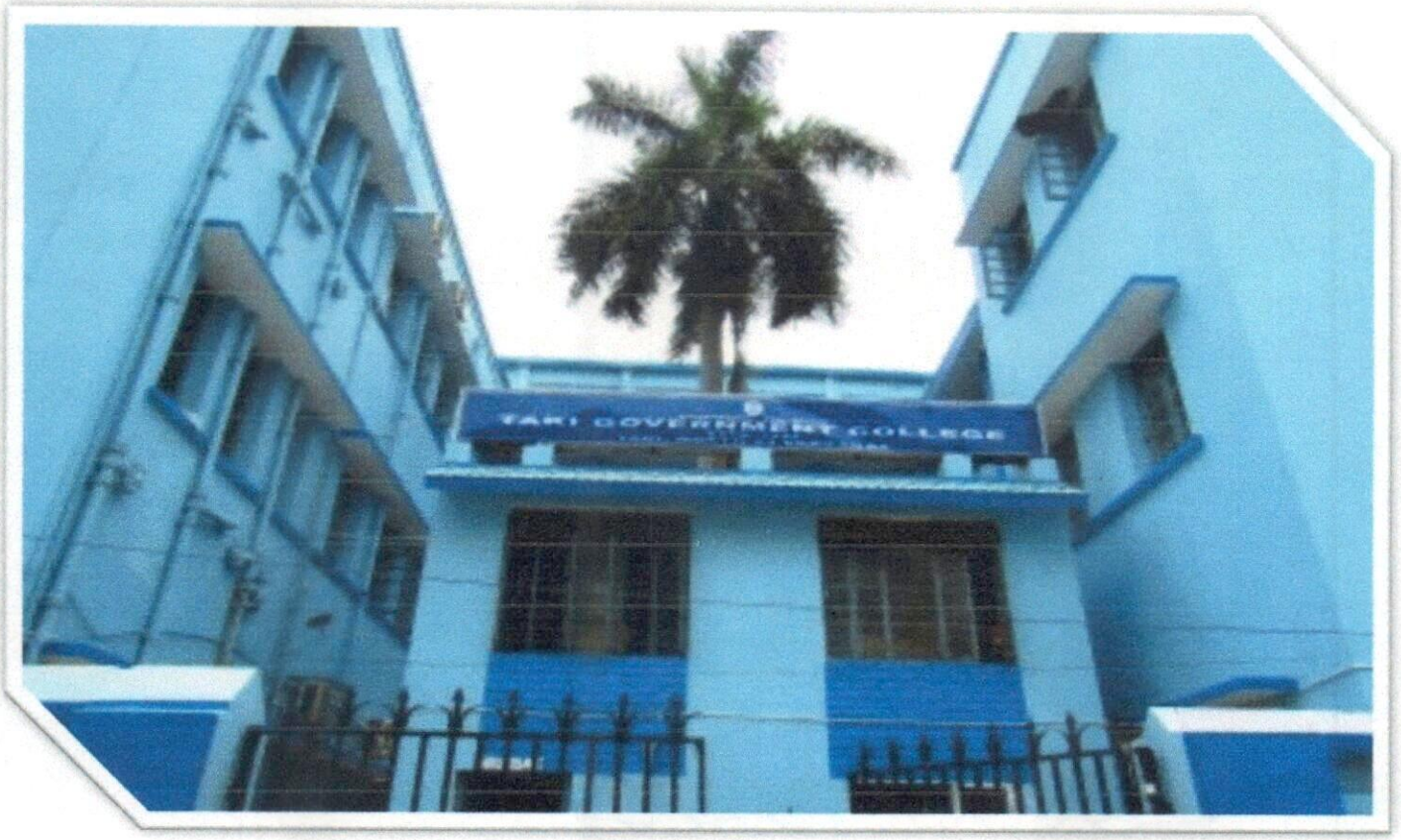
GREEN AUDIT REPORT

(2022 - 2023)



ESTD.1950

TAKI GOVERNMENT COLLEGE

TAKI, NORTH 24-PARGANAS, WEST BENGAL

Prepared by

Green Audit Committee
Taki Government College

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ACKNOWLDGEMENT

The Green Audit Team expresses sincerest gratitude to the Management and Administrative Heads of Taki Government College for giving the opportunity to conduct Green Audit at Taki Government College premises.

We are grateful to Dr. Shanta Mukhopadhyay, Officer-in-Charge, Taki Government College for her consistent support. We are also thankful to Dr. Shaubhik Das, Coordinator, IQAC for his guidance and support during preparation of the report.

We wish to express our heartfelt thanks to the External Expert, Prof. (Dr.) Narayan Ghorai, for his valuable guidance and support in the initiative.

We further wish to express our gratitude for the encouragement and support shown by the faculty members, staff and students of Taki Government College.

Green Audit Committee
Taki Government College

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CERTIFICATE

This is to certify that Taki Government College has conducted detailed Green Audit of the campus for the session 2022-23 and has submitted necessary data and credentials for scrutiny. The activities and measures carried out by the college have been verified based on the report submitted by the college authority and the report was found satisfactory. The efforts taken by the faculty and students towards environment and sustainability is highly appreciated and commendable.

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EXECUTIVE SUMMARY

The green audit aims to analyse environmental practices and resource use pattern within and outside the Higher Education Institute (HEI) premises and contributes to shape up an eco-friendly atmosphere. Green audit involves systematic identification, quantification, recording, reporting and analysis of components of HEI environment and available resources. It was initiated with the motive of inspecting the effort within the institutions in tune with agenda of Sustainable Development Goals, 2030. The green audit initiative provides a direction to improve the patten of utilization and consumption of nature and natural resources by promoting sustainability, raise awareness about environmental issues, and encourage institutions to adopt eco-friendly practices.

Green audit, also known as environmental audit or sustainability audit plays a crucial role in academic institutions by inculcating following values and environmental ethics to all the stakeholders as follows:

1. **Environmental responsibility:** Conducting green audits demonstrates their commitment to reducing their environmental impact and fostering a culture of sustainability among students, staff, and the wider community.
2. **Resource Efficiency:** Green audits help academic institutions identify areas where resources such as energy, water, and materials are being wasted. By implementing recommendations from the audit, institutions can improve resource efficiency, reduce operating costs, and minimize their ecological footprint.
3. **Educational Opportunity:** Involving students in the green audit process can enhance their understanding of environmental issues and sustainability principles, empowering them to become responsible citizens and future leaders in sustainability efforts.
4. **Compliance and Risk Management:** By identifying and addressing potential environmental risks and liabilities, academic institutions can ensure compliance with environmental regulations and standards and avoid reputational damage.
5. **Benchmarking and Continuous Improvement:** Green audits establish baseline data on environmental performance, which enables academic institutions to track progress over time and set targets for improvement.
6. **Demonstrating Leadership** Academic institutions are often seen as leaders in their communities. By conducting green audits and implementing sustainability initiatives, institutions can inspire others to take action and serve as role models for environmental stewardship.

7. **Long-Term Viability** Embracing sustainability through green audits ensures the long-term viability and resilience of academic institutions. By reducing environmental impacts and fostering a culture of sustainability, institutions can better adapt to future challenges such as climate change and resource scarcity.

Apart from these, Green Auditing of a Higher Education Institution (HEI) is essential as a part of Criteria 7 under the guidelines for submission of the mandatory Annual Quality Assurance Report (AQAR) by NAAC accredited institutions. It works on multiple facets of green campus initiative by the HEIs including water conservation, tree plantation, waste management, green energy initiative etc. The specific objective of the audit was to ascertain the adequacy of the management control framework of environmental sustainability in tune with applicable rules, regulations, policies, and standards.

For this purpose, an initial questionnaire survey was conducted to know about the resources available at the campus and consumption pattern of those resources by all the stakeholders of the institution. Water samples were collected from different locations of the college premises and analyzed. The flora and faunal diversity were estimated and photographed as much as practicable. Finally, a report pertaining to environmental management plan was prepared based on collected data with strength, weakness, and suggestions on environmental issue of the Taki Government College premises.

INTRODUCTION

Green auditing is the process of identifying and determining whether institution's practices are eco-friendly and sustainable. In the era of climate change and resource depletion it is always necessary to assess the resource use pattern and convert it in to green and clean one. Green audit provides a well adjudicated direction to these questions. It also increases overall consciousness among the stakeholders of the institution towards the environment and generates awareness to the adjoining community.

Taki Government College is an age-old institution that fosters the student aspirants exhaustively to uphold their motivation for education for a long time. In accordance with the Green Campus Evaluation Plan, as recommended by the Internal Quality Assurance Cell (IQAC) of the Taki Government College planned to conduct a green audit of the college in 2022. After preliminary field work and other formalities, the report was finally sent for approval to the authority (Officer-in- Charge and IQAC) on 04.04.2023. The purpose of the audit was to make sure that the practices followed in the campus are healthy and environment friendly. The specific objectives of the green audit were as follows:

1. Documentation of green practices followed by HEI
2. Identify strength and weakness in green practices
3. Document available biodiversity at the campus.
4. Evaluate facility of different types of waste management
5. Escalate environmental awareness throughout campus
6. Analyze and suggest solution for problems identified
7. Identify and assess environmental risk.
8. Motivates staff for optimized sustainable use of available resources

OVERVIEW OF THE COLLEGE

Taki Government College started its journey into educational arena of West Bengal on 15th September 1950 and has traversed a long way accumulating optimistic ingredients to arrive at its present momentous state, thereby fulfilling educational needs of large section of students of vast adjoining areas. Over the years, College has been upholding its pledge towards inclusive education and thus positioned itself as the seat of learning. The place Taki is well connected by railways and roadways with nearest Rail-station being Taki-Road in the Sealdah-Hasnabad route. Taki Government College is a Coeducational Undergraduate-cum-Postgraduate Degree

college, affiliated to West Bengal State University, Barasat. College offers Undergraduate Honours Courses under CBCS system in Bengali, English, Sanskrit, History, Philosophy, Political Science, Economics, Geography, Physics, Chemistry, Mathematics, Zoology, Botany and General Courses in Arts and Science. College also offers Post graduation in Bengali and English. Activities of College take place in three-part campus, Main-Building, Annex-Building and Geography-cum-playground enclave. Main-Building part consists office of the Principal, academic departments, Students-Union Room and College Canteen.

