

## CERTIFICATE OF COMPLETION

*This is to certify that*

---

*Sri Chintalapati Varaprasada Murthy Raju*  
*Government Degree College*

---

*has successfully completed*

GREEN LAND SCAPE AUDIT

The study was completed by Rekhapalli Environmental Solutions &  
Technologies Pvt Ltd



Dr Rekhapalli Srinivasa Rao

*Green, Eco & Energy Lead Auditor*  
*Certified ISO-14001 Auditor*



Issued by

**Rekhapalli Environmental Solutions & Technologies Pvt Ltd**

Aug 2021



## Green Landscape Audit

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# Acknowledgements

REST Pvt Ltd

**Dr Rekhapalli Srinivasa Rao**  
Green, Eco & Energy Lead Auditor  
Certified ISO-14001 Auditor

31 Aug 2021

## Green Landscape Audit

The REST Pvt Ltd acknowledges with thanks the cooperation extended to our team for completing the study at Sri Chintalapati Varaprasada Murthy Raju Government Degree College (SCHVPMR) by Eco-club team and Staff.

We deeply appreciate the interest, enthusiasm, and commitment of SCHVPMR team towards environmental sustainability.

We are sure that the recommendations presented in this report will be implemented and the SCHVPMR team will be further improve their environmental performance.

Kind regards

Your sincerely



**Dr Rekhapalli Srinivasa Rao**

Green, Eco & Energy Lead Auditor  
Certified ISO-14001 Auditor  
REST Pvt Ltd

# Executive Summary

The growth of countries across the world is leading to increased consumption of natural resources. There is an urgent need to establish environmental sustainability in every activity we do. In a modern academy, environmental sustainability will play a critical role in the very existence of an organization.

An educational institution is no different. Built environment, especially an educational institution, has a considerable foot print on the environment. Impact on the environment due to energy consumption, water usage and waste generation in an educational institution is prominent. Therefore, there is an imminent need to reduce the overall environmental footprint of the institution.

As an institution of higher learning, Sri Chintalapati Varaprasada Murthy Raju Government Degree College (SCHVPMR) firmly believes that there is an urgent need to address the environmental challenges and improve their environmental footprint.

True to its belief, SCHVPMR maintain an excellent landscaping in its campus. The whole campus is lush green, and trees are seen everywhere around the campus. REST congratulates the SCHVPMR for their efforts to create a truly green campus.

Based on the data submitted by SCHVPMR team, following improvement opportunities have been identified in the campus in terms of landscaping.

- Implement ecosystem restoration by development of theme gardens in used areas of the campus
- Develop green corridors between existing areas in the campus
- Develop natural areas to encourage bird roosting and nesting in built-up areas
- Increase tree density and canopy cover in the built-up areas by planting more fruit yielding trees.
- Conduct regular flora surveys for improving the existing data
- Develop strategies for regular monitoring prevention of invasive plant species.

By addressing the improvement opportunities, the campus would be able to achieve the following benefits:

- Identifying & implementation of proper measure for conservation of endangered floral species in the campus
- Reduce the microclimate temperature of the campus by 1-2° which is significant
- As many of the species have the capability to absorb contaminants in the air and therefore this would lead to better air quality in the campus
- This can evolve as an excellent educational campus for spreading awareness on biodiversity and benefit the nation at large.

# Introduction

## **Urbanisation and its effect on loss of biodiversity**

Urbanization causes biodiversity to decline. As cities grow vital habitat is destroyed or fragmented into patches not big enough to support complex ecological communities. In the city, species may become endangered or even locally extinct as natural areas are swallowed up by the urban jungle.

Ironically, it is urban growth that is often responsible for the introduction of non-native species, either accidentally or deliberately, for food, pets or for aesthetic reasons.

## **Documentation of Flora**

Knowledge on biodiversity of any geographical region is a paramount importance for sustainable management and conservation plans. The foremost task in the conservation process is to prepare an inventory of species. It is necessary to have full knowledge regarding the habit, habitat, distribution and phenology of various plants for their proper conservation.

