Water Audit Study for East Tambaram

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Abstract

Water auditing is a systematic approach to overcome the drought related issues, water losses, leakage etc. It plays the significant role in conservation measures to minimize the water loss which increase the efficiency of Urban Local Bodies and reduce the need to search for additional water sources. The main aim of the water audit study is to compute the amount of water that is being supplied by a water system, that is not being distributed or billed to customers. However, for the effective use of this system is to identify losses in the sums, the ULBs must first employ water auditing as a routine business practice. The various associations, such as IWA and AWWA which initiated a large-scale effort to assess the reduction of water related problems with the help of audit. Hence, a detail study on water audit is explored on the areas were water is being used in a system, identifying the sources of lost water, and an action plan is also developed to control or reduce water losses.

Keywords: ULB, IWA, AWWA, Water Audit.

Introduction

Water is virtually everything we do or use each day. India will soon be a water-stressed country and we all need to work towards our water security as the year passes. A simple action can be adopted to reduce the wastage of water and use it wisely. The study related to water shortage problem which is been existing for a long time. So, to resolve the problems a Water Auditing was done at one part of Tambaram Zone (East Tambaram). Therefore, the term water auditing is a qualitative and quantitative analysis of water consumption to identify the means of Reducing, Reusing, and Recycling the water. Some of the benefits of water auditing are to efficiently reduce water losses in the system which results in delay or avoid capital investments such as a new well, more treatment technology or additional water rights. Thus, the Urban Local Bodies takes an initiative in creating awareness among water users to understand the importance of water and take up the necessary steps to manage wastewater and save for the future. Therefore, the water audit is an effective educational and public relations tool for the water system.

Objectives of water audit

- To study and analyze the losses of water as per the IWA (International Water Association) concept by means of the population and water supply data.
- To suggest the measures to reduce the water losses for the East Tambaram.

Literatures

Amol.A.Kulkarni.et.al (2000) has determined the water balance chart as a tool for calculating the water audit, which serves as a framework for assessing a water loss situation. Water balance helps to find the recoverable losses, value the losses and to prepare the cost benefit analysis. Ganorkar (2002), has discussed about the study on water audit.
which covers the emphasis the importance of total water resources and their distribution. Jeff Sturman (2004) adopted the water auditing method for quantifying the water flows in easy or complicated systems, with a view to reduce water usage, as in many places people have difficulty to access the drinking water. Kedar.C & Astashil Bhahulkar (2012) described that water auditing is a tool to overcome physical losses due to pipe leakage and overflow, which helps to identify the efficient use to reduce the capital and operating cost. Mansi (2017) focused on analysis of total water usage for the study which is found more than the capital limit. Hence, it is necessary to optimize the excess water usage. Some of the suggestions has been discussed to minimize the excess usage and water losses, and inferred that, the water meters is an essential step for optimizing the water losses and therefore it is installed to decrease the water usage limit up to 8%.

Methodology of water audit adopted

The methodology for water audit is framed in such way to classify and measure all the water uses in the system, which is called as a balance. Therefore, all uses of water in the system are equal such that the amount of water input by the sources are accounted in the standard water balance by eliminating the required, and not required quantity for the calculation of the term unaccounted for water. The most common way to view the standard water balance which is represented in terms of an separate equations or in the form of worksheet, which was developed by American Water Works Association (AWWA) and International Water Association (IWA) in 2000, were the study is carried out by the graphical standard water balance starting with the System Input category. Therefore, it is important to understand the height of the System Input category represents all the data of water pumped by the system in each time. The amount of water can be divided into two additional categories (i.e) Authorized Use and Water Losses. Therefore, Authorized Use + Water Losses = System Input. As per the concept adopted by IWA, water balance table which holds the true water measurements, shown in the Figure.1.

![Water Balance Table (Source - IWA)](image)

It is noticed from the Water Balance Table, shown in Figure.1 that some volumes are simply sums of other volumes. For instance, Authorized Consumption = Billed Authorized Consumption + Unbilled Authorized Consumption. However, Water Losses and Real Losses are deduced, or derived, volumes—in other words, volumes that are calculated through a process of elimination:
Water Losses = Authorized Consumption - Water Supplied.
Real Losses = Apparent Losses - Water Losses.

Since Water Losses and Real Losses are derived volumes, they are not entered by the auditor. Water balance is calculated accurately by determining the volume of Water Losses and Real Losses.

