



OFFICE OF THE PRINCIPAL
GOVT. DEGREE COLLEGE D.H. PORA (KULGAM)

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No. GDC/DHP/EAC/02

Dated: 15-11-2021

CERTIFICATE OF AUDITOR

It is certified that the Environmental Audit has been successfully conducted by the audit committee in consultation with the external environmental experts at Government Degree College D.H. Pora during the year 2021. It included the:

1. Solid Waste Audit
2. Water Audit and
3. Energy Audit

The detailed Audit Report is appended to this certificate.


CONVENER ENVIRONMENT
AUDIT COMMITTEE
Govt. Degree College D. H. Pora
Environmental Audit Committee

Government Degree College D.H. Pora
Environmental Audit Report 2021-22



Prepared by Environmental Audit Committee
Government Degree College D.H. Pora



Department of Environmental Science, GDC D.H. Pora

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Internal Quality Assurance Cell (IQAC), GDC D.H. Pora

Environmental Audit Report

Government Degree College D.H. Pora

Prepared by

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EXECUTIVE SUMMARY

An environmental audit is also known as green audit and is of paramount importance in the context of effective environmental governance. The thrust of this audit report is to highlight the adequacy and effectiveness of interventions and approaches made by the institution to tackle some important environmental concerns in the college campus. The findings and recommendations made in this audit report shall enable the administration to take effective measures and to frame some important policies in order to improve the environmental efficiency and to encourage green governance. The main objective of this report is to assess and evaluate the activities being carried in the campus and to provide significant suggestions and recommendations for the formulation of efficient and environment friendly policies and planning for sustainable development of the college. This audit report shall provide an insight into the environmental issues prevailing in the college campus, like energy consumption, green spaces, solid waste management, waste water generation etc. The source of data related to land use has been collected from satellite images and data related to energy, water, fuel wood and solid waste generation and consumption has been collected from college official records and field survey.

The electric power consumption in the college is supplemented by the rooftop solar power system mounted almost all the buildings of the college.

The per capita water consumption in the college is about 4.19 litres per day. The institute generates about 8 kg of solid waste per day most of which is biodegradable. In view of the above mentioned observations, this report recommends some crucial suggestions for improving the existing system and to bring the sustainable changes within the campus for making college as green campus.

INTRODUCTION

1.1 Introduction to environmental audit

UNEP defines environmental audit as, “A systematic, documented, periodic and objective review by regulating entities of facility operations and practices related to meeting environmental requirements”. It is a tool to assess general practices implemented by organization in term of its impact on environment". It shows strength and weakness of organization towards conservation of environment and function in a manner to minimize its harmful environmental impact.

1.2 Need for environmental audit

Government Degree College D.H. Pora lies in an ecologically important zone, since it is surrounded by forests, mountains, water bodies and residential settlements. Therefore, need of

the hour is to develop an eco-friendly approach to carry out the activities of the college as per the environmental norms to make the college a green campus.

1.3 Objectives of environmental audit

1. To undertake the baseline survey regarding the implementation of green practices in the college campus.
2. To analyse the dynamics of land use pattern in the college campus.
3. To analyse and evaluate the existing solid waste, water consumption and energy use in the college campus.
4. To evaluate the potential of resources recovery from solid waste
5. To explore the alternative eco-friendly energy sources to run the academic and administrative activities successfully.
6. To suggest a suitable strategy for developing the existing campus into green campus

1.4 About the College

Govt. Degree College D.H.Pora, the highest seat of learning in the vast geographical area of Noorabad was established in the year 2011 vide Govt. Order No. 264-HE of 2011 Dated 29-06-2011, But the first Academic Session was started in March 2012. From its establishment the college was functioning in the few rooms of Govt. Higher Sec. School D.H.Pora. However the new building of the college was inaugurated by Hon'ble Minister for Education Jenab Syed Naeem Akhtar Andrabi in the presence of huge gathering of college staff, students and people on 25-08-2015 with the promising words to introduce Science stream in the college, and it shall be developed as a model college.

The 50 Kanals of college land will be set aside for the development of certain commercial ventures including crafts in order to supplement the new vocational courses in the college. The college has acquired 109 kanals and 01 Marlas of land on with concrete fencing, awesome beautification which captivates the heart of everyone. Despite some problems the college administration is putting best efforts to improve the educational standards of the students enrolled in the college with the steadfast cooperation, sincerity and dedication of teaching faculty and supporting staff. The college at present is offering undergraduate courses in the Arts and commerce stream to both male and female students. In the near future more subjects and science stream will be also introduced. We hope that with the grace of Almighty Allah this college will be one among the best colleges of the state in near future.

