

WATER AUDIT 2021 – 2022



1. INTRODUCTION

Water auditing is a method of getting an objective water balance by measuring the flow of water from the outlet point or treatment through the distribution system and into the areas where it is used before being discharged. People around the world are becoming more aware about the importance of water to their daily lives. This awareness crosses political and social boundaries. In many places, people have difficulty in accessing clean drinking water which is often polluted. In future, as demand for water increases, water audits will become more important for conserving water. Water auditing is a method of quantifying water flows and quality in simple or complex systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. There is an increasing awareness around the globe of the centrality of water to our lives.

Water is one of the most important substances on earth. All plants and animals must have water to survive. If there was no water there would be no life on earth. Therefore, it is a prime responsibility of St. John's College Anchal, management to meet basic water requirement of college staff, students and visitors in the college campus.

2. OBJECTIVES

The water audit of St. John's College, Anchal is carried out in order to list out the availability, use, purification, and recycling of the water resources of campus and to suggest recommendations if need any.

3. METHODOLOGY

Reconnaissance survey was carried out to find out the major water consumption and wastewater generation sectors in the college. Routine water quality analyses were carried out by Department of Environmental Science according to standard methods to assess the potability of drinking water. Quantification of water consumption and wastewater generation was carried out based on per capita consumption per day (approximately 1.5 L per day) and out of which 70 — 80 per cent are discharged as wastewater. The data has been collected from every department based on Questionnaire based survey with the help of students, teachers and non-teaching staffs.

PG and Research Department of environmental sciences is affiliated to Kerala State Pollution Control Board for the drinking water quality testing for the public (Reg. No. PCB/CL/RL/24/2019), they are frequently conducting the water quality testing to assure the potability of the drinking water.

4. WATER SOURCES

The campus has a well-maintained pond at the boarder of the campus, two open wells including the well located nearby the College Canteen. The water from the wells is used on a daily purpose. One rainwater harvesting plants have been constructed in the campus to store rainwater.

Table 1. Details of Water source

| Sl. No. | Location |
|---------|--|
| 1 | Well maintained pond near main play ground |
| 2 | Open well near RUSSA Building |
| 3 | Open well near Canteen |
| 4 | Rain water harvesting tank |



1. Rain water harvesting tank; 2. Open well; 3. Well-maintained pond

5. WATER USAGE AND STORAGE

Water usage refers to the use of water from various sources for various activities such as use in the canteen, academic buildings, gardens, grounds etc. Water is used on campus for both drinking and non-drinking purposes. Non-drinking purposes include toilet and bathing, watering plants etc.

There are numerous water outlets for students and a water cooler in the college campus. It is found that approximately 194 taps, 3 coolers, and 25 flush tanks are in working condition within the campus.

Table 2. Details of main outlets in the campus

| Sl. No | Main outlets | Number |
|--------|--------------|--------|
| 1 | Taps | 194 |
| 2 | Coolers | 3 |
| 4 | Flush tanks | 25 |

Selected photos of water usage



6. WATER CONSERVATION

As water is an essential condition of life on this planet, water resources have been a decisive factor in the growth and development of human civilizations throughout history. Maintaining purity of water resources to the utmost level is of prime importance to meet the new challenges of the modern society especially in an educational institution. Non-availability of good quality drinking water is a critical problem in most of the areas of Anchal Grama Panchayat especially during summer months. Groundwater has been the mainstay for meeting the domestic needs of the college besides, fulfilling the irrigation needs of gardens. However, the groundwater potential of this region is comparatively very low as compared to that of many other parts of the State. The groundwater level receding drastically during the summer months and drying up of the wells are common features.

Methodology

7. WATER CONSUMPTION

Major water consumption areas in the college can be summarized as in Table 3. Hand washing and bathroom facilities were found to be consuming major portion of water, which is followed by Zoology and Botany lab, Chemistry lab, Gardening, canteen, and environmental science laboratory. As per the strength of students and staff, approximately 2000 L of water was consumed per day and annual water consumption may come around 380 KL. Percentage of consumption may change according to different factors like seasons, practical exams and project works, etc.

