



7.1.3: Quality audits on environment and energy regularly undertaken by the Institution. The institutional environment and energy initiatives are confirmed through the following

Green , Energy and Environment Audits

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- PRINCIPAL

Avanthi's Institute of Pharmaceutical Sciences
Gunthapally (V), Hayath Nagar (M),
Ranga Reddy Dist.



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Gunthapally (V), Abdullapurmet(M), RR Dist, Hyderabad -501512.)

2022-2023

Green, Environment and Energy Audit

On 19 JUNE 2023



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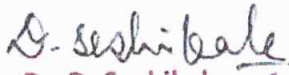
DEPARTMENT OF ENVIRONMENTAL SCIENCE
OSMANIA UNIVERSITY - HYDERABAD.


CERTIFICATE
(GREEN, ENERGY and ENVIRONMENT AUDIT)


This is to certify that Environmental, Energy and Green Audit has been conducted at the Ayanthi Institute of Pharmaceutical Sciences, Hayathnagar, RR Dist by the Green Audit Committee, Department of Environmental Science of Osmania University, Hyderabad. The Committee has verified the Green initiatives carried out by the College and the College has successfully demonstrated knowledge on Energy Conservation, Water Conservation, Bio Diversity, Waste Management and Carbon footprint.

The Green Audit Committee is pleased to declare the following grades in the following categories for their satisfactory performance and is valid from 2022 to 2023

Green Initiatives	'A' Grade
Energy Conservation	'A' Grade
Environmental Protection	'A' Grade


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GREEN & ENVIRONMENT AUDIT REPORT

2022 – 2023



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

AUDIT TEAM:

Dr. D. Seshikala, Dept . of Environment Science,
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AS EXTERNAL AUDITORS

&

Chairman	Dr. K. Balaji, Principal, AIPS
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Pharmaceutical Sciences
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics
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LIST OF ABBREVIATIONS USED

AIPS	: Avanthi Institute of Pharmaceutical Sciences
AICTE	: All India Council for Technical Education
TSSRTC	: Telangana State Road Transport Corporation
B. Pharm	: Bachelor of Pharmacy
Pharm-D	: Doctor of Pharmacy
BS & H	: Basic Sciences and Humanities
PW P	: Plastic Waste
C	: Carbon
Ca	: Calcium
CAD	: Computer Aided design
CAM	: Computer Aided Manufacturing
CO ₃	: Carbonates
DO	: Dissolved Oxygen
E waste	: Electrical & Electronic Waste
EC	: Electrical Conductivity
EKL	: Enviro Kamka3r LLP
Fig.	: Figure
Fe	: Ferrous ion
GHRDC	: Global Human Resource Development Centre
ha	: Hectare
HCO ₃	: Bicarbonates
Hp	: Horse Power
HSD	: High Speed Diesel
HW	: Hazardous Waste
ISO	: International Standards Organization
JNTUH	: Jawaharlal Nehru Technological University Hyderabad
K	: Potassium
kg	: Kilo Grams
KL	: Kilo litres
KLD	: Kilo litres Day
km	: Kilo Meters
Kvah	: Kilo volts amps per hour
KW	: Kilo Watts
LPG	: Liquefied Petroleum Gas
lph	: Litres per hour
M Tech	: Master of Technology
Mg	: Magnesium
MSW	: Municipal Solid Waste
Na	: Sodium
NAAC	: National Assessment and Accreditation Council
NBA	: National Board of Accreditation
NCC	: National Cadet Corps

NBA	: National Board of Accreditation
NCC	: National Cadet Corps
NSS	: National Service Scheme
pH	: Potential of Hydrogen
PW	: Plastic Waste
RO	: Reverse Osmosis water plant
SO Carbon	: Soil Organic Carbon
sq m	: Square meter
TA	: Total Alkalinity
TDS	: Total dissolved solids
TH	: Total Hardness
UGC	: University Grants Commission



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Gunthapally (V), Abdullapurmet (M), R.R. Dist., Near Ramoji Filmcity, Hyderabad - 501 512.



PREAMBLE

Avanthi Institute of Pharmaceutical Science (AIPS) is a pioneer institution in main streaming “Environment and Sustainable development: in all its academic, administrative and extension programs, and aligned these with national missions on the environment, and climate change and complies with AICTE, NAAC, and university policies. AIPS has initiated Green and Environmental Audits since the academic year 2020-2021, and with the inclusion of a third-party professional, **XXXXXXXXXX**, a start up company groomed by **IIM(B) & NSRCEL** and gained experience in the Green and Environment Audits. This report deals with “Green Audit” for the academic year (AY) 2022 – 2023 and is a third consecutive annual audit.

The past two audit years have witnessed several perturbations in the functional modes of all the educational institutions because of the impacts of the Covid pandemic and thereby, the audit processes and the findings provided limited implications. However, they helped in streamlining the management systems related to Environmental education, awareness, natural resources, and energy conservation aspects. AIPS has developed its own Environmental Policy in AY 2022-2023, based on which all green and environmental activities are being planned, implemented, reviewed, and verified. This AY 2022 – 2023 attempted to report the progress and conformity with the Environment Policy of AIPS.

With a focus on academic excellence and holistic development, the institute aims to equip its students with the necessary skills and knowledge to excel in their respective fields. Over the years, AIPS has garnered a reputation for its commitment to quality education and continues to play a significant role in shaping the future of Pharmacy professionals in the region and beyond.

1. ABOUT AIPS

Avanthi Institute of Pharmaceutical Science and (AIPS), an institution of the Avanthi Educational Society, established in 2007 is engaged in providing quality education and 1 contributing to the development of Pharmacy for over 16 years. The founder of the institutions, Sri M. SrinivasaRao, a philanthropist, has contributed to the development of these institutions with a vision to provide fair access to higher education to the students of the Telangana . The main campus of AIPS (Fig.1) is located at Gunthapally, a semi-urban area situated near Abdullapurmet, Ranga Reddy district. Telangana, and is equidistance to most places of the region.

AIPS offers various undergraduate and postgraduate AND Pharm-D programs in the field of Pharmacy and pharmaceutical science , and is affiliated with Jawaharlal Nehru Technological University, Hyderabad; approved by the All-India Council for Technical Education (AICTE),and approved (PCI) Pharmacy Council Of Indian has been offering high-quality Pharmacy education. It also accredited by the NAAC. In the year 2018, it received a B++ grade and a score of 3.00 scale points out of 4 in its NAAC accreditation. AIPS also provides students with a holistic development experience through various activities such as Games & Sports, NCC, NSS, BIO ADHAYAAN and other technological pursuits. With a spacious and an equipped for both outdoor and indoor games, the college offers excellent facilities for sports and recreational events.



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Fig.1: AIPS Campus Building

2.1. Campus Community:

AIPS Campus community can broadly be considered fewer than four categories: (a) Students and Research scholars; (b) Teaching Staff; (c) non-teaching staff; and (d) Associate 2 personnel. Of these four categories, Associates are such members who are associated with such activities like material suppliers; service providers, contractors, etc. More than 95% of the AIPS members are Day comers. Thus, during Sundays and holidays campus activities will be at their low, including the requirement of essential resources. The distribution of the different sectors of the community is illustrated in Fig. 1, which indicates that during this AY students accounted for 600 and their strength has increased from the previous year when it was 2007. In the case of the size of the other three sectors of the community, there was no change in their numbers from the previous year.

2. SCOPE OF GREEN AUDIT

The plans and activities of the AIPS being implemented to realize the goals and objectives of AIPS's Environment Policy shall be the broad scope of the Green Audit. The policy envisages that the AIPS campus be made a "Green Campus" making it comply with a Net Zero emission campus (Fig.2). Further, encourage the participation of all its members in environmental activities, more particularly in the conservation of natural resources, Energy, and minimization of waste. Towards this, the Environmental Management Cell of the AIPS, and the Green Auditor, **M/S XXXXXXXX**, have evolved documentation. Different methods including the documentation.



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Implementation status of the GA recommendations of the previous year is included to enable a review of management systems for realizing the Environmental Policy's goals and objectives. Overall, the scope of the GA encompasses the management of natural resources, waste generation, and adherence to green building norms, carbon footprint assessment, and ensuring active participation of all members, including the management.



Clean & Green Programme



The Audit was carried out in three stages, each stage comprising of different activities as shown in Table. 2.

Table, 2. Stages and Activities of the Green Audit of AIPS for AY 2022 -2023

Pre Audit Stage	<ul style="list-style-type: none">•Appointment to external Audit Agency•Constitution of Audit team•Scoping of audit and finalization of methods•Initiating the Audit
Audit Stag	<ul style="list-style-type: none">•Units interactions•Documents Scrutinise•Collection and Validation of audit evidences.•Finalization of audit findings•Submission of Audit recommendations
Post Audit Stage	<ul style="list-style-type: none">•Recommendation wise discussion and planning for improving the managements and other practices. 56

The external auditors from **XXXXX** and the Internal Audit team have met several times and revisited the audit protocols, interaction schedules, documentation of collected audit evidence, and inspections of conformities and started 2nd Stage of the process. Validation of the audit evidence was carried out by the External auditor using the standard methods for validation. The audit findings of each unit were shared with the concerned unit before their finalization.

3. GREEN AUDIT

Implementation of the audit recommendations of the AY 2021 - 2022, was first reviewed and the observations reveal that "though the implementation was slow in pace, the progress made is significant in the sense that the overall objectives of the policy goals can be achieved. The implementation status of the audit recommendations of the AY 2021 – 2022 is presented in table (3) below:



3.METHODS ADOPTED

The Principal AIPS had constituted an Internal Audit team (Table 1) to assist the External auditor and the team was constituted on 2nd June 2023. All the Heads of the departments and other wings of the institute were informed for cooperating with the audit team and the process.

Table 1: Internal Green , Environment & Energy Audit Team for the AY 2022 – 2023.

Chairman	Dr. K. Balaji, Principal, AIPS	
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator	
Special Invitee	Dr.Ch.Kantlam Principal, Brilliant Institute of Pharmaceutical Sciences	
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics	
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics	
Invitee	Dr. Anwar Dept. of Health,Gunthapally.	
Student Members	1.D.Vamshi 21GN1T0027 2.CH.Akshay Kumar 21GN1T0019	



Table 3. Implementation Status of 2022-2023 Green Audit Recommendations:

R.No	Recommendation	Present Status.
1	AIPS's EMC should develop an implementation plan for realizing the Environmental policy goals and objectives;	Objective wise plans are under progress with sub-committees constituted.
2	AIPS has several high energy consumption electrical equipment and should have a time bound plan for their replacement with the energy efficient equipment or gadgets;	A sub-plan is being prepared and is a part of response to Recommendation 1
3	Although the resources consumptions appear to be high compared to the previous Audit Year, the present audit year the number of working days was almost twice to that of the previous year, as pandemic period was very short during this year. However, scope for further reduction in the consumption is high;	Strategies for reduction in resources consumption is being developed and is a part of response to Recommendation 1
4	The scope for enhancing Solar power generation is to be explored;	Noted and under consideration.
5	The scope for improving the biodiversity and carbon stocks in the vegetation also is high.	Is a part of response to Recommendation 1.
6	AIPS should incorporate its Environmental Policy and the Green activities in its web site.	Complied with.

Over all, the implementation was successful and of the eight recommendations, two were already complied with, while the remaining is in different stages of their completion. The status of the different Green components for the AY 2022 – 2023 are as follows:



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3.1.Land Use and Land Utilization:

AIPS Campus at Gunthapally Village, near Abdullapurmet, has a spread of 2.12 ha of semi-urban land surrounded by rural green cover of (Fig.1). In this area, there was no change in the Land Use and Land utilization from the status of AY 2021-2022.

However, the constructed area has been improvised for better utilization by the addition of several indoor plants. A significant portion within the constructed area was allocated for different blocks which are discrete in distribution

Table 4. Distribution of Land use types in AIPS as on August 2022.

LAND USE	Area (sq m)
Constructed Area	4660 sqm
Pavements & Paths	1850 sqm
Play Grounds	4050 sqm
Under Greens	1086 sqm
TOTAL LAND AREA	2 ACRS



Satellite Image showing AIPS Boundary and Greenery of the area.



About 2% of the constructed area, and around 13-15% of the land has been allocated for major departments like B. Pharmacy, M Pharmacy Pharm-d and for laboratories (Fig. 4). These labs provide students with hands-on learning experiences and equip them with practical skills in their respective fields

The Pharmacy building occupies 15% of the land, providing a dedicated space for academic and research activities related to M.pharmacy of all branches. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

3.2. Vegetation & Biodiversity:

The AIPS campus has a spread of 4.15 ha of land, of this the green areas account for nearly 58.5% and supports over 50 different species of higher plants. Amongst these, the campus had 363 matured trees, while another 170 trees were in developing stages.

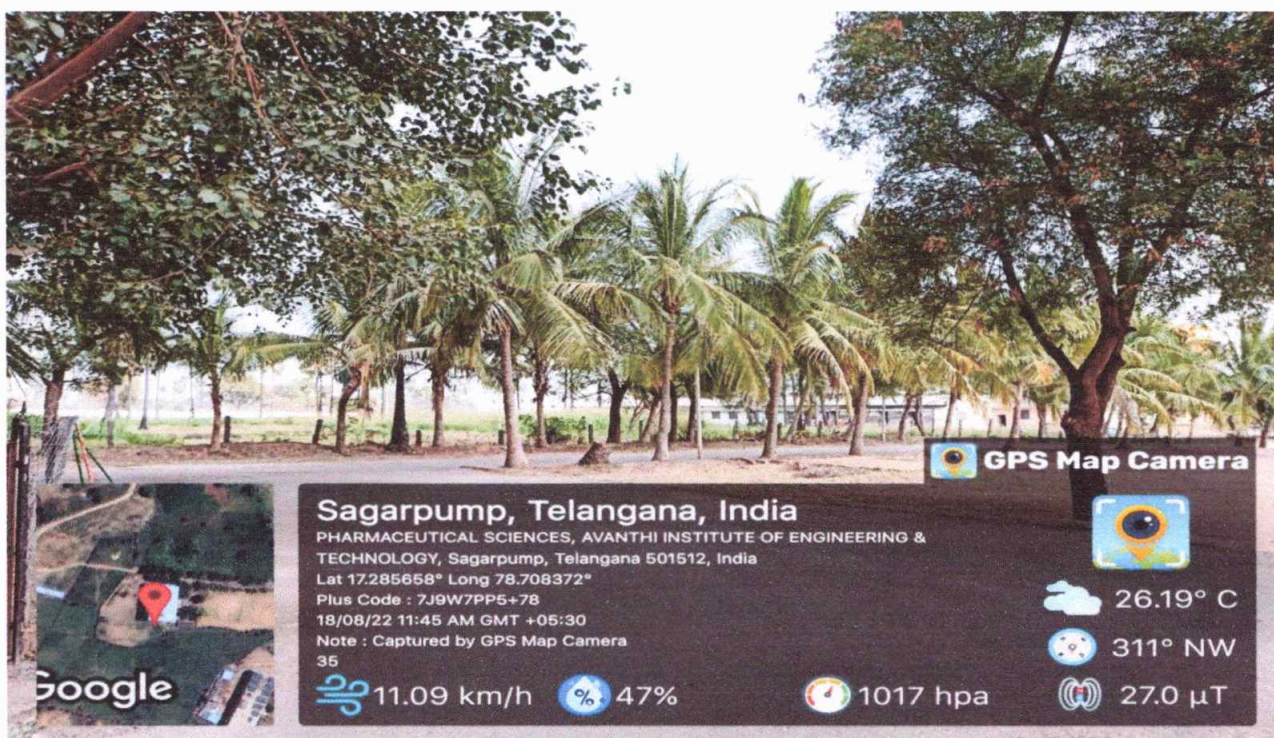


FIG: Different varieties of trees and plants



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FIG: 3 Different varieties of trees and plants



A. FLORA & PLANT DIVERSITY:

The flora of the campus comprises 40 species belonging to 36 genera and 20 families. Of these 19 were tree species and 30 were herb species, while shrubs were recorded with only two species. Among herbs and shrub species, exotic ornamental species were not taken into account. The list of plant species recorded is presented in Table (5).

Table 5: Flora species of AIPS during 2022-2023

No	Family	Species	Habit	Common/Telugu Name
1	Acanthaceae	Peristrophepaniculata(Forssk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthesaspera L.	H	Uttareni
3	Amaranthaceae	AlternantheraparonychioidesSt.	H	Ponnaganti
4	Amaranthaceae	Alternantherasessilis	H	Ponnaganti
5	Amaranthaceae	Amaranthusviridis L.	H	Chilacathotakura
6	Asteraceae	Ageratum conyzoides L.	H	PokaBanthi
7	Euphorbiaceae	Euphorbia hirtaL.	H	Nanubalu
8	Fabaceae	Cassia obtusifoliaL.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosiapurpurea (L.) Pers	H	Vempali
11	Malvaceae	SidaacutaBurmF.	H	
12	Piperaceae	Piper Betle	H	
13	Malvaceae	Sidacordifolia L.	H	
14	Nyctaginaceae	BoerhaviaeAIETtaL.	H	Punarnava
15	Fabaceae	Acacia Aneura	T	Mulaga
16	Fabaceae	Acacia catechu (L.f.) Willd	S	
17	Fabaceae	Hibiscus rosa-sinensis L	S	Mandara

18	Anacardiaceae	Mangifera indica	T	Mango
19	Aaceae	Borassus flabellifer	T	Thati
20	Aaceae	Cocos nucifera	T	Coconut
21	Aaceae	Wodyetia bifurcata	T	Foxtail palm
22	Combretaceae	Conocarpus setus	T	Conocarpus
23	Combretaceae	Terminalia catappa	T	Badam
24	Fabaceae	Acacia leucophloea (Roxb.) Willd.	T	Tellathumma
25	Fabaceae	Caesalpinia pulcherrima	T	Gulmohor
26	Fabaceae	Tamarindus indica	T	Chintha
27	Lamiaceae	Tectona grandis	T	Teak
28	Meliaceae	Azadirachta indica	T	Neem
29	Moraceae	Ficus benghalensis	T	Marri
30	Myrtaceae	Syzygium cumini	T	Neeredu
31	Rubiaceae	Neolamarckia cadamba	T	Kadambari
32	Moraceae	Artocarpus heterophyllus	T	Panasa/Jackfruit
33	Fabaceae	Saraca asoca	T	Ashoka trees
34	Moraceae	Ficus religiosa	T	Raavi
35	Sapotaceae	Sapodilla	T	Sapota
36	Poaceae	Cynodon dactylon	H	Gariki
37	Poaceae	Aeluropus lagopoides	H	Gaddi
38	Malvaceae	Sida acuta	H	

H = Herb

S = Shrub

T – Tree

There were eight fruit bearing species and the overall Maximum Possible Diversity of the campus was at 3.664 bits as per the Shannon-Weiner Index. The Actual Species Diversity of tree species was at 2.609 bits with a Species Evenness of 0.903, indicating good distribution.



B. TREES ENUMERATION & BIOMASS:

There was no significant change in the population of the matured trees in the AIPS campus as compared to the state in the previous AY 2021-2022. However, due to the Tree plantation activities during the year, the number of trees in the developing stages were recorded at 160, and within three years most of them will be contributing to the tree cover. Presently, 363 matured trees are existing in the campus. For the purpose of Trees biomass, only the matured trees were taken into consideration. Based on the girth and height of the trees enumerated, by using the standard ecological methods, the biomass of the trees for the 18 species was estimated and the total Tree Biomass was at 31.04 tons in the AY 2022-2023 (Table 6). This is 4.69 tons greater than the record of the previous audit year.



FIG: 4 Tree plantation activities during the year

C. CARBON STOCKS:

The Carbon stocks in the trees of AIPS campus were estimated using standard stock assessment methods. The general default value of 46% of the Dry weight recommended for tropical trees was adopted and thus the C stocks from the trees arrived at 14.898 tons. Added to this, another 47 tons of C was present in the soils. Thus, the total C stock in the AIPS Campus was estimated at 62 tons.



Table 6. Tree Enumeration and Biomass Stock at AIPS Campus during AY 2022-2023.

S No	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangifera indica L.	40.5	7	18	1.491
2	Borassus flabellifer L.	40	9	44	4.572
3	Cocos nucifera L.	31	8	19	1.054
4	Wodyetia bifurcata A.K. Irvine)	38.2	6	62	3.876
5	Conocarpus Erectus L	27	7	23	0.847
6	Terminalia catappa L.	43	9	16	1.921
7	Acacia leucophloea (Roxb.) Willd.	28.1	6	3	0.102
8	Caesalpinia pulcherrima (L.) SW.	36	6	29	1.627
9	Tamarindus indica L.	40	6	22	1.524
10	Tectona grandis L. f	30.5	11	11	0.812
11	Azadirachta indica A. Juss	27	9	13	0.616
12	Ficus religiosa L.	39	7	1	0.077
13	Syzygium cumini L. Skeels	59.1	6	12	1.809
14	Neolamarckia cadamba (Roxb.) Bosser	53	8	7	1.135
15	Artocarpus heterophyllus	37.5	6	4	0.244
16	Acacia aneura	30.5	6	29	1.168
17	Saraca asoca	22	7	40	0.978
18	Sapodilla	22.2	6	10	0.213
TOTAL					25.067



D. FAUNA:

The fauna records were almost the same as in the year 2021-2022, and therefore the same was reported for this year also. The campus vegetation at AIPS serves as a habitat for various animal species, providing a home for diverse wildlife. During a single day's inventory, over 24 species were observed, as listed in Table 7. The most common bird species found on campus is the Common Myna, while the presence of numerous butterfly species adds to the enchantment. In addition to these natural inhabitants, the campus supports a range of other fauna.

Table 7. List of major faunal species recorded in AIPS Campus

S.No	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Ranaspp	Frog
REPTILES			
1	Tree Gecko	Hemidactylussp	Lizard
2	Wall lizard	Hemidactylusprashadi	Lizard
3	Garden Lizard	Calotesversicolor	Lizard
4	Snakes	Serpentes	Snakes
BIRDS			
1	Red-vented bulbul	Pycnonotuscafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotherestrictis	Diurnal Birds
4	Crow	Corvuscorvidae	Diurnal Birds
5	Common Cuckoo	Cuculuccanorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittaculakrameria	Diurnal Birds
8	Black Drongo	Dicrurusmacrocerucus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds

10	Eagle	Accipitridae	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattusrattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danauschrysisippus	Insects
2	The Gram Blue	Euchrysopsenejus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumalalimniace	Moth
7	Honey bee	Apis	Insects
8.	Dragon flies	Suborder Anisoptera	Insects



Some Birds and insects in Campus



3.3. Water Resources Management:

The total water consumption of the AIPS can be classified into THREE use categories:

1. Academic and administration
2. Transportation and Other Utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are four bore wells existing in the campus, each connected to a separate overhead tank located at various academic and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 17 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 10 KLD of water, of which 7 KLD is sourced from RO reject waters. Overall, AIPS utilizes 24 KLD of groundwater on all working days.