1.5 Location of the College

The college is a rural college and is located in Bongam, Damhal Hanjipora Kulgam on the left bank of Kandi Nala. The college is located in the lap of beautiful mountains viz Lais Baal, Dora Baal, Reshiora Baal, Tathan, Khashi Nar etc. of Pir Panchal Range.

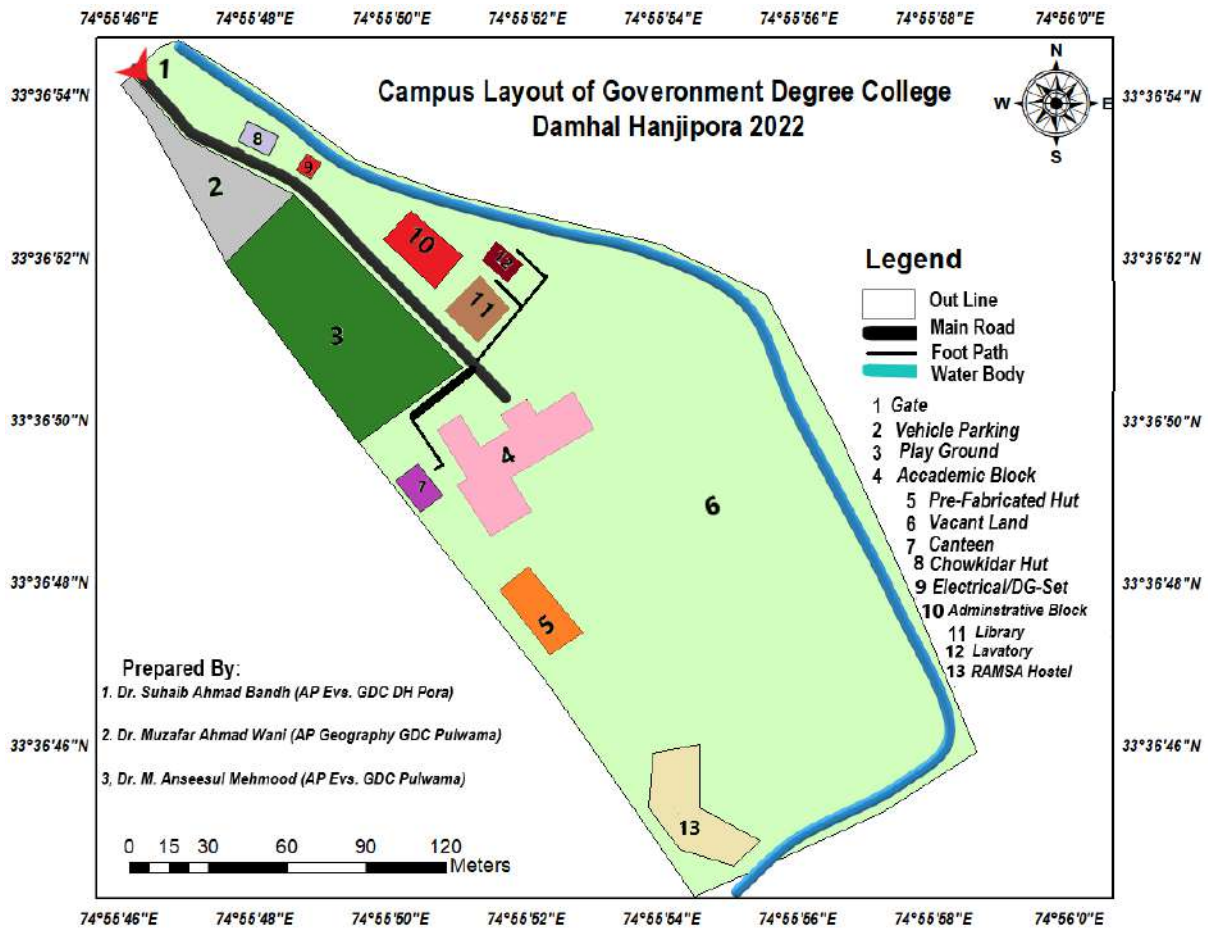


Fig. 1: Location Map of the Government Degree College D.H. Pora

1.6 Data Base for Map Generation

The Base map for this report was generated from Google earth satellite map by Dr. Muzaffar Ahmad Wani, Assistant Professor Geography at Government Degree College Pulwama with a vast experience in Geographic Information System (GIS). The map was Geo-referenced in QGIS 3.2 open source software. The information related to the land use and built-up of the college was recorded with the help of a handheld GPS. The buildings, parks and roads etc. are shown as points, lines and polygons.

