

Green Audit Report

2021-2022

Mangaldai Commerce College



Prepared By: -

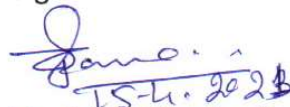
*Green Audit team,
Mangaldai Commerce College,
Mangaldai, Darrang, Assam,
Pin- 784125.*

Certificate

This is to Certify that Mangaldai Commerce College, Mangaldai, Darrang, Assam-784125, has prepared a green audit report for the year 2021. After going through the report I have visited the college campus and made a study of the various provisions as shown in the report and found everything correct. The college has maintained eco-friendly campus. The College also involved in awareness activities on environment and biodiversity etc, within and outside the campus. The overall assessment of the contribution of the College towards of protection at environment as satisfactory.

I wish all the success and bright future of the institution.

Signature.



Dr. Gajen Chandra Sarma
Retd . Professor
Dept at Botany
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Dr. Gajen Ch. Sarma
Curator & Research Guide
Deptt. of Botany,
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Acknowledgement

IQAC and green audit assessment team special thanks Mr. Pankaj Kr Saha, principal of Mangaldai Commerce College, Mangaldai for assigning the task of green audit of this college to us.

I appreciate the co-operation that we got from the faculties, staff and students, NSS volunteers during the data collection, photography and entire process of preparation of the report.

The green audit team specially thanks retd. prof. Dr. Gajen Chandra Sarma, Gauhati University, Dept of Botany while identifying the plants in the college campus.

The green audit team also thanks office of the Executive Engineer (PHE) Mangaldai Division, Mangaldai, Darrang (Assam).

I also thanks Sri Mrinmay Baruah, energy auditor for conducting energy audit of our college.

Lastly, I thank all my audit members, NSS volunteers, members of eco club and special thanks to Md. Sabibar Rahman, Asstt. Prof., Mangaldai Commerce College for their valuable contribution in this project.

Dr. Hemanta Chakravarty
IQAC (Coordinator),
Mangaldai Commerce college,
Mangaldai, Darrang, Assam-784125

Disclaimer

Mangaldai Commerce College, Green Audit team has prepared this report on the basis of primary data collected from different adjacent areas including the college campus. All reasonable care has been taken in its preparation. Details contained in this report have been compiled in good faith based on information gathered.

Members of Green Audit

Sl. No.	Name of Audit Member	Designation
1	Sri. Pankaj Kumar Saha (Chairman)	Principal, MCC
2	Dr. Hemanta Chakravarty (Co-Ordinator, IQAC)	Asstt. Professor, MCC
3	Sri. Prabodh Sarma	Asstt. Professor, MCC
4	Sri. Kamaleswar Deka	Asstt. Professor, MCC
5	Md. Sabibar Rahman	Asstt. Professor, MCC

Sl. No.	Name of External Audit Member	Designation
1	Dr. Gajen Chandra Sarma	Retd. Curator & Research Guide, G.U. Dept. of Botany
2	Sri. Mrinmoy Baruah	External Auditor (Energy)

Sl. No.	Name of Student Audit Participant	Designation
1	Sri. Rabin Das	B. Com 5 th Semester
2	Sri. Pranab Baroi	B. Com 3 rd Semester
3	Sri. Krisenjit Sarma	B. Com 1 st Semester

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Executive summary

With the increase in human population, there is a lot of demand for food, clothing, vehicles etc. All these demands are exerting a lot of pressure on land, air, water and other natural resources which leads to pollution, environmental degradation, biodiversity and other environmental issues. On this background it becomes essential to adopt the system of the green campus for the institute. Which will lead to sustainable development?

Mangaldai Commerce College, Mangaldai is deeply concerned and unconditionally believes that there is an urgent need to address these fundamental problems and reverse the trends. Being a premier institution of higher education, the college has initiated the green campus programs 4 years back that actively promote the various projects like the environmental protection and sustainability.

The purpose of the audit was to ensure that the practices followed the campus is in accordance with the green policy adopted by the institution. This green audit can make a tremendous impact on students, health and learning college operational costs and the environment.

Introduction

The term green means eco-friendly or not damaging the environment. Green audit was initiated in the beginning of 1970s with the motive of inspecting the works conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environments.

Green audit can be defined as systematic identification, quantification, recording reporting and analysis of components of environmental diversity. "Green auditing" an umbrella term, is known by another name " environmental auditing", the "green audit" aims to analyze environmental practices within and outside the college campus, which will have an impact on the eco-friendly ambience. It was initiated with the motive of inspecting the work conducted within the organizations whose exercises can cause risk to the health of inhabitants and the environment.

Educational institutions have broad impacts on the world around them, both negative and positive. The activities pursued by campus. can create a variety and adverse environmental impacts. But they are also in a unique position as educational institutions to be leaders in pursuing environmentally sustainable solutions. Mangaldai Commerce College, Mangaldai has taken a number of positive steps to reduce its environmental impact.

We hope that the time-to-time green audit will provide an accurate snapshot of colleges environmental impacts at the point in time, and that it will encourage the campus in prioritizing positive steps it can take to improve overall sustainability.

Why need Green Audit

An Environmental Sustainability is becoming an increasingly important issue note the nation the role of higher educational institutions in solution to Environmental Sustainability more prevalent. In this context, it becomes imperative to adopt the system of the green campus for the institutes which will lead to Sustainable development besides it also seduces a sizeable amount or atmospheric Co2 from the Environment.

Green Audit is assigned to the **Criteria 07 of NAAC, National Assessment and Accreditation Council** which is a self-govern organizations of India that accredits the institution according to the scores assigned at the time of accreditation. NAAC has made it mandatory that all higher Educational Institution should submit an Annual Green Audit Report.

Green Auditing promotes financial saving through reduction of resources use. It gives an opportunity for the development of ownership, personal and social responsibility for the students and teachers.

Objective of the study

The overall objective of green auditing is to assist in safeguarding the Environment by minimizing risks to human health. Green auditing is a risk management tool and not a mitigating measure. The broad objectives of Environmental Audit are:

1. Sustainable use of natural resources in the campus.
2. Eco-friendly practices in campus for reduction of resource use.
3. To prepare check list of flora and fauna diversity in and around the college campus.
4. To find out various sources organic and solid waste, regeneration and mitigation possibilities.
5. To estimate the energy requirements of the college.
6. To introduce and aware students about environment and sustainability.
7. To create green campus.

Brief description of the college

Mangaldai Commerce College, the only Commerce college in Darrang, district, established by some dedicated and noted educationist in the year 1982. The College campus spreads over a vast area on serene in the northern fringes of the town, at a distance of nearly 1.5 km from ASTC Bus Stand and easily accessible from the town. Situated in a natural setting and the river Mangaldai on the western side, the campus covered several buildings catering to academic needs and support facilities.