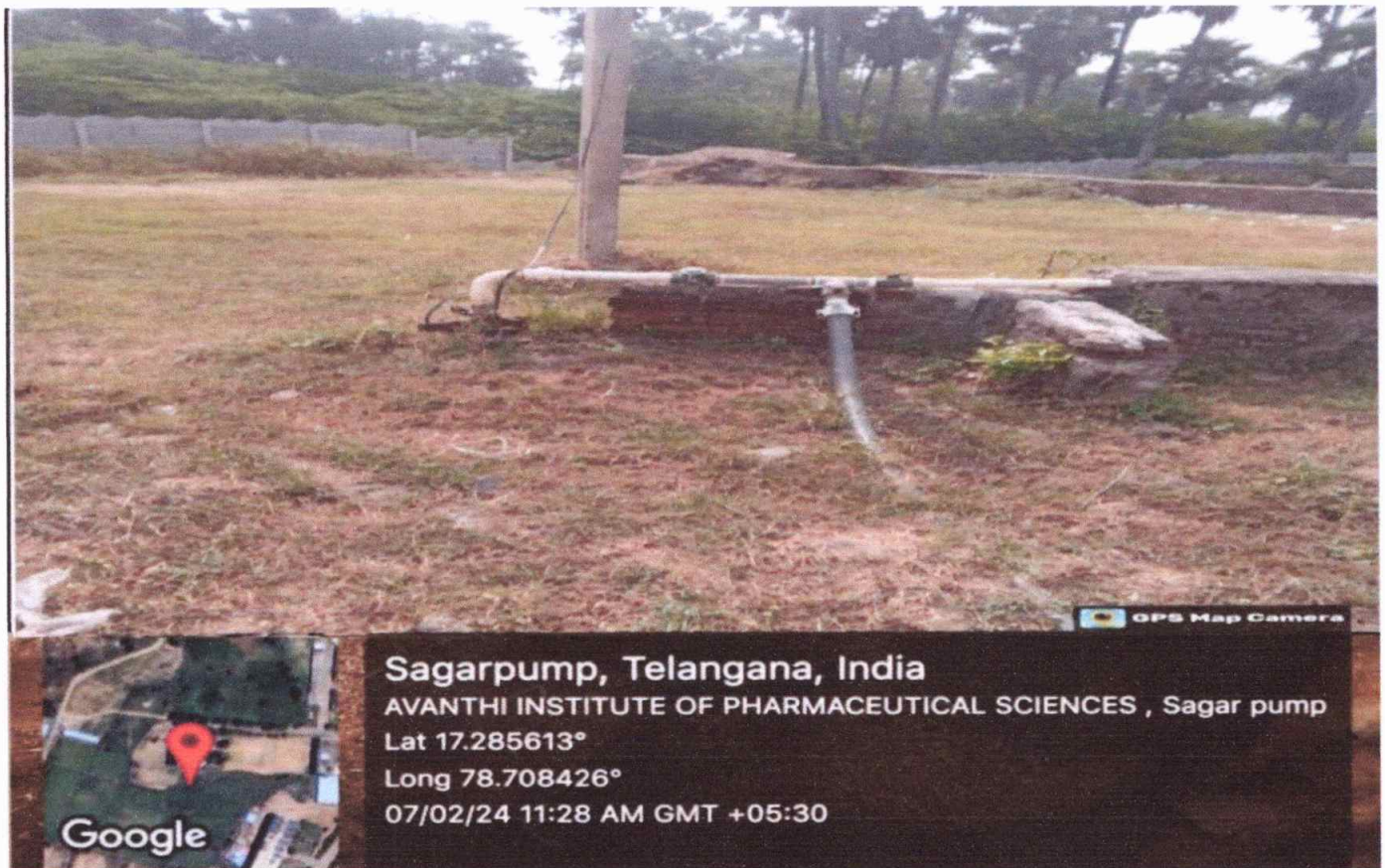


FIG: 7HP Motor capacity was installed near the Pharmacy block



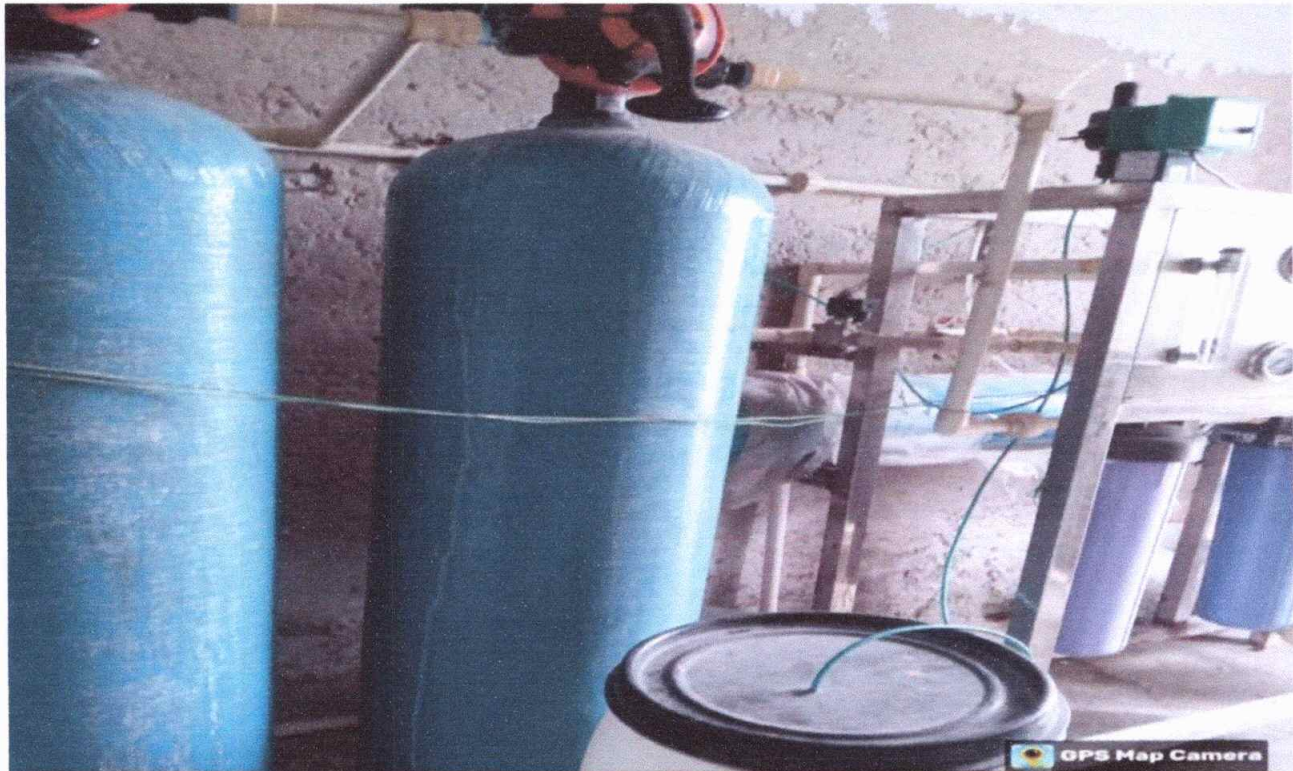
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AIPS has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are One RO plants, with capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.



GPS Map Camera



Sagarpump, Telangana, India

AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES , Sagarpump

Lat 17.285613°

Long 78.708426°

Overall, compared to the AY 2021-2022, this audit year has shown a saving of 6 KLD and consequently, the per capita consumption has come down to 9.6 lpd.

AIPS has One RO water plants, and it produce 3 liters of wastewater for every 1 liter of treated water. On working days, approximately 10 KLD (Kilo Liters per Day) of water is rejected by RO plant. The rejected water is used for gardens and green areas.

The Pre-monsoon water quality of the two bore wells being used by AIPS was analysed for drinking water quality standard IS 10500. The results are presented in Table (7). The results indicate that the water quality was almost the same in the two sources and also there was no significant change from the water quality of the previous AY 2021-2022. The water quality complies with the IS 10500 standard, with the



Table 8. Pre-monsoon Water Quality of the Groundwaters of AIPS – 2023.

S.No	Parameter*	BW-1	BW-2	IS 10500
1	pH	7.2	7	6.5-8.5
2	EC	243.8	247.8	500
3	TDS	412	412	500
4	TH	212	215	300
5	Ca	62	60	75
6	Mg	22	21.4	30
7	Na	11	14	200
8	k	8	7	10
9	Fe	0.05	0.05	0.3
10	Cl	100	100	250
11	PO ₄	1	0.8	10
12	NO ₂	0.03	0.03	1
13	F	0.4	0.4	1.2
14	TA	122.5	128.8	200
15	CO ₂	36.1	30.2	---
16	HCO ₃	229	227	---
17	DO	3	2.9	4.8

* = All parameters are in mg/l, with the exception of pH



3.4. Energy Management:

With the aim to become a model institution for energy efficiency and conservation, AIPS has initiated its energy management and the institution conducting exclusive energy audits to assess its energy management practices and efficiency. The findings of these audits, conducted by an accredited consultant, are documented in the energy audit reports. This report provides an overview of the institution's energy utilization and management within the context of the environment, highlighting its significance as a crucial aspect of the overall environmental management in relation to carbon emissions. AIPS meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power
4. LPG

Compared to the remaining three sources, the use of LPG was very insignificant. The use of solar power had a history of Five years.

5.4a. HT Power Consumption:

During the audit year, the Institute consumed a total of 230 KVAh of electricity from the metered connection, with a monthly average of 20.9 KVAh. Monthly variations in consumption were significant, ranging from a low of 16 KVAh in March 2023 to a high of 20 KVAh in September 2022. The annual Mean Power Factor was 0.99. Therefore, the annual consumption is equal to 215.4 KW.

Compared to the previous year, the consumption is very high during the AY 2022-2023 and exceeded by 38% from the previous year. However, the previous year was partly affected by the COVID closures and virtual mode. AIPS's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Computers, labs, and Machinery. During the audit year, the use by Air-conditioning sector was the maximum, accounting for 50% of the total load, followed by Computers and Machinery sector accounting for nearly 25% of the total load.

5.4b. Power generated from Solar Systems:

The Institute has installed rooftop power generation systems, with a capacity of 120 KWp, During the audit year, a total of 118211 Units was generated, which is equivalent to 54.96% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.



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FIG: 6 Installed solar panels that consist the capacity of 60 KW Each

5.4c. Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 62.5 KVA. During the audit year, the generator consuming around 600 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.1/KWh.

Overall, the total electricity consumption from all three sources, including the DG sets, was 215097 KVAh.

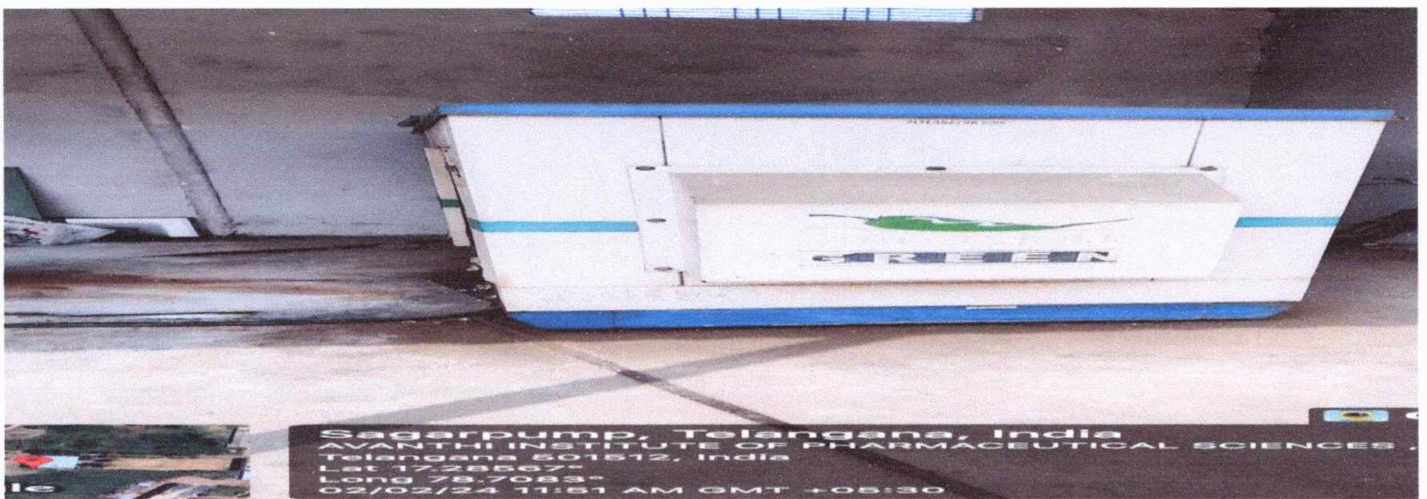


FIG: 7 DG-SET 62.5KVA



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5.4d. Energy for Transportation:

AIPS being an institution with no residential facility and all the members are dependent on transportation. Thus, Transportation is a major sector demanding high energy consumption.

With its 09 buses fleet, AIPS provides transport facility for 35% of its members. The average trip length for the buses was at 72 km /day, and provides the facility for 450 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 69,350 liters. This translates to a per capita consumption of 33.24 liters per annum. The per capita consumption of this AY is 12 liters less than that of the previous year's and is a significant saving. Around 79% of the AIPS community members utilize the other modes. This includes 60.57% using public transportation, 8.89% using auto-rickshaws, 9.04% using their own two-wheelers, and 0.5% use four-wheelers.

5.4e. LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 60 non-domestic cylinders (60 X 19 kg) and Four domestic cylinders (6 X 14.8 kg). Thus, the estimate was 822.2 Kg. There was no change in the consumption from the previous year.

5.4f. Abstract of Energy Use:

AIPS's total energy use from different sources and for several purposes during the AY 2022-2023 is presented below:

➤HT Power from Grid	: 96886 Units
➤HSD Used	: 69,950 Litres (Buses + HSDG)
➤LPG	: 822.2 Kg
➤Solar Power Generated	: 118211 Units



Compared to AY 2021-2022, this AY had high consumption and this is mainly because of the institution was functioning virtually due to pandemic conditions and therefore a great amount of electricity and transportation were not reflected.

Renewable energy generation (Solar Power) was the same during the previous and current years. 5.4g. Energy Use & Carbon Footprint: While meeting its energy needs, AIPS could generate nearly 54.96% of its energy needs from renewable source of solar power. However, transportation has become a major contributor to the consumption of HSD and thereby to the pollution loads. The carbon emissions from the energy management during the audit year are presented in Table 7 below, which reveals that the net Carbon emissions from the AIPS stands at 246.7 t CO₂ e/annum.

Table 8. CO₂ Emissions from AIPS during the AY 2022 – 2023.

S.No	Emission Source	Annual Consumption	CO ₂ emission Factor (kg/Unit)	Total CO ₂ emissions (kg)	Total emissions (t CO ₂ e/ann)
1	Grid Electricity	96886 KVAh	0.94	52760.32	53
2	Diesel Oil	69,950litres	2.68	108142.36	109
3	LPG	822.2 Kg	2.252	108143.36	0
TOTAL Carbon emissions					162
Emission Offset through Solar Power					52
NET Carbon emissions					110

Compared to the previous year, Net emissions during the AY 2022-2023 have increased by 14.4 t CO₂ e. However, if the per capita CO₂ emissions are considered, the current year had 0.089 t CO₂ e/head/annum compared to 0.095 t CO₂ e of AY 2021-2022.



3.5.Solid Wastes Management:

Solid Waste Management is one area where AIPS is striving to develop suitable models. After initiating Green Audits, the AIPS community, particularly students and researchers are focussing on effective segregation and quantification of different wastes. For the purpose of waste management, all the solid waste is classified as per the standard norms. At the first instance, Two Categories are recognized: (1) Wet waste; and (2) Dry Waste. The first category is usually generated from Canteen, Dining Halls, Waiting Rooms, and other areas of gathering places. At identified places, wet waste collection bins were provided.

On the other hand, the second category, Dry Waste was further classified into Five types: (1) Paper & Board; (2) Plastic; (3) Glass & Metallic; (4) E-Waste; and (5) Sanitary Waste. The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E-Waste. The estimates of different wastes and their disposal route are presented in Table (8) below:

Table 8. Solid Wastes generation and Disposal Routes followed by AIPS during AY 2022-2023.

S.No	Waste Type	Waste Type	Qty	Disposal
1	Wet Waste	DiningHalls, Messes & Canteen	3 kg/day	To Compost
2	Paper & Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	negligible	IC/Authorized Collectors
4	Plastic	All	0.12 kg/day	IC/Authorized Collectors

In terms of solid waste management, AIPS has implemented various initiatives through its Innovation Centre. Metallic, plastic, and e-wastes are examined by the members of the Innovation Club to explore opportunities for reuse, repair, recovery, or reduction, fostering innovation among the students. Overall, AIPS's waste management practices aim to minimize waste generation, promote recycling and composting, and encourage innovative approaches to waste reduction and reuse.



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4. GREEN AUDIT: OBSERVATIONS & RECOMMENDATIONS

- All students need to be involved in enhancing and appreciating the campus biodiversity. This on one hand helps in the total inventory of the flora and fauna, and on the other enables the students to realize Biodiversity as the Natural Capital for the sustainable development
- Recommended to replace at least 20% of the electrical and electronic gadgets which are not certified for energy efficiency
- Improvement in the Carbon stock in the Greens is commendable
- The scope for enhancing Solar Power generation is to be explored;
- The Institute's website should have a separate link for Green and Environment activities and need to be monitored and updated by the EMC.



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Gunthapally (V), Abdullapurmet(M), RR Dist, Hyderabad -501512.)

2021-2022

Green, Environment and Energy Audit

On 08 JULY 2022



Prepared By:

Dr. D. Seshikala, Dept . of Environment Science,

Dr. A. Vijaya Bhasker Reddy, Dept of Botany,

Dr. A.Nageswara Rao ,Dept of Zoology,

**DEPARTMENT OF ENVIRONMENTAL SCIENCE
OSMANIA UNIVERSITY - HYDERABAD.**

**CERTIFICATE
(GREEN, ENERGY and ENVIRONMENT AUDIT)**

This is to certify that Environmental, Energy and Green Audit has been conducted at the Avanthi Institute of Pharmaceutical Sciences, Hayathnagar, RR Dist by the Green Audit Committee, Department of Environmental Science of Osmania University, Hyderabad. The Committee has verified the Green initiatives carried out by the College and the College has successfully demonstrated knowledge on Energy Conservation, Water Conservation, Bio Diversity, Waste Management and Carbon footprint.

The Green Audit Committee is pleased to declare the following grades in the following categories for their satisfactory performance and is valid from 2021 to 2022

<i>Green Initiatives</i>	<i>'A' Grade</i>
<i>Energy Conservation</i>	<i>'A' Grade</i>
<i>Environmental Protection</i>	<i>'A' Grade</i>

D. Seshikala

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GREEN & ENVIRONMENT AUDIT REPORT

2021 – 2022



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

AUDIT TEAM:

Dr. D. Seshikala, Dept . of Environment Science,

Dr. A. Vijaya Bhasker Reddy, Dept of Botany,

Dr. A.Nageswara Rao, Dept of Zoology.

AS EXTERNAL AUDITORS

&

Chairman	Dr. K. Balaji, Principal, AIPS
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Pharmaceutical Sciences
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics
Invitee	Dr. Anwar, Dept. of Health

As In house Team

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LIST OF ABBREVIATIONS USED

AIPS	: Avanthi Institute of Pharmaceutical Sciences
AICTE	: All India Council for Technical Education
TSSRTC	: Telangana State Road Transport Corporation
B. Pharm	: Bachelor of Pharmacy
Pharm-D	: Doctor of Pharmacy
BS & H	: Basic Sciences and Humanities
PW P	: Plastic Waste
C	: Carbon
Ca	: Calcium
CAD	: Computer Aided design
CAM	: Computer Aided Manufacturing
CO ₃	: Carbonates
DO	: Dissolved Oxygen
E waste	: Electrical & Electronic Waste
EC	: Electrical Conductivity
EKL	: Enviro Kamka3r LLP
Fig.	: Figure
Fe	: Ferrous ion
GHRDC	: Global Human Resource Development Centre
ha	: Hectare
HCO ₃	: Bicarbonates
Hp	: Horse Power
HSD	: High Speed Diesel
HW	: Hazardous Waste
ISO	: International Standards Organization
JNTUH	: Jawaharlal Nehru Technological University Hyderabad
K	: Potassium
kg	: Kilo Grams
KL	: Kilo litres
KLD	: Kilo litres Day
km	: Kilo Meters
Kvah	: Kilo volts amps per hour
KW	: Kilo Watts
LPG	: Liquefied Petroleum Gas
lph	: Litres per hour
M Tech	: Master of Technology
Mg	: Magnesium
MSW	: Municipal Solid Waste
Na	: Sodium
NAAC	: National Assessment and Accreditation Council
NBA	: National Board of Accreditation
NCC	: National Cadet Corps

NBA	: National Board of Accreditation
NCC	: National Cadet Corps
NSS	: National Service Scheme
pH	: Potential of Hydrogen
PW	: Plastic Waste
RO	: Reverse Osmosis water plant
SO Carbon	: Soil Organic Carbon
sq m	: Square meter
TA	: Total Alkalinity
TDS	: Total dissolved solids
TH	: Total Hardness
UGC	: University Grants Commission



PREAMBLE

Avanthi Institute of Pharmaceutical Science (AIPS) is a pioneer institution in main streaming “Environment and Sustainable development: in all its academic, administrative and extension programs, and aligned these with national missions on the environment, and climate change and complies with AICTE, NAAC, and university policies. AIPS has initiated Green and Environmental Audits since the academic year 2020-2021, and with the inclusion of a third-party professional, XXXXXXXXXX, a start up company groomed by IIM(B) & NSRCEL and gained experience in the Green and Environment Audits. This report deals with “Green Audit” for the academic year (AY) 2021 – 2022 and is a third consecutive annual audit.

The past two audit years have witnessed several perturbations in the functional modes of all the educational institutions because of the impacts of the Covid pandemic and thereby, the audit processes and the findings provided limited implications. However, they helped in streamlining the management systems related to Environmental education, awareness, natural resources, and energy conservation aspects. AIPS has developed its own Environmental Policy in AY 2021-2022, based on which all green and environmental activities are being planned, implemented, reviewed, and verified. This AY 2021 – 2022 attempted to report the progress and conformity with the Environment Policy of AIPS.

