Bulb	100	27	2700	11	Photocopier	300	1	300
3	Tubelight	40	125	500	12	Induction Oven	1200	3	3600
4	CFL Bulb	40	2	80	13	Refrigerator	200	1	200
		23	2	46	14	Projector	150	1	150
		18	15	270	15	Audio System Box	200	4	800
5	Ceiling Fan	65	80	5200	16	College Bell	20	1	20
6	Pedestal Fan	120	6	720	17	Laptop	50	1	50
7	Wall Mounted Fan	65	13	845	18	Water Pump	3000	3	9000

Appliance List of Hostel

S.No	Appliance	Wattage	Units	Total
1	Bulb (CFL)	18	7	126
2	Tube	40	26	1040
3	Ceiling Fan	65	24	1560
4	Stand Fan	120	1	120
5	Water Pump1HP	3000	1	3000
6	Exhaust Fan	65	1	65
7	St Light	23	6	138

Total Power Liability: 37431 W + 6049W =43480 W

One-unit equals 1000 watts (1 kW hr.). It requires 0.538 kg or approximately ½kg of coal to produce 1 unit of electricity. The total quantity of coal required to produce 18225 units of electricity (18225×0.538 kg coal) = 9805.05 kg or 9.8 tons.

CO₂ emission by coal: One kilogram of coal emits 2.86 kg of CO₂, thereby increasing the carbon-foot print which in turn contributes to global warming.

Therefore, 9.8 tons of coal consumed indirectly by the Institution through consumption of 18225 units of electricity led to the emission of (9805.05 kg of coal \times 2.86 kg CO₂) 28042.44 kg or 28.04 tons of CO₂ into the atmosphere.

Additionally, the Generator adds to the burden of carbon emission.

The positive factor in this regard is that the college does not own any transport vehicles, to arrange conveyance for students or staff. Taking into consideration that the College is located along the road parallel to Hingalganj - Lebukhali main road and the availability of adequate public transport system, the College Management has taken a principled stand right from the beginning to encourage students and staff to use the public transport system to reduce carbon emissions. A spacious cycle stand is available within campus.

Recommendations

1. It is suggested to install solar panels as early as possible.
2. It is also advised to replace the old filament bulbs, CFL bulbs and tube lights by low energy consuming LED bulbs and LED tubes and bulky high-power consuming fans by energy efficient fans in order to keep the electricity consumption of the college as low as possible.

2.6 Water Use and Water Management

Major Findings and Recommendations

Water audit is an on-site survey and assessment to determine the water use and hence improving the efficiency of its use.

1. The study observed that Well and Government supply are the two major sources of water.
2. Water is used for drinking purpose, canteen, toilets and gardening.
3. During the survey, no loss of water is observed, neither by any leakages, or by over flow of water from overhead tanks.
4. The data collected from all the departments is examined and verified. On an average the total use of water in the college is 5000 L/day. Water for gardening is obtained from underground well.
5. No rain water harvesting units are found during the survey.
6. Gardens are watered by traditional irrigation system, there is no drip irrigation system to conserve water.
7. Drinking water comes from PHE (Public Health Engineering) supply station (*Sandeler Bill*)
8. The quality of other water source (Tube well) is very bad and full of salinity and it may have risk of arsenic concentration above permissible levels. So, this water is not used for drinking and gardening.
9. One RO filter is present in faculty room but only for staff, students drink only the supply water.
10. Two Over-head tanks of 2500 Liter water holding capacity are present in the college
11. Regular checking and maintenance of pipelines are done to control water wastage.
12. Approximate per capita average consumption and usage per day is 6.6 L of water.

Recommendations

1. It is recommended to construct a roof water harvesting system to arrest the rain water and this water may be used in toilet and garden.
2. Rain water harvesting coupled with ground water recharge well is recommended to benefit ground water level.
3. Drip irrigation system must be practiced in the campus.
4. RO filtered water must be provided to students.
5. In campus small scale/medium scale/large scale reuse and recycle of water system is necessary.
6. Awareness camps and seminars in collaboration with in-house NSS unit or local authorities may be conducted annually to increase awareness for water conservation.
7. Water testing at regular intervals is recommended.

Water Outlet Points

S.No	Location	Number of outflow points
1	Staff Toilet (Male)	10
2	Staff Toilet (Female)	7
3	Students' Toilet (Boys)	13
4	Students' Toilet (Girls)	7
5	Staffroom Basin	2
6	Drinking Water Area	6
7	Girls' Hostel	18



(Already existing NSS set-up may be used to conduct awareness programs on water recycling and conservation)

2.7. Waste Generation

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, biodegradable, construction, glass, dust etc. and recycling. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone. The survey focused on volume, type and current management practice of solid waste generated in the campus. The different solid wastes collected as mentioned above.

a) Observations

1. The total solid waste collected in the campus is 3 Kg/day. Waste generation from tree droppings and lawn management is a major solid waste generated in the campus.
2. There is no process of waste segregation at source by providing separate dustbins for Bio-degradable and Non- Bio-degradable waste.
3. The college does not have any recycling device to carry on the procedure.
4. The college has no vermi-compost plant that ensures proper treatment of all organic wastes.
5. Single sided used papers are reused for writing and printing in all departments.
6. Very less plastic waste (0.1Kg/day) is generated by some departments, office, garden etc. but it is neither categorized at point source nor sent for recycling.
7. 10 large sculpted-motif dustbins are present in campus corridors and 10 small dustbins are there in offices and faculty room.



b) Recommendations

1. Reduce the absolute amount of waste that it produces from college staff-offices.
2. It is advice to install a vermi-compost plant in the college.
3. The waste has to be segregated at source by providing separate dustbins for Bio-degradable and Plastic waste.
4. Provide sufficient, accessible and well-publicized collection points for recyclable waste, with responsibility for recycling clearly allocated.
5. Single sided papers to be used for writing and photocopy.
6. Important and confidential papers after their validity to be sent for pulping.
7. The campus area should preferably be declared as a "No Plastic Zone", discouraging use of plastic, especially beyond the permissible micron. Use of single use plastic in campus should be absolutely banned.

