JANKI DEVI MEMORIAL COLLEGE

University of Delhi

ENVIRONMENTAL SELF-ASSESSMENT REPORT 2017-18

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Environmental Self Assessment Report 2017-18

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Introduction

Educational institutions have a vital role to play in societal and environmental reform. In the current deteriorating environmental scenario, it is crucial that these institutions lead by example and pave the way for future generations by harbouring and implementing environmentally friendly initiatives and technologies within their campus. Janki Devi Memorial College, University of Delhi, a premier institution for higher education in the capital, founded in 1959 by the famous Gandhian Shri Brij Krishan Chandiwala in memory of his mother, Smt. Janki Devi, has been diligently fulfilling this responsibility for almost six decades. The concept of environmental consciousness permeates the core functions of this institution, and the Environmental Self-Assessment report is an honest attempt to analyse the college's environmental policies.

The Environmental Self-Assessment or the 'Green Audit' collates the environmentally friendly activities and initiatives being carried out in JDMC. The Department of Environmental Studies collaborated with AVANI - The Environmental Club of the College for the Green Audit. Faculty and students involved were divided into small groups and each took charge of a section of the assessment, which involved data collection, analysis and report writing. The Green Audit report is divided into seven sections, each covering a different aspect of the college.

Physical Profile

The physical layout of the institution is a good indicator of the ideology of the organization. For an academic institution, the structure and design of the college campus can encourage positive thinking within the students and the faculty. Green spaces develop an environment which nurtures a connection with nature, and is often the only connection to greenery for students coming from densely populated parts of the city.

Surrounded by fragments of the Central Ridge parts of the Aravalli Hills and the bustling market of Karol Bagh and Rajendra Nagar, JDMC is on the overlap between natural and man-made ecosystems. Providing a learning environment to over 2000 students and a spacious work environment for teaching and non-teaching staff requires a robust and well planned infrastructure which optimally utilizes the physical space. Out of the total plot area of 43,108 sqm, the main college building is 9,007 sqm, which is around 21%. Around 66% of the campus consists of green spaces and the sports ground. A new hostel aims to provide on campus accommodation to outstation students.

The college is disabled-friendly and provides all possible support to remove any hindrances for disabled students. Ramps on all floors and an elevator allow free movement of wheelchairs. The students are also sensitized on issues relating to disabilities in their peers. A further detailed breakup of the physical profile of the campus is given below.

S.No.	Description	Area (m^2)
1	Plot area	43,109
2	Playground area	10,442
3	Surface parking area	3,775
4	Road area	4,407
5	Lawn area	9,462
6	College building area	9,008
7	Staff residence area	1,717
	A) Teacher 3 No.	514
	B) Class IV staff quarters	239
	C) Principal Bungalow	21
8	Girls hostel building	2,085
9	Entrance foyer	86

10	Staff room	487
11	Administration office area	450
12	Library	1214
13	Computer lab-1	80
14	Computer lab-2	57
15	Computer lab-3	225
16	Class rooms	2,855
17	Tutorial room	455
18	Student wash room (First Floor)	39
19	Student wash room (Second Floor)	39
20	Student wash room (Third Floor)_	39
21	Powder toilet (Library)	45
22	Powder toilet (Third Floor)	45
23	Music room	254
24	Canteen	359
25	Union room	-
26	Sports room	92
28	Pio room	22
29	Medical room	13
30	Common room	-
31	Canara bank	105
32	Area under green and landscaping	18,203
33	Existing covered area on ground floor	4,639
	A) College block	1,455
	B) Library block	1,011
	C) Canteen block	565
	D) Covered seating	475
	E) Stage	255
	F) Music room	120
	G) Home Science Lab	264
	H) Vocational Training Centre	493
34	Existing covered area on first floor	2,737
	A) College block	1,455
35	Existing covered area on second floor	638
	A) Colleqe block	638
36	Net covered area on all floor	8,015

College hostel

Water Profile

In terms of bio-geographical location, Delhi falls under the ‘Semi-Arid’ zone of India, which means availability of fresh water is always a matter of concern. According to the official 2011 census, the population of Delhi stood at 16.8 million, which has expanded further in the last seven years. As per the Delhi Jal Board data, the daily water consumption has risen to 1.1 trillion litres daily by 2005, a tenfold increase from 1976. One can safely say that it is probably higher as of now. Hence, the water profile of an institute is a vital cog in its environmentally friendly design.