The teaching imparted by a team of dedicated teachers who are totally devoted to their duties and responsibilities having all of them a background of brilliant academic career and distinction.

Vision

To be an institute of academic excellence with total commitment to quality education in Commerce, management and related fields.

Mission

- Empowering students with all the knowledge and guidance that they need to fit in the global business world.
- Learning by doing.
- Providing for holistic and value-based development of students which ultimately enhances their employability.
- To carve a niche for ourselves in the specialized field of commerce and management.
- Grooming youth to become a truly global personality well equipped to deal with the modern world and its challenges.

Overview of college

1. Name of the college:	Mangaldai Commerce College, Mangaldai.
2. Total land area:	8.265 acre (25 Bighas).
3. Total building area:	31,500 Sq feet.
4. Total no. of students:	1200
5. Total no of faculty members:	22
6. Total no of departments:	06
7. Total no. of girl's common room:	01
8. Total no. of boy's common room:	01
9. Computer laboratory:	02
10. Total no. of class room:	10
11. No of playground:	02
12. NSS activity room:	01
13. NCC activity room:	01

Institutional strength

- Highly qualified and experienced teaching staff.
- Digital library.
- Digital classroom.
- Well-equipped computer laboratories.
- Clean and green campus.
- Achievements in sports and cultural activities
- Govt. scheme properly implemented.



Photo. 1: Principal's



Photo. 2: Visitor's Room



Photo. 3: Conference Room



Photo.4: IQAC, Coordinator's Room



Photo. 5: College Office



Photo. 6: College Library



Photo. 7: Teacher's Reading Room



Photo. 8: Digital Class Room

Environmental policy of the college

Mangaldai Commerce College, Mangaldai has taken number of initiatives to protect its own environment in the campus. In every year college observed “**World Environmental Day**” in 5th June. In the College campus trees have regularly been planted by the faculties, NSS volunteers and office staff to keep the Environment green and pollution free.

Target areas of green auditing

The target areas of green audit basically on -

1. Water management.
2. Energy use and conservation.
3. Green belt area and conservation (biodiversity)
4. Waste management.

Methodology

The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the green policy adopted by the institution.

The methodology of the audit based on the following components: -

1. Collection of primary and secondary data.
2. Physical inspection of the campus.
3. Data analysis.
4. Observation and review of documents.
5. Group discussion.
6. Preparation on the green audit report.

Pre-audit meeting

A meeting held on **3rd March, 2021** in Mangaldai Commerce College, conference hall. Dr. Gajen Chandra Sarma, Retired Professor, Gauhati University, Dept of Botany inaugurates the green audit training programme. and Mr. Pankaj Kr Saha presided over the meeting, Dr. Hemanta Chakravarty, IQAC Coordinator was also felicitated in the meeting. The faculty members and students had also attended the training programme.

The meeting has adopted the following resolutions: -

Resolution 1: - Resolved that the energy uses and conservation of the college is audited by the private external energy.

Resolution 2: - Resolved that college authority will audit the remaining three uses of conservation and management i.e., waste management, water uses and conservation, Biodiversity management and conservation.

Resolution 3: - Resolved that a survey for the preparation of green audit report should be undertaken immediately.

Resolution 4: - Resolved that audit team be formed for the purpose of green audit survey.



Photo: - A Green Audit training programme

Water uses and its conservation

Water audit is an effective management tool book minimizing losses, optimizing various user and thus enabling considerable conservation of water. Water audit improve the knowledge and documentation of the distribution, system- it leads to reduced losses.

Water is one of the most common and useful substance around us. It is essential for the existence of all forms of life, after knowing the importance of it and center awareness is being created by organizations of the world. 22nd March is celebrated as “**World Water Day**” to attract the attention of everybody towards the importance of conserving water.

Water management is the activity of planning, developing, distributing and managing the optimum use at center resources. No living creature can live without water. There is a scarcity of water. To avoid this scarcity, water should be saved and managed efficiently.

Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhea, dysentery, hepatitis, typhoid and polio. Inadequately or inappropriate management of water and sanitation services expose the individuals to various health risks. Improved water supply and sanitation and better management or water resources can boost the country's economic growth and can contribute greatly to the reduction of poverty.

Water Sample Collection: - Water quality testing, center samples were collected from college campus. The collected samples were transported to the laboratory, Deptt. of Botany, Gauhati University (GU) Gauhati.

Water Testing Report: - Water testing can provide valuable data on the condition of a particular body of water and also ensure whether it needs special treatment before use. Examine factors such as the PH level, nutrient level amount of dissolved oxygen, alkalinity and bacteria etc. are all useful in understanding the health of water body allowing us to accurately create a water management plan with the data.



Photo.9: Water Pump



Photo.10: Water Storage Tank



Photo.11: Water basin



Photo.12: Water purifier



Photo.13: Drinking Water facility

A questionnaire-based water survey form

SI No	Problem of Statement	Response
1	Sources of water	Ground water (Boarding)
2	NO. of Boring	01
3	NO. of Motors used	02
4	Horse Power of Motors	1HP=01 1/2HP= 01
5	Depth of well	70 feet
6	Number of water tanks.	01
7	Capacity of the tank	4000 liters
8	Quantity of water pumped everyday	4000 liters
9	Any water wastes? Yes/No	No
10	Any Laboratory (Scientific) Yes/No	No
11	Rain water harvest available? Yes/No.	No
12	Any leaky tap? Yes/ No	No
13	Amount of water lost everyday	Negligible
14	Any water saving technique followed	No.
15	Total number of taps.	49
16	Total no. of water purifiers	03

Water audit observation

1. During the survey, no loss of water is observed by any kind of leakage or by overflow of water from overhead tanks.
2. Of an average, the total use of water in the college is 3000 lit/day
3. Optimum use of water.
4. College does not have any chemical laboratories.
5. College has no agricultural field.
6. College Campus has no hostel.
7. There is no water meter box in the college.
8. Water is mainly used for drinking, toilet, washing, gardening and construction works.
9. There is no rain water harvesting technique in the college campus.
10. College has no waste water treatment Plan.
11. College does not have any vehicle and hence there is no water usages for vehicle maintenance.



Photo: - Members of Green Audit team during discussion with the principal

Recommendation

1. Establishment of rain water harvesting system.
2. Water overflowing from the tank should be collected and reused for gardening or any other purpose.
3. Provide push button tops limiting the time for 30 seconds.
4. Installation of water treatment plan.
5. Awareness campaigns can be conducted among the students.
6. Posters can be placed at the wash areas as well as toilets to make the students aware about the value of water resources.
7. Water cooler and more purifiers to be installed at drinking water points as well as at the supply points.
8. Display boards for switching of the taps to be put on at appropriate place.
9. Automatic leak detection system for conservation of water.
10. Water testing can be done through any external testing and consultancy service provider.