With a focus on academic excellence and holistic development, the institute aims to equip its students with the necessary skills and knowledge to excel in their respective fields. Over the years, AIPS has garnered a reputation for its commitment to quality education and continues to play a significant role in shaping the future of Pharmacy professionals in the region and beyond.

1. ABOUT AIPS

Avanthi Institute of Pharmaceutical Science and (AIPS), an institution of the Avanthi Educational Society, established in 2007 is engaged in providing quality education and 1 contributing to the development of Pharmacy for over 16 years. The founder of the institutions, Sri M. SrinivasaRao, a philanthropist, has contributed to the development of these institutions with a vision to provide fair access to higher education to the students of the Telangana . The main campus of AIPS (Fig.1) is located at Gunthapally, a semi-urban area situated near Abdullapurmet, Ranga Reddy district. Telangana, and is equidistance to most places of the region.

AIPS offers various undergraduate and postgraduate AND Pharm-D programs in the field of Pharmacy and pharmaceutical science, and is affiliated with Jawaharlal Nehru Technological University, Hyderabad; approved by the All-India Council for Technical Education (AICTE), and approved (PCI) Pharmacy Conical Of Indian has been offering high-quality Pharmacy education. It also accredited by the NAAC. In the year 2018, it received a B++ grade and a score of 3.00 scale points out of 4 in its NAAC accreditation. AIPS also provides students with a holistic development experience through various activities such as Games & Sports, NCC, NSS, BIO ADHAYAAN and other technological pursuits. With a spacious and an equipped for both outdoor and indoor games, the college offers excellent facilities for sports and recreational events.



Fig.1: AIPS Campus Building

2.1. Campus Community:

AIPS Campus community can broadly be considered fewer than four categories: (a) Students and Research scholars; (b) Teaching Staff; (c) non-teaching staff; and (d) Associate 2 personnel. Of these four categories, Associates are such members who are associated with such activities like material suppliers; service providers, contractors, etc. More than 95% of the AIPS members are Day comers. Thus, during Sundays and holidays campus activities will be at their low, including the requirement of essential resources. The distribution of the different sectors of the community is illustrated in Fig. 1, which indicates that during this AY students accounted for 600 and their strength has increased from the previous year when it was 2007. In the case of the size of the other three sectors of the community, there was no change in their numbers from the previous year.

2. SCOPE OF GREEN AUDIT

The plans and activities of the AIPS being implemented to realize the goals and objectives of AIPS's Environment Policy shall be the broad scope of the Green Audit. The policy envisages that the AIPS campus be made a "Green Campus" making it comply with a Net Zero emission campus (Fig.2). Further, encourage the participation of all its members in environmental activities, more particularly in the conservation of natural resources, Energy, and minimization of waste. Towards this, the Environmental Management Cell of the AIPS, and the Green Auditor, M/S XXXXXXXX, have evolved documentation. Different methods including the documentation.



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Implementation status of the GA recommendations of the previous year is included to enable a review of management systems for realizing the Environmental Policy's goals and objectives. Overall, the scope of the GA encompasses the management of natural resources, waste generation, and adherence to green building norms, carbon footprint assessment, and ensuring active participation of all members, including the management.



Clean & Green Programme



The Audit was carried out in three stages, each stage comprising of different activities as shown in Table. 2.

Table, 2. Stages and Activities of the Green Audit of AIPS for AY 2021 -2022

Pre Audit Stage	<ul style="list-style-type: none">•Appointment to external Audit Agency•Constitution of Audit team•Scoping of audit and finalization of methods•Initiating the Audit
Audit Stag	<ul style="list-style-type: none">•Units interactions•Documents Scrutinise•Collection and Validation of audit evidences.•Finalization of audit findings•Submission of Audit recommendations
Post Audit Stage	<ul style="list-style-type: none">•Recommendation wise discussion and planning for improving the managements and other practices. 56

The external auditors from XXXXX and the Internal Audit team have met several times and revisited the audit protocols, interaction schedules, documentation of collected audit evidence, and inspections of conformities and started 2nd Stage of the process. Validation of the audit evidence was carried out by the External auditor using the standard methods for validation. The audit findings of each unit were shared with the concerned unit before their finalization.

3. GREEN AUDIT

Implementation of the audit recommendations of the AY 2021 - 2022, was first reviewed and the observations reveal that "though the implementation was slow in pace, the progress made is significant in the sense that the overall objectives of the policy goals can be achieved. The implementation status of the audit recommendations of the AY 2021 – 2022 is presented in table (3) below:



3.METHODS ADOPTED

The Principal AIPS had constituted an Internal Audit team (Table 1) to assist the External auditor and the team was constituted on 2nd June 2022. All the Heads of the departments and other wings of the institute were informed for cooperating with the audit team and the process.

Table 1: Internal Green , Environment & Energy Audit Team for the AY 2021 – 2022.

Chairman	Dr. K. Balaji, Principal, AIPS	
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator	
Special Invitee	Dr.Ch.Kantlam Principal, Brilliant Institute of Pharmaceutical Sciences	
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics	
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics	
Invitee	Dr. Anwar Dept. of Health,Gunthapally.	
Student Members	1.D.Vamshi 21GN1T0027 2.CH.Akshay Kumar 21GN1T0019	



Table 3. Implementation Status of 2021-2022 Green Audit Recommendations:

R.No	Recommendation	Present Status.
1	AIPS's EMC should develop an implementation plan for realizing the Environmental policy goals and objectives;	Objective wise plans are under progress with sub-committees constituted.
2	AIPS has several high energy consumption electrical equipment and should have a time bound plan for their replacement with the energy efficient equipment or gadgets;	A sub-plan is being prepared and is a part of response to Recommendation 1
3	Although the resources consumptions appear to be high compared to the previous Audit Year, the present audit year the number of working days was almost twice to that of the previous year, as pandemic period was very short during this year. However, scope for further reduction in the consumption is high;	Strategies for reduction in resources consumption is being developed and is a part of response to Recommendation 1
4	The scope for enhancing Solar power generation is to be explored;	Noted and under consideration.
5	The scope for improving the biodiversity and carbon stocks in the vegetation also is high.	Is a part of response to Recommendation 1.
6	AIPS should incorporate its Environmental Policy and the Green activities in its web site.	Complied with.

Over all, the implementation was successful and of the eight recommendations, two were already complied with, while the remaining is in different stages of their completion. The status of the different Green components for the AY 2021 – 2022 are as follows:



3.1.Land Use and Land Utilization:

AIPS Campus at Gunthapally Village, near Abdullapurmet, has a spread of 2.12 ha of semi-urban land surrounded by rural green cover of (Fig.1). In this area, there was no change in the Land Use and Land utilization from the status of AY 2021-2022.

However, the constructed area has been improvised for better utilization by the addition of several indoor plants. A significant portion within the constructed area was allocated for different blocks which are discrete in distribution

Table 4. Distribution of Land use types in AIPS as on August 2022.

LAND USE	Area (sq m)
Constructed Area	4660 sqm
Pavements & Paths	1850 sqm
Play Grounds	4050 sqm
Under Greens	1086 sqm
TOTAL LAND AREA	2 ACRES



Satellite Image showing AIPS Boundary and Greenery of the area.



About 2% of the constructed area, and around 13-15% of the land has been allocated for major departments like B. Pharmacy, M Pharmacy Pharm-d and for laboratories (Fig. 4). These labs provide students with hands-on learning experiences and equip them with practical skills in their respective fields

The Pharmacy building occupies 15% of the land, providing a dedicated space for academic and research activities related to M.pharmacy of all branches. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

3.2. Vegetation & Biodiversity:

The AIPS campus has a spread of 4.15 ha of land, of this the green areas account for nearly 58.5% and supports over 50 different species of higher plants. Amongst these, the campus had 363 matured trees, while another 170 trees were in developing stages.

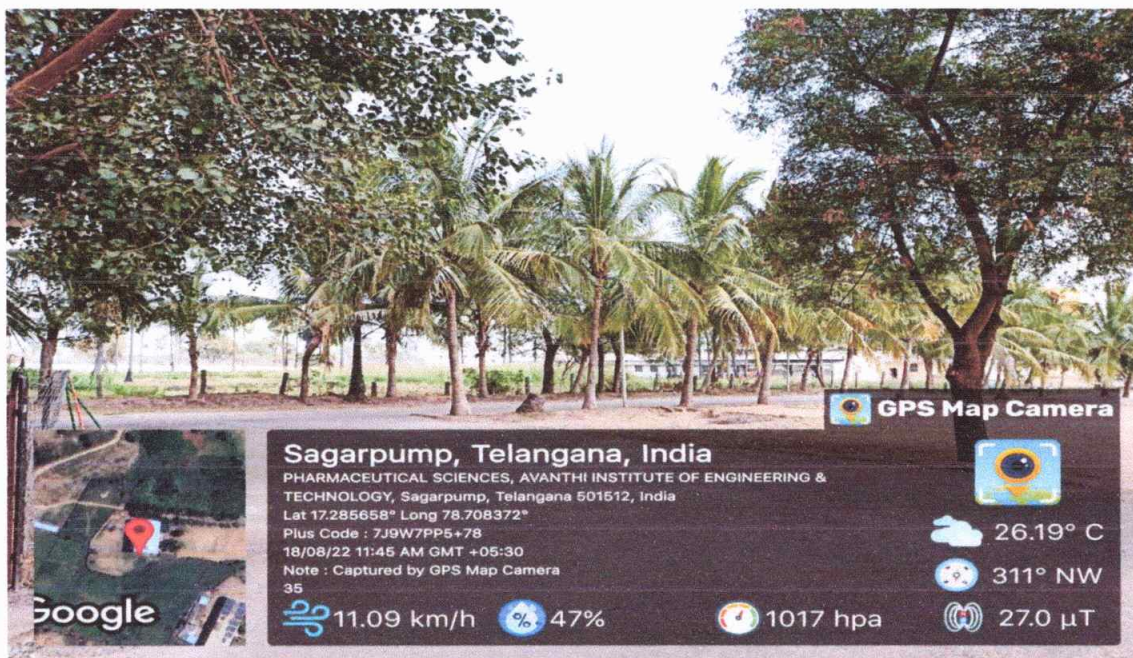


FIG: Different varieties of trees and plants



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FIG: 3 Different varieties of trees and plants



A. FLORA & PLANT DIVERSITY:

The flora of the campus comprises 40 species belonging to 36 genera and 20 families. Of these 19 were tree species and 30 were herb species, while shrubs were recorded with only two species. Among herbs and shrub species, exotic ornamental species were not taken into account. The list of plant species recorded is presented in Table (5).

Table 5: Flora species of AIPS during 2021-2022

No	Family	Species	Habit	Common/Telugu Name
1	Acanthaceae	Peristrophepaniculata(Forssk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthesaspera L.	H	Uttareni
3	Amaranthaceae	AlternantheraparonychioidesSt.	H	Ponnaganti
4	Amaranthaceae	Alternantherasessilis	H	Ponnaganti
5	Amaranthaceae	Amaranthusviridis L.	H	Chilacathotakura
6	Asteraceae	Ageratum conyzoides L.	H	PokaBanthi
7	Euphorbiaceae	Euphorbia hirtaL.	H	Nanubalu
8	Fabaceae	Cassia obtusifoliaL.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosiapurpurea (L.) Pers	H	Vempali
11	Malvaceae	SidaacutaBurmF.	H	
12	Piperaceae	Piper Betle	H	
13	Malvaceae	Sidacordifolia L.	H	
14	Nyctaginaceae	BoerhaviaeAIETtaL.	H	Punarnava
15	Fabaceae	Acacia Aneura	T	Mulaga
16	Fabaceae	Acacia catechu (L.f.) Willd	S	

17	Fabaceae	Hibiscus rosa-sinensis L	S	Mandara
18	Anacardiaceae	Mangifera indica	T	Mango
19	Aaceae	Borassus flabellifer	T	Thati
20	Aaceae	Cocos nucifera	T	Coconut
21	Aaceae	Wodyetia bifurcata	T	Foxtail palm
22	Combretaceae	Conocarpus setus	T	Conocarpus
23	Combretaceae	Terminalia catappa	T	Badam
24	Fabaceae	Acacia leucophloea (Roxb.) Willd.	T	Tellathumma
25	Fabaceae	Caesalpinia pulcherrima	T	Gulmohor
26	Fabaceae	Tamarindus indica	T	Chintha
27	Lamiaceae	Tectona grandis	T	Teak
28	Meliaceae	Azadirachta indica	T	Neem
29	Moraceae	Ficus benghalensis	T	Marri
30	Myrtaceae	Syzygium cumini	T	Neeredu
31	Rubiaceae	Neolamarckia cadamba	T	Kadambari
32	Moraceae	Artocarpus heterophyllus	T	Panasa/ Jackfruit
33	Fabaceae	Saraca asoca	T	Ashoka trees
34	Moraceae	Ficus religiosa	T	Raavi
35	Sapotaceae	Sapodilla	T	Sapota
36	Poaceae	Cynodon dactylon	H	Gariki
37	Poaceae	Aeluropus lagopoides	H	Gaddi
38	Malvaceae	Sida acuta	H	

H = Herb

S = Shrub

T – Tree

There were eight fruit bearing species and the overall Maximum Possible Diversity of the campus was at 3.664 bits as per the Shannon-Weiner Index. The Actual Species Diversity of tree species was at 2.609 bits with a Species Evenness of 0.903, indicating good distribution.



B. TREES ENUMERATION & BIOMASS:

There was no significant change in the population of the matured trees in the AIPS campus as compared to the state in the previous AY 2021-2022. However, due to the Tree plantation activities during the year, the number of trees in the developing stages were recorded at 160, and within three years most of them will be contributing to the tree cover. Presently, 363 matured trees are existing in the campus. For the purpose of Trees biomass, only the matured trees were taken into consideration. Based on the girth and height of the trees enumerated, by using the standard ecological methods, the biomass of the trees for the 18 species was estimated and the total Tree Biomass was at 31.04 tons in the AY 2021-2022 (Table 6). This is 4.69 tons greater than the record of the previous audit year.



FIG: 4 Tree plantation activities during the year

C. CARBON STOCKS:

The Carbon stocks in the trees of AIPS campus were estimated using standard stock assessment methods. The general default value of 46% of the Dry weight recommended for tropical trees was adopted and thus the C stocks from the trees arrived at 14.898 tons. Added to this, another 47 tons of C was present in the soils. Thus, the total C stock in the AIPS Campus was estimated at 62 tons.



Table 6. Tree Enumeration and Biomass Stock at AIPS Campus during AY 2021-2022.

S No	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangiferaindica L.	40.5	7	18	1.491
2	Borassusflabellifer L.	40	9	44	4.572
3	Cocosnucifera L.	31	8	19	1.054
4	Wodyetia bifurcate A.K. Irvine)	38.2	6	62	3.876
5	Conocarpus Erectus L	27	7	23	0.847
6	Terminaliacatappa L.	43	9	16	1.921
7	Acacia leucophloea (Roxb.) Willd.	28,1	6	3	0.102
8	Caesalpiniapulcherrima (L.) SW.	36	6	29	1.627
9	Tamarindusindica L.	40	6	22	1.524
10	Tectonagrandis L. F	30.5	11	11	0.812
11	Azadirachtaindica A. Juss	27	9	13	0.616
12	Ficusreligiosa L.	39	7	1	0.077
13	Syzygiumcumini L. Skeels	59.1	6	12	1.809
14	Neolamarckiacadamba (Roxb.) Bosser	53	8	7	1.135
15	ArtocarpusHeterophyllus	37.5	6	4	0.244
16	Acacia Aneura	30.5	6	29	1.168
17	SaracaAsoca	22	7	40	0.978
18	Sapodilla	22.2	6	10	0.213
TOTAL					25.067



D. FAUNA:

The fauna records were almost the same as in the year 2021-2022, and therefore the same was reported for this year also. The campus vegetation at AIPS serves as a habitat for various animal species, providing a home for diverse wildlife. During a single day's inventory, over 24 species were observed, as listed in Table 7. The most common bird species found on campus is the Common Myna, while the presence of numerous butterfly species adds to the enchantment. In addition to these natural inhabitants, the campus supports a range of other fauna.

Table 7. List of major faunal species recorded in AIPS Campus

S.No	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Ranaspp	Frog
REPTILES			
1	Tree Gecko	Hemidactylussp	Lizard
2	Wall lizard	Hemidactylusprashadi	Lizard
3	Garden Lizard	Calotesversicolor	Lizard
4	Snakes	Serpentes	Snakes
BIRDS			
1	Red-vented bulbul	Pycnonotuscafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotherestrictis	Diurnal Birds
4	Crow	Corvuscorvidae	Diurnal Birds
5	Common Cuckoo	Cuculuccanorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittaculakrameria	Diurnal Birds
8	Black Drongo	Dicurusmarcocerucus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds

10	Eagle	Accipitridae	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattusrattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danauschrysippus	Insects
2	The Gram Blue	Euchrysopscejus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumalalimniace	Moth
7	Honey bee	Apis	Insects
8.	Dragon flies	Suborder Anisoptera	Insects



Some Birds and insects in Campus



3.3. Water Resources Management:

The total water consumption of the AIPS can be classified into THREE use categories:

1. Academic and administration
2. Transportation and Other Utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are four bore wells existing in the campus, each connected to a separate overhead tank located at various academic and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 17 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 10 KLD of water, of which 7 KLD is sourced from RO reject waters. Overall, AIPS utilizes 24 KLD of groundwater on all working days.

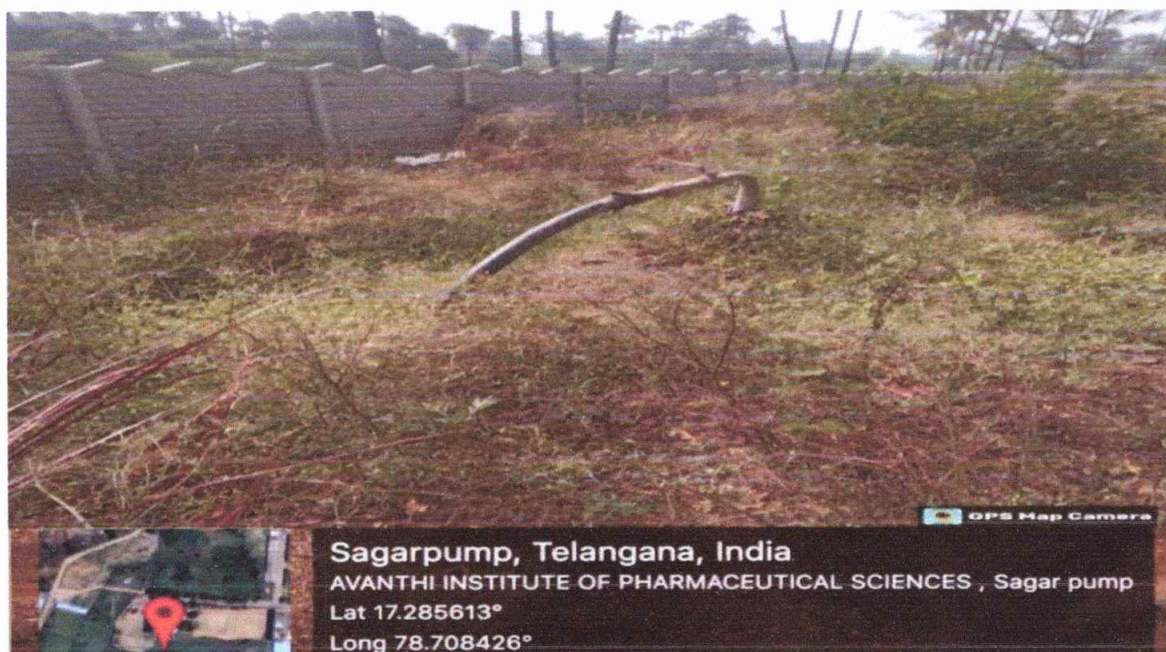
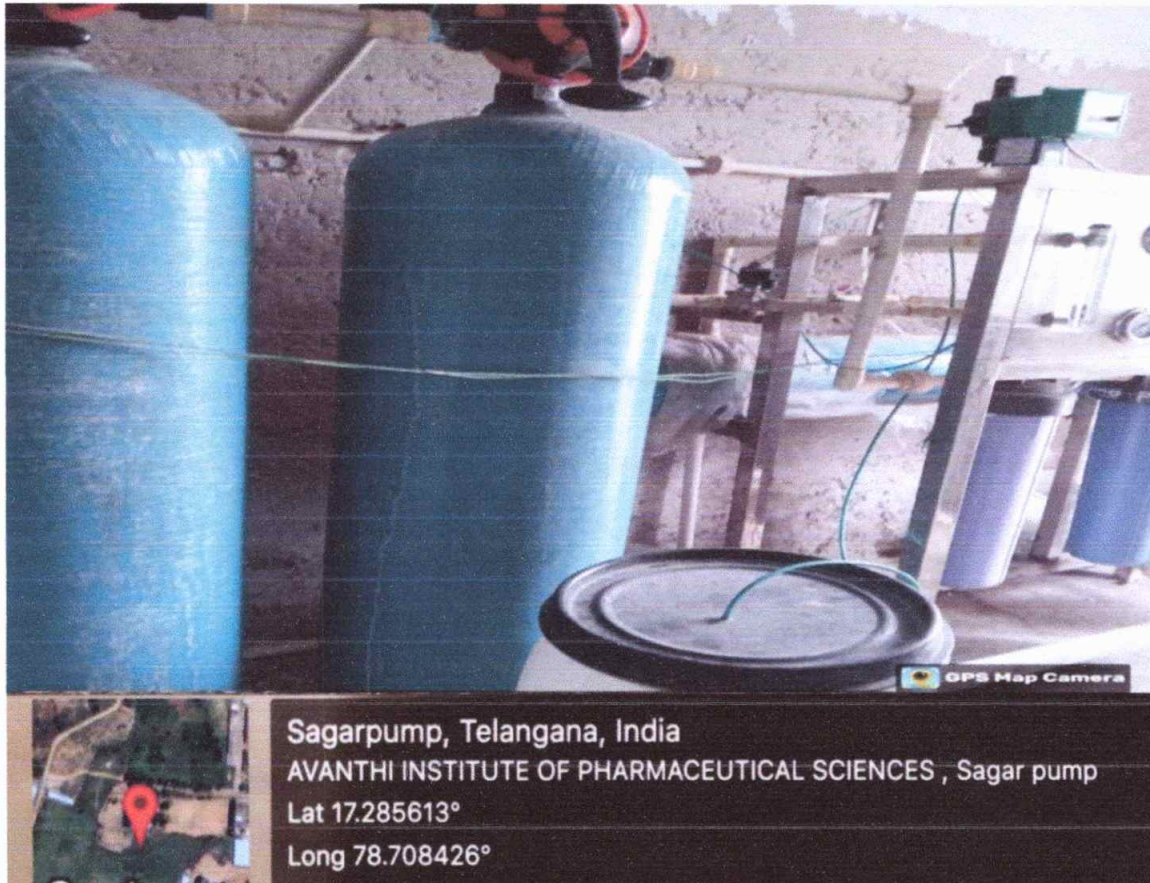


FIG: 7HP Motor capacity was installed near the Pharmacy block



AIPS has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are One RO plants, with capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.