Water bills were analyzed in order to understand the consumption pattern (in Kl) of the college. The data is presented in the table below and shows a monthly/bi-monthly unit consumption of water. The water consumption is split between the academic block and the teaching staff quarters. The bills for Academic Block are generated approximately every 60 days, while the Teaching Staff Quarters bills are generated monthly. The primary use of water in campus is for drinking and sanitation. Janki Devi Memorial College has taken significant steps towards utilizing harvested rainwater for purposes on campus. The college has taken several steps to reduce water consumption and develop its rainwater harvesting program. The average monthly consumption of water has been reduced from 194 KL (2016-2017) to 111 KL (2017-2018)

Month	Academic Block	Teaching Staff Quarters	Month	Academic Block	Teaching Staff Quarters
Jul-16	124	85	Jul-17	178	31
Aug-16		168	Aug-17		23
Sep-16	178	93	Sep-17	266	27
Oct-16		127	Oct-17		29
Nov-16	306	104	Nov-17	234	25
Dec-16		149	Dec-17		23
Jan-17	207	64	Jan-18	74	27
Feb-17		88	Feb-18		23
Mar-17	144	81	Mar-18	91	27
Apr-17		34	Apr-18		26
May-17	331	23	May-18	179	25
Jun-17		27	Jun-18		25
Total Consumption (KL)	1290	1043		1022	311
Total Consumption of both meters (KL)		2333			1333
Average Monthly Consumption (KL)		194			111

Energy Profile

Several environmental problems can be traced back to non-renewable energy resources. Air pollution due to burning of fossil fuels, water and soil pollution due to coal mining and oil drilling, displacement of tribal communities, loss of forest land due to dams etc. are some of the impacts of extracting and utilizing non-renewable sources of energy. It is imperative that judicious consumption and conservation of energy should be at the heart of every institution's design and functioning.

Electricity bills of the college were accessed and the monthly unit consumption was compiled as below. The table indicates that the peak electricity consumption was in the summer months, with the highest consumption in the post monsoon period. The average monthly electricity consumption was 24,759 Kwh for 2016-17 and 29,466 Kwh for 2017-2018. The college has taken steps to reduce its electricity consumption and shift towards renewable sources of energy. 2017-2018 value is slightly higher as October 2016 data is not available for this year

Month	Electricity Consumption (Kwh)	Month	Electricity Consumption (Kwh)
Jul-16	34320	Jul-17	42112
Aug-16	42736	Aug-17	51552
Sep-16	45456	Sep-17	42185
Oct-16	NA	Oct-17	29072
Nov-16	18864	Nov-17	19024
Dec-16	13648	Dec-17	15312
Jan-17	18224	Jan-18	20080
Feb-17	14672	Feb-18	18656
Mar-17	18208	Mar-18	17072
Apr-17	31600	Apr-18	32128
May-17	34617	May-18	36935
Average Monthly Electricity Consumption	24759		29466

Solid Waste Profile

Municipal solid waste consists of the non-hazardous waste material produced in the city limits. Commonly identified as ‘garbage’, it is the end point for most natural resources in the urban environment. Sanitary Landfills and Incineration are the two common methods employed by the government to dispose the waste material, both of which contribute to various forms of pollution. Thus, it is imperative to understand how much waste material JDMC produces, and how is it disposed.

The primary sources on campus included the student canteen and the garbage cans around campus. Garbage from the campus is collected on a daily basis in a rickshaw cart. Though it is difficult to weigh the garbage and estimate the mass, the volume of the garbage can be approximated with some degree of accuracy. The dimensions of the empty cart were measured to be 122 cm (Length), 82 cm (Breadth) and 79 cm (Depth). Upon loading the cart, the height of the garbage was approximately 89 cm. The volume of the fully loaded cart was calculated to be 0.89 m3. The frequency of the collection was monitored for a period of two weeks.