Table 3: Significant Areas and Annual Water Consumption in Percentage

| Sl. No. | Priority Areas | Percentage |
|---------|----------------------------------|------------|
| 1 | Hand Wash and Toilets | 53 |
| 3 | Zoology and Botany Labs | 13 |
| 4 | Chemistry Laboratory | 12 |
| 5 | Gardening | 9 |
| 6 | Canteen | 8 |
| 7 | Environmental Science Laboratory | 5 |

8. WASTEWATER GENERATION

Wastewater generation was generally from hand wash areas and toilets, washing and cleaning facilities of canteen, washing of glasswares in the laboratories, running of distillation and

Soxhlet apparatus. Approximately 1400 — 1600 liters of water was discharged as wastewater per day and the annual discharge comes about 266 — 304 KL.

9. WATER QUALITY AND WASTEWATER MANAGEMENT

Water source for drinking and domestic activities is mainly coming from a well-maintained pond and open well located within the campus. Drinking water quality analysis revealed that the groundwater is suitable for drinking purposes after disinfection or heating. The water quality analysis report of the water sample is summarized in Table 4. Besides, the college is successfully running a rainwater harvesting tank of capacity 1.5 lakh liters to meet the demand of water during summer months. Analysis report of rainwater stored in the harvesting tank is also done along with others. Both the above water resources adequately meet the demand of water in college campus. The PG and Research Department of Environmental Science of the college periodically tested the microbiological count of the water from the different sources and validated that water can be used for drinking.



Rainwater harvesting tank of capacity 1.5 lakh Liters

Table 4: Results of water quality testing

TEST REPORT OF WATER SAMPLE

| Sl. No. | Parameters | C1 | C2 | C3 | C4 | C5 |
|---------|---|-------|-------|-------|-------|-------|
| 1. | pH | 6.22 | 6.42 | 6.25 | 6.65 | 6.31 |
| 2. | Conductivity ($\mu\text{S/cm}$) | 168.3 | 53.51 | 130.9 | 86.58 | 171.6 |
| 3. | TDS (mg L^{-1}) | 134.8 | 48.82 | 104.1 | 69.03 | 141.9 |
| 4. | Alkalinity (mg L^{-1}) | 120 | 115 | 60 | 130 | 105 |
| 5. | Acidity (mg L^{-1}) | 32.5 | 47.5 | 110 | 35 | 2.5 |
| 6. | Free CO_2 (mg L^{-1}) | 73 | 35.2 | 213 | 65 | 44 |
| 7. | Hardness (mg L^{-1}) | 44 | 44 | 26 | 26 | 44 |
| 8. | Nitrate (mg L^{-1}) | 1.2 | 1.7 | 1.9 | 2.1 | 1.7 |
| 9. | Phosphate (mg L^{-1}) | 0.92 | 0.31 | 0.57 | 0.22 | 0.89 |
| 10. | Salinity (ppt) | 0.736 | 0.277 | 0.585 | 0.413 | 0.693 |
| 11. | Total Coliforms (MPN/100ml) | 17 | 9 | 18 | 7 | 17 |

C1: Well Maintained pond; C2: Rain Water harvesting tank; C3: Well Water of Canteen; C4: Well water Near RUSSA Building; C5: Tap Water