2. Methodology

2.1 Methods Adopted

The study was undertaken to understand different environmental parameters like, solid waste generation and management, water consumption, energy consumption and plantation cover etc. The study was aimed to explore alternatives and opportunities to achieve higher levels of sustainability. The data was collected using a variety of methods so as to seek a better understanding of the challenges, opportunities and alternatives. The data regarding number of staff members, students, coal consumption, firewood, LPG and electricity was obtained from the administrative office and IQAC. In order to understand the water consumption and quantifying and characterizing the solid waste, direct waste assessment and analysis technique was adopted. For the ease of the waste estimation, polythene bags of 5 kg capacity were used

to conduct the survey sampling. The land data of the college was obtained through analysis of satellite remote sensing image.

3. Data analysis

3.1. Solid waste Audit

3.1.1 Solid Waste Management

Solid waste is being regarded as the worst type of pollution because it is discernible unlike other types of pollutions and frequently occurring in every passing second. The solid waste management has become a burgeoning problem for international, national and local governments as it is the single largest budget item for the majority of urban centres. Besides the crude open dumping is a common method of waste disposal, which poses a huge potential and real threat to the public health and especially to the environmental quality. The magnitude of solid waste generation is so high, that the existing technologies, manpower and finance are falling short to handle it properly. It has so far, exceeded the earth's natural decomposition and absorption capabilities. The improper management of waste contributes to the occurrence of problems like global warming, ozone layer depletion and climate change. Once the waste material is buried in a landfill, it releases methane gas, which often contributes to air pollution and adversely impacts the human health and environment. The biodegrading process of waste also causes the formation of leachate, which has the potential to pollute underground water. In this regard, the mechanism of integrated solid waste management minimizes the quantum of waste disposal through the methods of reducing, reusing, recycling, recovering, composting, and incineration, etc. to ensure environmental purity and sustainable management of resources.

3.1.2 Magnitude of waste generation in the Campus

The colleges and other higher education institutes are becoming important landmarks of the urban landscape in Kashmir valley. The college has about 715 student enrolment for the year 2021-22. In addition, there are about 18 teachers and 14 non-teaching members in the college. On an average, college generates about 8 Kg of solid waste/day with a per capita waste generation of is 0.011kgs/day, which is quite modest.

Table 1: Magnitude of waste generation in GDC D.H. Pora

Total number of individual on campus (Students + Staff)	Per day waste generation (in kgs)	Monthly waste generation (in kgs)	Annual waste generation (in kgs)	Per capita waste generation
747	8	240	2880	0.011 kgs/day

3.1.3. Composition of solid waste generated

The base of successful planning for a waste management programme depends up on the availability of reliable information about the quantity. Effective waste management through analysis of waste composition studies is important for numerous reasons, including the need to estimate material recovery potential, to identify sources of waste generation, to facilitate design of processing equipment, to estimate physical and chemical properties of the waste. From the

Table 2, it is evident that about 41% of the total waste generated from the college campus is compostable in nature, including fruit and food wastes and lawn clippings etc.

The recyclable wastes come third with a percentage of 26 while the miscellaneous wastes including the dust sweepings and ash etc. rank second with a percentage contribution of 33. Of all the wastes Plastic and polythene constitute about less than 1% and that usually come in the form of packaging material of the machines and equipment purchased from the market. Ash content is another major constituent of the waste stream, which arises usually in the winter season in order to conduct the examinations, as around 3 coal Bukharis are used on a daily basis.