Salient details of study area

Tambaram municipality meets the water supply-demand through surface and subsurface sources. The local body-initiated water supply to the town from Palar River which is situated about 40 km which is augmented to the study area through TamilNadu water supply and drainage board. Water collected at Villiyambakkam head works are diverted to the newly constructed headworks at Melachery. The scheme was completed in 2010 and since then the entire quantity of water to Tambaram is supplied from the newly constructed Melachery Headworks. During the time of water scarcity, the water is supplied through lorries to meet the demands. The groundwater is used only during emergency as the groundwater recharge takes more times. Hence, The Figure.2 represents the distribution of water for the residents through various modes.

Figure 2. Distribution network of Water Supply to study area

### Table 1. Details of study area

| S.No | Name/ Location of Service Reservoir | Storage Capacity (LL) | Ward Covered |
|------|-----------------------------------|-----------------------|--------------|
| 1    | Muthurangam Park                   | 3.64                  | 5,6,7(P),8(P),9(P),10,29,30(P),33(P),34,35,36,37(P),38(P) |
| 2    | Devanesan Park (GLSR)              | 3.00                  | 33(P),37(P)  |
| 3    | Konekrishna Nagar                  | 3.00                  | 30(P),31,33(P),38(P) |
| 4    | Thiruneermalai road                | 3.00                  | 18(P),9(P),39 |
| 5    | CTO colony                        | 4.00                  | 32(p)        |
| 6    | Krishna Nagar                      | 3.00                  | 32(p)        |
| 7    | Thiru Vi.Ka Nagar                  | 3.00                  | 2,3,4,7(P)  |
| 8    | Tamil park                         | 6.00                  | 28,29(P),34(P) |
| 9    | Gandhi park                        | 3.80                  | 11,12,14,15,16(P),17(P),23(P),24(P),25,26(P) |
| 10   | Subbarayyan park                   | 12.00                 | 13,16(P),17(P),18(P),19(P),22(P),23(P) |
| 11   | Srinivasanagare                    | 5.00                  | 19,20(P),21  |
| 12   | Barathi Nagar                      | 3.00                  | 18(P),19(P),20(P),22(P) |
| 13   | Ganesh Nagar                       | 3.00                  | 18(P),19(P)  |
| 14   | Irumbuliyyur                       | 2.00                  | 24(P),26(P),27 |

Table.1 represents the areas covered for the study are been highlighted.

**Field Test Analysis**

Tambaram east consists of 6 water supply zones in that we randomly selected one water supply zone for conducting the field test, where few houses were selected. The time taken for the pipeline to fill the 5 litre water can at the time of water supply in the selected zone was noted. We selected 1 water supply zone at Irumbuliyyur OHT for the field test, which has a tank capacity 0.2MLD, Water supplied on the day of d-system 0.2 MLD , and the house service connection at that particular zone are 188, for which the total consumption is about 1.55 LL. Samewise, the time taken to fill the 5 litres of can, during the water supply of 1 hour 30 min, is nearly about 18.48 sec. From, the above process we can also calculate the consumption of water,
losses, and supply. Finally, the outcome of water audit in the water balance table were calculated.

Suggestive measures for the existing water supply system

- Overflows in Sumps should be avoided by proper scheduling of pump set operations.
- Visible leakages in Water Treatment Plant should be arrested immediately.
- Visible leakages in Transmission mains, Feeder mains, Distribution system and Valves should be arrested immediately.
- Repair in ELSRs should be done immediately for arresting minor leaks.
- Leaks in service line must be attended immediately.
- Public awareness should be created to close the tap in HSC as soon as the required water is collected to avoid wastage.
- Maintenance personnel may be educated to write the logbook of pump sets in the standard format to monitor the quantity of water pumped at each location, water received and delivered in each ELSR.
- Proper reporting of pumping return should be established to monitor the water supply at least on daily basis.

Finally, the bulk flow meters, and pressure gauges should be installed at all pump Stations, Sumps, ELSRs and critical points in the distribution network to measure flow and pressure in the lines

Conclusion

From the water audit study, it is concluded that the utilization of water should be used based on the requirement and the need without any losses and wastage. During the earlier period, the consumers has dealt with user-oriented water conservation practices and devices. The devices used was quite effective in reducing consumption and also often results in various additional benefits such as water utility which includes increase in revenue to the utility by introducing lumps within uses of various sectors, giving reduction rate on reduced consumption & giving grants for reuse of waste water use and rainwater harvesting.

Notations

ULBs – Urban Local Bodies
IWA - International Water Association
AWWA – American Water Work Association
LL – Lakh Litres
sec – Seconds
OHT – Overhead Tank
MLD - Million Litre per Day
HSC – House Service Connection
ELSR – Elevated Service Reservoir

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