The documentation of flora will help in identifying, documenting and promoting the conservation of native flora in India. This in turn will help in promoting native species for landscapes as they suit one growing interest in “Low maintenance” gardening and landscaping.

Many species are vigorous & hard and can survive winter, cold, and summer heat. These species once established, can flourish without irrigation or fertilization and are resistant to most pests & diseases.

## **Need for documentation of Flora**

The knowledge building on significance and importance of various flora existing around us is the need of the hour. Loss of the biodiversity is likely to result in loss of various other taxonomic groups.

## **Serve as a ready reckoner:**

Most of the campuses have huge landscape with diverse floral species. Nevertheless, the availability of information on these species is minimal. Hence, the documentation of the species would serve as an educational material on the details of species existing within the campus.

**Public Visibility:**

Despite having various biodiversity initiatives in place within the campus most of the campuses lack the visibility of the measures taken in conservation. The study will create awareness & visibility of the campus on various conservation measures implemented to the occupants as well as to the visitors.

Also, the organization will gain globally amongst its shareholders for the positive steps taken towards protecting biodiversity.

**Conservation of Species:**

Due to Urbanization most of the floral species are under tremendous pressure. The need of the hour is to conserve and protect these species. The study would help in identifying such species in the campus which need to be conserved.



# SCHVPMR carbon sequestration through plantation

Carbon sequestration through plantation is one of the important steps towards achieving carbon neutrality. In carbon footprint calculation of SCHVPMR, carbon sequestration through plantation is considered and due credit has been given.

No. of trees considered for carbon footprint calculation	: 80 trees
CO2 absorbed by a tree in one year	: 18 KG
Total CO2 sequestered	: 80trees x 18 KG of CO2/year : 1440 KGS of CO2





# Plantation & Maintenance techniques

## Selection of species

- Native species like *Azadirachta indica* (Neem), *Pongamia pinnata* (Pongam tree), *Cassia fistula* (Indian shower tree), *Butea monosperma* (Flame of the forest) and also fruit bearing species like *Mangifera indica* (Mango), *Manilkara sapota* (Chikoo), *Syzygium cumini* (Jamun Tree), *Psidium guajva* (Guava), *Annona squamosa* (Custard apple), *Punica granatum* (Pomegranate), *Phyllanthus emblica* (Indian Gooseberry), *Citrus sinensis* (Sweet lime) and *Citrus limon* (Lime) to be selected for plantation
- Saplings of 2-3 ft height to be considered for plantation in public areas
- Plantation can be taken up as avenues (roadside plantation) and green belts (thick plantation in one area)
- Fruit plantation can be taken up in protected areas, institutions with large areas. Special care to be taken in maintenance since these plants also generate revenue

## Digging of pits

Pits to be dug about one month prior to the plantation date and it should be exposed to sunlight

This will help in killing of harmful disease-causing bacteria and virus.

1. In places of no availability of proper sunlight, dry trash to be filled in the pit and burnt.
2. Pit size should be normally 2ft or 3ft and in soils which are very hard 4ft<sup>3</sup> or above to be dug.
3. Further to the digging of pit, the bottom of the pit should be loosened up to 6-9 inches.
4. While digging, we can observe different soil profiles. Topsoil will be soft and contains enough nutrients for nourishing the plant. The topsoil should be deposited on one end and hard soil on the other end. While filling the pit with soil, the topsoil only should be used. The topsoil from the non-plantation area around the pit to be collected and mixed with manure and used for filling of the pit.

## **Transportation**

- Visit to the nurseries and enquire about plant species like availability, size, age and girth prior to the plantation. Also, the size of the packet in which the plant is existing to be enquired.
- Ensure that the material is available in the nursery and allotted to pick up
- The saplings to be watered one or two days prior to the movement of plants to plantation area
- The plants to be procured at least 15 days prior to plantation.
  - The saplings to be watered as soon as they reach the plantation area and regularly thereafter.
  - They should be kept in shade, non-windy & protected areas.