RESULTS						
Sr. No	Parameter	Protocol Used	Result	IS:10500:2012(Second Revision)		Unit
				Desirable limit	Max. Permissible limit (in absence of better alternate source)	
1	Colour	IS : 3025 (Part 4)		5	15	HU (Hazen)
2	Odour	IS : 3025 (Part 5)		Agreeable		
3	Sulphate(as SO ₄)	IS : 3025 (Part 24)		200	400	mg/L
4	pH	IS :3025 (Part 11)	6.50	6.5 to 8.5	No relaxation	pH Units
5	Total Dissolved Solids	IS: 3025 (Part 16)		500	2000	mg/L
6	Turbidity	IS: 3025 (Part 10)	2.30	1	5	NTU
7	Chloride (as Cl)	IS:3025 (Part 32)	7.09	250	1000	mg/L
8	Total Alkalinity (as CaCO ₃)	IS:3025 (Part 23)	118	200	600	mg/L
9	Total Hardness (as CaCO ₃)	IS:3025 (Part 21)	48	200	600	mg/L
10	Calcium (as Ca)	IS:3025 (Part 40)		75	200	mg/L
11	Magnesium (as Mg)	IS:3025 (Part 46)		30	100	mg/L
12	Total Iron (as Fe)	APHA 3500- Fe Method B (Phenanthroline Method)	0.04	0.3	1.0	mg/L
13	Total Arsenic (as As)	APHA 3500- As Method B (SDDC Method)	BDL	0.01	No relaxation	mg/L
14	Fluoride (as F)	APHA 4500 – F Method D (SPADNS Method)	0.78	1	1.5	mg/L

BDL : Below Detectable Limit

Option : The Parameter/s tested at Sr. No..... In the test report does/do not meet the requirement of IS 10500:2012 (Second revision)

Electrical Energy & Safety Audit Report of Mangaldoi Commerce College, Mangaldoi, Assam



Audit Period: 31/03/2022-04/04/2022

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ACKNOWLEDGEMENT

We sincerely thank Mr. Pankaj Kumar Saha, Principal, Mangaldoi Commerce College, as well as Dr. Hemanta Chakrabarty, Head, IQC, and Mr. Sabibur Rahman, Lecturer, for their facilitation and support in conducting the data collection and measurement for this Electrical Energy & Safety audit conducted on 31/03/2022.

Electricity utilisation in the college campus is primarily for classroom activities and management. Overall electricity utilisation is optimal. However, some weaknesses were observed in the electrical power distribution system. Suggestions for needful rectification/revamping of all these defects were verbally briefed to the college administration during the visit. Detailed observations and suggestion for improvement are elaborated in this report.

We trust that the findings of this Electrical Energy & Safety Audit and the suggestions provided in this formal audit report will be helpful for safe and optimal use of electricity and upkeep of the electrical power distribution system and installations in the Mangaldoi Commerce College.

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Audit Period: 31/03/22–04/04/22

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Energy Audit	Circuit Design	Fault Detection & Analysis	LT/HT Works	Load Balancing	PF Improvement	Fault Detection & Analysis	LT/HT Works
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PAN: ACAPB0084F

CERTIFICATE OF ENERGY AUDIT

(Certificate no.: TS / Energy Audit / Mangaldoi Commerce College / 21-22/ 001)

This is to certify that we had conducted **Electrical Energy & Safety Audit** of **Mangaldoi Commerce College, Mangaldoi, Assam** on **31st March, 2022**.

The overall electricity utilization at the college campus was found to be **optimal**.

A few safety weaknesses were observed in the electrical power distribution system. These observed weaknesses and their improvement measures are elaborated in our submitted "**Electrical Energy & Safety Audit Report**."

The audited installation (**Mangaldoi Commerce College**) may be considered fully safe after implementing the suggested safety improvement measures.



(Mrinmoy Boruah)
Chief Energy Auditor

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FOREWORD

This audit was carried out as per the verbal work order received from the Principal, Mangaldoi Commerce College for the Electrical Energy & Safety Audit of Mangaldoi Commerce College, Mangaldoi, Assam.

The broad scope of this audit was to evaluate the energy usage efficiency and safety status of the Power distribution system of the Mangaldoi Commerce College campus. The audit was carried out in the presence of electrical support staff of the College.

As part of the audit work (physical observation, testing and necessary data collection) a physical inspection visit was made to the college campus on 31/03/2022.

Review of electricity bills and physical observations reveal that electricity utilisation in the college campus is optimal. However some safety weakness/discrepancies were observed in the electricity distribution system of the college during the data collection part of the audit work. These were briefed and highlighted to all those present during the audit. Some cleaning job at the substation were carried out immediately during the audit.

The audited installation (Mangaldoi Commerce College) will be considered fully safe after rectification of the discrepancies. Regular maintenance and upkeep are utmost essential for optimal and safe use of electricity.

Approach and methodology

The approach and methodology in carrying out the work were as follows:

Conducting of audit:

Conducting of audit and training of personnel was done by experienced Power quality and safety auditors. The audit team of four persons was headed by Mr. Mrinmoy Boruah, BEE certified Energy Auditor & Electrical Consultant, having wide experience of conducting such audit. The other assisting team members were also experienced and have been regularly assisting Mr. Boruah in energy audit related works. The names of the team members and their years of experiences are enlisted in the following table.

Sl. No.	Name	Qualification	Experience (years)
1.	Mr. Mrinmoy Boruah, B.E.(Electrical) & BEE certified Energy Auditor	Energy Auditor & Head of the audit team	10+years' experience in auditing
2.	Mr. Aditya Boruah B.Tech. (Electrical)	Associate Engineer	2+ years
3.	Mr. Hironmoy Baruah	Technical Assistant	10+ years
4.	Mr. Madan Prasad	Technical Assistant	10+ years

Instruments for conducting audit: The following instruments were deployed for on-site measurements

- a) 2 nos. of Three-phase Power Loggers along with analyzing software (Hioki 31000-94 and Fluke 1735)
- b) Single-phase clamp-on power meter (Meco)
- c) Digital Multimeter (Metravi)
- d) Thermal Camera (Seek CompactPro)
- e) IR temperature gun (Benetech GM550)
- f) Earth resistance tester
- g) Insulation tester
- h) Lux Meter

Data analysis: Data collected and monitored during the field work were analyzed and report on analysis are presented in subsequent pages.