Taki Government College houses a team of inspiring faculty, dedicated staff, and modern infrastructure ready to serve huge number of students coming from adjoining rural hinterland. The whole campus is under CCTV surveillance, ensuring security and discipline. Teaching and support staffs always strive to achieve excellence for college remembering that only through combined efforts the college can be raised to summit. Students come to college, flourish and proceed further for better prospect, but the college remains as mighty foundation to their future, shaping their destiny year after year, unhindered and unabated.

VISION AND MISSION

VISION

Every institution has certain 'inclusive' specificities which mark its 'exclusive' commitment and contribution to the Indian nationhood. Taki Government College was established at a critical juncture after independence with the vision to educate the uprooted young men and women along with the underprivileged of the surrounding region, to amalgamate them into the main stream of the society, to make them socially responsible citizens by inculcating human values and to prepare them for getting established as flourishingly productive human resources in service and employment.

With all these, the Institution envisages that the students educated by its abundance become self-reliant, develop leadership qualities and contribute to the nation building in course of their prospective timeline.

MISSION

The College remains devoted to create the pervading environment conducive for total academic growth of all the students hailing from different socio-economic and cultural background and hence its efforts to make available all possible support for the weaker sections to enshrine the

ethos of inclusive education. The College strives for an ever stretching infrastructural built including addition of contemporary equipment in the laboratories and adapting increasingly to ICT teaching and learning for all out development of the students.

College feels responsible for upkeep of the paradigm of EQUALITY and thus fosters to eradicate any and all sorts of discriminations.

Specific objectives are:

- To accommodate all the student aspirants exhaustively to uphold their motivation for education.
- To promote and fulfill academic ambition of students.
- To cultivate social values within students.
- To extend Postgraduate teaching in all existing subjects.
- To enhance the infrastructural built of the Institution so that there remains surplus space.
- To equip all the Laboratories with futuristic facilities of global standard.
- To infuse more and more ICT facilities and courses for better training of students.
- To upgrade the Library with newer publications and contemporary facilities.
- To endow all the students with hostel lodgings.
- To depute resolute efforts in nourishing and inspiring students for their inclusive progress.

OBJECTIVES

The main objectives of carrying out Green Audit are:

1. Setup goal, vision, and mission for Green practices in campus

2. To inculcate concern for environment and its sustainability among students, staff as well as larger community.

3. To assess biodiversity profile of the college.

4. Establish and implement Environment Management in the campus.

5. To measure energy requirement of the college and explore possibility of green energy utilization.

5. To evaluate waste disposal system of the College

6. To record the meteorological parameter of Taki, where the college is situated.

7. Continuous assessment for betterment in performance in green

9. To bring out a status report on environmental compliance.

10. Development of ownership, personal and social responsibility for the College campus and its environment

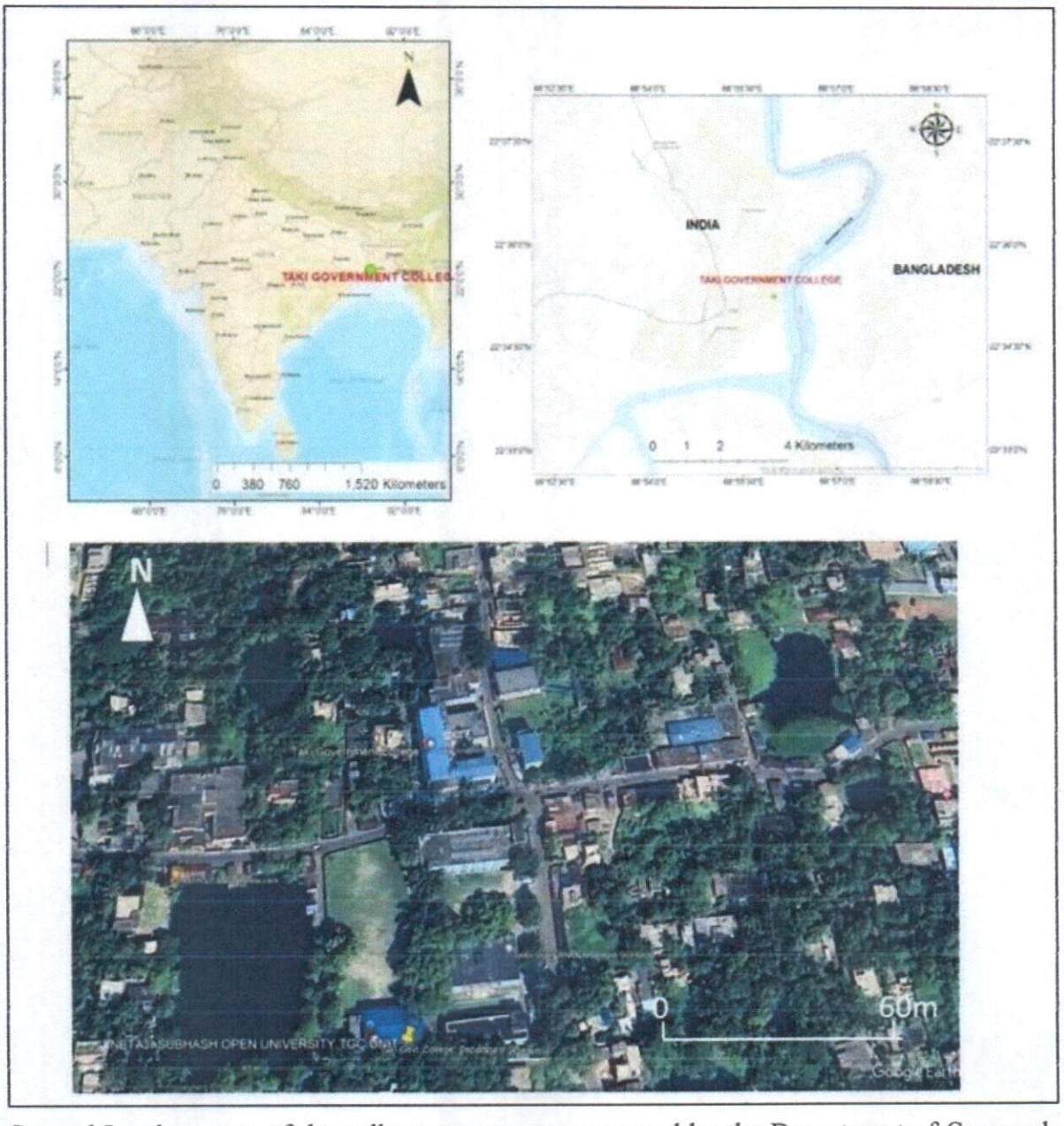
METHODOLOGY OF GREEN AUDITING

The Green Audit taken up by Taki Government College had been divided into following stages:

1. Selection of area/activities/parts of the campus where green audit would be performed.
2. Planning of visit to campus to discuss about the audit process with green audit team members.
3. A meticulous action plan and survey questionnaire was prepared.
4. Data pertaining to identified parameters for green auditing of the campus were collected directly through an on-site visit and survey.
5. Available background information on the identified activities and other parameters were collected.
6. The role of each stakeholder in green related activities has been collected.
7. Flora and faunal diversity of the premises documented by the audit team.
8. Data collection based on questionnaire was performed for different facets of resource use in campus, specially, energy expenditure, water usage and waste generation, etc.
9. Data analysis and evaluation.
10. Discussion on the findings with the college authority and IQAC.
11. Report preparation and recommendations submitted.