Table 2: Composition of solid waste generated in the GDC D.H. Pora

Waste Category	Items	Daily generation of solid wastes (kgs)	Weight (in Kgs)	Weight Percentage
Compostable	Food and fruit waste	8	3.28	41
	Garden clippings			
Recyclable	Paper		2.08	26
	Cardboard			
	Glass			
	Metals			
	Plastic			
Miscellaneous	Polyethene		2.64	33
	e-wastes			
	Dust sweeping			
	Wood			
	Ash			
Total		8		100

3.1.4. Solid Waste disposal in the Campus

The proper waste management practices start with the installation of color-coded dust bins in the campus. Throwing waste in the bins also includes good civic sense among the students and staff for which the Department of Environmental Science of the college along with the IQAC and NSS is always at the forefront by organizing different awareness programs among the students and staff. Presently there are around 10 color-coded dust bins. The wet waste generated in the campus is decomposed using the compost pit while the dry waste is burnt down.

3.1.5 Compost Pit

Composting though an old traditional method is still an effective method to increase nutrients in soils from organic wastes. It is a process in which waste is broken down biologically under controlled conditions so that the end product can be used for agriculture and horticulture as an effective eco-friendly fertilizer. Composting reduces the formation of leachate and methane formation, decreases volume of the waste, and also kills pathogens. It also reduces the chances of unwanted weed generation in the agricultural fields. It has been adopted by many municipal bodies all over the world as a viable method of waste management. With an increasing interest

in organic agriculture, the production of compost is simultaneously gaining popularity because of its positive effect on biological, physical and chemical characteristics of soil. It is an odour free process normally taking between three and six months depending on the handling of wastes and the period can be reduced by turning over the material regularly. Apart from preventing waste entering into dumpsites, composting process can enhance the fertility effectively because the soil of the campus is coarse and generally highly deficient in the organic matter. Compost can increase the humus content, moisture retaining capacity and fertility of the soils. Therefore, composting has promising prospects for the entire Kashmir valley because it can help in developing the horticulture and agriculture with the negative least impact on the fragile ecosystem. The college already has a compost pit with a dimension of 6x8 to manage the daily generated bio-degradable waste of the college. Daily 3.28 Kgs of bio-degradable waste is dumped in the compost pit. The compost obtained from the compost shed is used as a green manure in college flower beds, kitchen garden and apple plantation.



Fig.2: Compost pit of the college

4.1. Water audit

Water audit refers to the periodic exercises done to determine the water supplied into the distribution system and water lost and/or used within the distribution system. Water audit is aimed to establish the water consumption pattern in the individual sections, bench-mark the consumption levels with respect to best international practices, explore various pollution prevention and wastewater minimization opportunities. Water audits also provide platform to establish the performance of the existing water distribution systems as well as wastewater collection, treatment facilities and various wastewater recycling programs.

Table 3: Total Water storage capacity in the college campus

Source of water	No of water tanks to hold the water	Storage capacity (in litres)
Supply line of Jal Shakti Department, J&K		
Freshwater Spring in the College Campus	12	9000
Freshwater Stream running through the college Campus		

