Evaluation of Sustainable Concepts in Vvce, Mysuru

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***Abstract*—** With the construction sector experiencing an advent in growth, it is inevitable that this will have a negative impact on the environment. The four main goals of sustainability development are to create buildings that use less energy, less cost to operate and maintain, limit the impact on precious natural resources, and create places for people to work and live that promote health and productivity. The buildings should satisfy the goals of green or sustainable development. Vidyavardhaka College of Engineering (VVCE) which is one of the leading educational institution in Mysuru with huge infrastructure focused towards adopting sustainability. Keeping these aspects in mind an attempt was made to assess the sustainability components in VVCE. Aspects like water quality, energy usage, solar energy, vehicle data, green coverage are considered and constraints was analyzed and suggestion to improve few more aspect of sustainability in VVCE.

Keywords*— *Sustainability, Green cover, Solar panel, Vehicle count

I. INTRODUCTION

The global commitment to environmental preservation increases due to the current global warming phenomenon. Global warming and climate change are not illusions but real environmental problems to be resolved immediately.

With the construction sector experiencing an advent in growth, it is inevitable that this will have negative impact on the environment. The four main goals of sustainability development are to create buildings that use less energy, less cost to operate and maintain, limit the impact on precious natural resources, and create places for people to work and live that promote health and productivity. The buildings should satisfy the goals of green or sustainable development.

II. MATERIALS AND METHODOLOGY

A. Pre-treatment sampling procedure for water

Water samples were collected from all identified sampling points from Block A, B, C, D, E, G and MBA. The water samples was collected in low density polyethylene bottles with inside stopper. Again, the bottles was rinsed three times with the sample water prior to collection.

The samples were obtained directly from the water cooler after allowing the water to run for at least 02 min. Then the samples were carefully transported to the Environmental Engineering laboratory for analyses within short duration after collection with maintaining the temperature of 4°C for the determination of physico-chemical parameter. All analyses were carried out as per Standard methods (2017). The methodology carried is shown in the Fig.1.

III. RESULT AND DISCUSSION

A. Water quality and effluent concentration

The water samples collected from the blocks were analyzed and the results of parameter analyzed were depicted in Fig.2. The graph clearly indicates that the pH assessed are within the permissible limit as per BIS. Similarly the TDS, Chlorides, Fluoride, Total hardness, Calcium hardness, BOD, Nitrate, Phosphate, Sulphate and Iron concentration were found to be within the permissible limits of BIS. Hence the RO units which is used for drinking water are in good condition and hence the water is fit for drinking purpose. The effluent analysis carried out and analyzed for BOD, COD, Nitrate, Iron and Phosphate showed that the treatment is effective and the treated effluent can be safely used for gardening.

A. ENERGY CONSUMPTION DETAILS

The effort for the energy consumption reduction in college campus is certainly needed by the following reason; first, contribution for the reduction request about green house gas emission. Second, energy cost reduction in college campus. Hence the data was collected by counting the number of lights, fan and AC in the A, B, C, D, G, H and MBA blocks. The data indicates that there is sufficient number of energy sources to provide light and to keep the place cool. During data collection it was observed that due to lack of intensity of

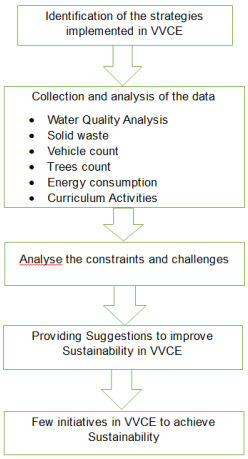
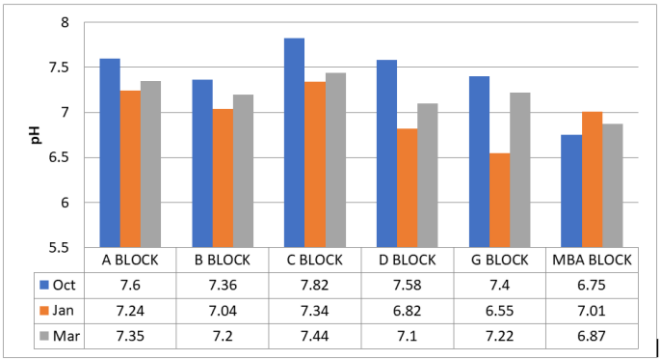


Fig.1 Methodology adopted



	A BLOCK	B BLOCK	C BLOCK	D BLOCK	G BLOCK	MBA BLOCK
Oct	7.6	7.36	7.82	7.58	7.4	6.75
Jan	7.24	7.04	7.34	6.82	6.55	7.01
Mar	7.35	7.2	7.44	7.1	7.22	6.87

Fig. 2 pH

light in many class rooms, students rely on light source even during peak sunlight. This clearly indicates that the building was not well designed for maximum entry of sun light.

B. SOLAR ENERGY

Solar energy is type of energy generated from the sun. The energy is used to generate electricity using technologies like solar power, solar panels. These solar panels will absorb radiation from the sun and then this solar energy is converted into electrical energy which is used further.