2.8. E-Waste Generation

E-waste can be described as consumer and business electronic equipment that is near or at the end of its useful life. This is much more hazardous than other waste because electronic components contain cadmium, lead, mercury, and Polychlorinatedbiphenyls (PCBs) that can damage human health and the environment.

Observations

1. E-waste generated in the campus is very less in quantity.
2. The cartridges of laser printers are refilled outside the college campus.
3. Administration conducts theawareness programs regarding E-waste Management with the help of NSS and IQAC.
4. The E- waste and defective items from computer laboratory are beingstored properly for future disposal.

Recommendations

1. Recycle or safely dispose of white goods, computers and electrical appliances.
2. Use reusable resources and containers and avoid unnecessary packaging where possible.
3. Always purchase recycled resources where these are both suitable and available.



*Cleanliness Program (Swachh Bharat) by NSS (Left) and Awareness Seminar on Environment (Right) :
Effective ways to spread awareness and instill core values of waste management and cleanliness.*

2.9 NOISE PROFILE

NOISE LEVEL IN AND AROUND HINGALGANJ MAHAVIDYALAYA

Noise pollution, also known as **environmental noise** or **sound pollution**, is the propagation of **noise** with harmful impact on the activity of human or animal life. The source of outdoor **noise** worldwide is mainly caused by machines, transport (especially planes) and propagation systems. There are two basic properties of sound, (1) loudness and (2) frequency.

Loudness is the strength of sensation of sound perceived by the individual. It is measured in terms of Decibels. Just audible sound is about 10 Db, while that of rocket engine is about 180 dB. The loudest sound a person can stand without much discomfort is about 80 dB. Sounds beyond 80 dB can be safely regarded as Pollutant as it harms hearing system. The WHO has fixed 45 dB as the safe noise level for a city. For international standards a noise level upto 65 dB is considered tolerate.

Frequency is defined as the number of vibrations per second. It is denoted as Hertz (Hz).

OBJECTIVES OF THE STUDY

- To assess the impact on human work efficiency due to different noise indices, and attitudinal response.
- To study the temporal pattern of road traffic in the study area.
- To study the existing status of noise levels in the study area by recording the noise intensity at various locations.
- Identification and consideration of suitable mitigation and abatement measures.

Methodology and Major Findings

Noise level meter or noise measuring app, Sound Meter and Noise Detector (version: 2.9.2), was used to measure the noise level. **Sound Meter and Noise Detector** is a participatory noise sensing application launched in 2016 by Tools Dev.

MEASUREMENT PROCEDURE

The noise level was recorded from the road, commercial and domestic premises located in and around the campus area. At different selected sites of the College, noise level is measured. At each spot, the measurements were taken for 60 seconds during day time (6 AM- 6 PM) twice

and recorded. Screen shots of the measurements of noise were taken immediately on the app at the time of 60th second of each measurement.

Major Findings

PLACE	MINIMUM dBA	MAXIMUM dBA
CENTRAL COURTYARD	23.06	30.06
PLAYGROUND	30.09	32.05
GENERATOR ROOM	10.10	80.09
MAIN OFFICE	15.89	20.87
FACULTY ROOM	6.08	12.07
MAIN GATE	30.67	34.09
HOSTEL AREA	12.98	27.09
TERRACE	12.09	25.99
CLASSROOM (DURING LECTURE)	15.90	20.88
CLASSROOM (OFF PERIOD)	23.98	34.77
GIRLS' COMMON ROOM	10.87	15.75
BOYS' COMMON ROOM	12.78	20.67
OUTDOOR GARDEN	10.56	23.78

Source: Data collected and recorded by students of Geography Department (Sem II)

The Noise Range detected was:

Inside Campus: 0-80 db. Outside Campus: 25-80 dB (depending mostly on traffic)

CONCLUSION

Conclusion

The Green Audit Team has made every effort to record environmental data of Hingaljan Mahavidyalaya as far as practicable. However, the report is only primarily based on generalized study of existing scenario. The college, being an undergraduate college at its nascent stages of development, there is a huge potential to channelize future developments toward sustainable growth.

The process of auditing has a dual effect. First, it allows the institution to understand its value as an institution in terms of environmental impact. Second, the process itself generates an awareness in the staff and students who realize the value of conservation, tree plantation and waste management not just in qualitative but in quantitative terms. Quantification of data ensures better planning to set time-bound and feasible landmarks.

The Internal Quality Assurance Cell has shown absolute solidarity with the Team and has assured that the recommendations put forward by the Audit Team would be considered as priority. Some of the recommendations have already been considered and discussed for immediate implementation. The Team advises the IQAC to process and prepare a Post-Audit Development Report within the next six months to show progress in the area.

The on-site Data is collected mostly through direct recording. Weather Reports and satellite data is collected from authentic Government/Standard Web-sources as and when required. Any error in data is deeply regretted as unintended.

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