The above said steps to be followed for movement of plants near to the pits within the plantation area. Enough water to be stored for watering the plants after plantation. Also, tools and manpower to be kept in place to ensure proper plantation of saplings. If the sapling is bushy with many branches, then the branches are to be trimmed before plantation.

## **Plantation**

- The poly bag around the root ball to be carefully cut with a knife / sickle / scissors without disturbing the roots
- Rope and stakes are to be kept ready to support the plant after plantation.
- Regular watering to be done to the plants followed by mulching (loosening of top 3-4 inches of soil)
- Mulching will help in conservation of moisture, aeration of roots and control of weeds.
- Note: At least 5% of extra plants to be procured for timely gap filling and to ensure 100% survival. Care to be taken for these plants like other plants.

# Recommendations for Enhancing Flora in Campus

## 1. Implement Ecosystem Restoration

- Theme Gardens' can be developed in unused areas of the campus to increase proportion of natural area

## 2. Enhance Ecosystem Protection

- Protect and maintain the existing Open Area segments

## 3. Planting more fruit yielding trees

- Increase tree density and canopy cover in the built-up areas

## 4. Increase number of Native Plants in the Landscape area

- Increase native plants to boost native biodiversity
  - Bees, butterflies and other insects
- Healthy native plant growth will help in easy identification of invasive alien species

## 5. Introduce more native species in Open Areas

## 6. Preventing/ Decreasing Invasive Alien Species Spread

- Identify potential threatening species in advance and implement quarantine measures
- Mass Eradication techniques for larger spreads
- Commitment to complete eradication
- Manual Uprooting of small populations

## 7. Develop natural areas to encourage bird roosting and nesting in built-up areas

## 8. Improve measures for rainwater harvesting in paved and un-paved areas

- Open fields, parks, pavement landscapes, etc.
- Open Classroom

# Conclusion

As seen in the carbon sequestration calculation, tree plantations lead to a tremendous reduction in net emissions of the campus. Therefore, SCHVPMR needs to develop a roadmap to include tree plantation as a strategy to reduce overall carbon emissions of the campus.

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ENVIRONMENTAL AUDIT

(WATER & WASTE MANAGEMENT)

The study was completed by Rekhapalli Environmental Solutions &  
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# Environmental Audit (Water & Waste Management)



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31 August 2021

## Environmental Audit (Water & Waste Management)

The REST Pvt Ltd acknowledges with thanks the cooperation extended to our team for completing the study at Sri Chintalapati Varapasada Murthy Raju Government Degree College (SCHVPMR).

The interactions and deliberations with SCHVPMR team were exemplary and the whole exercise was thoroughly a rewarding experience for us. We deeply appreciate the interest, enthusiasm, and commitment of SCHVPMR team towards environmental sustainability.

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As an Institution of higher learning, Sri Chintalapati Varapasada Murthy Raju Government Degree College (SCHVPMR) firmly believes that there is an urgent need to address the environmental challenges and improve their environmental footprint.

True to its belief, SCHVPMR has implemented rainwater harvesting in the campus. Continuing with rainwater harvesting, the college can also investigate the following recommendations:

- **Attain water positive status:** SCHVPMR should focus on capturing the harvested rainwater to substitute freshwater consumption, work on sustainable groundwater beyond the fence and create a framework towards attaining water positive status over a period. Presently, SCHVPMR is consuming nearly 1500 L of fresh water per day. Since metering is not available, the water consumption is calculated rather than measure value. The first step is to increase the water conservation activities in the campus to reduce water consumption at source. The next step is to increase the rainwater harvesting capacity to completely offset the freshwater requirements of the plant. Sri Chintalapati Varapasada Murthy Raju Government Degree College can also explore adopting lakes, desilting of ponds and restoration of water bodies in localities surrounding the campus. Water getting harvested in those structures can offset the freshwater consumption of the college.
- **Install water efficient fixtures:** The best way to conserve water is at the source. Therefore, SCHVPMR will have to install water efficient fixtures to reduce water consumption. Some of the water efficient fixtures are:
  - Waterless urinals
  - Electronic taps (e-taps)
  - Electronic flush urinals (e-flush)
  - Foam taps
  - Spring loaded push taps
  - Low flush cistern
- **Install water flow meters:** Water flow meters are vital in understating the water consumption patterns of the campus. Presently, the water consumption is calculated rather than being