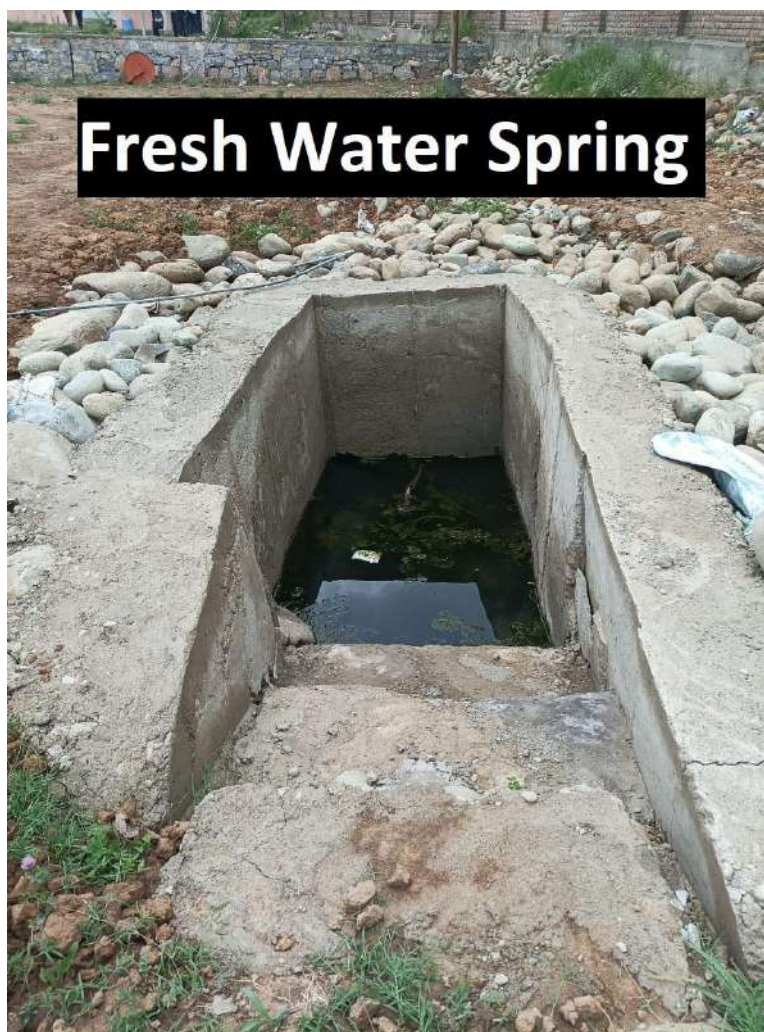


Fig.3: Freshwater Spring in the College Campus

To meet out the drinking water supply the college is entirely dependent on the supply line of the Jal Shakti Department, while as for irrigation purposes the college uses the water of the spring and the stream running through the college campus. The water from the spring and the nallah is driven using electric motors. The college has 12 tanks with capacity of 9000 litres to holding the water, out of which 3000 litres are consumed on daily basis.

Table 4: Magnitude of water consumption

Total number of individual on campus (Students + Staff)	Daily water consumption (litres)	Per capita water consumption per day (litres)
715+26= 741	3000	4.19

The rate of water computation is significantly lower in the college i.e. 4.19 litres/persons/day. Therefore, looking at nature of the water source and intensity of water consumption rate it is strongly recommended the college should start rain water harvesting especially for ground water recharge.



Fig. 4: Water shortage tanks

5.1: Energy audit

As per ISO 50002 standards, an energy audit is a systematic analysis of energy use and energy consumption within a defined energy audit scope, in order to identify, quantify and report on

the opportunities for improved energy performance. Energy Audit is a key to the systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use, and serves to identify all the energy streams in a facility. It quantifies energy usage according to its discrete functions. The energy is utilized in the campus for transportation, lighting, heating and cooling, running of lab instruments, appliances, water heating, ground water pumping, cooking, etc. The data regarding the energy consumption given in Table 5 indicates that the college utilises renewable as well as non-renewable energy sources to meet its energy needs.

Table 5. Sources of energy

S. No.	Energy Source	Consumption/ Potential/installed capacity
1	Solar	18 KVA installed capacity
2	Electrical	Potential installed capacity
3	Coal	18 Quintals
4	LPG	13 Cylinders
5	Diesel	200 litres

5.2: Solar energy

The spectrum of solar light at the Earth's surface is mostly spread across the visible and near-infrared ranges with a small part in the near-ultraviolet. Most of the world's population live in areas with insolation levels of 150–300 watts/m², or 3.5–7.0 kWh/m² per day. Thus the total power output of the sun is 64 x 10 times 6.09 x 10¹⁸ m², equivalent to 3.9 x 10²⁶ watts. It is without any doubt, an enormous amount of power when we consider that the entire world's energy. A solar cell, or photovoltaic cell, is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect, which is a physical and chemical phenomenon. As a nature friendly initiative the college has installed solar panels, or photovoltaic cells, with a total capacity of 18 KVA. The solar power system provides 24x7 power supply to the academic block, the administrative block and the library block of the college. All computers, smart boards, Xerox machines, lighting blubs, and other accessories are running on solar energy in these buildings.

