

Green Audit Report

(GREEN, ENERGY & ENVIRONMENT AUDIT)



2019-20

**Pt. Chiranjilal Sharma Govt. College
Karnal, Haryana**

(Affiliated to Kurukshetra University Kurukshetra)

(Accredited with "A" Grade by NAAC)



Green Audit Certificate
(GREEN, ENERGY & ENVIRONMENT AUDIT)

This is to certify that Pt. Chiranji Lal Sharma Govt. College, Sector 14 (UE), Karnal has submitted necessary data and credentials for detailed Green, Energy & Environmental audit of their campus. The activities and measures carried out by the college have been verified by us based on the report submitted and it was found to be highly appreciable. The efforts taken by the faculty and students towards environment protection and sustainability is commendable.

Green Audit Committee

1. Dr. Chander Shekhar,
Principal, Dyal Singh College,
Karnal
2. Mr. M. S. Jaglan, SDE,
Horticulture, Karnal
3. Sh. Subhash Turan, Associate
Professor (Retd) of
Geography, Govt. College,
Gharaunda
4. Sh. Ramniwas, JE (Retd),
Karnal

Signature

1. .

Chander Shekhar
Principal
Dyal Singh College
Karnal

2. .

M. S. Jaglan
Sub Divisional Engineer
Horticulture Sub-Division
Hr. P.W.D. B.&R. Branch
Karnal

3. .

S. Subhash Turan
2.3.2020

4. .

Ramniwas Gupta
2.3.2020
RAM NIWAS GUPTA

Chairperson IQAC:

Dr. Rekha Sharma, Principal

IQAC Coordinator:

Dr. Rajesh Rani, Associate Professor of Hindi

Green Audit Report Preparation Committee

S. No	Name	Designation	
1.	Dr. Ranjeet Singh	Associate Professor of Botany	Convener
2.	Dr. Suresh Kumar	Associate Professor of Geography	Member
3.	Dr. Kanwar Bhan	Associate Professor of Geography	Member
4.	Dr. Parveen Vats	Associate Professor of Zoology	Member
5.	Dr. J. S. Chhillar	Associate Professor of Zoology	Member
6.	Dr. Laxmi Biban	Assistant Professor of Botany	Member

Internal Green Audit Committee

S. No	Name	Designation	
1.	Sh. Satish Gupta	Associate Professor of Electronics	Convener
2.	Dr. M. S. Bagi	Associate Professor of History	Member
3.	Dr. Jarnail Singh	Associate Professor of Geography	Member
4.	Mr. Suresh Kumar	Associate Professor of Geography	Member
5.	Dr. Rekha Jangra	Assistant Professor of Botany	Member
6.	Dr. Sandeep	Assistant Professor of Chemistry	Member

External Green Audit Committee

S. No.	Name	Designation	
1.	Dr. Chander Shekhar	Principal, Dyal Singh College, Karnal	Convener
2.	Mr. M.S. Jaglan	Sub Divisional Engineer Horticulture Sub Division Hr. P.W.D. B.&R. Branch, Karnal	Member
3.	Sh. Subhash Turan	Associate Professor (Retd) of Geography, Govt. College, Gharaunda	Member
4.	Sh. Ramniwas	JE (Retd), Karnal	Member

Introduction:

From the day of its establishment, the college has been providing quality education to the rural students in and around Karnal district of Haryana. For the protection and conservation of environment, a committee has been formed in the college. As per suggestions made by IQAC, Environment Committee is entrusted with the responsibility to do green audit.

Pt. Chiranjee Lal Sharma Government College, Karnal is a premier institution of Department of Higher Education, Haryana and is located on NH 44 between Delhi and Chandigarh. This institution was established in 1976 and has been awarded “The Best College of Haryana” by the Department of Higher Education Haryana and Kurukshetra University Kurukshetra in 1997-98 and 2003-04. This college was also adjudged best college by the University in respect of Science Activities for the session 2002-03. The institution is accredited with grade B by NAAC, Bangaluru in 2003. The college is spread over 20 acres of land in the ancient city, Karnal and providing education to approx. 4400 students in various UG and PG courses. The college campus is lush green covered with large trees, shrubs and a number of herbaceous plants. The Environmental Committee of the college always encourages the students and staff to increase the greenery in the campus. In the college, the students of NSS, Red Cross and Red-ribbon club and of other committees always participate in the extensive plantation programmes to create environmental awareness and conservation of biodiversity among the students and in the society.

Definition:

Green auditing is a systematic, documented, periodic, and objective review to monitor environmental requirements and is a means of assessing environmental performance. It is the systematic examination of the interactions between various operation and its surroundings. This includes all emissions to air; land and water; legal constraints; the effects on the neighbouring community; landscape and ecology; the public’s perception of the organization in the local area. Green audit neither stop all compliance with legislation nor is it a ‘green washing’ public relations exercise. Rather it is a total strategic approach to the organisation’s activities:

Objectives of Green audit:

1. **Verifying compliance:** Verifying compliance with standards or best available techniques.
2. **Identifying problems:** Detecting any leakage, spills or other such problems with the operations and processes.
3. **Formulating environmental policy:** Formulating the organisation's environmental policy if there is no existing policy.
4. **Measuring environmental impact:** Measuring the environmental impact of each and every process and operation on the air, water, soil, worker health and safety and society at large.
5. **Measuring performance:** Measuring the environmental performance of an organization against best practices.
6. **Indications:** Giving an indication of the effectiveness of the system and suggestions for improvement.
7. **Database:** Providing a database of corrective action and future plans.
8. **Developing the organization's environmental strategy:** Enabling management to develop its environmental strategy for moving towards a greener corporate and performance culture.
9. **Communication:** Communicating its environmental performance to its stakeholders though reporting will enhance the image of the company.

Green Auditing Process:

General steps

- Systematic and comprehensive data collection and documentation with physical evidences.
- Independent evaluation of regulatory requirements and standards.
- Systematic and comprehensive management and improvement of existing infrastructure and processes.