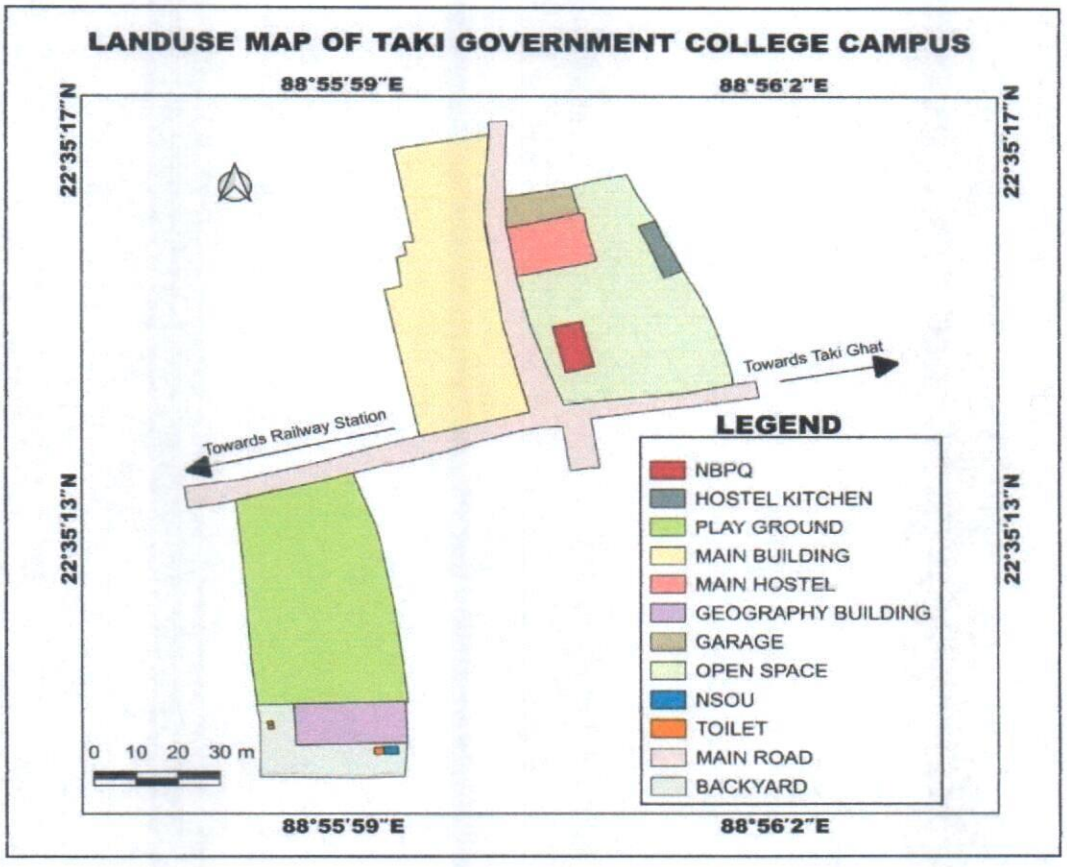
GEOGRAPHICAL LOCATION

Taki Government College is situated in the Taki Municipality of Hasnabad block, district North 24 Parganas and is just a 2-hour distance from Kolkata. Taki is the land of Zamindars. Taki is connected with Kolkata via Taki Road and Indian Railways lines. The geographical coordinate of the college is 22.5874583°N and 88.932584°E. The dynamic Ichhamati river is flowing in the North-East part of the campus. Taki is a popular weekend getaway spot where visitors may unwind in the scenic surroundings along the Ichhamati River.



General Landuse map of the college campus was prepared by the Department of Geography using Google map and GIS technology. The college campus covered an area of 1.87 acre. The college campus is divided into three parts. I) Main Annex building, 2) Department of Geography and NOSU cum playground and 3) NBPQ and Hostel area. Most of the area covered by buildings. Only Department of Geography has the provision of playground and survey area.

The college campus has no provision for vegetation cover as well as lack of open space for campus expansion.

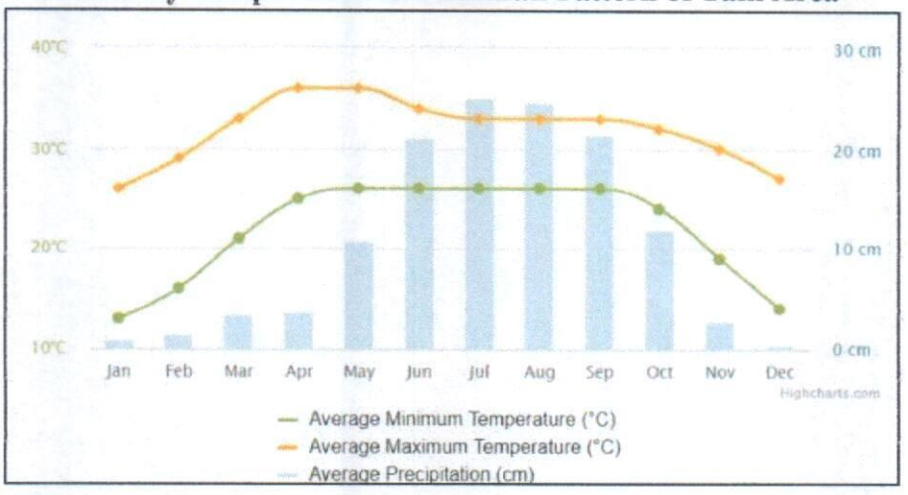


ANNUAL WEATHER TRENDS

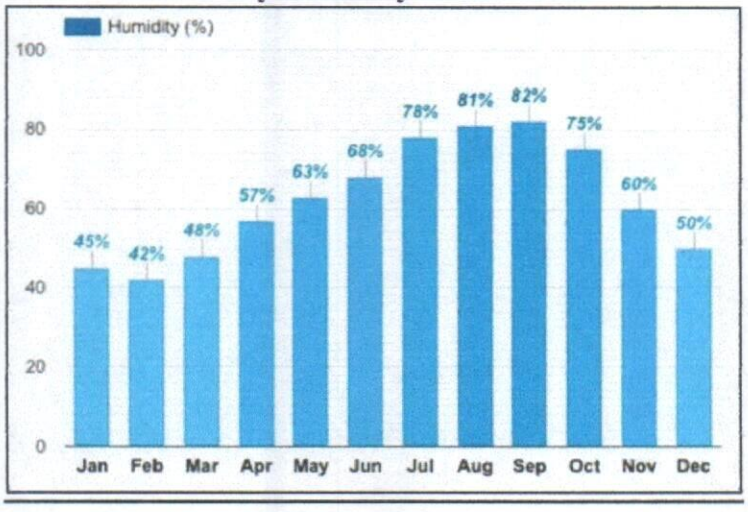
This region experiences a swelteringly hot summer, high levels of humidity almost year-round, and evenly spaced rainfall during the monsoon season. The summer, which lasts from March to May, comes after the winter, which lasts from around the middle of November to the end of February. June through September is when the south-west monsoon season occurs. The post-monsoon season lasts from October through the first part of November. April has the highest average high temperature (38.5°C), making it the warmest month. January has the lowest average high temperature of any month, at 27°C.

Rainfall amounts to 1600 mm on average each year. The months of June through September during the South-West Monsoon account for over 74% of the total yearly precipitation. The latter part of the hot season and October see some rainfall, primarily in the form of thundershowers. There is not much of a difference in rainfall between years. From the southeast to the northwest, the amount of rainfall decreases.

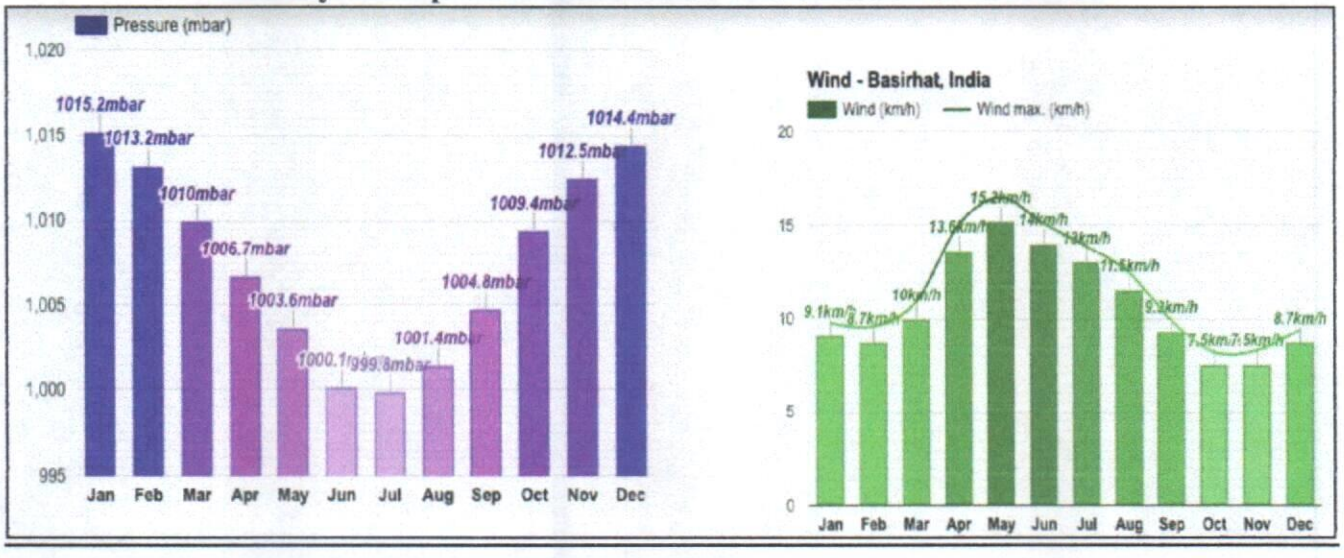
Monthly Temperature and Rainfall Pattern of Taki Area