Overall, compared to the AY 2021-2022, this audit year has shown a saving of 6 KLD and consequently, the per capita consumption has come down to 9.6 lpd.

AIPS has One RO water plants, and it produce 3 liters of wastewater for every 1 liter of treated water. On working days, approximately 10 KLD (Kilo Liters per Day) of water is rejected by RO plant. The rejected water is used for gardens and green areas.

The Pre-monsoon water quality of the two bore wells being used by AIPS was analysed for drinking water quality standard IS 10500. The results are presented in Table (7). The results indicate that the water quality was almost the same in the two sources and also there was no significant change from the water quality of the previous AY 2021-2022. The water quality complies with the IS 10500 standard, with the only exception being TDS (Total Dissolved Solids), which is slightly higher than the permissible levels.



Table 8. Pre-monsoon Water Quality of the Groundwaters of AIPS – 2022.

S.No	Parameter*	BW-1	BW-2	IS 10500
1	pH	7.2	7	6.5-8.5
2	EC	243.8	247.8	500
3	TDS	412	412	500
4	TH	212	215	300
5	Ca	62	60	75
6	Mg	22	21.4	30
7	Na	11	14	200
8	k	8	7	10
9	Fe	0.05	0.05	0.3
10	Cl	100	100	250
11	PO ₄	1	0.8	10
12	NO ₂	0.03	0.03	1
13	F	0.4	0.4	1.2
14	TA	122.5	128.8	200
15	CO ₂	36.1	30.2	---
16	HCO ₃	229	227	---
17	DO	3	2.9	4.8

* = All parameters are in mg/l, with the exception of pH



3.4. Energy Management:

With the aim to become a model institution for energy efficiency and conservation, AIPS has initiated its energy management and the institution conducting exclusive energy audits to assess its energy management practices and efficiency. The findings of these audits, conducted by an accredited consultant, are documented in the energy audit reports. This report provides an overview of the institution's energy utilization and management within the context of the environment, highlighting its significance as a crucial aspect of the overall environmental management in relation to carbon emissions. AIPS meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power
4. LPG

Compared to the remaining three sources, the use of LPG was very insignificant. The use of solar power had a history of Five years.

5.4a. HT Power Consumption:

During the audit year, the Institute consumed a total of 230 KVAh of electricity from the metered connection, with a monthly average of 20.9 KVAh. Monthly variations in consumption were significant, ranging from a low of 16 KVAh in March 2021 to a high of 20 KVAh in September 2022. The annual Mean Power Factor was 0.99. Therefore, the annual consumption is equal to 215.4 KW.

Compared to the previous year, the consumption is very high during the AY 2021-2022 and exceeded by 38% from the previous year. However, the previous year was partly affected by the COVID closures and virtual mode. AIPS's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Computers, labs, and Machinery. During the audit year, the use by Air-conditioning sector was the maximum, accounting for 50% of the total load, followed by Computers and Machinery sector accounting for nearly 25% of the total load.

5.4b. Power generated from Solar Systems:

The Institute has installed rooftop power generation systems, with a capacity of 120 KWp, During the audit year, a total of 118211 Units was generated, which is equivalent to 54.96% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.



FIG: 6 Installed solar panels that consist the capacity of 60 KW Each

5.4c. Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 62.5 KVA. During the audit year, the generator consuming around 600 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.1/KWh.

Overall, the total electricity consumption from all three sources, including the DG sets, was 215097 KVAh.



FIG: 7 DG-SET 62.5KV



5.4d. Energy for Transportation:

AIPS being an institution with no residential facility and all the members are dependent on transportation. Thus, Transportation is a major sector demanding high energy consumption.

With its 09 buses fleet, AIPS provides transport facility for 35% of its members. The average trip length for the buses was at 72 km /day, and provides the facility for 450 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 69,350 liters. This translates to a per capita consumption of 33.24 liters per annum. The per capita consumption of this AY is 12 liters less than that of the previous year's and is a significant saving. Around 79% of the AIPS community members utilize the other modes. This includes 60.57% using public transportation, 8.89% using auto-rickshaws, 9.04% using their own two-wheelers, and 0.5% use four-wheelers.

5.4e. LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 60 non-domestic cylinders (60 X 19 kg) and Four domestic cylinders (6 X 14.8 kg). Thus, the estimate was 822.2 Kg. There was no change in the consumption from the previous year.

5.4f. Abstract of Energy Use:

AIPS's total energy use from different sources and for several purposes during the AY 2021-2022 is presented below:

➤HT Power from Grid	: 96886 Units
➤HSD Used	: 69,950 Litres (Buses + HSDG)
➤LPG	: 822.2 Kg
➤Solar Power Generated	: 118211 Units



Compared to AY 2021-2022, this AY had high consumption and this is mainly because of the institution was functioning virtually due to pandemic conditions and therefore a great amount of electricity and transportation were not reflected.

Renewable energy generation (Solar Power) was the same during the previous and current years. 5.4g. Energy Use & Carbon Footprint: While meeting its energy needs, AIPS could generate nearly 54.96% of its energy needs from renewable source of solar power. However, transportation has become a major contributor to the consumption of HSD and thereby to the pollution loads. The carbon emissions from the energy management during the audit year are presented in Table 7 below, which reveals that the net Carbon emissions from the AIPS stands at 246.7 t CO₂ e/annum.

Table 8. CO₂ Emissions from AIPS during the AY 2021 – 2022.

S.No	Emission Source	Annual Consumption	CO ₂ emission Factor (kg/Unit)	Total CO ₂ emissions (kg)	Total emissions (t CO ₂ e/ann)
1	Grid Electricity	96886 KVAh	0.94	52760.32	53
2	Diesel Oil	69,950litres	2.68	108142.36	109
3	LPG	822.2 Kg	2.252	108143.36	0
TOTAL Carbon emissions					162
Emission Offset through Solar Power					52
NET Carbon emissions					110

Compared to the previous year, Net emissions during the AY 2021-2022 have increased by 14.4 t CO₂ e. However, if the per capita CO₂ emissions are considered, the current year had 0.089 t CO₂ e/head/annum compared to 0.095 t CO₂ e of AY 2021-2022.



3.5.Solid Wastes Management:

Solid Waste Management is one area where AIPS is striving to develop suitable models. After initiating Green Audits, the AIPS community, particularly students and researchers are focussing on effective segregation and quantification of different wastes. For the purpose of waste management, all the solid waste is classified as per the standard norms. At the first instance, Two Categories are recognized: (1) Wet waste; and (2) Dry Waste. The first category is usually generated from Canteen, Dining Halls, Waiting Rooms, and other areas of gathering places. At identified places, wet waste collection bins were provided.

On the other hand, the second category, Dry Waste was further classified into Five types: (1) Paper & Board; (2) Plastic; (3) Glass & Metallic; (4) E-Waste; and (5) Sanitary Waste. The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E-Waste. The estimates of different wastes and their disposal route are presented in Table (8) below:

Table 8. Solid Wastes generation and Disposal Routes followed by AIPS during AY 2021-2022.

S.No	Waste Type	Waste Type	Qty	Disposal
1	Wet Waste	DiningHalls, Messes& Canteen	3 kg/day	To Compost
2	Paper & Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	negligible	IC/Authorized Collectors
4	Plastic	All	0.12 kg/day	IC/Authorized Collectors

In terms of solid waste management, AIPS has implemented various initiatives through its Innovation Centre. Metallic, plastic, and e-wastes are examined by the members of the Innovation Club to explore opportunities for reuse, repair, recovery, or reduction, fostering innovation among the students. Overall, AIPS's waste management practices aim to minimize waste generation, promote recycling and composting, and encourage innovative approaches to waste reduction and reuse.



4. GREEN AUDIT: OBSERVATIONS & RECOMMENDATIONS

- All students need to be involved in enhancing and appreciating the campus biodiversity. This on one hand helps in the total inventory of the flora and fauna, and on the other enables the students to realize Biodiversity as the Natural Capital for the sustainable development
- Recommended to replace at least 20% of the electrical and electronic gadgets which are not certified for energy efficiency
- Improvement in the Carbon stock in the Greens is commendable
- The scope for enhancing Solar Power generation is to be explored;
- The Institute's website should have a separate link for Green and Environment activities and need to be monitored and updated by the EMC.



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Gunthapally (V), Abdullapurmet(M), RR Dist, Hyderabad -501512.)

2020-2021

Green, Environment and Energy Audit

On 08 JULY 2021



Prepared By:

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GREEN & ENVIRONMENT AUDIT REPORT

2020 – 2021



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

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Dr. A.Nageswara Rao, Dept of Zoology.

AS EXTERNAL AUDITORS

&

Chairman	Dr. K. Balaji, Principal, AIPS
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Pharmaceutical Sciences
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics
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As In house Team

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LIST OF ABBREVIATIONS USED

AIPS	: Avanthi Institute of Pharmaceutical Sciences
AICTE	: All India Council for Technical Education
TSSRTC	: Telangana State Road Transport Corporation
B. Pharm	: Bachelor of Pharmacy
Pharm-D	: Doctor of Pharmacy
BS & H	: Basic Sciences and Humanities
PW P	: Plastic Waste
C	: Carbon
Ca	: Calcium
CAD	: Computer Aided design
CAM	: Computer Aided Manufacturing
CO ₃	: Carbonates
DO	: Dissolved Oxygen
E waste	: Electrical & Electronic Waste
EC	: Electrical Conductivity
EKL	: Enviro Kamka3r LLP
Fig.	: Figure
Fe	: Ferrous ion
GHRDC	: Global Human Resource Development Centre
ha	: Hectare
HCO ₃	: Bicarbonates
Hp	: Horse Power
HSD	: High Speed Diesel
HW	: Hazardous Waste
ISO	: International Standards Organization
JNTUH	: Jawaharlal Nehru Technological University Hyderabad
K	: Potassium
kg	: Kilo Grams
KL	: Kilo litres
KLD	: Kilo litres Day
km	: Kilo Meters
Kvah	: Kilo volts amps per hour
KW	: Kilo Watts
LPG	: Liquefied Petroleum Gas
lph	: Litres per hour
M Tech	: Master of Technology
Mg	: Magnesium
MSW	: Municipal Solid Waste
Na	: Sodium
NAAC	: National Assessment and Accreditation Council
NBA	: National Board of Accreditation
NCC	: National Cadet Corps

NBA	: National Board of Accreditation
NCC	: National Cadet Corps
NSS	: National Service Scheme
pH	: Potential of Hydrogen
PW	: Plastic Waste
RO	: Reverse Osmosis water plant
SO Carbon	: Soil Organic Carbon
sq m	: Square meter
TA	: Total Alkalinity
TDS	: Total dissolved solids
TH	: Total Hardness
UGC	: University Grants Commission



PREAMBLE

Avanthi Institute of Pharmaceutical Science (AIPS) is a pioneer institution in main streaming “Environment and Sustainable development: in all its academic, administrative and extension programs, and aligned these with national missions on the environment, and climate change and complies with AICTE, NAAC, and university policies. AIPS has initiated Green and Environmental Audits since the academic year 2020-2021, and with the inclusion of a third-party professional, **XXXXXXXXXX**, a start up company groomed by **IIM(B) & NSRCEL** and gained experience in the Green and Environment Audits. This report deals with “Green Audit” for the academic year (AY) 2020 – 2021 and is a third consecutive annual audit.

The past two audit years have witnessed several perturbations in the functional modes of all the educational institutions because of the impacts of the Covid pandemic and thereby, the audit processes and the findings provided limited implications. However, they helped in streamlining the management systems related to Environmental education, awareness, natural resources, and energy conservation aspects. AIPS has developed its own Environmental Policy in AY 2020-2021, based on which all green and environmental activities are being planned, implemented, reviewed, and verified. This AY 2020 – 2021 attempted to report the progress and conformity with the Environment Policy of AIPS.

With a focus on academic excellence and holistic development, the institute aims to equip its students with the necessary skills and knowledge to excel in their respective fields. Over the years, AIPS has garnered a reputation for its commitment to quality education and continues to play a significant role in shaping the future of Pharmacy professionals in the region and beyond.

1. ABOUT AIPS

Avanthi Institute of Pharmaceutical Science and (AIPS), an institution of the Avanthi Educational Society, established in 2007 is engaged in providing quality education and 1 contributing to the development of Pharmacy for over 16 years. The founder of the institutions, Sri M. SrinivasaRao, a philanthropist, has contributed to the development of these institutions with a vision to provide fair access to higher education to the students of the Telangana . The main campus of AIPS (Fig.1) is located at Gunthapally, a semi-urban area situated near Abdullapurmet, Ranga Reddy district. Telangana, and is equidistance to most places of the region.

AIPS offers various undergraduate and postgraduate AND Pharm-D programs in the field of Pharmacy and pharmaceutical science , and is affiliated with Jawaharlal Nehru Technological University, Hyderabad; approved by the All-India Council for Technical Education (AICTE),and approved (PCI) Pharmacy Conical Of Indian has been offering high-quality Pharmacy education. It also accredited by the NAAC. In the year 2018, it received a B++ grade and a score of 3.00 scale points out of 4 in its NAAC accreditation. AIPS also provides students with a holistic development experience through various activities such as Games & Sports, NCC, NSS, BIO ADHAYAAN and other technological pursuits. With a spacious and an equipped for both outdoor and indoor games, the college offers excellent facilities for sports and recreational events.



Fig.1: AIPS Campus Building

2.1. Campus Community:

AIPS Campus community can broadly be considered fewer than four categories: (a) Students and Research scholars; (b) Teaching Staff; (c) non-teaching staff; and (d) Associate 2 personnel. Of these four categories, Associates are such members who are associated with such activities like material suppliers; service providers, contractors, etc. More than 95% of the AIPS members are Day comers. Thus, during Sundays and holidays campus activities will be at their low, including the requirement of essential resources. The distribution of the different sectors of the community is illustrated in Fig. 1, which indicates that during this AY students accounted for 600 and their strength has increased from the previous year when it was 2007. In the case of the size of the other three sectors of the community, there was no change in their numbers from the previous year.

2. SCOPE OF GREEN AUDIT

The plans and activities of the AIPS being implemented to realize the goals and objectives of AIPS's Environment Policy shall be the broad scope of the Green Audit. The policy envisages that the AIPS campus be made a "Green Campus" making it comply with a Net Zero emission campus (Fig.2). Further, encourage the participation of all its members in environmental activities, more particularly in the conservation of natural resources, Energy, and minimization of waste. Towards this, the Environmental Management Cell of the AIPS, and the Green Auditor, M/S XXXXXXXX, have evolved documentation. Different methods including the documentation.



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by PCI, AICTE & Affiliated to JNTUH)

Gunthapally (V), Abdullopurmet (M), R.R. Dist., Near Ramoji Filmcity, Hyderabad - 501 512.



Implementation status of the GA recommendations of the previous year is included to enable a review of management systems for realizing the Environmental Policy's goals and objectives. Overall, the scope of the GA encompasses the management of natural resources, waste generation, and adherence to green building norms, carbon footprint assessment, and ensuring active participation of all members, including the management.



Clean & Green Programme



The Audit was carried out in three stages, each stage comprising of different activities as shown in Table. 2.

Table, 2. Stages and Activities of the Green Audit of AIPS for AY 2020 -2021

Pre Audit Stage	<ul style="list-style-type: none">•Appointment to external Audit Agency•Constitution of Audit team•Scoping of audit and finalization of methods•Initiating the Audit
Audit Stag	<ul style="list-style-type: none">•Units interactions•Documents Scrutinise•Collection and Validation of audit evidences.•Finalization of audit findings•Submission of Audit recommendations
Post Audit Stage	<ul style="list-style-type: none">•Recommendation wise discussion and planning for improving the managements and other practices. 56

The external auditors from **XXXXX** and the Internal Audit team have met several times and revisited the audit protocols, interaction schedules, documentation of collected audit evidence, and inspections of conformities and started 2nd Stage of the process. Validation of the audit evidence was carried out by the External auditor using the standard methods for validation. The audit findings of each unit were shared with the concerned unit before their finalization.

3. GREEN AUDIT

Implementation of the audit recommendations of the AY 2020 - 2021, was first reviewed and the observations reveal that "though the implementation was slow in pace, the progress made is significant in the sense that the overall objectives of the policy goals can be achieved. The implementation status of the audit recommendations of the AY 2020 – 2021 is presented in table (3) below:



3.METHODS ADOPTED

The Principal AIPS had constituted an Internal Audit team (Table 1) to assist the External auditor and the team was constituted on 2nd June 2021. All the Heads of the departments and other wings of the institute were informed for cooperating with the audit team and the process.

Table 1: Internal Green , Environment & Energy Audit Team for the AY 2020 – 2021.

Chairman	Dr. K. Balaji, Principal, AIPS	
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator	
Special Invitee	Dr.Ch.Kantlam Principal, Brilliant Institute of Pharmaceutical Sciences	
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics	
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics	
Invitee	Dr. Anwar Dept. of Health, Gunthapally.	
Student Members	1.D.Vamshi 21GN1T0027 2.CH.Akshay Kumar 21GN1T0019	



Table 3. Implementation Status of 2020-2021 Green Audit Recommendations:

R.No	Recommendation	Present Status.
1	AIPS's EMC should develop an implementation plan for realizing the Environmental policy goals and objectives;	Objective wise plans are under progress with sub-committees constituted.
2	AIPS has several high energy consumption electrical equipment and should have a time bound plan for their replacement with the energy efficient equipment or gadgets;	A sub-plan is being prepared and is a part of response to Recommendation 1
3	Although the resources consumptions appear to be high compared to the previous Audit Year, the present audit year the number of working days was almost twice to that of the previous year, as pandemic period was very short during this year. However, scope for further reduction in the consumption is high;	Strategies for reduction in resources consumption is being developed and is a part of response to Recommendation 1
4	The scope for enhancing Solar power generation is to be explored;	Noted and under consideration.
5	The scope for improving the biodiversity and carbon stocks in the vegetation also is high.	Is a part of response to Recommendation 1.
6	AIPS should incorporate its Environmental Policy and the Green activities in its web site.	Complied with.

Over all, the implementation was successful and of the eight recommendations, two were already complied with, while the remaining is in different stages of their completion. The status of the different Green components for the AY 2020 – 2021 are as follows:



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

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Gunthapally (V), Abdullapurmet (M), R.R. Dist., Near Ramoji Filmcity, Hyderabad - 501 512.



3.1.Land Use and Land Utilization:

AIPS Campus at Gunthapally Village, near Abdullapurmet, has a spread of 2.12 ha of semi-urban land surrounded by rural green cover of (Fig.1). In this area, there was no change in the Land Use and Land utilization from the status of AY 2020-2021.

However, the constructed area has been improvised for better utilization by the addition of several indoor plants. A significant portion within the constructed area was allocated for different blocks which are discrete in distribution

Table 4. Distribution of Land use types in AIPS as on August 2021.

LAND USE	Area (sq m)
Constructed Area	4660 sqm
Pavements & Paths	1850 sqm
Play Grounds	4050 sqm
Under Greens	1086 sqm
TOTAL LAND AREA	2 ACRES



Satellite Image showing AIPS Boundary and Greenery of the area.



About 2% of the constructed area, and around 13-15% of the land has been allocated for major departments like B. Pharmacy, M Pharmacy Pharm-d and for laboratories (Fig. 4). These labs provide students with hands-on learning experiences and equip them with practical skills in their respective fields

The Pharmacy building occupies 15% of the land, providing a dedicated space for academic and research activities related to M.pharmacy of all branches. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

3.2. Vegetation & Biodiversity:

The AIPS campus has a spread of 4.15 ha of land, of this the green areas account for nearly 58.5% and supports over 50 different species of higher plants. Amongst these, the campus had 363 matured trees, while another 170 trees were in developing stages.

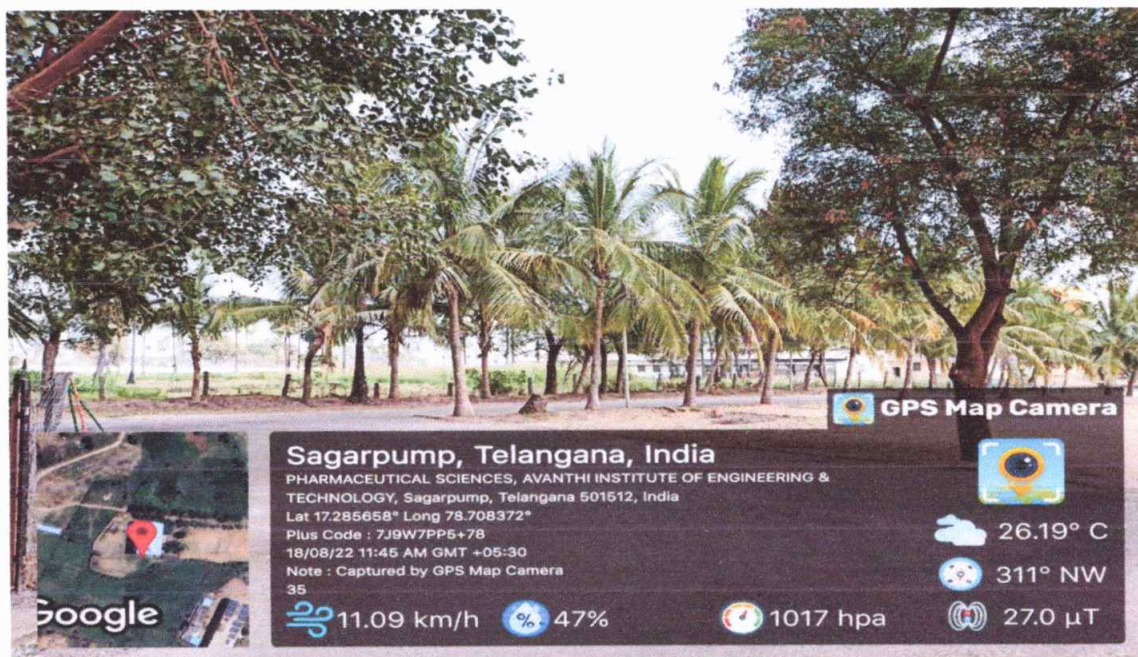


FIG: Different varieties of trees and plants



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FIG: 3 Different varieties of trees and plants



A. FLORA & PLANT DIVERSITY:

The flora of the campus comprises 40 species belonging to 36 genera and 20 families. Of these 19 were tree species and 30 were herb species, while shrubs were recorded with only two species. Among herbs and shrub species, exotic ornamental species were not taken into account. The list of plant species recorded is presented in Table (5).

