

GREEN AUDIT REPORT

2017-18



DAMDAMA COLLEGE

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THE GREEN AUDIT is an attempt to identify, quantify, record, analyze and report the environmental diversity of a select area.

The Damdama College is situated in an environmentally rich and prosperous region. Therefore, on the backdrop of the ensuing challenges all over the globe towards sustenance of ecological balance, such audits are the acts of enormous importance. Because they can be very authentic accounts for their penetrative focus in a micro region; and also because they can be immensely effective as an elementary but substantial weapon to sensitize the folks about the present and the future alike vis a vis the environmental issues. Such an act, in this way, may be one significant, meaningful contribution towards the mankind in present scenario.

The Damdama College is on **26°14'48'' NL and 91°34'54'' EL**. the north bank of the Brahmaputra River and surrounded by several patches of small hills and hillocks in the region. There is Alaboi patch of hills on the east, the hillocks like Boromboi Pahar, Duoni-Muwoni on the north, the Godurachal Pahar on the west, south –west; The Kulhati Pahar, the Bangshar Pahar, Dampurpahar, on the south and south east direction. It is situated on a spot wherefrom the aerial distance to the mighty Brahmaputra River is about 5KMs to the south, to the Puthimari River is about 1.5 KMs to the north and to the Sessa Noi about 600 meters to the south east.

The geographical versatility in the region has significant bearing on the flora and fauna in the locality around the college in general and the campus of the college in particular.

But on the other hand, accomplishment of such potentialities is not at all without challenges. One big challenge is urbanization. With the inauguration of the new Saraighat Bridge, and due to the natural barriers that exist on the other sides of the city, further expansion of the metropolitan city of Guwahati is tending towards the north Bank of the Brahmaputra River. Already several natural water reservoirs on this side have been converted to office and residential complexes.

Efforts for maintaining ecological balance in the campus of the college gets added importance on this context, as it unveils a different dimension on this paradigm.

Also that, the College shares its boundary on the north with the state highway that connects Guwahati with important towns like Hajo, Nalbari, and Barpeta etc. This road is going to be elevated to the rank of the National Highways soon and already accorded the National Highway Number 427. As the connecting link between these important towns with Guwahati, this road is already one of the busiest in the state. With its elevation in future, the quantum of traffic is certainly going to magnify in coming times. The challenges of noise and air pollution are the by-products of busy road traffic and the College is going to face steeper challenge on this front in the coming times, which already exists by a formidable proportion.

Another environmental challenge experienced globally is the case of deforestation. As per the India State of Forest Report 2017, released by the Ministry of Environment, Forest and Climate Change published last February (2018), all the top five states in India losing forest cover in the state are from the North East. In Assam also, there has been continuous decline in the forest cover. At the same time the global leaders are struggling to find a balance between politico-economic interests and ecological issues to which raising the forest cover could have been a viable and sustainable solution for the mankind; so also for Assam. Maintaining a green campus in the college may be a way to sensitize the youth and inculcate the modern values in them favoring preservation and up gradation of the bounty of the nature besides being useful in its own right.

PRESENT CONDITION IN THE CAMPUS:

The report focus upon the following areas subject to the campus of the college-

- (i) Plantation
- (ii) Ground water level
- (iii) Rain water harvesting
- (iv) Power saving system
- (v) Waste management
- (vi) Birds in the campus
- (vii) Air and sound pollution
- (viii) Soil condition

(i) PLANTATION

The campus of the college is built upon an originally marshy land. Except the long stretch along the road passing by the northern boundary of the campus, most of the land area accorded to the college was basically a deep gorge. An area of more than 35000 sq. meters in the campus can still be seen lying in its original form. Therefore, except along the north boundary, the plantation in the campus is relatively new.

Plantations are categorized as per their location in to three parts. Those in the front part are likely to be stable in future. But it is likely to change in the middle part, after the current developmental activities in this portion is over. In the rear part of the campus, the land is not in a suitable condition for further plantation as of now. It may only subsequently happen to some earth filling on there.