The average waste collected per day was 1.67 carts or 1.03 m3. Leftover food material and plastic was the main component of this waste. The college has taken steps to reduce the production of solid waste and develop its compost recycling system. JDMC has also incorporated ‘segregation of waste at the source’ by installing the blue and green dustbins at multiple places in the college for easy handling of the waste.

Vegetation Profile

Green spaces are rare in a crowded city like Delhi, and for students and employees, a college campus can often be an oasis. The green cover also is a factor that attracts many students to this beautiful campus year after year. The department of Environmental Studies and AVANI – The Environmental Club initiated the Tree Census in order to understand and quantify the floral diversity of the campus. The project also aimed to educate the students about the different tree species that they encounter in their daily lives.

A total of 300 trees were found in the College campus, which included 45 unique species. Neem (Azadirachta Indica) was the most prolific tree species, followed by Champa (Plumeria rubra) and Ashok (Polyalthia longifolia). The campus also had some well-established Banyan trees (Ficus benghalensis), which are a keystone species as their fruits (figs) provide nutrition to a large variety of animals, including several bird species. A related observation was the invasion of Vilayati Kikar (Prosopis juliflora) from the periphery of the college. We identified 14 individuals which had established themselves in the area behind the new hostel construction. Adequate steps should be taken to remove these trees as they have a tendency to spread quickly and overpower the local vegetation.
Overall, the tree census yielded a wealth of knowledge about the floral diversity on the campus.

I.No.	r ▬▬▬	▬▬▬▬	▬▬
1	Amaltas	*Cassia fistula*	6
2	Arjun	*Terminalia* af]1	1
3	Ashok	*Pofya* a *longif"*	18
4	Bakain	*Melia azedarach*	4
5	Banyan	*Ficus benghalensis*	5
6	Belpa	*Aegle marmelos*	3
7	Cabbage Palm	*Saba/ palmetto*	6
8	Champa	*Pfumeria rubra*	25
9	Chamrod	*Ehretia laevis*	3
10	Chir Pine	*Pinus roxburghii*	3
11	Christmas tree	*Araucaria cu/umnaris*	2
12	:yeas	*Cyca. ,p.*	17
13	Dhak	*Butea monosperma*	1
14	Fiddle leaf Fig	*Ficus lyrata*	1
15	Firangipani	*Plumeria obtusa*	4
16	Floss Silk Tree	*Ceiba spec1osa*	2
17	Harsingar	*Nyctanthes arbor-tristis*	2
18	Imli	*Tamarindus indica*	4
19	Indian Rubber Tree	*Ficus elastica*	3
20	Jaggery Palm	*Caryota urens*	1
21	Jamun	*Syzygium cumini*	3
22	Jarul	*Lagerstroe. speC/OSi*	5
23	Kadi Patta	*Murraya koenigii*	1
24	Kassod	*Senna siamea*	6
25	Katthal	*Artocarp heterophyllu*	1
26	Lasara	*Cordia dichotoma*	1
27	Mahua	*Madhuca long1*	1

28	Mango	*Mangifera indica*	12
29	Maulsari	*Mimusops elengi*	6
30	Neem	*Azadirachta indica*	82
31	Oak	*Casuarina equisetifolia*	2
32	Orange species	*Trifoliate orange*	1
33	Peepal	*Ficus religiosa*	9
34	Royal Palm	*Roystonea regia*	8
35	Safeda	*Eucalyptis camaldu/ensis*	4
36	Saptaparni	*Alstonia scholaris*	3
37	Semal	*Bombax ceiba*	1
38	Shahtoot	*Morus alba*	6
39	Sheesham	*Dalbergia sissoo*	4
40	Silver Oak	*Grevi/lea robusta*	2
41	Siris	*Afbizia lebbeck*	3
42	Sonjna	*A oringa oleifera*	2
43	Traveller's Palm	*Ravena/a madagascariensis*	2
44	Vilayati Kikar	*Prosopis juliflora*	14
45	Weeping Bottlebrush	*Callistemon viminalis*	8
46			2
	Unidentified Species	-	

Sustainable Activities

Janki Devi Memorial College prides itself on the numerous environmental initiatives, which have won the college many accolades. We believe that sustainable development must go beyond the classroom and the books, and permeate into the core functions of the institution. With this in mind, the College has initiated several programmes over the last two decades which reflect the environmentally friendly ideology of the institution.