Report preparation: Compilation of the Audit Report, highlighting scope for economizing electricity usage and suggesting ways to improve safety and regulatory compliances, if any. Photographs, diagrams, measured data and power-logs taken during the audit are to be included in the compiled report for reference and record.

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Audit Period: 31/03/22–04/04/22

EXECUTIVE SUMMARY

Observations and analysis of collected data reveal that electricity utilization at the Mangaldoi Commerce College campus is optimal. However, some safety weakness/discrepancies were observed in the power distribution arrangement.

A summary of rectification recommendations are presented below for needful corrective action. These defect rectification and revamping/improvement work are necessary to make electricity utilisation in the College campus optimal and safe.

- 1) An MCB switch of appropriate rating should be installed at the LT Grid supply input, in place of the existing 100A fuse. The fuse protection system currently being used is not sufficient to ensure safety of the power distribution system of the college.
- 2) A distribution board (DB) should be installed for power distribution to the various rooms of the college campus. This main distribution board should have MCB switches of appropriate rating for each of the circuits outgoing to the different rooms of the college.
- 3) The DBs installed at the various rooms of the college have isolators as their Main Incomer Switch. These isolators should be replaced by MCB switches of appropriate ratings.
- 4) A complete revamping of the earth arrangement is necessary.

New earth-pits should be constructed at easily accessible locations in the college campus. Concrete earth-pit protection chambers having a hinged CI cover should be constructed for these earth-pits.

Earthing connections should be provided for each of the switchboards and DBs at each room of the college campus. The earthing conductors should be neatly drawn to the earth-pit and securely fastened to the earth-pipe.

The earth-pits should be regularly watered to keep the earth resistance values at a minimum. A funnel should be installed for pouring water into these earth-pits.

**Audit observations
of
Electrical installations
and
Power Distribution System**

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Audit Period: 31/03/22–04/04/22

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4.1 Electrical distribution topology

At present there is no Single Line Diagram of power distribution circuit available for verification. The existing power distribution circuits should be traced out and a single line diagram representation of the same should be prepared.

A mandatory approval of the final SLD is to be secured from the office of the Chief Electrical Inspector cum Advisor, Govt. of Assam. It is a safety rule/measure for enabling easy tracing of electric circuits in case of any trouble and for any necessary alteration in the power distribution arrangement.

Observations:

- The primary source of power supply to the college campus is from an Overhead LT Grid Supply cable.
- The LT grid supply cable is fed to a 100A Fuse, mounted on a wall at the corridor outside the Office room. There is no MCB/MCCB protection at the LT Grid supply input.
- From this fuse, 5 nos. of outgoing circuits are drawn out for power distribution to the various rooms of the college campus. There are 5 nos. of fuses (1 x 63A, 4 x 32A) installed for the protection of each of these outgoing circuits. These fuses are also mounted on a wall in the corridor. There is no Distribution Board installed for the power distribution to these circuits.
- Multiple tappings are taken from these outgoing circuits to provide power supply to the different rooms. There are distribution boxes (DBs) installed at the different rooms for their power distribution. The Main incomer switch of each of these DBs are isolators. These isolators do not provide any protection for these circuits.



Photo: 100A Fuse at grid supply incomer



Photo: DB at Room #9:
1 x 40A DP Isolator (Main Incomer)
2 x 6A SP MCBs (Outgoing)



Photo: DB at Room #7:
1 x 40A DP Isolator (Main Incomer)
4 x 10A SP MCBs (Outgoing)

		
<p><u>Photo:</u> 40A DP Isolator at Computer Room (Main incomer)</p>	<p><u>Photo:</u> 2 x 20A SP MCBs at Computer room (Outgoing)</p>	<p><u>Photo:</u> DB#1 at Computer room (major): 1 x 40A DP Isolator (Main Incomer) 2 x 25A SP MCBs (Outgoing)</p>
		
<p><u>Photo:</u> DB#2 at Computer room (major): 3 x 10A SP MCBs; 3 x 6A SP MCBs (Outgoing)</p>	<p><u>Photo:</u> 40A DP Isolator at Room #2</p>	<p><u>Photo:</u> 16A Fuse Switch at Staff Room</p>
		
<p><u>Photo:</u> DB at Office Room: 1 x 40A DP Isolator (Main Incomer) 2 x 25A and 2 x 6A SP MCBs (Outgoing)</p>	<p><u>Photo:</u> 10A SP MCB for photocopier at Office Room</p>	<p><u>Photo:</u> 10A SP MCB at Office Room</p>

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Audit Period: 31/03/22–04/04/22

4.2 Study/findings on Earthing System



Photo: Earthing strip connected to the earth-pit buried underground.

Observations:

- There is only one earth-pit installed for the entire college campus. This earth-pit is untraceable as it has been buried under concrete cover
- There is a Copper earthing strip drawn out from this earth-pit. The earth resistance value was checked at this copper strip and found to be **38 Ohm**. The earth resistance value of this earth-pit is extremely high.
- There are copper multistrand wires used as earthing conductors to provide earthing connection to the switchboards at few of the rooms of the college campus. These copper wires are not connected to the earthing strip.

Essentially there is no earthing connection for the entire college campus.

A complete revamping of the earthing arrangement is necessary.

4.3 Load survey

Name of load	Qty	Wattage (W)	Total Load (W)
LED Tubelight	26	20	520
CFL Bulb	32	18	576
Incandescent Bulb	10	60	600
TV (42 inch)	2	120	240
LED Projector	1	150	150
Sub-woofer speaker	1	150	150
Photocopier	1	1500	1500
Printer	2	50	100
Water filter	1	25	25
DVR for CCTV Cameras	1	40	40
Total connected load=			3.901 KW

Table: List of connected loads

4.4 Analysis of electricity bill records

The electricity bill records for the past 11 months (April 2021 – February 2022) have been tabulated below:

Month	Billing period		No. Of days billed for	Maximum Demand (KVA)	Contract Demand (KVA)	MD/CD	PF
Apr'21	01-04-2021	30-04-2021	30	3.53	3.53	100%	0.85
May'21	01-05-2021	31-05-2021	31	3.53	3.53	100%	0.85
Jun'21	01-06-2021	30-06-2021	30	3.53	3.53	100%	0.85
Jul'21	01-07-2021	31-07-2021	31	3.53	3.53	100%	0.85
Aug'21	01-08-2021	31-08-2021	31	3.53	3.53	100%	0.85
Sep'21	01-09-2021	30-09-2021	30	3.53	3.53	100%	0.85
Oct'21	01-10-2021	31-10-2021	31	3.53	3.53	100%	0.85
Nov'21	01-11-2021	30-11-2021	30	3.53	3.53	100%	0.85
Dec'21	01-12-2021	31-12-2021	31	3.53	3.53	100%	0.85
Jan'22	01-01-2022	31-01-2022	31	3.53	3.53	100%	0.85
Feb'22	01-02-2022	28-02-2022	28	3.53	3.53	100%	0.85

Table: Electricity bill records of past 11 months

The Average MD recorded for the past 11 months was found to be **3.53KVA**

The Average PF recorded for the past 11 months was found to be **0.85**.