TABLE NO: 1

FRONT SIDE			
SL NO	LOCAL NAME	SCIENTIFIC NAME	QUANTITY
1	AMLOKHI	Emblica Officinails Gaertn	1
2	HILIKHA	Temunalia Chebula	2
3	MUMAI TAMUL	Areca Gracilis	3
4	DEVADARU	Polyalthia longitolia Pendulus	4
5	EUCALYPTUS	Eucalyptus Globulus	1
6	ACACIA	Acacia Verticillatum	1
7	BOTTLE BRUSH	callistemonViminalis	4
8	XIRIX	Albizila lebbek	2
9	RONGA CHANDAN		2
10	MODHURI	Psidiumguajava	1
11	BOKUL	Mimosopselengi	1
12	XEWALI	Nyctanthes arboristris	N
13	BELL	Aergle Marmelos	1
14	PATA BAHAR	Codiaeum VariegatumCrispum	6
15	DALIM	Punica Granatum	1
16	PINE	Pinus Kesiya	1
17	BOKUL	Mimosops Elengi	1

TABLE NO.: 2

B. MIDDLE PART			
1	NIMM	Azadiracta Indica	22
2	NARIKOL	Cocokucifera Areceae	2
3	KHEJUR	Phoenix Sylvestris	1
4	KARABI	Nerium oleander	4
5	DEVADARU	Polyalthia longitolia Pendulus	6
6	AMLAKHI	Emblica Officinails Gaertn	1

TABLE NO:: 3			
C. REAR PART			
1	GHURA NIMM	Melia Azedarach	8
2	NARIKOL	Cocoskucifera Arecaceae	6
3	AMARA	Spondias Mangifera	2
4	GORU HADA		2
5	BHELKAD	Trewanudiflora	4
6	BOGORI	Zizyphus Jujuba	3
7	OMITA	Carica Papaya	2
8	XIRIX	Albizila lebbek	4
9	KODOM	Anthocephalus Cadamba	4

The sprawling campus of the college leaves enough space for systematic plantation all over. Care should be taken for plantation of the fruit plants like, mango, plum, guava, litchi, which can yield food for birds, recreational support to the students apart from the regular ecological benefits.

Hadgila is one of the most endangered species of birds in the world. The Alaboi Pahar is one of the very few natural habitats of this bird species. There is a plan for plantation of KODOM GOSS in the campus in future. it is expected to help in terms of the regular ecological dimensions apart from extending the habitation area for the said species if bird.

A botanical garden with special consideration to medicinal plants and a horticultural area reflecting the local agro economic features- within the campus could be developed without much toil.

(ii) GROUND WATER LEVEL:

As per the ‘Ground Water Information Booklet of Kamrup and Kamrup Metro District, Assam’(September,2013) prepared by the Central Ground Water Board, NE Region under the Ministry of Water Resources, the depth of ground water in the Kamrup District ranges between 50-300 meters.Storability is reported to be 2.17×10^{-3} to 8.6×10^{-4} S. The net annual ground water draft is estimated to be 715.97 MCM. The demand for domestic and industrial use is expected to be 105.16 MCM by 2025. Ground water availability for future irrigation is estimated as 912.64 MCM. The stage of ground water development is found to be 43%. Studies (Bakshi and Roy, 2014) reveal that ‘In northern bank, due to deep weathering profile and mono aquifer system, water-bearing formation exists right from ground level to more than 200metres. Hence ground water can be developed at shallow depth within 30 metres. Depth to water level lies within 2-5 metres in the flood plain and alluvial planes.’ Further that, ‘the study of long term water level trend shows no significant change in rise/fall in water level in the last 10 years.’ The district is placed under ‘safe’ category in case of ground water. The same report recommends use of shallow tubewells, deep tube wells and ring wells for extraction of water to meet the drinking and other requirements of limited quantities of individual households etc.

As of now, no separate study has so far been conducted for assessing the ground water condition subject to the campus of the College.

The Damdama College has two functioning deep tubewells in the campus for extraction of ground water for meeting its daily requirements of about 500 liters per day.

But, on the other side it is making significant contribution towards maintenance of the ground water in the region by the massive pond that exists in the south western corner of the Campus. It spreads over a 3 acre area. Water in the pond remains intact more or less at the same level throughout the year. And by that it helps maintaining the ground water level in the surroundings. It is because of this that the greeneries in the college campus as well as beyond remains relatively fresh and lively all around the year.