Table 5: Flora species of AIPS during 2020-2021

No	Family	Species	Habit	Common/Telugu Name
1	Acanthaceae	Peristrophepaniculata(Forsk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthesaspera L.	H	Uttareni
3	Amaranthaceae	AlternantheraparonychioidesSt.	H	Ponnaganti
4	Amaranthaceae	Alternantherasessilis	H	Ponnaganti
5	Amaranthaceae	Amaranthusviridis L.	H	Chilacathotakura
6	Asteraceae	Ageratum conyzoides L.	H	PokaBanthi
7	Euphorbiaceae	Euphorbia hirtaL.	H	Nanubalu
8	Fabaceae	Cassia obtusifoliaL.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosiapurpurea (L.) Pers	H	Vempali
11	Malvaceae	SidaacutaBurmF.	H	
12	Piperaceae	Piper Betle	H	
13	Malvaceae	Sidacordifolia L.	H	
14	Nyctaginaceae	BoerhaviaeAIEtTaL.	H	Punarnava
15	Fabaceae	Acacia Aneura	T	Mulaga
16	Fabaceae	Acacia catechu (L.f.) Willd	S	

17	Fabaceae	Hibiscus rosa-sinensis L	S	Mandara
18	Anacardiaceae	Mangifera indica	T	Mango
19	Aaceae	Borassus flabellifer	T	Thati
20	Aaceae	Cocos nucifera	T	Coconut
21	Aaceae	Wodyetia bifurcata	T	Foxtail palm
22	Combretaceae	Conocarpus setus	T	Conocarpus
23	Combretaceae	Terminalia catappa	T	Badam
24	Fabaceae	Acacia leucophloea (Roxb.) Willd.	T	Tellathumma
25	Fabaceae	Caesalpinia pulcherrima	T	Gulmohor
26	Fabaceae	Tamarindus indica	T	Chintha
27	Lamiaceae	Tectona grandis	T	Teak
28	Meliaceae	Azadirachta indica	T	Neem
29	Moraceae	Ficus benghalensis	T	Marri
30	Myrtaceae	Syzygium cumini	T	Neeredu
31	Rubiaceae	Neolamarckia cadamba	T	Kadambari
32	Moraceae	Artocarpus heterophyllus	T	Panasa/Jackfruit
33	Fabaceae	Saraca asoca	T	Ashoka trees
34	Moraceae	Ficus religiosa	T	Raavi
35	Sapotaceae	Sapodilla	T	Sapota
36	Poaceae	Cynodon dactylon	H	Gariki
37	Poaceae	Aeluropus lagopoides	H	Gaddi
38	Malvaceae	Sida acuta	H	

H = Herb

S = Shrub

T – Tree

There were eight fruit bearing species and the overall Maximum Possible Diversity of the campus was at 3.664 bits as per the Shannon-Weiner Index. The Actual Species Diversity of tree species was at 2.609 bits with a Species Evenness of 0.903, indicating good distribution.



B. TREES ENUMERATION & BIOMASS:

There was no significant change in the population of the matured trees in the AIPS campus as compared to the state in the previous AY 2020-2021. However, due to the Tree plantation activities during the year, the number of trees in the developing stages were recorded at 160, and within three years most of them will be contributing to the tree cover. Presently, 363 matured trees are existing in the campus. For the purpose of Trees biomass, only the matured trees were taken into consideration. Based on the girth and height of the trees enumerated, by using the standard ecological methods, the biomass of the trees for the 18 species was estimated and the total Tree Biomass was at 31.04 tons in the AY 2020-2021 (Table 6). This is 4.69 tons greater than the record of the previous audit year.



FIG: 4 Tree plantation activities during the year

C. CARBON STOCKS:

The Carbon stocks in the trees of AIPS campus were estimated using standard stock assessment methods. The general default value of 46% of the Dry weight recommended for tropical trees was adopted and thus the C stocks from the trees arrived at 14.898 tons. Added to this, another 47 tons of C was present in the soils. Thus, the total C stock in the AIPS Campus was estimated at 62 tons.



Table 6. Tree Enumeration and Biomass Stock at AIPS Campus during AY 2020-2021.

S No	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangifera indica L.	40.5	7	18	1.491
2	Borassus flabellifer L.	40	9	44	4.572
3	Cocos nucifera L.	31	8	19	1.054
4	Wodyetia bifurcata A.K. Irvine)	38.2	6	62	3.876
5	Conocarpus Erectus L	27	7	23	0.847
6	Terminalia catappa L.	43	9	16	1.921
7	Acacia leucophloea (Roxb.) Willd.	28.1	6	3	0.102
8	Caesalpinia pulcherrima (L.) SW.	36	6	29	1.627
9	Tamarindus indica L.	40	6	22	1.524
10	Tectona grandis L. F	30.5	11	11	0.812
11	Azadirachta indica A. Juss	27	9	13	0.616
12	Ficus religiosa L.	39	7	1	0.077
13	Syzygium cumini L. Skeels	59.1	6	12	1.809
14	Neolamarckia cadamba (Roxb.) Bosser	53	8	7	1.135
15	Artocarpus heterophyllus	37.5	6	4	0.244
16	Acacia aneura	30.5	6	29	1.168
17	Saraca asoca	22	7	40	0.978
18	Sapodilla	22.2	6	10	0.213
TOTAL					25.067



D. FAUNA:

The fauna records were almost the same as in the year 2020-2021, and therefore the same was reported for this year also. The campus vegetation at AIPS serves as a habitat for various animal species, providing a home for diverse wildlife. During a single day's inventory, over 24 species were observed, as listed in Table 7. The most common bird species found on campus is the Common Myna, while the presence of numerous butterfly species adds to the enchantment. In addition to these natural inhabitants, the campus supports a range of other fauna.

Table 7. List of major faunal species recorded in AIPS Campus

S.No	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Ranaspp	Frog
REPTILES			
1	Tree Gecko	Hemidactylussp	Lizard
2	Wall lizard	Hemidactylusprashadi	Lizard
3	Garden Lizard	Calotesversicolor	Lizard
4	Snakes	Serpentes	Snakes
BIRDS			
1	Red-vented bulbul	Pycnonotuscafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotherestrictis	Diurnal Birds
4	Crow	Corvuscorvidae	Diurnal Birds
5	Common Cuckoo	Cuculuccanorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittaculakrameria	Diurnal Birds
8	Black Drongo	Dicrurusmarcocerucus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds

10	Eagle	Accipitridae	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattusrattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danauschrysiippus	Insects
2	The Gram Blue	Euchryopscejeus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumalalimniace	Moth
7	Honey bee	Apis	Insects
8.	Dragon flies	Suborder Anisoptera	Insects



Some Birds and insects in Campus



3.3. Water Resources Management:

The total water consumption of the AIPS can be classified into THREE use categories:

1. Academic and administration
2. Transportation and Other Utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are four bore wells existing in the campus, each connected to a separate overhead tank located at various academic and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 17 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 10 KLD of water, of which 7 KLD is sourced from RO reject waters. Overall, AIPS utilizes 24 KLD of groundwater on all working days.

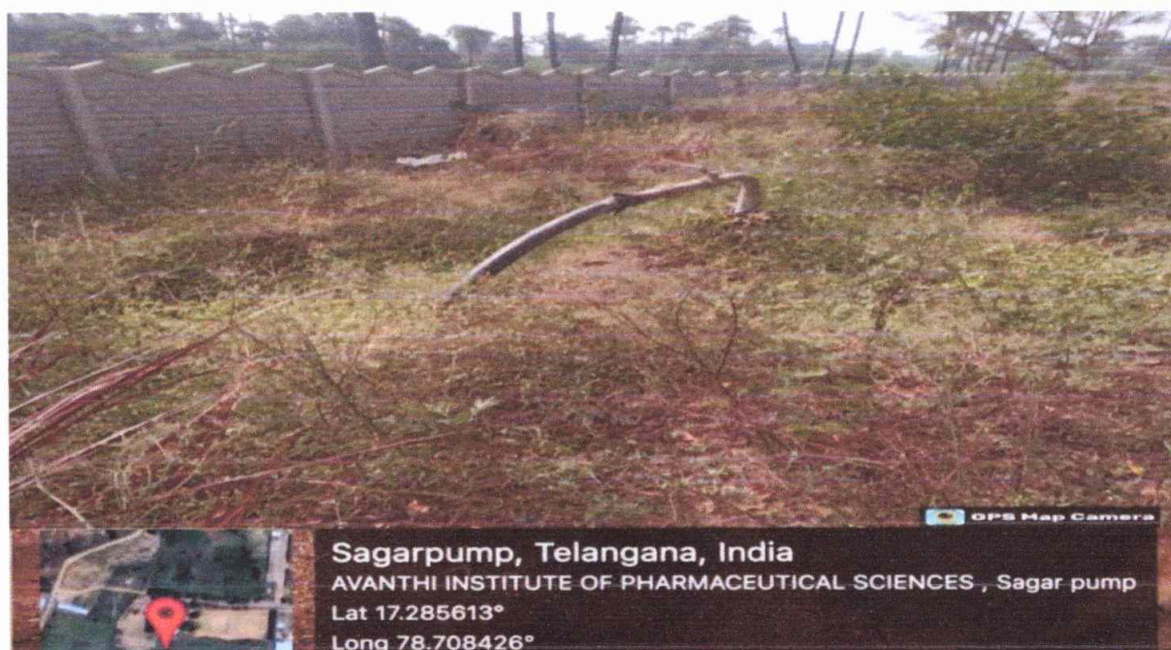


FIG: 7HP Motor capacity was installed near the Pharmacy block



AIPS has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are One RO plants, with capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.



Overall, compared to the AY 2020-2021, this audit year has shown a saving of 6 KLD and consequently, the per capita consumption has come down to 9.6 lpd.

AIPS has One RO water plants, and it produce 3 liters of wastewater for every 1 liter of treated water. On working days, approximately 10 KLD (Kilo Liters per Day) of water is rejected by RO plant. The rejected water is used for gardens and green areas.

The Pre-monsoon water quality of the two bore wells being used by AIPS was analysed for drinking water quality standard IS 10500. The results are presented in Table (7). The results indicate that the water quality was almost the same in the two sources and also there was no significant change from the water quality of the previous AY 2020-2021. The water quality complies with the IS 10500 standard, with the only exception being TDS (Total Dissolved Solids), which is slightly higher than the permissible levels.



Table 8. Pre-monsoon Water Quality of the Groundwaters of AIPS – 2021.

S.No	Parameter*	BW-1	BW-2	IS 10500
1	pH	7.2	7	6.5-8.5
2	EC	243.8	247.8	500
3	TDS	412	412	500
4	TH	212	215	300
5	Ca	62	60	75
6	Mg	22	21.4	30
7	Na	11	14	200
8	k	8	7	10
9	Fe	0.05	0.05	0.3
10	Cl	100	100	250
11	PO ₄	1	0.8	10
12	NO ₂	0.03	0.03	1
13	F	0.4	0.4	1.2
14	TA	122.5	128.8	200
15	CO ₂	36.1	30.2	---
16	HCO ₃	229	227	---
17	DO	3	2.9	4.8

* = All parameters are in mg/l, with the exception of pH



3.4. Energy Management:

With the aim to become a model institution for energy efficiency and conservation, AIPS has initiated its energy management and the institution conducting exclusive energy audits to assess its energy management practices and efficiency. The findings of these audits, conducted by an accredited consultant, are documented in the energy audit reports. This report provides an overview of the institution's energy utilization and management within the context of the environment, highlighting its significance as a crucial aspect of the overall environmental management in relation to carbon emissions. AIPS meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power
4. LPG

Compared to the remaining three sources, the use of LPG was very insignificant. The use of solar power had a history of Five years.

5.4a. HT Power Consumption:

During the audit year, the Institute consumed a total of 230 KVAh of electricity from the metered connection, with a monthly average of 20.9 KVAh. Monthly variations in consumption were significant, ranging from a low of 16 KVAh in March 2020 to a high of 20 KVAh in September 2021. The annual Mean Power Factor was 0.99. Therefore, the annual consumption is equal to 215.4 KW.

Compared to the previous year, the consumption is very high during the AY 2020-2021 and exceeded by 38% from the previous year. However, the previous year was partly affected by the COVID closures and virtual mode. AIPS's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Computers, labs, and Machinery. During the audit year, the use by Air-conditioning sector was the maximum, accounting for 50% of the total load, followed by Computers and Machinery sector accounting for nearly 25% of the total load.

5.4b. Power generated from Solar Systems:

The Institute has installed rooftop power generation systems, with a capacity of 120 KWp, During the audit year, a total of 118211 Units was generated, which is equivalent to 54.96% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.



FIG: 6 Installed solar panels that consist the capacity of 60 KW Each

5.4c. Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 62.5 KVA. During the audit year, the generator consuming around 600 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.1/KWh.

Overall, the total electricity consumption from all three sources, including the DG sets, was 215097 KVAh.



FIG: 7 DG-SET 62.5KV



5.4d. Energy for Transportation:

AIPS being an institution with no residential facility and all the members are dependent on transportation. Thus, Transportation is a major sector demanding high energy consumption.

With its 09 buses fleet, AIPS provides transport facility for 35% of its members. The average trip length for the buses was at 72 km /day, and provides the facility for 450 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 69,350 liters. This translates to a per capita consumption of 33.24 liters per annum. The per capita consumption of this AY is 12 liters less than that of the previous year's and is a significant saving. Around 79% of the AIPS community members utilize the other modes. This includes 60.57% using public transportation, 8.89% using auto-rickshaws, 9.04% using their own two-wheelers, and 0.5% use four-wheelers.

5.4e. LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 60 non-domestic cylinders (60 X 19 kg) and Four domestic cylinders (6 X 14.8 kg). Thus, the estimate was 822.2 Kg. There was no change in the consumption from the previous year.

5.4f. Abstract of Energy Use:

AIPS's total energy use from different sources and for several purposes during the AY 2020-2021 is presented below:

➤HT Power from Grid	: 96886 Units
➤HSD Used	: 69,950 Litres (Buses + HSDG)
➤LPG	: 822.2 Kg
➤Solar Power Generated	: 118211 Units



Compared to AY 2020-2021, this AY had high consumption and this is mainly because of the institution was functioning virtually due to pandemic conditions and therefore a great amount of electricity and transportation were not reflected.

Renewable energy generation (Solar Power) was the same during the previous and current years. 5.4g. Energy Use & Carbon Footprint: While meeting its energy needs, AIPS could generate nearly 54.96% of its energy needs from renewable source of solar power. However, transportation has become a major contributor to the consumption of HSD and thereby to the pollution loads. The carbon emissions from the energy management during the audit year are presented in Table 7 below, which reveals that the net Carbon emissions from the AIPS stands at 246.7 t CO₂ e/annum.

Table 8. CO₂ Emissions from AIPS during the AY 2021 – 2021.

S.No	Emission Source	Annual Consumption	CO ₂ emission Factor (kg/Unit)	Total CO ₂ emissions (kg)	Total emissions (t CO ₂ e/ann)
1	Grid Electricity	96886 KVAh	0.94	52760.32	53
2	Diesel Oil	69,950litres	2.68	108142.36	109
3	LPG	822.2 Kg	2.252	108143.36	0
TOTAL Carbon emissions					162
Emission Offset through Solar Power					52
NET Carbon emissions					110

Compared to the previous year, Net emissions during the AY 2020-2021 have increased by 14.4 t CO₂ e. However, if the per capita CO₂ emissions are considered, the current year had 0.089 t CO₂ e/head/annum compared to 0.095 t CO₂ e of AY 2020-2021.



3.5. Solid Wastes Management:

Solid Waste Management is one area where AIPS is striving to develop suitable models. After initiating Green Audits, the AIPS community, particularly students and researchers are focussing on effective segregation and quantification of different wastes. For the purpose of waste management, all the solid waste is classified as per the standard norms. At the first instance, Two Categories are recognized: (1) Wet waste; and (2) Dry Waste. The first category is usually generated from Canteen, Dining Halls, Waiting Rooms, and other areas of gathering places. At identified places, wet waste collection bins were provided.

On the other hand, the second category, Dry Waste was further classified into Five types: (1) Paper & Board; (2) Plastic; (3) Glass & Metallic; (4) E-Waste; and (5) Sanitary Waste. The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E-Waste. The estimates of different wastes and their disposal route are presented in Table (8) below:

Table 8. Solid Wastes generation and Disposal Routes followed by AIPS during AY 2020-2021.

S.No	Waste Type	Waste Type	Qty	Disposal
1	Wet Waste	DiningHalls, Messes& Cantcen	3 kg/day	To Compost
2	Paper & Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	negligible	IC/Authorized Collectors
4	Plastic	All	0.12 kg/day	IC/Authorized Collectors

In terms of solid waste management, AIPS has implemented various initiatives through its Innovation Centre. Metallic, plastic, and e-wastes are examined by the members of the Innovation Club to explore opportunities for reuse, repair, recovery, or reduction, fostering innovation among the students. Overall, AIPS's waste management practices aim to minimize waste generation, promote recycling and composting, and encourage innovative approaches to waste reduction and reuse.



4. GREEN AUDIT: OBSERVATIONS & RECOMMENDATIONS

- All students need to be involved in enhancing and appreciating the campus biodiversity. This on one hand helps in the total inventory of the flora and fauna, and on the other enables the students to realize Biodiversity as the Natural Capital for the sustainable development
- Recommended to replace at least 20% of the electrical and electronic gadgets which are not certified for energy efficiency
- Improvement in the Carbon stock in the Greens is commendable
- The scope for enhancing Solar Power generation is to be explored;
- The Institute's website should have a separate link for Green and Environment activities and need to be monitored and updated by the EMC.



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Gunthapally (V), Abdullapurmet(M), RR Dist, Hyderabad -501512.)

2019-2020

Green, Environment and Energy Audit

On 10 JULY 2020



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GREEN & ENVIRONMENT AUDIT REPORT

2019 – 2020



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

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As In house Team

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LIST OF ABBREVIATIONS USED

AIPS	: Avanthi Institute of Pharmaceutical Sciences
AICTE	: All India Council for Technical Education
TSSRTC	: Telangana State Road Transport Corporation
B. Pharm	: Bachelor of Pharmacy
Pharm-D	: Doctor of Pharmacy
BS & H	: Basic Sciences and Humanities
PW P	: Plastic Waste
C	: Carbon
Ca	: Calcium
CAD	: Computer Aided design
CAM	: Computer Aided Manufacturing
CO ₃	: Carbonates
DO	: Dissolved Oxygen
E waste	: Electrical & Electronic Waste
EC	: Electrical Conductivity
EKL	: Enviro Kamka3r LLP
Fig.	: Figure
Fe	: Ferrous ion
GHRDC	: Global Human Resource Development Centre
ha	: Hectare
HCO ₃	: Bicarbonates
Hp	: Horse Power
HSD	: High Speed Diesel
HW	: Hazardous Waste
ISO	: International Standards Organization
JNTUH	: Jawaharlal Nehru Technological University Hyderabad
K	: Potassium
kg	: Kilo Grams
KL	: Kilo litres
KLD	: Kilo litres Day
km	: Kilo Meters
Kvah	: Kilo volts amps per hour
KW	: Kilo Watts
LPG	: Liquefied Petroleum Gas
lph	: Litres per hour
M Tech	: Master of Technology
Mg	: Magnesium
MSW	: Municipal Solid Waste
Na	: Sodium
NAAC	: National Assessment and Accreditation Council
NBA	: National Board of Accreditation
NCC	: National Cadet Corps

NBA	: National Board of Accreditation
NCC	: National Cadet Corps
NSS	: National Service Scheme
pH	: Potential of Hydrogen
PW	: Plastic Waste
RO	: Reverse Osmosis water plant
SO Carbon	: Soil Organic Carbon
sq m	: Square meter
TA	: Total Alkalinity
TDS	: Total dissolved solids
TH	: Total Hardness
UGC	: University Grants Commission



PREAMBLE

Avanthi Institute of Pharmaceutical Science (AIPS) is a pioneer institution in main streaming “Environment and Sustainable development: in all its academic, administrative and extension programs, and aligned these with national missions on the environment, and climate change and complies with AICTE, NAAC, and university policies. AIPS has initiated Green and Environmental Audits since the academic year 2019-2020, and with the inclusion of a third-party professional, XXXXXXXXXX, a start up company groomed by IIM(B) & NSRCEL and gained experience in the Green and Environment Audits. This report deals with “Green Audit” for the academic year (AY) 2019 – 2020 and is a third consecutive annual audit.

The past two audit years have witnessed several perturbations in the functional modes of all the educational institutions because of the impacts of the Covid pandemic and thereby, the audit processes and the findings provided limited implications. However, they helped in streamlining the management systems related to Environmental education, awareness, natural resources, and energy conservation aspects. AIPS has developed its own Environmental Policy in AY 2019-2020, based on which all green and environmental activities are being planned, implemented, reviewed, and verified. This AY 2019 – 2020 attempted to report the progress and conformity with the Environment Policy of AIPS.

With a focus on academic excellence and holistic development, the institute aims to equip its students with the necessary skills and knowledge to excel in their respective fields. Over the years, AIPS has garnered a reputation for its commitment to quality education and continues to play a significant role in shaping the future of Pharmacy professionals in the region and beyond.

1. ABOUT AIPS

Avanthi Institute of Pharmaceutical Science and (AIPS), an institution of the Avanthi Educational Society, established in 2007 is engaged in providing quality education and 1 contributing to the development of Pharmacy for over 16 years. The founder of the institutions, Sri M. SrinivasaRao, a philanthropist, has contributed to the development of these institutions with a vision to provide fair access to higher education to the students of the Telangana . The main campus of AIPS (Fig.1) is located at Gunthapally, a semi-urban area situated near Abdullapurmet, Ranga Reddy district. Telangana, and is equidistance to most places of the region.

AIPS offers various undergraduate and postgraduate AND Pharm-D programs in the field of Pharmacy and pharmaceutical science ,and is affiliated with Jawaharlal Nehru Technological University, Hyderabad; approved by the All-India Council for Technical Education (AICTE),and approved (PCI) Pharmacy Conical Of Indian has been offering high-quality Pharmacy education. It also accredited by the NAAC. In the year 2018, it received a B++ grade and a score of 3.00 scale points out of 4 in its NAAC accreditation. AIPS also provides students with a holistic development experience through various activities such as Games & Sports, NCC, NSS, BIO ADHAYAAN and other technological pursuits. With a spacious and an equipped for both outdoor and indoor games, the college offers excellent facilities for sports and recreational events.