measured. Water flow meters gives an accurate status if water consumption in the campus and from the water consumption values, the roadmap for water conservation activities can be prepared.

- **Segregate waste at source:** SCHVPMR has provided bins for waste collection. SCHVPMR must embark on awareness creation methods to increase the effectiveness of collection and provide more bins for proper waste segregation.

# Environmental Audit

SCHVPMR and REST are working together to identify opportunities for improvement in water management, and waste management. This report highlights all the potential proposals for improvement through the audit and analysis of the data provided by SCHVPMR for water consumption and waste management. The report details the process conducted for the analysis such as on ground surveys performed for listing the type of water consumers with consumption per year, types of waste generated and disposal mechanisms.

## Submission of Documents

Environmental audit at SCHVPMR was carried out with the help data submitted by SCHVPMR team. SCHVPMR team was responsible for collecting all the necessary data and submitting the relevant documents to REST Pvt Ltd for the study.

## Preliminary Study

After the receipt of documents, a desktop review of the data for quality check, followed by preliminary study was carried out by Sustainable Living Inc. In case of discrepancy/inadequacy/non-clarity of data, REST Pvt Ltd team got in touch with the SCHVPMR team for clarification/additional information.

## Environmental Audit

Data submitted and collected during the visit was used to assess the water and waste management practices of the campus and finally provide necessary recommendation for environmental improvement.

## Note

Environmental audit is based on the data provided by SCHVPMR team. The scope of the study does not include the exclusive verification of various regulatory requirements related to environmental sustainability.

REST Pvt Ltd has the right to recall the study, if it finds (a) major violation in meeting the environmental regulatory requirements by the location and (b) occurrence of major accidents, leading to significant damage to ecology and environment.

# Water Conservation

To achieve a water positive status by continuous reduction of freshwater consumption should be the ultimate focus of SCHVPMR. Increased and focused attention should be given to attain water sustainability in future by inculcating the discipline of water conservation.

Fresh water consumption of SCHVPMR college : 1500 L per day

Rainwater harvesting : Carried out for roof area

According to the report, 'Water in India: Situation & Prospects', India is the largest consumer of groundwater in the world with an estimated usage of 230 km<sup>3</sup> per year. Approximately 60 per cent of the demand from agriculture and irrigation, and about 80 per cent of the domestic water demand, is met through groundwater. As per the Department of Drinking Water and Sanitation nearly 90 per cent of the rural water supply is from groundwater sources. This has led to an increased pressure on aquifers and the resulting hydrological imbalance.