Monthly Humidity of Taki Area

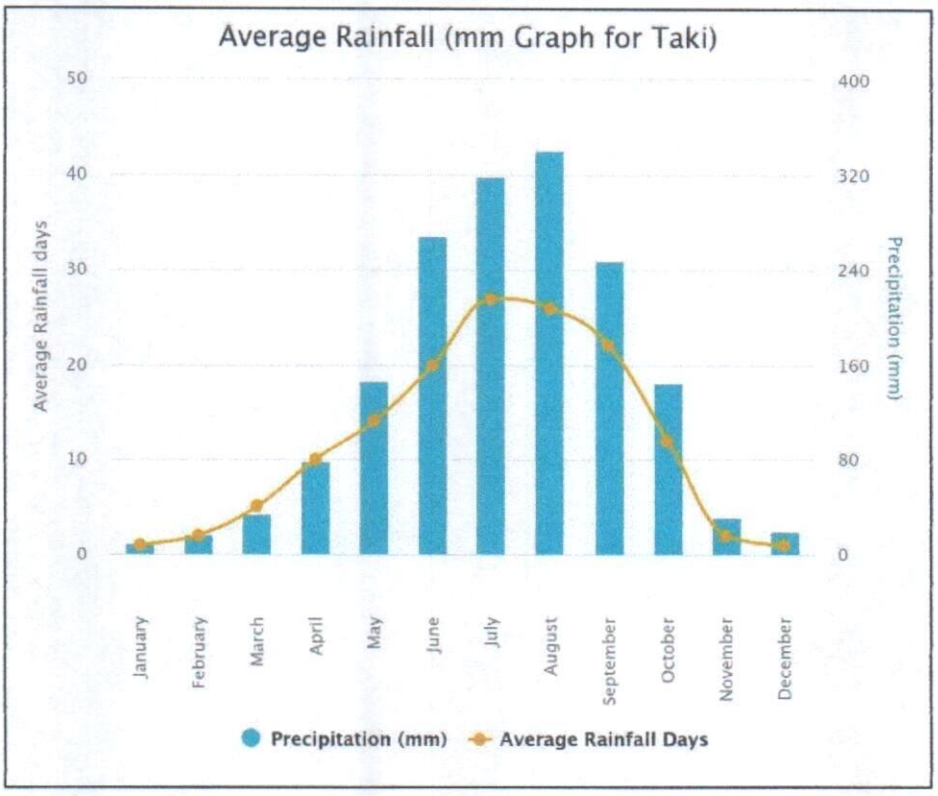


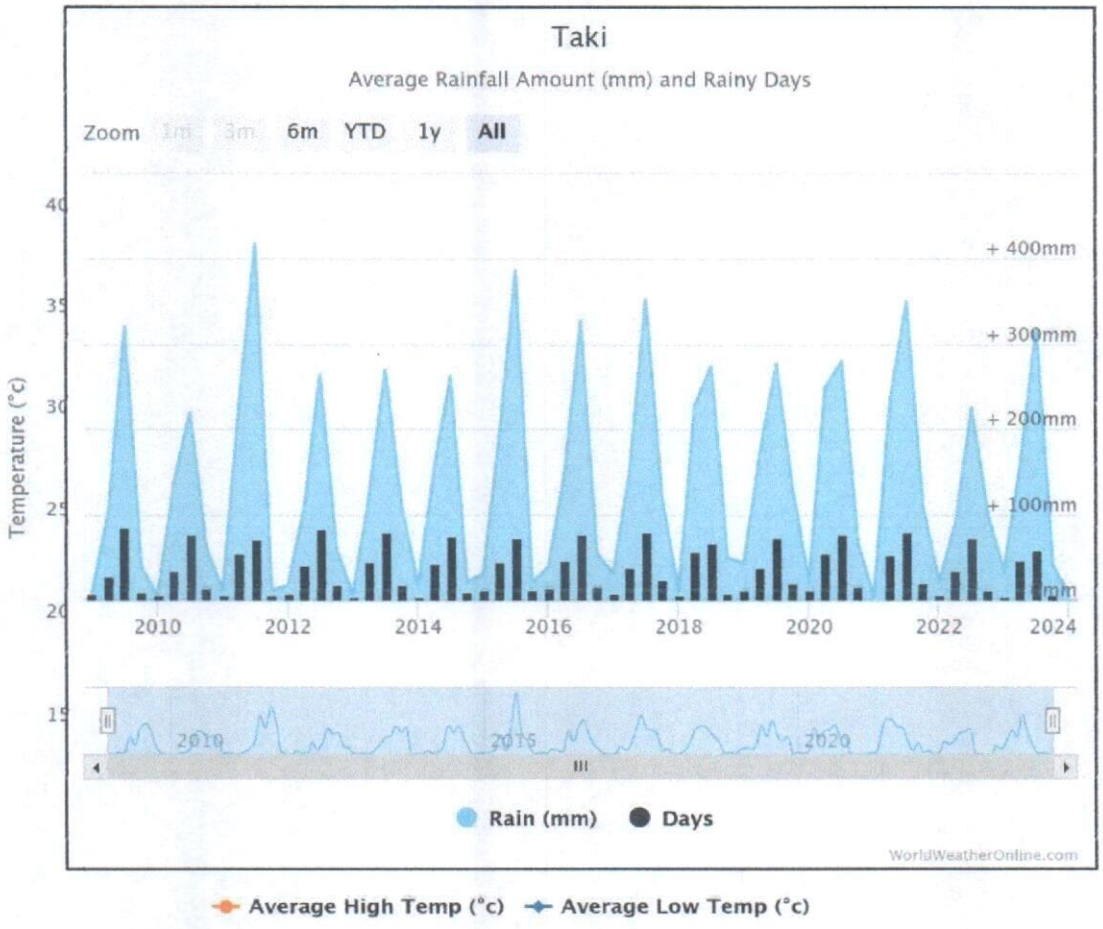
Monthly Atmospheric Pressure and Wind condition of Taki Area



Source: https://www.worldweatheronline.com

Source: https://www.worldweatheronline.com/taki-weather-averages/west-bengal/in.aspx





MAJOR FINDINGS AND RECOMMENDATIONS

Taki Government College is located far from the maddening crowd and hustle bustle of city life. Its location near the bank of river Ichhamati provides fresh air as well as an eco-friendly environment. It is very close to Sundarban Biosphere Reserve and hence maintenance of quality environment is very important for this HEI. The green audit team put forward following recommendations:

1. The college authority has always maintained healthy practices of planting trees at monsoon by celebrating Ban-Mahotsav. However, more green cover and maintenance of green areas is the need of the hour. Since, vacant land area is not available, the college authority can think of roof top garden alongside promoting green cover at annex building and hostel premises.
2. The college authority maintains a small medicinal garden. More varieties of medicinal plant can be added.
3. The College authority issued appropriate notice and strictly maintains NO Plastic Zone at the campus and college canteen. However, the reusable stainless steel canteen cutlery can also be replaced with eco-friendly and organic leaves, paper straw, disposable plates, edible spoons etc. This initiative will also inculcate the healthy practices in students.
4. The College has installed 10KW on grid Solar PV Power plant at the roof top procured from the grant received under RUSA 2.0 scheme. This supplies power to Principal Office. However, it requires proper maintenance for which fund should be allocated for AMC with appropriate agency. Besides, initiative should be taken to enhance the capacity or to install more such equipment to cover larger portion of the college premises under this facility.
5. The College has Boys and Girls hostel at the premises. However, these facilities are not available to the students since COVID pandemic time. Hence, proper maintenance, repair and renovation should be carried out to make it functional once again. It is learned from the college authority that there is a proposal for hostel renovation and upgradation to RUSA. The college authority should take immediate steps to receive further installment from RUSA in this regard.
6. The College extracts ground water for everyday use. Water management initiative with appropriate hygiene is undertaken. The areas of water tanks in site are clean

and no mosquito breeding spots are there. The provisions of rain water harvesting can be explored to reduce large scale ground water extraction.

7. Waste water should be collected and a waste water treatment plant can be installed in the open space wherein this water can be treated and reused for gardening and toilet flushing. Provision of water recharge pit can also be explored.
8. The college authority has placed adequate numbers of bins in all parts of building. The waste does not pollute the ground or surface water. There is no problem of air pollution from waste as noted during audit.
9. The College can construct vermicomposting pits. The Collected organic solid waste can be utilized in these pits and generate good quality manure for the college medicinal garden and rooftop garden.
10. The College maintains a no horn zone in its premises.
11. The College does not allow entry of any four wheeled auto mobiles. It has a covered car parking outside college premises, beside hostel building.
12. The college allows entry of Cycles of students and maintains a cycle stand for this purpose.
13. The College frequently performs extension activities for the purpose of social upliftment and awareness generation. The college can also perform awareness generation and motivational seminars/ workshops to disseminate the idea of Sustainable Development Goals (SDG) in the locality and try to enhance green cover in the area.