The energy utilization at the Mangaldoi Commerce College campus can be considered to be optimal.

CONCLUSION

The overall energy utilization at the Mangaldoi Commerce College campus was found to be optimal.

However, some safety weakness/discrepancies were observed in the power distribution arrangement.

A summary of recommendations is enlisted at the "Executive Summary" section of this report. Suggestions for the needful rectification works were stressed upon all concerned for ensuring safety of the power distribution system.

The power distribution system of the Mangaldoi Commerce College campus will be considered completely safe for its continued operation after completion of rectification of each of the observed discrepancies and carrying out of modification works as suggested by us.

--END OF REPORT--

Waste management

Over the past few years, waste management has become a global concern. Commonly waste is generated in households, factories, construction sites, refineries and nuclear power plants. With the increase population, increase consumption trends are changing along with the improvement in life style. It has posed alarming threats to the environment. If the waste is not managed properly, it can cause serious problems to human health and to the environment. So, it is necessary for college students as well as for the office staff and teachers to know the importance of waste management.

Improper handling of waste may lead to contamination of surface water, ground water, land and the air. Waste affects the health of human beings by spreading various disease, harm or kill the animals and cause damage to plants and natural resources. So, special attention should be given for scientific management and handling of waste which is generated in the college campus. Thus, the minimization of waste is essential for sustainable environment of the college campus.

The aim of waste management is to reduce the dangerous effects of waste on the environment as well as on human health.

Sources of waste management of the College

Each and every department of the college, along with the offices, library creates different categories of waste such as solid waste, liquid waste, e-waste etc. in the college campus. To, collect all these waste materials 10 dustbins are installed at different corners of the college campus. All the waste is collected by the sweeper of the college on regular basis.

The collected solid waste converted to compost in the vermin-composting unit and used to manner plants in the college garden. The liquid waste in disposed through proper drainage system. The wastes including plant litters are regularly collected and are burnt off at different spots.



Photo.14: Waste collection Bin

Source of waste in the college campus: -

1. Library: - The most generated waste is paper waste.
2. Office: - Paper waste that are generated are recycled and reused.
3. Garden: - Plastic and paper waste is comparatively less. Leaf litters are usually high.
4. Bathroom: - The waste is collected and are usually high, burned in an incineration behind the convert.
5. Classroom: - Paper wastes are collected in the waste basket and is it burned. But paper waste is generated in larger amount.
6. College premises: - The generation of plastic waste is usually less.

Observation

It was observed that,

1. Wet waste and dry waste segregations are practiced in the premises. Separate bins are provided for wet biodegradable and resalable waste.
2. Being a college with non-residential facility, the quantity of wet waste generated in the premises is quite minimum.
3. Solid waste management systems which are established are insufficient.
4. Lack of proper composting systems.
5. There is a good number of dustbins which are installed at different parts of the campus.
6. Liquid waste is disposed through proper drainage system.
7. The rejected papers are sold to vendors for recycling which also generate a small revenue to college and the source is used to pour the maintenance of the existing papers and files.

Recommendation

1. Cleaning the campus on a daily basis.
2. Students should be encouraged not to use plastic or plastic materials.
3. Campaign for reduce, reuse and recycle by NSS.
4. To reduce non-bio-durable wastes i.e., plastic cups, plates, disposable bottles etc. are replaced by paper made items.
5. Leaf litters from the campus can be effectively used for aerobic /vermicompost, so that the composted materials can be used as good manure.
6. Prints and photo copies are to be taken on both sides of the paper to avoid excess paper usage rather than Photocopy, digitalization (scanning) is practiced.

Vermicompost

Mangaldai Commerce College, Mangaldai has started vermicomposting method within the college since 2017-18. The main purpose of this is to reduce disposable waste in the college campus and manure thus produced is used in the horticultural activities within the campus.

Bio-diversity and its conservation

Biodiversity is the number and variety of plants, animals and other organisms that are living in an ecosystem. Bio means "live", diversity means "variety". Simply, biodiversity means diverse forms of life on earth. Biodiversity gives a functioning ecosystem that provide oxygen, clean air, and water, plant pollution, pest Controls, waste water treatment & lots of ecosystem services. Human activities are the main causes of biodiversity loss. Habitat fragmentation is caused by urbanization and agricultural practices. Over exploitation of resources leads to the depletion of species. Biodiversity plays a crucial role for all living creatures. Biodiversity should be conserved to prevent species extinction to maintain balance in nature.

A questionnaire on biodiversity audit:

1. Is there a garden in your college?
2. Do the students spend time in the garden?
3. Total number of plants in campus.
4. Number of trees planted in last 3 years.
5. Is there any medicinal plant in your college
6. Is there Have you displayed the seven- Ale names or Plant
7. Who is the in charge of the gardens?
8. Chat of the fruit yielding plant available in the campus
9. Is there any Eco-club at college?
10. What type of green awareness programs are carried out by college?
11. What type of water you are using for gardening purpose?
12. Are the students involved in the plantation and other gardening works?

Observation

The flora and fauna diversity of the college is very rich. The green area covers more than 30% of the total area of the campus. The result of the survey of the plant diversity in the college campus showed nearly 50 species and 42 animal species.

Sl No	Scientific name	Family	Local Name	Uses
1	Alizia lebbek	Mimosaceae	Siris tree	Mainly used in respiratory skin, urinary problem etc.
2	Albizia Samon	Mimosaceae	Rain Tree	Construction work, ply board making etc.
3	Aloe vera	Asphodelaceae	Salkuwori	Skin treatment etc.
4	Alstonia scholaris	Apocynaceae	Chatiyana	Bark is used to cure skin disease.
5	Amranathus spinosus	Amaranthaceae	Khutura	Used in fire burns, weakness.
6	Argemone maxicana	Papaveraceae	Sialkanta	Used in tumors treatment.
7	Arthocarpus lacucha	Moraceae	Bohot	Stomachache, headache etc.
8	Azadirachta indica	Meliaceae	Mohaneem	Skin disease, fungal treatment
9	Bacopa monieri	Scrophulariaceae	Brahmi	Brain tonic
10	Bambusa tulda	Poaceae	Jatibaah	House making
11	Bombax ceiba	Bombaceae	Shimlo	Fibres used in filing cushions
13	Cassia fistulaa	Caesalpiniaceae	Sonaru	Fruits are used as laxative
14	Cassia renigera	Caesalpiniaceae	Radhachura	Ornamental plants
15	Cassia tora	Fabaceae	Medelua	Skin & leprosy treatment.
16	Catharantus roseus	Apocynaceae	Nayantara	Diabetes, skin treatment
17	Centella asiatica	Apiaceae	Manimuni	Treatment of wounds
18	Chrysalidocarpus lutescens	Arecaceae	Momai tamul	Ornamental plants
19	Cynodon dactylon	Poaceae	Dubori bon	Brain & heart tonic
20	Datura sp.	Solanaceae	Dhatura	Seed are used in stomach pain
21	Delonix regia	Caesalpiniaceae	Krishnachura	Anti-bacterial & anti-fungal.