## Recommendations for water conservation

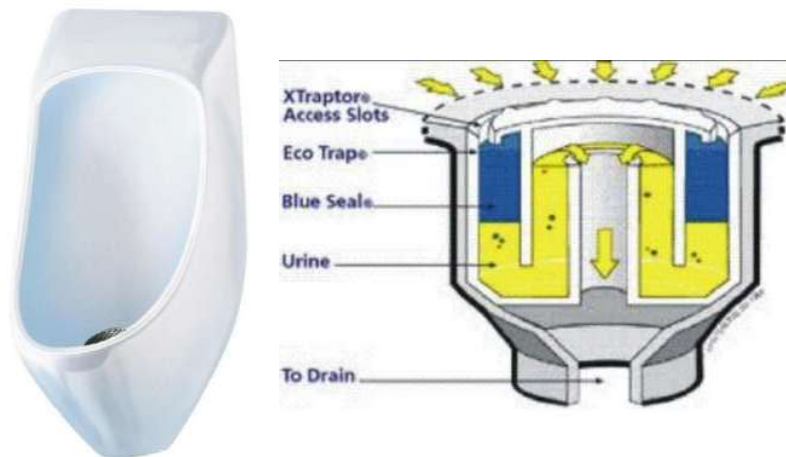
**1) Waterless urinals:** Waterless urinals look like regular urinals without a pipe for water intake. Men use them normally, but the urinals don't flush. Instead, they drain by gravity. Their outflow pipes conduits to a building's conventional plumbing system. In other words, unlike a composting toilet, which leaves you to deal with your waste, these urinals send the urine to a water treatment plant.

a. Urine flows into the drain insert of the EcoTrap.

b. Inside of the EcoTrap the urine moves through a floating layer of proprietary immiscible Blue Seal liquid, which creates a barrier, preventing sewer gases and urine odours from entering the restroom area.

c. The urine below the Blue Seal barrier overspills into the central tube and travels down into the drain line.

Waterless Urinal



d. Approximately 1500 sanitary uses are possible with just 3 ounces of BlueSeal. When the BlueSeal liquid is gone, it is simply replenished. This only takes about 20 seconds to perform and the EcoTrap is not touched.

e. Urine sediments are retained within the EcoTrap. Replacement is easy and need only be done 2 to 4 times per year depending on traffic to the urinal. As tool called the X-Traptor must be used to remove the EcoTrap. The use of the special tool helps to minimize vandalism. The entire process of replacement only takes 3 to 4 minutes.



Waterless urinals are available for women. Indian manufacturers are supplying waterless urinals technology. Ekameco is one such company providing solution for women waterless urinals. You may visit [www.ekameco.com](http://www.ekameco.com) and mail [info@ekameco.com](mailto:info@ekameco.com) for more details on waterless urinals for women.

2) Volume reduction in flush tanks: One simple method is to add a one-liter equivalent water bottle in the flush tank thereby reducing its consumption majorly. One-liter savings in the tank will help to save approximately by 20% and doesn't require any investment.



3) Rainwater harvesting: Water harvesting or more precisely rainwater harvesting is the technique of collection and storage of rainwater at surface or in subsurface aquifer, before it is lost as surface run off. In artificial recharge, the ground water reservoirs are recharged at a rate higher than natural conditions of replenishment. According to a report by the Central Groundwater Board published in 2007, the selection of a suitable technique for artificial recharge of ground water depends on various factors. They include:

- a) Quantum of non-committed surface runoff available
- b) Rainfall pattern
- c) Land use and vegetation
- c) Topography and terrain profile
- d) Soil type and soil depth
- e) Thickness of weathered / granular zones
- f) Hydrological and hydrogeological characteristics
- g) Socio-economic conditions and infrastructural facilities available
- h) Environmental and ecological impacts of artificial recharge scheme proposed



### Rainwater Harvesting Techniques in Urban Area

In urban areas rainwater is available from roof tops of buildings, paved and unpaved areas. This water could be stored and used to replace freshwater as well as used for recharging the aquifer.



4) Display water balance/conservation status at entrance of all blocks for overall involvement of all students & staff.

It is suggested to display specific water consumption numbers in terms of domestic use at the entrance of each blocks to create awareness among all students and stakeholders visiting the facility. This daily/continuous awareness creation will ultimately help in reduction of water consumption by students.

## Water Saving Gadgets

It is suggested to display specific water consumption numbers in terms of domestic use at the entrance of each block to create awareness among all students and stakeholders visiting the facility. This

### Electronic Taps (e-taps)

The latest trend in industries is to install electronic taps (e-taps). The advantages of using e-taps are as mentioned below:

- Unlike conventional taps, there is no twisting or turning in e-taps. They have a sensor, which cuts off water supply completely when not in use. This helps in saving up to 70% water during hand wash.