Rain Water Harvesting Program

The Rain Water Harvesting Programme in JDMC came as part of an initiative taken by Ms. Aruna Ludra, a faculty member of the English department of the college. She donated Thirty Thousand Rupees to the college on her retirement and the project was implemented with the help of the Centre for Science and Environment (CSE) in June 2001. CSE continued to monitor ground water level up till 2008. The cost of entire Rain Water Harvesting system was Rs. 70,000. It won the college the Chief Minister's Institutional Rain Water Harvesting Award in 2007.

Rainwater Harvesting System

1. *Rooftop Water Harvesting*

The runoff from the terrace of the college building is channelled into three recharge wells located at three different locations, each measuring 1m x 1m x 2m. All the rooftop rainwater outlets, except that from the Tutorial Block, discharge into stormwater drains and then to the recharge structures. In the Tutorial Block, a network of pipes linked through chambers take the rainwater to the recharge wells. To facilitate groundwater recharge, all structures are provided with 15m deep borewells of 150mm diameter. Layer of bricks filled inside the recharge well ensures proper filtration of harvested water.

2. Surface Runoff Water Harvesting

The runoff from the unpaved area is intercepted at the main gate by a collection trench. From here the runoff eventually drains into an abandoned open well, which facilitates groundwater recharge.

The total rooftop and surface area for collection stands at 32,170 m2. With the average annual rainfall in Delhi being 611 mm, the campus has the potential to harvest over 19,000 m3 or 19,000,000 Litres of water annually. Current volume of rainwater harvested 6880 (m^3) or 68, 80,000 Litres. This represents about 35% of the total rainwater harvesting potential of the campus. JDMC utilizes the ground water through three borewells inside the campus to cater to the water requirements of the college.

Impact

The Janki Devi Memorial College is located in Delhi's Ridge area. The water level in the college premises was 35.8 m below ground level (bgl) in May 2002. After implementing the RWH system on the campus, water levels rose remarkably. The water level in September 2002 was 22.1m (bgl) while in May 2003 it was 25.0 m (bgl), a rise of 10.8 m even during the peak summer month. The water level in July 2003 was recorded at 35.9 m (bgl). The data was collected and analyzed by the project tram from Center for Science and Environment.

Renewable Energy

Solar energy is the most abundant, easy, and cost effective renewable energy to harvest. It is also the most important of the non-conventional sources of energy because it does not generate any carbon dioxide and contributes to the efforts against global warming and climate change.

On 13 May 2016, JDMC signed a Power Purchase Agreement (PPA) with Azure Solar Solutions Pvt. Limited for 25 years under the Renewable Energy Service Company (RESCO) Model of the Ministry of Renewable Energy. Azure Solar Solutions Pvt. Limited is engaged in the business of building and operating solar power plants, including grid-connected rooftop power projects. Under the PPA, Azure Power installed the solar plant at JDMC, free of cost.

How does it work?

The College currently purchases electricity from two sources. The primary source is BSES which provides electricity through the main grid at a rate of Rs. 8.50 per unit of electricity consumed. The solar system generates electricity from the incident solar radiation falling on the PV modules and supplies it to the college at a rate of Rs. 3.20 per unit of electricity consumed.

A Net Energy Meter is used to keep track of the power generated from installed solar panel system. Any solar energy that is not used simultaneously with it production, goes back into the electrical grid through the meter. At night or on cloudy days when the system is not producing power to meet the building requirements, the college draws electricity directly from the grid. The Electricity Utility generates a bill for the 'net' consumption for any given billing period and provides a credit for any excess produced during a given period.