22	<i>Eichhornia crassipes</i>	Pontederiaceae	Pani meteka	Anti-bacterial & anti-fungal.
23	<i>Elaeocarpus floribundus</i>	Elacocarpaceae	Jolphai	Used in dysentery, diabetes.
24	<i>Eucalyptus Globus lobill</i>	Myrtaceae	Eucalyptus	Cold remedy.
25	<i>Ficus benghalensis</i>	Moraceae	Borgos	Leaf extract used in anti-diabetes.
26	<i>Hibiscus rosa sinensis pink</i>	Malvaceae	Joba phul	Food, Cosmetics.
27	<i>Ipomoea cornea</i>	Convolvulaceae	Kolmou	Food.
28	<i>Lagerstroemia indica</i>	Lythraceae	Ajar	Anti diabetes.
29	<i>Lagerstroemia spcosa</i>	Lythraceae	Jarul	Cosmetics.
30	<i>Laportea crenulata</i>	Urtieaceae	Chorat	Chronic fever.
31	<i>Leucas aspera</i>	Lamiaceae	Doron	Stomach treatment.
32	<i>Mangifera indica</i>	Anacardiaceae	Aam	Anti-Oxidant, Improve Immunity.
33	<i>Mimusops elengi</i>	Sapotaceae	Bokul	Food.
34	<i>Murray koenigii</i>	Rutaceae	Narasingha	Piles and dysentery treatment.
35	<i>Murraya paniculata</i>	Rutaceae	Kamini-kanchan	Stomach ache, diarrhea.
36	<i>Musa sp.</i>	Musaceae	Kol	Diarrhea, constipation.
37	<i>Oscimum sanctum</i>	Lamiaceae	Tulsi	Skin treatment.
38	<i>Phoneix dactilofera</i>	Arecaceae	Khejur	Seed increase stamina.
39	<i>Phyllanthus emblica</i>	Euphorbiaceae	Amlokhi	High value of vitamin, hair loss treatment.
40	<i>Polyalthia longifolia</i>	Annonaceae	Debdaru	Anti-microbial activity.
41	<i>Psidium guajava</i>	Myrtaceae	Modhuriaam	Dysentery & diabetes treatment.
42	<i>Pteris sp.</i>	Pteridaceae	Beeh dhekia	Ornamental purpose.
43	<i>Rosa indica</i>	Rosaceae	Gulap	Ornamental purpose.
44	<i>Syzygium cumini</i>	Myrtaceae	Jamu	Cough and diabetes.
45	<i>Tabernaemontana divaricata</i>	Apocynaceae	Kathanaphul	Hypertension & cosmetics.
46	<i>Tagetes erecta</i>	Asteraceae	Narji phul	Stomach pain.
47	<i>Tectona grandis</i>	Verbenaceae	Segun	Timber.
48	<i>Trewia nudiflora</i>	Euphorbiaceae	Velkol	Skin disease.
49	<i>Xanthium strumarium</i>	Asteraceae	Agar	Erectile dysfunctions.
50	<i>Ziziphus maurtiana</i>	Rhamnaceae	Bogori	Antioxidant property.

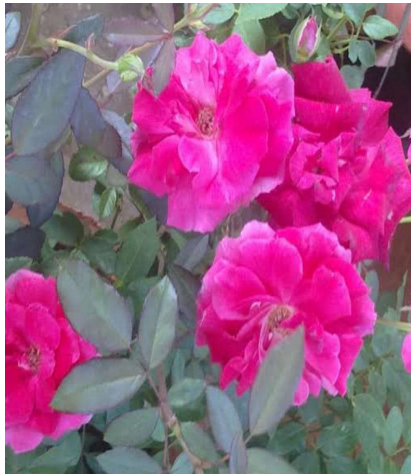


Fig.1: Rosa indica



Fig.2: Phyllanthus



Fig.3: Aloe vera



Fig.4: Oscimum sanctum



Fig.5: Mimosa elengi



Fig.6: Chrysalidocarpus lutescens



Fig.7: Ipomoea cornea



Fig.8: Xanthium strumarium



Fig.9: Cynodon dactylon



Fig.10: Cassia fistulaa



Fig.11: Bambusa tulda



Fig.12: Alstonia scholaris



Fig.13: Delonix regia



Fig.14: Cassia tora



Fig.15: Lagerstroemia indica



Fig.16: Centella asiatica



Fig.17: Amaranthus spinosus



Fig.18: Tegetes erecta



Fig.19: Murray koenigii

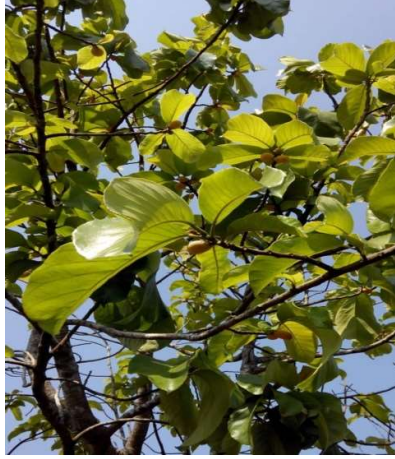


Fig.20: Arthocarpus lecucha



Fig.21: Musa sp.