The present green audit report includes the following activities:

- The sites / area /division that are to be audited were selected and information on the facilities available was collected. All processes related with green audit were completed in 4 meetings whose details are given below:-
- 1st meeting: in the first meeting the process of green audit was discuss with worthy members and action plan was formulated for the auditing of the green audit process.
- 2nd meeting: Onsite inspection for verification of green audit data by Internal Audit Committee
- 3rd meeting: Onsite inspection for verification of green audit data by External Audit Committee.
- 4th meeting: Submission of green audit report with findings and recommendations.

Procedure Followed

The green audit report collection data was divided into four topics under the guidance of the green audit committee and various groups of committees collected data on the assigned topics. The assigned topics were as follows:

- 1. Analysis of Air quality management.**
- 2. Analysis of Water management**
- 3. Analysis of Energy management**
- 4. Analysis of Waste management**

All the data required for the green audit was collected and accordingly a report was formulated with conclusions and recommendations.

AUDIT REPORT:

The base of any green audit is that its findings are supported by documents and verifiable information. The audit process seeks, on a sampled basis, to track past actions, activities, events, and procedures to ensure that they are carried out according to systems requirements and in the correct manner.

The objectives of the green audits can be attained only if they are carried out at defined intervals and their results can illustrate improvement or change over time. Although green audits are carried out using policies, procedures, documented systems and objectives as a test, there is always an element of subjectivity in an audit. The essence of any green audit is to find out how well the environmental organisation, environmental management and environmental equipment are performing. Each of the three components are crucial in ensuring that the organisation's environmental performance meets the goals set in its green policy. The individual functioning and the success of integration always play a role in the degree of success or failure of the organisation's environmental performance.

1. Analysis of air quality management.

Burning of fossil fuels is the main source and cause of carbon dioxide release to the atmosphere the different sources of carbon dioxide emitted to our college are vehicles, refrigerator, air conditioners and burning of waste. There are more than 500 different type of vehicle (Cars, Scooty and bikes etc.) in college campus. These vehicles release high amount of carbon dioxide in the surrounding.

Green initiatives to reduce carbon footprint:

In total, based on our data collected, there are approximately 1372 plants in the college campus. These plants in college release a lot of oxygen in the campus and maintaining healthy environment in the college. Being situated in the urban area, our college is exposed to various atmospheric pollutants from vehicles as well as by other external means. Also, the institution organizes various programmes to create awareness among students in the campus and involve them in maintaining eco-friendly environment. College in each academic year organise various awareness programmes through NSS, RRC, YRC and other clubs. In the college campus, slogan like "Go green" "Think Green", "Create Green" and "Save Green" are displayed. Under the Swachh Bharat Abhiyan, the students are always advised to make proper use of dustbins for neat, clean and green campus. The Environment Club of the college monitors the cleanliness of the campus.

Tree benefit analysis and Carbon sequestration data

For the tree benefit analysis of the college campus and to assess the environmental and climatic effects of college campusi-*Tree canopy v 7.0 digital software* was used. i-Tree Canopy is a web browser application that can be used to determine

the amount of an area of interest covered by tree canopy and other user-defined surfaces. It automatically generates random plot points within your study area boundaries. You simply visit each point and assign a land cover category to it. Land cover estimations and Tree benefit estimates are then generated statistically. The results of the report (annexure 3) are summarized in the table given below:

Table 1: Summary of the i-Tree Canopy report

S. No	Type	% / value	
1.	Type of green coverage area	Trees/shrub	44.74
		Grass/herbaceous	10.53
2.	Carbon sequestration	Sequestered in trees	Co2 equivalent of 45.43T
		Stored in trees	Co2 equivalent of 1140.91T
3.	Air pollution	Co2+NO2+O3+SO2 + PM10+PM2.5	695.88lb

Green Campus

Total number of tree species identified –	45
Tree cover of the campus -	477 m ²
Free space in the campus –	45866.26m ²
Garden area inside the college –	one acre
Total campus area –	19.84 Acres
Total number of plant species identified –	84
Tree cover of the campus –	-477 m ²

List of eco-friendly activities going on in the campus

- Planting and caring of trees in and around the campus.
- Timely disposal of wastes from the campus.
- Celebration of important days like World Environment Day, Ozone day, with great importance.
- Campus is declared plastic free.
- Distribution of plant saplings among students

College administration recently established small green house for greater control over the growing environment of plants. Students will be benefited academically by knowing various key factors (temperature, levels of light and shade, irrigation, fertilizer application, and atmospheric humidity) affecting growth of the plants in controlled conditions.



Fig. 1: Photographs showing green tree campus and landscaping

2. Analysis of Water management.

Water is a key driver and is vital to development of Biodiversity, Agriculture, Humans as well as the Economy. With recent experiences across the world and in India also, the water scarcity and security are emerging issues. Haryana government has taken serious initiative for the conservation of water and announce the Jal Shakti vision of Prime Minister and in this series, it has been decided to launch Special Water Conservation Campaign in 81 Dark Zone blocks of the 19 districts. Our college is also fully devoted for the conservation of water by adopting various procedures for maintaining and recharging underground water level.

Roof top based rain water harvesting structures in the campus:

1. In the college campus five rain water recharging wells are installed at various locations for rain water harvesting.
2. All the constructed blocks A, B, C, D and E(PG) blocks have been installed with roof-top based Rain water harvesting plants to recharge the groundwater and prevent surface run-off.
3. The instructions through assembly are given to students about the importance of water harvesting.
4. College staff and students were instructed not to waste water unnecessarily in order to avoid situation like water scarcity and drought in the absence of rainy season.
5. The run off rain water from the terrace of the college building is channelized to that well for the ground water recharge.

a) Water

❖ Main water uses in the campus

Garden, Lab Cleaning, Canteen, Drinking, Toilets, Bathrooms, Hostel, Washing, Construction works, Office uses

❖ Water cooler with drinking water filtration is installed (8 numbers).