BIODIVERSITY PROFILE OF THE COLLEGE

A flora survey was carried out to identify the total numbers of plants and trees in the college premises. The floral wealth was digitally photographed and compiled in this report as much as practicable. The landscape area has a variety of plantations as follows in the table below:

FLORAL DIVERSITY OF THE COLLEGE

Sl No	Scientific Name	Family	Number of individuals
1	*Andrographis paniculata*	Acanthaceae	16
2	*Rungia pectinata*	Acanthaceae	11
3	*Mangifera indica*	Anacardiaceae	4
4	*Dracaena marginata*	Asparagaceae	2
5	*Colocasia esculenta*	Araceae	24
6	*Alocasia macrorrhizos*	Araceae	19
7	*Roystonea regia*	Arecaceae	2
8	*Cocos nucifera*	Arecaceae	7
9	*Eclipta alba*	Asteraceae	22
10	*Tridax procumbence*	Asteraceae	39
11	*Wedelia calendulacea*	Asteraceae	66
12	*Ageratum conyzoides*	Asteraceae	26
13	*Vernonia cinerea*	Asteraceae	28
14	*Synedrella nodiflora*	Asteraceae	44
15	*Heliotropium indicum*	Boraginaceae	15
16	*Cleome gynandra*	Capparidaceae	19
17	*Cleome rotidospermum*	Capparidaceae	22
18	*Commelina nudiflora*	Commelinaceae	11
19	*Dryopteris filix-mas*	Dryopteridaceae	38
20	*Acalypha indica*	Euphorbiaceae	22
21	*Phyllanthus fraternus*	Euphorbiaceae	15
22	*Croton bonplundianum*	Euphorbiaceae	16
23	*Acacia auriculiformis*	Fabaceae	2
24	*Adenanthera pavonina*	Fabaceae	1
25	*Tamarindus indica*	Fabaceae	1
26	*Cassia sophera*	Fabaceae	25
27	*Pongamia pinnata*	Fabaceae	4
28	*Inga dulcis*	Fabaceae	1
29	*Caesalpinia pulcherrima*	Fabaceae	2
30	*Delonix regia*	Fabaceae	2
31	*Anisomeles ovata*	Lamiaceae	22
32	*Clerodendron infortunatum*	Lamiaceae	32

33	*Lagerstroemia speciosa*	Lythraceae	5
34	*Sida cordifolia*	Malvaceae	11
35	*Abutilon indicum*	Malvaceae	15
36	*Azadirachta indica*	Meliaceae	2
37	*Swietenia microphylla*	Meliaceae	2
38	*Xylocarpus granatum*	Meliaceae	4
39	*Artocarpus heterophyllus*	Moraceae	5
40	*Ficus racemose*	Moraceae	8
41	*Ficus benjamina*	Moraceae	1
42	*Moringa oleifera*	Moringaceae	10
43	*Ravenala madagascariensis*	Musaceae	2
44	*Bougainvillea glabra*	Nyctaginaceae	1
45	*Mirabilis jalapa*	Nyctaginaceae	13
46	*Vanda roxburghii*	Orchidaceae	28
47	*Oxalis stricta*	Oxalidaceae	52
48	*Argemone mexicana*	Papaveraceae	18
49	*Turnera ulmifolia*	Passifloraceae	20
50	*Eragrotis amabilis*	Poaceae	48
51	*Eragrotis tenella*	Poaceae	55
52	*Eragrotis ciliaris*	Poaceae	31
53	*Eragrotis viscosa*	Poaceae	22
54	*Eleusine indica*	Poaceae	25
55	*Chloris barbata*	Poaceae	17
56	*Pteris vittate*	Polypodiaceae	27
57	*Peperomia pellucida*	Piperaceae	28
58	*Ziziphus mauritiana*	Rhamnaceae	1
59	*Oldenlandia corymbosa*	Rubiaceaae	18
60	*Cardiospermum halicacabum*	Sapindaceae	2
61	*Lindenbergia indica*	Scrophulariaceae	21
62	*Scoparia dulcis*	Scrophulariaceae	19
63	*Vandellia crustacea*	Scrophulariaceae	12
64	*Linderria brachiate*	Scrophulariaceae	16
65	*Torenia cordata*	Scrophulariaceae	19
66	*Majus pumilus*	Scrophulariaceae	15
67	*Datura stramonium*	Solanacceae	2
68	*Physalis minima*	Solanacceae	8
69	*Solanum nigrum*	Solanaceae	18
70	*Nicotiana plumbaginifolia*	Solanaceae	25

Photographs of some of the plants of the campus

Figure- A-*Wedelia calendulacea*, B- *Ziziphus mauritiana*, C- *Ficus racemosa*, D- *Clerodendron infortunatum*, E, F- *Croton bonplandianum*, G- *Nicotiana plumbaginifolia*, H- *Solanum nigrum*, I- *Swietenia microphylla*, J- *Synedrella nodiflora*, K- *Tamarindus indica*, L- *Oxalia stricta*, M- *Dryopteris filix-mas*, N- *Azadirachta indica*, O- *Adenanthera pavonica*, P- *Eclipta alba*

Figure- *A- Aocasia macrorrhizos, B- Cardiospermum halicacanum, C- Mangifera indica, D- Dracaena marginata, E- Ficus benjamina, F- Oldenlandia corymbosa, G- Ageratum conyzoides, H- Cocos nucifera, I- Cassia sophera, J- Xylocarpus granatum, K- Anisomeles ovate, L- Pteris vittata, M- Datura stramonium, N- Turnea ulmifolia, O- Heliotropium indicum, P- Ravenala madagascariensis.*

Major Findings and Recommendation

1. Taki Government College is within the geo-position between 22.587387° N, 88.933528° E It encompasses an area of about 1.87 acres. As this college is near 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.

FAUNAL DIVERSITY IN TAKI GOVERNMENT COLLEGE CAMPUS

LIST OF FAUNA

INSECTS	SCIENTIFIC NAMES
BUTTERFLIES	*Euploea crameri (Spotted Black crow)* *Colotis amata* **(Small salmon arab)** *Junonia almanac* **(Peacock Pancy)** *Junonia atlites* **(Grey Pancy)** *Mycalesis perseus* **(Common Bush Brown)** *Papilio clytia* **(Common Mime)** *Papilio polymnestor* **(Blue Mormon)**
MOTHS	*Eressa discinota* *Amsacta emittens* *Paralleliaonelia* *Auchavelans* *Thoseacana*
SPIDERS	*Araneusellipticus* *Lepthyphantes sp.* *Draposa sp.*

	Menemerus sp.
	Lethocerus indicus *Diplonychus rusticus* *Laccotrephes griseus* *Hydrometra butleri* *Chrysocoris purpureus* *Cantao ocellatus* *Viliusmelanopterus* *Acanthaspis micrographa* *Dolycoris indicus*
MAMMALS	*Macaca mulatta* **(Rhesus Monkey)** *Sciurus carolinensis* **(Eastern Gray Squirrel)** *Pteropusgiganteus* **(The Indian Flying fox)** *Rousettus leschenaultia* **(Indian fulvous fruit bat)** *Bandicotta bengalensis* **(Indian mole rat)** *Mus booduga* **(Little Indian field mouse)** *Felis catus* **(Cat)**
BIRDS	*Anhinga melanogaster* **(Oriental Darter)** *Heliopaispersonatus* **(Masked fin foot)** *Leptoptilosdubius* **(Greater Adjutant)** *Pelargopsis amauroptera* **(Brown winged King fisher)** *Acridotherestristis* **(Common myna)** *Streptopelia orientalis* **(Oriental Turtle Dove)** *Athene noctua* **(Little owl)** *Pycnonotus cafer* **(Red vented Bulbul)**
REPTILES	*Ptyas mucosus* **(Indian Rat Snake)** *Calotes versicolor* **(Oriental Garden Lizard)** *Hemidactylus frenatus* **(Common house gecko)** *Eutropis multifasciata* **(Many Striped Skink)** *Enhydrisen hydris* **(Rainbow water snake)** *Xenochrophis cerasogaster* **(Painted keelback)** *Boiga trigonata* **(Indian Gaama)** *Bungarus caeruleus* **(Common Indian Krait)** *Naja naja kaouthia* **(Monoocelate Cobra)** *Vipera russelli* **(Russell's Viper)** *Varanus bengalensis* **(Bengal Monitor)**
AMPHIBIANS	*Duttaphrynus melanostictus* **(Common Indian Toad)** *Euphlyctis cyanophlyctis* **(Skipper Frog)** *Fejervarya limnocharis* **(Paddy Field Frog)** *Hoplobatrachustigerinus* **(Common Indian Bull frog)** *Euphlyctis hexadactylus* **(Indian Green Frog)** *Polypedetes bengalensis* **(Brown Blotched Tree Frog)**