E-taps enable hands free operation. No fear of cross contamination or contact with germs. E taps score very high on hygiene. It is the most ideal choice for multipurpose and multi-user washrooms.

- E-taps can work efficiently up to raw water TDS of 1,800 ppm.

The touch free electronic taps, available in AC and DC models consume minimal power only. The AC model has an efficient battery back-up, while the DC model runs on just 4 alkaline batteries.



### **Hand wash**

#### **Foam taps**

Conventional taps are used in the hand wash areas which results in wastage of large quantities of fresh water. Foam taps are a better fit in these high consumption areas. They consume 25-30% less water than conventional taps.

Foam taps



### **Spring loaded Push taps**

Spring loaded push type tap is an alternate device for minimizing hand wash water. The spring-loaded push taps operate with the simple mechanism of pressing the knob for water. The knob is automatically released back to close position in 5-7 seconds. This saves about 30-40% of water compared to the conventional taps.

Spring loaded push taps



### **Low flush cistern**

The latest model closets are water efficient and operate in dual mode, with a single flush releasing 2 litres of water and the dual flush releasing 4 litres per flush. This results in excellent water savings.

## Low flush cisterns



### **Install water flow meter:**

Water flow meters are vital in understating the water consumption patterns of the campus. Presently, the water consumption is calculated rather than being measured. Water flow meters gives an accurate status if water consumption in the campus and from the water consumption values, the roadmap for water conservation activities can be prepared.

Water Meters would have many advantages:

- Encourage water conservation - important given strain on water resources
- Encourage allocatively efficient distribution. People would consume to where the marginal cost = marginal utility
- In long term lower overall water consumption would reduce leading to even lower water bills.



## Waste Management

India has drawn world's attention with its high paced urbanization and industrialization. Over the last decade, India has emerged as the fastest growing country with rapid economic growth. A renewed focus on sustainable growth and development is imperative as India strives to maintain its high GDP growth rate in its pursuit of achieving developed country status by the year 2022. However, the flip side of higher economic growth has resulted in increased consumption of the natural resources, increased waste generation and hence ecological degradation.

Present status: has initiated waste management activities inside its facility. Separate bins have been provided for different types of wastes. Waste bins are provided throughout the campus and students are being urged to use the bins effectively.

Recommendation: The waste management yard must be maintained in a similar fashion as that of a raw material storage room. Therefore, a total revamp of the waste storage yard is to be carried out. By doing so, the quality of the materials stored in the yard will not deteriorate and can be used a raw material for a subsequent process.

Enhance awareness creation, training and capacity building

SCHVPMR should focus on implementing sustainable waste management practices. SCHVPMR should regularly interact with Pollution Control Board and TSDF operators to enhance knowledge on waste management. The team should also take efforts to communicate the waste management and other policies and activities to all students in the college.

Achieve zero liquid discharge status

SCHVPMR may install a STP to treat and recycle water. The treated water from STP can be used to substitute freshwater by utilizing the treated water in both high end and low-end applications.

# Conclusion

Environmental sustainability is a continuous process and there is always a scope for improvement. SCHVPMR has displayed itself as an advocate of environmental sustainability by getting environmental audit carried out. The organization has implemented several initiatives and measures to enhance efficiency and to optimize resource intensity. The journey ahead in the path towards environmental excellence has immense scope for improvement as brought out by this report.

SCHVPMR college needs to focus and work on areas efficiency levels needs to be enhanced. For example: waste management. The observations and suggestions put forth by the report would help the facility in improving its environmental performance and pave way for ecologically sustainable growth.

This report may be taken as a guide and roadmap for achieving higher performance rating in environmental stewardship. As one of the pioneers and leaders SCHVPMR degree college shoulder the task of further 'learning-teaching-learning' to improve, excel, and continue the innovative efforts for success of their students and associates.