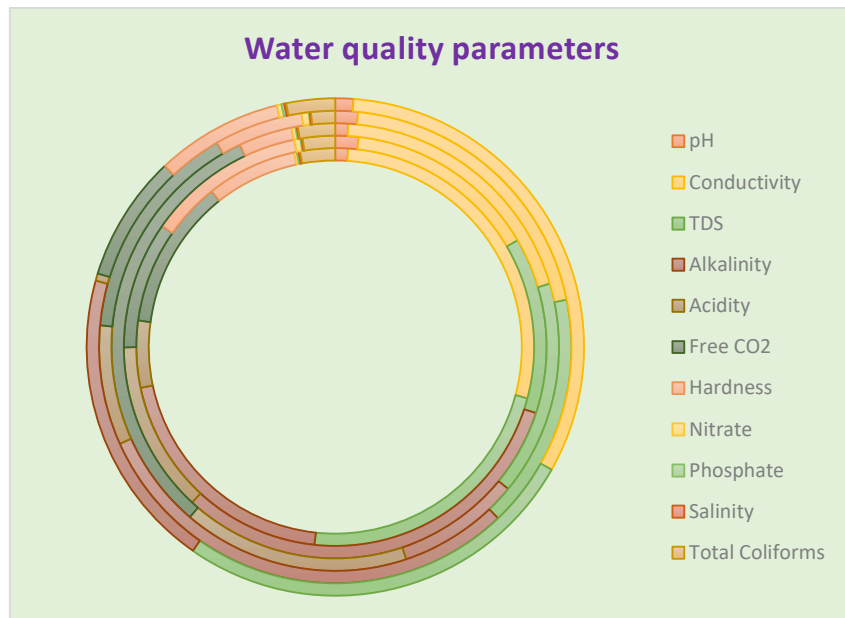


Figure 01: Graph showing total results of water quality

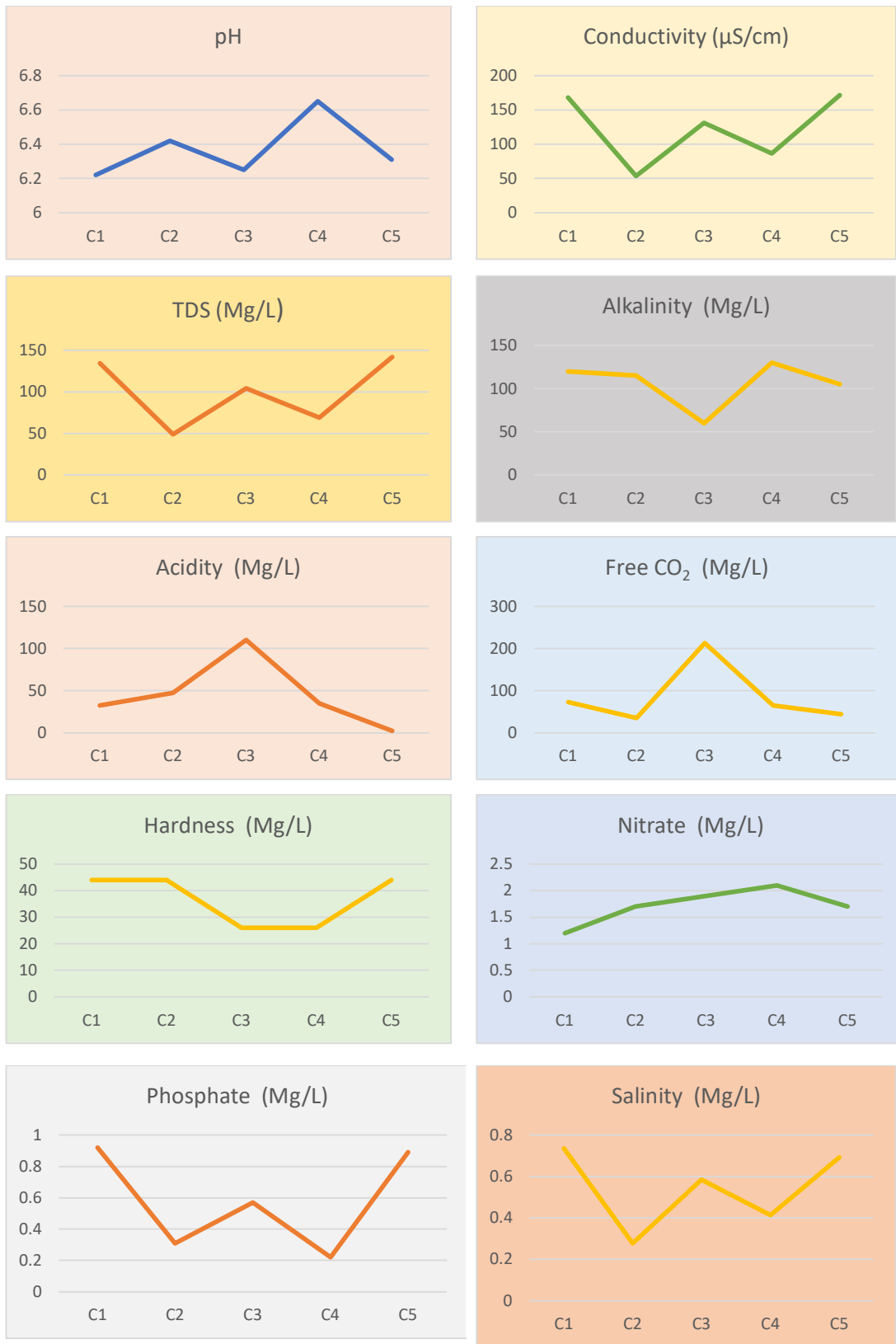


Figure 02: Graph showing water quality parameters

As far as the wastewater is concerned, currently there is no facility to make the water recycle or reuse. Wastewater generation from bathrooms was disposed through septic tanks. However, wastewater generated from the hand wash, canteen and laboratories are discharged directly into nearby land without any proper treatment or disinfection. Also there is no proper treatment facility to treat or reuse such water.

10. OBSERVATIONS

- Water consumption in the college is mainly for hand wash, toilets, canteen and laboratories.
- About 2000 liters of water was consumed per day and the annual average may come around 380 KL.
- Approximately 70 — 80 per cent of the consumed water is discharged as wastewater, i.e., 1400 — 1600 liters per day.
- Drinking water source of the college is a well-maintained pond and an open well. Also maintains a 1.5 lakh liter rainwater harvesting tank within the college campus.
- Water quality analyses revealed that both the water can be used for drinking purposes, but only after disinfection or heating.
- Septic tanks are used to dispose the wastewater generated from toilets and there is no proper treatment and management of wastewater generated from other sources.
- Water coolers are sufficient to supply water necessity of all students in the campus.

11. RECOMMENDATIONS

- Initiatives should be taken to recycle or reuse the wastewater generated from hand wash regions, canteen and from laboratories especially the wastewater generated by running distillation and Soxhlet apparatus.
- Steps should be taken to collect and treat wastewater generated from hand wash and laboratories. Treated water can be used for gardening purposes especially during summer.
- Steps should be taken to provide drinking water to the students and staff after treatment and disinfections monitor the indiscriminate use of water during peak hours especially in the hand wash region.