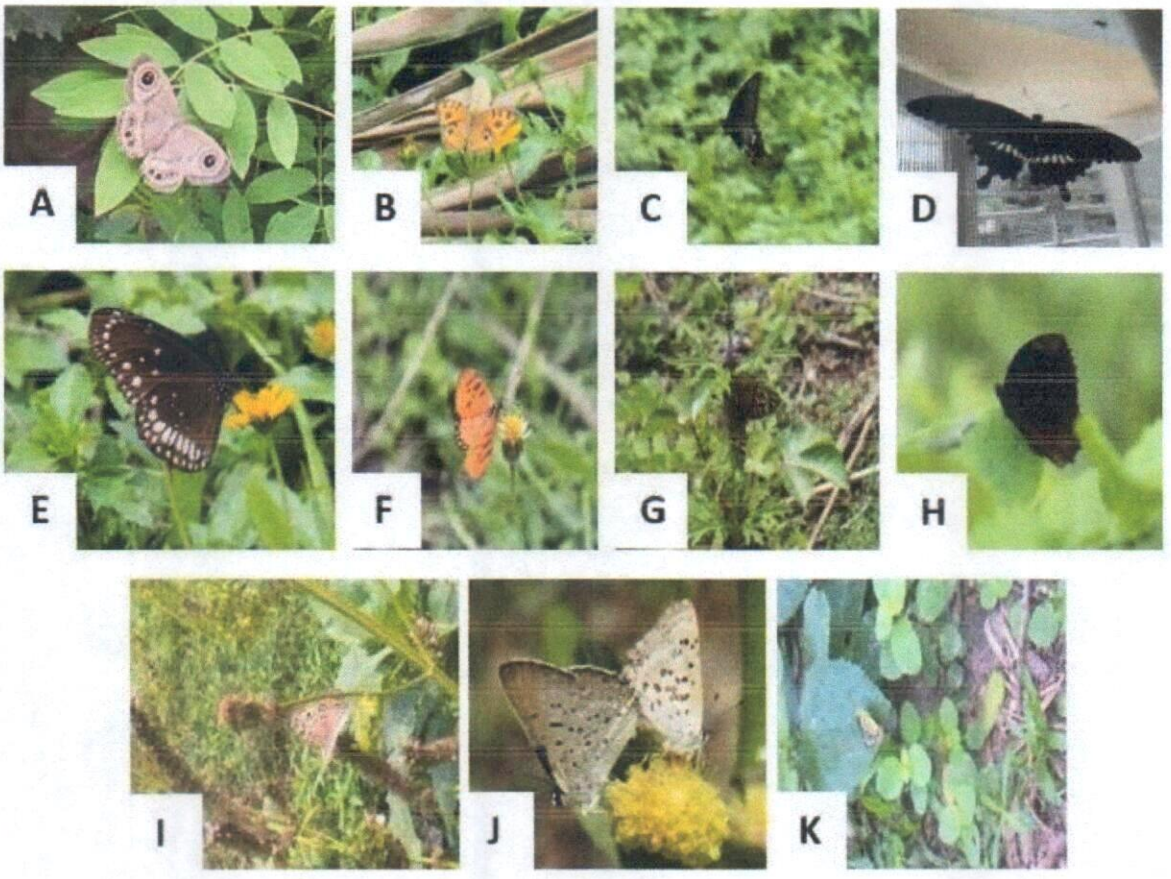


Figure- A- *Yapthima sp* (Common Five Ring Butterfly); B- *Junonia lmanac* (Peacock Pancy); C- *Papilio polytes* (Common Mormon); D- *Papilio polytes* (Common Mormon); E- *Euploea sp* (Common Crow); F- *Danaus sp* (Plain Tiger); G- *Junonia lemonias* (Lemon Pancy); H- *Elymnias hypermenstra* (Common Palmfly); I- *Junonia atlites* (Grey Pancy); J- *Chilades sp* (Plains Cupid); K- *Dalius eucharis* (Common Jezebel)

Figure- A. *Ptyas mucosa* (Indian Rat Snake); B- *Varanus bengalensis* (Bengal Monitor)

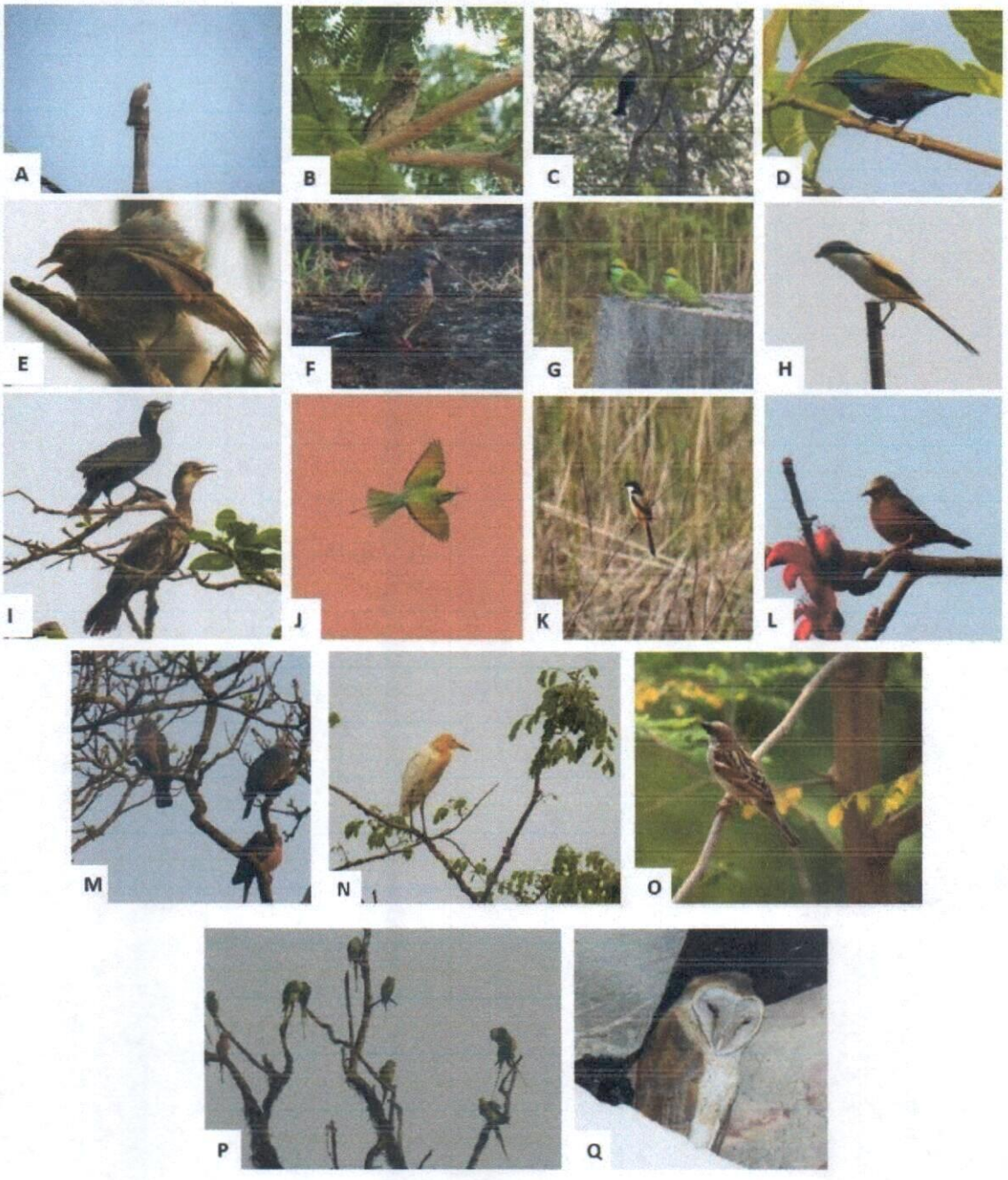


Fig: A- *Spilopelia chinensis* (Spotted Dove); B- *Athene brama* (Spotted Owlet); C- *Dicrurus macrocerus* (Black Drongo); D- *Cinnyris asiaticus* (Purple Sunbird); E- *Turdoides striata* (Jungle Babbler); F- *Spilopelia chinensis* (Spotted Dove); G- *Merops orientalis* (Green Bee Eater); H- *Lanius cristatus* (Brown Shrike); I- *Microcarbo niger* (Common Cormorant); J- *Merops orientalis* (Green Bee Eater); K- *Lanius cristatus* (Brown Shrike); L- *Sturnus vulgaris* (Starling); M- *Treron phoenicoptera* (Yellow footed green pigeon); N- *Bubulcus ibis* (Cattle Egret); O- *Passer domesticus* (House Sparrow); P- *Psittaculus* sp. (Parrot); Q- Brown Owl

Major Findings and Recommendations:

Energy is one of the major inputs for economic development and hence the energy sector receives critical importance in the long-sighted view of ever-increasing energy needs, particularly in higher education institutions. Energy-saving certainly reduces the burden on energy resources and the economy and also saves money with energy-efficient appliances. It requires optimum use of energy by minimizing wastage and avoiding loss or excess use without compromising the actual need. An energy audit is an effective tool to manage energy more systematically. It regulates the amount of energy consumption associated with a building and the probable investments linked with that energy consumption. The audit makes aware of saving energy and encouraging renewable energy techniques and technologies in general, besides the use of energy-efficient materials in particular. It also acts as a tool to estimate and analyse energy consumption and its pattern. It identifies all the energy streams in a system and quantifies the use of energy according to its discrete functions.

Established in 1950, Taki Government College is a premium higher education institute situated beside the river 'Ichhamati' in North 24 Parganas, West Bengal under the Higher Education Department of Government of West Bengal. It is affiliated to the West Bengal State University. The college provides graduation and post-graduation degree in various subjects. The college is a NAAC accredited institute.