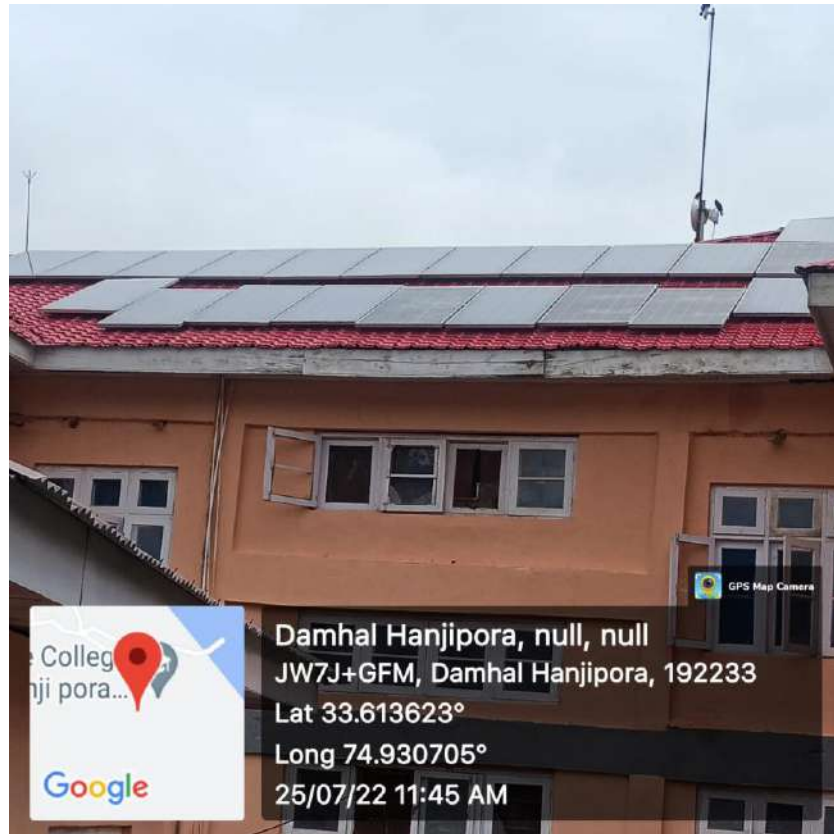


Fig. 5: Solar Panel on academic block

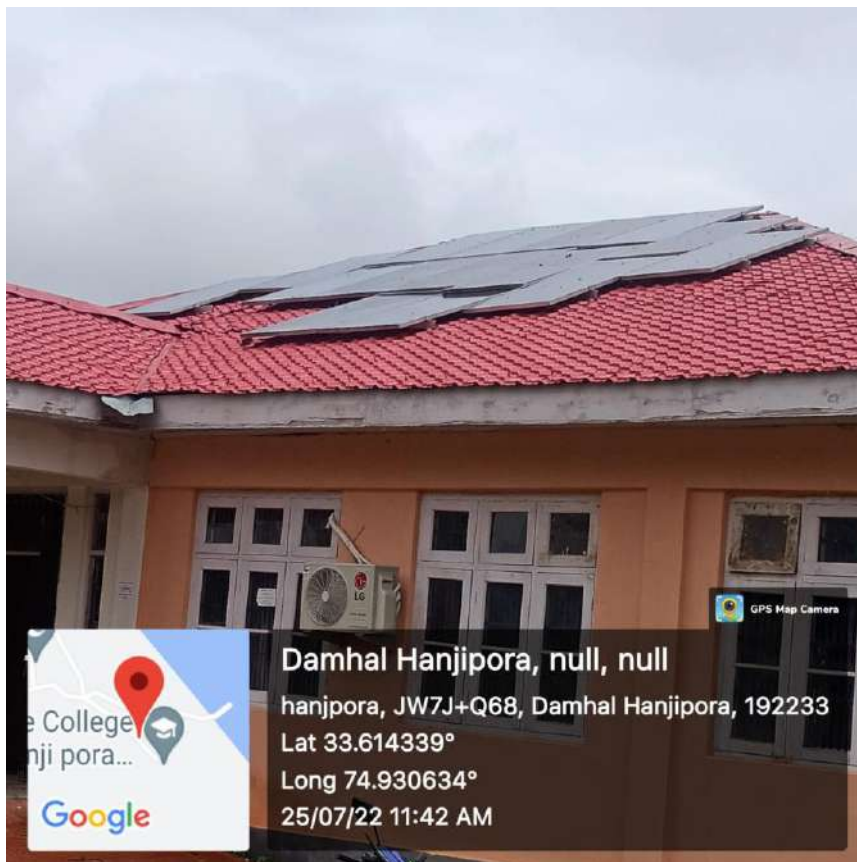


Fig. 6: Solar Panel on the administrative block

5.3 Coal

During the bone chilling cold winter conditions the college uses peat variety of coal, in order to keep classrooms, offices and examination halls warm. The college consumes about 18 Quintals of coal annually for this purpose. To ensure power burning of the coal, wood is used as catalyst. College uses about 7 quintal of brush wood annually for this purposes. However, it is not good source of energy because it produces many harmful gases such as Carbon dioxide and Carbon monoxide etc. So, in order to reduce the usage of this polluting source of energy the college has installed AC's in all the Classrooms and Office spaces.