❖ Number of urinals and toilets – 60

❖ Number of bathrooms – 15

❖ Number of water taps – 35

❖ Water taps in laboratories - 71

❖ Number of wells – 1 tube well

❖ Number of water tanks for water storage -53

❖ Amount of water stored – $32*500=16000+1*10000+20*3000=60000$ grand total=86000 L

Water Audit

Thousands of litres of water are used per day by the college for its different uses. The main source of water is ground water. Water from the public water supply is not utilized.

Table 2: Details of Various Water Utilization Activities

Activity	Average use per activity (litres)	Number of activity /day	water use/ person / day (litres)	Number of persons using water	Total water consumption /day (litres)
Washing hands and face	1L	1 times a day	1L	3000	3000
Bath	10-30	once	20L	10	200
Toilet flush	6-20	once	10L	2000	20000
Drinking (cup)	0.25	twice	0.5L	3000	1500
Washing dishes/clothes etc	20L	twice	100L	10	1000
Leaking/dripping tap (1 drop/ second /day)	30-60	continuous			11770
Garden use	4	once			4500
Cooking (average)	3	once	5L	20	100
Lab uses	3	once	5L	1500	7500
Total Water Usage					49570



Fig. 2: Rain Water Harvesting Structures installed in the College

3. Analysis of Energy management.

The college is well equipped with electricity supply. Maximum departments possess computers, printers etc along with instruments like pathological microscope, distillation unit, photoelectric colorimeter, U V Transilluminator, 2 Autoclaves, laminar air flow, hot plate, incubator, hot air oven, 2 centrifuges etc.

Energy Saved Through LED use: 2430 kWh/Month

Energy Utilization

Table 3: Details of Various Electrical Appliances and Energy Consumed

Appliances	Wattage per appliance	Average hours used daily	Number of appliances	Units consumed per month in kWh/month
Computers and laptops	80	5	256	$256 \times 0.40 \times 30 = 3072$
Air conditioners	5275	3	19	$19 \times 15.83 \times 30 = 9023$
Photocopiers	1650	2	3	$3 \times 3.3 \times 30 = 297$
LED lights	40	5	673	$270 \times 0.20 \times 30 = 1620$
Flood light	200	6	25	$25 \times 1.20 \times 30 = 900$
Fans	65	3	500	$500 \times 0.20 \times 30 = 3000$
Televisions	200	2	7	$7 \times 0.4 \times 30 = 84$
Inverters	1060	6	20	$20 \times 6.36 \times 30 = 3816$
Power UPS/Computer Back up	4500	5	9*4.5kw	$9 \times 22.5 \times 30 = 6075$
Water Heaters/Geysers	1500	2	3	$3 \times 3 \times 30 = 270$
CCTV DVR	30	24	44	$44 \times 0.72 \times 30 = 950$
Total Energy usage per month (kWh)				29107



Fig. 3: Energy Saving Installations in the College (32 KVA power substation and LED Lights)

Energy saving methods adopted in the college:

- Turn off electrical equipment's when not in use
- Use energy efficient light-emitting diode (LED) bulbs instead of incandescent and CFL bulbs
- Maintain appliances and replace old appliances.
- Use computers and electronic equipment's in power saving mode.

College administration is trying to install solar panel to fulfil the energy demands of the institution and all formalities regarding the installation of the Solar system have been completed on the behalf of the College. The proposal of Solar rooftop/solar energy has been taken over by the Karnal Smart City limited (Annexure 5)

4. Analysis of Waste management.

Wastes cannot be avoided in any environment. Wastes can be classified as Biodegradable and Non-biodegradable wastes. Biodegradable wastes include food wastes which can be easily decomposed by the bacteria in soil. But nonbiodegradable wastes are those which cannot be degraded by any organism and remain as such for many years. Much amount of waste is generated from the college campus.



Fig 4: Solid Waste Management by Compost Pit and Vermi-Compost Setup

Solid Waste Management

1. The Single use plastic prohibition awareness programmes are regularly organized and the campus is declared as 'Single Use Plastic Free Campus'.
2. The hazardous waste from chemistry labs is properly disposed off.
3. The acid batteries and electronic instruments are disposed periodically from the lab.
4. Green Dustbins are provided at each floor entrance, near the stairs, in outside area of the college campus especially for collection of recyclable and degradable solid waste.
5. In the college campus vermin-compost pits and physical compost pit for biological waste i.e. leaf litter are operational.
6. Waste management club/ Campus beautification club for disposal of waste for maintaining cleanliness.
7. Napkin disposal machines are installed inside the campus to dispose the used napkins in the hygienic way.
8. The unused computer sets are disposed off periodically.
9. The running UPS batteries are recharged and repaired as and when required.
10. The electronic instruments in poor working conditions are disposed of properly.
11. Rain water harvesting and RO water plants are installed in the college.

E-waste management: The e-waste generated in the college is disposed of as per guidelines of Government of Haryana and directions received from Department of Higher Education, Haryana. As per rules, e-waste is stored in the college and

periodically the e-waste is handed over for disposal to the company authorised for the disposal. The last e-waste disposal was done on 19/05/2017 vide reference no MRN NO ERPL-755/A and was recycled by the company Exigo Recycling Pvt. Ltd. (Annexure 4). As per this report at total of 83 IT and related Computer Items were disposed off by the college weighting a total of 458 Kgs.