The solar plant installed operates on a solar photovoltaic system of 58.90 KW capacity. The plant is installed on the rooftop measuring approximately 14,402 square feet and has a shade free area of approximately 12,292 square feet. The setup includes 84 panels, two inverters that modulate the voltage, a portable weather monitoring station, and a data logger and transmitter. The data logger collects the necessary data from the system and wirelessly transmits it to the Azure Power Monitoring team.

Parameters for the Solar Panel System

#	Parameters	Value
1	System Size	58.9 kW
2	Expected Annual Energy Generation	As per Schedule IV
3	Module Type	Polycrystalline Modules
4	Inverter Type and Rating	String Inverters
5	Electrical Parameter for interconnection	Interconnection in existing LT panels at 3 phase, 415V, 50 Hz
6	Mounting type	Fixed structure
7	Surface Azimuth Angle	0 degree
8	Tilt Angle	10 degrees
9	Wind Resistance	150 Km/ Hr

Contribution to the college

The solar power plant came into operation in the month of December 2016, it has produced a total of 8332 kW of energy over the course of the year which was approximately 16% of the energy demand in that period. Since the installation of solar panel, JDMC could see the difference in reduction of electricity bills as the electricity bought from the solar plant is priced at a much lower rate. We look forward to having the solar power plant generating at full capacity as summer approaches. The solar plant, coupled with power saving installations, will aim to fulfil the complete energy demand for the college in the coming years.

Month	Solar Electricity Generation	Solar Export Units
Jul-17	5139	256
Aug-17	4853	32
Sep-17	5801	32
Oct-17	5503	80
Nov-17	3827	128
Dec-17	4028	16
Jan-18	4237	32
Feb-18	5107	96
Mar-18	6127	144
Apr-18	4782.2	96
Total Generation	49404.2	912
Average Monthly Generation	4940.42	

E-waste collection program

Electronic waste, or e-waste, is a term for electronic products that have become unwanted, non-working or obsolete, and have essentially reached the end of their useful life. Because technology advances at such a high rate, many electronic devices become “trash” after a few short years of use. When electronics end up in landfills, toxic materials like lead, mercury, and cadmium leach into the soil and water thus leading to several forms of pollution.
In March 2018, we collected 40 kgs of E-Waste in collaboration with *Chintan* Environmental Research and Action Group. *Chintan* works for environmental justice in partnership with people and groups from diverse sections of society. Their focus is on ensuring equitable and sustainable production and consumption of materials, and improved disposal of waste. While all of *Chintan*'s work is anchored in grassroots partnerships with organizations of the urban marginalized like wastepickers (ragpickers) and kabaris, their MoU with the college helps in working closely with policymakers, students, parents, teachers, elected representatives, municipalities, Resident Welfare Associations (RWAs) and the police.
The department aims to carry forward this program by establishing JDMC as an E-Waste Collection Centre for the region.

Green Activities-Avani

The Environment Club AVANI, at the JDMC was set up in 2004. The club began with simple ideas like on-the-spot painting competitions, slogan and poster making in an effort to encourage students' interest in the environment. The "green treasure hunt" which involved locating tree species on campus, continues to be a much-awaited annual event.

The Environment Club AVANI has had a very productive year in 2017-2018.
The highlight of the year has been the creation of an ECOZONE under the guidance of the organisation GIVE ME TREES. The Zone has a composting pit and green dump and the compost is now viable. We also have a seed bank and the Zone is used as a work field for EVS students.
We have a vegetable patch that produced its first batch of vegetables in April 2018 consisting of onions ,fenugreek, brinjal, bottle gourd and bitter gourd.

AVANI continues to engage with the NGO, GREEN-O-TECH INDIA to recycle paper and in return, receive paper products of our choice which include white paper for office use. This year we exchanged 480 kgs of paper with them

We have engaged in two rounds of relief material collection which has been donated to GOONJ in September 2017 and January 2018, respectively

AVANI also organised "Green Matters," its annual inter-college bilingual debate on environmental issues on the 16th of February 2018. The topic of the debate was “Environmental pollution contributes least to our right to a healthy life." 15 teams participated in the event.