Objectives

- Generation of energy consumption profile of the campus
- Identification of major energy resources of the campus
- Identification of sustainable energy avenues existing in the campus

Methodology

The Taki Government College has taken the initiative for preparing the energy audit report in the academic year 2022-23 to get an estimate of the energy consumed and to find out ways to reduce the energy consumption for future use. A team has been formed comprising with Dr. Debasish Das (Assistant Professor of Zoology), Dr. Rama Prasad Adak (Assistant Professor of Physics) under the guidance of Officer-In-Charge of Taki Government College for preparing

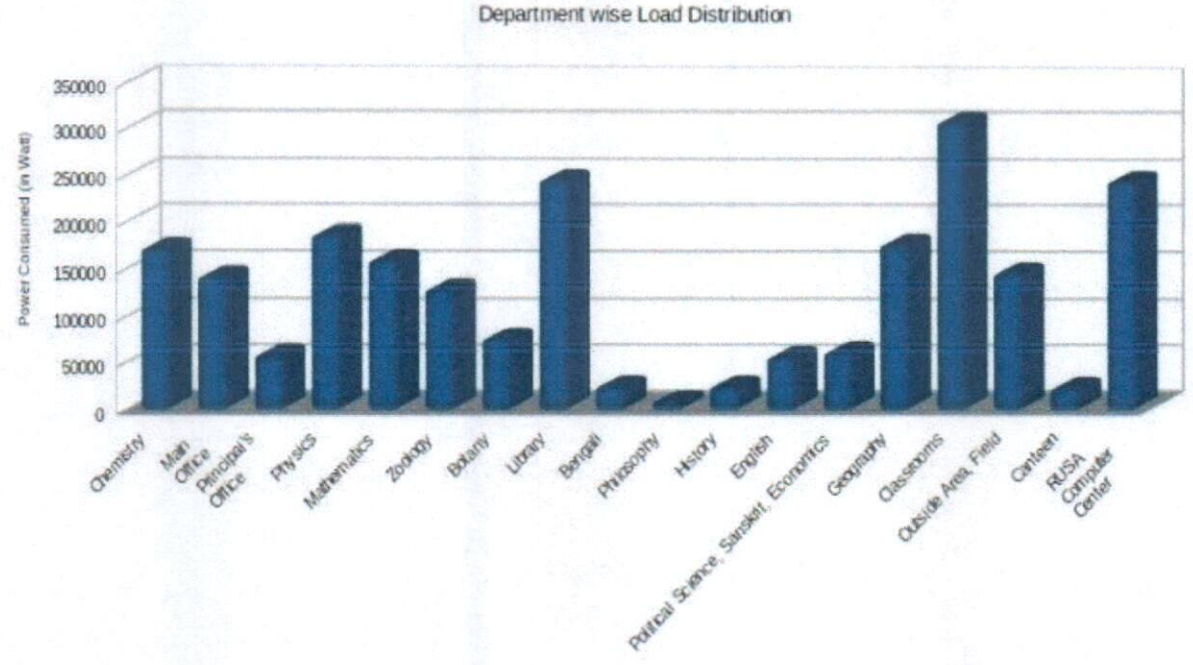
an report on consumption of energy. The college buildings comprise with one main building where departments of Chemistry, Physics, Mathematics, Zoology, Botany, Bengali, English, Economics, Philosophy, History, Political Sciences, Sanskrit, are there. This building has many classrooms, RUSA computer rooms, library, Staff room, Seminar room, Principal room, office, Cashier room, cheap store, Student's Common rooms, Sick room, canteen, Union room, corridors, Toilet, Garden and Lawn. There are other buildings of this college, mainly Geography Department building, New Build Principal Quarters. A Solar panel setup of 10 kW has been installed in the roof-top of the main building in November, 2021 by West Bengal Pollution Control Board. The energy audit report team has collected all connected load and plug point load (room wise) and then calculated the maximum power requirement, maximum energy consumption in a month and so many energies consumption analysis (using bar diagram). The team also analyses the actual power consumption (month wise) and make a comparative study on monthly consumption.

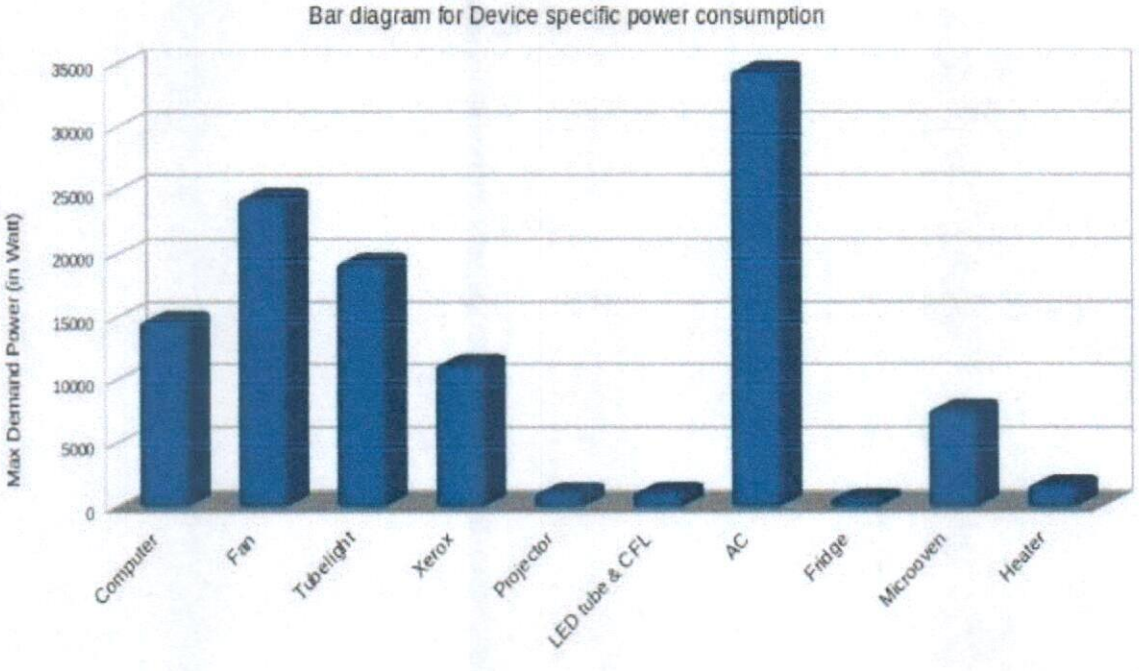
List of Energy Consuming Sources: - (Table Format) (Principal's Room, Principal's Office and Department wise)

Device wise consumption and their comparative is also presented in bar diagram.

	Chemistry	Main Office	Principal's Office	Physics	Mathematics	Zoology	Botany	Library	Bengali	Philosophy	History	English	Political Science, Sanskrit, Economics Geography	Classroom	Outside Area, Field	Canteen	RUSA Computer Center	Grand Total	Average Power Consumption Per Item In Watt	Total Power Consumption
TV			2	1									1		2		1	7	250	1750
Computer	2	12	3	10	14	2	2	6	2	1	3	2	3	16			24	102	200	20400
Laptop	2			1						1	1							5	70	350
Speakers		4													12		1	17	20	340
Scanner				1														1	15	15
Projector						5	3			1					3		1	8	200	1600
Water purifier													1	1		2		4	60	240
Printer		7	5	5	3	1	3		2	1	2	1	3				2	32	375	12000
Xerox/Big printers		4	1					1	1			1					1	11	1200	13200
Inverter Set	1		2						1		1						1	6	30	180
LED lamps			10	2	3	1		22	3				3		4	4	2	52	9	513
CFL lamp(9W/15W)			12										36				10	58	10	560
Pump (0.5,1.0 HP)	1													2		2		5	746	3730
Tube light	63	41	10	33	18	58	38	94	9		2	4	10	24	201		6	509	20	11960
Ceiling Fan	30	15	6	24	8	15	14	50	4		1	2	11	10	125		4	330	80	27040
Mike Set		1			1										8		1	11	2400	26400
Stand Fan	1			1	1							1		1	2			7	80	560
CCTV		1	1					2						3	2			10	7	125
AC		1	2	2	1	1	1	2				1	3				2	23	1500	34500
WB modem			4	1							1							6	15	90
6 A plug	11	11	12	30	40	19	20	30	3	5	6	11	16	46	85	12	6	352	1000	352000
16 A plug	39	14	6	24	15	21	6	32	5		2	5	4	17	21	4	2	236	60	13920
Generator(100 KVA)																1		1	0	0
MH light/Halogen 100W/60W																11		11	100	1100
Heavy duty fan											11						1	12	80	960
Glow sign Board					1	1	1	1	1		1	1						7	80	560
Electric Bell		1																1	5	5
Induction, Heater								1						1				2	1000	2000
Micro-Oven	1		1	1		2	1											6	1200	7200
Refrigerator				1		2	2						1				1	7	350	2450
Pump Submersible																1		1	373	373
Laboratory Instrument LT				20		1	13							1				35	20	700
Laboratory Instrument HT	4			36		4	6											50	100	5000
Total Plug Point Power In Watt	132440	90200	36960	132000	105600	99000	47520	178640	14520	3960	14960	39160	35200	120560	186120	29920	14960	1712160	1452880	971822
Total Power without	38656	50746	21002	52973	52752	28864	27690	96054	9067	3845	8955	15295	24462	54813	121030	15361	7038	72310	671622	
Total Power	171196	140946	57962	184973	158352	127864	75210	244694	23587	7805	23825	54459	59662	175373	307150	45281	21998	243470	2124700	

Bar diagram of Department wise Load Distribution:





Calculation of electric load and consumption : (Table format, item wise)

Sl No	Name of the item	Total no of Equipments	Wattage	Total Wattage	Demand Factor	Max Demand	Remarks
1	Computer	105	150-200	18375	0.8	14700	
2	Fan	338	70-100	28730	0.85	24420.5	
3	Tubelight	598	36-40	22724	0.85	19315.4	
4	Xerox	11	1200	13200	0.85	11220	
5	Projector	8	150-200	1400	0.8	1120	
6	LED tube & CFL	113	9-18	1356	0.85	1152.6	
7	AC	23	1000-2000	34500	1	34500	
8	Fridge	7	80-150	770	0.85	654.5	
9	Microoven	6	1000-2000	9000	0.85	7650	
10	Heater	2	1000	2000	0.85	1700	
11	Laboratory Instrument	84	200-1500	71400	0.85	60690	
12	16 A Plug	232	1000	232000	0.25	58000	
13	6 A plug	482	60	28920	0.5	14460	