Fig.22: Argemone maxicana



Fig.23: Azadirachta indica



Fig.24: Tabernaemontana divaricata



Fig.25: Albizia lebbek



Fig.26: Laportea crenulata

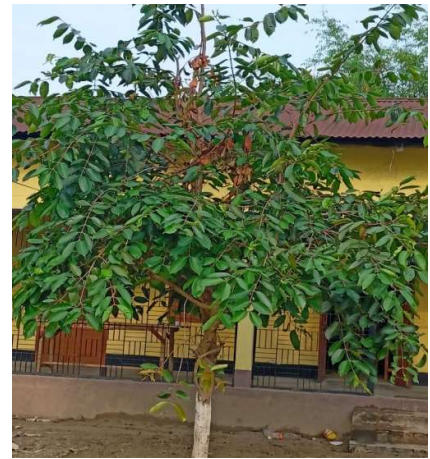


Fig.27: Syzygium cumini



Fig.28: Psidium



Fig.29: Catharantus



Fig.30: Lagerstroemia indica



Fig.31: Ficus benghalensis



Fig.32: Tectona grandis



Fig.33: Polyalthia longifolia



Fig.34: Eucalyptus globus lobilli



Fig.35: Moringa oleifera

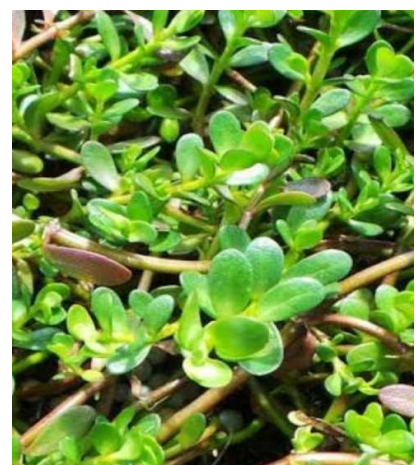


Fig.36: Bacopa monieri



Fig.37: *Phoneix dactilifera*

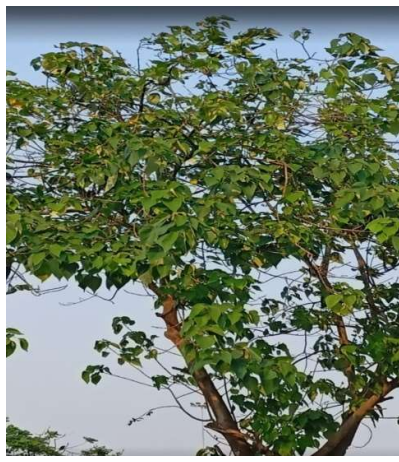


Fig.38: *Trewia nudiflora*



Fig.39: *Cascabela thevetia*



Fig.40: *Murraya paniculata*



Fig.41: *Leucas aspera*



Fig.42: *Elaeocarpus floribundus*



Fig.43: *Bombax ceiba*



Fig.44: *Datura species*



Fig.45: *Ziziphus*



Fig.46: *Eichhornia crassipes*



Fig.47: *Mangifera indica*



Fig.48: *Pteris* species



Fig.49: *Albizia samon*



Fig.50: *Cassia renigera*

Faunal diversity of the college

Regarding faunal total 58 specific reported in the college campus. Among them go species of birds, 05 sp. of reptiles, of species of amphibian, 06 Species of mammals and 21 species of Invertebrates are reported in college campus. It has a small pond for aquatic plants and animals.

Sl. No.	Phylum	Class	Local Name	Scientific Name
1	Chordata	Aves	Salika sorai	Acridotheres tristis
2	Chordata	Aves	Dauk	Amaurornis phoenicurs
3	Chordata	Actinopterygii	Moa	Amblypharyngodon mola
4	Chordata	Teleostei	Kawoi	Anabus testudineus
5	Chordata	Aves	Hamuk bhonga	Anastomus oscitans
6	Arthropoda	Insecta	Mou makhi	Apis dorsata
7	Chordata	Aves	Kona muchori	Ardeola grayii
8	Chordata	Aves	Uruli phesa	Athene brama
9	Chordata	Aves	Bogoli	Bubulcus ibis
10	Arthropoda	Insecta	Porua	Componotus compressus
11	Chordata	Actinopterygii	Shawl mass	Channa striata
12	Arthropoda	Insecta	Ghena makhi	Chrysomya sp
13	Chordata	Actinopterygii	Magur mass	Clarius batrachus
14	Chordata	Aves	Paro sorai	Columba livia domestica
15	Chordata	Aves	Dohikotora	Copsychus saularis
16	Chordata	Aves	Kauri	Corvus splendens
17	Chordata	Aves	Bamuni phensu fechkunda	Dicrurus hottentottus
18	Chordata	Actinopterygii	Dorikona mass	Esomus danricus
19	Chordata	Aves	Kuli chorai	Eudynamys scolopaceus
20	Chordata	Amphibia	Pani beng	Euphylyctis cynophlyctis
21	Arthropoda	Arachnida	Japa mokora	Hasarius adansoni
22	Chordata	Reptilia	Zethi	Hemidactylus frenatus
23	Arthropoda	Arachnida	Mokora	Holocnemus sp
24	Chordata	Amphibia	Sagoli beng	Hoplobatrachus tigrinus
25	Arthropoda	Insecta	Pokhila	Junonia almana
26				

Sl. No.	Phylum	Class	Local Name	Scientific Name
27	Chordata	Actinopterygii	Bhokua mass	Labeo catla
28	Chordata	Actinopterygii	Rou mass	Labeo rohita
29	Chordata	Mammalia	Molua bandor	Macaca mulatta
30	Chordata	Actinopterygii	Cuchia	Monopterusuchia
31	Chordata	Actinopterygii	Tengera	Mystus tengera
32	Arthropoda	Insecta	Gagoni	Orthetrum sabina
33	Chordata	Aves	Kothalguti chorai	Orthotomus sutorius
34	Chordata	Aves	Ghorchirika	Passer italiae
35	Chordata	Actinopterygii	Puthi mass	Puntius chola
36	Chordata	Aves	Bulbuli chorai	Pycnonotus cafer
37	Chordata	Aves	Kopou chorai	Streptopelia chinensis
38	Arthropoda	Insecta	-	Unidentified Butterfly species
39	Chordata	Aves	Sila	Unidentified kite species
40	Chordata	Reptilia	Bamuni saap	Unidentified snake species 1
41	Chordata	Reptilia	-	Unidentified snake species 2
42	Chordata	Amphibia	Belun beng	Uperodan globulosus