❖ Total Stakeholders –	5000 (Student + staff + guests)
❖ Class rooms –	50
❖ Staff rooms -	1
❖ Office rooms –	25
❖ E-wastes-	computers, electrical and electronic parts – Disposal by selling
❖ Plastic waste-	disposal by selling
❖ Solid wastes –	Damaged furniture, paper waste, paper plates, and food wastes – to Municipal waste collection canters
❖ Chemical wastes –	Laboratory waste – No treatment
❖ Waste water –	washing, urinals, and bathrooms in soak pits
❖ Glass waste –	Broken glass wares from the labs to municipal waste collection centres.
❖ Napkin incinerators -	3
Dustbin	Iron 15
	Plastic 6
	Portable 10

Quantity of waste generated-

❖ Biodegradable –	2 kg/day (office + labs) (Approx)
❖ Non-biodegradable –	½ kg/day (office) (Approx)
❖ Biodegradable –	10 kg/day (campus plant waste) (Approx)
❖ Non-biodegradable –	¼ kg/day (lab bottles etc) (Approx)

Canteen waste

❖ Biodegradable college canteen –	20kg/day (Approx)
❖ Non-biodegradable –	½ kg/day (Approx)

Waste

❖ Total Biodegradable waste =	22 kg/day (Approx)
❖ Non-biodegradable waste =	1 ¾ kg/day (Approx)
❖ Hazardous wastes =	150grams/day (Approx)
❖ e- wastes =	458Kg disposed off on 19/5/2017

Conclusion and Full List of Recommendations

The green audit assists in the process of testing performance in the environmental arena and is fast becoming an indispensable aid to decision-making in a college. The green audit reports assist in the process of attaining an eco-friendly approach to the sustainable development of the college. Hope that the results presented in the green auditing report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as well as spawn new activities and innovative practices. A few recommendations are added to curb the menace of waste management using eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus and thus sustainable environment and community development. It has been shown frequently that the practical suggestions, alternatives, and observations that have resulted from audits have added positive value to the audited organisation. An outside view, perspective and opinion often help staffs who have been too close to problems or methods to see the value of alternative approaches. A green audit report is a very powerful and valuable communications tool to use when working with various stakeholders who need to be convinced that things are running smoothly and systems and procedures are coping with natural changes and modifications that occur.

Common Recommendations

- ❖ Adopt an environmental policy for the college.
- ❖ Establish a purchase policy for environmentally friendly materials.
- ❖ Introduce the Environmental Science course for all students.
- ❖ Conduct more seminars and group discussions on environmental education.
- ❖ Students and staff should be encouraged to solve local environmental issues.
- ❖ Establish more efficient water, waste and energy management systems

Criteria Wise Recommendations

Water

- Remove damaged taps and install sensitive taps is possible.
- Drip irrigation for gardens and vegetable cultivation can be initiated.
- Establish rain water harvesting systems for each building.
- Establish water treatment systems.
- Awareness programs on water conservation to be conducted.
- Install display boards to control over exploitation of water.

Energy

- Employment of more solar panels and other renewable energy sources.
- Conduct more save energy awareness programs for students and staff.
- Replace computers and TVs with LED monitors.
- More energy efficient fans should be replaced.

- Observe a power saving day every year.
- Automatic power switch off systems may be introduced.

Waste

- Establish a functional bio gas plant.
- A model solid waste treatment system to be established.
- Practice of waste segregation to be initiated.
- Establish a plastic free campus.
- Avoid plastic plates and cups for all functions in the college.

Green Campus

- All trees in the campus should be named scientifically.
- Create more space for planting.
- Grow potted plants at both veranda and class rooms.
- Create automatic drip irrigation system during summer holidays.
- Not just celebrating environment day but making it a daily habit.
- Beautify the college building with indoor plants
- Providing funds to nature club for making campus more green
- Encouraging students not just through words, but through action for making the campus green
- Conducting competitions among departments for making students more interested in making the campus green.

Carbon footprint

- Establish a system of carpooling among the staff to reduce the number of four wheelers coming to the college.
- Introduce college bus services to the students and staff.
- Encourage students and staff to use cycles.
- Discourage the students using two wheelers for their commutation.
- More use of generators every day should be discouraged.

Follow Up Action and Plans

Green Audits are exercises which generate considerable quantities of valuable management information. The time and effort and cost involved in this exercise is often considerable and in order to be able to justify this expenditure, it is important to ensure that the findings and recommendations of the audit are considered at the correct level within the organisation and that action plans and implementation programs result from the findings. Audit follow up is part of the wider process of continuous improvement. Without follow-up, the audit becomes an isolated event which soon becomes forgotten in the pressures of organisational priorities and the passing of time.

Next Audit

In order to promote continuous improvement, it is recommended to conduct the next green auditing during the year 2021. Green audit report is one of the useful means of demonstrating an organisation's commitment to openness and transparency. If an organisation believes it has nothing to hide from its stakeholders, then it should feel confident enough to make its green audit reports freely available to those who request them. As a basic rule, green audit reports should be made available to all stakeholders.

Acknowledgement:

At the onset, we are highly thankful to Director General, Higher Education Department, Haryana for providing the administrative and financial support for making college campus lush green and environment friendly. We are also thankful to Deputy Commissioner of Karnal for providing financial support to establish vermi-compost Unit, physical compost pit and many others environment friendly units in Pt. C. L. Sharma Govt. College, Sector 14, Karnal. The timer and services provided by the team of internal and external green audit committee is thankfully acknowledged here because without their critical inspection, analysis and recommendations this audit will be incomplete. Thanks, are also due for all the participants of the green auditing data collection team along with the students, faculty and non-teaching staff of the college who helped us in data collection. We also thank the office staff who helped us during the document verification.