Total Wattage	249583	Watt
Sum of individual maximum demand in KW	249.583	KW
Simultaneous maximum demand (50% of Total Demand)	124.791	KW
Maximum Energy consumption one hour per day (kwh)	124	BOT unit
Maximum Energy consumption five hour per day (kwh)	624	BOT unit
Maximum Energy consumption for one year (taking 240 working days)	149750	BOT unit
Maximum Energy consumption for rest 125 days (taking 5% of normal consumption)	3900	BOT unit
Maximum Energy consumption for one Year	153650	BOT unit
Maximum Energy consumption (average) for one month	12804	BOT unit

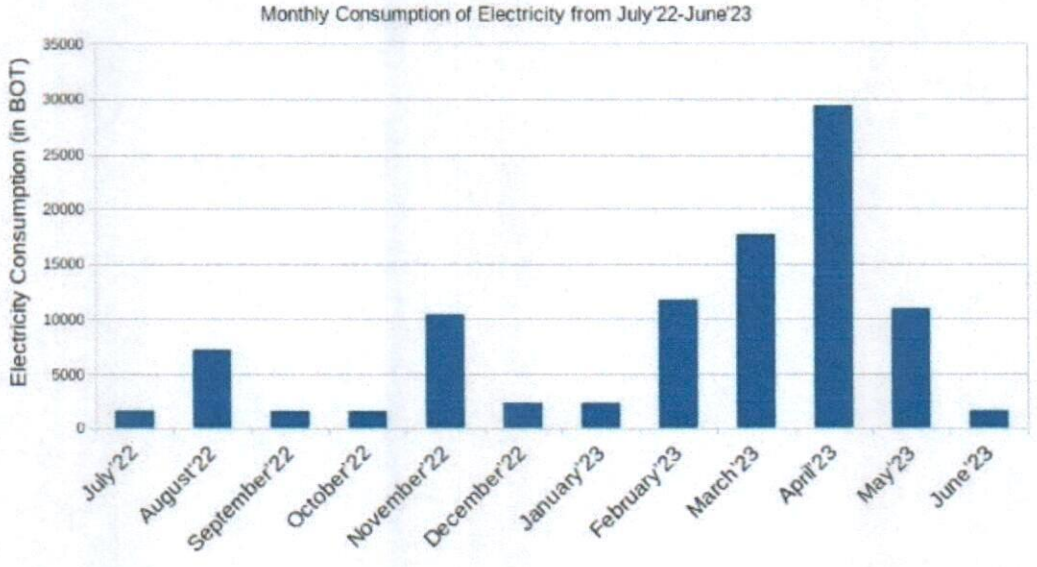
Consumption of Electricity in the period from July'22 to June'23 : (table format)

Consumption of electricity (in BOT) from July'22-June'23

Sl No.	Consumer ID	Jul '22	Aug '22	Sep '22	Oct '22	Nov '22	Dec '22	Jan '23	Feb '23	Mar '23	Apr '23	May '23	Jun '23	Solar Energy Adjusted
1	150648729	242	2833	619	619	4507	1001	1002	372	558	930	1696	242	
2	150648730	1285	2836	619	619	4663	1036	1036	11143	16715	27858	8996	1285	6901
3	150648732	31	96	21	21	182	41	41	28	41	69	216	31	
4	150648734	0	153	33	33	387	86	86	0	0	0	0	0	573
5	150648755	29	267	58	58	514	114	114	62	93	155	29	29	
6	150648759	6	0	0	0	0	0	0	5	8	13	6	6	
7	150648760	0	0	0	0	0	0	0	0	0	0	0	0	
8	150648763	18	0	0	0	0	0	0	101	151	252	18	18	
9	150648764	5	0	0	0	0	0	0	0	0	0	5	5	
10	156048767	0	978	214	214	109	24	24	53	79	132	0	0	
11	150648768	8	67	15	15	75	17	17	11	17	28	8	8	
12	150648769	0	0	0	0	0	0	0	0	0	0	0	0	
	Total unit	**1624**	**7230**	**1579**	**1579**	**10437**	**2319**	**2320**	**11775**	**17662**	**29437**	**10974**	**1624**	**7474**

Yearly Total (Off Grid)	106034	Unit
Yearly Total (On Grid)	98560	Unit
Monthly Avg (Off Grid)	8836	Unit
Monthly Avg (On Grid)	8213	Unit
Monthly Savings (for On Grid)	623	Unit

Bar Diagram of Electricity consumption in different months from July'22-June'23



Solar panel in the roof-top of main building implemented by West Bengal Pollution Control Board

Observations: - (Point Wise)

a) Filament bulbs are completely replaced by LED bulbs and Tubes which save the power consumption.

b) Solar power reduces the monthly billing units though reduced data is not recorded due to lack of "ON GRID" meter connection

c) Most of the energy consumption done by AC.

d) Most of the plug points use for low wattage devices.

e) The classrooms consume maximum energy out of total consumption of the college.

Comments:

During data collection for energy audit, we find the actual load distribution among different Dept/Section inside the college campus. The load carrying capacity of the connecting wire for different Dept/Section must be chosen as per load distribution of that section and load distribution data helps us for this particular precautionary measurement.

WASTE MANAGEMENT

Waste is inevitable in an HEI regularly attended by thousands of students, staff and other stakeholders. The wastes are of different types:

1. Paper waste in the form of Newspaper, Examination scripts, old question paper, register, notices etc are accumulated and given to the Vendors.
2. Computers and other E-waste are properly sorted and accumulated in the go down and given to the Vendors
3. Dust, dirt, dry waste from Canteen is accumulated and collected by the municipality.
4. Liquid wastes from toilets, washbasins – Around 100 – 120 liters per week and other sources led into storm water drains and cleaned by the Taki Municipality.

Observation and Recommendations:

1. The College authority issued appropriate notice and strictly maintains NO Plastic Zone at the campus and college canteen. there is very little plastic waste generation in the premises.

2. Adequate number of dustbins were placed in different parts of the building for accumulation of solid waste and are regularly cleaned.

3. The waste does not pollute the ground or surface water. There is no problem of air pollution from waste as noted during audit.

4. The college has no vermicompost plant that can effectively manage better treatment of all organic waste.

FUTURE PLAN

1. Initiative of year-wise internal audit on green, water, energy and noise will be taken.

2. Month-wise mapping of water usage and proper management of the same will be monitored by keeping records. Quality of drinking water will also be measured by competent authority at regular interval.

3. Measures will be taken for proper management of waste water.

4. Measures will be taken for proper monitoring and disposal of waste from chemical laboratories.

5. Awareness Programmes and seminars in collaboration with in-house NSS unit or local authorities may be conducted to enhance awareness on water usage and to increase environment consciousness.

6. Maintenance of energy by proper use of electrical appliances will be practiced.

7. Initiative will be taken to prepare a medicinal plant garden or vegetable crop planting at the any suitable available space of the campus.

8. Regular cleaning program in collaboration with NSS unit will be organized involving students and teachers.

9. Measures will be taken to maintain greeneries in the open space of the campus.

CONCLUSION

This audit involves considerable team discussions and meetings with key staff members on a variety of environmental-related topics. The Green Audit Team has made every effort to record environmental data of Taki Government College 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.

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.

Overall, the main College campus is an example of Built Ecosystem i.e. where building construction is made and allied areas of the college including NBPQ building, Hostel (for Boys) and Department of Geography includes trees, bushes, and enough green cover. The College makes a significant effort to act in an environmentally responsible manner and considers the environmental effects of the majority of its activities. The recommendations in this report suggests some more ways in which the College can work to improve its practices and develop into a more sustainable institution, despite the fact that it performs rather well overall. It's important to begin a few things, such drip irrigation and checking the water flow from the taps. Additionally, we strongly advise installing water meters at each building/block and water balancing report.

The Team also 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.

A. SOLAR PANEL IN THE ROOFTOP OF MAIN BUILDING; B. NO PLASTIC ZONE.

A. RESTRICTION OF AUTOMOBILES; B. TREE PLANTATION PROGRAMME

Government of West Bengal
TAKI GOVERNMENT COLLEGE
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DECLARATION

The Green Audit Report of Taki Government College for the session 2022-23 has been prepared by the Green Audit Committee of Taki Government College. The committee has done a commendable work in framing out the green policy in our college. We strive to comply with Energy Conservation Act 2001 and other relevant standards, and Green Audit Framework. The report is based on the primary data collected from different areas of the college. All reasonable care has been taken in its preparation. The details contained in the report have been complied in good faith based on gathered information.

We hereby accept all the recommendations and observations mentioned in the Green Audit Report and undertake to implement the same.

Coordinator
Internal Quality Assurance Cell
Taki Government College

Coordinator
Internal Quality Assurance Cell (IQAC)
Taki Government College

Estd : 1950
24 Pgs.(N)
TAKI GOVERNMENT COLLEGE

Officer-in-Charge
Taki Government College

Officer-in-charge
Taki Government College

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2. The Petroleum Act: 1934 – The Petroleum Rules: 2002

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4. Rules:1989 (Amended in 2005)

5. Energy Conservation Act 2010.

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7. The Air [Prevention & Control Of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982

8. The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981

9. E-waste management rules 2016

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