Fig.1: AIPS Campus Building

2.1. Campus Community:

AIPS Campus community can broadly be considered fewer than four categories: (a) Students and Research scholars; (b) Teaching Staff; (c) non-teaching staff; and (d) Associate 2 personnel. Of these four categories, Associates are such members who are associated with such activities like material suppliers; service providers, contractors, etc. More than 95% of the AIPS members are Day comers. Thus, during Sundays and holidays campus activities will be at their low, including the requirement of essential resources. The distribution of the different sectors of the community is illustrated in Fig. 1, which indicates that during this AY students accounted for 600 and their strength has increased from the previous year when it was 2007. In the case of the size of the other three sectors of the community, there was no change in their numbers from the previous year.

2. SCOPE OF GREEN AUDIT

The plans and activities of the AIPS being implemented to realize the goals and objectives of AIPS's Environment Policy shall be the broad scope of the Green Audit. The policy envisages that the AIPS campus be made a "Green Campus" making it comply with a Net Zero emission campus (Fig.2). Further, encourage the participation of all its members in environmental activities, more particularly in the conservation of natural resources, Energy, and minimization of waste. Towards this, the Environmental Management Cell of the AIPS, and the Green Auditor, M/S XXXXXXXX, have evolved documentation. Different methods including the documentation.



Implementation status of the GA recommendations of the previous year is included to enable a review of management systems for realizing the Environmental Policy's goals and objectives. Overall, the scope of the GA encompasses the management of natural resources, waste generation, and adherence to green building norms, carbon footprint assessment, and ensuring active participation of all members, including the management



Clean & Green Programme



The Audit was carried out in three stages, each stage comprising of different activities as shown in Table. 2.

Table 2. Stages and Activities of the Green Audit of AIPS for AY 2019 -2020

Pre Audit Stage	<ul style="list-style-type: none">•Appointment to external Audit Agency•Constitution of Audit team•Scoping of audit and finalization of methods•Initiating the Audit
Audit Stag	<ul style="list-style-type: none">•Units interactions•Documents Scrutinise•Collection and Validation of audit evidences.•Finalization of audit findings•Submission of Audit recommendations
Post Audit Stage	<ul style="list-style-type: none">•Recommendation wise discussion and planning for improving the managements and other practices. 56

The external auditors from XXXXX and the Internal Audit team have met several times and revisited the audit protocols, interaction schedules, documentation of collected audit evidence, and inspections of conformities and started 2nd Stage of the process. Validation of the audit evidence was carried out by the External auditor using the standard methods for validation. The audit findings of each unit were shared with the concerned unit before their finalization.

3. GREEN AUDIT

Implementation of the audit recommendations of the AY 2019 - 2020, was first reviewed and the observations reveal that "though the implementation was slow in pace, the progress made is significant in the sense that the overall objectives of the policy goals can be achieved. The implementation status of the audit recommendations of the AY 2019 – 2020 is presented in table (3) below:



3.METHODS ADOPTED

The Principal AIPS had constituted an Internal Audit team (Table 1) to assist the External auditor and the team was constituted on 2nd June 2020. All the Heads of the departments and other wings of the institute were informed for cooperating with the audit team and the process.

Table 1: Internal Green , Environment & Energy Audit Team for the AY 2019 – 2020.

Chairman	Dr. K. Balaji, Principal, AIPS	
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator	
Special Invitee	Dr.Ch.Kantlam Principal, Brilliant Institute of Pharmaceutical Sciences	
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics	
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics	
Invitee	Dr. Anwar Dept. of Health, Gunthapally.	
Student Members	1.K. Akhila goud 15GN1T0016 2. Anish kumar das 15GN1T0019	



Table 3. Implementation Status of 2019-2020 Green Audit Recommendations:

R.No	Recommendation	Present Status.
1	AIPS's EMC should develop an implementation plan for realizing the Environmental policy goals and objectives;	Objective wise plans are under progress with sub-committees constituted.
2	AIPS has several high energy consumption electrical equipment and should have a time bound plan for their replacement with the energy efficient equipment or gadgets;	A sub-plan is being prepared and is a part of response to Recommendation 1
3	Although the resources consumptions appear to be high compared to the previous Audit Year, the present audit year the number of working days was almost twice to that of the previous year, as pandemic period was very short during this year. However, scope for further reduction in the consumption is high;	Strategies for reduction in resources consumption is being developed and is a part of response to Recommendation 1
4	The scope for enhancing Solar power generation is to be explored;	Noted and under consideration.
5	The scope for improving the biodiversity and carbon stocks in the vegetation also is high.	Is a part of response to Recommendation 1.
6	AIPS should incorporate its Environmental Policy and the Green activities in its web site.	Complied with.

Over all, the implementation was successful and of the eight recommendations, two were already complied with, while the remaining is in different stages of their completion. The status of the different Green components for the AY 2019 – 2020 are as follows:



3.1.Land Use and Land Utilization:

AIPS Campus at Gunthapally Village, near Abdullapurmet, has a spread of 2.12 ha of semi-urban land surrounded by rural green cover of (Fig.1). In this area, there was no change in the Land Use and Land utilization from the status of AY 2019-2020.

However, the constructed area has been improvised for better utilization by the addition of several indoor plants. A significant portion within the constructed area was allocated for different blocks which are discrete in distribution

Table 4. Distribution of Land use types in AIPS as on August 2020.

LAND USE	Area (sq m)
Constructed Area	4660 sqm
Pavements & Paths	1850 sqm
Play Grounds	4050 sqm
Under Greens	1086 sqm
TOTAL LAND AREA	2 ACRES



Satellite Image showing AIPS Boundary and Greenery of the area.



About 2% of the constructed area, and around 13-15% of the land has been allocated for major departments like B. Pharmacy, M Pharmacy Pharm-d and for laboratories (Fig. 4). These labs provide students with hands-on learning experiences and equip them with practical skills in their respective fields

The Pharmacy building occupies 15% of the land, providing a dedicated space for academic and research activities related to M.pharmacy of all branches. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

3.2. Vegetation & Biodiversity:

The AIPS campus has a spread of 4.15 ha of land, of this the green areas account for nearly 58.5% and supports over 50 different species of higher plants. Amongst these, the campus had 363 matured trees, while another 170 trees were in developing stages.

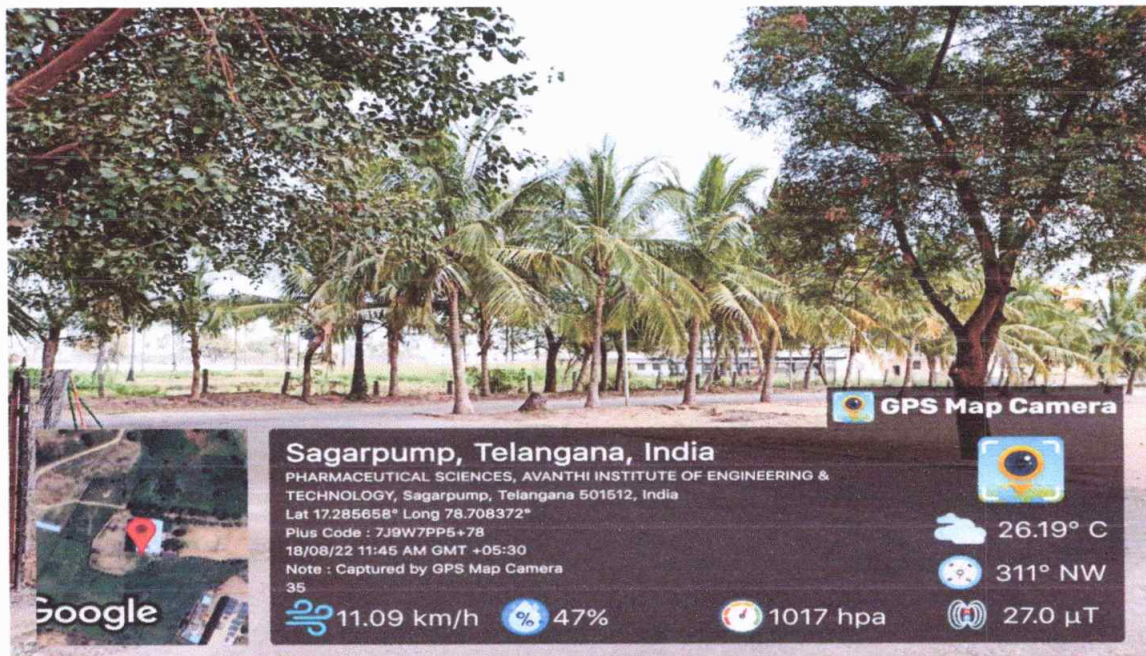


FIG: Different varieties of trees and plants



FIG: 3 Different varieties of trees and plants



A. FLORA & PLANT DIVERSITY:

The flora of the campus comprises 40 species belonging to 36 genera and 20 families. Of these 19 were tree species and 30 were herb species, while shrubs were recorded with only two species. Among herbs and shrub species, exotic ornamental species were not taken into account. The list of plant species recorded is presented in Table (5).

Table 5: Flora species of AIPS during 2019-2020

No	Family	Species	Habit	Common/Telugu Name
1	Acanthaceae	Peristrophepaniculata(Forssk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthesaspera L.	H	Uttareni
3	Amaranthaceae	AlternantheraparonychioidesSt.	H	Ponnaganti
4	Amaranthaceae	Alternantherasessilis	H	Ponnaganti
5	Amaranthaceae	Amaranthusviridis L.	H	Chilacathotakura
6	Asteraceae	Ageratum conyzoides L.	H	PokaBanthi
7	Euphorbiaceae	Euphorbia hirtaL.	H	Nanubalu
8	Fabaceae	Cassia obtusifoliaL.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosiapurpurea (L.) Pers	H	Vempali
11	Malvaceae	SidaacutaBurmF.	H	
12	Piperaceae	Piper Betle	H	
13	Malvaceae	Sidacordifolia L.	H	
14	Nyctaginaceae	BoerhaviaeAIETtaL.	H	Punarnava
15	Fabaceae	Acacia Aneura	T	Mulaga
16	Fabaceae	Acacia catechu (L.f.) Willd	S	

17	Fabaceae	Hibiscus rosa-sinensis L	S	Mandara
18	Anacardiaceae	Mangifera indica	T	Mango
19	Aceae	Borassus flabellifer	T	Thati
20	Aceae	Cocos nucifera	T	Coconut
21	Aceae	Wodyetia bifurcata	T	Foxtail palm
22	Combretaceae	Conocarpus setus	T	Conocarpus
23	Combretaceae	Terminalia catappa	T	Badam
24	Fabaceae	Acacia leucophloea (Roxb.) Willd.	T	Tellathumma
25	Fabaceae	Caesalpinia pulcherrima	T	Gulmohor
26	Fabaceae	Tamarindus indica	T	Chintha
27	Lamiaceae	Tectona grandis	T	Teak
28	Meliaceae	Azadirachta indica	T	Neem
29	Moraceae	Ficus benghalensis	T	Marri
30	Myrtaceae	Syzygium cumini	T	Neeredu
31	Rubiaceae	Neolamarckia cadamba	T	Kadambari
32	Moraceae	Artocarpus heterophyllus	T	Panasa/ Jackfruit
33	Fabaceae	Saraca asoca	T	Ashoka trees
34	Moraceae	Ficus religiosa	T	Raavi
35	Sapotaceae	Sapodilla	T	Sapota
36	Poaceae	Cynodon dactylon	H	Gariki
37	Poaceae	Aeluropus lagopoides	H	Gaddi
38	Malvaceae	Sida acuta	H	

H = Herb

S = Shrub

T – Tree

There were eight fruit bearing species and the overall Maximum Possible Diversity of the campus was at 3.664 bits as per the Shannon-Weiner Index. The Actual Species Diversity of tree species was at 2.609 bits with a Species Evenness of 0.903, indicating good distribution.



B. TREES ENUMERATION & BIOMASS:

There was no significant change in the population of the matured trees in the AIPS campus as compared to the state in the previous AY 2019-2020. However, due to the Tree plantation activities during the year, the number of trees in the developing stages were recorded at 160, and within three years most of them will be contributing to the tree cover. Presently, 363 matured trees are existing in the campus. For the purpose of Trees biomass, only the matured trees were taken into consideration. Based on the girth and height of the trees enumerated, by using the standard ecological methods, the biomass of the trees for the 18 species was estimated and the total Tree Biomass was at 31.04 tons in the AY 2019-2020 (Table 6). This is 4.69 tons greater than the record of the previous audit year.



FIG: 4 Tree plantation activities during the year

C. CARBON STOCKS:

The Carbon stocks in the trees of AIPS campus were estimated using standard stock assessment methods. The general default value of 46% of the Dry weight recommended for tropical trees was adopted and thus the C stocks from the trees arrived at 14.898 tons. Added to this, another 47 tons of C was present in the soils. Thus, the total C stock in the AIPS Campus was estimated at 62 tons.



Table 6. Tree Enumeration and Biomass Stock at AIPS Campus during AY 2019-2020.

S No	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangifera indica L.	40.5	7	18	1.491
2	Borassus flabellifer L.	40	9	44	4.572
3	Cocos nucifera L.	31	8	19	1.054
4	Wodyetia bifurcata A.K. Irvine)	38.2	6	62	3.876
5	Conocarpus Erectus L	27	7	23	0.847
6	Terminalia catappa L.	43	9	16	1.921
7	Acacia leucophloea (Roxb.) Willd.	28.1	6	3	0.102
8	Caesalpinia pulcherrima (L.) SW.	36	6	29	1.627
9	Tamarindus indica L.	40	6	22	1.524
10	Tectona grandis L. F	30.5	11	11	0.812
11	Azadirachta indica A. Juss	27	9	13	0.616
12	Ficus religiosa L.	39	7	1	0.077
13	Syzygium cumini L. Skeels	59.1	6	12	1.809
14	Neolamarckia cadamba (Roxb.) Bosser	53	8	7	1.135
15	Artocarpus heterophyllus	37.5	6	4	0.244
16	Acacia aneura	30.5	6	29	1.168
17	Saraca asoca	22	7	40	0.978
18	Sapodilla	22.2	6	10	0.213
TOTAL					25.067



D. FAUNA:

The fauna records were almost the same as in the year 2019-2020, and therefore the same was reported for this year also. The campus vegetation at AIPS serves as a habitat for various animal species, providing a home for diverse wildlife. During a single day's inventory, over 24 species were observed, as listed in Table 7. The most common bird species found on campus is the Common Myna, while the presence of numerous butterfly species adds to the enchantment. In addition to these natural inhabitants, the campus supports a range of other fauna.

Table 7. List of major faunal species recorded in AIPS Campus

S.No	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Ranaspp	Frog
REPTILES			
1	Tree Gecko	Hemidactylussp	Lizard
2	Wall lizard	Hemidactylusprashadi	Lizard
3	Garden Lizard	Calotesversicolor	Lizard
4	Snakes	Serpentes	Snakes
BIRDS			
1	Red-vented bulbul	Pycnonotuscafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotherestrictis	Diurnal Birds
4	Crow	Corvuscorvidae	Diurnal Birds
5	Common Cuckoo	Cuculuccanorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittaculakrameria	Diurnal Birds
8	Black Drongo	Dicrurusmarrocercus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds

10	Eagle	Accipitridae	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattusrattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danauschrysisippus	Insects
2	The Gram Blue	Euchrysopsnejus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumalalimniace	Moth
7	Honey bee	Apis	Insects
8.	Dragon flies	Suborder Anisoptera	Insects



Some Birds and insects in Campus



3.3. Water Resources Management:

The total water consumption of the AIPS can be classified into THREE use categories:

1. Academic and administration
2. Transportation and Other Utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are four bore wells existing in the campus, each connected to a separate overhead tank located at various academic and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 17 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 10 KLD of water, of which 7 KLD is sourced from RO reject waters. Overall, AIPS utilizes 24 KLD of groundwater on all working days.

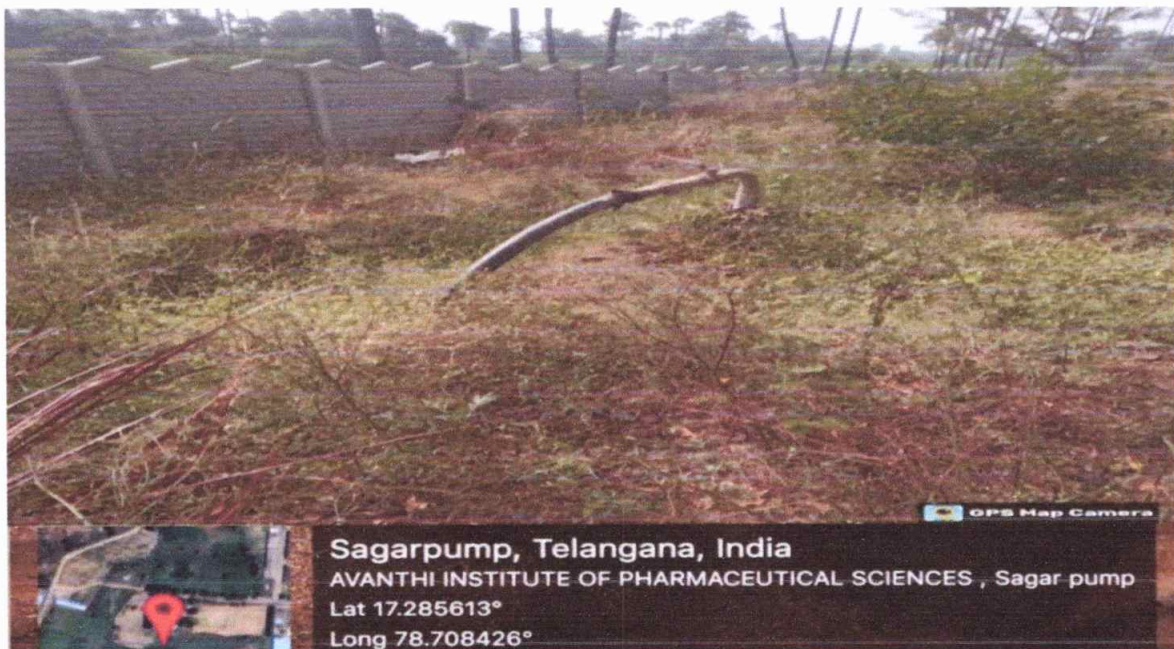
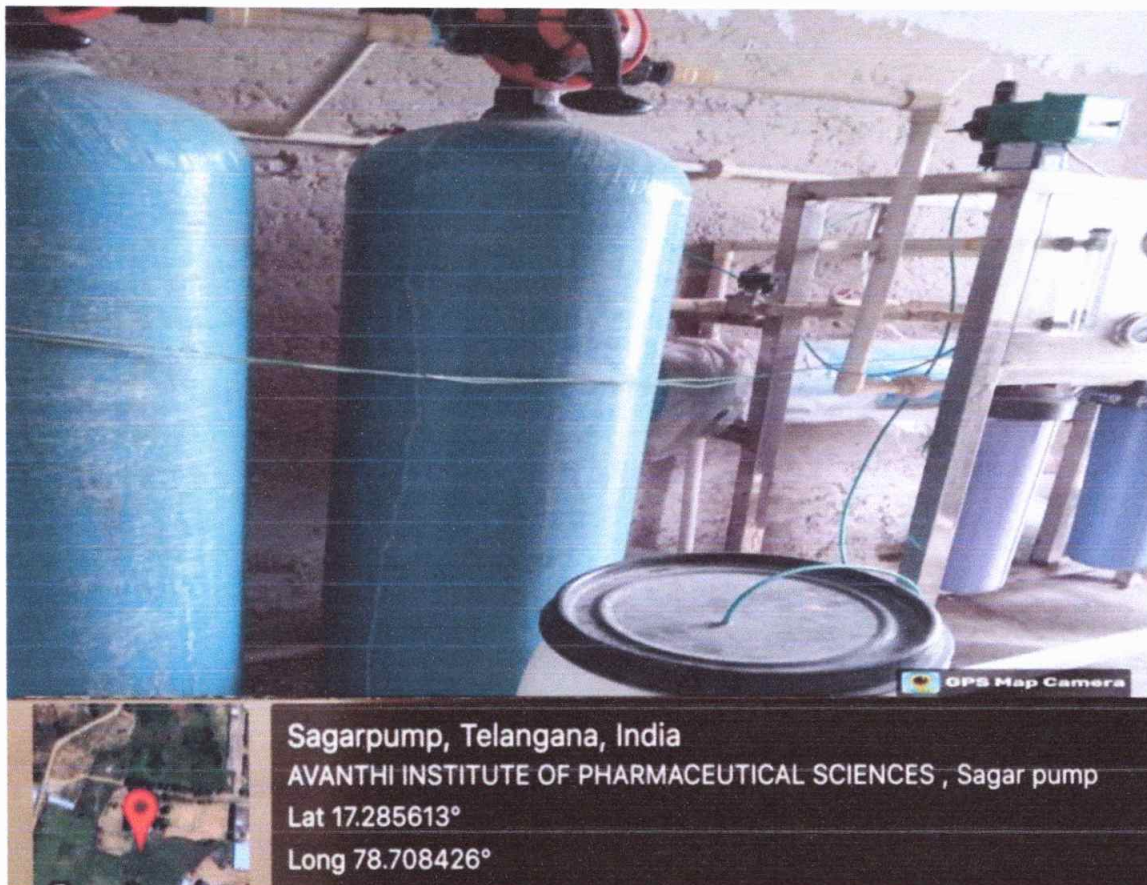


FIG: 7HP Motor capacity was installed near the Pharmacy block



AIPS has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are One RO plants, with capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.



Overall, compared to the AY 2019-2020, this audit year has shown a saving of 6 KLD and consequently, the per capita consumption has come down to 9.6 lpd.

AIPS has One RO water plants, and it produce 3 liters of wastewater for every 1 liter of treated water. On working days, approximately 10 KLD (Kilo Liters per Day) of water is rejected by RO plant. The rejected water is used for gardens and green areas.

The Pre-monsoon water quality of the two bore wells being used by AIPS was analysed for drinking water quality standard IS 10500. The results are presented in Table (7). The results indicate that the water quality was almost the same in the two sources and also there was no significant change from the water quality of the previous AY 2019-2020. The water quality complies with the IS 10500 standard, with the only exception being TDS (Total Dissolved Solids), which is slightly higher than the permissible levels.



Table 8. Pre-monsoon Water Quality of the Groundwaters of AIPS – 2020.