6.5: Liquid Petroleum Gas:

LPG is another source of energy used in the college, commonly for heating purpose during the bone chilling winter season. As per the table 5 the college uses about 13 cylinders (342 litres LPG/year). In addition, the college about 200 litres of diesel are used annually in order to run the power generator

7.1: Plantation audit

Due to infertile and barren soil the college campus is poorly planted, however, we are trying our best to improve the soil conditions to subsequently increase the plantation cover. We have recently added some good soil to the college campus to improve the landscape by increasing the plantation and grass cover. Currently there are some 70 apple plants and 80 mulberry trees planted ion the college campus.



Fig. 7: Apple plantation in the college campus

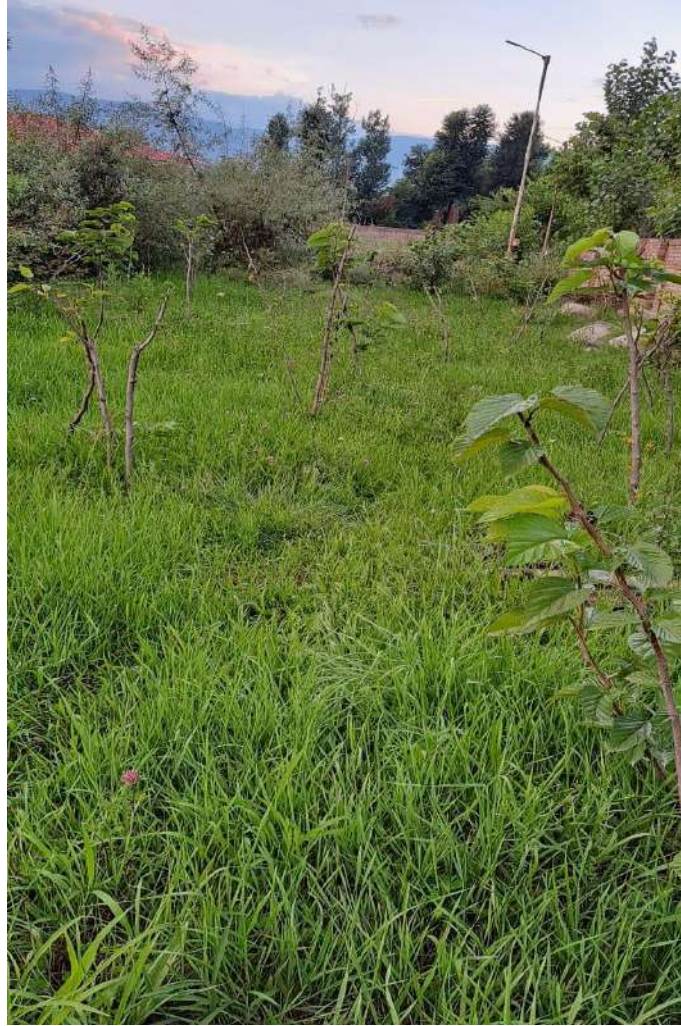


Fig. 8: Mulberry plantation in the college campus

Summary and Recommendations

This report is a pioneering attempt of the college towards its eco-friendly approach to carry on its activities as per environmental norms. Major part of the land is open with green spaces. To fulfil the growing energy needs, the college has installed solar power system in all its major building including the academic, administrative and library blocks. Though coal and LPG is still used during winters for heating purpose in working places and class rooms, we have installed AC's in all the classrooms and office places to reduce their usage. The college doesn't generate a huge amount of solid waste, however, out of the total quantum of the waste generated a large portion is biodegradable and is hence decomposed in the campus using a compost pit to be subsequently used in the kitchen garden and apple plantation. Facility for collection of wastes and disposal is provided by the institute itself in the form of colour coded dust bins. The water is stored in overhead storage tanks and the per capita water usage in the campus is about 4.19 litres per day. The wastewater produced in the washrooms is disposed-off using underground pits and septic tanks. The campus has a poorly developed vegetal cover comprising of some apple trees, mulberry plantation, and small deodars etc. meant for the beautification of the campus and subsequent environmental benefits.