(iii) RAIN WATER HARVESTING:

The region in which the college is situated is rich in rainfall. As per the report (2012) by the ministry of water resources the climate of the area has been classified as sub-tropical humid climate with heavy rainfall, hot summer and high humidity. Average temperature ranges from 12 to 38°C during the year. In winter, temperature ranges from 15 to 25°C during day and 8 to 15°C during night. The summer temperature ranges from 25 to 38°C during day and 15 to 25°C during night. Average annual rainfall of the district is 1752 mm and co-efficient of variation is 15.3%. The annual normal rainfall of the district as compiled from IMD data is 2125.4 mm with 96.5 rainy days.

As per the data recorded at the Regional Rain fed Lowland Rice Research Station (RRLRRS) situated at Geruah, which is only about a few hundred meters of Aerial distance from the college campus, the total number of rainy days in here is 105 days in 2017. Total rainfall during the year was 2025.4 mm. So the number of rainy days in the area was roughly 10 days more than the normal figure for the district, where as the quantity of rainfall was about 10 cm less. The standard deviation in inter-month rainy days is 7.4 where as the standard deviation in total rainfall quantity is 153.4. The April-July period received 64% of the rainfall. The period covering the two quarters from April to September received 90% of the rainfall. Considering the close proximity between the two campuses we reproduce below the data received from the RRLRRS as valid for the Damdama College campus also.

RAINFALL IN DAMDAMA COLLEGE CAMPUS IN 2017

MONTH IN 2017	NO OF RAINY DAYS	TOTAL RAINFALL (mm)	AVERAGE RAINFALL PER DAY (mm)
January	00	0.0	0.00
February	02	34.3	17.15
March	08	44.0	5.50
April	21	437.4	18.23
May	17	252.0	14.82
June	15	311.7	20.78
July	14	281.9	20.14
August	09	208.5	23.17
September	14	326.4	23.31
October	05	127.1	25.42
November	00	2.1	α
December	00	0.0	00.00
TOTAL	105	2025.4	

Therefore the rainfall amount on the Damdama College campus can be roughly estimated to be around 64000 m³ in the year. That is a huge amount. As of now, there is no systematic process for harvesting this huge reservoir. But the pond that spreads over an area of around 3acres of land inside the campus serves as a natural support to it. The natural gradient that appears downward towards the pond helps the process of accumulation of rainwater in there.

(iv) POWER SAVING SYSTEM:

The campus of the college receives rich amount of sunshine around the year. So there is a huge prospect for using non-conventional energy sources for generation of power in the campus. As of now, however, no such system for using the solar power exists in here. Different power consumption sources in the campus are enumerated below.

A. NORTH-SOUTH BLOCK ALONG THE EASTERN BOUNDARY:

Length of this block is of 70 meters and comprises of 8 numbers of rooms. It contains 1 motor connection, 1 inverter, 2 CCTV, 17 computers with printers in 5 of them, 1 biometric machine and 1 Xerox machine, apart from a number of regular electric appliances like bulbs, fans and charging points- which are activate almost round the clock during the office period.

B. NORTH-SOUTH BLOCK ALONG THE WESTERN BOUNDARY:

The block is 54 meters in length and comprises of 9 numbers of rooms. There is one CCTV connection, apart from which there a number of ordinary electrical appliances like fans and lights operational in this stretch.

C. EAST-WEST BLOCK:

This block runs parallel to the state highway along the northern boundary. Its length is of 75 meters and it includes two sub sections. In the eastern part of them there are two rooms and the western segment has 6 rooms. There is one computer one CCTV apart from the other regular appliances.

D. REAR SIDE BLOCK:

This section was relatively new. It has altogether 9 numbers of rooms. These rooms are used either as teachers Common Rooms or as Classrooms. All the electrical applications in this block are of regular variety only. There is one CCTV connection in this block also.

The total electricity consumption by the college over the year of 2017 is as follows--

The electricity consumption statistics of the College over the last year is as follows..

Month (2017)	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov.	Dec.
Electricity Consumed	255	230	255	246	255	246	255	255	246	255	246	255

A number of efforts could be undertaken for curtailing the energy consumption without compromising on the utility and productivity.

Systematic effort should be undertaken for replacement of the bulbs by LED for power consumption purpose. Awareness drives among the faculty and students for economizing on the use of the electronic facilities are also need of the hour.