S.No	Parameter*	BW-1	BW-2	IS 10500
1	pH	7.2	7	6.5-8.5
2	EC	243.8	247.8	500
3	TDS	412	412	500
4	TH	212	215	300
5	Ca	62	60	75
6	Mg	22	21.4	30
7	Na	11	14	200
8	k	8	7	10
9	Fe	0.05	0.05	0.3
10	Cl	100	100	250
11	PO ₄	1	0.8	10
12	NO ₂	0.03	0.03	1
13	F	0.4	0.4	1.2
14	TA	122.5	128.8	200
15	CO ₂	36.1	30.2	---
16	HCO ₃	229	227	---
17	DO	3	2.9	4.8

* = All parameters are in mg/l, with the exception of pH



3.4. Energy Management:

With the aim to become a model institution for energy efficiency and conservation, AIPS has initiated its energy management and the institution conducting exclusive energy audits to assess its energy management practices and efficiency. The findings of these audits, conducted by an accredited consultant, are documented in the energy audit reports. This report provides an overview of the institution's energy utilization and management within the context of the environment, highlighting its significance as a crucial aspect of the overall environmental management in relation to carbon emissions. AIPS meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power
4. LPG

Compared to the remaining three sources, the use of LPG was very insignificant. The use of solar power had a history of Five years.

5.4a. HT Power Consumption:

During the audit year, the Institute consumed a total of 230 KVAh of electricity from the metered connection, with a monthly average of 20.9 KVAh. Monthly variations in consumption were significant, ranging from a low of 16 KVAh in March 2019 to a high of 20 KVAh in September 2020. The annual Mean Power Factor was 0.99. Therefore, the annual consumption is equal to 215.4 KW.

Compared to the previous year, the consumption is very high during the AY 2019-2020 and exceeded by 38% from the previous year. However, the previous year was partly affected by the COVID closures and virtual mode. AIPS's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Computers, labs, and Machinery. During the audit year, the use by Air-conditioning sector was the maximum, accounting for 50% of the total load, followed by Computers and Machinery sector accounting for nearly 25% of the total load.

5.4b. Power generated from Solar Systems:

The Institute has installed rooftop power generation systems, with a capacity of 120 KWp. During the audit year, a total of 118211 Units was generated, which is equivalent to 54.96% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.



FIG: 6 Installed solar panels that consist the capacity of 60 KW Each

5.4c. Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 62.5 KVA. During the audit year, the generator consuming around 600 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.1/KWh.

Overall, the total electricity consumption from all three sources, including the DG sets, was 215097 KVAh.



FIG: 7 DG-SET 62.5KV



5.4d. Energy for Transportation:

AIPS being an institution with no residential facility and all the members are dependent on transportation. Thus, Transportation is a major sector demanding high energy consumption.

With its 09 buses fleet, AIPS provides transport facility for 35% of its members. The average trip length for the buses was at 72 km /day, and provides the facility for 450 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 69,350 liters. This translates to a per capita consumption of 33.24 liters per annum. The per capita consumption of this AY is 12 liters less than that of the previous year's and is a significant saving. Around 79% of the AIPS community members utilize the other modes. This includes 60.57% using public transportation, 8.89% using auto-rickshaws, 9.04% using their own two-wheelers, and 0.5% use four-wheelers.

5.4e. LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 60 non-domestic cylinders (60 X 19 kg) and Four domestic cylinders (6 X 14.8 kg). Thus, the estimate was 822.2 Kg. There was no change in the consumption from the previous year.

5.4f. Abstract of Energy Use:

AIPS's total energy use from different sources and for several purposes during the AY 2019-2020 is presented below:

➤HT Power from Grid	: 96886 Units
➤HSD Used	: 69,950 Litres (Buses + HSDG)
➤LPG	: 822.2 Kg
➤Solar Power Generated	: 118211 Units



Compared to AY 2019-2020, this AY had high consumption and this is mainly because of the institution was functioning virtually due to pandemic conditions and therefore a great amount of electricity and transportation were not reflected.

Renewable energy generation (Solar Power) was the same during the previous and current years. 5.4g. Energy Use & Carbon Footprint: While meeting its energy needs, AIPS could generate nearly 54.96% of its energy needs from renewable source of solar power. However, transportation has become a major contributor to the consumption of HSD and thereby to the pollution loads. The carbon emissions from the energy management during the audit year are presented in Table 7 below, which reveals that the net Carbon emissions from the AIPS stands at 246.7 t CO₂ e/annum.

Table 8. CO₂ Emissions from AIPS during the AY 2019 – 2020.

S.No	Emission Source	Annual Consumption	CO ₂ emission Factor (kg/Unit)	Total CO ₂ emissions (kg)	Total emissions (t CO ₂ e/ann)
1	Grid Electricity	96886 KVAh	0.94	52760.32	53
2	Diesel Oil	69,950litres	2.68	108142.36	109
3	LPG	822.2 Kg	2.252	108143.36	0
TOTAL Carbon emissions					162
Emission Offset through Solar Power					52
NET Carbon emissions					110

Compared to the previous year, Net emissions during the AY 2019-2020 have increased by 14.4 t CO₂ e. However, if the per capita CO₂ emissions are considered, the current year had 0.089 t CO₂ e/head/annum compared to 0.095 t CO₂ e of AY 2019-2020.



3.5.Solid Wastes Management:

Solid Waste Management is one area where AIPS is striving to develop suitable models. After initiating Green Audits, the AIPS community, particularly students and researchers are focussing on effective segregation and quantification of different wastes. For the purpose of waste management, all the solid waste is classified as per the standard norms. At the first instance, Two Categories are recognized: (1) Wet waste; and (2) Dry Waste. The first category is usually generated from Canteen, Dining Halls, Waiting Rooms, and other areas of gathering places. At identified places, wet waste collection bins were provided.

On the other hand, the second category, Dry Waste was further classified into Five types: (1) Paper & Board; (2) Plastic; (3) Glass & Metallic; (4) E-Waste; and (5) Sanitary Waste. The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E-Waste. The estimates of different wastes and their disposal route are presented in Table (8) below:

Table 8. Solid Wastes generation and Disposal Routes followed by AIPS during AY 2019-2020.

S.No	Waste Type	Waste Type	Qty	Disposal
1	Wet Waste	DiningHalls, Messes& Cantcen	3 kg/day	To Compost
2	Paper & Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	Negligible	IC/Authorized Collectors
4	Plastic	All	0.12 kg/day	IC/Authorized Collectors

In terms of solid waste management, AIPS has implemented various initiatives through its Innovation Centre. Metallic, plastic, and e-wastes are examined by the members of the Innovation Club to explore opportunities for reuse, repair, recovery, or reduction, fostering innovation among the students. Overall, AIPS's waste management practices aim to minimize waste generation, promote recycling and composting, and encourage innovative approaches to waste reduction and reuse.



4. GREEN AUDIT: OBSERVATIONS & RECOMMENDATIONS

- All students need to be involved in enhancing and appreciating the campus biodiversity. This on one hand helps in the total inventory of the flora and fauna, and on the other enables the students to realize Biodiversity as the Natural Capital for the sustainable development
- Recommended to replace at least 20% of the electrical and electronic gadgets which are not certified for energy efficiency
- Improvement in the Carbon stock in the Greens is commendable
- The scope for enhancing Solar Power generation is to be explored;
- The Institute's website should have a separate link for Green and Environment activities and need to be monitored and updated by the EMC.



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Gunthapally (V), Abdullapurmet(M), RR Dist, Hyderabad -501512.)

2018-2019

Green, Environment and Energy Audit

On 22 JUNE 2019



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GREEN & ENVIRONMENT AUDIT REPORT

2018 – 2019



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

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&

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Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator
Special Invitee	Dr. Shaik Rusthum, Principal, Brilliant Institute of Pharmaceutical Sciences
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LIST OF ABBREVIATIONS USED

AIPS	: Avanthi Institute of Pharmaceutical Sciences
AICTE	: All India Council for Technical Education
TSSRTC	: Telangana State Road Transport Corporation
B. Pharm	: Bachelor of Pharmacy
Pharm-D	: Doctor of Pharmacy
BS & H	: Basic Sciences and Humanities
PW P	: Plastic Waste
C	: Carbon
Ca	: Calcium
CAD	: Computer Aided design
CAM	: Computer Aided Manufacturing
CO ₃	: Carbonates
DO	: Dissolved Oxygen
E waste	: Electrical & Electronic Waste
EC	: Electrical Conductivity
EKL	: Enviro Kamka3r LLP
Fig.	: Figure
Fe	: Ferrous ion
GHRDC	: Global Human Resource Development Centre
ha	: Hectare
HCO ₃	: Bicarbonates
Hp	: Horse Power
HSD	: High Speed Diesel
HW	: Hazardous Waste
ISO	: International Standards Organization
JNTUH	: Jawaharlal Nehru Technological University Hyderabad
K	: Potassium
kg	: Kilo Grams
KL	: Kilo litres
KLD	: Kilo litres Day
km	: Kilo Meters
Kvah	: Kilo volts amps per hour
KW	: Kilo Watts
LPG	: Liquefied Petroleum Gas
lph	: Litres per hour
M Tech	: Master of Technology
Mg	: Magnesium
MSW	: Municipal Solid Waste
Na	: Sodium
NAAC	: National Assessment and Accreditation Council
NBA	: National Board of Accreditation
NCC	: National Cadet Corps

NBA	: National Board of Accreditation
NCC	: National Cadet Corps
NSS	: National Service Scheme
pH	: Potential of Hydrogen
PW	: Plastic Waste
RO	: Reverse Osmosis water plant
SO Carbon	: Soil Organic Carbon
sq m	: Square meter
TA	: Total Alkalinity
TDS	: Total dissolved solids
TH	: Total Hardness
UGC	: University Grants Commission



PREAMBLE

Avanthi Institute of Pharmaceutical Science (AIPS) is a pioneer institution in main streaming “Environment and Sustainable development: in all its academic, administrative and extension programs, and aligned these with national missions on the environment, and climate change and complies with AICTE, NAAC, and university policies. AIPS has initiated Green and Environmental Audits since the academic year 2018-2019, and with the inclusion of a third-party professional, XXXXXXXXXX, a start up company groomed by IIM(B) & NSRCEL and gained experience in the Green and Environment Audits. This report deals with “Green Audit” for the academic year (AY) 2018 – 2019 and is a third consecutive annual audit.

The past two audit years have witnessed several perturbations in the functional modes of all the educational institutions because of the impacts of the Covid pandemic and thereby, the audit processes and the findings provided limited implications. However, they helped in streamlining the management systems related to Environmental education, awareness, natural resources, and energy conservation aspects. AIPS has developed its own Environmental Policy in AY 2018-2019, based on which all green and environmental activities are being planned, implemented, reviewed, and verified. This AY 2018 – 2019 attempted to report the progress and conformity with the Environment Policy of AIPS.

With a focus on academic excellence and holistic development, the institute aims to equip its students with the necessary skills and knowledge to excel in their respective fields. Over the years, AIPS has garnered a reputation for its commitment to quality education and continues to play a significant role in shaping the future of Pharmacy professionals in the region and beyond.

1. ABOUT AIPS

Avanthi Institute of Pharmaceutical Science and (AIPS), an institution of the Avanthi Educational Society, established in 2007 is engaged in providing quality education and 1 contributing to the development of Pharmacy for over 16 years. The founder of the institutions, Sri M. SrinivasaRao, a philanthropist, has contributed to the development of these institutions with a vision to provide fair access to higher education to the students of the Telangana . The main campus of AIPS (Fig.1) is located at Gunthapally, a semi-urban area situated near Abdullapurmet, Ranga Reddy district. Telangana, and is equidistance to most places of the region.

AIPS offers various undergraduate and postgraduate AND Pharm-D programs in the field of Pharmacy and pharmaceutical science , and is affiliated with Jawaharlal Nehru Technological University, Hyderabad; approved by the All-India Council for Technical Education (AICTE),and approved (PCI) Pharmacy Conical Of Indian has been offering high-quality Pharmacy education. It also accredited by the NAAC. In the year 2018, it received a B++ grade and a score of 3.00 scale points out of 4 in its NAAC accreditation. AIPS also provides students with a holistic development experience through various activities such as Games & Sports, NCC, NSS, BIO ADHAYAAN and other technological pursuits. With a spacious and an equipped for both outdoor and indoor games, the college offers excellent facilities for sports and recreational events.



Fig.1: AIPS Campus Building

2.1. Campus Community:

AIPS Campus community can broadly be considered fewer than four categories: (a) Students and Research scholars; (b) Teaching Staff; (c) non-teaching staff; and (d) Associate 2 personnel. Of these four categories, Associates are such members who are associated with such activities like material suppliers; service providers, contractors, etc. More than 95% of the AIPS members are Day comers. Thus, during Sundays and holidays campus activities will be at their low, including the requirement of essential resources. The distribution of the different sectors of the community is illustrated in Fig. 1, which indicates that during this AY students accounted for 600 and their strength has increased from the previous year when it was 2007. In the case of the size of the other three sectors of the community, there was no change in their numbers from the previous year.

2. SCOPE OF GREEN AUDIT

The plans and activities of the AIPS being implemented to realize the goals and objectives of AIPS's Environment Policy shall be the broad scope of the Green Audit. The policy envisages that the AIPS campus be made a "Green Campus" making it comply with a Net Zero emission campus (Fig.2). Further, encourage the participation of all its members in environmental activities, more particularly in the conservation of natural resources, Energy, and minimization of waste. Towards this, the Environmental Management Cell of the AIPS, and the Green Auditor, M/S XXXXXXXX, have evolved documentation. Different methods including the documentation.



Implementation status of the GA recommendations of the previous year is included to enable a review of management systems for realizing the Environmental Policy's goals and objectives. Overall, the scope of the GA encompasses the management of natural resources, waste generation, and adherence to green building norms, carbon footprint assessment, and ensuring active participation of all members, including the management



Clean & Green Programme



The Audit was carried out in three stages, each stage comprising of different activities as shown in Table. 2.

Table 2. Stages and Activities of the Green Audit of AIPS for AY 2018 -2019

Pre Audit Stage	<ul style="list-style-type: none">•Appointment to external Audit Agency•Constitution of Audit team•Scoping of audit and finalization of methods•Initiating the Audit
Audit Stag	<ul style="list-style-type: none">•Units interactions•Documents Scrutinise•Collection and Validation of audit evidences.•Finalization of audit findings•Submission of Audit recommendations
Post Audit Stage	<ul style="list-style-type: none">•Recommendation wise discussion and planning for improving the managements and other practices. 56

The external auditors from XXXXX and the Internal Audit team have met several times and revisited the audit protocols, interaction schedules, documentation of collected audit evidence, and inspections of conformities and started 2nd Stage of the process. Validation of the audit evidence was carried out by the External auditor using the standard methods for validation. The audit findings of each unit were shared with the concerned unit before their finalization.

3. GREEN AUDIT

Implementation of the audit recommendations of the AY 2018-2019, was first reviewed and the observations reveal that "though the implementation was slow in pace, the progress made is significant in the sense that the overall objectives of the policy goals can be achieved. The implementation status of the audit recommendations of the AY 2018 – 2019 is presented in table (3) below:



3.METHODS ADOPTED

The Principal AIPS had constituted an Internal Audit team (Table 1) to assist the External auditor and the team was constituted on 2nd June 2020. All the Heads of the departments and other wings of the institute were informed for cooperating with the audit team and the process.

Table 1: Internal Green , Environment & Energy Audit Team for the AY 2018 – 2019.

Chairman	Dr. K. Balaji, Principal, AIPS	
Vice Chairman	Dr.NiharRanjan Das IQAC Coordinator	
Special Invitee	Dr.Ch.Kantlam Principal, Brilliant Institute of Pharmaceutical Sciences	
Co-ordinator	Mrs. P. Lavanya Associate Professor of Pharmaceutics	
Members	1.Dr. M.Ramakrishna Prof .Dept.of Pharmaceutics 2.Mrs.B.Manjula Prof .Dept.of Pharmaceutics	
Invitee	Dr. Anwar Dept. of Health,Gunthapally.	
Student Members	1.K. Akhila goud 15GN1T0016 2. Anish kumar das 15GN1T0019	



Table 3. Implementation Status of 2018-2019 Green Audit Recommendations:

R.No	Recommendation	Present Status.
1	AIPS's EMC should develop an implementation plan for realizing the Environmental policy goals and objectives;	Objective wise plans are under progress with sub-committees constituted.
2	AIPS has several high energy consumption electrical equipment and should have a time bound plan for their replacement with the energy efficient equipment or gadgets;	A sub-plan is being prepared and is a part of response to Recommendation 1
3	Although the resources consumptions appear to be high compared to the previous Audit Year, the present audit year the number of working days was almost twice to that of the previous year, as pandemic period was very short during this year. However, scope for further reduction in the consumption is high;	Strategies for reduction in resources consumption is being developed and is a part of response to Recommendation 1
4	The scope for enhancing Solar power generation is to be explored;	Noted and under consideration.
5	The scope for improving the biodiversity and carbon stocks in the vegetation also is high.	Is a part of response to Recommendation
6	AIPS should incorporate its Environmental Policy and the Green activities in its web site.	Complied with.

Over all, the implementation was successful and of the eight recommendations, two were already complied with, while the remaining is in different stages of their completion. The status of the different Green components for the AY 2019 – 2020 are as follows:



3.1.Land Use and Land Utilization:

AIPS Campus at Gunthapally Village, near Abdullapurmet, has a spread of 2.12 ha of semi-urban land surrounded by rural green cover of (Fig.1). In this area, there was no change in the Land Use and Land utilization from the status of AY 2018-2019.

However, the constructed area has been improvised for better utilization by the addition of several indoor plants. A significant portion within the constructed area was allocated for different blocks which are discrete in distribution

Table 4. Distribution of Land use types in AIPS as on August 2019.

LAND USE	Area (sq m)
Constructed Area	4660 sqm
Pavements & Paths	1850 sqm
Play Grounds	4050 sqm
Under Greens	1086 sqm
TOTAL LAND AREA	2 ACRES



Satellite Image showing AIPS Boundary and Greenery of the area.



About 2% of the constructed area, and around 13-15% of the land has been allocated for major departments like B. Pharmacy, M Pharmacy Pharm-d and for laboratories (Fig. 4). These labs provide students with hands-on learning experiences and equip them with practical skills in their respective fields.

The Pharmacy building occupies 15% of the land, providing a dedicated space for academic and research activities related to M.pharmacy of all branches. Similarly, the administrative building, known as the Main Block, covers 14% of the land, serving as the central hub for administrative functions and student services.

3.2. Vegetation & Biodiversity:

The AIPS campus has a spread of 4.15 ha of land, of this the green areas account for nearly 58.5% and supports over 50 different species of higher plants. Amongst these, the campus had 363 matured trees, while another 170 trees were in developing stages.

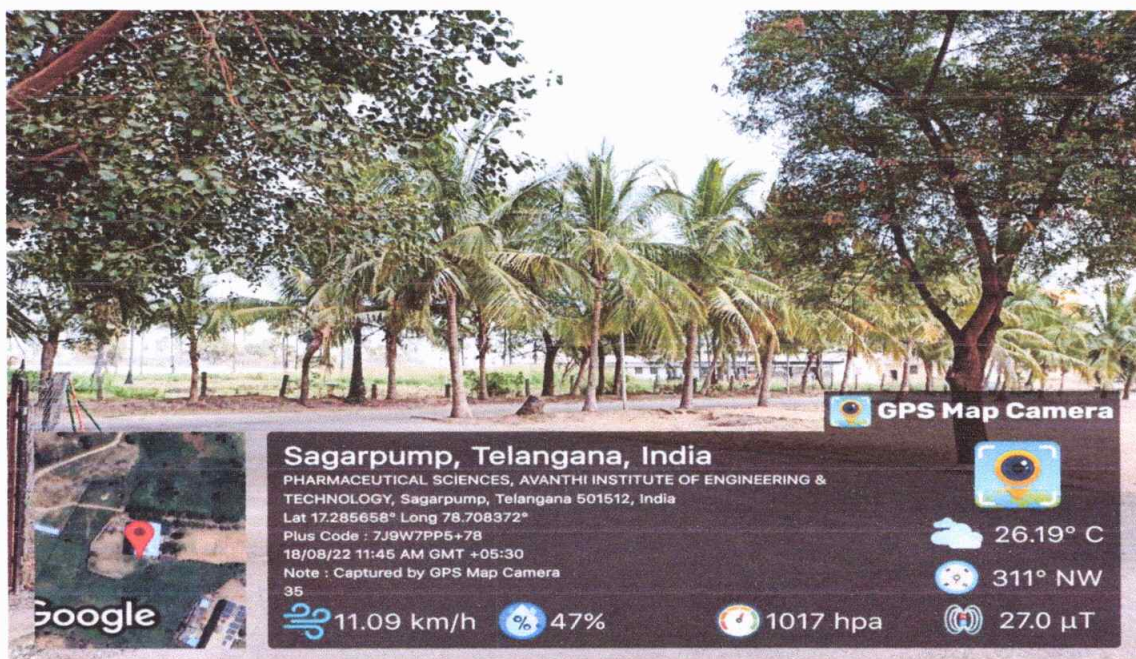


FIG: Different varieties of trees and plants



AVANTHI INSTITUTE OF PHARMACEUTICAL SCIENCES

(Approved by PCI, AICTE & Affiliated to JNTUH)

Gunthapally (V), Abdullapurmet (M), R.R. Dist., Near Ramoji Filmcity, Hyderabad - 501 512.



FIG: 3 Different varieties of trees and plants



A. FLORA & PLANT DIVERSITY:

The flora of the campus comprises 40 species belonging to 36 genera and 20 families. Of these 19 were tree species and 30 were herb species, while shrubs were recorded with only two species. Among herbs and shrub species, exotic ornamental species were not taken into account. The list of plant species recorded is presented in Table (5).