- Monitor and maintain the pipes and taps especially in the laboratories and toilets to avoid or reduce the wastage of water.

- Educate the students and staff about the significance of water and wastewater management and conservation.

12. MAIN INITIATIVES OF 2021-2022

- In world water day, NSS released a special video in that occasion for the conservation of water at audio visual hall and to give awareness to all students.
- An awareness programme conducted for rain water harvesting and water conservation at the main auditorium.
- PG and Research Department of Environmental sciences conducted poster presentation and signature collection in order to provide awareness about the need of water conservation.

13. SUGGESTIONS

- Proper and periodic monitoring of pipes and connection to ensure preventing the leakage.
- Replace the present taps by sensor-based system.
- Apply overflow alarm/float valve system to prevent overflow of the storage tanks
- Conduct more awareness programme for students about water conservation
- Re-strengthening the existing water management practices

14. CONCLUSION

- The water audit is an effective tool for evaluating the campus's available water sources and usage patterns.
- Also, it provides scientific methods to improve water conservation by controlling water loss and indiscriminate consumption.
- By conducting the audit it was observed that there was no water leakage through the taps.
- Water quality parameters are within the desirable limit as specified by BIS.
- It might be due to the periodic inspection and timely maintenance.
- Periodic assessment of microbial count in well water were also carried out.

Appendix 1: Water Quality Report

**PG DEPARTMENT OF ENVIRONMENTAL SCIENCES
WATER QUALITY TESTING LABORATORY**

(Approved by Kerala State Pollution Control Board)

St. JOHN'S COLLEGE

Anchal, Kerala – 691306

Reg. No. PCB/CL/RL/24/2019

Ph. 0475 273326

St. John's College Anchal, Kollam

TEST REPORT OF WATER SAMPLE

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Water Analyst




Head of the Department