Fig.1: *Mystus tengera*



Fig.2: *Eudynamys scolopaceus*



Fig.3: *Monopterus cuchia*



Fig.4: Unidentified snake



Fig.5: *Macaca mulatta*



Fig.6: Unidentified butterfly



Fig.7: *Amblypharyngodon mola*



Fig.8: *Corvus splendens*



Fig.9: *Componotus compressus*



Fig.10: Clarius batrachus



Fig.11: Hasarius adansoni



Fig.12: Puntius chola



Fig.13: Passer italiae



Fig.14: Chrysomya sp



Fig.15: Hemidactylus frenatus



Fig.16: Labeo catla



Fig.17: Pycnonotus cafer



Fig.18: Amaurornis phoenicurus



Fig.19: Hoplobatrachus tigrinus



Fig.20: Junonia almana



Fig.21: Holocnemus sp



Fig.22: Orthotomus sutorius



Fig.23: Ardeola grayii



Fig.24: Dicrurus hottentottus



Fig.25: Anabus testudineus



Fig.26: Labeo rohita



Fig.27: Channa striata



Fig.28: *Acridotheres tristis*



Fig.29: Unidentified kite



Fig.30: Uperodan



Fig.31: Unidentified snake species



Fig.32: *Columba livia*



Fig.33: *Streptopelia*



Fig.34: *Athene brama*



Fig.35: *Apis dorsata*



Fig.36: *Bubulcus ibis*



Fig.37: Euphylyctis



Fig.38: Esomus danricus



Fig.39: Orthetrum



Fig.40: Passer



Fig.41: Amblypharyngodon



Fig.42: Anastomus

Recommendation

1. All trees in the campus should be labeled with their common and scientific name.
2. Involve students and staff for green campus activities.
3. Grow potted plants of both corridor and classrooms.
4. Providing funds to eco-club for making campus greener.
5. It is recommended to plant more indigenous and evergreen/bruit trees inside the campus.
6. A new garden needs to be developed in the campus.
7. Trees should be planted in the campus and also near the roads around the campus to minimize air pollution.
8. Boundary wall needs to be constructed to protect biodiversity of the college campus.
9. The new saplings that are planted should be well guarded by benching so that no animals devour them.
10. To grow a vegetable garden.
11. To monitor the developmental activities and their impact on the biodiversity of the Campus.

Cultural & Sports Activities in college

The college engages the students in various cultural activities throughout the year. There are numerous committees in the college, which perform different functions. The college organizes orientation programme for fresher's and guest lectures to equip them. We have been celebrating Saraswati Puja, Fresher's Day, Alumni meet, Republic Day, beautification programme, Teachers Day etc. The college encourages the students to participate in various inter-college, district & state level competitions.

The college strives for the development of cultural activities like Painting, Music, Drama, Dance, Rangoli and literary activities such as debate, essay writing, letter writing etc. Students are encouraged to take part in such events at the College level and inter collegiate level.

Sports is a crucial part of a student's life which helps in the development of mental health and Physical fitness of the body. Through participation in sports and games, a student's gains various skills, experience and confidence that are helpful for their Personality. Our student participated in various Sports events like football, cricket, chess, athletics, Karate organized by district administration or different banner.

NSS activity

The National Service Scheme unit of the Mangaldai Commerce College was started in the year 2014. The objectives of NSS are to create social awareness among the students and the all-round development of their Personality. The NSS unit of the college conducts regular campaign, awareness programmes on personality development, blood donation camp etc.

Health awareness activities

NSS unit, Mangaldai Commerce College organizes various awareness programme related to World Yoga Day, free health checkup camp etc. Our NSS volunteers and programme officer took part in the blood donation camp organized by some local NGO's.

Plantation Programme

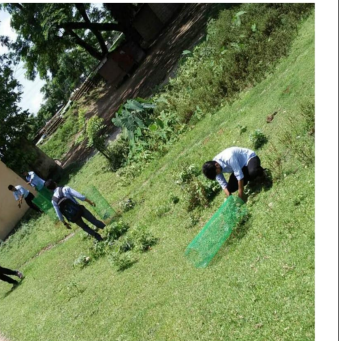
NSS unit, Mangaldai Commerce College, Mangaldai had organized mega tree plantation programme at the college campus on 05th June, 2017. About 150 plants of different types such as Neem trees, Krishnachura, Radhachura and other plants were planted in the unused open land of the college campus. Majority of the college teachers and students, all NSS volunteers and staff participated in the mega tree plantation programme. Our honorable principal sir, took the lead role in this programme. The plantation programme started at 10 a.m. and ended at 02 p.m. At last, the students were served with tea and refreshment. Every year on 05th June World Environment Day is observed at the college. NSS volunteers have their active Participation in these activities.

Programme officer: - Prof. Sabibar Rahman. (Ph. no: - 8638795772)

The volunteer strength of the unit is 112. (2021-2022).

Some of the awareness programme organized by Mangaldai commerce college

Sl. No.	Date	Programme Conducted
1	05-06-2016	inauguration of NSS unit mcc.
2	05 th June every year	observed World Environmental Day.
3	13-08-2016	NSS programme officers deliver speech in IIE, Guwahati.
4	31-10-2016	celebration Rastriya Ekta Diwas.
5	10-06-2017	organized NSS volunteers' free health checkup camp.
6	05-06-2018	observed plantation programme at Bandia High Madrassa School, Mangaldai.
7	10-09-2018	NSS team survey Adhamapara village, Mangaldai.
8	14-06-2018	NSS volunteers participate World Blood Donation Day.
9	21-06-2018	observed International Yoga Day.
10	02-10-2019	observed Swachh Bharat Mission programme.
11	14-10-2019	observed Swachhta Hi Seva (campus cleanliness drive and tree plantation.
12	20-10-2020	observed Covid-19 awareness programme.
13	12-03-2021	observed clean India programme in the occasion Azadi Ka Amrit Mahotsav.











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 GMT 07:07:41 AM Monday, 14.10.2019

Areas of improvement

1. Campus biodiversity of Mangaldai commerce college should be maintained and recorded properly.
2. Water conservation practices should be implemented properly.
3. Water meter should be installed and maintained.
4. The community environmental awareness programme should be regularly organized by the college.
5. A waste management plan should be improved.
6. Try to restrict the use of plastic inside the college campus.
7. Botanical garden should be developed.
8. Solar plant should be installed. Some seminars or workshops can be conducted on environmental education.

Future Action Plan

Mangaldai Commerce College is taking various initiatives for making the campus clean and green. Several steps have already been taken by college authority with the help of NSS units and eco-club, we are still trying to improve our college campus to keep greener and cleaner. In this regard is stated as follows-

1. We will install the rain water harvesting technique very soon.
2. We will introduce solar energy inside campus as far as possible.
3. We will try to develop herbal and medicinal plants garden very soon.
4. For bird conservation we will plant more fruit yielding plants.
5. All trees in the campus should be named scientifically.
6. Proper waste management system will be improved shortly.
7. Botanical garden will be developed shortly.

Conclusion

We, Mangaldai commerce college believe that we have successfully completed the analysis of various environmental components. We hope that the suggestions put forward by us would be considered by the college authority and implemented as soon as possible.



Signature,

A handwritten signature in black ink, appearing to read "Hemanta Chakrabarty".

Dr. Hemanta Chakrabarty
IQAC and Green Audit (Coordinator)
Mangaldai Commerce college,
Mangaldai, Darrang, Assam- 784125

Co-ordinator/Assistant Co-ordinator,
Internal Quality Assurance Cell, (IQAC)
Mangaldai Commerce College,
Mangaldai, Darrang (Assam)