Table 5: Flora species of AIPS during 2018-2019

No	Family	Species	Habit	Common/Telugu Name
1	Acanthaceae	Peristrophepaniculata(Forssk). Brummitt	H	Cheburu
2	Amaranthaceae	Achyranthesaspera L.	H	Uttareni
3	Amaranthaceae	AlternantheraparonychioidesSt.	H	Ponnaganti
4	Amaranthaceae	Alternantherasessilis	H	Ponnaganti
5	Amaranthaceae	Amaranthusviridis L.	H	Chilacathotakura
6	Asteraceae	Ageratum conyzoides L.	H	PokaBanthi
7	Euphorbiaceae	Euphorbia hirtaL.	H	Nanubalu
8	Fabaceae	Cassia obtusifoliaL.	H	Tagirasa
9	Fabaceae	Crotalaria calycinal	H	
10	Fabaceae	Tephrosiapurpurea (L.) Pers	H	Vempali
11	Malvaceae	SidaacutaBurmF.	H	
12	Piperaceae	Piper Betle	H	
13	Malvaceae	Sidacordifolia L.	H	
14	Nyctaginaceae	BoerhaviaeAIETtaL.	H	Punarnava
15	Fabaceae	Acacia Aneura	T	Mulaga
16	Fabaceae	Acacia catechu (L.f.) Willd	S	

17	Fabaceae	Hibiscus rosa-sinensis L	S	Mandara
18	Anacardiaceae	Mangifera indica	T	Mango
19	Aceae	Borassus flabellifer	T	Thati
20	Aceae	Cocos nucifera	T	Coconut
21	Aceae	Wodyetia bifurcata	T	Foxtail palm
22	Combretaceae	Conocarpus setus	T	Conocarpus
23	Combretaceae	Terminalia catappa	T	Badam
24	Fabaceae	Acacia leucophloea (Roxb.) Willd.	T	Tellathumma
25	Fabaceae	Caesalpinia pulcherrima	T	Gulmohor
26	Fabaceae	Tamarindus indica	T	Chintha
27	Lamiaceae	Tectona grandis	T	Teak
28	Meliaceae	Azadirachta indica	T	Neem
29	Moraceae	Ficus benghalensis	T	Marri
30	Myrtaceae	Syzygium cumini	T	Neeredu
31	Rubiaceae	Neolamarckia cadamba	T	Kadambari
32	Moraceae	Artocarpus heterophyllus	T	Panasa/Jackfruit
33	Fabaceae	Saraca asoca	T	Ashoka trees
34	Moraceae	Ficus religiosa	T	Raavi
35	Sapotaceae	Sapodilla	T	Sapota
36	Poaceae	Cynodon dactylon	H	Gariki
37	Poaceae	Aeluropus lagopoides	H	Gaddi
38	Malvaceae	Sida acuta	H	

H = Herb

S = Shrub

T – Tree

There were eight fruit bearing species and the overall Maximum Possible Diversity of the campus was at 3.664 bits as per the Shannon-Weiner Index. The Actual Species Diversity of tree species was at 2.609 bits with a Species Evenness of 0.903, indicating good distribution.



B. TREES ENUMERATION & BIOMASS:

There was no significant change in the population of the matured trees in the AIPS campus as compared to the state in the previous AY 2018-2019. However, due to the Tree plantation activities during the year, the number of trees in the developing stages were recorded at 160, and within three years most of them will be contributing to the tree cover. Presently, 363 matured trees are existing in the campus. For the purpose of Trees biomass, only the matured trees were taken into consideration. Based on the girth and height of the trees enumerated, by using the standard ecological methods, the biomass of the trees for the 18 species was estimated and the total Tree Biomass was at 31.04 tons in the AY 2018-2019 (Table 6). This is 4.69 tons greater than the record of the previous audit year.



FIG: 4 WORLD ENVIROMENT DAY

C. CARBON STOCKS:

The Carbon stocks in the trees of AIPS campus were estimated using standard stock assessment methods. The general default value of 46% of the Dry weight recommended for tropical trees was adopted and thus the C stocks from the tress arrived at 14.898 tons. Added to this, another 47 tons of C was present in the soils. Thus, the total C stock in the AIPS Campus was estimated at 62 tons.



Table 6. Tree Enumeration and Biomass Stock at AIPS Campus during AY 2018-2019.

S No	Species	Mean GBH (cm)	Mean Ht (m)	Population	Total BM (Tons)
1	Mangifera indica L.	40.5	7	18	1.491
2	Borassus flabellifer L.	40	9	44	4.572
3	Cocos nucifera L.	31	8	19	1.054
4	Wodyetia bifurcata A.K. Irvine)	38.2	6	62	3.876
5	Conocarpus Erectus L	27	7	23	0.847
6	Terminalia catappa L.	43	9	16	1.921
7	Acacia leucophloea (Roxb.) Willd.	28.1	6	3	0.102
8	Caesalpinia pulcherrima (L.) SW.	36	6	29	1.627
9	Tamarindus indica L.	40	6	22	1.524
10	Tectona grandis L. F	30.5	11	11	0.812
11	Azadirachta indica A. Juss	27	9	13	0.616
12	Ficus religiosa L.	39	7	1	0.077
13	Syzygium cumini L. Skeels	59.1	6	12	1.809
14	Neolamarckia cadamba (Roxb.) Bosser	53	8	7	1.135
15	Artocarpus heterophyllus	37.5	6	4	0.244
16	Acacia aneura	30.5	6	29	1.168
17	Saraca asoca	22	7	40	0.978
18	Sapodilla	22.2	6	10	0.213
TOTAL					25.067



D. FAUNA:

The fauna records were almost the same as in the year 2018-2019, and therefore the same was reported for this year also. The campus vegetation at AIPS serves as a habitat for various animal species, providing a home for diverse wildlife. During a single day's inventory, over 24 species were observed, as listed in Table 7. The most common bird species found on campus is the Common Mina, while the presence of numerous butterfly species adds to the enchantment. In addition to these natural inhabitants, the campus supports a range of other fauna.

Table 7. List of major faunal species recorded in AIPS Campus

S.No	Common name	Scientific Name	Type
AMPHIBIAN			
1	Common frog	Ranaspp	Frog
REPTILES			
1	Tree Gecko	Hemidactylussp	Lizard
2	Wall lizard	Hemidactylusprashadi	Lizard
3	Garden Lizard	Calotesversicolor	Lizard
4	Snakes	Serpentes	Snakes
BIRDS			
1	Red-vented bulbul	Pycnonotuscafer	Diurnal Birds
2	House Sparrow	Passer domesticus	Diurnal Birds
3	Common Myna	Acridotherestrictis	Diurnal Birds
4	Crow	Corvuscorvidae	Diurnal Birds
5	Common Cuckoo	Cuculuccanorus	Diurnal Birds
6	Cattle Egret	Bubulcus ibis	Diurnal Birds
7	Rose ringed Parakeet	Psittaculakrameria	Diurnal Birds
8	Black Drongo	Dicurusmarcrocerucus	Diurnal Birds
9	King fisher	Alcedinidae	Diurnal Birds

10	Eagle	Accipitridae	Diurnal Birds
MAMMALS			
1	Squirrel	Sciuridae	Squirrel
2	House Rat	Rattusrattus	Rat
BUTTERFLIES			
1	Plain Tiger	Danauschrysippus	Insects
2	The Gram Blue	Euchrysopsenejus	Insects
3	Common Baron	Euthaliagaruda	Moth
4	Common Cerulean	Jamidesceleno	Moth
5	Common sailor	Neptishylas	Moth
6	The Blue Tiger	Tirumalalimniace	Moth
7	Honey bee	Apis	Insects
8.	Dragon flies	Suborder Anisoptera	Insects



Some Birds and insects in Campus



3.3. Water Resources Management:

The total water consumption of the AIPS can be classified into THREE use categories:

1. Academic and administration
2. Transportation and Other Utilities
3. Greenery

For all these uses, the institution relies entirely on groundwater resources. There are four bore wells existing in the campus, each connected to a separate overhead tank located at various academic and administrative buildings. On an average working day, the academic and administrative areas had a consumption of 17 KLD (Kilo Liters per Day) of water, while the canteen, garage, workshops, and other utilities 6 KLD. All gardens and green zones used about 10 KLD of water, of which 7 KLD is sourced from RO reject waters. Overall, AIPS utilizes 24 KLD of groundwater on all working days.

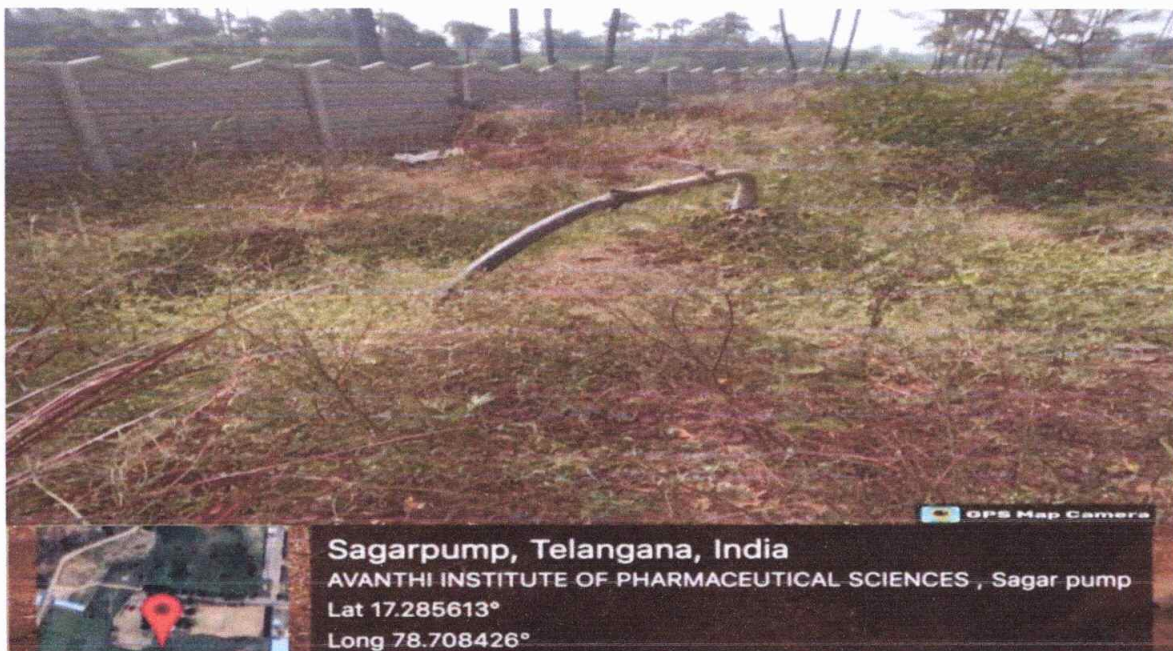
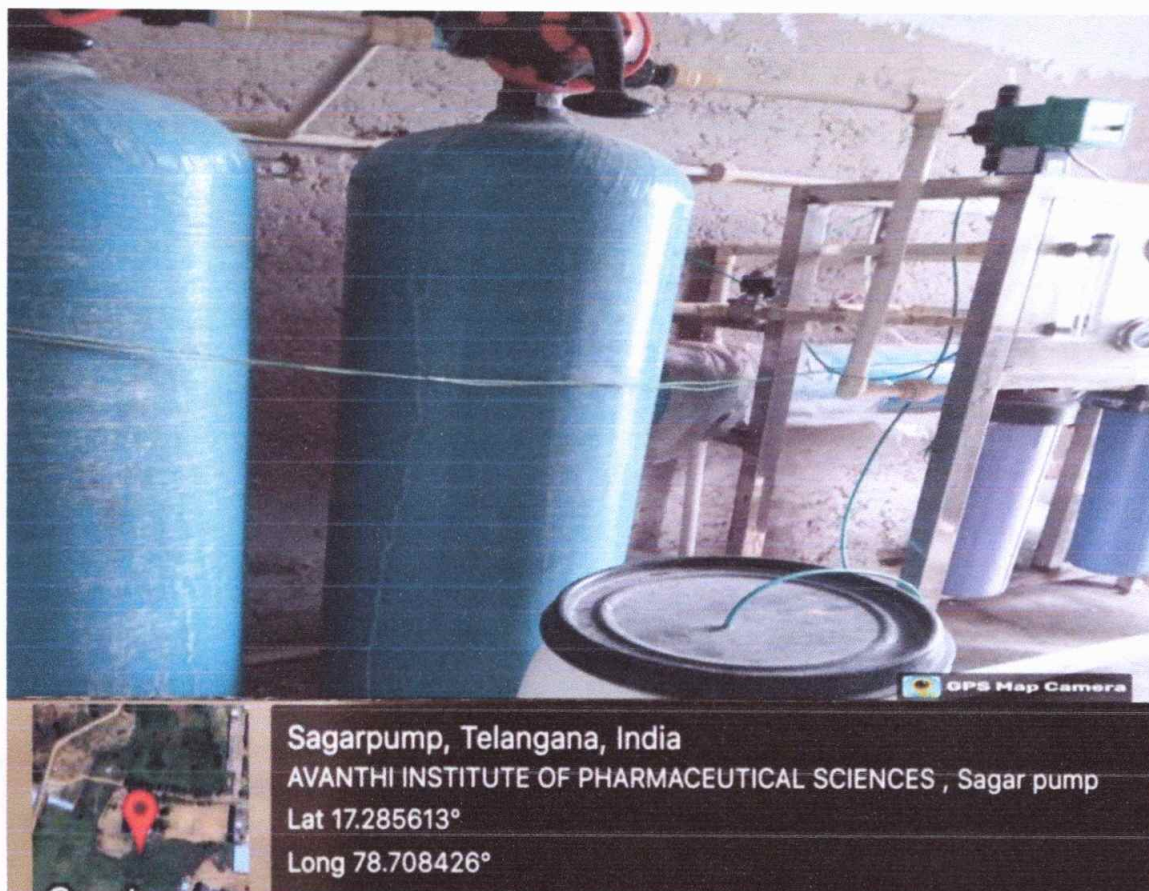


FIG: 7HP Motor capacity was installed near the Pharmacy block



AIPS has a total water storage capacity of 20 000 liters in 4 tanks, each with a capacity of 5000 liters. For all purposes, these waters are used directly, while for drinking purposes, the waters are treated in a RO plant before use. There are One RO plants, with capacity of 1000 liters (2000 liters in total). On all Sundays and general holidays, the water consumption was at 4 KLD, which is less than 20% of the consumption during working days.



Overall, compared to the AY 2018-2019, this audit year has shown a saving of 6 KLD and consequently, the per capita consumption has come down to 9.6 lpd.

AIPS has One RO water plants, and it produce 3 liters of wastewater for every 1 liter of treated water. On working days, approximately 10 KLD (Kilo Liters per Day) of water is rejected by RO plant. The rejected water is used for gardens and green areas.

The Pre-monsoon water quality of the two bore wells being used by AIPS was analysed for drinking water quality standard IS 10500. The results are presented in Table (7). The results indicate that the water quality was almost the same in the two sources and also there was no significant change from the water quality of the previous AY 2018-2019. The water quality complies with the IS 10500 standard, with the only exception being TDS (Total Dissolved Solids), which is slightly higher than the permissible levels.



Table 8. Pre-monsoon Water Quality of the Groundwaters of AIPS – 2019.

S.No	Parameter*	BW-1	BW-2	IS 10500
1	pH	7.2	7	6.5-8.5
2	EC	243.8	247.8	500
3	TDS	412	412	500
4	TH	212	215	300
5	Ca	62	60	75
6	Mg	22	21.4	30
7	Na	11	14	200
8	k	8	7	10
9	Fe	0.05	0.05	0.3
10	Cl	100	100	250
11	PO ₄	1	0.8	10
12	NO ₂	0.03	0.03	1
13	F	0.4	0.4	1.2
14	TA	122.5	128.8	200
15	CO ₂	36.1	30.2	---
16	HCO ₃	229	227	---
17	DO	3	2.9	4.8

* = All parameters are in mg/l, with the exception of pH



3.4. Energy Management:

With the aim to become a model institution for energy efficiency and conservation, AIPS has initiated its energy management and the institution conducting exclusive energy audits to assess its energy management practices and efficiency. The findings of these audits, conducted by an accredited consultant, are documented in the energy audit reports. This report provides an overview of the institution's energy utilization and management within the context of the environment, highlighting its significance as a crucial aspect of the overall environmental management in relation to carbon emissions. AIPS meets its electric energy needs from the following three major sources:

1. HT supply from the Public Distribution Company;
2. HSD Generation
3. Solar Power
4. LPG

Compared to the remaining three sources, the use of LPG was very insignificant. The use of solar power had a history of Five years.

5.4a. HT Power Consumption:

During the audit year, the Institute consumed a total of 230 KVAh of electricity from the metered connection, with a monthly average of 20.9 KVAh. Monthly variations in consumption were significant, ranging from a low of 16 KVAh in March 2018 to a high of 20 KVAh in September 2019. The annual Mean Power Factor was 0.99. Therefore, the annual consumption is equal to 215.4 KW.

Compared to the previous year, the consumption is very high during the AY 2018-2019 and exceeded by 38% from the previous year. However, the previous year was partly affected by the COVID closures and virtual mode. AIPS's Electricity use can be considered under four major Load Sectors: (1) Illumination; (2) Fans and Ventilations; (3) Air Conditioning; and (4) Computers, labs, and Machinery. During the audit year, the use by Air-conditioning sector was the maximum, accounting for 50% of the total load, followed by Computers and Machinery sector accounting for nearly 25% of the total load.

5.4b. Power generated from Solar Systems:

The Institute has installed rooftop power generation systems, with a capacity of 120 KWp. During the audit year, a total of 118211 Units was generated, which is equivalent to 54.96% of the metered supply consumption. Monthly data on variations of the units were not available for a comparative assessment.



FIG: 6 Installed solar panels that consist the capacity of 60 KW Each

5.4c. Power Generated from DG Sets:

AIPS has two DG set generators as backup power supply, with capacities of 62.5 KVA. During the audit year, the generator consuming around 600 liters of Diesel oil. The cost of power generated from the DG sets was around Rs. 14.1/KWh.

Overall, the total electricity consumption from all three sources, including the DG sets, was 215097 KVAh.



FIG: 7 DG-SET 62.5KV



5.4d. Energy for Transportation:

AIPS being an institution with no residential facility and all the members are dependent on transportation. Thus, Transportation is a major sector demanding high energy consumption.

With its 09 buses fleet, AIPS provides transport facility for 35% of its members. The average trip length for the buses was at 72 km /day, and provides the facility for 450 members of the institute. As was evident from the payments made to the HSD, the annual consumption of HSD was 69,350 liters. This translates to a per capita consumption of 33.24 liters per annum. The per capita consumption of this AY is 12 liters less than that of the previous year's and is a significant saving. Around 79% of the AIPS community members utilize the other modes. This includes 60.57% using public transportation, 8.89% using auto-rickshaws, 9.04% using their own two-wheelers, and 0.5% use four-wheelers.

5.4e. LPG Energy:

The use of LPG energy was relatively insignificant when compared to the other forms. LPG is mostly used in the Canteen facility, and in a couple of laboratories. The AY, the use was 60 non-domestic cylinders (60 X 19 kg) and Four domestic cylinders (6 X 14.8 kg). Thus, the estimate was 822.2 Kg. There was no change in the consumption from the previous year.

5.4f. Abstract of Energy Use:

AIPS's total energy use from different sources and for several purposes during the AY 2018-2019 is presented below:

➤HT Power from Grid	: 96886 Units
➤HSD Used	: 69,950 Litres (Buses + HSDG)
➤LPG	: 822.2 Kg
➤Solar Power Generated	: 118211 Units



Compared to AY 2018-2019, this AY had high consumption and this is mainly because of the institution was functioning virtually due to pandemic conditions and therefore a great amount of electricity and transportation were not reflected.

Renewable energy generation (Solar Power) was the same during the previous and current years. 5.4g. Energy Use & Carbon Footprint: While meeting its energy needs, AIPS could generate nearly 54.96% of its energy needs from renewable source of solar power. However, transportation has become a major contributor to the consumption of HSD and thereby to the pollution loads. The carbon emissions from the energy management during the audit year are presented in Table 7 below, which reveals that the net Carbon emissions from the AIPS stands at 246.7 t CO₂ e/annum.

Table 8. CO₂ Emissions from AIPS during the AY 2018 – 2019.

S.No	Emission Source	Annual Consumption	CO ₂ emission Factor (kg/Unit)	Total CO ₂ emissions (kg)	Total emissions (t CO ₂ e/ann)
1	Grid Electricity	96886 KVAh	0.94	52760.32	53
2	Diesel Oil	69,950litres	2.68	108142.36	109
3	LPG	822.2 Kg	2.252	108143.36	0
TOTAL Carbon emissions					162
Emission Offset through Solar Power					52
NET Carbon emissions					110

Compared to the previous year, Net emissions during the AY 2018-2019 have increased by 14.4 t CO₂ e. However, if the per capita CO₂ emissions are considered, the current year had 0.089 t CO₂ e/head/annum compared to 0.095 t CO₂ e of AY 2018-2019.



3.5. Solid Wastes Management:

Solid Waste Management is one area where AIPS is striving to develop suitable models. After initiating Green Audits, the AIPS community, particularly students and researchers are focussing on effective segregation and quantification of different wastes. For the purpose of waste management, all the solid waste is classified as per the standard norms. At the first instance, Two Categories are recognized: (1) Wet waste; and (2) Dry Waste. The first category is usually generated from Canteen, Dining Halls, Waiting Rooms, and other areas of gathering places. At identified places, wet waste collection bins were provided.

On the other hand, the second category, Dry Waste was further classified into Five types: (1) Paper & Board; (2) Plastic; (3) Glass & Metallic; (4) E-Waste; and (5) Sanitary Waste. The last two types being hazardous wastes, these are managed differently and all the remaining three types are to be disposed of through special waste bins provided as Dry bins. Based on several samplings for quantification of different wastes, the waste generated was estimated in all types, except for E-Waste. The estimates of different wastes and their disposal route are presented in Table (8) below:

Table 8. Solid Wastes generation and Disposal Routes followed by AIPS during AY 2018-2019.

S.No	Waste Type	Waste Type	Qty	Disposal
1	Wet Waste	DiningHalls, Messes & Cantcen	3 kg/day	To Compost
2	Paper & Board	Administrative & Academic	2.3 kg/day	Authorized Collectors
3	Metallic	All	Negligible	IC/Authorized Collectors
4	Plastic	All	0.12 kg/day	IC/Authorized Collectors

In terms of solid waste management, AIPS has implemented various initiatives through its Innovation Centre. Metallic, plastic, and e-wastes are examined by the members of the Innovation Club to explore opportunities for reuse, repair, recovery, or reduction, fostering innovation among the students. Overall, AIPS's waste management practices aim to minimize waste generation, promote recycling and composting, and encourage innovative approaches to waste reduction and reuse.



4. GREEN AUDIT: OBSERVATIONS & RECOMMENDATIONS

- All students need to be involved in enhancing and appreciating the campus biodiversity. This on one hand helps in the total inventory of the flora and fauna, and on the other enables the students to realize Biodiversity as the Natural Capital for the sustainable development
- Recommended to replace at least 20% of the electrical and electronic gadgets which are not certified for energy efficiency
- Improvement in the Carbon stock in the Greens is commendable
- The scope for enhancing Solar Power generation is to be explored;
- The Institute's website should have a separate link for Green and Environment activities and need to be monitored and updated by the EMC.