Annexure 1

Flora of Pt. C. L. Sharma Govt. College, Sector 14, Karnal

S. No	Botanical Name	Common Name	Family	Use
1	<i>Acacia auriculiformis</i>	Auri	Fabaceae	treat rheumatism, root treats pain and sore eyes
2	<i>Acacia nilotica</i>	Babool	Fabaceae	Antioxidant, antimicrobial, Antipyretic and antiinflammatory action
3	<i>Aegle marmelos</i>	baelpatra	Rutaceae	used in chronic diarrhoea, dysentery and peptic ulcer
4	<i>Alstoniascholarish</i>	Saptaparn, Devils tree	Apocynaceae	Treat fever, malaria, troubles in digestion, tumors, ulcers
5	<i>Aurocaria</i>	Monkeys puzzle tree	Arucariaceae	Antiulcer, antiviral, antipressent, anticoagulant
6	<i>Azadirachta indica</i>	Neem	Meliaceae	used as Antimalarial, antibacterial, antiviral, in various skin diseases
7	<i>Bauhinia variegata</i>	kachnar	Fabaceae	used as food and medicine
8	<i>Calliandrahaematoc ephala</i>	Calliandra	Fabaceae	leaves have antibacterial and insecticidal properties
9	<i>Callistemon lanceolatus</i>	Bottle brush	Myrtaceae	Used as water accent, anticough, antibronchitis and insecticide
10	<i>Caryotaurens</i>	Fish tail palm	Arecaceae	Antiinflammatory, antimalarial, analgesic, antioxidant
11	<i>Cassia fistula</i>	Amaltas	Fabaceae	used in ayurvedic medicines
12	<i>Cinnamomum camphora</i>	Kapoor	Lauraceae	Treat fungal infections, relieves pain and reduce itching
13	<i>Cycas revoluta</i>	Sago palm	Cycadaceae	Stem and seeds used for high B.P., headache, rheumatism and bone pain
14	<i>Dalbergia sissoo</i>	Sheesham	Fabaceae	timber high quality
15	<i>Delonix regia</i>	Gulmohar	Fabaceae	Antibacterial, antidiabetic, anti-diarrheal, anti-inflammatory

16	<i>Elaeocarpus ganitrus</i>	Rudraksh	Elaeocarpaceae	Manages high B.P., asthma, mental disorders, diabetes
17	<i>Eucalyptus</i>	safeda	Myrtaceae	oil used as insect repellent and antimicrobial activity
18	<i>Ficus benghalensis</i>	bargad	Moraceae	Bark is used as tonic, antidiabetic and astringent in the treatment of Leucorrhoea
19	<i>Ficus carica</i>	Fig	Moraceae	cures diabetes, high cholesterol, and skin diseases
20	<i>Ficus racemosa</i>	gular	Moraceae	used in diabetes, liver disorders, diarrhea, inflammatory conditions
21	<i>Ficus religiosa</i>	Peepal	Moraceae	sacred tree, used in asthma, diabetes, epilepsy, inflammatory disorder
22	<i>Ficus virens</i>	pilkhan	Moraceae	used as food and medicine
23	<i>Hibiscus rosa sinensis</i>	China rose	Malvaceae	anti-inflammatory properties and used in skin care products
24	<i>Holoptelia integrifolia</i>	Papdi	Ulmaceae	bark is used in Rheumatism, treating ring worm, skin diseases, leprosy
25	<i>Juniperus communis</i>	Juniper	Cupressaceae	Parasitic skin problems, rheumatism, treatment of burns and scalds
26	<i>Kigelia africana</i>	balamkheera	Bignoniaceae	skin care products, making sweet beer
27	<i>Livistona chinensis</i>	Fan Palm	arecaceae	Anticancer agent, antiproliferative and antiangiogenic properties
28	<i>Mangifera indica</i>	Mango	Anacardiaceae	used as food and medicine
29	<i>Melia azedarach</i>	Deg	Meliaceae	Timber high quality
30	<i>Millettia pinnata</i>	Karanj	Fabaceae	Oil used as antiseptic, lubricant, biodiesel production
31	<i>Moringa oleifera</i>	Sahjan	Moringaceae	rich source of vitamins, mineral, amino acids, cures diabetes, liver, antimicrobial.

32	<i>Morus alba</i>	Mulberry	Moraceae	food for silkworm
33	<i>Musa</i>	banana	Musaceae	source of vit C, improves digestion
34	<i>Nerium oleander</i>	Kaner	Apocynaceae	Ornamental plant
35	<i>Pinus sp.</i>	Cheer	Pinaceae	Important source of Turpentine
36	<i>Plumeria rubra</i>	Champa	Apocynaceae	Antitoxic agent, skindiseases, cough and rheumatism
37	<i>Prunus persica</i>	Peach	Rosaceae	Fruiting tree
38	<i>Psidium guajava</i>	Guava	Myrtaceae	used as cough sedative, antidiarrheic, diabetes mellitus, hypertension
39	<i>Saraca indica</i>	Ashoka	Fabaceae	used as medicine in menstruation
40	<i>Syzgiumcumini</i>	Jamun	Myrtaceae	Relives stomach pain, carminative, diuretic, indiabeties
41	<i>Tecoma stans</i>	Tecoma bells	Bignoniaceae	used as tonic, diuretic, antisiphilitic and vermifuge
42	<i>Tectona grandis</i>	Teak	Lamiaceae	timber high quality
43	<i>Terminalia arjuna</i>	Arjun	Combretaceae	used in heart diseases
44	<i>Terminalia bellerica</i>	Baheda	Combretaceae	used in Triphala
45	<i>Ziziphus mauritiana</i>	Beri	Rhamnaceae	Treat typhoid in children, bark cures inflammation of eyes