In March 2018, we gathered 40 kilos of E-waste that was collected by CHINTAN, the NGO with whom we have an MOU.
As a part of our institutional and outreach work in April 2018, AVANI started the *Ao Bag Banao* campaign.
Our aim is to replace plastic bags with cloth bags made by students and faculty. Already a batch of 100 bags has been made by students and faculty and these have been distributed on and outside the college campus. The campaign will continue through the year

Garden Committee

The college gardens are campus treasures full of tall trees, colourful flower beds and a variety of plants that adds to the beauty and peaceful ambience of the college.

Our gardens include Main (front) garden, herbal garden, rose garden with exclusive display of rockery and a green cliff at entrance with name of the college written on it.

During 2017-18, to begin with, the entrance front garden was deweeded. New plants namely Euphorbia and Lantana were placed in front garden. A new entrance gate was also built in the front lawn and the gate was covered by creeper of Tacoma. We also developed rockery in the rose garden and a new rockery garden was also built at the right side of the entrance gate. The side entrance lawns were also developed in a landscape design that adds further to the green living of the college. The Garden Committee has redeveloped the rockery in the rose garden into a picturesque landscape.

A new herb garden with tilted pathways houses more than 150 varieties of herb species. The herbs, numbered trees of college and the potted plants can be easily identified with their popular (common) names and Scientific (botanical) names. We have added new herbs like Putjjiva, Aparajita, Akar kara, Kesar and different kinds of Tulsi etc.

The Garden Committee together with AVANI celebrated the World Environment Day on June 5th 2018 in the college. The event aimed at raising awareness about the green cover to preserve the environment. The overall impression of open green spaces surrounded by trees and shrubs in garden creates a clean and green college environment.


Janki Devi Memorial College
University of Delhi
Celebrates
WORLD ENVIRONMENT DAY


Janki Devi Memorial College
Sir Ganga Ram Hospital Marg, New Delhi - 110060

Environmental Education

The Department of Environmental Studies at Janki Devi Memorial College takes extra effort to provide a wholesome educational experience for the students. The Ability Enhancement Compulsory Course (AECC) in Environmental Studies was initiated in 2015 and the Department of Environmental Studies has taught over 2600 students in this period. Apart from classroom teaching, the students are taken out of the campus on environmental field trips.

At the start of the 2017-18, field visits began in October for the first semester students to the Aravalli and Yamuna Biodiversity Park as part of the AECC Environmental Studies curriculum. Despite the October heat, the students relished the outdoor experience and were able to relate the theoretical classroom knowledge to natural ecosystems. Students of the second semester had their excursion in February, 2018. The department organized eighteen visits between the two parks in order to accommodate all the students over the course of two semesters.

The Department also makes each and every student work in the ECOZONE of the college as a practical part of the subject. The campus has a huge green cover with rich species diversity in the campus. The Environment Club AVANI along with EVS makes use of this fact in teaching the students practical methods of eco-friendly living .The students are given tasks such as preparing a DIY bio enzyme (organic fertilizer for growing plants), planting seasonal saplings like neem, tomatoes, chillies, coriander etc using waste plastic bottles / bags. Similarly, some students work with the Garden Committee, learn about the various medicinal plants in the college campus, help the gardeners with different tasks across the college.

Conclusion

The Environmental Self-Assessment was a landmark project in the sixty-year history of Janki Devi Memorial College. In a constant effort to keep up with the changing times, it is important to understand where one stands in the present. In the environmental scenario, an institution has a duty not only towards itself, but also to the students and society to evolve with the shifting tides and to contribute towards a greener and cleaner future. Of the many tools available to assess the impact of one's activity on the environment, a Green Audit is indispensable.

This project would not have been possible without the support of the Principal, Dr. Swati Pal, the administrative staff, faculty members and the students. It is their assistance and collaboration that has taken this Green Audit to fruition.