Conversion to solar power should be the long term objective in this case. For effective use of solar power, the solar panels require to have sufficient supply of sunshine. Availability of at least 4 hours of bright sunshine is best for the solar panels. Bright sunshine is defined by 1000 watts of photovoltaic power per square meter. Data collected at the RLLRRS, Geruah show that in 2017, the average number of hours of bright sunshine in the area was 5.3 hours. The bright sunshine hours in each month was considerably above the 4 hour mark, except for September, when it was only slightly less. Therefore the College is in a very convenient position to use solar power as a source of energy, which in ultimate cost-benefit analysis shall be a highly rewarding exercise. Apart from the regular benefits in financial and

environmental terms, the college can earn a few brownie- points by this exercise in the locality as the pioneer institute converting to solar power and thereby become a roll model.

BRIGHT SUNSHINE AVAILABLE IN DAMDAMA COLLEGE CAMPUS

MONTH IN 2017	TOTAL BRIGHT SUNSHINE HOURS	AVERAGE BRIGHT SUNSHINE HOURS
January	181.9	5.9
February	161.8	5.8
March	161.1	5.2
April	145.3	4.8
May	164.0	5.3
June	132.9	4.4
July	139.2	4.5
August	144.8	4.7
September	115.8	3.8
October	177.1	5.7
November	226.4	7.5
December	186.4	6.0
	1936.7	5.3

SOURCE: RLLRRS, BGERUAH

Further, local monitoring for curtailing on the misuse of electricity also can save electricity to a significant extent.

(v) **WASTE MANAGEMENT:**

Careless discarding of solid wastes is a commonsite in the campus. Proper allocation of dustbins all over the campus as well as awareness drives along with engaging administrative dictate could have helped the scenario to improve substantially.

The number of dustbins used in various parts of the campus is as follows...

Place	NORTH-SOUTH BLOCK ALONG THE EASTERN BOUNDARY	NORTH-SOUTH BLOCK ALONG THE WESTERN BOUNDARY	EAST-WEST BLOCK:	REAR SIDE BLOCK
No. of dustbins	6	0	0	1

Obviously, the dustbins in the campus are insufficient and unevenly distributed. The pattern of distribution shows clear lack of purpose for improving the habit of cleanliness among the pupils of the college. Over the entire stretch of the blocks having class rooms, not a single dustbin can be seen. So clearly, a lot remains to be achieved on this aspect.

Both bio-degradable as well as non-bio-degradable solid wastes are produced in the campus of the college. The bio degradable wastes are basically produced in the canteen and the non-biodegradable wastes are produced during the office activities and around the common rooms of the faculties and the students. Land filling is the general waste management strategy adopted by the College and there is no management plan for managing inorganic waste, especially plastics. The amount of bio degradable wastes are meager in quantity and the thought of establishing projects like bio-gas plants are therefore not been paid a serious thought as of now. However avoidance of flex banners, plastic tea cups in social functions and academic programmes in the campus can be a positive step in this direction. Declaring the campus as a plastic free zone and its strict implementation also will deliver a strong message in this aspect.

(vi) **BIRDS IN THE CAMPUS:**

As per the experts, as many as 1288 species of birds are available in India. Out of them 696 species are available in Assam. 171 of them are of migratory type, and 515 are of local variety.

Out of them, different varieties of local and migratory birds are observed in the campus of the college. Some of them are seen around the year and the migratory birds appear during appropriate season. An indicative list of them, mentioning the frequently observed varieties only, can be prepared as below-

SOME FREQUENTLY SEEN LOCAL/MIGRATORY VARIETIES

Sl.No	Local Name	Scientific Name	Sl.No	Local Name	Scientific Name
1	Xamuk bhonga	Open billed stork	12	Kupti	Dove*
2	Pani bogoli	Little egret*	13	Gharchirika	House Sparrow*
3	konamusori	Paddy bird*	14	Xalika	Common Myna*
4	Gu-bogoli	Bubulcus Ibis	15	Moina	Hill Myna*
5	Massoruka	Kingfisher	16	Dauk	
6	Barhoituka	Dinopium benghalem	17	dahikatara	Magpie Robin
7	Pani kauri		18	Bulbuli	Redvented Bulbul
8	Pati kauri	House crow	19	Dhura kauri	Jungle crow
9	bhatou	parrot	20	Lakkhee fessa	Barn owl
10	xorali		21	hadgila	
11	kuli		22	keteki	

Plantation of the fruit-plants in the campus can enhance ecological quotient of the campus along with supporting the birds.