Annexure 2

Fauna of Pt. Chiranji Lal Sharma Govt. College, Sector 14, Karnal

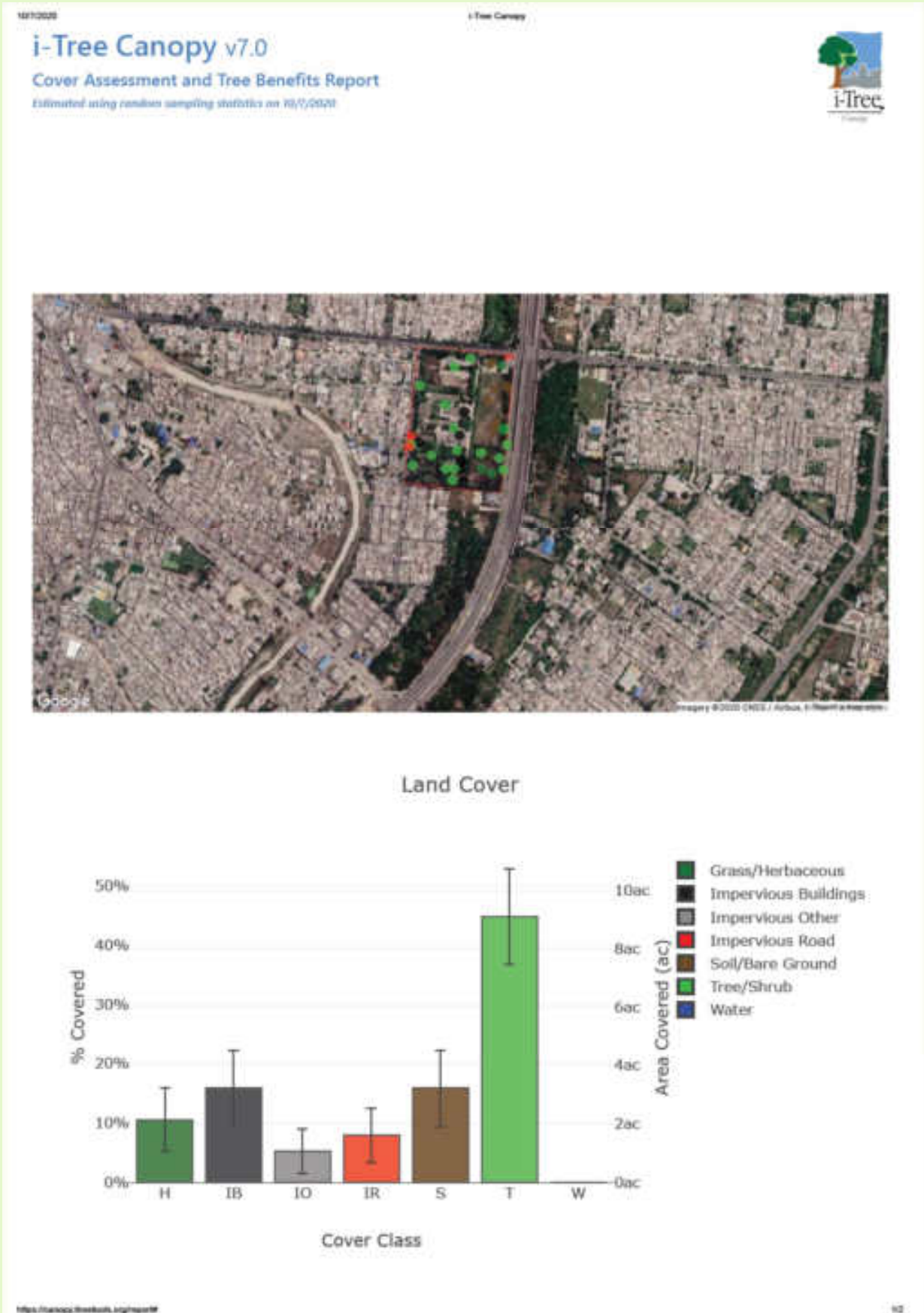
S. No.	Phylum	Class	Common Name
1.	Annelida	Oligochaeta	Earthworm
2.	Arthropoda	Insecta	Grass hopper
3.	Arthropoda	Insecta	Praying mentis
4.	Arthropoda	Insecta	Cockroach
5.	Arthropoda	Insecta	House cricket
6.	Arthropoda	Insecta	Garden cricket
7.	Arthropoda	Insecta	Silver fish
8.	Arthropoda	Insecta	Ant
9.	Arthropoda	Insecta	Yellow wasp
10.	Arthropoda	Insecta	Honey bee
11.	Arthropoda	Insecta	Small honey bee
12.	Arthropoda	Insecta	Brown wasp
13.	Arthropoda	Insecta	Fruit fly
14.	Arthropoda	Insecta	Mosquito Aedes
15.	Arthropoda	Insecta	Mosquito culex
16.	Arthropoda	Insecta	Mosquito Anopheles
17.	Arthropoda	Insecta	Dragon Fly
18.	Arthropoda	Insecta	Butter fly
19.	Arthropoda	Insecta	Butter fly
20.	Arthropoda	Insecta	House fly
21.	Arthropoda	Insecta	Ant black
22.	Arthropoda	Insecta	Ant yellow
23.	Arthropoda	Insecta	Weevil
24.	Arthropoda	Insecta	Dung Beetle 1
25.	Arthropoda	Insecta	Dung Beetle 2
26.	Arthropoda	Insecta	Lady bird beetle 2
27.	Arthropoda	Insecta	Mealy bugs
28.	Arthropoda	Insecta	Termite
29.	Arthropoda	Insecta	Water strider
30.	Arthropoda	Crustacea	Daphnia
31.	Arthropoda	Arachnida	Plant Mite
32.	Arthropoda	Arachnida	Millipede
33.	Arthropoda	Arachnida	Centipede
34.	Arthropoda	Arachnida	Scorpion
35.	Arthropoda	Arachnida	Jumping Spider
36.	Arthropoda	Arachnida	Orbweb spider
37.	Arthropoda	Arachnida	Argiope spider
38.	Mollusca	Gastropoda	Snail
39.	Mollusca	Gastropoda	Slug
40.	Chordata	Amphibia	Toad
41.	Chordata	Amphibia	Frog