At VVCE, solar energy is trapped by using solar panels. Solar panels are installed in A-block, B-block, and C-block. The data related to electricity consumption and solar power generated in the year 2023 was collected. Here the power is measured in kwh and amount corresponding to solar power generation is calculated. And total savings is also calculated by using the electricity board bill and amount corresponding to solar power generation. The Solar energy generated in the year 2024 from Jan-May was collected. In the month of January about 9506kwh power is generated, similarly, in February 14926kwh, in March 14719kwh, in April 14371kwh and in May 5167kwh was generated.

C. INTENSITY OF LIGHT

As per IS.10894.1984 the intensity of light for the classroom, Lecture room, reading room, Laboratories, Libraries in educational institution is 300(Lux) & for corridors it should be 70 and also for staff room it should be 150.

As per the results obtained, the light intensity obtained is less than the Standards, which leads to adoptions the artificial lights. The intensity of light at class rooms, laboratories, staff room, office and at A, B, C, D, E, G, H and MBA blocks. The data clearly shows that in none of the class rooms the intensity of light is less than the Standards. The lighting in educational institutions should improve concentration periods as well as leisure time; it should ensure the visual comfort and safety of all people. It is therefore critical to select the proper lighting systems that create the optimal visual setting and offer an environment that is conducive to learning. To create that conducive environment intensity of light is increased by using artificial light. About 1077 numbers of light is being used to get high intensity of light in all the blocks. This indicates the high consumption of electric energy. Maximizing the use of natural light is the ideal formula: it helps create the best possible climate and leads to significant energy savings. Additionally, as natural daylight impacts students' biological rhythms, it also improves their well-being, their productivity as well as their ability to concentrate. The design of building could have properly designed to get natural light which would have increased natural light penetration inside the building.

D. TREES COUNT AND GREEN COVERAGE

According to policy action plan of Office of Natural Resources and Environmental Policy and Planning (ONEP) that has suggested at least 30% of the land parcel being the sustainable green are in urban education institute. As per the stipulations of MoEF, greenbelt is to be provided all along the boundary by planting tall, evergreen trees and the total green area including landscaping area will be 1/3rd (about 33%) of the plant area (Fif. 4).

Fig.3 Solid waste

Fig.4 Tree sample

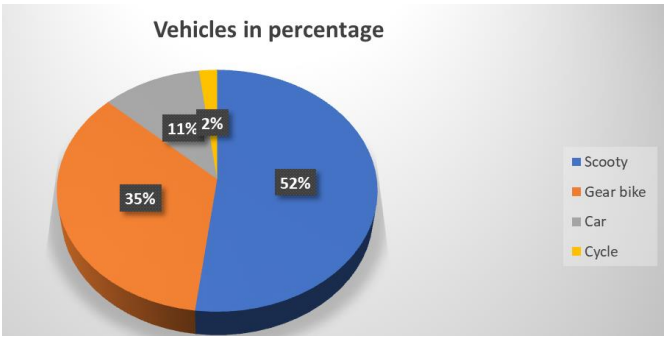


Fig.5 Tree

Total green coverage area= 12154.51m^2

- Percentage of green coverage is calculated by locating green cover/area in VVCE campus using google map.
- Total green cover area is calculated and total peripheral area is also calculated and both are considered for calculating percentage of green coverage.

- Total green coverage area divided by Total peripheral area multiplied by 100, gives the percentage of green coverage in the campus.
- The Percentage of Green Coverage = (12154.51/48062.02)x100
- Percentage of Green Coverage obtained is 25.28%.

E. SOLID WASTE DATA COLLECTION DETAILS

Solid waste data is collected at different locations of VVCE campus. Solid waste is calculated by weighing the waste. Normally in VVCE solid waste which is generated in the campus is collected by the workers and then it is handed over to the Vehicle from Municipal Corporation, Mysuru which collects the waste by segregation (Fig. 3).

F. VEHICLE EMISSION

Vehicles emits air pollutants like carbon dioxide, carbon monoxide, nitrogen dioxide and these pollutants harms human health by causing serious respiratory problems, and also cause climate change. When internal combustion in vehicle is not proper then the vehicles releases harmful pollutants into the air.
So, to overcome these type of problems emission test should be done for every vehicle. Emission test is mandatory for vehicles.
Vehicles data is collected by calculating the number of vehicles at different intervals of time in all parking areas of VVCE. Vehicles like four wheelers, two wheelers are considered. And observed that the number of two wheelers like Scooty, Gear bikes are more in all the parking areas compared to the cars. And number of Cycles are less in numbers (Fig. 5).
In the college, as per the data collected approximately 78% of the vehicles is having vehicle emission test. The vehicles should meets the emission standards prescribed by Rule 115(2) of CMVR 1989. Then that certificate is valid all around the India.

CONCLUSION

- Water quality analysis has been done and the resulted showed that the concentration of all the parameters analysed are within the limits (As per IS 10500, 2012) and hence the water is fit for drinking.
- Light intensity is checked using lux meter and as per IS.10894.1984 the result showed that the intensity of light is less than the standard values in all the rooms
- Energy consumption data is calculated by considering both electrical and solar energy and savings is calculated.
- Solid waste segregation and disposal methods are known and amount of waste generation is calculated as around 100-150 kg/day.
- Vehicle count is done and suggestion is made on emission test for vehicles.
- Tree count inside campus showed that the percentage of green coverage is 25% which is less than the 33% (as per MoEF norms)
- Percentage of sustainable concepts in curriculum is 12.5%
- Awareness about sustainability amongst students and staff is required in all aspects

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