(vii) AIR AND SOUND POLLUTION:

The Damdama College is a receiver, not contributor to air and sound pollution in general. The state highway passing by the northern boundary of the college is one of the busiest streets in the state which is soon going to be elevated to the ranks of the national highway. It has been already awarded the number 427 in hat national roster. Total vehicle passing on average per hour is as follows during the college hour.

VEH. PER HOUR ON AVG.	TIME	VARIETY				
		2 WHEELER	3 WHEELER	4 WHEELER	6 WHEELER	MORE THAN 6 WHEELERS
	9-10 AM	792	168	276	48	-
	10-11 AM	864	216	528	24	-
	11-12 AM	876	324	216	24	-
	12-1 PM	876	276	300	36	-
	1-2 PM	792	300	300	24	-
	2-3 APM	660	204	420	24	-

Source: Survey Conducted by the Students of 5th Sem., Dept. of Economics, 27.08.2018.

The transport sector now contributes 25% all carbon dioxide (CO₂) emission released to the atmosphere around the globe. Almost 80% of them are from road transport. In India the total distance of passenger kilometers travelled over the country is roughly estimated to be around 18 trillion kms in 2017. Total estimated emission of the CO₂ from the road transport is 540 million metric ton. Therefore the average passenger km per kg of emitted CO₂ is 34 in India. (Data reproduced/estimated from Sanjay Singh, 2008). The survey conducted on the study area shows that on average 24 numbers of vehicles pass through the front of the college per minute. Total travel distance covered by such vehicles through the front of the college during the college hours (9am-3pm) was found to be 85.68 kms per day. Accordingly, the amount of CO₂ emitted by such vehicles is 2.52 kg per day. The national average growth rate of carbon emission from increase in road traffic per annum is 5.7%. Accordingly this amount of emission is also bound to increase with every year.

Adequate plantation on the front part of the campus only can help the atmosphere in the campus withstand to this serious challenge that is assuming formidable proportion with every passing year.

(viii) SOIL CONDITION : As per the investigation conducted by Geotech & Civil Engineering Consultancy Pvt. Ltd based on data collected on 14.12.2017, the constituting elements of the soil in Damdama College Campus at various depths are as follows

Depth (m)	Clay (%)	Silt (%)	Fine Sand (%)	Medium Sand (%)	Coarse Sand (%)	Gravel (%)
3.0	53.89	24.76	21.35	---	---	---
4.5	45.62	21.53	28.59	4.26	---	---
7.5	43.26	18.64	29.13	8.97	---	---
10.5	43.19	21.48	23.80	11.53	---	---
13.5	46.25	19.72	25.31	8.72	---	---

Suggestions and recommendations:

Some tangible initiatives for improving the status of the environment in the campus could be mentioned as follows. Some of them got mentioned also during the body of the analysis.

1. The pond in the campus could be periodically cleaned especially for convenience of the migratory birds. Without harming the ecological substance, the pond could be used for pisciculture for earning some revenue for the college.
2. Plantation in the campus should be systematically and substantially increased as there are enormous amount of open space available in the campus.
3. Special attention should be paid for plantation of fruit trees like mango, litchi, banana, coconuts, guava etc. which will help the birds and also enhance the quality of recreational time of the students in the campus.
4. Plantation of the KODOM GOSS' is a welcome vision of the college authority as it will help in expanding the habitat for the hadgila which is one of the most endangered species of birds around the world; and thereby it will render a great service to the mankind.
5. Incineration should be constructed for garbage management. Construction of a vermicompost preparation plant shall serve the dual objective of managing the bio-degradable in the campus as well as producing some resources at the same time.
6. Proper care should be taken for developing adequate drainage facility within the campus simultaneously to the construction of new buildings.
7. The campus should be declared as plastic free zone and should be enforced as soon and as strictly as possible.
8. Systematic effort should be undertaken for converting to the use of solar power as the source of energy.
9. Number of dustbins in the campus should be increased.
10. Methodical and scientific process should be undertaken for rainwater harvesting.

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