42.	Chordata	Reptilia	Lizard
43.	Chordata	Reptilia	Garden Lizard
44.	Chordata	Reptilia	Varanus
45.	Chordata	Reptilia	Wolf Snake
46.	Chordata	Reptilia	Rat Snake
47.	Chordata	Reptilia	Blind Snake
48.	Chordata	Reptilia	Cobra
49.	Chordata	Reptilia	Krait
50.	Chordata	Reptilia	Viper
51.	Chordata	Aves	Pied Bushchat
52.	Chordata	Aves	Common Stone Chat
53.	Chordata	Aves	White-browed Wagtail
54.	Chordata	Aves	White Wagtail
55.	Chordata	Aves	Common Myna
56.	Chordata	Aves	Bank Myna
57.	Chordata	Aves	Brahminy Starling
58.	Chordata	Aves	Asian Pied Starling
59.	Chordata	Aves	Common Tailorbird
60.	Chordata	Aves	Ashy Prinia
61.	Chordata	Aves	House Crow
62.	Chordata	Aves	Rufous Treepie
63.	Chordata	Aves	Black Drongo
64.	Chordata	Aves	Long-tailed Shrike
65.	Chordata	Aves	Large Grey Babbler
66.	Chordata	Aves	Purple Sunbird
67.	Chordata	Aves	House sparrow
68.	Chordata	Aves	Wire-tailed Swallow
69.	Chordata	Aves	Black-breasted Weaver
70.	Chordata	Aves	Grey Heron
71.	Chordata	Aves	Indian Pond Heron
72.	Chordata	Aves	Cattle Egret
73.	Chordata	Aves	Little Cormorant
74.	Chordata	Aves	Black Kite
75.	Chordata	Aves	Brahminy Kite
76.	Chordata	Aves	Black-winged Kite
77.	Chordata	Aves	Shikra
78.	Chordata	Aves	Green Bee-eater
79.	Chordata	Aves	White-throated Kingfisher
80.	Chordata	Aves	Indian Roller
81.	Chordata	Aves	Rock Pigeon
82.	Chordata	Aves	Spotted Dove
83.	Chordata	Aves	Eurasian Collared Dove
84.	Chordata	Aves	Red- wattled Lapwing
85.	Chordata	Aves	Black-winged Stilt
86.	Chordata	Aves	Brown -headed Barbet
87.	Chordata	Aves	Asian Koel
88.	Chordata	Aves	Greater Coucal

89.	Chordata	Aves	Rose -ringed Parakeet
90.	Chordata	Aves	Alexandrine Parakeet
91.	Chordata	Aves	Indian Grey Hornbill
92.	Chordata	Aves	Common Hoopoe
93.	Chordata	Aves	Grey Francolin
94.	Chordata	Aves	Spotted Owlet
95.	Chordata	Mammals	Monkey
96.	Chordata	Mammals	Squirrel
97.	Chordata	Mammals	Rat
98.	Chordata	Mammals	Mouse
99.	Chordata	Mammals	Shrew
100.	Chordata	Mammals	Mongoose
101.	Chordata	Mammals	Bat
102.	Chordata	Mammals	Dog
103.	Chordata	Mammals	Cat



Fig. 5: Some important faunal species observed in theCollege.



Abbr.	Cover Class	Description	Points	% Cover ± SE	Area (ac) ± SE
H	Grass/Herbaceous		4	10.53 ± 5.26	2.14 ± 1.07
IB	Impervious Buildings		6	15.79 ± 6.43	3.29 ± 1.31
IO	Impervious Other		2	5.26 ± 3.72	1.07 ± 0.76
IR	Impervious Road		3	7.89 ± 4.56	1.60 ± 0.92
S	Soil/Bare Ground		6	15.79 ± 6.43	3.29 ± 1.31
T	Tree/Shrub		17	44.74 ± 8.07	9.08 ± 1.64
W	Water		0	0.00 ± 0.00	0.00 ± 0.00
Total			38	100.00	20.29

Tree Benefit Estimates: Carbon (English units)

Description	Carbon (T)	±SE	CO ₂ Equiv. (T)	±SE	Value (USD)	±SE
Sequestered annually in trees	12.39	±2.23	43.43	±8.19	\$2,113	±381
Stored in trees (Note: this benefit is not an annual rate)	311.16	±56.10	1,140.91	±205.70	\$53,068	±9,568

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Amount sequestered is based on 1,365 T of Carbon, or 5,005 T of CO₂ per ac/yr and rounded. Amount stored is based on 34,281 T of Carbon, or 123,697 T of CO₂ per ac and rounded. Value (USD) is based on \$170.53/T of Carbon, or \$46.51/T of CO₂ and rounded. (English units: T = tons (2,000 pounds), ac = acres)

Tree Benefit Estimates: Air Pollution (English units)

Abbr.	Description	Amount (lb)	±SE	Value (USD)	±SE
CO	Carbon Monoxide removed annually	8.18	±1.48	\$0	±0
NO ₂	Nitrogen Dioxide removed annually	44.63	±8.05	\$1	±0
O ₃	Ozone removed annually	-444.47	±80.14	\$31	±6
SO ₂	Sulfur Dioxide removed annually	28.12	±5.07	\$0	±0
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	148.88	±26.84	\$23	±4
PM2.5	Particulate Matter less than 2.5 microns removed annually	21.60	±3.89	\$65	±12
Total		695.88	±125.47	\$119	±22

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Air Pollution Estimates are based on these values in lb/ac/yr @ \$/lb/yr and rounded:

CO 0.902 @ \$0.04 | NO₂ 4.917 @ \$0.01 | O₃ 48.968 @ \$0.07 | SO₂ 3.098 @ \$0.00 | PM10* 16.400 @ \$0.15 | PM2.5 2.379 @ \$2.89 (English units: lb = pounds, ac = acres)

Tree Benefit Estimates: Hydrological (English units)

Abbr.	Benefit	Amount (gal)	±SE	Value (USD)	±SE
AVRO	Avoided Runoff	4.69	±0.85	\$0	±0
E	Evaporation	387.51	±69.87	N/A	N/A
I	Interception	389.68	±70.26	N/A	N/A
T	Transpiration	524.37	±94.54	N/A	N/A
PE	Potential Evaporation	2,836.36	±529.42	N/A	N/A
PET	Potential Evapotranspiration	2,395.83	±431.97	N/A	N/A

Currency is in USD and rounded. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Hydrological Estimates are based on these values in gal/ac/yr @ \$/gal/yr and rounded:

AVRO 0.517 @ \$0.01 | E 42.694 @ N/A | I 42.833 @ N/A | T 57.771 @ N/A | PE 323.509 @ N/A | PET 263.956 @ N/A (English units: gal = gallons, ac = acres)

About i-Tree Canopy

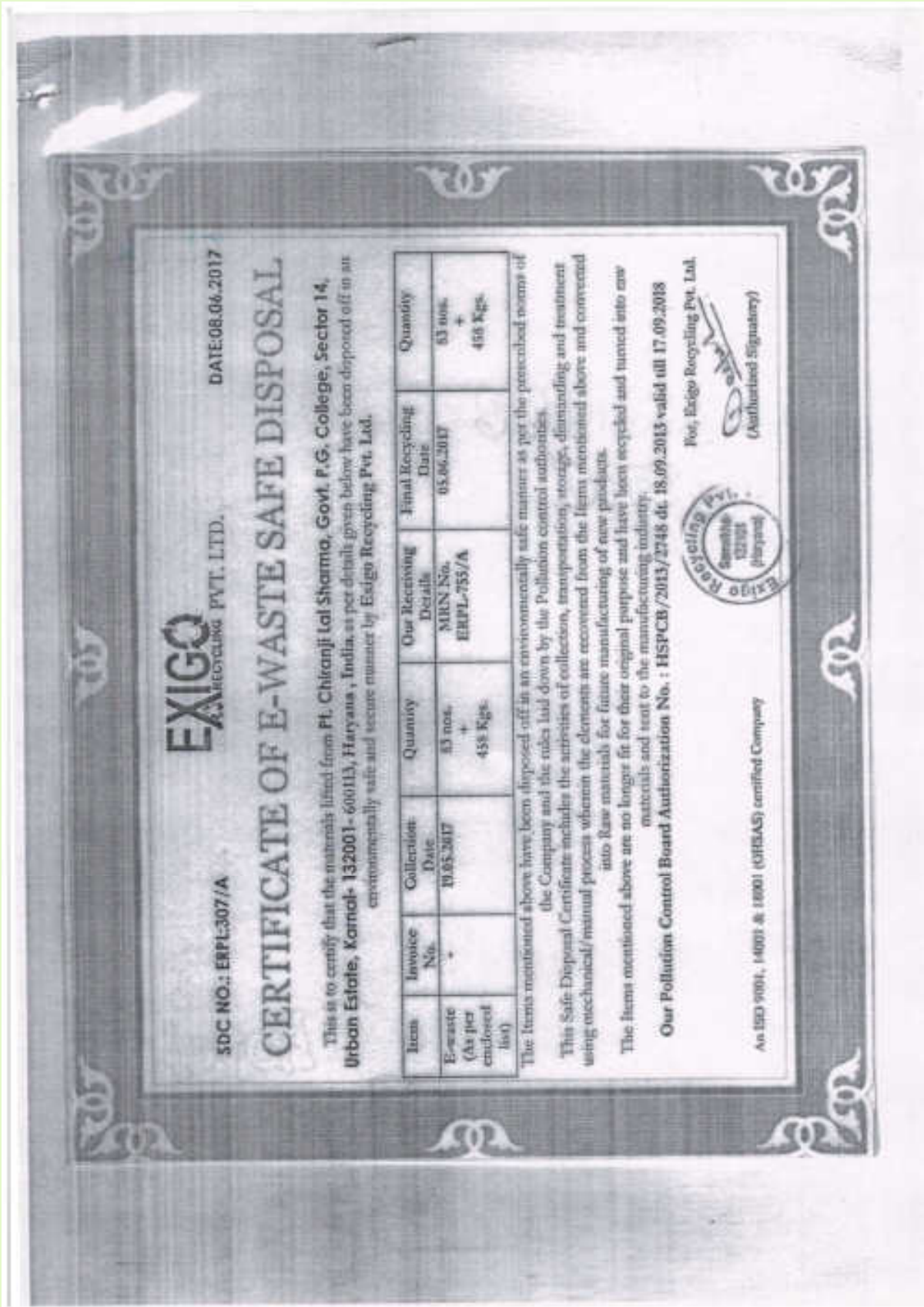
The concept and prototype of this program were developed by David J. Nowak, Jeffrey T. Walton, and Eric J. Greenfield (USDA Forest Service). The current version of this program was developed and adapted to i-Tree by David Dlingworth, Mike Binkley, and Scott Maco (The Davey Tree Expert Company)

Limitations of i-Tree Canopy

The accuracy of the analysis depends upon the ability of the user to correctly classify each point into its correct class. As the number of points increases, the precision of the estimate will increase as the standard error of the estimate will decrease. If too few points are classified, the standard error will be too high to have any real certainty of the estimate.



Use of this tool indicates acceptance of the [TUSA](#)



KARNAL SMART CITY LIMITED

KARNAL SMART CITY 1986 Municipal Corporation, Dist. D.A.N. 31, Sec. School, Margola Ashrafi, Karnal, Haryana India - 132001
Email: smartcitykarnal@gmail.com
SMART CITY Tel: 0184-2214730 Fax: 0184-408028

To

2700
14-01-2020

The Principal,
 Pt. Chiranji Lal Sharma
 Govt. College, Karnal-132001

Memo No. KSCL/ CEO/ 2019-20/3 Dated: 02/01/2020

Sub:- Work of Solar Roof Top/Solar Energy on the premises of Pt. Chiranji Lal Sharma Govt. College, Karnal.

Ref:- Your Letter No. GCK/2019/7524 Dt. 18/12/2019.

Kindly refer your letter under reference vide which you have reported that HAREDA has not considered the Project of Solar Roof Top for your premises & further requested for doing this work under Smart City Project, Karnal.

Your request has been acceded/accepted & your premises have been included along with other government buildings in the Project of Solar Energy under Karnal Smart City, Karnal. The project is under Tendering stage & Tenders will be floated very shortly.

This is for your kind information & further necessary action please.

Chief Executive Officer
 Karnal Smart City Limited



